

APPENDIX C. SWPPP FOR QUEEN STREET DRAINAGE PROJECT

**Comprehensive
Stormwater Pollution Prevention Plan (C-SWPPP)
For Construction Activities:**

Project/Site Name:

Queen Street Storm Drainage
Improvements

Project Address/Location:

Queen St. and Front St. / Sampit River
Georgetown, SC 29440

Primary Permittee:

City of Georgetown - Engineering

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Day-to-Day Operator:

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Section 1 Project Overview

1.1 Narrative

CONSTRUCTION ACTIVITIES AND BMP SUMMARY

The Queen Street storm drainage improvements project is a component to a master drainage plan established by the City of Georgetown. The project involves the replacement of the existing storm drain line from the intersection of Queen Street and Front Street to the existing outfall at the Sampit River. The overall purpose of the project is to help improve the street drainage in downtown Georgetown between Front St. and Highmarket St.

The proposed improvements include the addition of approximately 176 linear feet of 48" RCP and four storm drainage structures. The total area of disturbance for these improvements is 0.36 acres. 417 square feet (0.01 acres) of waters of the U.S. will be impacted through the placement of rip rap for erosion control at the Sampit River outfall. The construction activities at this site will be implemented in 1 distinct Erosion Prevention and Sediment Control Phase.

PRE-DEVELOPMENT CONDITIONS

The existing drainage pipe network to be removed and replaced is located in the City of Georgetown within the Queen St. right of way between TMS#'s 05-0032-119-00-00 and TMS# 05-0029-115-00-00 . Please see the attached Vicinity Map in **Appendix A**.

The project site is found on the US Department of Interior, US Geological Survey (USGS) Georgetown South, SC, 2017 Quadrangle map shown in **Appendix A**.

The site is located in Zone AE, as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the City of Georgetown, SC, Georgetown County, Map Number 4500870002 D, dated March 16th, 1989. An excerpt from this map is shown in **Appendix A**.

The soils for the parcel were identified with the US Department of Agriculture's (USDA) Web Soil Survey online tool. An excerpt from this website, with the approximate site location, can be found in **Appendix A**. Two soil types were identified to be part of the study area:

- Yauhannah (12A)
- Wakulla (25A)

Yauhannah is a loamy fine sand with 0 to 2 percent slopes and is moderately well drained. USGS Web Soil Survey classifies Yauhannah in the Hydrologic Soil Group (HSG) of "B/D".

Wakulla is a sand with 0 to 2 percent slopes and is somewhat excessively drained. USGS Web Soil Survey classifies Wakulla in the Hydrologic Soil Group (HSG) of "A".

Curve Number data for each sub-basin is taken from Table 2-2a of the USDA Technical Release 55 (TR-55) dated June 1986. Pre-development weighted CN numbers for each sub-basin and Time of Concentration (Tc) calculations were calculated with the Win TR-55 software program shown in the report which can be found in **Appendix D, Exhibit 1**. The recommended minimum time of concentration is six (6) minutes. See below for a summary table of Pre-Development land use.

Pre-Development Basin Land Use			
Basin Name	CN Value	Time of Concentration (minutes)	Area (acres)
A1	98	6	0.24
A2	98	6	0.13
A3	98	6	0.04
A4	98	6	0.15
A5	98	6	0.16
A6	98	6	0.14
A7	98	6	0.74
A8	91	12.90	2.50
A9	85	12.48	1.14
A10	85	13.20	0.81
A11	89	12.84	0.45
A12	88	12.90	0.63
A13	89	11.58	0.66
A14	87	15.36	1.62
A15	80	14.58	2.70
A16	91	11.94	0.56
A17	81	15.24	1.43
Totals	87	N/A	14.10

Design storm precipitation data for the site was taken from Appendix F “South Carolina Rainfall Data” in the South Carolina DHEC Storm Water Management BMP Handbook.

Georgetown County Design Storm Precipitation Data (inches)					
County Name	2-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
Georgetown (east)	4.6	7.0	8.5	9.8	11.1

Pre-development calculations were performed using ICPR, and the results for the analysis point is summarized below. The design storm duration for the computations was a 24-hour storm event utilizing a SCS Type III distribution. The existing pipe conveyance system identified in the ICPR model contains pipe sizes ranging from 8” pipes at Highmarket St. to 24” and 36” pipes at Front St. Survey of the existing storm pipe slopes and inlet rim elevations for the storm network above Front St. was not provided. Minimum pipe slopes were assumed, and rim elevations were approximated based on Lidar data. The storm pipe network outfalls into the Sampit River at the end Queen St. through a 24” RCP. The outfall pipe end invert elevation could not be located as the pipe end was submerged. A tailwater elevation of 4.40’ was provided in the ICPR model to represent the tidally influence Sampit River. Reference the Engineering Report found in Appendix D.

Storm Frequency Peak Discharge (cfs)					
Analysis Point	2-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
Analysis Point A	26.99	40.40	48.20	54.55	60.59

As shown in the Pre-Development ICPR model results in Appendix D, the existing storm pipe network is undersized . Stormwater was consistently staging above the inlet rim elevations for the 2, 10, and 25-yr storm events. Due to the undersized pipe network, stormwater flow is restricted which resulted in decreased flow downstream to the Sampit River outfall pipe. To better understand the flow capacity requirements at the outfall, a second Pre-Development ICPR model was created called the “Queen St. Drainage Basin.” This model will provide the future conditions flow required at the Sampit River outfall once the stormwater network upgrades are completed between Front St. and Highmarket St. The ICPR model was simplified by removing the undersized pipes upstream and replacing with adequately sized

pipes to pass the design storm events. The results for the future conditions analysis point is summarized below.

Queen St. Drainage Basin Land Use			
Basin Name	CN Value	Time of Concentration (minutes)	Area (acres)
Queen St. Drainage Basin	87	15.48	14.10

Storm Frequency Peak Discharge (cfs) – Queen St. Drainage Basin					
Analysis Point	2-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
Queen St. Drainage Basin	30.32	50.63	63.25	74.12	84.95

POST-DEVELOPMENT CONDITIONS

The first phase of the City’s Queen St. drainage improvements will occur from the intersection of Queen St. and Front St. to the existing outfall at the Sampit River. The improvements include the addition of approximately 176 linear feet of 48” RCP and four storm drainage structures located within the Queen St. right of way. Waters of the U.S. will be impacted by the proposed Sampit river outfall pipe and placement of rip rap. USACE and OCRM Section 10 Navigable Waters permit applications have been submitted for these impacts.

