City of Norfolk

Department of Public Works
Operations Division

NORFOLK STORMWATER DESIGN AND CONSTRUCTION MANUAL

FINAL

July 1, 2024

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CHAPTER 1.0 INTRODUCTION AND PURPOSE

This design and construction manual is intended for use by any person, agency or organization involved in the development, design or construction of projects which will impact storm water runoff. Possible users of this manual include homeowners, builders, developers, design professionals, redevelopment authorities, and City staff. Users are reminded that avoiding property damage, personal injury, or creation of unsafe conditions remains the owner or permittee's responsibility regardless of the criteria or other requirements provided in this manual.

1.1 Purpose

Compliance with this document is required to ensure the general health, safety, and welfare of the citizens of the City of Norfolk (City) and protect the quality of state waters from the potential harm of unmanaged stormwater runoff, including protection from a land disturbing activity causing unreasonable degradation of properties, water quality, stream channels and other natural resources, and, in accordance with *Code of Virginia*, § 62.1-44.15:27, to establish procedures whereby stormwater requirements related to water quality and quantity shall be administered and enforced. Stormwater means precipitation that is discharged across the land surface or through conveyances to one or more waterways and that may include stormwater runoff, snow melt runoff, and surface runoff and drainage.

Development and redevelopment projects shall be conducted in accordance with the requirements of this manual and subsequent amendment made thereto. This manual will be amended to reflect changes in the *Code of Virginia* or Virginia Administrative Code affecting local implementation of the Virginia Erosion Control and Stormwater Management Program. Any subsequent amendments to this design manual will be reviewed and approved by the Virginia Department of Environmental Quality prior to incorporation herein.

Upon the adoption of an amended manual, previous versions of the design manual will be null and void and development and redevelopment projects will be required to be conducted in accordance with the amended design and construction manual from its effective date unless another date is specified within the amendment.

The effective date of this design and construction manual is **July 1, 2024.**

1.2 Definitions

Notwithstanding other definitions to the contrary in the Norfolk City Code or Zoning Ordinance, as used in this design and construction manual, the following terms have the following definitions:

"*Adequate channel*" means a channel that will convey the designated frequency storm event without overtopping the channel bank nor causing erosive damage to the channel bed or banks.

"*Administrator*" means the Director of the Department of City Planning or his designated agent.

"*Agreement in lieu of a plan*" or "*Agreement in Lieu*" means a contract between the VESMP authority and the owner or permittee that specifies methods that shall be implemented to comply with the requirements of VESMA for the construction of a (i) single-family detached residential structure or (ii) farm building or structure on a parcel of land with a total impervious cover percentage, including the impervious cover from the farm building or structure to be constructed, of less than 5.0%; such contract

may be executed by the VESMP authority in lieu of a soil erosion control and stormwater management plan.

"*Best management practice*" or "*BMP*" means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices, including both structural and nonstructural practices, to prevent or reduce the pollution of surface waters and groundwater systems.

1. "*Nonproprietary best management practice*" means both structural and nonstructural practices to prevent or reduce the pollution of surface waters and groundwater systems that are in the public domain and are not protected by trademark or patent or copyright.

2. "*Proprietary best management practice*" means both structural and nonstructural practices to prevent or reduce the pollution of surface waters and groundwater systems that are privately owned and controlled and may be protected by trademark or patent or copyright.

"*Board*" means State Water Control Board.

"*Causeway*" means a temporary structural span constructed across a flowing watercourse or wetland to allow construction traffic to access the area without causing erosion damage.

"*Channel*" means a natural stream or manmade waterway.

"*Chesapeake Bay Preservation Act*" means Article 2.5 (§ 62.1-44.15:67 et seq.) of Chapter 3.1 of Title 62.1 of the Code of Virginia.

"*Chesapeake Bay Preservation Area*" means any land designated by a local government pursuant to Part III (9VAC25-830-70 et seq.) of the Chesapeake Bay Preservation Area Designation and Management Regulations and § 62.1-44.15:74 of the Chesapeake Bay Preservation Act. A Chesapeake Bay Preservation Area shall consist of a Resource Protection Area and a Resource Management Area as defined in the Chesapeake Bay Preservation Area Designation and Management Regulations (9VAC25-830).

"*Chesapeake Bay Preservation Act land-disturbing activity*" means a land-disturbing activity including clearing, grading or excavation that results in a land disturbance equal or greater than 2,500 square feet and less than one acre in all areas of jurisdictions designated as subject to the regulations adopted pursuant to the Chesapeake Bay Preservation Act, *Code of Virginia*, § 62.1-44.15:67, et seq.

"*Clean Water Act*" or "*CWA*" means the federal Clean Water Act (33 USC §1251 et seq.), formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972, Public Law 92-500, as amended by Public Law 95-217, Public Law 95-576, Public Law 96-483, and Public Law 97-117, or any subsequent revisions thereto.

"*Cofferdam"* means a watertight temporary structure in a river, lake, etc., for keeping the water from an enclosed area that has been pumped dry so that bridge foundations, dams, etc., may be constructed.

"*Common plan of development or sale*" means a contiguous area where separate and distinct construction activities may be taking place at different times on different schedules.

"*Conservation management area*" or "*CMA*" means an area designated by Department of Public Works – Storm Water Management Division to be conserved for the purpose of improved environmental quality. Vegetation in CMAs will be managed towards this goal and is not subject to ordinances for management of turf, landscaping or trees. CMAs may include, but are not limited to, tidal or non-tidal wetlands; forested or grass buffers around wetlands, streams, ditches, or stormwater ponds; managed meadows; and upland forest groves.

"*Construction activity*" means any clearing, grading, or excavation associated with large construction activity or associated with small construction activity.

"*Construction record drawing*" means a design, working drawing or as built drawing submitted as the final record of documentation for a land disturbing activity.

"*Control measure*" means any BMP, stormwater facility, or other method used to minimize the discharge of pollutants to state waters.

"Clean Water Act" *or* "*CWA"* means the federal Clean Water Act (33 USC §1251 et seq.), formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972, Public Law 92-500, as amended by Public Law 95-217, Public Law 95-576, Public Law 96-483, and Public Law 97-117, or any subsequent revisions thereto.

"*CWA and regulations*" means the Clean Water Act and applicable regulations published in the Code of Federal Regulations promulgated thereunder. For the purposes of this manual, it includes state program requirements.

"Dam" means a barrier to confine or raise water for storage or diversion, to create a hydraulic head to prevent gully erosion, or to retain soil, rock or other debris.

"Denuded" means a term applied to land that has been physically disturbed and no longer supports vegetative cover.

"Department" or "*DEQ*" means the Virginia Department of Environmental Quality.

"Development" means land disturbance and the resulting landform associated with the construction of residential, commercial, industrial, institutional, recreation, transportation or utility facilities or structures or the clearing of land for non-agricultural or non-silvicultural purposes. The regulation of discharged from development, for purposes of stormwater management, does not include exclusion found in 9VAC25-875-860.

"Dike" means an earthen embankment constructed to confine or control water, especially one built along the banks of a river to prevent overflow of lowlands, levee.

"Discharge" when used without qualification, means the discharge of a pollutant.

"Discharge of a pollutant" means:

1. Any Addition of a pollutant or combination of pollutants to state water from any point source.
2. Any Addition of any pollutant or combination of pollutants of the waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft which is being used as means of transportation.
   This definition includes additions of pollutants into surface waters from: surface runoff that is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a state, municipality, or other person that do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works. This term does not include an addition of pollutants by any indirect discharger.

"*District"* or "*soil and water conservation district*" means a political subdivision of the Commonwealth organized in accordance with the provisions of Article 3 (§ 10.1-506 et seq.) of Chapter 5 of Title 10.1 of the Code of Virginia.

"*Diversion"* means a channel with a supporting ridge on the lower side constructed across or at the bottom of a slope for the purpose of intercepting surface runoff.

"Dormant" means denuded land that is not actively being brought to a desired grade or condition.

"*Drainage area"* means a land area, water area, or both from which runoff flows to a common point.

"Energy dissipator" means a nonerodible structure which reduces the velocity of concentrated flow to reduce its erosive effects.

"Environmental Protection Agency" or "*EPA*" means the United States Environmental Protection Agency.

"*Erosion and sediment control plan"* means a document containing material for the conservation of soil and water resources of a unit or group of units of land. It may include appropriate maps, an appropriate soil and water plan inventory and management information with needed interpretations, and a record of decisions contributing to conversation treatment. The plan shall contain all major conservations decisions to ensure that the entire un or units of land will be so treated to achieve the conservation objectives.

"*Erosion impact area*" means an area of land that is not associated with a current land disturbing activity but is subject to persistent soil erosion resulting in the delivery of sediment onto neighboring properties or into state waters. This definition shall not apply to any lots of parcel of land of 10,000 square feet or less used for residential shorelines where the erosion results from wave action or other coastal processes.

"ESC" means erosion and sediment control.

"*ESM plan*" means a soil erosion control and stormwater management plan, commonly referred to as the erosion control and stormwater management plan.

"*Flood fringe*" means the portion of the floodplain outside the floodway that is usually covered with water from the 100-year flood or storm event. This includes the flood or floodway fringe designated by the Federal Emergency Management Agency.

"Flooding" means a volume of water that is too great to be confined within the banks or walls of the stream, water body, or conveyance system and that overflows onto adjacent lands, thereby causing of threatening damage.

"Floodplain" means the area adjacent to a channel, river, stream, or other water body that is susceptible to being inundated by water normally associated with the 100-year floor or storm event. This included the floodplain designated by the Federal Emergency Management Agency.

"Flood-prone area" means the component of a natural or restored stormwater conveyance system that is outside the main channel. Flood-prone areas may include the floodplain, the floodways, the flood fringe, wetlands, riparian buffers, or other areas adjacent to the main channel.

"General permit" means a permit authorizing a category of discharges under the CWA and the VESMA within a geographical area.

"Hydrologic Unit Code" or *"HUC"* means a watershed unit established in the most recent version of Virginia's 6th Order National Watershed Boundary Dataset unless specifically identified as another order.

"*Impervious area*" or "*impervious cover*" means a surface composed of any material that significantly impedes or prevents natural infiltration of water into the soil. Impervious surfaces include, but are not limited to, roofs, buildings, streets, parking areas, and any concrete, asphalt, or compacted gravel surface.

"Inspection" means an on-site review of the project's compliance with any applicable design criteria, or an on-site review to obtain information or conduct surveys or investigations necessary in the implementation or enforcement of the VESMA and applicable regulations.

"*Intensely Developed Areas*" means those areas designated by the local government pursuant to 9VAC25-830-100.

"Karst area" means any land area predominantly underlain at the surface or shallow subsurface by limestone, dolomite, or other soluble bedrock regardless of any obvious surface karst features.

"Karst features" means sinkholes, sinking and losing streams, caves, large flow springs, and other such landscape features found in karst areas.

"Land disturbance" or *"land-disturbing activity"* means a manmade change to the land surface may result in soil erosion or has the potential to change its runoff characteristics including construction activity such as clearing, grading, excavating or filling of land.

"Land disturbing approval" means an approval allowing a land-disturbing activity to commence issued by the VESMP authority after the requirements of § 62.1-44.15:34 of the Code of Virginia have been met.

"Large construction activity" means construction activity including clearing, grading, and excavation, except operations that result in the disturbance of less than five acres of total land area. Large construction activity also includes the disturbance of less than five acres of total land area that is a part of a larger common plan of development or sale if the larger common plan will ultimately disturb five acres or more.

Large construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the facility.

"*Layout*" means a conceptual drawing sufficient to provide for the specified stormwater management facilities required at the time of approval.

"*Linear development project*" means a land-disturbing activity that is linear in nature such as, but not limited to, (i) the construction of electric and telephone utility lines, and natural gas pipelines; (ii) construction of tracks, rights-of-way, bridges, communication facilities and other related structures of a railroad company; (iii) highway construction projects; (iv) construction of stormwater channels and stream restoration activities; and (v) water and sewer lines. Private roads and streets shall not be considered linear development projects.

"Live watercourse" means a definite channel with bed and banks within which concentrated water flows continuously.

"Localized flooding" means smaller scale flooding that may occur outside of a stormwater conveyance system. This may include high water, ponding, or standing water from stormwater runoff, which is likely to cause property damage or unsafe conditions.

"Main channel" means the portion of the stormwater conveyance system that contains the base flow and small frequent storm events.

"Minimize" means to reduce or eliminate the discharge of pollutants to the extent achievable using stormwater controls that are technologically available and economically practicable.

"*Minor modification*" means minor modification or amendment of an existing permit before its expiration for the reasons listed at 40 CFR 122.63 and as specified in 9VAC25-875-1240. "Minor modification" for the purposes of this manual also means other modifications and amendments not requiring extensive review and evaluation, including changes in EPA promulgated test protocols, increasing monitoring frequency requirements, changes in sampling locations, and changes to compliance dates within the overall compliance schedules. A minor permit modification or amendment does not substantially alter permit conditions, substantially increase or decrease the amount of surface water impacts, increase the size of the operation, or reduce the capacity of the facility to protect human health or the environment.

"Natural channel design concepts" means the utilization of engineering analysis and fluvial geomorphic processes to create, rehabilitate, restore, or stabilize an open conveyance system for the purpose of creating or recreating a stream that conveys its bankfull stormwater event within its banks and allows larger flows to access its bankfull bench and its floodplain.

"Natural stream" means a tidal or nontidal watercourse that is part of the natural topography. It usually maintains a continuous or seasonal flow during the year and is characterized as bring irregular in cross-section with a meandering course. Constructed channels such as drainage ditches or swales shall not be considered streams; however, channels designed utilizing natural channel design concepts may be considered natural streams.

"New Development" means development where the predevelopment land cover condition is forested or mowed at a frequency of less than four times per year.

"Nonerodible" means a material, e.g., riprap, concrete, plastic, etc., that will not experience surface wear due to natural forces.

"Nonpoint source pollution" means pollution such as sediment, nitrogen, phosphorous, hydrocarbons, heavy metals, and toxics whose sources cannot be pinpointed but rather are washed from the land surface in a diffuse manner by stormwater.

"*Operator*" means the owner or operator of any facility or activity subject to the VESMA and this manual. In the context of stormwater associated with a large or small construction activity, "operator" means any person associated with a construction project that meets either of the following two criteria: (i) the person has direct operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications or (ii) the person has day-to-day operational control of those activities at a project that are necessary to ensure compliance with a stormwater pollution prevention plan for the site or other permit or VESMP authority permit conditions (i.e., the person is authorized to direct workers at a site to carry out activities required by the stormwater pollution prevention plan or comply with other permit conditions). In the context of stormwater discharges from an MS4, "operator" means the operator of the regulated MS4 system.

"*Owner*" means the same as that term is defined in § 62.1-44.3 of the Code of Virginia. For a regulated land-disturbing activity that does not require a permit, "owner" also means the owner or owners of the freehold of the premises or lesser estate therein, mortgagee or vendee in possession, assignee of rents, receiver, executor, trustee, lessee, or other person, firm, or corporation in control of the property.

"Peak flow rate" means the maximum instantaneous flow from a prescribed design storm at a particular location.

"Percent impervious" means the impervious area within the site divided by the area of the site multiplied by 100.

"Permit" means a VPDES permit issued by the department pursuant to § 62.1-44.15 of the Code of Virginia for stormwater discharges from a land-disturbing activity.

"Permittee" means the person to whom the Permit is issued.

"*Person*" means any individual, partnership, firm, association, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, county, city, town, or other political subdivision of the Commonwealth, governmental body, including a federal or state entity as applicable, any interstate body, or any other legal entity.

