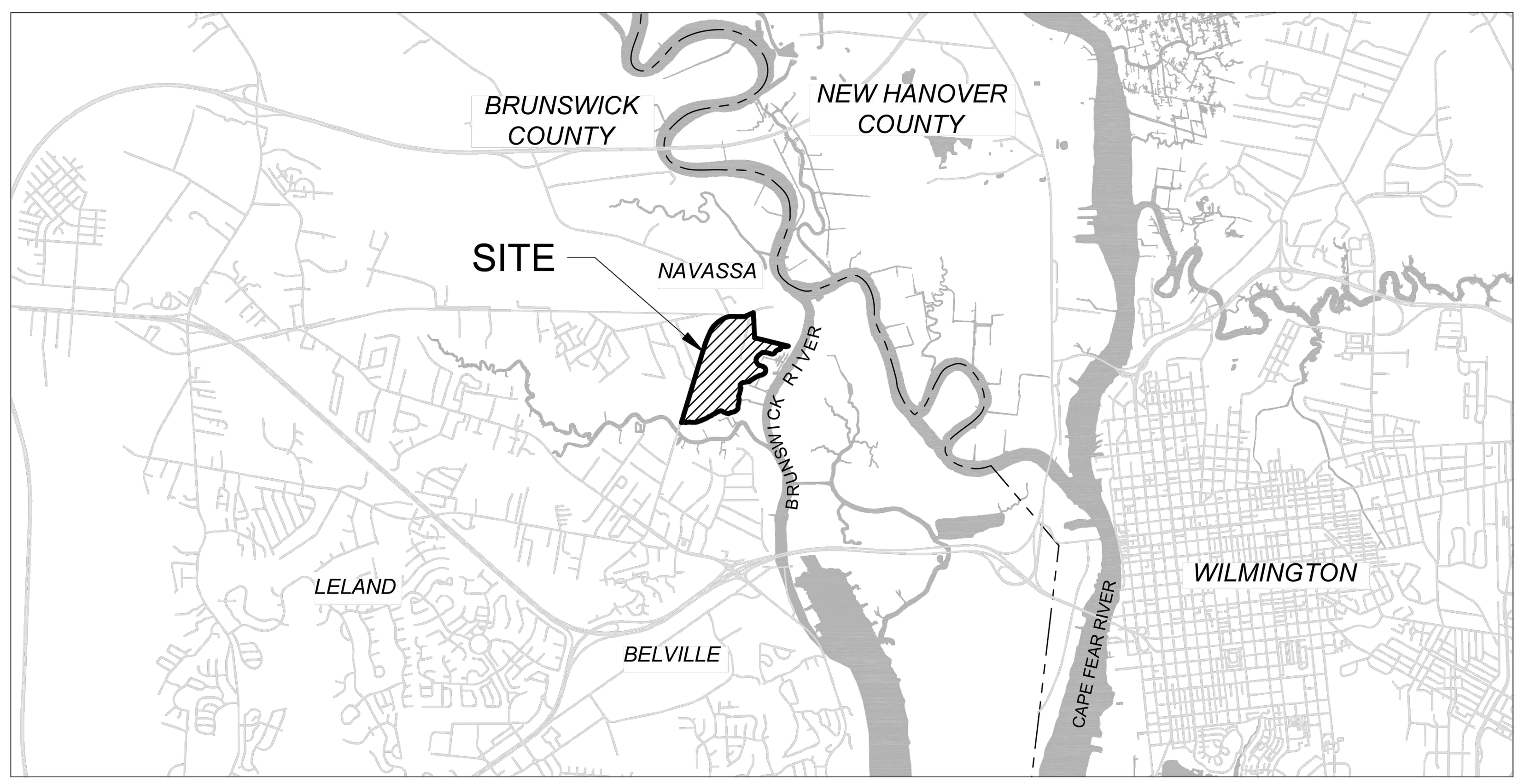
OPERABLE UNIT 2 REMEDIAL ACTION
EROSION AND SEDIMENT POLLUTION CONTROL PLAN
KERR-McGEE CHEMICAL CORP.
SUPERFUND SITE
NAVASSA, NORTH CAROLINA



VICINITY MAP

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NORTH CAROLINA STATE MAP

N.T.S.

PREPARED FOR

SR&R ENVIRONMENTAL 30th Anniversary 1991 - 2021

SR&R ENVIRONMENTAL, INC.

PO BOX 221
WILMINGTON, NC 28402

PREPARED BY

SKELLY AND LOY
A Terracon Company

449 EISENHOWER BOULEVARD
SUITE 300
HARRISBURG, PENNSYLVANIA 17111-2302

GENERAL DRAWINGS	
G-101	COVER
G-102	NOTES
EROSION & SEDIMENT POLLUTION CONTROL DRAWINGS	
ES-101 THRU ES-102	EROSION & SEDIMENT POLLUTION CONTROL PLANS
ES-501 THRU ES-502	EROSION & SEDIMENT POLLUTION CONTROL DETAILS

SITE INSPECTION	
INSPECTOR	JAMES SHANNON
CREDENTIALS	NC STORMWATER CERTIFIED PROFESSIONAL

PROJECT OWNER:

GREENFIELD ENVIRONMENTAL MULTISTATE TRUST LLC
TRUSTEE OF THE MULTISTATE ENVIRONMENTAL RESPONSE TRUST

PROJECT ENGINEER:

JANE SUND, P.E.
INTEGRAL ENGINEERING, P.C.
31 WEST 34th STREET, SUITE 7196
NEW YORK, NY 10001

PROJECT LOCATION:

THE SITE IS LOCATED AT 34°14'50.0" NORTH LATITUDE AND 77°59'56.5" WEST LONGITUDE IN NAVASSA, BRUNSWICK COUNTY, NORTH CAROLINA

- DRAWING NO. G-101
- GREENFIELD ENVIRONMENTAL MULTISTATE TRUST LLC
- OPERABLE UNIT 2 REMEDIAL PLAN
- NAVASSA BRUNSWICK NORTH CAROLINA
- COVER
- DSGN CFB
- DFTSMN JRG
- CHKR CFB
- APPV BAS
- SCALE AS SHOWN
- Plotted on: 2023-11-30
- REV | DESCRIPTION | BY | APPV | DATE
- e:\projects\2023\jn237419\cad\es plans - standard\es plans.dwg
- NORTH CAROLINA PROFESSIONAL ENGINEER SEAL CALVIN F. BUSH 2023-12-01
- SKELLY AND LOY A Terracon Company
- 449 EISENHOWER BOULEVARD, SUITE 300 HARRISBURG, PA 17111
- TEL: (717) 232-0593 - FAX: (717) 232-1799 - WWW.skellyloy.com
- PROJECT NUMBER: JN237419
- TASK: 2
- SUBTASK:
- DATE: NOVEMBER 2023

PROJECT DESCRIPTION

THIS PROJECT ADDRESSES OPERABLE UNIT 2 (OU2) OF THE KERR-MCGEE CHEMICAL CORP.—NAVASSA SUPERFUND SITE (SITE). THE OU2 REMEDIAL ACTION INCLUDES REMOVAL OF SURFACE SOILS WITH CONSTITUENTS OF CONCERN (COCS) AT CONCENTRATIONS THAT REPRESENT AN UNACCEPTABLE RISK TO POTENTIAL FUTURE RESIDENTS AND/OR CONCENTRATIONS OF HIGH MOLECULAR WEIGHT (HMW) POLYCYCLIC AROMATIC HYDROCARBON (PAH) THAT REPRESENT AN UNACCEPTABLE RISK TO ECOLOGICAL RECEPTORS.