At the address 615 Front Street, the development of a 70-room hotel called “The George” is in progress. The proposed hotel site entrance will exist within Queen Street and the hotel overflow parking will be shared with the adjacent property of the Harborwalk Marina and the Georgetown County Chamber of Commerce. The hotel construction is planned to be completed by the end of 2020. Improvements to the Queen St. drainage will occur in conjunction with The George Hotel.

The post-development conditions discharge to the same analysis points as designated in the pre-development map. The Post Development site drainage area map is shown **Appendix B, Exhibit 2**. Post-development Curve Number data for the basin was taken from Table 2-2a of the USDA Technical Release 55 (TR-55) dated June 1986. To obtain conservative results, a single weighted curve number was applied to each catch basin within the project site only. The post-development Time of Concentration (within the project site only) was also set at the minimum allowable time (6 minutes) to be conservative. See below for a summary table of the curve number calculations.

Post Development Basin Land Use			
Basin Name	CN Value	Time of Concentration (minutes)	Area (acres)
A1	98	6	0.24
A2	98	6	0.27
A3	98	6	0.04
A4	98	6	0.15
A5	98	6	0.16
A7	98	6	0.74
A8	91	12.90	2.50
A9	85	12.48	1.14
A10	85	13.20	0.81
A11	89	12.84	0.45
A12	88	12.90	0.63
A13	89	11.58	0.66
A14	87	15.36	1.62
A15	80	14.58	2.70

A16	91	11.94	0.56
A17	81	15.24	1.43
Totals	87	N/A	14.10

Post-development calculations were performed using ICPR, and the results for the analysis point are summarized below.

The design storm duration for the computations was a 24-hour storm event utilizing a SCS Type III distribution (with a unit hydrograph peaking factor of 323) as seen in Figure B-2 of the TR-55 manual.

Storm Frequency Peak Discharge (cfs)					
Analysis Point	2-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
Analysis Point A	29.08	44.51	53.83	61.54	68.99

A peak discharge summary for the pre- development v. post-development conditions are shown below.

Analysis Point A - Storm Frequency Peak Discharge (cfs)					
	2-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
Pre-Development	26.99	40.40	48.20	54.55	60.59
Post-Development	29.08	44.51	53.83	61.54	68.99
Queen St. Drainage Basin	30.32	50.63	63.25	74.12	84.95
Δ Pre. Vs. Post	+2.09	+4.11	+5.63	+6.99	+8.40

As shown in the table above, there's a rise in stormwater flow associated with proposed increase in pipe size from a 24-inch RCP to a 48-inch RCP. This increase in flow was expected as the existing pipe network was undersized and restricting stormwater flow to the Sampit River. The difference in flows between the Post- Development conditions and the overall Queen St. Drainage Basin results further exemplifies that the existing pipe network upstream of the proposed improvements remain undersized. The capacity requirements for the Sampit River 48" RCP outfall pipe can be found in **Appendix D, Exhibit 2**. Future drainage improvements along Queen St. have been identified by the City and will be completed as part of the City of Georgetown Stormwater Master Plan created by WK Dickson dated July 2019.

SEDIMENTOLOGY

Sedimentology will be handled with double row silt fence, seeding, weekly site inspections and a Type A and Type E inlet protection device. Silt Fence Trapping efficiency is shown in Appendix D, Exhibit 3.

FLOODING ISSUES

The site is located in Zone AE with a 100-yr. flood elevation of 9 feet, as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the City of Georgetown, SC, Georgetown County, Map Number 4500870002 D, dated March 16th, 1989. Due to the proximity to the tidally influenced Sampit River and existing downtown Georgetown elevations, flooding typically occurs during extreme high tides. Flooding has been observed to occur from Front St. to Highmarket St.

1.2 Stormwater Management and Sediment Control (CGP Section 3.2.2)

EROSION PREVENTION BMPS

As the existing site is cleared, grubbed and graded to the proposed contours shown on the construction site plans, erosion prevention BMPs shall be placed throughout the construction site to aid in the prevention of sediment-laden stormwater runoff. These BMPs shall be focused in areas with high potential of erosion, areas preceding infiltration practices, and shall be applied to all steep slopes. That is slopes equal to or greater than 3H:1V.

Each erosion prevention measure shall be selected on a site-specific basis and details have been provided on the construction site plans. The plans identify all proposed Erosion Prevention BMPs and the recommended installation, maintenance, and inspection procedures.

Examples of Erosion Prevention BMPs are, but are not limited to, surface roughening, temporary seeding, erosion control blankets, turf reinforcement mats, sodding, riprap, outlet protection, dust control, and polyacrylamide (PAM). Information on the design and proper use of Erosion Prevention BMPs can be located in the SC DHEC's BMP Handbook.

SEDIMENT CONTROL BMPS

Sediment Control BMPs are designed to remove some of the sediment accumulated within stormwater runoff, to the best extent practicable. These BMPs help prevent sediment impacts to adjacent properties and water bodies from stormwater discharges originating from construction sites.

Typically, these BMPs are placed near each of the site's outfalls and are installed prior to clearing and grubbing of the site (before large areas of soil are exposed). However, these BMPs can also be located throughout the construction site and, in these circumstances, are installed after mass grading has occurred. Placement, sizing and modifications of Sediment Control BMPs should be left to the SWPPP preparer and/or the Site Engineer. Contractors must consult the SWPPP Preparer as listed at the front of this SWPPP before making any significant changes to these BMPs.

Each sediment control BMP shall be selected on a site-specific basis. Examples of Sediment Control BMPs are, but are not limited to sediment traps, sediment basins, silt fence, rock check dams, rock sediment dikes, sediment tubes, and inlet protection. Please consult SC DHEC's BMP Handbook for more information on Sediment Control BMPs.

STRUCTURAL CONTROL BMPS AND FLOODPLAIN PLACEMENT

This site-specific SWPPP utilizes the following structural control BMPs: retention pond, detention pond, Bioretention areas, perimeter earthen berms, permanent vegetated swales, and storm sewer systems. These practices have been designed to either divert flows from exposed soils, to retain/detain flows, and to otherwise limit the runoff and the discharge of pollutants from disturbed areas of the construction site.