"Point of discharge" means a location at which concentrated stormwater runoff is released. "Point source" means any discernible, confined, and discrete conveyance including any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be

discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

"Pollutant discharge" means the average amount of a particular pollutant measured in pounds per year or other standard reportable unit as appropriate, delivered by stormwater runoff.

"Pollution" means such alteration of the physical, chemical, or biological properties of any state waters as will or is likely to create a nuisance or render such waters (a) harmful or detrimental or injurious to the public health, safety, or welfare, or to the health of animals, fish or aquatic life; (b) unsuitable with reasonable treatment for use as present or possible future sources of public water supply; or (c) unsuitable for recreational, commercial, industrial, agricultural, or other reasonable uses, provided that (i) an alteration of the physical, chemical, or biological property of state waters, or a discharge or deposit of sewage, industrial wastes or other wastes to state waters by any owner which by itself is not sufficient to cause pollution, but which, in combination with such alteration of or discharge or deposit to state waters by other owners, is sufficient to cause pollution; (ii) the discharge of untreated sewage by any owner into state waters; and (iii) contributing to the contravention of standards of water quality duly established by the State Water Control Board, are "pollution" for the terms and purposes of this ordinance.

"Post-development" means conditions that reasonably may be expected or anticipated to exist after completion of the land development activity on a specific site.

"*Predevelopment*" refers to the conditions that exist at the time that plans for the land-disturbing activity are submitted to the VESMP authority. Where phased development or plan approval occurs (e.g., preliminary grading, demolition of existing structures, or roads and utilities), the existing conditions at the time prior to the commencement of land-disturbing activity shall establish predevelopment conditions.

"*Prior developed lands*" means land that has been previously utilized for residential, commercial, industrial, institutional, recreation, transportation, or utility facilities or structures and that will have the impervious areas associated with those uses altered during a land-disturbing activity.

"Qualified personnel" means a person knowledgeable in the principles and practices of erosion and sediment and stormwater management controls who possesses the skills to assess conditions at the construction site for the operator that could impact stormwater quality and quantity and to assess the effectiveness of any sediment and erosion control measures or stormwater management facilities selected to control the quality and quantity of stormwater discharges from the construction activity.

"*Redevelopment*" means any reconstruction, alteration, improvement or replacement of existing development.

"*Regulations*" means the Virginia Erosion and Stormwater Management Program (VESMP) Regulation, 9VAC25-875, effective July 1, 2024.

"*Resource Management Area*" means that component of the Chesapeake Bay Preservation Area that is not classified as the Resource Protection Area.

"*Resource Protection Area*" means that component of the Chesapeake Bay Preservation Area comprised of lands adjacent to water bodies with perennial flow that have an intrinsic water quality value due to the ecological and biological processes they perform or are sensitive to impacts that may result in significant degradation to the quality of state waters.

"*Responsible land disturber*" or "*RLD*" means an individual holding a certificate issued by the department who is responsible for carrying out the land-disturbing activity in accordance with the approved erosion and sediment control plan. The RLD may be the owner, applicant, permittee, designer, superintendent, project manager, contractor, or any other project or development team member. The RLD must be designated on the erosion and sediment control plan or permit as defined in this chapter as a prerequisite for engaging in land disturbance.

"Runoff" or *"stormwater runoff"* means that portion of precipitation that is discharged across the land surface or through conveyances to one or more waterways.

"Runoff characteristics" includes maximum velocity, peak flow rate, volume, and flow duration.

"Runoff volume" means the volume of water that runs off the land development project from a prescribed storm event.

"Sediment basin" means a temporary impoundment built to retain sediment and debris with a controlled stormwater release structure.

"Sediment trap" means a temporary impoundment built to retain sediment and debris which is formed by constructing an earthen embankment with a stone outlet.

"Sheet flow" (also called overland flow) means shallow, unconcentrated and irregular flow down a slope. The length of strip for overland flow usually does not exceed 200 feet under natural conditions.

"Shoreline erosion control project" means an erosion control project approved by local wetlands boards, the Virginia Marine Resources Commission, the department, or the United States Army Corps of Engineers and located on tidal waters and within nonvegetated or vegetated wetlands as defined in Title 28.2 of the Code of Virginia.

"*Single family*" means a detached building containing only one dwelling unit surrounded by yards. Manufactured homes, mobile homes, travel trailers, housing mounted on self-propelled or drawn vehicles, tents, or other forms of temporary housing or portable housing are not included in this definition.

"*Site*" means the land or water area where any facility or land-disturbing activity is physically located or conducted, including adjacent land used or preserved in connection with the facility or land-disturbing activity. Areas channelward of mean low water in tidal Virginia shall not be considered part of a site.

"Site hydrology" means the movement of water on, across, through, and off the site as determined by parameters including soil types, soil permeability, vegetative cover, seasonal water tables, slopes, land cover, and impervious cover.

"Slope drain" means tubing or conduit made of nonerosive material extending from the top to the bottom of a cut or fill slope with an energy dissipator at the outlet end.

"Small construction activity" means:

1. Construction activities including clearing, grading, and excavating that results in land disturbance of equal to or greater than one acre and less than five acres. Small construction activity also includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one and less than five acres. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the facility. The department may waive the otherwise applicable requirements in a general permit for a stormwater discharge from construction activities that disturb less than five acres where stormwater controls are not needed based on an approved "total maximum daily load" (TMDL) that addresses the pollutants of concern or, for nonimpaired waters that do not require TMDLs, an equivalent analysis that determines allocations for small construction sites for the pollutants of concern or that determines that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. For the purpose of this subdivision, the pollutants of concern include sediment or a parameter that addresses sediment (such as total suspended solids, turbidity, or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. The operator shall certify to the department that the construction activity will take place, and stormwater discharges will occur, within the drainage area addressed by the TMDL or provide an equivalent analysis. As of the start date in Table 1 of 9VAC25-31-1020, all certifications submitted in support of the waiver shall be submitted electronically by the owner or operator to the department in compliance with this subdivision and 40 CFR Part 3 (including, in all cases, 40 CFR Part 3 Subpart D), 9VAC25-875-940, and Part XI (9VAC25-31-950 et seq.) of the Virginia Pollutant Discharge Elimination System (VPDES) Permit Regulation. Part XI of 9VAC25-31 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part XI of 9VAC25-31, permittees may be required to report electronically if specified by a particular permit.

2. Any other construction activity designated by either the department or the EPA regional administrator, based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to surface waters.

"Soil erosion" means the movement of soil by wind or water into state waters or onto lands in the Commonwealth.

"*Soil erosion and stormwater management plan*", commonly referred to as the erosion control and stormwater management plan, or “ESM plan”, means a document describing methods for controlling soil erosion and managing stormwater in accordance with the requirements adopted pursuant to the VESMA. The ESM plan may consist of aspects of the erosion and sediment control plan and the stormwater management plan as each is described in this manual.

"Stabilized" means land that has been treated to withstand normal exposure to natural forces without incurring erosion damage.

"State" means the Commonwealth of Virginia.

"State application" or *"application"* means the standard form or forms, including any additions, revisions, or modifications to the forms, approved by the administrator and the department for applying for a permit.

"State Board" means the Virginia State Water Control Board.

"State permit" means an approval to conduct a land-disturbing activity issued by the State Board in the form of a state stormwater individual permit or coverage issued under a state general permit or an approval issued by the State Board for stormwater discharges from an MS4. Under these state permits, the Commonwealth imposes and enforces requirements pursuant to the federal Clean Water Act and regulations, the Virginia Stormwater Management Act and the Regulations. "State Water Control Law" means Chapter 3.1 (§62.1-44.2 et seq.) of Title 62.1 of the Code of Virginia.

"State waters" means all water, on the surface and under the ground, wholly or partially within or bordering the Commonwealth or within its jurisdiction, including wetlands.

"Storm sewer inlet" means a structure through which stormwater is introduced into an underground conveyance system

"Stormwater" means precipitation that is discharged across the land surface or through conveyances to one or more waterways and that may include stormwater runoff, snow melt runoff, and surface runoff and drainage.

"Stormwater conveyance system" means a combination of drainage components that are used to convey stormwater discharge, either within or downstream of the land-disturbing activity. This includes:

1. "Manmade stormwater conveyance system" means a pipe, ditch, vegetated swale, or other stormwater conveyance system constructed by man except for restored stormwater conveyance systems;

2. "Natural stormwater conveyance system" means the main channel of a natural stream and the flood-prone area adjacent to the main channel; or

3. “Restored stormwater conveyance system” means a stormwater conveyance system that has been designed and constructed using natural channel design concepts. Restored stormwater conveyance systems include the main channel and the flood-prone area adjacent to the main channel.

"Stormwater detention" means the process of temporarily impounding runoff and discharging it through a hydraulic outlet structure to a downstream conveyance system.

"Stormwater management facility" means a control measure that controls stormwater runoff and changes the characteristics of that runoff including the quantity and quality, the period of release or the velocity of flow.

“Stormwater management plan” means a document containing material describing methods for complying with the requirements of a VESMP.

"*Stormwater Pollution Prevention Plan*" or "*SWPPP*" means a document that is prepared in accordance with good engineering practices and that identifies potential sources of pollutants that may reasonably be expected to affect the quality of stormwater discharges. A SWPPP required under a VESMP or VSMP for construction activities shall identify and require the implementation of control measures and shall include or incorporate by reference an approved erosion and sediment control plan, an approved stormwater management plan, and a pollution prevention plan.

"Subdivision" means the same as defined in Chapter 42.5 – Subdivision Ordinance of the Norfolk City Code.

"*Surface waters*" means:

1. All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide;

2. All interstate waters, including interstate wetlands;

3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

a. That are or could be used by interstate or foreign travelers for recreational or other purposes;

b. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

c. That are used or could be used for industrial purposes by industries in interstate commerce;

4. All impoundments of waters otherwise defined as surface waters under this definition;

5. Tributaries of waters identified in subdivisions 1 through 4 of this definition;

6. The territorial sea; and

7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in subdivisions 1 through 6 of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA and the law, are not surface waters. Surface waters do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other agency, for the purposes of the CWA, the final authority regarding the CWA jurisdiction remains with EPA.

"Temporary vehicular stream crossing" means a temporary nonerodible structural span installed across a flowing watercourse for use by construction traffic. Structures may include bridges, round pipes or pipe arches constructed on or through nonerodible material.

"Ten-year storm" means a storm that is capable of producing rainfall expected to be equaled or exceeded on the average of once in 10 years. It may also be expressed as an exceedance probability with a 10% chance of being equaled or exceeded in any given year.

"Total maximum daily load" or *"TMDL"* means the sum of the individual wasteload allocations for point sources, load allocations for nonpoint sources, natural background loading and a margin of safety. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure. The TMDL process provides for point versus nonpoint source trade-offs.

"Two-year storm" means a storm that is capable of producing rainfall expected to be equaled or exceeded on the average of once in two years. It may also be expressed as an exceedance probability with a 50% chance of being equaled or exceeded in any given year.

"Virginia Stormwater Management Act" or *"Act"* means Article 2.3 (§62.1-44.15:24 et seq.) of Chapter 3.1 of Title 62.1 of the Code of Virginia.

"Virginia Erosion and Stormwater Management Program" or *"VESMP"* means a program established by a VESMP authority for the effective control of soil erosion and sediment deposition and the management of the quality and quantity of runoff resulting from land-disturbing activities to prevent the unreasonable degradation of properties, stream channels, waters, and other natural resources. The program shall include such items as local ordinances, rules, requirements for permits and land-disturbance approvals, policies and guidelines, technical materials, and requirements for plan review, inspection, and enforcement consistent with the requirements of the VESMA.

"Virginia Erosion and Stormwater Management Program authority" or *"VESMP authority"* means the City of Norfolk(“ City”) or the City of Norfolk Department of City Planning, which is designated by the City to administer the VESMP.

"Virginia Pollutant Discharge Elimination System (VPDES) permit" or *"VPDES permit"* means a document issued by the department pursuant to the State Water Control Law authorizing, under prescribed conditions, the potential or actual discharge of pollutants from a point source to surface waters.

"*Virginia Stormwater BMP Clearinghouse*" means a collection that contains detailed design standards and specifications for control measures that may be used in Virginia to comply with the requirements of the VESMA and associated regulations.

"Virginia Stormwater Management Handbook" means a collection of pertinent information that provides general guidance for compliance with the VESMA and associated regulations and is developed by the department with advice from a stakeholder advisory committee.

"Wasteload allocation" or *"wasteload"* means the portion of a receiving surface water's loading or assimilative capacity allocated to one of its existing or future point sources of pollution. Wasteload allocations are a type of water quality-based effluent limitation.

"Water quality technical criteria" means standards set forth in regulations adopted pursuant to the VESMA that establish minimum design criteria for measures to control nonpoint source pollution.

"Water quantity technical criteria" means standards set forth in regulations adopted pursuant to the VESMA that establish minimum design criteria for measures to control localized flooding and stream channel erosion.

"Watershed" means a defined land area drained by a river or stream, karst system, or system of connecting rivers or streams such that all surface water within the area flows through a single outlet. In karst areas, the karst feature to which water drains may be considered the single outlet for the watershed.

"Wetlands" means those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

CHAPTER 2.0 STORMWATER MANAGEMENT PLAN PREPARATION

2.1 Stormwater Plan Review Process Overview

To protect the quality and quantity of state water from the potential harm of unmanaged stormwater runoff resulting from land-disturbing activities, the City requires all development and redevelopment which go through site plan review, as required in the Chapter 26, *Site Plan Review*, of the Zoning Ordinance of the City of Norfolk, and to comply with the applicable storm water technical criteria for regulated land-disturbing activities as determined in Section 2.3, below.

2.2 Exemptions

The following activities are exempt from City of Norfolk stormwater management technical criteria but may be subject to regulation under the City of Norfolk Municipal Separate Storm Sewer System permit where discharges from these activities enter the City storm sewer system:

1. Routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original construction of the project. The paving of an existing road with a compacted or impervious surface and reestablishment of existing associated ditches and shoulders shall be deemed routine maintenance if performed in accordance with this subsection;[1]
2. Single-family residences separately built and disturbing less than 2,500 square feet and not part of a larger common plan of development or sale, including additions or modifications to existing single-family detached residential structures;[2]
3. Land disturbing activities that disturb less than 2,500 square feet of land area except for land disturbing activities that are part of a larger common plan of development or sale that is 2,500 square feet or greater of disturbance
4. Discharges from a land-disturbing activity to a sanitary sewer or combined sewer system;[3]
5. Conducting land-disturbing activities in response to a public emergency where the related work requires immediate authorization to avoid imminent endangerment to human health or the environment. In such situations, the VESMP authority shall be advised of the disturbance within seven days of commencing the land-disturbing activity and compliance with the administrative requirements of 9VAC25-875-530 and Section 2.3 is required within 30 days of commencing the land-disturbing activity.
6. Activities under a State or federal reclamation program to return an abandoned property to an agricultural or open land use;
7. Clearing of lands specifically for bona fide agricultural purposes; the management, tilling, planting or harvesting of agricultural, horticultural, or forest crops, livestock feedlot operations, or as additionally set forth by the Board in regulations, including engineering operations as follows: construction of terraces, terrace outlets, check dams, desilting basins, dikes, ponds, ditches, strip cropping, lister furrowing, contour cultivating, contour furrowing, land drainage, and land irrigation. However, this exception shall not apply to harvesting of forest crops unless the area on which harvesting occurs is reforested artificially or naturally in accordance with the provisions of Chapter 11 (§ 10.1 – 1100 et seq.) of Title 10.1 of the Code of Virginia or is converted to bona fide agricultural or improved pasture use as described in subsection B of §10.1-1163 of the Code of Virginia;

8. Permitted surface or deep mining operations and projects, or oil and gas operations and projects conducted under the provisions of Title 45:1 of the Code of Virginia;

9. Linear development projects are exempt from the stormwater management requirements of these Standards provided that:
   - The project does not alter the predevelopment runoff characteristics of the land surface after the completion of construction and final stabilization;
   - The project is managed so that less than one (1) acre of land disturbance occurs on a daily basis;
   - The disturbed land where work has been completed is adequately stabilized on a daily basis. "Stabilized" means land that has been treated to withstand normal exposure to natural forces without incurring erosion;
   - The environment is protected from erosion and sedimentation damage associated with the land-disturbing activity;
   - The owner and/or construction activity operator designs, installs, implements, and maintains pollution prevention measures to:
     - Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters;
     - Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on-site to precipitation and to stormwater;
     - Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures;
     - Prohibit the discharge of wastewater from the washout of concrete;
     - Prohibit the discharge of wastewater from the washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials; and,
     - Prohibit the discharge of fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance.
   - The owner and/or construction activity operator provides reasonable assurance to the City of Norfolk that all of the above conditions will be satisfied by incorporating these conditions into an erosion and sediment control plan developed for the project.