THE OU2 REMEDIAL ACTION IS BEING CONDUCTED BY THE GREENFIELD ENVIRONMENTAL MULTISTATE TRUST LLC, TRUSTEE OF THE MULTISTATE ENVIRONMENTAL RESPONSE TRUST (MULTISTATE TRUST), AS PART OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA) REMEDIATION OF THE SITE, UNDER U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) AND NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY (NCDEQ) OVERSIGHT.

SITE DESCRIPTION

MOST OF THE SITE CONSISTS OF THE PROPERTY FORMERLY OWNED AND OPERATED BY KERR-MCGEE. THE SITE INCLUDES A FORMER WOOD TREATING FACILITY (ABOUT 70 ACRES) AND AN APPROXIMATE 30-ACRE AREA OF TIDALLY INFLUENCED MARSH (TERMED THE "SOUTHERN MARSH") SITUATED TO THE SOUTH. THE FORMER WOOD TREATING FACILITY IS PART OF A LARGER PROPERTY OWNED BY THE MULTISTATE TRUST. THE SOUTHERN MARSH IS OWNED BY THE STATE OF NORTH CAROLINA. THE FORMER WOOD TREATING FACILITY IS BOUNDED TO THE NORTH BY QUALITY DRIVE AND PACON MANUFACTURING; TO THE WEST BY NAVASSA ROAD; TO THE EAST BY THE EASTERN UPLAND AREA, EASTERN MARSH, AND THE BRUNSWICK RIVER; AND TO THE SOUTH BY THE SOUTHERN MARSH AND STURGEON CREEK. NEITHER THE EASTERN UPLAND AREA NOR THE EASTERN MARSH ARE PART OF THE SITE. THE FACILITY WAS IN USE FOR ACTIVE OPERATIONS—TREATING WOOD FOR UTILITY POLES, RAILROAD TIES, AND PILINGS—BETWEEN 1936 AND 1974. KERR-MCGEE DISCONTINUED OPERATIONS IN 1974 AND DISMANTLED THE FACILITY IN 1980, SELLING AS SCRAP ALL EQUIPMENT, TREATMENT CYLINDERS, BUILDINGS, AND TANKS, ALTHOUGH SOME BUILDING FOUNDATIONS REMAIN ON THE PROPERTY TODAY. KERR-MCGEE ALSO REFORESTED THE AREA BY PLANTING PINE TREES. IN 1991, 92 ACRES OF THE PROPERTY MARSH LAND WAS TRANSFERRED TO THE STATE OF NORTH CAROLINA.

SOILS

THE SOILS IN THE PROJECT AREA WHERE WORK IS BEING PERFORMED ARE MAPPED AS FORESTON LOAMY FINE SAND, LEON FINE SAND, AND MANDARIN FINE SAND. THE SOILS ARE CONSIDERED MODERATELY WELL DRAINED, POORLY DRAINED, AND SOMEWHAT POORLY DRAINED, RESPECTIVELY. THE SOIL ERODIBILITY FACTOR RANGES FROM 0.02 TO 0.15

PLANNED EROSION AND SEDIMENTATION CONTROL PRACTICES

1. ROCK CONSTRUCTION ENTRANCE - A ROCK CONSTRUCTION ENTRANCE WILL BE INSTALLED NEAR THE NORTH END OF THE PROJECT SITE. A DECONTAMINATION CONTROL WILL BE UTILIZED AS NECESSARY FOR MAINTAINING ALL SOILS ON SITE.
2. DECONTAMINATION FACILITY - A TEMPORARY AND MOVEABLE SYSTEM UTILIZING THE PACTEC PT125012 CONTAINMENT BERM CONSTRUCTED OF 40 MIL POLYETHYLENE CHEMICAL RESISTANT MATERIAL WILL BE PLACED AT THE CONSTRUCTION ENTRANCE, TRANSITION POINT FROM OU2 TO OU4, AND AT EACH WORK ZONE. CONSTRUCTION VEHICLES WILL UTILIZE THE CONTAINMENT AREA FOR DECONTAMINATION OPERATIONS BEFORE LEAVING THE SITE, LEAVING THE SPECIFIC WORK AREAS, AND TRANSITIONING BETWEEN OU2 AND OU4.
3. TEMPORARY DIVERSION CHANNEL - A TEMPORARY DIVERSION CHANNEL WILL BE CONSTRUCTED STARTING AT THE EXISTING SUMP AREA OF THE STORM WATER CULVERT, THAT CONVEYS FLOWS INTO THE FORMER FIRE PROTECTION POND AND DOWN SLOPE TO THE EXISTING SURFACE, AND DISCHARGES TO EXISTING UNDISTURBED SURFACE; RIP-RAP PROTECTION MAY BE USED IF NEEDED AT THE OUTLET END OF THE CHANNEL, HOWEVER THE SOIL TYPES INDICATE RESISTANCE TO THE CALCULATED VELOCITIES AND ADDITIONAL PROTECTION MAY NOT BE NEEDED. THE EXISTING STORM WATER CULVERT SHOULD BE TEMPORARILY SEALED OR PLUGGED UNTIL COMPLETION OF THE PROJECT WORK. IN LIEU OF A CHANNEL, THE USE OF A PUMP AND PIPING MAY BE USED TO WITH APPROPRIATE ROCK PROTECTION AT THE DISCHARGE END OF THE PIPING.
4. COMPOST FILTER SOCK - COMPOST FILTER SOCK WILL BE INSTALLED AT THE DOWN SLOPE SIDES OF THE PROJECT WORK AREAS TO CAPTURE SEDIMENT IN RUN-OFF. THE COMPOST FILTER SOCK CAN BE EXTENDED TO THE FULL PERIMETER OF THE WORK AREA IF LOCAL DRAINAGE PATTERNS DICTATE THE NEED TO PREVENT SEDIMENT DISCHARGE. ADDITIONALLY, COMPOST FILTER SOCKS [OR WATTLES] WILL BE INSTALLED AT THE ACCESS ROAD FRINGES WHERE THE STORMWATER DRAINS THROUGH EXISTING CULVERT CROSSINGS IN THE NORTHERN SECTION OF OU2 NEAR THE CONSTRUCTION ENTRANCE.
5. ROCK FILTER OUTLETS - IN THE CASE OF FAILURE OF THE COMPOST FILTER SOCK OR SILT FENCE, A ROCK FILTER OUTLET WILL BE INSTALLED ALONG THE LENGTH OF THE FAILURE FOR THESE SYSTEMS.
6. ROCK FILTER - THE ROCK FILTER SHALL BE INSTALLED AT THE OUTFLOW CHANNEL OF THE FORMER FIRE PROTECTION POND.
7. COMPOST FILTER SOCK SEDIMENT TRAP - THE COMPOST FILTER SOCK SEDIMENT TRAP WILL BE INSTALLED IMMEDIATELY BEFORE THE FORMER FIRE PROTECTION POND OUTFLOW CHANNEL OPENING.
8. TEMPORARY STOCKPILE - TEMPORARY STOCKPILE OF CLEAN AND NON-CONTAMINATED MATERIAL CAN BE STORED WITHIN WORK AREAS, WHERE CROSS CONTAMINATION IS NOT POSSIBLE, AS PRESCRIBED BY THE DETAIL WHICH LIMITS THE SIZE, SLOPES, AND DICTATES THE USE OF SILT FENCE AS A PERIMETER CONTROL OF SEDIMENT LADEN RUNOFF.
9. SILT FENCE - THE SILT FENCE SHALL BE INSTALLED AS INDICATED FOR USE WITH THE TEMPORARY STOCKPILE, AS NEEDED.
10. TEMPORARY PROTECTIVE FENCE - TEMPORARY PROTECTIVE FENCE CAN BE UTILIZED AS NEEDED TO PROVIDE A VISUAL BARRIER AND CONTROL ACCESS TO AND THROUGH WORK AREAS OR TO DEMARCATE AREAS WHERE DISTURBANCE IS NOT AUTHORIZED.
11. SEEDING AND MULCHING - SEEDING AND MULCHING SHALL MEET THE REQUIREMENTS PROVIDED IN THE NCDOT STANDARD SPECIFICATIONS SECTION 1660 SEEDING AND MULCHING AND SECTION 1060 LANDSCAPE DEVELOPMENT MATERIALS. WOOD THAT IS CHIPPED ONSITE WILL BE STOCKPILED AND USED IN THE RESTORATION DESIGN FOR MULCH, OR AT OTHER LOCATIONS ON THE FACILITY AS DIRECTED BY THE OWNER'S REPRESENTATIVE.