Throughout the lifespan of the construction project these BMPs will be installed and maintained, as required by the SWPPP and the construction site plans, until final stabilization has been achieved for the areas draining to each BMP. Upon final stabilization, each structural control BMP must be modified to the post-construction conditions shown within the approved construction site plans or removed, if the structural BMP was a temporary structure.

Any Structural Control BMPs that are being proposed within the 100-yr. floodplains will require approval from the local regulating agency, since SC DHEC does not have the authority to regulate within the associated flood plains. Approvals from the local agency will be located in Appendix C, Additional Approvals/Certifications of this SWPPP. If the required approval is not located in this SWPPP, please contact the Primary Permittee listed on the title sheet of this SWPPP before performing work within the floodplain.

CONSTRUCTION ENTRANCES AND DUST CONTROL

All access areas into and out of the limits of disturbance, as shown on the construction site plans, are required to be equipped with a construction entrance. The use of this BMP will limit the amount of sediment being transported by construction vehicles onto existing roadways or other impervious areas. Any tracked sediment, along with any attached pollutants, deposited on impervious areas could be washed downstream

during the next rain event. Each construction entrance must be installed as shown in the details section of the construction site plans.

If a new entrance or exit is required, that is not shown on the plans, install the construction entrance as noted by the construction entrance detail, mark the location on the plans and make a record of this minor modification in the SWPPP's modification log, which is located within one of the appendices of the On-site SWPPP.

Each stabilized construction entrance should be used in conjunction with Street Sweeping measures if it becomes apparent that sediment is still being tracked onto adjacent impervious areas, even with the use of the construction entrance.

During extremely dry conditions, drought, and/or excessive winds, the construction site should be treated for dust control to prevent the suspension of fine sediment particles into the air, being carried offsite, and deposited on adjacent properties or surface waters. This practice may not be directly called out for on the construction site plans. A water tanker used to spray the soil down may be an effective way to prevent excessive dust at a construction site.

WATER QUALITY BMPS DURING CONSTRUCTION

Site-specific water quality BMPs (e.g., sediment basins, sediment traps, rock check dams, and rock sediment dikes) must be installed prior to the mass clearing, grubbing and grading of the site, and must be kept in functioning order throughout the lifespan of all construction activities. Each of these BMPs must be maintained and inspected until all areas draining to these BMPs have reached final stabilization, approved by the construction site inspector or the SWPPP Preparer, and recorded within the stabilization log located as an appendix of the On-site SWPPP.

The location, installation procedures, and maintenance procedures for each water quality BMP can be found within the approved construction site plans.

POST-CONSTRUCTION WATER QUALITY

All construction sites disturbing 5 acres or more, including construction activities associated with Larger Common Plans disturbing 5 acres or more (for sites located within an MS4 this may be 1 acre or more), must be designed to treat water quality post-construction. These water quality controls must be installed and stabilized prior to terminating coverage under the CGP. These controls will require routine maintenance to remain functional; this is to be conducted by the Primary Permittee or the entity that accepts responsibility for these structures once construction has been completed. Additional information, including permanent maintenance and inspection procedures, can be found in Appendix C of the OS-SWPPP or within the construction site plans.

Upon final stabilization, each construction site will have to make the transition from temporary BMPs to permanent BMPs. This transition may include the conversion of a sediment basin to a detention basin, a sediment trap to a bioretention area, or diversion swales to permanently vegetated swales. All post-construction (permanent) water quality and water quantity BMPs are identified in the final phase of the Erosion and Sediment Control located within the construction site plans.

OTHER STORMWATER MANAGEMENT PROCEDURES

Based on the nature, conditions, and/or procedures associated with this construction site, the following items must be followed and adopted by all those conducting land disturbing activities at this site:

- All construction debris must be stockpiled in designated areas, which have been provided with the proper BMPs to prevent the discharge of pollutants through stormwater runoff from building or other similar materials off-site or into surface waters.
- Any additional waste material or stockpile material (i.e., soil and mulch) must also be stored in the designated areas as shown on the Construction Site Plans or as the contractor, responsible for day-day activities at this site, deems appropriate. Silt fence or an approved equal shall surround all stockpiled materials.
- All parties conducting work at this construction site must be informed of and make note of pollutant sources, both industrial and construction, at this site, and be informed of all controls and measures that will be implemented to prevent the discharge of these pollutants in stormwater runoff.
- Any additional non-stormwater discharges, as referenced in the CGP, should be eliminated or reduced to the maximum extent feasible. All unpreventable non-stormwater discharges shall be treated through the approved stormwater management system before release off-site. Following is a list of allowable non-stormwater discharges:
 - Fire hydrant flushing
 - Wash water without detergents
 - Water used for dust control
 - Potable water
 - Building wash down water without detergents
 - Uncontaminated pavement wash water
 - Uncontaminated condensation from mechanical equipment
 - Uncontaminated ground or spring water
 - Water from foundation of footing drains
 - Uncontaminated excavation dewatering
 - Landscape irrigation.
- (Additional notes specific to your construction site may be inserted here and below in list format or however you see fit. The regulatory agency may request additional notes here after initial review of the submitted SWPPP.)

1.3 Sequence of Construction

The construction sequence for this project has been provided on sheets C4 and C6 of the construction site plans. Each item/step of that construction sequence has been listed in the sequence that they should be implemented.

For additional information or questions on the sequencing please contact the SWPPP Preparer or the Permittee referenced on the cover of this SWPPP.

1.4 Non-Numeric Effluent Limits

STORMWATER VOLUME AND VELOCITY CONTROL

During the implementation of construction activities, all parties performing work at this construction site whose work may affect the implementation of the SWPPP must be informed of and directed on how to comply with this Non-Numeric Effluent Limit, which requires the management of stormwater runoff within the construction site and at each outfall. The purpose of this requirement is to control the stormwater volume and velocity at these locations to minimize erosion.

Specifically, each responsible party should be made aware of the practices that have been or should be implemented at the construction site to accomplish these particular stormwater management practices.

Below is a list of practices that may be utilized within the disturbed area and at each outfall at construction sites to control stormwater volume and velocity:

VOLUME CONTROL

- Limiting the amount of disturbed area and exposed soils
- Staging and/or Phasing of the Construction Sequence;
- Sediment Basins and Sediment Traps
- Diverting off-site flow around the construction site;
- Controlling the Drainage Patterns within the Construction Site;
- Temporary Stabilization of Disturbed Areas.