[1] Routine maintenance does not include the wholesale replacement of an existing improvement

[2] Single family residence construction usually results in more than 2,500 square feet of land disturbance and generally requires a land disturbance permit.

[3] Discharges to the sanitary sewer system must be in accordance with either Chapter 39.1 or Chapter 39.2 of the Code of the City of Norfolk.

2.3 Stormwater Technical Criteria

Regulated land disturbance activities shall comply with the technical criteria contained in Part II B of the Virginia Erosion Control and Stormwater Management Regulations. Please see Chapter 10 for allowed exceptions.

Approved Stormwater Management Plans and Executed Agreements in Lieu of a Soil Erosion and Stormwater Management Plan shall be good for a period of five (5) years from the date of plan approval.

2.3.1 Single Family Home Construction

Single family home construction permit requirements are driven by the amount of land disturbance and whether the construction is part of a larger common plan of development. Single family home construction less than 10,000 square feet of land disturbance are not required to account for water quality or quantity. The water quantity criteria is met as long as the sheet flow from single family residential does not contribute to downstream erosion, sedimentation, or flooding . However, those properties that are greater than 2,500 square feet but less than 10,000 square feet of land disturbance are required to complete an Agreement in Lieu and ensure grading measures outlined in section 2.3.1.2 are met. Single family home construction with land disturbance greater than 10,000 square feet must account for both water quantity and quality and must have completed a Stormwater Management Plan. Tables 2.1 and 2.2 describe the permitting required for single family home construction depending upon whether the construction is stand alone or part of a larger common plan development (subdivision).

All single-family home construction sites greater than 2,500 square feet of land disturbance must provide appropriate drainage to avoid creating a nuisance to neighboring properties. If the City receives notice that a nuisance exists, a Notice of Violation may be issued. No Certificate of Occupancy will be granted until the Notice of Violation is complied with to the City's satisfaction. On-site drainage must be conveyed from the property to the City's right of way or to an existing drainage system capable of conveying the anticipated volume of storm water runoff. Any increase in the rate (cfs) or volume (CF) of stormwater discharge because of an increase in impervious area shall be conveyed to the City drainage system without impacting adjacent lots or downstream City drainage systems.

The Department of City Planning will review all single-family home construction sites that disturb less than 10,000 square feet. The Department of Public Works, Division of Storm Water Management will review single-family home construction >10,000 square feet land disturbance.

2.3.1.1 Grading and Drainage Requirements for Single-Family Dwellings

Development of new, single-family dwellings (SFD) within the City of Norfolk geographic boundary typically results in increased impervious area (dwelling, driveway, etc.), which results in increased site runoff (rate and volume). Site development should limit obstruction or negative impacts to drainage on adjacent properties. To avoid property damage to existing adjacent property owners, projects should maintain and properly convey drainage in the existing drainage pattern. This conveyance is usually obtained through the installation of a grassed swale or underdrain. City engineering staff may provide further assistance to the developer to identify cost effective, aesthetically pleasing, and low maintenance means to accomplish this goal. If conveyance cannot be met on the property, an exception may be requested through the Storm Water Engineer as explained in Chapter 10. The criteria provided herein have been developed to reduce the probability of property damage associated with increased flooding from new development, however avoiding property damage to other properties remains the owner or permittee's responsibility regardless of the criteria or other requirements provided in this manual.

A site grading plan must be submitted for review prior to land disturbance when the Developer/Builder intends to affect the direction, rate or volume of surface runoff from the site, including revised grades of a SFD site from existing conditions. In accordance with Section 42-20.2 and/or 42-20.3 of the City Code of Ordinances and Section 2.3.2 of the *Norfolk Design and Construction Manual* adopted by Ordinance in

Section 41.2, the Developer/Builder is required to obtain a Fill Permit. If the Developer/Builder obtains an approved site plan from the Department of City Planning that incorporates, at a minimum, the items outlined below in Section 2.3.1.2, the Fill Permit may be waived by the Director of Public Works, or their designee.

2.3.1.2 Storm Water Grading and Drainage Requirements

1. Topographic Survey prepared and certified as complete and accurate by a Professional Engineer (PE) or Licensed Land Surveyor (LS) is required. If the property does not require a VESMP, a qualified Registered Design Professional may certify. The survey shall meet the following requirements;

    a. Drawn to scale.

    b. All existing site features, including any areas to be filled or regraded (topographic contours and/or spot elevations).

2. Site Plan.
    a. The extent of the proposed grading within the area of land disturbance including elevations. Obstructing or increasing drainage to adjacent properties is prohibited.
    b. Site must demonstrate how new site grades will tie-in or match grade to existing grade on adjacent property(-ies).
    c. Location of any natural or man-made drainage system(s) which could be affected by grading modifications including any known easements, public or private. New grading may not block existing drainage.
    d. Provide detailed excavation spoil disposal plan. Disposal may include removal from the site or reuse on-site for regrading purposes. Provide a cut/fill analysis.
    e. Provide flow arrows to indicate site runoff.
        i. Runoff (including rain barrel overflow) must be directed to City right-of-way, an approved City-maintained drainage system, natural waterway or directly to waters of the United States.
        ii. Builder/Developer is encouraged to utilize low-impact design and maintain drainage on-site (e.g. Infiltration, Bioretention), so long as appropriate means are in place to ensure proper infiltration of runoff.
3. Developer/Builder must install gutters and downspouts to collect and convey runoff to City right-of-way, an approved City-maintained drainage system, natural waterway or directly to the Waters of the United States (WUS). A shallow swale may be necessary to achieve this. Indicate location of all gutter downspouts and direction of discharge. If drainage cannot be directed towards an approved location, a stormwater BMP shall be installed to manage the increase in runoff from the site without negatively impacting adjacent properties. If you are unable to install gutters or downspouts, demonstrate how the flow is directed away from the property and adjacent parcels.
4. All improvements and tie-ins to the City right-of-way are subject to inspection by the Department of Public Works, Stormwater Management Division, Department of Transit, Right of Way and Department of City Planning
5. Inspections must be completed on the grading aspect of the site prior to issuance of an occupancy permit.

a. Provide an As-Built, prepared and certified as complete and accurate by a Professional Engineer (PE) or Licensed Land Surveyor (LS). If the property does not require a VSMP, a qualified Registered Design Professional may certify.
   i. Drawn to scale.
   ii. All newly constructed site features, including any areas filled or regraded (topographic contours and/or spot elevations), location, size, depth, and invert elevations of any stormwater control features.
   iii. See Appendix 6Ffor completed list of required features.
b. Final occupancy permits will not be issued until the as-builts are reviewed by the Department of Public Works or Department of City Planning staff to verify site conditions match the approved site plan.

2.3.1.3 Agreement in Lieu of a Soil Erosion Control and Stormwater Management Plan for Single Family

An Agreement in Lieu of a Soil Erosion Control and Stormwater Management Plan shall be submitted for single family construction when a developer is disturbing 2,500 square feet but less than 10,000 square feet assuming all city infrastructure is present, the property is not multi-family or part of a common plan of development. The Agreement in Lieu of a Soil Erosion Control and Stormwater Management Plan for Single Family can be found in the Appendices.

Land disturbance greater than 10,000 square feet requires compliance with water quality standards and all other major site plan review requirements.

Table 2.1: Stand-Alone Single Family Home Permitting

Single Family Construction Land Disturbance	Erosion and Sediment Control Approval Required?	Stormwater Management Plan Approval or Executed Agreement in Lieu of a Soil Erosion Control and Stormwater Management Plan Required?	Construction General Permit Required?
2,500 sq. ft - 10,000 sq ft	Agreement in Lieu	Agreement in Lieu.	No
10,001 sq ft – 1 acre	Yes	Yes (Stormwater Management Plan)	No
Disturbance ≥ 1 acre	Yes	Yes (Stormwater Management Plan)	Yes

Table 2.2: Single Family Home Permitting Within a Common Plan of Development greater than 1 acre.

Single Family Construction, Part of a Larger Development Plan	Erosion and Sediment Control Approval Required?	Stormwater Management Plan Approval or Executed Agreement in Lieu of a Soil Erosion Control and Stormwater Management Plan Required?	Construction General Permit Required?
2,500 sq. ft – 10, 000 sq. ft	Yes (Agreement in Lieu)	Yes (Plan from larger development may qualify)	Yes
10,001 sq ft – 1 acre	Yes (Agreement in Lieu)	Yes (Plan from larger development may qualify)	Yes
Disturbance ≥ 1 acre	Yes	Yes (Plan from larger development may qualify)	Yes

Below are examples of instances where, as the Virginia Stormwater Management Program (VESMP) Authority, the Department of City Planning may utilize the Common Plan of Development when determining VESMP requirements:

- Commercial and/or industrial properties where a regional BMP was previously designed to cover maximum buildable areas within a contiguous area.
- Large-scale contiguous developed properties phased over multiple years.
- Multiple contiguous single-family infill lots that are developed in a previously subdivided area or outlined in a previously approved master plan.
- Development of more than two (2) single-family dwellings.
- A subdivision that creates more than two (2) buildable lots.
- Lots that can be divided to create more than two buildable lots.
- Single-family infill lots that may cause nuisance flooding to either adjacent or downstream private property or City right-of-way.

The Common Plan of Development can be used to cover projects that otherwise may be exempted from Site Plan Review, subdivision ordinances, or other staff review to ensure compliance with state and City-administered stormwater quality and quantity requirements.

If your project meets the definition of a Common Plan of Development as outlined by the Council-adopted Manual and state regulations, you will be required to obtain a VESMP permit for the total development site

if the site is larger than 1 acre, including development of a stormwater management plan outlining how you intend to address water quality and quantity. If a VESMP permit is not required, a land disturbance will be required. Additional permits/approvals required are Erosion and Sediment Control approval and a Construction General Permit.

2.3.2 Fill Permit Required

Before any filling is done by any person in any area in the City which could affect the direction, rate or volume of surface flow from one property onto another or onto a public right of way, a fill plan shall be filed with the Director of Public Works, or their designee. This fill plan can be incorporated into site plans for a site and must contain, at a minimum, the following items:

1. A survey drawn to scale, certified as complete and accurate by a professional engineer, landscape architect or a certified land surveyor, which clearly delineates:
    a. The existing topography of the area proposed to be filled or graded shown by contour lines;
    b. The location, elevation, extent, and type of proposed fill or grading shown by contour lines and total fill and disturbed area calculations; and,
    c. The location of natural drainage areas which would or could be obstructed by the fill.
2. Appropriate erosion and sedimentation control procedures as required by Chapter 15 of the City Code.
3. A description of the purpose and necessity of the filling or grading.
4. Any additional information or data the Director of Public Works or his designee requests to complete their review of the fill plan.

If the builder/developer obtains an approved Site Plan from the Department of City Planning that incorporates, as a minimum, the items outlined in Section 2.3.1.2, the Fill Permit may be waived by the Director of Public works or their designee. The issuance of a fill permit does not convey property rights in either real or personal property, or exclusive privileges, nor does it authorize injury to private property or invasion of personal property rights, nor infringement of any other federal, state or local law or regulation.

2.3.3 Chesapeake Bay Land Disturbing Activities

After July 1, 2014, commercial, industrial, institutional, and multi-family projects disturbing between 2,500 square feet and 43,559 square feet, which are not part of a larger common plan of development or sale, do not require coverage under a general permit. These sites still require coverage under a land disturbing permit issued by the City of Norfolk and are also subject to the stormwater management technical criteria and stormwater management plan criteria of Chapter 42.1 of the Code of the City of Norfolk and this Design Manual.

The original or subsequent owners of commercial, industrial or institutional lots within larger common plans of development may utilize the stormwater management plan approved for the common plan of development to satisfy the requirement for the preparation of a stormwater management plan for their individual lot or parcel provided the development is conducted in conformance with the previously approved stormwater management plan and the water quality and quantity control features designed and installed to treat runoff from the lot are installed and functioning in accordance with their approved design.

All development equaling or exceeding one acre (43,560 square feet) of land disturbance must obtain coverage under the general permit and provide proof of general permit coverage to the City of Norfolk prior to the issuance of a land disturbance permit.

2.3.4 Construction Laydown Areas

Construction laydown area permit requirements are driven by the amount of land disturbance and whether or not the laydown area is contiguous to the project site. For laydown areas contiguous to other land disturbing activities, the process for permitting may be included with the remainder of the site.

When the construction laydown area is not contiguous to the site, and the laydown area is not covered under a CGP, the contractor shall submit the site plan for the laydown area through the normal review process. Areas greater than 1 acre will be required to obtain a Construction General Permit. Areas less than 1 acre in size require coverage under a land disturbing permit issued by the City of Norfolk and are required to submit a Stormwater Management Plan meeting the requirements of Section 2.4.1. The contractor shall restore the site to preconstruction condition.

2.4 Development of the Stormwater Management Plan

As a part of the site plan review process, a stormwater management plan must be developed and submitted to the City of Norfolk for review for all land disturbance exceeding 2,500 square feet. The Department of City Planning is responsible for site plan review and for distributing site plans to additional departments for review. The Department of Public Works, Storm Water Management Division reviews stormwater management for water quantity and quality calculations and stormwater management facility design. Where stormwater runoff is comingled with other sources of surface or subsurface water runoff from a site, the stormwater management plan must consider the combined flow in its totality regardless of source. Stormwater management plans are not considered submitted for review until any required plan review fees are paid to the City of Norfolk by the applicant.

2.4.1 Stormwater Management Plan Contents

The required elements of the stormwater management plan shall follow Part II B of the Virginia Erosion Control and Stormwater Management Regulations. For a stormwater management plan to be considered complete, it must contain the following elements:

1. Information on the type of and location of stormwater discharges, information on the features to which stormwater is being discharged including surface waters if present, and predevelopment and post-development drainage areas;

2. Contact information including the name, address, and telephone number of the owner and the tax reference number and parcel number of the property or properties affected;

3. A narrative that includes a description of pre-development site conditions and post-development site conditions;

4. A general description of the proposed stormwater management facilities and the mechanism through which the facilities will be operated and maintained after construction is complete;

5. Any existing BMP proposed to be removed and/or replaced during the site development or redevelopment process shall be specifically identified and approval of such removal and/or replacement shall require the written approval of both Public Works Storm Water Management Division and the City Attorney.

6. Under the provisions of Ch. 41.1-4 (pollution of the stormwater system) in an effort to minimize the infiltration and/or runoff potential of petroleum-based materials, provide oil/water separators for contributory drainage areas serving vehicle fueling canopies, underground storage tank fill areas, and solid waste dumpster enclosures. Coordinate with the Building Official's office for proper placement of the OWS on-site so that fuel- and/or pollutant-laden runoff is processed through the OWS to the maximum extent practicable prior to tie-in to the stormwater system.