GENERAL CONSTRUCTION SEQUENCE

1. OBTAIN PLAN APPROVAL AND OTHER APPLICABLE PERMITS.
2. DEMARCATE SENSITIVE AREAS AND NON-WORK AREAS WHERE CONSTRUCTION ACCESS SHOULD BE LIMITED OR DENIED ENTRY, AS NEEDED, WITH TEMPORARY PROTECTIVE FENCE..
3. INSTALL ROCK CONSTRUCTION ENTRANCE.
4. INSTALL COMPOST FILTER SOCKS AS SHOWN ON THE PLANS PRIOR TO ANY EARTH DISTURBANCE.
5. CONSTRUCT THE TEMPORARY DIVERSION CHANNEL [OR PIPING] AT THE LOCATION SHOWN ON THE PLANS AT THE FORMER FIRE PROTECTION POND AND PLUG THE STORM WATER CONVEYANCE CULVERT AT THE UPSTREAM END WHERE THE TEMPORARY DIVERSION CHANNEL IS BEING CONSTRUCTED. THE DISCHARGE LOCATION MAY BE FIELD ADJUSTED WHILE MAINTAINING DESIGN SLOPES AND DIMENSIONS.
6. INSTALL ROCK FILTER AND COMPOST SOCK SEDIMENT TRAP AT THE FORMER FIRE PROTECTION POND AS SHOWN ON THE PLANS.
7. SET-UP DECONTAMINATION FACILITIES AS REQUIRED FOR THE SEQUENCE OF THE WORK PLAN BEING PERFORMED.
8. AS REQUIRED, PROVIDE TEMPORARY STABILIZATION THROUGH SEEDING AND MULCHING AS PROVIDED HEREIN OR AS SPECIFIED IN SEPARATE WORK PLAN CONTRACT DOCUMENTS PROVIDED BY THE CLIENT AND AS APPROVED BY THE OWNER'S REPRESENTATIVE.
9. COMPLETE FINAL GRADING IN ACCORDANCE WITH WORK PLAN. INSTALL PERMANENT VEGETATION, LANDSCAPE, AND MULCH AS PRESCRIBED IN THE CONTRACT DOCUMENTS.
10. ALL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE INSPECTED WEEKLY AND AFTER RAINFALL EVENTS. NEEDED REPAIRS WILL BE MADE IMMEDIATELY.
11. AFTER SITE IS STABILIZED, STABILIZED SHOULD BE CONSIDERED 70% COVERAGE OF TEMPORARY VEGETATION OR EROSION CONTROL MATTING INSTALLED PER OWNER'S REPRESENTATIVES REVIEW AND APPROVAL, REMOVE ALL TEMPORARY MEASURES AND INSTALL PERMANENT VEGETATION ON THE DISTURBED AREAS.

MAINTENANCE PLAN

1. ALL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CHECKED FOR STABILITY AND OPERATION FOLLOWING EVERY RUNOFF-PRODUCING RAINFALL BUT IN NO CASE LESS THAN ONCE EVERY WEEK. ANY NEEDED REPAIRS WILL BE MADE IMMEDIATELY TO MAINTAIN ALL PRACTICES AS DESIGNED.
2. THE COMPOST FILTER SOCK SEDIMENT TRAP WILL BE CLEANED OUT WHEN THE LEVEL OF SEDIMENT REACHES 1/3 THE HEIGHT OF THE SOCKS.
3. SEDIMENT WILL BE REMOVED FROM BEHIND THE SEDIMENT FENCE WHEN IT BECOMES ABOUT 0.5 FEET DEEP AT THE FENCE. THE SEDIMENT FENCE WILL BE REPAIRED AS NECESSARY TO MAINTAIN A BARRIER. ROCK FILTER OUTLETS WILL BE USED FOR FAILURES OF SEDIMENT FENCE.
4. COMPOST FILTER SOCKS THAT ARE DAMAGED WILL BE REPAIRED ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION. BIODEGRADABLE COMPOST FILTER SOCKS SHALL BE REPLACED AFTER 6 MONTHS. PHOTO-DEGRADABLE SOCKS SHALL BE REPLACED AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS.
5. ALL SEEDED AREAS SHALL BE FERTILIZED, RE-SEEDED AS NECESSARY, AND MULCHED ACCORDING TO THE SPECIFICATIONS HEREIN OR THE WORK PLAN TO MAINTAIN A VIGOROUS, DENSE VEGETATIVE COVER.

CONSTRUCTION SCHEDULE

TASK	DATE [APPROXIMATE]
INSTALL CONSTRUCTION ENTRANCE AND E&SC BMP	MID-JANUARY
PERFORM CLEARING	LATE JANUARY 2024
UPGRADE HAUL ROADS	EARLY FEBRUARY 2024
EXCAVATE IMPACTED AREAS AND HAUL TO FORMER FIRE PROTECTION POND (FFP)	MID- TO LATE FEBRUARY 2024
CONSTRUCT STOCKPILE AT FFP AND FOR TB-16 SOILS	LATE FEBRUARY 2024 TO EARLY MARCH 2024
BACKFILL IMPACTED AREAS	MID- TO LATE FEBRUARY 2024
INSTALL LINER AT FFP STOCKPILE AND TB-16 STOCKPILE	EARLY TO MID-MARCH 2024
REMOVAL AND DISPOSAL OF TIES, ACM, AND CONCRETE	LATE MARCH 2024 TO EARLY APRIL 2024
PROVIDE BACKFILL FRO ANY DEBRIS REMOVAL AREAS	LATE MARCH 2024 TO EARLY APRIL 2024
PERFORM SITE RESTORATION	EARLY TO MID APRIL 2024

SITE DATA

TOTAL SITE AREA: 153.7 ACRES
TOTAL DISTURBED AREA: 10.12 ACRES [0.869 ACRES OF OU2 REMEDIATION AREA]

NEAREST BODY OF WATER: STURGEON CREEK

SUPPORTING CALCULATIONS

ESTIMATING RUNOFF

Rational Method

User Input Data
Calculated Value
Reference Data

Designed By:	CFB	**Date:**	11/10/2023
Checked By:	BAS	**Date:**	11/10/2023
Company:	Skelly and Loy		
Project Name:	Kerr-McGee OU2		
Project No.:	JN237419		

Site Location (City/Town)	NAVASSA
Watershed Basin Id.	Diversion Channel #1

The rational formula is:

$$Q = CIA$$

where:
Q = peak rate of runoff in cubic feet per second (cfs)
C = runoff coefficient, an empirical coefficient representing the relationship between rainfall rate and runoff rate
I = average intensity of rainfall in inches/hour, for a storm duration equal to the time of concentration, T_c
A = drainage area in acres

The general procedure for determining peak discharge using the rational formula is presented below and illustrated in Sample Problem 8.03a.