VELOCITY CONTROL

- Surface Roughening and/or other Slope Stabilization Practices;
- Level Spreaders, Riprap Plunge Pools and/or other Velocity Dissipation BMPS located at the Construction Site's and Sediment Basin Outfalls.
- Use of Rock Checks, Sediment Tubes, Etc. in Temporary Diversion Swales and Ditches.
- Use of Erosion Control Blankets, Turf Reinforcement Mats, and other Non-Vegetative BMPs that can be used to Quickly Stabilize Disturbed Areas

The SWPPP Preparer/Engineer should approve any modifications (Additional BMPs or Changes to Existing BMPs) to address the management of stormwater volume and velocity prior to implementation. All approved SWPPPs that were issued coverage under the CGP should include ample BMPs and other control measures to address this specific Non-Numeric Effluent Limit.

SOIL EXPOSURE, COMPACTION AND PRESERVATION

Throughout construction activities, the amount of soil exposed during construction should be kept to a minimum. This may be accomplished by minimizing the amount the disturbed area within the permitted Limits of Disturbance (shown on the approved construction site plans) to only that which is necessary to complete the proposed work. For areas that have already been disturbed and where construction activities will not begin for a period of 14 days or more, temporary stabilization techniques must be implemented.

Prior to implementation of any major grading activities, topsoil is to be preserved by placing it in areas designated for stockpiling until final grades are reached. Each stockpile must be equipped with proper sediment and erosion controls to preserve the topsoil and protect adjacent areas from impacts. Once final grades have been reached, the preserved topsoil should be utilized to apply to areas identified for stabilization. Topsoil contains nutrients and organisms that aid in the growth of vegetation.

The Compaction of Soil should also be minimized to the degree practicable during grading activities. This is especially important during the replacement of topsoil to aid in a quick establishment of vegetative cover. Compaction of soil may also reduce rainfall's ability to infiltrate into the soil, increasing the amount of stormwater runoff.

SOIL STABILIZATION

Throughout construction activities, soil stabilization techniques are to be initiated as soon as practicable whenever any clearing, grading, excavating, or other land-disturbing activities have permanently or temporarily ceased on any portion of the construction site and will not resume for a period exceeding 14 calendar days. For areas where initiating stabilization measures is infeasible, (e.g., where snow cover, frozen ground, or drought conditions preclude stabilization), initiate vegetative or non-vegetative stabilization measures as soon as practicable.

STEEP SLOPES (SLOPES OF 30% GRADE OR GREATER)

All disturbed steep slopes (30% grade, ~3H:1V, or greater), and steep slopes to be created through grading activities must be managed in a fashion that limits the potential of erosion along the slopes. All parties whose work is/was responsible for the creation/disturbance of steep slopes must comply with the following items:

- Minimize the Disturbance of all steep slopes, when possible.
- Divert Concentrated or Channelized Flows of stormwater away from and around steep slope disturbances.
- Use Specialized BMP Controls including temporary and permanent seeding with soil binders, erosion control blankets, surface roughening, reducing continuous slope length with terracing or diversions, gradient terraces, interceptor dikes and swales, grass-lined channels, pipe slope drains, subsurface drains, level spreaders, check dams, seep berms, and triangular silt dikes to minimize erosion.
- Initiate Stabilization Measures as soon as practicable on any disturbed steep slope areas where construction activities have permanently or temporarily ceased and will not resume for a period exceeding 7 calendar days.
- A Vegetative and/or Non-Vegetative Cover must be established within 3 working days from the time that stabilization measures were initiated.

Stabilization of steep slopes should be a priority for those performing work at the construction site. At the very least, runoff control BMPs should be implemented to transport stormwater runoff from the top of the slope to the toe of the slope. An example of this is to install diversion swales along the top of slope and direct the runoff towards pipe slopes drains to transports the runoff to the toe of the slope. All pipe slope drain outlets are to be equipped proper outlet protection.

SEDIMENT DISCHARGE MINIMIZATION

Permittees, Contractors, and all other parties responsible for conducting land-disturbing activities are required to install and maintain all erosion and sediment BMPs that are identified on the approved construction site plans. These BMPs have been designed and approved to address such factors as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soils particle sizes expected to be present on the construction site. Proper installation, inspection, and maintenance will allow these BMPs to operate at maximum efficiencies in order to minimize sediment discharges to the maximum extent practical.

POLLUTANT DISCHARGE MINIMIZATION

Permittees, Contractors, and all other parties responsible for conducting land-disturbing activities are required to install, implement, and maintain effective pollution prevention measures to minimize the discharge of pollutants. At a minimum, the following items must be implemented:

- Minimize the discharge of pollutants from dewatering trenches and excavations by managing runoff with the appropriate controls. Otherwise these discharges are prohibited;
- Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
- Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials present on the site to precipitation and to stormwater; and

- Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures.

PROHIBITED DISCHARGES

Permittees, Contractors, and all other responsible parties for conducting land-disturbing activities are prohibited to discharges, from the construction site, the following items:

- Wastewater from washout of concrete, unless managed by an appropriate control;
- Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;
- Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance; and
- Soaps or solvents used in vehicle and equipment washing.

1.5 Buffer Zone Management

BUFFER ZONE NARRATIVE (COMPLIANCE OPTION C)

Per Section 3.2.4.C of the CGP, a buffer zone is required to be provided along the Sampit River; however, an undisturbed buffer zone is not capable of being provided due to pre-existing development that has disturbed the majority of the required buffer zone area. For this reason, Compliance Option C was selected for this project.

Compliance Option C was selected since the pre-existing development has stripped the buffer zone area from natural strands of vegetation. The pre-existing state of the project area was a parking area and rip rap area that extended to within a few feet of the surface waters. For this reason, a buffer zone will not be provided as allowed through Compliance Option C listed in Section 3.2.4.C of the CGP.

In lieu of a buffer zone, all sediment control BMPs discharging to this river have been designed to meet an 80% trapping efficiency to prevent impacts to this surface water. Supporting Calculations demonstrating these silt fence trapping efficiencies can be found in Appendix D of this SWPPP.