7. Information on *each* of the proposed on-site stormwater management facilities, including:

    a. the type of facility;

    b. its location, including geographic coordinates;

    c. the square feet and acreage treated;

    d. the surface waters into which each facility will discharge. For interconnected stormwater management features, the ultimate receiving water for each series of interconnected features should be reported;

    e. documentation and calculations verifying compliance with the applicable water quality and quantity requirements for all areas within the limit of disturbance (LOD) inclusive of work within the right-of-way (ROW), including a summary of pre- and post-development land cover totals for forest/open space, managed turf, and impervious surface area;

    f. the elevation of the seasonally high groundwater table (GWT) at each BMP. If the GWT intersects the BMP section, provide impermeable liner and buoyancy calculations;

    g. water quantity/quality storage required and provided (in cubic feet);

    h. a sequence of when each BMP will be installed in the construction project; and,

    i. the following elevations for each BMP shall be provided: (i) water quality (1-inch) storm event; (ii) 1-, 2-, and 10-year 24-hour storm events (NOAA Atlas 14); and (iii) the seasonal high groundwater table (GWT).

8. Hydrologic and hydraulic computations, runoff characteristics including site specific testing and determination of the depth to seasonal high groundwater for all BMP's, and the infiltration rate for runoff reduction BMP's;

9. A survey map or maps of the site that depict the topography of the site and that include:

    a. All contributing drainage areas;

b. Existing streams, ponds, culverts, ditches, wetlands, other water bodies, Chesapeake Bay Preservation Area features and any associated buffers, and floodplains;

c. Soil types, forest cover, and other vegetative areas;

d. Current land use including existing structures, roads, and locations of known utilities and easements;

e. Sufficient information including spot elevations, downstream existing drainage outfalls, and obstructions to flow such as fences and trees on the five (5) adjoining parcels to assess the impacts of stormwater from the site on these parcels and to ensure there are no upstream or downstream effects;

f. The limits of clearing and grading, and the proposed drainage patterns on the site;

g. Proposed buildings, roads, parking areas, utilities, and stormwater management facilities; and

h. Proposed land use with tabulation of the percentage of surface area to be adapted to various uses, including but not limited to planned locations of utilities, roads, and easements;

10. If an operator intends to meet the water quality requirements established by Part II B of the Virginia Stormwater Management Regulations through the use of off-site compliance options, where applicable, then a letter of availability from the off-site provider must be included. If eligible, credit offsets can be purchased at an approved bank.

11. A tabulation of practices to be employed on the site to meet "Component 2: Stormwater Management" requirements of the Resiliency Quotient (RQ) of Section 5.12 of the Zoning Ordinance shall be provided. The tabulation will provide a summary of the RQ points attributable to each practice and whether the practice has quantifiable water quality and water quantity (runoff reduction) benefits using industry acceptable methodology. Supporting calculations shall be provided for each quantifiable practice being proposed.

2.4.2 Certification Requirements for Plan Preparation

Elements of the stormwater management plans that include activities regulated under Chapter 4 (§54.1-400 et seq.) of Title 54.1 of the Code of Virginia shall be appropriately sealed and signed by a professional registered in the Commonwealth of Virginia pursuant to Article 1 (§ 54.1-400 et seq.) of Chapter 4 of Title 54.1 of the Code of Virginia.

Topographic Surveys and As-Builts must be prepared and certified as complete and accurate by a Professional Engineer (PE) or Licensed Land Surveyor (LS). If the property does not require a VSMP, a qualified Registered Design Professional may certify.

2.4.3 Maintenance Plan Requirements

Prior to land disturbance permit issuance, the applicant must prepare and submit for formal review and approval a BMP Maintenance Manual as described in 7.2.1 and an executed Declaration of Covenants for the proposed permanent stormwater management facilities on the project site.

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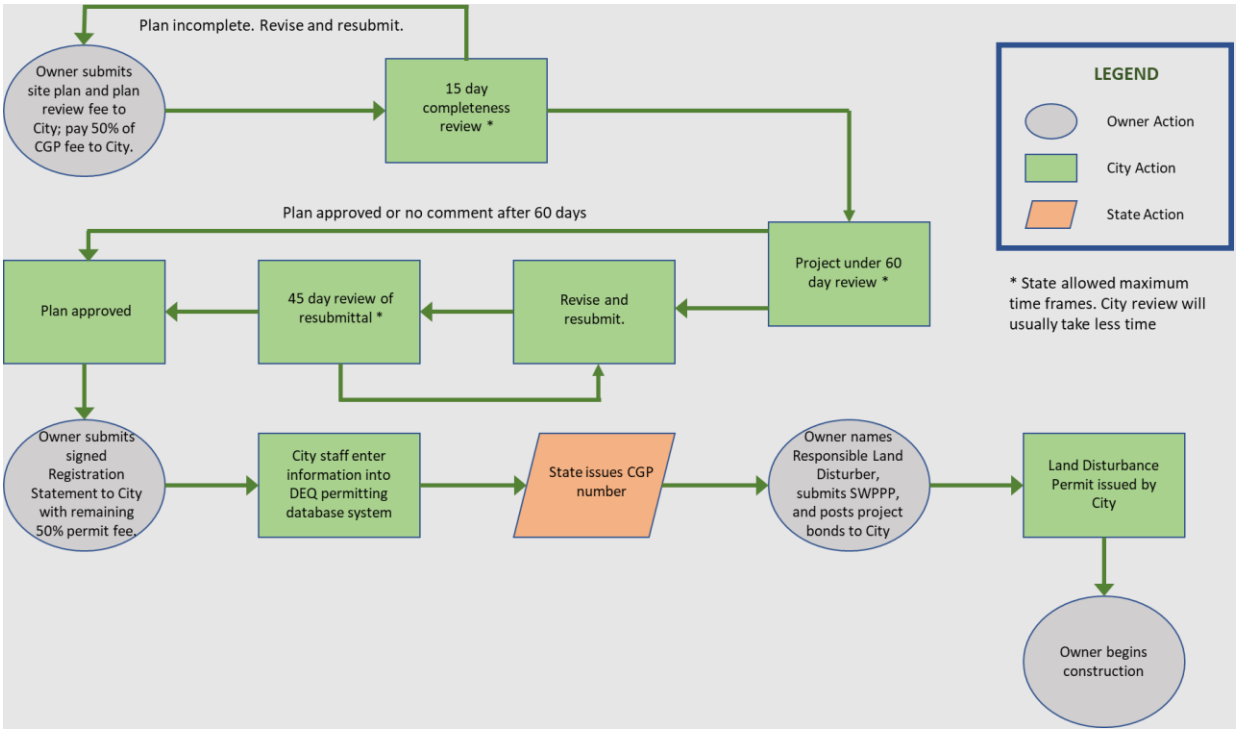
CHAPTER 3.0 STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL PLAN REVIEW PROCESS

3.1 Stormwater Approval Process

Stormwater runoff is regulated by federal, state and local laws and regulations. The purpose of these regulations is to limit the amount of pollutants that are discharged into the waterways around the City of Norfolk with stormwater. A key aspect of the program for reducing pollution in stormwater runoff is the treatment of stormwater runoff both during and after construction within urban areas like Norfolk. Runoff from construction activities and from the completed projects is controlled through design practices contained in the project plans. These plans are reviewed by the Department of City Planning, Bureau of Environmental Services for erosion and sediment control compliance and by the Department of Public Works, Storm Water Management Division for stormwater quality and runoff reduction compliance. Figure 3.1 depicts the stormwater plan review and approval process.

Figure 3.1: Stormwater Plan Approval Process



The City of Norfolk will enter project information into the state developed e-Permitting system on behalf of the owner / applicant and will notify the Commonwealth via the e-Permitting system when the stormwater plan and erosion and sediment control plans are approved.

3.2 Stormwater Management Plan Completeness Review

Upon receipt of a stormwater management plan, the plan will be reviewed for completeness. All required fees shall be paid by the applicant to the City of Norfolk prior to issuance of the coverage under the VESMP Authority Permit. Incomplete fee payments are deemed non-payments. The applicant will be notified within fifteen (15) days of receipt as to whether the plan is complete and if incomplete, what items are required to be submitted for the plan to be considered complete.

3.3 Stormwater Management and Erosion and Sediment Control Plan Technical Review

Upon receipt of a complete stormwater management plan, the plan will be reviewed for compliance with the technical criteria of Part II B of the Regulations, Chapter 42.1 of the code of the City of Norfolk, the latest guidance from Virginia DEQ design manual. The erosion and sediment control plan will be reviewed for compliance with the Virginia Erosion and Sediment Control Law and Regulations, Chapter 15.1 of the code of the City of Norfolk, the latest guidance from Virginia DEQ, and this design manual by the Department of City Planning – Bureau of Environmental Services.

3.4 Stormwater Management and Erosion and Sediment Control Plan Approval or Disapproval

The results of the technical review will be communicated to the applicant and the plan will be deemed approved or not approved. For plans where the applicant was notified that the plan was complete within 15 days from submittal, the City will have up to sixty (60) additional days to perform the stormwater management plan technical review. For plans reviewed by the City where no written notification of plan completeness was provided to the applicant, the City will perform the technical review within sixty (60) days of the date of initial stormwater management plan submittal to the City. For plans deemed not approved, the applicant must revise and resubmit the stormwater management plan and/or erosion and sediment control plan for technical review to the Department City Planning-Bureau of Environmental Services. Revised plans will be reviewed and approval or disapproval with written comments will be provided to the applicant within forty-five (45) days of resubmittal.

3.5 Plan Modification

The approved stormwater management plan or erosion and sediment control plan may only be modified by the applicant after the submittal of the proposed modification to the Department of City Planning and the proposed stormwater management plan modification reviewed by the Department of Public Works, Storm Water Management Division staff and the proposed erosion and sediment control plan modifications reviewed by the Department of City Planning – Bureau of Environmental Services.

CHAPTER 4.0 EROSION AND SEDIMENT CONTROL PLAN REQUIREMENTS

All projects having land disturbance of 2,500 square feet or more, excluding single family residences disturbing between 2,500 square feet and one acre, are required to submit and obtain approval of an erosion and sediment control plan prior to land disturbance. Single family residences between 2,500 square feet and 10,000 square feet are handled by having the owner/developer sign an agreement in lieu of an erosion and sediment control plan. Projects that are 10,000 square feet to one acre are required to submit and obtain approval of an erosion and sediment control plan prior to land disturbance.

4.1 Standard Erosion and Sediment Control Plan

All erosion and sediment control plans must comply with Title 62.1, Chapter 3.1, Article 2.4 of the Code of Virginia, including the applicable regulations. Generally, all erosion and sediment control plans must include a map or maps depicting proposed structural and non-structural measures and associated details, limits of disturbance (LOD) of all on-site and off-site work, City of Norfolk Standard Erosion and Sediment Control Notes, an erosion and sediment control narrative, temporary and permanent vegetative stabilization specifications, calculation of the total site area and proposed amount of land disturbance, Virginia Stormwater Management Program General Permit for Stormwater Discharges from Construction Activities note (if required), and preconstruction conference note.

The plans are reviewed by a Virginia DEQ certified erosion and sediment control plan reviewer who utilizes the Virginia Department of Environmental Quality plan review checklist, and the plan is either approved or disapproved within 60 days of plan submittal. For plans disapproved, the reason(s) for plan disapproval are communicated to the applicant in writing. Prior to the issuance of a land disturbance permit, the owner or applicant must name a Responsible Land Disturber (RLD) who will assume the responsibility of site compliance with the Erosion and Sediment Control ordinance.

4.2 Agreement In-Lieu of a Plan

For land disturbance of greater than 2,500 square feet but less than 10,000 square feet on a single-family residential lot, the land disturber may choose to file an agreement in lieu of an erosion and sediment control plan with the Department of City Planning. Prior to the execution of the agreement in lieu of a plan, the owner or applicant must name a Responsible Land Disturber (RLD) who will assume the responsibility of site compliance with the Erosion and Sediment Control ordinance. The agreement in lieu of an erosion and sediment control plan form can be found in Appendix 6 of this stormwater design and construction manual.

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CHAPTER 5.0 STORMWATER QUALITY AND QUANTITY TECHNICAL CRITERIA

5.1 General Criteria Applicable to Water Quality and Quantity Compliance

The following items apply to regulated land disturbing activities within the City of Norfolk following Part II B criteria and the Regulations that apply to a particular land disturbance project.

Stormwater harvesting is encouraged for the purposes of landscape irrigation systems, fire protection systems, flushing water closets and urinals, and other water handling systems to the extent such systems are consistent with federal, state, and Norfolk Health Department regulations. The preservation of open space, maintenance or creation of natural buffers and other low impact design practices are encouraged as a means to both reduce the volume of stormwater runoff and improve runoff quality. The City is committed to meeting the spirit and intent of its Total Maximum Daily Load (TMDL) requirements for pollutant sources and encourages implementation of a managed meadow around all new stormwater retention, detention, or constructed wetland basins. Infiltration practices are generally discouraged in the City of Norfolk due to the presence of a high ground water table and poor soils. Any stormwater management facilities designed to detain, retain or treat stormwater runoff proposed to be constructed in City rights of way and on City property other than school property are subject to the review and approval of the Director of Public Works or their designee.

Best Management Practices that are preferred on City property:

1. Manufactured Treatment Devices
   Examples that are currently accepted at time of Stormwater Construction Manual publication:
   a. CDS- Hydrodynamic Separator
   b. Hydro Downstream Defender
   c. Hydro First Defense
   d. Old Castle Dual Vortex Separator
   e. Hydroworks Hydrostorm
   f. Bioclean Sciclone
   g. Contech Cascade Separator
   h. Filterra

   *Please refer to the DEQ BMP Clearinghouse website for the most up to date list of approved MTD's. Only those that are on the list at the time of plan approval will be accepted. *

2. Underground storage/detention
3. Extended Detention Pond
4. Wet Pond
5. Grass Channel
6. Rooftop (Impervious Surface) Disconnection
7. Sheet Flow to Vegetated Filter Strip/Conserved Open Space
8. Vegetated Roof
9. Rainwater Harvesting
10. Dry Swales

11. Wet Swales
12. Constructed Wetlands
13. Filtering Practices (those that do not include media cartridges)

Best Management Practices that will be accepted on a case-by-case basis on City property:

1. Soil Compost Amendment
2. Permeable Pavement
3. Infiltration Practices
4. Bioretention (including Urban Bioretention)

Under certain circumstances, and subject to certain conditions, offsite compliance options may be utilized to meet the water quality requirements of these regulations in accordance with and 9VAC25-875-600. In accordance with Virginia Code §62.1-44.15:35, Virginia requires localities to allow the purchase of nutrient offsets for compliance with stormwater non-point nutrient runoff water quality criteria. The city allows projects with less than 5 acres of land disturbance to purchase credits. For sites under 5 acres where onsite compliance is not feasible, the Director of Public Works or their designee may grant a waiver to this requirement if justification and engineering analysis is provided and approved. Projects must demonstrate on-site control of at least 75% of the required phosphorus reductions prior to purchasing credits for developments exceeding 5 acres of land disturbance. If eligible, credit offsets can be purchased at a DEQ certified bank. Even if offsite water quality compliance options are used, all site water quantity requirements must be satisfied on the project site. Where nutrient credits are proposed to meet the required pollutant reduction in whole or in part, the applicant must submit proof of credit availability from an approved nutrient bank to the City with the stormwater management plan and shall submit proof of purchase of nutrient credits to the City prior to land disturbance permit issuance.