Step 1. Determine the drainage area in acres.

Total Drainage Area 0.801

Step 2. Determine the runoff coefficient, C, for the type of soil/cover in the drainage area (Table 8.03b).

If the land use and soil cover is homogenous over the drainage area, a C value can be determined directly from Table 8.03b. If there are multiple soil cover conditions, a weighted average must be calculated, or the area may be subdivided.

Subarea A (acres)	0.801	
Subarea A Runoff Coefficient	0.15	Runoff Coefficient
Subarea B (acres)		
Subarea B Runoff Coefficient		
Subarea C (acres)		
Subarea C Runoff Coefficient		
Subarea D (acres)		
Subarea D Runoff Coefficient		
Weighted Runoff Coefficient	**0.15**	

Step 3.

Go to Intensity Worksheet

Step 4.

2-year Rainfall Intensity, i (in/hr)	4.62
10-year Rainfall Intensity, i (in/hr)	7.17

Step 5. Determine peak discharge, Q (cubic feet per second), by multiplying the previously determined factors using the rational formula (Sample Problem 8.03a);

$$Q = CIA$$

Q_2 Flow (cfs)	**0.6**
Q_{10} Flow (cfs)	**0.9**

INSPECTION FREQUENCY	
SITE CONDITION	FREQUENCY
DURING CONSTRUCTION	ONCE PER WEEK
RUNOFF PRODUCING EVENT	AFTER EVENT
TEMPORARY STABILIZATION ACHIEVED	ONCE EVERY TWO WEEKS
PERMANENT STABILIZATION ACHIEVED	ONCE EVERY MONTH UNTIL PROJECT CLOSED OR UNTIL BMPs ARE REMOVED

Step 3. Time of Concentration

Overland flow Tc -- Kinematic Wave Theory

Length of overland flow	230.0	feet
Mannings "n" for surface	0.400	Manning's n
Average watershed slope	0.010	ft./ft.
Constant alpha	0.4	
Constant m	1.67	
Weighted Runoff Coefficient	0.15	

Shallow Conc Flow Tc

Slope	0.009
Length of Conc Flow	0
V (unpaved)	1.5

Channel/Pipe Flow Tc

Slope	0.03
Length of Channel/Pipe Flow	0
R	0.8
n	0.4
V	0.6

Tc Overland (min)	**54.95**
Tc Shallow Conc (min)	**0.0**
Tc Channel/Pipe (min)	**0.0**
Tc Total (min)	**55.0**

1) Enter the rainfall intensity values for the corresponding times of duration in the table below. Rainfall intensity can be found from the following NWS hyperlink: http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

2) Select the rainfall Intensity that corresponds to the trial time of duration that is equal to or less than the calculated time of concentration.

3) Copy the selected rainfall intensity into cell below.

2-year Rainfall Intensity, i (in/hr)	4.62
10-year Rainfall Intensity, i (in/hr)	7.17

Trail Time of Duration tr (min)	Rainfall Intensity (IDF), i (in/hr)	Calculation of Time of Concentration, tc (min)
5	0.804	131.91
10	1.28	109.51
15	1.63	99.41
30	2.36	85.73
60 (1 hour)	3.07	77.16
120 (2 hours)	3.85	70.48
180 (3 hours)	4.16	68.33
360 (6 hours)	5.17	62.64
720 (12 hours)	6.13	58.51
1440 (24 hours)	7.17	54.95

Step 3. Determine the time of concentration, T_C, for the drainage area. The Kinematic Wave Theory defines time of concentration as the "travel time of a wave to move from the hydraulically most distant point in the catchment to the outlet (Bedient and Huber, 1992)". The formula for the time of concentration is:

$$T_C = (L/(\alpha * I_e)^{m-1})^{1/m}$$

where:
T_C = time of concentration, in minutes. It consists of the total time for overland sheet flow.
L = length of overland flow plane (feet);
I_e = rainfall excess = $I_i * C/43{,}200$ (43,200 converts inches per hour to feet per second in the overall equation).
I_i = rainfall intensity;
C = rational runoff coefficients;

This equation contains two sets of parameters that need further definition, α and m. For turbulent flow, which is the normal field condition,

$$m = 5/3 = 1.667$$

$$\alpha = \frac{(1.49 * S^{1/2})}{n}$$

where:
S = slope (ft/ft);
n = Manning's roughness.

Since m will always be 5/3, this equation can be simplified to:

$$T_C = \frac{\left[\dfrac{L}{\alpha\,(I_i * C/43{,}200)^{2/3})}\right]^{2/3}}{60 \text{ (minutes)}}$$

Because both time of concentration and rainfall intensity are unknown variables in one equation, the solution must be found through iterations. The use of a spreadsheet is recommended. An example is shown in Table 8.03a.

Channel ID Diversion Channel 1
Design Q: 0.9 cfs — 10 -YR recurrence

b =	2.0 ft	[bottom width]
[Flow Depth] d =	0.29 ft	[flow depth]
z_L =	3.0	[left side slope = zH:1V]
z_R =	3.0	[right side slope = zH:1V]
a =	0.8 sf	[cross-sectional flow area]
P =	3.8 ft	[wetted perimeter]
r =	0.22 ft	[hydraulic radius]
Width @ d =	3.7 ft	[width at flow surface]
Width @ D =	8.0 ft	[width at freeboard surface]
S =	0.00995 ft/ft	
K =	0.15	[soil erodibility factor]
	D	[vegetative lining retardance class]
n =	0.050	[Manning's n from Vegetated Fig 8.05c]
v =	1.1 ft/sec	Permissible Velocity for Soil Type 2.5 fps
Q =	0.9 cfs	
τ =	0.2 lb/sf	
S_c =	0.062 ft/ft	
Flow Conditions ->	stable	[based on critical slope]
F_{calc} =	0.07 ft	[calculated freeboard]
F =	0.50 ft	[utilized freeboard]
D =	1.00 ft	[flow depth + freeboard]

Channel ID Diversion Channel 1
Design Q: 0.9 cfs — 10 -YR recurrence

b =	2.0 ft	[bottom width]
[Flow Depth] d =	0.44 ft	[flow depth]
z_L =	3.0	[left side slope = zH:1V]
z_R =	3.0	[right side slope = zH:1V]
a =	1.5 sf	[cross-sectional flow area]
P =	4.8 ft	[wetted perimeter]
r =	0.31 ft	[hydraulic radius]
Width @ d =	4.6 ft	[width at flow surface]
Width @ D =	8.0 ft	[width at freeboard surface]
S =	0.00995 ft/ft	
K =	0.15	[soil erodibility factor]
	B	[vegetative lining retardance class]
n =	0.110	[Manning's n from Vegetated Fig 8.05c]
v =	0.6 ft/sec	
Q =	0.9 cfs	
τ =	0.3 lb/sf	
S_c =	0.269 ft/ft	
Flow Conditions ->	stable	[based on critical slope]
F_{calc} =	0.11 ft	[calculated freeboard]
F =	0.50 ft	[utilized freeboard]
D =	1.00 ft	[flow depth + freeboard]