All perimeter BMPs and sediment control BMPs, as shown on sheets C4-C6 of the construction site plans, are to be installed prior to the discharge of stormwater runoff into the adjacent surface water from disturbed areas. Inspection and maintenance of these BMPS are to be conducted until final stabilization is reached. All maintenance procedures and inspection requirements for these BMPs can be found on plan sheets C4-C6.

Additionally, a Surface Water Protection Plan, which outlines a list of procedures to protect the Sampit River has been provided on plan sheet C4.

1.6 Certification Statement

"I have placed my signature and seal on the design documents submitted signifying that I accept responsibility for the design of the system. Further, I certify to the best of my knowledge and belief that the design is consistent with the requirements of Title 48, Chapter 14 of the Code of Laws of SC, 1976 as amended, pursuant to Regulation 72-300 et seq. (if applicable), and in accordance with the terms and conditions of SCR100000."



Name Bryan Kizer, P.E.

Title Principal

Date 01/27/2020

(Signature and Seal)

Section 2 Site Features and Sensitive Areas

2.1 Sources of Pollution

Throughout construction activities, each permittee, contractor, and person responsible for conducting work will need to ensure that sources of pollution are managed to prevent their discharge from the construction site. Expected pollution sources during construction have been identified in Table 2.1-A, but due to the nature of construction activities, it is often tough to predict all pollution sources that may appear throughout the life of a construction project. For that reason, the following table has also been provided to help all those performing work at this construction site identify possible sources of pollution

Stormwater runoff subjected to the identified pollution sources must be treated by the appropriate BMPs as directed by this SWPPP.

In the event that any additional sources of pollution are identified during construction, the person(s) with day-to-day operational control at the site is to add the new source(s) to Table 2.1-A and consult with the SWPPP Preparer to properly address this source and to prevent the discharge of its pollutant through stormwater runoff.

Table 2.1-A: Potential Sources of Pollution

Source	Material or Chemical	Location*	Appropriate Control Measures
Loose soil exposed/disturbed during clearing, grubbing and grading activities	Sediment	All areas within the Limits of Disturbance	As directed by the construction Plans. This includes Silt Fence, sediment tubes, sediment basins, and sediment traps.
Areas where construction equipment are cleaned, a.k.a. concrete washout	Heavy Metals & pH	Located adjacent to each construction entrance	Concrete Washout Basin as shown on sheet C-8 of the plans.
Water encountered during trenching	Nutrients & Sediment	In and around any trenching activities.	Direct water into impoundments such as basins or traps to allow for the sedimentation of the listed pollutants.
Paving Operations	Sediment & Trash	All areas to be paved.	Inlet protection.
Material Delivery and Storage Areas	Nutrients, pH, Sediment, Heavy Metals, oils & grease	All areas used as storage areas	Silt fence and/or sediment dikes
Equipment fueling and maintenance areas	Metals, hydrocarbons, oils and greases	Areas surrounding fuel tanks	Provide secondary containments, locate in upland areas. Repair leaking and broken hoses.
Paints	Metal oxides, Stoddard solvent, talc, calcium-carbonate, arsenic	Throughout site, primarily in areas of building construction	Wash water should be contained and is prohibited from being discharged

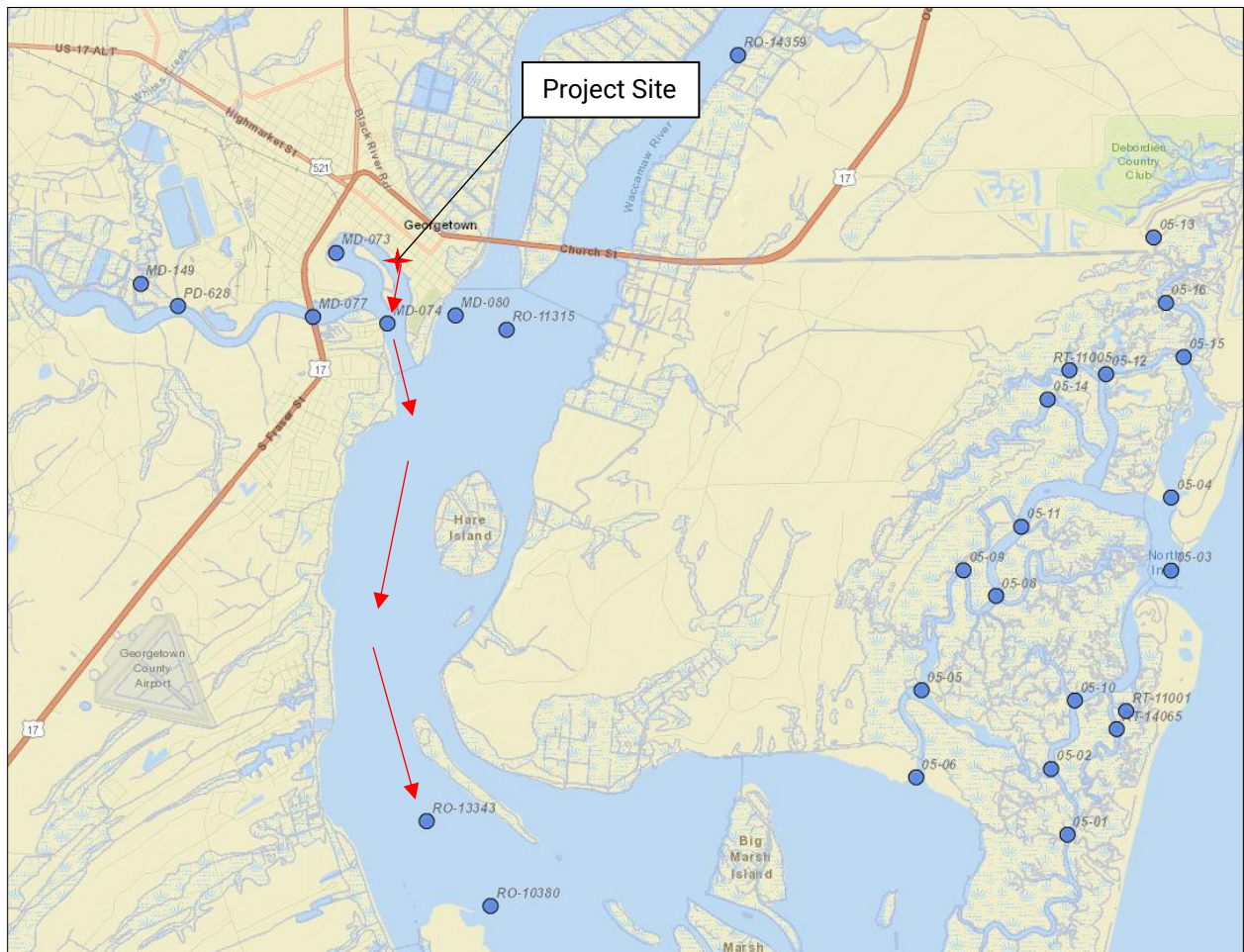
*Area where material/chemical is used on site.