Sites discharging to either Lake Whitehurst or Lake Wright are considered to be sources of pollution of the stormwater system and/or the water system (http://norfolk.elaws.us/code/coor_ch46.1_artiv_sec46.1-46). Sites which directly discharge into Lake Whitehurst or Lake Wright are required to provide 100% on-site water quality treatment per directive from the Department of Utilities. The purchase of off-site nutrient credits will not be allowed.

5.2 Technical Criteria of Part II B of the Virginia Stormwater Management Regulations

In order to protect the quality of state waters and to control the discharge of stormwater pollutants from regulated activities, the following minimum design criteria and statewide standards for stormwater management shall be applied to the site.

5.2.1 New Development

The total phosphorus load of new development projects shall not exceed 0.41 pounds per acre per year, as calculated pursuant to 9VAC25-875-590. Please verify alignment with the latest approved Virginia Runoff Reduction Method (VRRM) criteria from DEQ.

5.2.2 Redevelopment

For redevelopment projects, under no case will the total phosphorus load be required to be reduced to below the applicable standard for new development.

For regulated land-disturbing activities defined as redevelopment that disturb greater than 2,500 square feet and less than one acre, the total phosphorus load shall be reduced at least 10% below the predevelopment total phosphorus load.

For regulated land-disturbing activities defined as redevelopment that disturb greater than or equal to one acre, the total phosphorus load shall be reduced at least 20% below the predevelopment total phosphorus load.

5.2.3 Water Quality Compliance

Projects subject to the requirements of Part II B of the Regulations shall meet the water quality standards found at 9VAC25-875-590.

5.2.4 Design Storms and Hydraulic Methods

The prescribed design storms are the one-year, two-year, and 10-year 24-hour storms using the site-specific rainfall precipitation frequency data recommended by the U.S. National Oceanic and Atmospheric Administration (NOAA) Atlas 14. Partial duration time series shall be used for the precipitation data.

The following steps should be used for calculating storm water runoff.

1. Use the Norfolk Master Storm Drain Plan sheets or other appropriate mapping with elevation information to delineate drainage basin boundaries for the site. Outline the drainage area contributing storm water runoff to the site and include off-site drainage areas that contribute runoff discharge through the project site.
2. Measure drainage area and project site area in acres. Measure impervious area of project site for existing and proposed conditions. Impervious area shall include pavement, buildings, roofs and any other surface including permanent water bodies which do not allow infiltration of water into the soil. Concrete, asphalt, and gravel surfaces are also considered impervious.
3. Based on size of drainage area contributing runoff to the site, use Table 5.1 to choose the runoff calculation method.
4. Calculate storm water runoff for design of the storm drain system.

All hydrologic analyses shall be based on the existing watershed characteristics and how the ultimate development condition of the subject project will be addressed.

The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) synthetic 24-hour rainfall distribution and models, including, but not limited to TR-55 and TR-20; hydrologic and hydraulic methods developed by the U.S. Army Corps of Engineers; or other standard hydrologic and hydraulic methods, shall be used to conduct hydraulic analysis for projects subject to Part II B of the Regulations.

5.2.5 Use of BMPs from the Virginia BMP Clearinghouse Required

The BMPs listed on the Virginia Stormwater BMP Clearinghouse on the DEQ website are approved for use as necessary to effectively reduce the phosphorus load and runoff volume in accordance with the Virginia Runoff Reduction Method.

Other approved BMPs found on the Virginia Stormwater BMP Clearinghouse Website may also be utilized. Design specifications and the pollutant removal efficiencies for all approved BMPs are found on the Virginia Stormwater BMP Clearinghouse.

Where a BMP listed on the Virginia BMP Clearinghouse contains Coastal Plain design considerations, these considerations shall be employed during the design of the BMP within the City of Norfolk.

When the Forest and Open Space land use category is used in runoff reduction spreadsheet calculation, the area accounted for in this category will be considered a BMP, with required covenants and maintenance plans provided. Use of this land use category should emphasize conservation and/or restoration of hydrologically functional natural landscapes, as defined by Virginia DEQ in Guidance Memo 16-2001.

5.2.6 Stormwater Pollutant Removal Calculations

Most projects which go through site plan review are required to have stormwater Best Management Practices (BMP) to achieve post-construction water quality compliance. BMPs are methods of improving the quality of storm water runoff from developed land. The following steps should be used for selection and design of a BMP. Some BMPs may also be used for quantity control of storm water runoff.

Subdivisions Creating New Buildable Lots:

a. Determine the maximum buildable zoning, wetlands or dune/beach, and buffer area requirements. Determine the area of proposed off-site impervious surfaces such as streets and parking.

b. Calculate the pollutant removal efficiency requirements for the proposed parcel(s) and off-sire improvements assuming full coverage of maximum building area with impervious surfaces. See the steps outlined above for **New Development** or **Redevelopment.**

c. Identify the type of BMP necessary to meet the pollutant removal requirement that is also consistent with maximum building area, soils conditions, depth to groundwater, and other appropriate site limitations of the proposed subdivision.

d. Identify with a note on the plat the maximum buildable area of each parcel and the type of BMP needed to meet the removal requirement. The detail needed for the note will be determined by type of BMP. At a minimum, the note will include type of BMP (e.g. infiltration practices, detention/ retention) and the location (Public vs. private property, inside or outside buffer area). It is the option of the developer to identify a building area less than the maximum in order to reduce the pollutant removal requirement, as long as minimum buildable area, parking, circulation and road width requirements are met.

1. Required Site Data:

a. Identify environmental site features such as wetlands, CBPA buffer zone and coastal primary sand dunes and obtain preliminary approval from the Department of City Planning, Bureau of Environmental Services for location and size of proposed impervious surfaces (e.g. buildings and parking areas). Preliminary approval is required for structural BMP's located in the CBPA buffer zone.

b. Conduct a minimum of one, ten-foot piezometer test to determine seasonal high groundwater table.

c. Obtain a minimum of one soil sample, taken two feet above the groundwater table or at the bottom of the proposed BMP Structure to determine classification, permeability coefficient, infiltration rate, and plastic and liquid limits. For infiltration facilities, modified grass swales, and bioretention basins and swales, more soil samples are required to include the above soil information. Additionally, for bioretention or infiltration practices, the site-specific permeability must be calculated at the proposed location of each measure.

5.2.7 Best Management Practices

1. BMP Design:

Design the BMP using the guidelines found in the latest edition of the Virginia Stormwater Management Handbook. Some BMPs, such as retention and detention basins, may also be used for storm water quantity control. Other types of BMPs may be accepted by the City if supporting data can demonstrate an acceptable pollutant removal efficiency.

2. Maintenance Agreement:

A maintenance agreement is required from the property owner by the City and is included in Appendix 5. Easement requirements for maintenance access to BMPs are discussed in Section 5.3.1.

3. Design for Multi-Use Facilities:

Construction of BMPs which result in a pond, lake, or wetlands can provide additional benefits beyond the design intent of pollutant reduction. Although not specifically required by existing criteria and regulations, design of BMPs for multi-use benefits is encouraged. The designer should consult the Storm Water Management Division concerning additional features which could be incorporated into the BMP design. Typical additional benefits which can be designed into BMPs include:

- Wetlands Mitigation
- Public Use and Education
- Wildlife Habitat Creation
- Improved Site Aesthetics
- Water Supply Protection

A more detailed discussion of how these additional benefits could be incorporated into the BMP design and a technique for introducing alternative BMP technologies are included in the Norfolk Storm Water Management Plan.

5.2.8 Stream Channel Erosion and Flooding Prevention

Erosion to streams and ditches shall be prevented by designing to the requirements of 9VAC25-875-710 of the Regulations. Flooding shall be prevented by designing to the requirements of 9VAC25-875-720 of the Regulations.

5.2.9 Design Storms and Hydraulic Methods

Determination of flooding and channel erosion impacts to receiving streams due to land disturbing activities shall be measured at each point of discharge from the land disturbance and such determination shall include any runoff from the balance of the watershed that also contributes to that point of discharge.

The specified design storms shall be defined as either a 24-hour storm using the rainfall distribution recommended by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) when using NRCS methods or as the storm of critical duration that produces the greatest required storage volume at the site when using a design method such as the Modified Rational Method.

For purposes of computing runoff, all pervious lands in the site shall be assumed prior to development to be in good condition (if the lands are pastures, lawns, or parks), with good cover (if the lands are woods), or with conservation treatment (if the lands are cultivated); regardless of conditions existing at the time of computation. Pre-development and post-development runoff rates shall be verified by calculations that are consistent with good engineering practices.

Outflows from a stormwater management facility or stormwater conveyance system shall be discharged to an adequate channel.

The storm drain system shall be designed for the 10-year frequency storm and it shall be checked to meet the following requirement:

> **The post-development peak runoff discharge rate from the 10-year frequency storm shall not exceed the respective predevelopment discharge rates for the 10-year frequency storm.**

If the proposed storm water drainage system does not limit the post-development peak runoff discharge rate to equal the predevelopment rate for the 10-year frequency storm, the system design shall be modified to meet this requirement. The peak runoff discharge rate shall be defined as the maximum runoff rate leaving the site and discharging into a natural or man-made receiving channel, pipe, or storm drain system at each point of discharge.

If the City determines that the site is not required to limit its post-development peak discharge rate to the predevelopment peak discharge rate for the 10-year storm, the site shall meet the requirements for discharging to an adequate channel as described in *The Virginia Storm Water Management Handbook* Control Minimum Standard #19, *Virginia Erosion and Sediment Control Regulations* (9VAC25-875). *The Virginia Storm Water Management Handbook*, 2024, Chapter 5 describes how to apply the requirements for an adequate receiving channel.

The following steps should be used for calculating storm water runoff from a project:

1. Use the Norfolk Master Storm Drain Plan sheets or other appropriate mapping with elevation information to delineate drainage basin boundaries for the site. Outline the drainage area contributing storm water runoff to the site and include off-site drainage areas that contribute runoff discharge through the project site.

2. Measure drainage area and project site area in acres. Measure impervious area of project site for existing and proposed conditions. Impervious area shall include pavement, buildings, roofs and any other surface which does not allow infiltration of water into the soil. Concrete, asphalt, and gravel surfaces are considered impervious.

3. Utilize the 10-year, 24-hour storm for hydraulic design.
4. Based on size of drainage area contributing runoff to the site, use Table 5.1 to choose the runoff calculation method.
5. Calculate storm water runoff for design of the storm drain system.

Table 5.1: Runoff Calculation Methods

Approved Procedure	Total Drainage Area
• Rational Method • Modified Rational Method (peak discharge only)	≤ 20 Acres
• SCS Graphical Peak Discharge Method (peak discharge only) • SCS Tabular Method (runoff hydrograph)	> 20 Acres

Table 5.3: Design Storms

System Component	Minimum Design Storm Frequency
• On-Site Storm Drain System • Local Street System • Minor Storm Drain System • Collector Street System • Major Trunk Line • Regional Storm Water Facility • Pump Station	10-year

Definitions of System Components

- *On-Site Storm Drain System* – Privately owned storm drain system that includes pipes, inlets, ditches, culverts and retention or detention basins. It usually connects to a City-owned minor storm drain system or major trunk line system. The owner shall provide drainage for a minimum design storm. A greater design storm may be used to lessen the risk of flooding.
- *Local Street System* - Runoff from a local street will be conveyed by a minor storm drain system and in some cases by a major trunk line system. Spacing of curb drop inlets and diameter of connecting pipes will determine the amount of storm water runoff that can be conveyed off of the street.
- *Minor Storm Drain System* – Total drainage area to this City-owned system is less than 20 acres. A minor system usually conveys the storm water runoff from local streets.

- *Collector Street System* – Runoff from a collector street is usually conveyed by a major trunk line system. A collector street is usually used as an emergency route and should have lower flooding risk than a secondary road.
- *Major Trunk Line System* – Total drainage area to this system is 20 acres or more. The system is usually characterized by a combination of two or more minor systems into a major trunk line which is City-owned. A major trunk line will be more likely to flood when undersized due to the combination of peak flows from contributing minor storm drain systems.
- *Regional Storm Water Facility* – Usually a retention pond or lake that drains an area of 10 acres or more. Design requires calculation of the total volume of runoff for the design year storm. A regional storm water facility shall allow a 100-year design storm to pass without flooding surrounding structures.
- *Pump Stations* – Pump stations are usually located at underpasses of collector or arterial streets used as primary routes. Pump stations may also be located in other areas to provide flood control. The pump station and underpass storm drain system, if present, should be designed for peak discharge rate.

5.3 City of Norfolk Design Criteria

This section provides the specific criteria and approved methods for design of storm water drainage systems in the City of Norfolk. The user should contact the Department of Public Works, Storm Water Management Division to obtain any revisions to the criteria made subsequent to issuance of this manual.

The latest versions of the City of Norfolk standard notes and details must be incorporated into the design and included on all stormwater management and erosion and sediment control plans submitted for review. In addition to the requirements specified in the Virginia Stormwater Management Handbook and the Virginia Stormwater BMP Clearinghouse, the following requirements must be complied with when designing stormwater management systems for new development and redevelopment projects in the City of Norfolk, regardless of the procedure being utilized to meet water quality and quantity compliance.

5.3.1 Storm Drain System

The criteria and steps for designing a storm drain system are listed below. The components of a storm drain system consist of inlet structures, pipe laterals and trunk lines, manholes, junction chambers, culverts, channels, and detention/retention basins. The Virginia Stormwater Management Handbook and Virginia Department of Transportation (VDOT) Drainage Manual provide guidelines for designing inlets, piping, culverts, open channels, detention basins, and for computing the hydraulic grade line.

Inlet Design:

If pavement gutters are present, the amount of flow in the gutter must be calculated to check the spread of water on the pavement. Maximum spread shall be the lesser of 7 feet or one-half of the vehicle travel way in each direction for rainfall intensity of 3.5 inches per hour. Inlets along the gutter shall be spaced and sized to limit the spread to the maximum width.

Pipe System Design:

Pipe laterals and trunk lines usually consist of two or more pipes in a series connected by one or more drop inlets. This step should follow the location, spacing and design of all drop inlets.

Figure 5.1 shows the design criteria for pipe systems.

Since a tail water elevation of 1.7 (NAVD 88) corresponds to an annual high tide and is frequently exceeded, it should be considered as the minimum design reference elevation for storm drain system tail water calculations.

Hydraulic Grade Line (HGL):

This is the final step in design of a pipe system. The hydraulic grade line is calculated to determine, for the design year storm, the elevation the water will rise in inlets, manholes, or junctions. The hydraulic grade line elevation shall not exceed the curb flow line grade at the inlet opening or manhole rim elevation.

Culvert Design:

A culvert conveys surface water across or from a street or road right-of-way. A culvert must be designed to support the embankment and road for traffic conveyance. Where a culvert is constructed in the 100-year flood plain, it shall allow the 100-year flood to pass over the culvert without raising the water surface elevation more than one foot over existing conditions. The minimum culvert diameter shall be 12 inches for a length of 50 feet or less. For lengths over 50 feet, the minimum diameter shall be 15 inches. The minimum diameter for a culvert under a driveway entrance is 15 inches.

The headwater elevation for the design discharge shall not exceed an elevation which is 18 inches below the edge of shoulder of the road. The following upstream controls may also limit the headwater elevation:

- upstream property damage
- headwater depth/culvert diameter or depth = 1.0 to 1.5
- low point in the road grade that is not at the culvert location
- ditch or ground elevations that will permit flow to divert around culvert
- elevations established to delineate floodplain zoning

The outlet velocity shall be computed for the design discharge and erosion control shall be provided in accordance with VDOT criteria contained in the VDOT Drainage Manual.

At culvert sites where a heavy volume of debris is expected, debris control structures shall be provided. For culverts without endwalls or headwalls, the potential for failure due to buoyancy forces shall be checked.