DRAWING NO. **G-102**

GREENFIELD ENVIRONMENTAL MULTISTATE TRUST LLC
OPERABLE UNIT 2
REMEDIAL PLAN
NAVASSA BRUSNWICK NORTH CAROLINA
NOTES

DSGN CFB | DFTSMN JRG | CHKR CFB | APPV BAS | SCALE AS SHOWN | Plotted on: 2023-11-30

REV | DESCRIPTION | BY | APPV | DATE

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 054510 CALVIN F. BUSH II

SKELLY AND LOY
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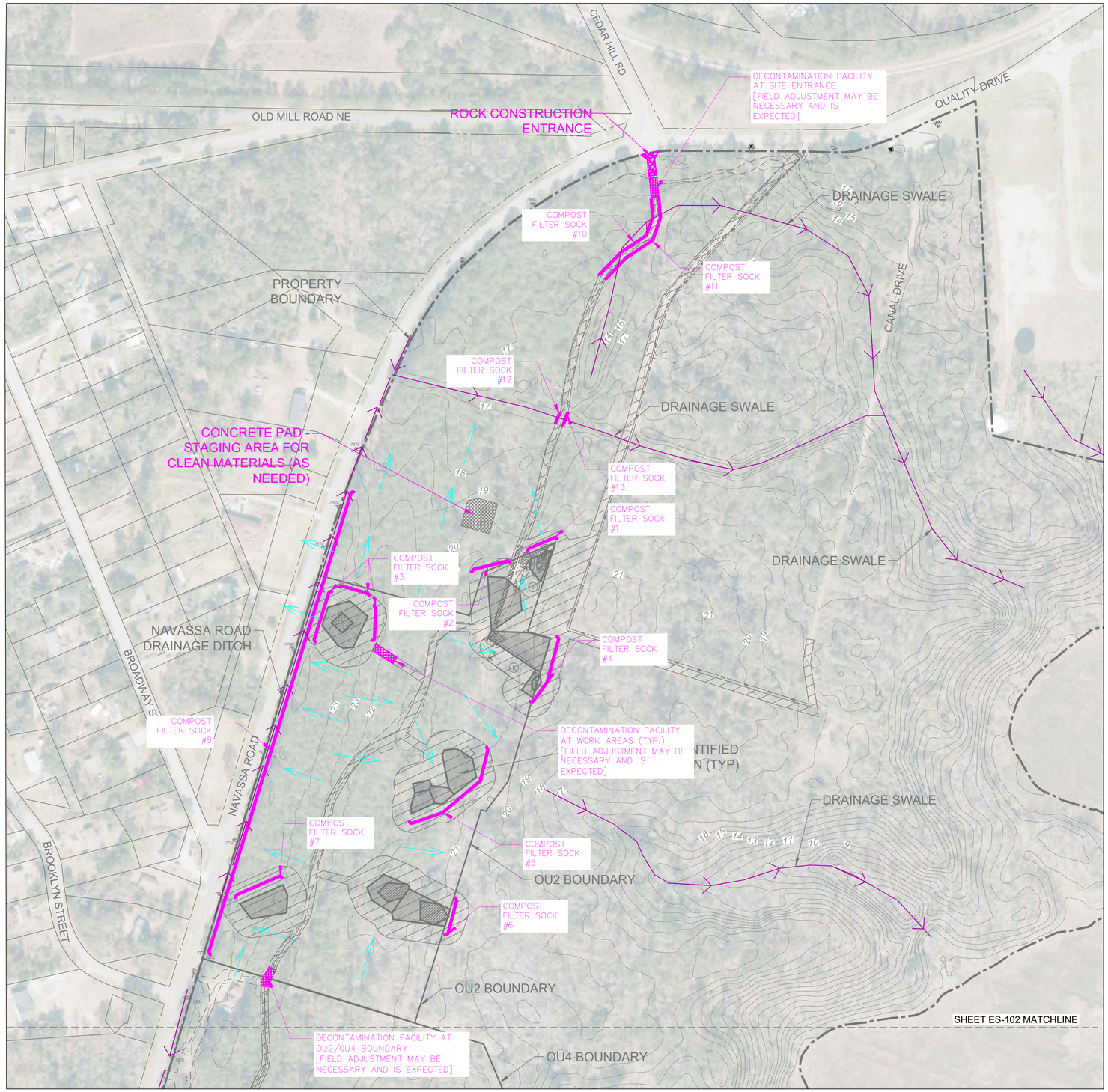
HARRISBURG, PA 17111
TEL: (717) 232-0593 - FAX: (717) 232-1799 - WWW.skellyloy.com

PROJECT NUMBER: JN237419
TASK: 2 SUBTASK:
DATE: NOVEMBER 2023



LEGEND

- PROPERTY BOUNDARY
- OPERATIONAL UNIT BOUNDARY
- OU2 PARCEL IDENTIFIED FOR REMEDIATION
- ESTIMATED AREA FOR LOGGING /CLEARING
- CONCRETE PAD
- RECORDED ATV TRAIL
- OFFSITE HAUL ROUTE OPTIONS
- OVERHEAD POWERLINE
- EXISTING ELEVATION CONTOUR
- COMPOST FILTER SOCK [1]
- COMPOST SOCK SEDIMENT TRAP
- ROCK FILTER
- ROCK CONSTRUCTION ENTRANCE
- DRAINAGE FLOW DIRECTION
- DECONTAMINATION FACILITY

NOTES

1.) COMPOST FILTER SOCKS ARE SHOWN AT THE DOWNSLOPE SIDE TO CAPTURE RUNOFF FLOW FROM WORK AREA. ADDITIONAL COMPOST FILTER SOCK CAN BE USED TO FULLY SURROUND WORK AREA OR ADDED TO ADDRESS MORE LOCALIZED DRAINAGE PATTERNS NOT APPARENT AT THE TOPOGRAPHIC MAPPING LEVEL.