2.2 Surface Waters

Stormwater runoff from the proposed construction site discharges to the Sampit River, which lies along the southwest boundary of the site. From the Sampit River, the stormwater runoff from this site will enter the Winyah Bay. Winyah Bay discharges into Atlantic Ocean.

The Sampit River is tidally influenced; therefore, the corresponding tidal high-water mark has been outlined on the construction plans. A critical line has been delineated by Cygnus Environmental along the banks of the Sampit River. USACE and OCRM Section 10 Navigable Waters permit applications have been submitted for the impacts to the Sampit River.

Figure 2.2: Stormwater Runoff Route



2.3 Impairments and TMDLs

Some Waters of the State (WoS) have been identified as not meeting the State’s water quality standards for recreational swimming, fish consumption, aquatic life use, and/or shellfish harvesting for one or more pollutants even after controls for point and nonpoint source pollution have been put in place. These waterbodies have been classified as “impaired.” Once these waterbodies have been identified they are listed on the State’s 303(d) List of Impaired Waterbodies. South Carolina lists impairments as “stations” where samples were taken along a waterbody.

The most recently approved 303(d) list can be found at the following link:

<http://www.scdhec.gov/environment/water/tmdl/index.htm#4>

After a pre-determined period of time, DHEC is obliged to develop a Total Maximum Daily Load (TMDL) for the pollutant of concern for each impaired station listed on the 303(d) List. A TMDL is the amount of a single pollutant (such as bacteria, nutrients, metals) that can enter a waterbody on daily basis and that waterbody still meet water quality standards. "TMDL" refers to both a calculation of a pollutant entering a waterbody as well as the document containing this calculation along with source assessments, watershed and land use information, reductions and allocations information, implementation and other relevant information, maps, figures, and pictures.

Once a TMDL has been developed and approved by the EPA, the impaired WoS is removed from the 303(d) list. A separate list is maintained for WoS with approved TMDLs.

Any construction site whose discharges are released into a WoS listed on the 303(d) List or for which an EPA-approved TMDL has been developed must address the specific pollutant set forth in the TMDL and/or potential pollutants for the impairment. The SWPPP must include a description of BMPs to address these pollutants.

The primary permittee and/or contractor must ensure that the construction site discharges remain in compliance with the State's water quality standards. To do so, these parties will have to ensure the function of all approved BMPs to handle the specific pollutant.

Construction Stormwater Discharges are expected to contain pollutants that contribute and/or can cause the following impairments to receiving water bodies: BIO (Macroinvertebrate Community), Turbidity, TP (Total Phosphorus), TN (Total Nitrogen), CHLA (Chlorophyll-a), and Fecal Coliform in waters classified for Shellfish Harvesting in the coastal zone. The presence of any of these impairments in receiving waters will require approval control of the site's construction stormwater discharges. Information on each of these impairments and how to treat stormwater runoff for these impairments has been provided below.

IMPAIRMENTS EFFECTED BY CONSTRUCTION SITE DISCHARGES AND METHODS TO CONTROL POTENTIAL POLLUTANTS CAUSING OR CONTRIBUTING TO THE IMPAIRMENTS

1. **BIO (Macroinvertebrate Community):** A balanced and varied group of Macroinvertebrate organisms is an indicator of a healthy stream that supports aquatic life. A balanced community can be defined as a natural, diverse group of organisms (including Macroinvertebrate) characterized by the ability to sustain itself through season changes, presence of food chain species and a lack of domination by pollutant tolerant or invasive species. If these conditions do not exist, then the site may be considered impaired due to the presence of an undesirable or non-existent Macroinvertebrate community. Sediment from construction sites may further threaten the propagation of these organisms.

Address by: Examples include limiting the amount of disturbed area, designing sediment control BMPs to remove the maximum amount of sediment possible, immediate stabilization of disturbed areas, and other practices may be utilized to control the discharge of sediment from construction sites.

2. **Turbidity:** Turbidity can be generally defined as the "cloudiness" of a waterbody and may be caused by the growth of aquatic phytoplankton and the presence of suspended solids in the water column. In SC, a water quality standard for turbidity is applicable to all waters of the State (see R. 61-68 D.

11. for numeric targets by waterbody classification). Turbidity levels that exceed the water quality standard may reduce light penetration, thereby inhibiting aquatic flora growth, and may reduce the ability of fauna, such as fish, to absorb oxygen across their gills.

Address by: Examples include limiting the amount of disturbed area, designing sediment control BMPs to remove the maximum amount of sediment possible, immediate stabilization of disturbed areas, and other practices may be utilized to control the discharge of sediment from construction sites.

3. **TP (Total Phosphorus):** Similar to total nitrogen, TP is an essential nutrient for the propagation of aquatic life. In SC, a water quality standard for TP is applicable to lakes greater than 40 acres (see R. 61-68 D. 11. for numeric and narrative targets). At acceptable levels, TP is assimilated by aquatic flora ensures the propagation of an overall balanced, indigenous aquatic community. TP levels that exceed the water quality standard are considered impaired and may cause negative impacts to the overall health of the aquatic community by promoting excessive algal growth in lakes. Phosphorous may enter a site's stormwater when excess amounts of the nutrient are applied to the site during temporary or final stabilization.

Address by: To prevent this soil should be tested to determine the quantity of the nutrient present in the soil and the correct amount that needs to be added so that it is absorbed by the vegetation.