If the outfall channel consists of material which could experience erosion, the following criteria shall apply:

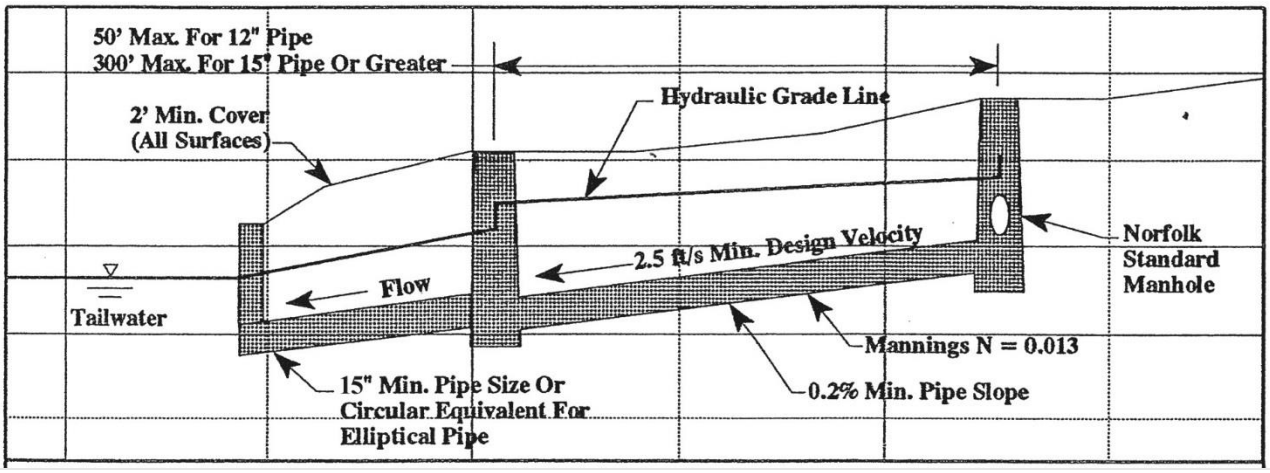
- The outlet velocity shall be computed for the design discharge.
- Erosion Control Treatment - Type A & B shall be in accordance with the VDOT Standard EC-1.
- Special Design Energy Dissipaters - shall consist of heavy rip rap or other structures designed to provide protection for the specific site conditions.

Table 5.4: Required Energy Dissipation Devices for Various Discharge Rates

Outlet Velocity (fps)	Culvert End Treatment	
	End Section	Endwall, or Headwall with Curtain Walls
0 - 6	None	None
6 - 10	EC-1 Type A	None
10 - 14	EC-1 Type A	EC-1 Type A
14 - 19	EC-1 Type B	EC-1 Type B
19+	Special Design	Special Design

SOURCE: *VDOT DRAINAGE MANUAL*

Figure 5.1: Pipe System Design



Design Criteria:

1. Storm drain design shall be in accordance with Chapter 4 of the VDOT Drainage Manual. Where design criteria conflict, Norfolk criteria in this manual shall take precedence.
2. Storm drain systems shall be designed to convey peak storm water flows based on the design storm required in Table 5.3.
3. Maximum hydraulic grade line elevation for the design year storm shall not exceed curb flowline grade at inlet opening or manhole rim elevation.
4. Maximum spread shall be 7 ft. or one-half of the vehicle travelway in each direction for rainfall intensity of 3.5 in/hr.
5. Tailwater elevation, the initial outfall hydraulic grade, shall be the highest of:
   - elevation corresponding to 80% of outfall pipe diameter; or
   - elevation 1.7 (NAVD 88 with 92 adjustment, City of Norfolk 2000)

   For systems that outfall to Lake Whitehurst use a tailwater elevation of 5.5 (NAVD 88 92 adjustment).
6. Outfall erosion protection shall be in accordance with VDOT standards.
7. Proposed storm drain systems which convey public water through private properties shall have a drainage easement. Easement widths are calculated by methods described in Section 5.3.1 and shown on Figure 5.2. ·

Pipe Materials:

1. Storm drain pipes shall be reinforced concrete pipe.
2. Storm drain pipes in right-of-way and subject to vehicular traffic shall be VDOT Class III.
3. Other types of pipe materials may be considered by the City in non-traffic areas.
4. Minimum final depth of cover or all storm sewer pipes shall be two (2) feet. Where minimum cover cannot be obtained, increase the class of pipe subject to the written approval of the Department of Public Works.

Construction Standards:

1. Inlet structures, conduit, outfall structures, manholes and drainage components required to construct a system shall be in accordance with VDOT Road and Bridge Standards, Volumes I and II, latest edition.
2. When specified by the Department of Public Works, the storm drain system shall be constructed in accordance with Norfolk Standards.

Open Channel Design:

Roadside ditches, median ditches and man- made channels that convey storm water runoff are classified as open channels.

Roadside and median ditches shall have an adequate capacity to convey a design year storm applicable to the type of roadway. A 2-year frequency storm shall be used in the design of the roadside or median ditch lining for erosion control.

Man-made drainage channels other than roadside ditches shall convey a minimum 10- year design storm. The channel lining shall also be designed for the 10-year frequency storm. The City may require a higher design storm frequency for man-made channels depending upon location, flood risk, future needs and environmental considerations.

In accordance with the policy of the Department of Public Works, Storm Water Management Division, natural channels shall not be modified or disturbed if possible. If a natural channel or floodplain encroachment is unavoidable, then a detailed environmental, regulatory, hydraulic and legal evaluation of such proposed changes and encroachments shall be made.

There are several reasons why a ditch or channel should not be filled in and piped and they are listed below:

- The ditch may contain tidal wetlands and/or be designated Waters of the United States or a state water and may require permits from natural resource agencies for impacts to jurisdicational waters that require you to avoid and minimize impacts based on the Clean Water Act.
- Pollutants in the storm water runoff are treated by filtration through the grass, infiltration through the soil, and some settling of sediments in natural channels.
- More runoff can be stored in a floodplain than in a pipe system and this helps to prevent flooding of properties.
- Flow velocities are decreased by the vegetated lining in a ditch and other natural channel features which helps prevent erosion downstream.
- Natural habitat for wildlife is provided by the vegetated banks of ditches and floodplains.

Some existing ditches may have erosion, sedimentation, and stagnant water problems that can be fixed by maintenance and repairs. If ditch health or safety problems cannot be solved by maintenance or repair, the Department of Public Works, Storm Water Management Division will determine if the ditch should be piped.

Storm Water Detention:

BMP facilities such as retention or detention basins that are designed to improve storm water runoff quality may also be used to control the quantity of runoff. The BMP shall be designed to treat the required water quality volume and, for quantity control, it shall be sized for a range of storm events up to and including the 10-year storm. A retention or detention basin shall also be checked so that a 100-year design storm can pass without flooding surrounding structures and property.

Maintenance:

The storm water system designer must address the considerations for maintenance of the system during the design phase of the project. These factors can be categorized as follows:

- Location

- Easements
- Landscaping

Location:

The location of storm water piping, manholes, BMPs and related structures shall be designed to take into account natural topography and runoff patterns. In no case will storm water be allowed to be redirected to another drainage area or outfall. Natural drainage courses shall be utilized wherever possible to convey treated runoff from the site. The designer should make an effort to maximize sheet flow and vegetative filters for pre-treatment as they improve the performance of the BMP.

Easements:

Proposed drainage systems which convey public storm water through private properties shall have permanent drainage easements to establish access to the system. Subject to a minimum width of fifteen (15) feet, easement widths for pipes and closed culverts are calculated by:

W = 2d + D +2 (rounded to nearest 5')
Where: d = Depth to invert
D = Diameter of pipe or total width of closed culvert
W = Minimum easement width in feet

Minimum easement widths for open ditches or culverts shall be calculated by:

W = Tw + 12
Where: Tw = Top width of ditch or culvert
W = Mininum easement width in feet

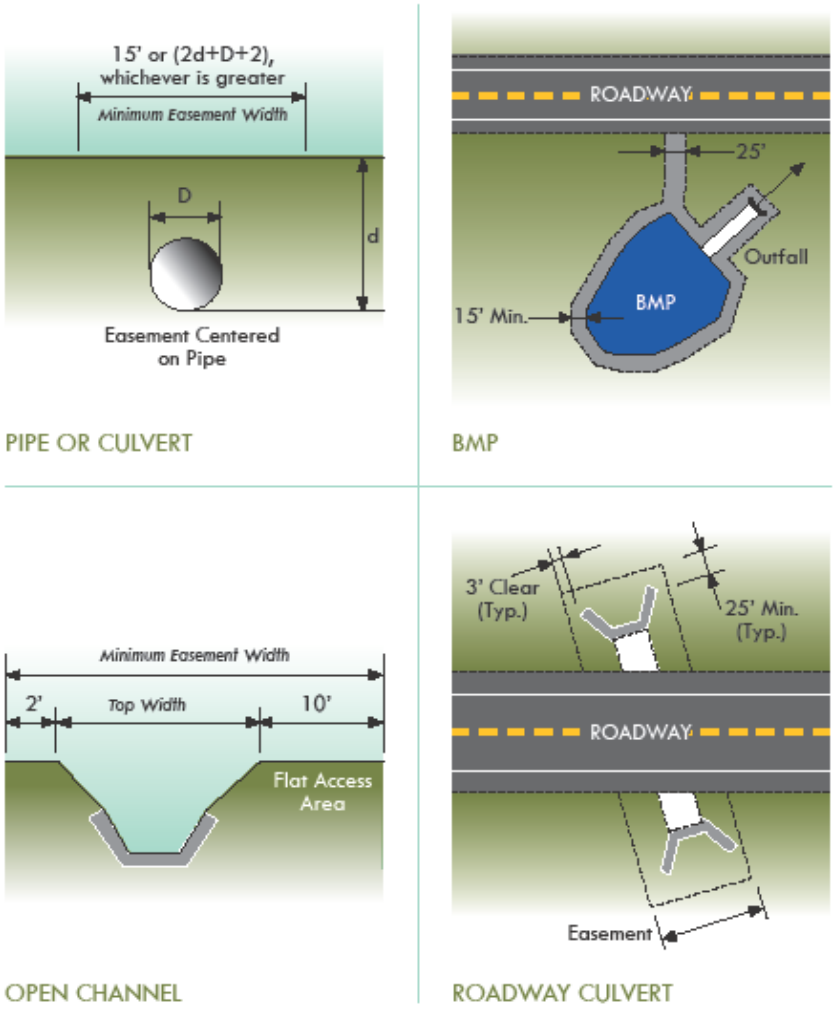
For culverts crossing roadway projects, the minimum easement shall be extended at least 25 feet beyond the end of the culvert or wing wall structure.

BMPs which collect public storm water and are located on private properties shall require easements. A minimum 25-foot access easement from a paved, public street to the BMP shall be provided. In addition, a minimum 15-foot flat clear maintenance easement located-around the perimeter of the BMP shall be provided. Where fences are located at least a 16-foot-wide double swing gate will be provided to access through the fencing crossing the easement. Access from public or private streets shall be provided to allow for the inspection and maintenance of privately owned BMPs. See Figure 5.2 for easement dimensions.

Landscaping:

Landscaping in maintenance access zones shall be limited to grass and small caliper shrubs. Landscaping within 25’ of a state regulated impounding structure (aka. earthen dam) shall be limited to grasses and non-woody vegetation only that is well maintained.

Figure 5.2: Easement Width Calculation



5.3.2 Coastal Plain Design Criteria

In addition to City of Norfolk specified design criteria, all BMPs proposed for use in the City of Norfolk shall incorporate all of the Coastal Plain design criteria specified in the Virginia BMP Clearinghouse. In addition, designers should consider the information contained in Section 1 of the Hampton Roads Planning District Commission (HRPDC) Report *Land and Water Quality in Hampton Roads, Phase II, November 2013* contained in Appendix 3.

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CHAPTER 6.0 REQUIREMENTS FOR WATER QUALITY RETROFITS TO EXISTING SITES

Projects developed specifically to improve the quality of runoff leaving an existing developed site or from upstream developed areas and not designed to treat stormwater runoff from new land development or redevelopment will follow guidance developed by the Virginia Department of Environmental Quality for assessing MS4 compliance with the Chesapeake Bay Total Maximum Daily Load. In addition to BMPs listed on the Virginia Stormwater BMP Clearinghouse and techniques approved by the Chesapeake Bay Program, water quality retrofits may include, but are not limited to:

- New storm water BMPs;
- Expansion or enhancement of existing storm water BMPs;
- Shoreline and buffer management;
- Stream restoration; and,
- Improvements to the storm water conveyance ditches, and wetland restoration.

While the DEQ guidance allows for flexibility in project design, projects are encouraged to meet the design standards of the Virginia Stormwater BMP Clearinghouse Manual to the extent practicable. Greater effort should be made to meet standards required by the City of Norfolk Design and Specification Manual and Section 1 of the Hampton Roads Planning District Commission Report *Land and Water Quality in Hampton Roads, Phase II, November 2013*. Construction of stormwater quality retrofit projects are not subject to the technical requirements of Part II B of the regulations pertaining to post construction water quality; however, water quantity requirements must be maintained at the existing value. Projects exceeding 2,500 square feet must demonstrate compliance with erosion and sediment control regulations including Minimum Standard 19. Construction of water quality retrofits remain subject to all other regulations regarding land disturbing activities in the City of Norfolk.

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CHAPTER 7.0 LAND DISTURBANCE REQUIREMENTS

7.1 Required Bonds

All development subject to the City's site plan review process per Chapter 26 of the Zoning Ordinance is required to provide a performance bond for the stormwater infrastructure. Bonds shall be provided in the form of a surety bond, letter of credit, or escrow account, and will be collected by the Department of Public Works, Right-of-Way Division prior to the issuance of a land disturbing permit.

7.1.1 Bond Amount Calculation

The contractor is to provide an itemized cost estimate for all components of the stormwater infrastructure based on the City's approved stormwater bond estimate form. The bond estimate will be reviewed and approved by the Storm Water Engineer or their designee.

7.1.2 Inspection

Sites will be inspected by the Department of Public Works, Storm Water Management Division during construction. Deficiency punch lists will be prepared and sent back to the contractor for review and action. This process will continue until there are no longer any punch list items needing action. When the final site inspection and final cost estimates for the bonds are approved, and all re-inspections have resulted in no further punch list items, the bond can be released following city bond release procedures, a certificate of occupancy (CO) can be issued, and the site will enter the defect surety process.

7.1.3 Special Performance Security Bond

In most cases, a developer may request to use a Special Performance Surety Process to allow for incomplete items (final layer of asphalt, residential sidewalks, street trees and buffer plant materials [delayed due to inappropriate planting season, drought, etc.]) when releasing the bond. This process follows the performance bond process above, where cost estimates for incomplete items are reviewed and resubmitted for approval by the Storm Water Engineer or his designee. Once the surety bond has been accepted, the incomplete items should be completed within the first year of the two-year Defect Bond period, with the remaining year of the defect period covering these items for faulty workmanship and materials.

7.1.4 Bond Release Procedures

Bonds will be released by the Department of Public Works, Right-Of-Way upon completion of a final inspection of the storm water infrastructure performed by the Storm Water Engineer or his designee, and submittal and final approval of construction record drawings and any other construction certifications to ensure that stormwater infrastructure installation was performed in accordance with the approved site plan by the Storm Water Engineer or his designee. For all stormwater infrastructure within the right-of-way, a copy of CCTV pipe inspections must be submitted for review by the Storm Water Engineer or his designee prior to release of bond.