DRAWING NO. ES-101

GREENFIELD ENVIRONMENTAL MULTISTATE TRUST LLC

OPERABLE UNIT 2
REMEDIAL PLAN

NAVASSA — BRUNSWICK — NORTH CAROLINA

EROSION & SEDIMENT POLLUTION CONTROL PLANS

DSGN	CFB	
DFTSMN	JRG	
CHKR	CFB	
APPV	BAS	
SCALE	AS SHOWN	
Plotted on:	2023-11-30	

REV	DESCRIPTION	BY	APPV	DATE

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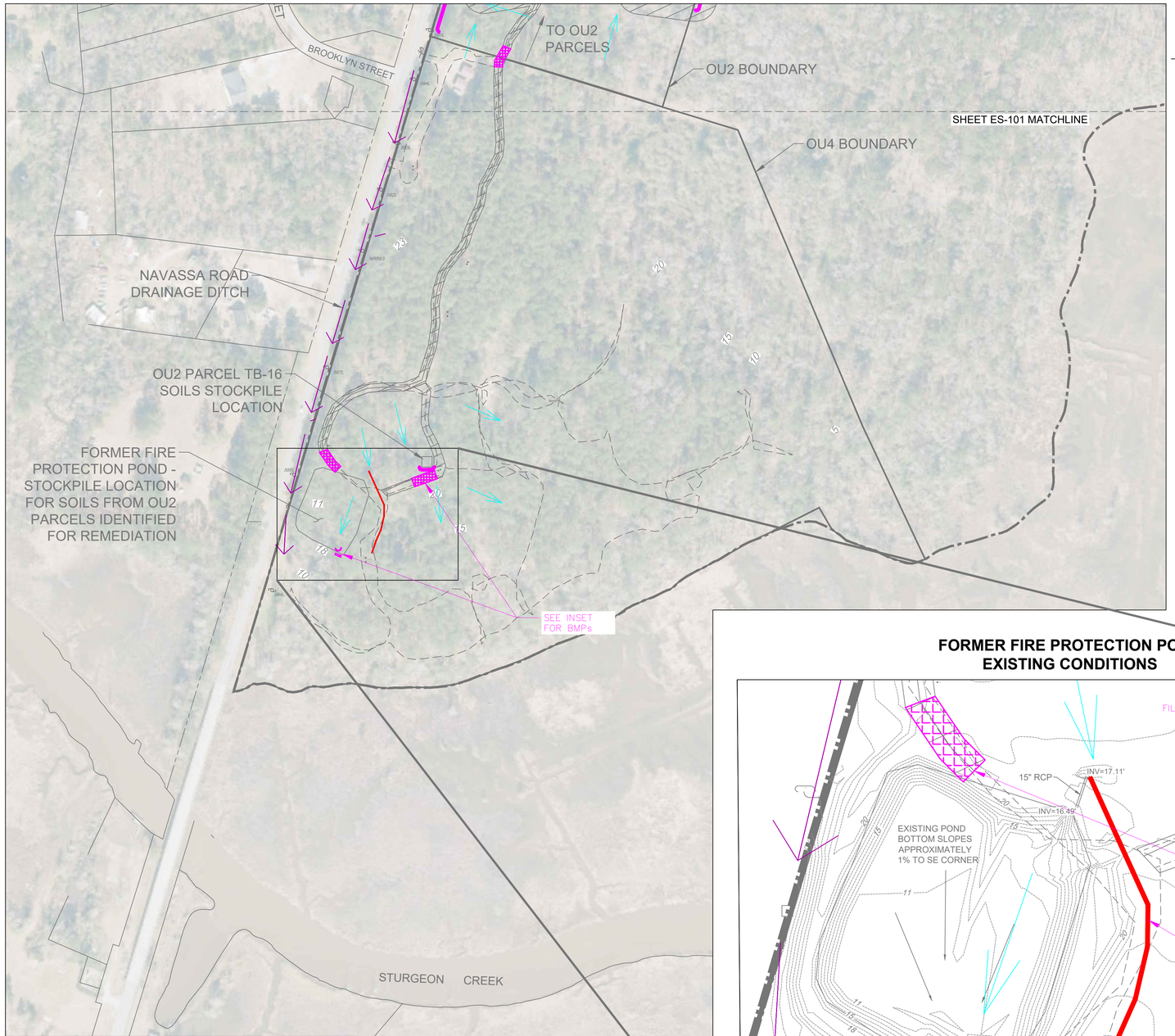
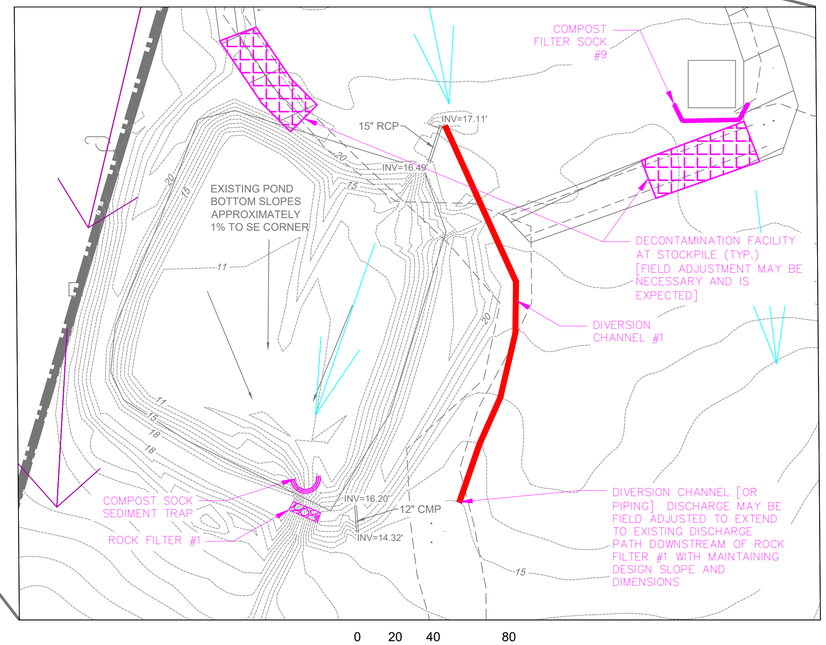


FORMER FIRE PROTECTION POND EXISTING CONDITIONS



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GREENFIELD ENVIRONMENTAL MULTISTATE TRUST LLC

OPERABLE UNIT 2
REMEDIAL PLAN

NAVASSA BRUNSWICK NORTH CAROLINA

EROSION & SEDIMENT POLLUTION CONTROL PLANS

DRAWING NO. **ES-102**

DSGN	CFB	
DFTSMN	JRG	
CHKR	CFB	
APPV	BAS	
SCALE	AS SHOWN	
Plotted on:	2023-11-30	

REV	DESCRIPTION	BY	APPV	DATE
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 054510 CALVIN F. BAS

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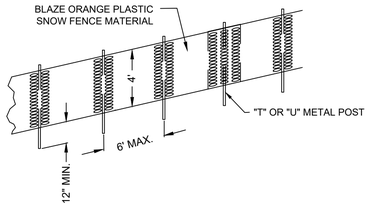
PROJECT NUMBER: JN237419
TASK: 2
SUBTASK:
DATE: NOVEMBER 2023



NOTES:

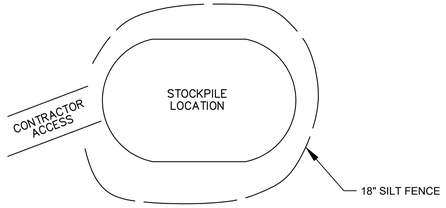
1. INSTALL THE FENCE USING A METAL "T" OR "U" POST DRIVEN INTO THE GROUND TO A DEPTH OF 12 TO 18 INCHES. POSTS SHOULD BE SPACED EVERY 6 FEET. NOTE: NOTCHED POSTS ARE IDEAL TO PREVENT THE FENCE FROM SLIPPING.

2. SECURE THE FENCE TO THE POST USING THREE WIRE TIES, WRAPPED AROUND THE FENCE STRAND AND THE POST. TENSION WIRE OR ROPE MAY BE USED AS A TOP STRINGER AND WOVEN THROUGH THE TOP ROW OF STRANDS TO PREVENT POTENTIAL SAGGING.

3. TWO ROLLS OF SAFETY FENCE MAY BE OVERLAPPED AT THE INTERSECTION OF A POST AND SECURED WITH WIRE TIES.

TEMPORARY PROTECTIVE FENCE

NOT TO SCALE



TEMPORARY STOCKPILE CONSTRUCTION SPECIFICATIONS

1. INSTALL 18" SILT FENCE AROUND PERIMETER OF PROPOSED STOCKPILE LOCATION.

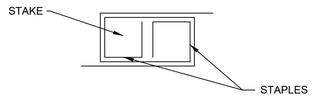
2. STOCKPILED MATERIAL WHICH IS UNDISTURBED FOR MORE THAN 20 DAYS MUST BE SEEDED.

3. STOCKPILE HEIGHTS MUST NOT EXCEED 20'. STOCKPILE SLOPE MUST BE 2:1 OR FLATTER.

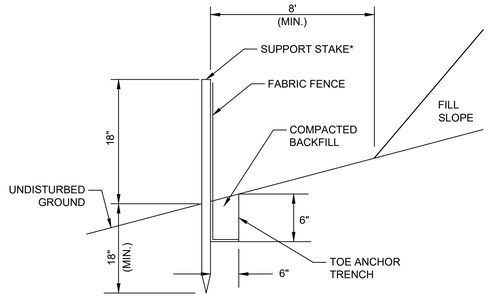
4. INSTALL SILT BARRIER FENCE IN ACCORDANCE WITH SILT BARRIER FENCE DETAILS.