4. **TN (Total Nitrogen):** Similar to total phosphorus, TN is an essential nutrient for the propagation of aquatic life. In SC, a water quality standard for TN is applicable to lakes greater than 40 acres (see R. 61-68 D. 11. for numeric and narrative targets). At acceptable levels, TN is assimilated by aquatic flora and ensures the propagation of an overall balanced, indigenous aquatic community. TN levels that exceed the water quality standard are considered impaired and may cause negative impacts to the overall health of the aquatic community by promoting excessive algal growth in lakes. Nitrogen may enter a site's stormwater when excess amounts of the nutrient are applied to the site during temporary or final stabilization

Address by: Examples include that the soil should be tested to determine the quantity of the nutrient present in the soil and the correct amount that needs to be added so that it is absorbed by the vegetation.

5. **Chlorophyll-a (CHLA):** CHLA is a pigment present in the cells of photosynthetic flora and some algal species. The presence of CHLA in an aquatic environment is a water quality indicator of the overall productivity in the aquatic system. CHLA is linked to the levels of TP, TN and light penetration in the water column. In SC, a water quality standard for CHLA is applicable to lakes greater than 40 acres (see R. 61-68 D. 11. for numeric and narrative targets). CHLA levels that exceed the water quality standard may suggest that other undesirable water quality impacts are present as the aquatic system may be too productive to support the propagation of an overall balanced, indigenous aquatic community. Excess nutrients may discharge from a construction site during temporary and final stabilization. Limiting the amount of phosphorus and nitrogen applied while establishing vegetation will prevent excessive levels of CHLA in receiving waters.

Address by: Examples include that the soil should be tested to determine the quantity of the nutrients present in the soil and the correct amount that needs to be added so that it is absorbed by the vegetation.

6. **Fecal Coliform (FC) in Shellfish Harvesting waters:** Fecal Coliform is an indicator bacterium for other pathogens which may be present in a waterbody. Shellfish Harvesting Waters are tidal saltwater protected for shellfish harvesting and must be protected to a higher standard than other waters because of the risk to human health posed by ingesting shellfish from areas with high levels of bacteria. Bacteria levels increase following rain events. Potential sources of bacteria on

construction sites include improperly located porta-johns and litter that may attract rodents and other animals.

Address by: Porta-johns should be placed away from WoS and not placed on catch basins and other drainage structures. Litter and construction debris should be placed in identified areas and emptied on a routine basis.

IMPAIRMENT SOURCES AND PREVENTION

Construction sites can contribute to these impairments directly through the release of excess soil and/or nutrients within stormwater runoff. For this reason, proper sediment and erosion control BMPs should be implemented and the design of the stormwater management systems, during both construction and post-construction, should address the control of stormwater runoff. A reduction in the volume released or the rate at which this volume is released can significantly improve the quality of stormwater runoff and limit the amount of the pollutants that contribute to the above listed impairments.

As an example, sediment basins and/or traps should be used during construction to allow for sedimentation of soils/nutrients, and to control the release of stormwater into the impaired water body. Vegetated Detention and Infiltration structures should be implemented as post-construction BMPs to control stormwater volumes. Caution is advised when using fertilizers to reach Final Stabilization; excess fertilizer can contribute to each of the above listed impairments.

SITE-SPECIFIC REQUIREMENTS

This construction site's discharges drain into WoS that is either Impaired or has an established TMDL for the following impairment(s): Turbidity. Due to the possibility of pollutants in construction stormwater discharges from this site that may contribute to this impairment, the following must be conducted throughout the lifespan of all land-disturbing activities at this site:

- Monthly monitoring of the construction site's outfalls;
- Biweekly inspections of all the primary sediment control BMPs including Type A Gator inlet protection, Type E inlet protection, and silt fence.
- Limiting the total amount of disturbed area, and the temporary and permanent stabilization by seeding of disturbed areas;
- Employee training/acknowledgement during the Pre-Construction Meeting;
- Installation of additional BMPs to meet the water quality standards (as directed by the SWPPP preparer and as approved by the regulating agency); and
- All sediment control BMPs have been designed to meet or exceed an 80% trapping efficiency.

2.4 Critical Areas (CZC only)

The Sampit River is a coastal waterbody; therefore, a critical line has been delineated by Cygnus Environmental and survey at the river high water mark. The critical line is shown on the boundary survey and provided on the construction plans. USACE and OCRM Section 10 Navigable Waters permit applications have been submitted for the impacts to the Sampit River Double Row silt fence will separate the critical line from the construction limits.

Section 3 Compliance Requirements

3.1 SWPPP Availability

The OS-SWPPP should be kept at the office at the entrance to the project. Per the CGP Section 3.1.6,

- A copy of the OS-SWPPP, as defined by Section 3.1.1.H, must be retained at the construction site entrance or a nearby location easily accessible during normal business hours, from the date of commencement of construction activities to the date that final stabilization is reached.
- If a location within the construction site is unavailable to store the OS-SWPPP when no personnel are present, notice of the plan's location, along with any update contact information, must be posted near the main entrance at the construction site.
- Contractors and/or Builders, who have day-to-day operational control over the OS-SWPPP implementation, must have a copy of this SWPPP available at a central location within the construction site for the use by all those identified as having responsibilities under the OS-SWPPP.
- For linear construction or roads and utilities (i.e., electrical power lines, gas lines, main sewer trunk lines and water distribution lines). Which is not part of an LCP, where it is not practical to have the OS-SWPPP on location, the Permittee and/or Operator must upon request make the OS-SWPPP available by the end of normal business hours, or by the following business day under extenuating circumstances.
- On-Site SWPPPs must be made available upon request and at the time of a construction site inspection by EPA; DHEC; a tribal entity delegated under Regulation 72-300; local government officials; and the Operator of a Municipal Separate Storm Sewer System (MS4) receiving discharges from the construction site to the requestor.

3.2 Pre-Construction Conferences

A preconstruction conference shall be held on site by the SWPPP preparer and must be attended by all Primary Permittees, Secondary Permittees, co-permittees, contractors, subcontractors, blanket utility providers, OS-SWPPP preparers, site managers, and site inspectors/monitors.

The primary purpose of the pre-construction meeting is the review and explain the OS-SWPPP so that all are aware of the requirements before they start performing construction-related (land disturbing) activities that may affect the implementation of the approved OS-SWPPP.

All attendees must sign a registration form for proof of attendance and SWPPP records.