7.1.5 Defect Security Bond Process

Once a CO has been issued, a defect surety bond is to be submitted for review and approval by the Storm Water Engineer or his designee. The defect bond lasts for two years. At least 90 days prior to the expiration of the defect bond, the site will be inspected by the Department of Public Works, Storm Water Management Division. Deficiency punch lists will then be prepared and sent back to the contractor for

review and action. When the final site inspection has been completed with no further punch list items, and all of the Special Performance Surety Bond items have been completed, the defect bond can be released / allowed to expire and all surety institutions can be notified by the Department of Public Works, Right-of-Way Division.

Note: If part of the site within contributing drainage area served by the system does not have permanent stabilization for E&S control and/or storm water infrastructure is not 100% installed and functional, then the full bond will not be released and the project may be subject to partial bond release for up to 1 year.

7.2 BMP Maintenance Agreement (Stormwater Declaration of Covenants)

The appropriate BMP maintenance agreement must be executed by the applicant and the City of Norfolk prior to site plan approval for all proposed permanent stormwater management features. It is recommended that the owner or their agent submit the Declaration of Covenants to the Storm Water Management Division for review prior to submitting the document for execution. The appropriate BMP maintenance agreement templates contained in Appendix 5 shall be utilized by all applicants.

7.2.1 Maintenance Manual Required

The BMP maintenance agreement must also include a site-specific BMP maintenance manual specifying the frequency and scope of BMP inspections for each permanent BMP and detailing a schedule of maintenance for each of the proposed BMPs.

At a minimum, the manual shall contain the design plans depicting the size and location of drainage and maintenance easements, the sizing calculations for the BMPs, an inspection checklist for each BMP, any information on maintenance items or frequencies from the manufacturer of any BMP component and typical corrective action(s) for each inspection item on the checklist. Much of this information can be found through the DEQ storm water website or from the manufacturer of a proprietary BMP.

7.2.2 Recordation

The property owner or his designee is responsible for recording the Declaration of Covenants at the Circuit Court Clerk's Office (150 St. Paul's Blvd., Norfolk, VA 23510) and for providing a copy of the recorded document and stamped Cover Sheet to the Department of Public Works, Storm Water Management Division; http://www.norfolk.gov/index.aspx?nid=1499. The applicant is required to pay all recordation fees associated with the BMP Maintenance Agreement (Stormwater Declaration of Covenants) and to provide proof of recordation.

7.2.3 Transfer

A BMP owner must notify the City when they transfer any of their ownership rights or responsibilities for a BMP facility to another party. The owner shall supply the Department of Public Works, Storm Water Management Division with a recorded copy of the document of transfer, executed by both parties and a copy the maintenance agreement acknowledged by both parties. Upon the City's receipt of the document to transfer, the conveying owner of the property will be released from all liability arising under the Declaration of Covenants subsequent to the date of conveyance and will transfer those responsibilities to the identified third party.

7.3 Proof of Construction General Permit Coverage

All land disturbing activities that equal or exceed one acre (43,560 square feet), and land disturbing activities exceeding 2,500 square feet that are part of a larger common plan of development or sale, shall be required to receive coverage under the construction general permit (VAR10).

7.3.1 Presentation of Coverage Letter

The Owner or Operator of a land disturbing activity subject to coverage under the construction general permit shall provide the Department of City Planning, Bureau of Environmental Services with a copy of the general permit coverage verification upon receipt by the Owner or Operator. Proof of coverage for regulated land disturbing activities is required to be presented prior to the issuance of a City of Norfolk land disturbance or fill permit.

For projects required to obtain coverage under the general permit, prior to land disturbance permit issuance, the applicant shall submit a complete stormwater pollution prevention plan containing all of the required elements found at 9VAC25-880-70 Part II to the Department of City Planning – Bureau of Environmental Services for review and initial approval.

7.3.2 Responsible Land Disturber Required

Prior to the issuance of the land disturbance permit or fill permit, a Responsible Land Disturber or individual holding a DEQ certificate of Erosion and Sediment Control Inspection must be named in accordance with Section 15-8 of the Code of the City of Norfolk.

7.3.3 Issuance of Land Disturbance Permit

Upon the applicant paying the required fee and providing proof of site plan approval where required, proof of stormwater management plan approval, proof of erosion and sediment control plan approval or, for single family residences, an executed agreement in lieu of an erosion and sediment control plan and, where required, an agreement in lieu of a plan, the designation of a Responsible Land Disturber (RLD), a copy of proof of coverage under the VESMP construction general permit if applicable, completed land disturbance permit application, proof of the purchase of nutrient credit offsets if applicable and upon review and approval of the project SWPPP by the Department of City Planning – Bureau of Environmental Services, a land disturbance permit shall be issued to the owner or operator of a regulated land disturbing activity

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CHAPTER 8.0 CONSTRUCTION PHASE INSPECTIONS AND MAINTENANCE

8.1 Pre-Construction Conference

After issuance of the land disturbing permit and after the establishment of initial erosion and sediment control measures, the identified Responsible Land Disturber must schedule a pre-construction conference with the Department of City Planning, Bureau of Environmental Services. Staff from the Department of Public Works, Storm Water Management Division will attend the pre-construction conference where there are permanent stormwater management facilities proposed or where public stormwater infrastructure will be installed including where proposed connections between private and public stormwater conveyance systems will be made.

The pre-construction conference is to be held at the project site and a review of the approved erosion and sediment control and stormwater management plans will be conducted with the owner, contractor and/or Responsible Land Disturber. In addition, the project stormwater pollution prevention plan (SWPPP) (if applicable) is again reviewed for compliance.

8.2 Construction General Permit Stormwater Pollution Prevention Plan Review

Each land disturbing activity receiving construction general permit coverage from the Commonwealth is required to develop, implement, maintain and update a project specific stormwater pollution prevention plan (SWPPP) for the land disturbing activity. The SWPPP shall contain the elements listed in 9VAC25-875-54 of the Regulations and the requirements of the general permit found at 9VAC25-880-70. It is the responsibility of the permittee to ensure compliance with specific permit requirements including updates to grandfathering of projects and turbidity testing.

For projects required to obtain coverage under the construction general permit, prior to land disturbance permit issuance, the applicant shall submit a complete SWPPP containing all of the required elements found at 9VAC25-880-70 Part II to the Department of City Planning – Bureau of Environmental Services for review and initial approval.

During project construction, City staff shall periodically review the project stormwater pollution prevention plan. Failure to have a complete SWPPP on site during construction or failure to implement the SWPPP or approved stormwater management or erosion and sediment control plans may result in the issuance of a "NOTICE OF VIOLATIONS" or "STOP WORK" order for the site until the SWPPP is deemed complete by the Department of City Planning, Bureau of Environmental Services during project construction.

8.2.1 Modification to a Stormwater Pollution Prevention Plan

The project SWPPP must be amended when, at the discretion of the City of Norfolk, there is a change in design, construction, operation or maintenance that has a significant effect on discharge of pollutants not addressed by existing SWPPP.

8.2.2 Maintenance of the SWPPP by the Operator

The SWPPP must be maintained by the operator at a central location onsite. If an onsite location is unavailable, a notice of the SWPPP's location must be posted at a location visible from the public right of

way near the main entrance at the construction site listing the location of the SWPPP and the name and contact number for the operator.

8.3 Pollution Prevention Plan Required

Each land disturbing activity requiring a stormwater management plan shall develop, implement and maintain a plan for implementing pollution prevention measures during construction activities.

8.3.1 Pollution Prevention Plan Contents

The pollution prevention plan shall detail the design, installation, implementation, and maintenance of effective pollution prevention measures to minimize the discharge of pollutants. At a minimum, the pollution prevention plan must:

a. Identify the potential pollutant-generating activities and the pollutant that is expected to be exposed to stormwater;

b. Describe the location where the potential pollutant-generating activities will occur, or if identified on the site plan, reference the site plan;

c. Identify all nonstormwater discharges, as authorized in Part I E of this general permit, that are or will be commingled with stormwater discharges from the construction activity, including any applicable support activity;

d. Identify the person responsible for implementing the pollution prevention practices for each pollutant-generating activity (if other than the person listed as the qualified personnel);

e. Describe the pollution prevention practices and procedures that will be implemented to:

(1) Prevent and respond to leaks, spills, and other releases, including (i) procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases; and (ii) procedures for reporting leaks, spills, and other releases in accordance with Part III G;

(2) Prevent the discharge of spilled and leaked fuels and chemicals from vehicle fueling and maintenance activities (e.g., providing secondary containment such as spill berms, decks, spill containment pallets, providing cover where appropriate, and having spill kits readily available);

(3) Prevent the discharge of soaps, solvents, detergents, and wash water from construction materials, including the clean-up of stucco, paint, form release oils, and curing compounds (e.g., providing (i) cover (e.g., plastic sheeting or temporary roofs) to prevent contact with stormwater; (ii) collection and proper disposal in a manner to prevent contact with stormwater; and (iii) a similarly effective means designed to prevent discharge of these pollutants);

(4) Minimize the discharge of pollutants from vehicle and equipment washing, wheel wash water, and other types of washing (e.g., locating activities away from surface waters and storm drain inlets, and constructed or natural site drainage features and directing wash waters to sediment basins or traps, using filtration devices such as filter bags or sand filters, or using similarly effective controls);

(5) Direct concrete wash water into a leak-proof container or leak-proof settling basin designed so that no overflows can occur due to inadequate sizing or precipitation. Hardened concrete wastes shall be removed and disposed of in a manner consistent with the handling of other construction wastes. Liquid concrete wastes shall be removed and disposed of in a manner consistent with the handling of other construction wash waters and shall not be discharged to surface waters, disposed of through infiltration, or otherwise disposed of on the ground;

(6) Minimize the discharge of pollutants from storage, handling, and disposal of construction products, materials, and wastes, including (i) building products such as asphalt sealants, copper flashing, roofing materials, adhesives, and concrete admixtures; (ii) pesticides, herbicides, insecticides, fertilizers, and landscape materials; and (iii) construction and domestic wastes such as packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, Styrofoam, concrete, and other trash or building materials;

(7) Prevent the discharge of fuels, oils, and other petroleum products, hazardous or toxic wastes, waste concrete, and sanitary wastes;

(8) Address any other discharge from the potential pollutant-generating activities not addressed in this subdivision 4; and

(9) Minimize the exposure of waste materials to precipitation by closing or covering waste containers during precipitation events and at the end of the business day~~,~~ or implementing other similarly effective practices. Minimization of exposure is not required in cases where the exposure to precipitation will not result in a discharge of pollutants; and

f. Describe procedures for providing pollution prevention awareness of all applicable wastes, including any wash water, disposal practices, and applicable disposal locations of such wastes, to personnel in order to comply with the conditions of this general permit. The operator shall implement the procedures described in the SWPPP.

Discharges from dewatering activities are prohibited unless managed by appropriate controls. Dewatering controls shall be selected based on the pollutants contained in the dewatering discharge. Pollutants expected in dewatering discharges (including sediment) should be described in the pollution prevention plan and appropriate controls for each identified pollutant described.

8.3.2 Pollution Prevention Plan Review

Staff from the Department of City Planning Bureau of Environmental Services will review the site pollution prevention plan during the SWPPP review, at the preconstruction meeting and then periodically during construction activities.

8.3.3 Modification and Update to Pollution Prevention Plan

Where staff determines the pollution prevention plan is inadequate to either minimize or prohibit the discharge of pollution with stormwater runoff in accordance with Section 8.2.1, the plan shall be amended and additional measures or practices added to the site and their installation, inspection and maintenance requirements as described in the pollution prevention plan.

8.4 Land Disturbance and Construction General Permit Inspections

Staff from the Department of City Planning, Bureau of Environmental Services and the Department of Public Works, Storm Water Management Division conduct periodic inspections of active construction projects to determine site compliance with the Regulations and Code of the City of Norfolk. All single-family homes subject to an approved Stormwater Management Plan or an executed Agreement in Lieu of a Plan will be inspected for compliance with the provision of the Plan or Agreement by the Department of Public Works, Storm Water Management Division. Inspections will review site compliance with erosion and sediment control plan and stormwater management plan, implementation and updating of the pollution prevention plan and development and implementation of additional control measures to address an approved total maximum daily load (TMDL) implementation plan.

8.5 Corrective Action Policy

Failure to comply with the land disturbance permit; approved erosion and sediment control, stormwater management, stormwater pollution prevention or pollution prevention plans; or, the construction general permit may result in an unauthorized discharge and a violation of local, state and federal laws and regulations.

If the City determines that an unauthorized discharge has occurred from a construction activity, it must be contained so that it will not flow from the site or enter groundwater, even if this requires removal, treatment, and disposal of onsite or offsite soil.

Any observed violations of approved plans or issued permits excluding the need for performing routine maintenance to existing silt fence, existing inlet protection, and an existing construction entrance will be considered a violation against the site. Unauthorized discharges from failed erosion and sediment control measures or stormwater pollution prevention measures are violations of the Code of the City of Norfolk.

If violations are noted during the duration of construction then a summons may be issued in accordance with Section 15-11 of the Code of the City of Norfolk - Erosion and Sediment Control Ordinance which is a class one misdemeanor punishable by not more than 12 months in jail and/or a $2,500 fine, either or both. Each day of non-compliance shall constitute a separate offence. Discharges that occur in an egregious manner may result in the issuance of an immediate notice of violation, stop work order or summons.

If unauthorized discharges from construction activity occur other than those in violation of Chapter 15 of the Code of the City of Norfolk including but not limited to the discharge of oil, petroleum or lubricants from vehicle fueling or maintenance, paint waste and wash out water, concrete washout rinse water or concrete residue, etc., the responsible party will be in violation of Section 41.1-4 of the Code of the City of Norfolk - Pollution of the Storm Water System which pursuant to Section 41.1-2 is a class one misdemeanor, punishable by not more than 12 months in jail and/or a $2,500 fine, either or both. Each day of a violation shall constitute a separate offense.

In addition to these remedies, the City of Norfolk reserves the right to utilize all authorities granted under the Virginia Erosion and Stormwater Management Regulations, the Code of Virginia and the Norfolk City Code, including but not limited to Virginia Code § 62.1-44.15:48.

Additionally, the responsible party will be required to clean the spill or discharge. If the responsible party fails to mitigate the discharge, the City of Norfolk may abate the spill/discharge and charge the responsible party for any costs associated with the release and clean-up requirements.

8.6 Permanent Stormwater Management Facility Construction Inspections

The Department of Public Works, Storm Water Management Division shall be contacted at least two working days prior to the intended inspection date for scheduling the inspection of the construction of permanent stormwater management facilities that receive, treat or convey public water or the tie-in point from a private conveyance and/or treatment system and the public stormwater system. The frequency of construction phase stormwater infrastructure inspections will be established at the pre-construction conference and the specific structures and items requiring City inspection will be provided to the contractor by the City.

8.7 Construction Record Drawings and Record Certifications

Two (2) hard copies and one (1) electronic copy of construction record drawings for permanent stormwater management facilities shall be submitted to the Department of Public Works, Storm Water Management Division in accordance with 9VAC25-875-130. The construction record drawing shall be appropriately sealed and signed by a professional registered in the Commonwealth of Virginia, and contain a certification statement attesting that the stormwater management facilities have been constructed in accordance with the approved stormwater management plan. The certification shall also contain a table of actual volumes at the completion of construction for all stormwater practices using retention or detention as a treatment mechanism.

For wet ponds, the survey shall include both topography of the area within the pond maintenance area as well as the bathymetry of the completed pond.

For infiltration and bioretention facilities, the as-built survey shall include the following information that is determined by the total amount of impervious area treated, one (1) infiltration test and boring for <2,500 square foot BMP's and two (2) for 2,500 to 10,000 square feet. Add one (1) for each additional 10,000 square feet. Post-construction infiltration tests shall calculate the rate of infiltration in inches per hour (in/hr) within the feature soil media and immediately below the bottom of the feature in the substrate. For additional guidance refer to Appendix 4A and the BMP Warehouse.