5. CONTRACTOR STOCKPILE LOCATIONS TO BE APPROVED BY ENGINEER BEFORE INSTALLATION.

TEMPORARY STOCKPILE



JOINING FENCE SECTIONS



* STAKES SPACED @ 8' MAXIMUM. USE 2" X 2" (±¾") WOOD OR EQUIVALENT STEEL (U OR T) STAKES.

STANDARD SILT FENCE (18" HIGH)

1. FABRIC SHALL HAVE THE MINIMUM PROPERTIES AS SHOWN IN TABLE 4.3.

TABLE 4.3
FABRIC PROPERTIES FOR SILT FENCE

FABRIC PROPERTY	MINIMUM ACCEPTABLE VALUE	TEST METHOD
GRAB TENSILE STRENGTH (LB)	120	ASTM D1682
ELONGATION AT FAILURE (%)	20% MAX.	ASTM D1682
MULLEN BURST STRENGTH (PSI)	200	ASTM D 3786
TRAPEZOIDAL TEAR STRENGTH (LB)	50	
PUNCTURE STRENGTH (LB)	40	ASTM D 751 (MODIFIED)
SLURRY FLOW RATE (GAL/MIN/SF)	0.3	ASTM 5141
EQUIVALENT OPENING SIZE	30	US STD. SIEVE CW-02215
ULTRAVIOLET RADIATION STABILITY (%)	80	ASTM G-26

2. FABRIC WIDTH SHALL BE 30" MINIMUM. STAKES SHALL BE HARDWOOD OR EQUIVALENT STEEL (U OR T) STAKES.

3. SILT FENCE SHALL BE PLACED AT LEVEL EXISTING GRADE. BOTH ENDS OF THE FENCE SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.

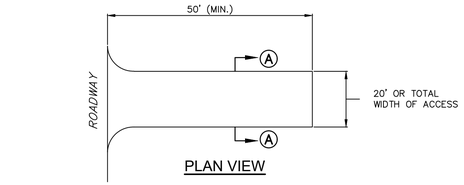
4. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH HALF THE ABOVEGROUND HEIGHT OF THE FENCE.

5. ANY SECTION OF SILT FENCE WHICH HAS BEEN UNDERMINED OR TOPPED SHALL BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET (SEE DETAIL - SHEET ES-501).

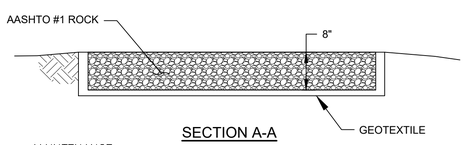
6. FENCE SHALL BE REMOVED AND PROPERLY DISPOSED OF WHEN TRIBUTARY AREA IS PERMANENTLY STABILIZED.

STANDARD SILT FENCE (18" HIGH)

NOT TO SCALE



PLAN VIEW



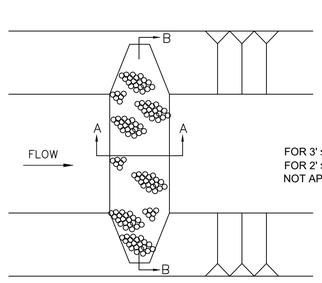
SECTION A-A

MAINTENANCE:

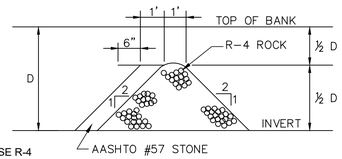
ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. AT THE END OF EACH CONSTRUCTION DAY, ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE.

ROCK CONSTRUCTION ENTRANCE DETAIL

NOT TO SCALE

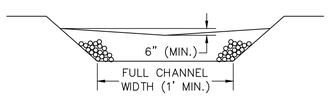


PLAN VIEW



FOR 3' ≤ D, USE R-4
FOR 2' ≤ D, USE R-3
NOT APPLICABLE FOR D < 2'

SECTION A-A



SECTION B-B

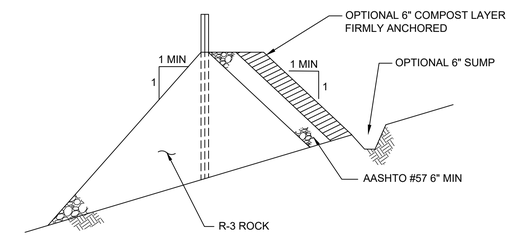
FILTER NO.	LOCATION	D (FT.)	RIPRAP SIZE
1	OUTLET CHANNEL - FORMER FIRE PROTECTION POND	3.0 (MIN.)	R-4

1. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE HEIGHT OF THE FILTER.

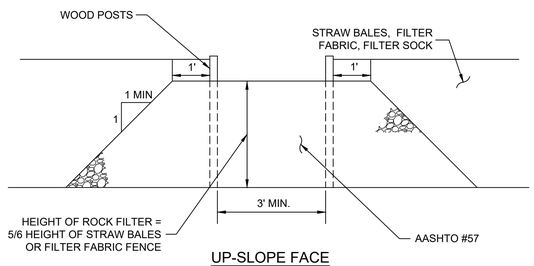
2. IMMEDIATELY UPON STABILIZATION OF EACH CHANNEL, INSTALLER SHALL REMOVE ACCUMULATED SEDIMENT, REMOVE ROCK FILTER, AND STABILIZE DISTURBED AREAS.

ROCK FILTER

NOT TO SCALE



OUTLET CROSS-SECTION



UP-SLOPE FACE

ROCK FILTER OUTLET

1. A ROCK FILTER OUTLET SHALL BE INSTALLED WHERE FAILURE OF A SILT FENCE OR STRAW BALE BARRIER HAS OCCURRED DUE TO CONCENTRATED FLOW. ANCHORED COMPOST LAYER SHALL BE USED ON UPSLOPE FACE IN HQ AND EV (SENSITIVE) WATERSHEDS.

2. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH 1/3 THE HEIGHT OF THE OUTLET.

ROCK FILTER OUTLET

NOT TO SCALE

DRAWING NO. ES-501

GREENFIELD ENVIRONMENTAL MULTISTATE TRUST LLC
OPERABLE UNIT 2
REMEDIAL PLAN
BRUNSWICK NAVASSA NORTH CAROLINA

EROSION & SEDIMENT POLLUTION CONTROL DETAILS

DSGN	DFTSMN	CHKR	APPV	SCALE	DATE
CFB	JRG	CFB	BAS	AS SHOWN	Plotted on: 2023-11-30

REV	DESCRIPTION	BY	APPV	DATE

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 054510 CALVIN F. BIDDY

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PROJECT NUMBER: JN237419
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SUBTASK:
DATE: NOVEMBER 2023

TABLE 4.1
Compost Sock Fabric Minimum Specifications

Material Type	3 mil HDPE	5 mil HDPE	5 mil HDPE	Multi-Filament Polypropylene (MFPP)	Heavy Duty Multi-Filament Polypropylene (HDMFPP)
Material Characteristics	Photo-degradable	Photo-degradable	Bio-degradable	Photo-degradable	Photo-degradable
Sock Diameters	12" 18"	12" 18" 24" 32"	12" 18" 24" 32"	12" 18" 24" 32"	12" 18" 24" 32"
Mesh Opening	3/8"	3/8"	3/8"	3/8"	1/8"
Tensile Strength		26 psi	26 psi	44 psi	202 psi
Ultraviolet Stability % Original Strength (ASTM G-155)	23% at 1000 hr.	23% at 1000 hr.		100% at 1000 hr.	100% at 1000 hr.
Minimum Functional Longevity	6 months	9 months	6 months	1 year	2 years
Two-ply systems					
Inner Containment Netting	**HDPE biaxial net** **Continuously wound** **Fusion-welded junctures** **3/4" X 3/4" Max. aperture size**				
Outer Filtration Mesh	**Composite Polypropylene Fabric (Woven layer and non-woven fleece mechanically fused via needle punch)** **3/16" Max. aperture size**				
Sock fabrics composed of burlap may be used on projects lasting 6 months or less.					