3.3 Inspection Requirements

1. **Scope.** Construction Site Inspections are to be conducted on a routine basis, as outlined in Section 4.2.B, and must include all areas disturbed by construction activity, including perimeter BMPs and areas used for storage of materials that are exposed to precipitation. Each inspection must look for the evidence of, or the potential for, inefficiencies within the implemented OS-SWPPP, whether the inefficiencies are a direct result of improper design, installation or maintenance, by inspecting, at a minimum, the following:
 - All areas of the site disturbed by construction activity and areas used for storage of materials that are exposed to precipitation;
 - All stormwater conveyance systems for any evidence of, of the potential for, pollutants entering these systems;

- All BMPs identified in the OS-SWPPP;
- All discharge locations to ascertain whether the implemented BMPs are effective in preventing the discharge of sediment from the site. Where discharge locations are inaccessible, nearby downstream locations must be inspected to the extent that such inspections are practicable; and
- Locations where vehicles enter or exit the site must be inspected for evidence of off-site sediment tracking.

If inspection responsibilities are not shared between Primary and Secondary Permittees, each secondary permittee must provide their own inspections for the portions of the site for which their coverage includes.

2. **Frequency.** After construction activities begin, inspections must be conducted at a minimum of a least once every calendar week and must be conducted until final stabilization is reached on all areas of the construction site. An inspection is recommended within 24 hours of the end of a storm event of 0.5 inches or greater.

Permittees shall either maintain an on-site rain gauge or use data from a certified weather record (such as a personal weather station of an airport) located within a reasonable proximity of the construction site, to record rainfall records from any significant rainfall event, 0.5 inches or greater. These recorded rainfall amounts must be maintained in a Rain Log located in the OS_SWPPP. Rainfall records for the day of an inspection and any significant rainfall events since the last inspection must be reported on each weekly inspection report.

Inspections must be conducted by qualified personnel. "Qualified personnel" means a person knowledgeable in the principles and practice of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact Stormwater quality and to assess the effectiveness of any BMPs selected to control the quality of Stormwater discharges from the construction site. This person must be either the preparer of the C-SWPPP or an individual who is under the direct supervision of the preparer of the approved C-SWPPP and who meets the requirements in the paragraph or an individual who is under the direct supervision of the person with an equivalent registration and who meets the requirements in this paragraph.

3.4 Maintenance Requirements

- A. **Construction Maintenance.** All BMPs and other protective measures identified in the OS-SWPPP must be maintained in effective operating condition. If site inspections required by Section 4.2 identify BMPs that are not operating effectively, maintenance must be performed within seven (7) calendar days, before the next inspection, or as reasonably possible, and before the next storm event whenever practicable to maintain the continued effectiveness of Stormwater controls. If periodic inspection or other information indicates that a BMP has been used inappropriately, or incorrectly, the Permittee must address the necessary replacement or modification required to correct the BMP within a time frame of 48 hours of identification.

If existing BMPs need to be modified or if additional BMPs are necessary to comply with the requirements of this permit and/or SC's Water Quality Standards, implementation must be completed before the next storm event whenever practicable. If implementation before the next storm event is impracticable, the situation must be documented in the OS-SWPPP and alternative BMPs must be implemented as soon as reasonably possible. Sediment from sediment traps or sediment basins must be removed as indicated in the OS-SWPPP or when the design capacity has been reduced by 50%, whichever occurs first. Sediment collected by

Silt Fence or another sediment control measure, must be removed when the deposited sediment reaches 1/3 of the height of the above-ground portion of these BMPs, or before it reaches a lower height based on the manufacturer's specifications.

- B. **Permanent Maintenance.** Permanent Stormwater management structures must be routinely maintained to operate per design. The Department requires inclusion of a Permanent Stormwater Management Maintenance Agreement and a Maintenance Plan to ensure proper operation. Provide a detailed proposed maintenance plan for permanent stormwater management structures proposed for your project in the Narrative. The maintenance agreement and maintenance plan, when required, must be identified and located in the C-SWPPP.
- C. Refer to the construction site plans sheets for BMP maintenance notes, and drainage facility maintenance notes and schedules.
- D. **Secondary Permittee Common BMP Maintenance Requirement.** It shall be the responsibility of the Secondary Permittee to either maintain or coordinate the maintenance of any common stormwater BMPs, accepting stormwater discharges from any area associated with their work, with the primary permittee or the party responsible for permanent maintenance.

3.5 Record Keeping

Any logs necessary to track the progress, compliance, modifications and those associated with the construction site. These logs may include, but are not limited to, a pre-construction conference log, and inspection log, SWPPP modifications, a stabilization log, a rain log, a contractor log and/or any additional record keeping as deemed necessary by the Permittee, contractor, DHEC, MS4 or an entity delegated under Regulation 72-300.

3.6 Final Stabilization

Final stabilization will be achieved when all disturbed areas have either been paved, had houses built upon them, or have been permanently grassed or sodded. Grass shall have taken root and shall have good coverage of 80% or more. Stormwater ponds shall have been cleaned and drugged of accumulated sediment. All ditches shall have good grass coverage and have begun a regular maintenance program of cutting to reduce weeds and cattails in the ditch bottom. Riprap areas shall be free of accumulated sediment. Rock check dams and level spreaders shall be maintained and remain free of accumulated sediments. Once this is achieved, the OS-SWPPP administrator shall request a final inspection and notice of termination (NOT) of the land disturbance permit. If the NOT is approved, the contractor may remove the temporary BMPs, i.e., the silt fence and temporary curb inlet filters.

The NOT must be submitted within 30 days of one of the above conditions being met. Authorization to discharge terminates at midnight of the day the NOT is signed.

If a NOT has been submitted and the construction site does not meet the criteria for termination, then the construction site remains subject to the provisions of this permit.

A revised maintenance agreement, consistent with Section 4.3.C of the CGP must be submitted along with the NOT, when the responsible parties or individual(s) accepting ownership or maintenance of permanent storm water control devices have changed from what was originally approved.

For residential subdivisions, Primary Permittees do not need to terminate permit coverage in areas where Secondary Permittees have received permit coverage to perform work under the permit. Primary Permittees can request to terminate coverage when Secondary Permittees are authorized to conduct construction activities, independent of the Primary Permittee, for the remaining disturbed areas on the construction site and final stabilization has been achieved on all other areas of the construction site.

Section 4 Reference Materials

REFERENCE MATERIALS AVAILABLE UPON REQUEST