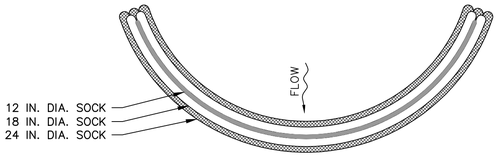
Filtrexx & JMD

TABLE 4.2
Compost Standards

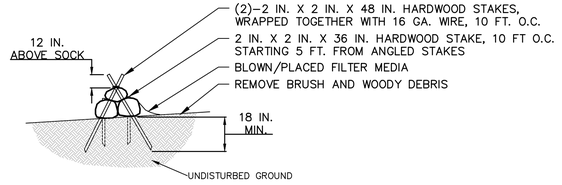
Organic Matter Content	25% - 100% (dry weight basis)
Organic Portion	Fibrous and elongated
pH	5.5 - 8.5
Moisture Content	30% - 60%
Particle Size	30% - 50% pass through 3/8" sieve
Soluble Salt Concentration	5.0 dS/m (mmhos/cm) Maximum

Filtrexx

SOCK FABRIC AND COMPOST STANDARDS
NOT TO SCALE



PLAN VIEW



STAKING DETAIL

NOTES:

SOCK MATERIAL SHALL MEET THE STANDARDS OF TABLE 4.1. COMPOST SHALL MEET THE STANDARDS OF TABLE 4.2.

COMPOST SOCK SEDIMENT TRAPS SHALL NOT EXCEED THREE SOCKS IN HEIGHT AND SHALL BE STACKED IN PYRAMIDAL FORM AS SHOWN ABOVE. MINIMUM TRAP HEIGHT IS ONE 24" DIAMETER SOCK. ADDITIONAL STORAGE MAY BE PROVIDED BY MEANS OF AN EXCAVATED SUMP 12" DEEP EXTENDING 1 TO 3 FEET UPSLOPE OF THE SOCKS ALONG THE LOWER SIDE OF THE TRAP.

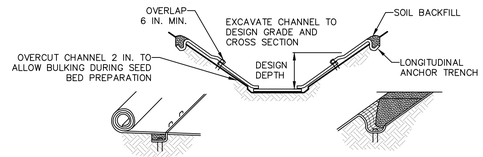
TYPICAL COMPOST SOCK SEDIMENT TRAPS PROVIDE 2,000 CUBIC FEET STORAGE CAPACITY WITH 12" FREEBOARD FOR EACH TRIBUTARY DRAINAGE ACRE. (SEE MANUFACTURER FOR ANTICIPATED SETTLEMENT.) THIS PROJECT SHOULD ALLOW FOR MINIMUM STORAGE BASED ON THE FILL PLACEMENT AREA.

THE TYPICAL MAXIMUM TRIBUTARY DRAINAGE AREA IS 5.0 ACRES. SINCE COMPOST SOCKS ARE "FLOW–THROUGH," NO SPILLWAY IS REQUIRED.

COMPOST SOCK SEDIMENT TRAPS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/3 THE HEIGHT OF THE SOCKS.

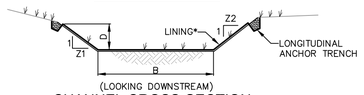
PHOTODEGRADABLE AND BIODEGRADABLE SOCKS SHALL NOT BE USED FOR MORE THAN 1 YEAR.

COMPOST SOCK SEDIMENT TRAP
NOT TO SCALE



INTERMITTENT CHECK SLOT LONGITUDINAL ANCHOR TRENCH

ISOMETRIC VIEW



(LOOKING DOWNSTREAM)

CHANNEL CROSS-SECTION

* SEE MANUFACTURER'S LINING INSTALLATION DETAIL FOR STAPLE PATTERNS, VEGETATIVE STABILIZATION FOR SOIL AMENDMENTS, SEED MIXTURES AND MULCHING INFORMATION

CHANNEL NO.	LENGTH	BOTTOM WIDTH B (FT)	DEPTH D (FT)	TOP WIDTH W (FT)	Z1 (FT)	Z2 (FT)	LINING *
1	APPROX. 212 LF	2	1	8	3	3	TALL FESCUE (RETARDANCE CLASS B)

NOTES:

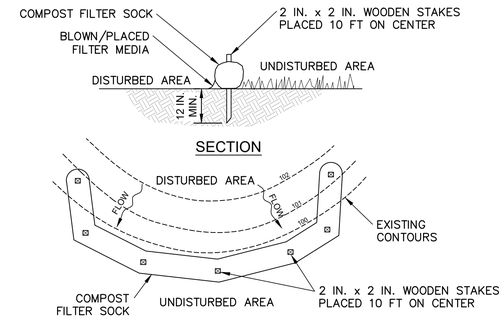
ANCHOR TRENCHES SHALL BE INSTALLED AT BEGINNING AND END OF CHANNEL IN THE SAME MANNER AS LONGITUDINAL ANCHOR TRENCHES.

CHANNEL DIMENSIONS SHALL BE CONSTANTLY MAINTAINED. CHANNEL SHALL BE CLEANED WHENEVER TOTAL CHANNEL DEPTH IS REDUCED BY 25% AT ANY LOCATION.

SEDIMENT DEPOSITS SHALL BE REMOVED WITHIN 24 HOURS OF DISCOVERY OR AS SOON AS SOIL CONDITIONS PERMIT ACCESS TO CHANNEL WITHOUT FURTHER DAMAGE. DAMAGED LINING SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS OF DISCOVERY.

NO MORE THAN ONE THIRD OF THE SHOOT (GRASS LEAF) SHALL BE REMOVED IN ANY MOWING. GRASS HEIGHT SHALL BE MAINTAINED BETWEEN 2 AND 3 INCHES UNLESS OTHERWISE SPECIFIED. EXCESS VEGETATION SHALL BE REMOVED FROM PERMANENT CHANNELS TO ENSURE SUFFICIENT CHANNEL CAPACITY.

VEGETATED CHANNEL
NOT TO SCALE



PLAN VIEW

NOTES:

SOCK FABRIC SHALL MEET STANDARDS OF TABLE 4.1 . COMPOST SHALL MEET THE STANDARDS OF TABLE 4.2.

COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY BARRIER SHALL NOT EXCEED THAT SPECIFIED FOR THE SIZE OF THE SOCK AND THE SLOPE OF ITS TRIBUTARY AREA.

TRAFFIC SHALL NOT BE PERMITTED TO CROSS COMPOST FILTER SOCKS.

ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/2 THE ABOVE GROUND HEIGHT OF THE BARRIER AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.

COMPOST FILTER SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.

BIODEGRADABLE COMPOST FILTER SOCKS SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

SOCK NO.	Dia. In.	LOCATION	SLOPE PERCENT	SLOPE LENGTH ABOVE BARRIER (FT)
1 THRU 13	18 (MIN)	AS SHOWN, ALL LOCATIONS	VARIES	VARIES

COMPOST FILTER SOCK
NOT TO SCALE

DRAWING NO. **ES-502**

GREENFIELD ENVIRONMENTAL MULTISTATE TRUST LLC
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