For manufactured BMPs, submit manufacturer supplied activation letters certifying that the BMP was installed and activated per manufacturer standards and specifications.

8.8 Submittal of Proof of Construction General Permit Notice of Termination

Prior to the release of the stormwater performance bond for a project with construction general permit coverage, the permit holder must submit a copy of the completed Notice of Termination form submitted to the Department of City Planning – Bureau of Environmental Services.

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CHAPTER 9.0 POST CONSTRUCTION STORMWATER MANAGEMENT FACILITY INSPECTION AND MAINTENANCE

9.1 Inspection Frequency

All non-proprietary permanent stormwater management facilities, including conservation management areas, except those on a single-family lot serving that lot alone, shall be inspected at least once every five years by the Department of Public Works, Storm Water Management Division. An owner of a single-family lot with a stormwater management facility on the lot shall ensure that the facility continues to function in accordance with its original design and shall comply with the conditions recorded on the plat and contained in the declaration of covenants on file with the City.

Owners of proprietary BMPs, including underground detention/infiltration structures and pervious pavement/pavers/asphalt, shall submit maintenance certifications and the results of infiltration testing performed in accordance with the provisions of "Appendix 4B – Encased Falling Head Infiltration Testing Procedure for use in the City of Norfolk" to the Department of Public Works, Storm Water Management Division at the frequency specified by the manufacturer but not less than once every five years. Site inspections will occur at least once every 5 years by the Department of Public Works, Division of Environmental Stormwater Management.

All single-family homes subject to an approved Stormwater Management Plan or an executed Agreement in Lieu of a Plan will be inspected for compliance with the provisions of the Plan or Agreement by the Department of Public Works, Storm Water Management Division.

9.2 Certification of Inspection Reports

Inspection reports required to be submitted by proprietary BMP owners in Section 9.1 shall be signed by either an individual holding a valid stormwater management inspector certification from the Virginia Department of Environmental Quality, by a Virginia licensed professional engineer, architect, land surveyor or landscape architect or by a person who works under the direction and oversight of the licensed professional engineer, architect, landscape architect, or land surveyor provided the inspection report is signed and sealed by the licensed professional overseeing the inspector.

9.3 Stormwater Management Facility Corrective Action Plans

Deficiencies identified through the performance of an inspection shall be corrected by the owner of the facility to restore its design and function to that which meets or exceeds the design contained in the approved facility record drawing in accordance with the recorded declaration of covenants and Chapter 41.1-5 of the Code of the City of Norfolk, Virginia. In the event that the Director of Public Works determines that maintenance to a stormwater management facility is needed to protect the health, safety and general welfare of the citizens of the City of Norfolk, it will be undertaken by the Department of Public Works, Storm Water Management Division in accordance with the provisions of the BMP Maintenance Agreement.

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CHAPTER 10.0 EXCEPTIONS FROM THE STORMWATER MANAGEMENT REQUIREMENTS

10.1 Procedure for Requesting an Exception

Exception requests to the requirements of the stormwater management requirements shall be submitted in writing as part of the stormwater management plan during the plan review process.

10.2 Exception Request Evaluation

An exception may be granted provided that:

a. the exception is the minimum necessary to afford relief,

b. reasonable and appropriate conditions shall be imposed as necessary upon any exception granted so that the intent of the Act and the Regulations are preserved,

c. granting the exception will not confer any special privileges that are denied in other similar circumstances, and

d. exception requests are not based upon conditions or circumstances that are self-imposed or self-created.

Economic hardship alone is not sufficient reason to grant an exception from the requirements of the stormwater management requirements.

Under no circumstance shall an exception be made to the requirement that the regulated land-disturbing activity obtain state permits, nor shall an exception be granted to approve the use of a BMP not allowed in state regulations as administered by DEQ.

Exceptions to requirements for phosphorus reductions shall not be allowed unless offsite options available through 9VAC25-875-610 have been considered and found not available.

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CHAPTER 11.0 HEARINGS AND APPEALS

11.1 Hearings

Any permit applicant or permittee aggrieved by any action associated with this manual by a City representative without a formal hearing, or by inaction of the City representative, may request in writing a formal hearing by the VESMP Committee. The VESMP Committee will be made up of members of the City of Norfolk Planning and Public Works Departments consisting of the Environmental Services Bureau Manager (Chair), Storm Water Senior Construction Project Manager, Storm Water Civil Engineer III, and Zoning Administrator or their designees, as assigned by the directors of each City department. A verbatim record of the hearing will be recorded by the City and maintained in the project file by the Department of City Planning, Bureau of Environmental Services.

A written petition requesting a hearing must be filed with the Department of City Planning, Bureau of Environmental Services Bureau Manager within 30-days of the action. Failure to submit a written petition within the timeframe specified by this section shall constitute unconditional acceptance of the action of the City.

The petition submitted by the aggrieved party and the testimony of witnesses, including City staff members, will be presented at a Committee hearing, which will be scheduled within 30-business days from receipt of the petition. Written notice of the hearing date, time, and location will be sent to the petitioning party at the address provided in the petition at least one week before the hearing. If the petition does not contain a mailing address, written notice will be sent to the address listed on the permit application or permit. Follow-up investigations will be conducted, where necessary, by the Department of City Planning, Bureau of Environmental Services Bureau Manager. The Committee will offer a majority rule decision on the matter and provide the decision in writing to the aggrieved party at the address to which the hearing notice was sent. This written decision will be retained as part of the record. The record will be a public record subject to the provisions of the Virginia Freedom of Information Act. The applicant or permittee impacted may appeal the decision of the VESMP Committee.

11.2 Appeal of Decision

Any permit applicant or permittee, or person subject to the requirement of this manual, including City staff, aggrieved by any decision of the VESMP Committee process may appeal the decision in writing to the Director of Public Works or their designee within 15 days after the date of the Committee's decision.

The Director will schedule a hearing within 15-business days after receiving the formal petition for appeal. Written notice of the hearing, date, time, and location will be sent in the same manner as above in 11.1. The review will be based upon a review of the record from the formal hearing and argument of the parties to the appeal. The decision made by the Director or their designee shall be provided in writing to the party filing the appeal at the address to which the hearing notice was sent. The record of appeal and of the decision will be public records subject to the provisions of the Virginia Freedom of Information Act.

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CHAPTER 12.0 APPENDICES

Appendix 1: Engineering Calculations

1A – Appendix C.2.1 Virginia Stormwater Management Handbook - Hydrologic Soil Group

1B – Appendix 11-B VSWMH - Rainfall Depths in Virginia

1C– Appendix 11-C VSWMH – Rainfall-Runoff Curves for Selected CN

1D – Virginia Runoff Reduction Method (VRRM) Worksheets

Appendix 2: Norfolk Standard Notes and Details

2A – Norfolk Standard Engineering Details

2B – Norfolk Standard Notes

Appendix 3: Section 1 from the Hampton Roads Planning District Commission Report *Land and Water Quality in Hampton Roads, Phase II, November 2013*

Appendix 4: Approved Stormwater Management Practices

4A – Norfolk Modifications to the Approved Virginia BMP Clearinghouse Practices

4B – Encased Falling Head Infiltration Testing Procedure for use in the City of Norfolk

Appendix 5: BMP Maintenance Standards

5A – Standard Declaration of Covenants (BMP Maintenance Agreement)

5B – Subdivision Declaration of Covenants

5C – Pollutant Reduction Declaration of Covenants

5D – Appendix H. 1 Virginia Stormwater Management Handbook - BMP Checklist

Appendix 6: Norfolk Sample Forms

6A – Land Disturbance Permit Application

6B – Agreement in Lieu of a Soil Erosion Control and Stormwater Management Plan- Single Family

6C – Stormwater Pre-Construction Checklist

6D – Stormwater Best Management Practice Reporting Form

6E – Stormwater As-Built Checklist

6F - City of Norfolk Standard Erosion & Sediment Control Notes

Appendix 7: Stormwater Program Fees (As set forth annually by the Norfolk City Council)

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Appendix 1: Engineering Calculations

1A – Appendix C.2.1. Virginia Stormwater Management Handbook - Hydrologic Soil Group

1B – Appendix 11-B VSWMH - Rainfall Depths in Virginia

1C– Appendix 11-C VSWMH – Rainfall-Runoff Curves for Selected CN

1D – Virginia Runoff Reduction Method (VRRM) Worksheets

1A – Appendix C.2.1. Virginia Stormwater Management Handbook, Version 1.0 - Hydrologic Soil Group

Information on Hydrologic Soil Group can be found in the Virginia Stormwater Management Handbook or at Home | Virginia Stormwater Management Handbook (encodeplus.com)

1B – Appendix 11-B VSWMH - Rainfall Depths in Virginia

The most current version of the NOAA Atlas 14 data for the city of Norfolk may be found by selecting "NORFOLK WSO AIRPORT" from the dropdown list located at

https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=va

1C– Appendix 11-C VSWMH – Rainfall-Runoff Curves for Selected CN

Information on Rainfall-Runoff Curves can be found in the Virginia Stormwater Management Handbook.

1D – Virginia Runoff Reduction Method (VRRM) Worksheets

All VRRM calculations shall be performed using the 2011 Virginia bmp Clearinghouse Standards. The most current version of the worksheets may be found at Guidance & VRRM | Virginia DEQ

Appendix 2: Norfolk Standard Notes and Details

2A – Norfolk Standard Engineering Details

2B – Norfolk Standard Notes

2A – Norfolk Standard Engineering Details

The most current version of the Standards may be found at
https://norfolk.gov/DocumentCenter/View/68962

2B – Norfolk Standard Notes

1. The Contractor shall promptly notify the Norfolk Fire Marshall's office, NDRC, and VDEQ of any chemical spills in accordance with local, state, and Federal reporting requirements.
2. Compliance with VESMP requirements does not absolve the Contractor from compliance with other local, state, and Federal regulatory requirements and permits.
3. All new curbs receiving flow shall have integral curb and gutter as provided in the Norfolk City Design Standards.
4. All storm drainage shall be installed to within 0.1 feet (one-tenth of one foot) of the elevation shown on the plan, or as specified in writing by the City.
5. Minimum storm sewer slopes indicated on the plans are absolute minimums. Lesser slopes will not be accepted unless in writing by the City.
6. Contractor to be responsible for all correction costs (i.e. plan revision, physical correction, etc.) required as a result of noncompliance with the tolerances stated herein.
7. All storm sewer pipes, manholes, and curb inlets shall be cleaned of debris and eroded materials during the final stages of construction.
8. All storm drainage features shall be completed as soon as feasible in the construction schedule.
9. Temporary drainage during construction shall be provided by the Contractor to relieve and prevent flooding in areas that may cause damage or nuisance to roadways and private property.
10. Precast structures shall be built and assembled in accordance with City of Norfolk Standards and Specifications and other applicable standards.
11. All new drainage structures shall have VDOT Std. IS-1 inlet shaping.
12. Where drainage pipe is subjected to vehicular loading, reinforced concrete pipe (RCP), Class III minimum, shall be utilized. Non-RCP pipe may be utilized outside of traffic areas when approved in writing by the Department of Public Works, Storm Water Management Division.
13. All metal pipe culverts and storm sewers shall be installed in accordance with drawing PB-1 of the Virginia Department of Transportation Road and Bridge Standards.
14. All storm sewer pipe joints shall be installed silt free, shall be wrapped as detailed in the Norfolk City Design Standards (NCDS2021.12), and secured in place prior to backfilling.
15. All BMPs should be kept free from both private and public utilities. Utilities encroaching upon BMPs shall be relocated when directed by the Department of Public Works, Storm Water Management Division.
16. All site drainage must be directed to the City right-of-way, an approved City-maintained drainage system, natural waterway, or to Waters of the United States.
17. Temporary drainage during construction shall be provided by the Contractor to relieve areas that may cause damage to roadways or private property.
18. The stormwater management/BMP facility and associated stormwater conveyance systems for this project require the submission, review, and approval by the Department of Public Works,

Storm Water Management Division of a record drawing (as-built) and construction certification prior to release of the CO. Record drawing and construction certification is required to be recorded and checked by a licensed surveyor.

19. The Contractor shall provide project record drawings, including BMP drawings, in both hardcopy format and in an electronic format acceptable to the Department of Public Works, Storm Water Management Division.
20. Contractor to contact Department of Public Works Storm Water Management Division at 823-4089 (48-hour notice) for pre-construction conference and inspection requirement when a BMP is proposed and/or tie-in to the City storm drain system is planned.
21. To the extent practical, construct sidewalks to avoid conflicts within the pavement to include manholes, handholes, sanitary cleanouts, and water main valves. Include provisions for conveying downspout flows beneath or through sidewalks.
22. To the extent practical, BMPs having an infiltration function, including porous pavements, should be protected from compaction from construction activities and personnel.
23. Trees should be selectively removed and only as necessary for grading associated with the project and as specified in the approved E&S plan.
24. Minimum final depth of cover for all storm sewer pipes shall be two (2) feet. Where minimum cover cannot be obtained, increase the class of pipe subject to the written approval of the Department of Public Works.
25. Sites which directly discharge into Lake Whitehurst or Lake Wright are required to provide 100% on-site water quality treatment per directive from the Department of Utilities. The purchase of off-site nutrient credits will not be allowed.

    FOR PROJECTS REQUIRING THE PURCHASE OF WATER QUALITY CREDITS, MODIFY THE FOLLOWING NOTE ACCORDINGLY AND PLACE ON THE PROJECT COVER SHEET IN BOLD TEXT:

26. Credits totaling X lb/year of Total Phosphorus (TP) have been purchased from XYZ Bank to fulfill project water quality requirements.

Appendix 3: Section 1 from the Hampton Roads Planning District Commission Report *Land and Water Quality in Hampton Roads, Phase II, November 2013*

INTRODUCTION

In October 2012, the Hampton Roads Planning District Commission (HRPDC) was awarded a grant under Section 309 of the Coastal Zone Management Act, as amended, from the Virginia Coastal Zone Management Program to continue efforts to assist local governments in Hampton Roads in implementing required and recommended land development and environmental protection practices in response to the Chesapeake Bay Total Maximum Daily Load (TMDL) and revised Virginia Stormwater Management Regulations. This project was included as part of the Land and Water Quality Protection section of Virginia's Section 309 Cumulative and Second Impacts Strategies for 2011-2016 and is part of a five-year planned program. This specific grant project builds upon work done in the previous year, which assessed the potential impacts of these new requirements on local governments and identified some tools currently available to help develop effective responses.

This project consists of three parts, each of which is described in a section of the following report. The first part provides a series of specific findings and recommendations related to stormwater best management practices (BMPs) and land development practices, including how they are treated by the stormwater spreadsheet now mandated by the Virginia Department of Environmental Quality. This section describes the relative benefits of various common stormwater management BMPs and assesses if and how they should be discounted when used in the coastal plain. The first section also describes the potential for using site design to reduce nutrient loads.

The second section describes an assessment of local codes and ordinances for two cities in Hampton Roads, Norfolk (representing urban, developed communities) and Suffolk (representing growing, suburban or transitional communities). The local development regulations for both cities were analyzed using a tool identified during the previous grant year, the Center for Watershed Protection's Code and Ordinance Worksheet. This section also includes several specific recommendations that were developed based on ordinance assessments and discussions with locality staff.

The third section demonstrates the use of a geographic information systems (GIS) approach to model potential development impacts on stormwater runoff in order to inform the site design process. Two case study sites are used: a redevelopment site in Norfolk and a reimagining of an existing subdivision in Suffolk as a cluster development. This approach combines a typical GIS analytical approach with the

Virginia Runoff Reduction Method spreadsheet to calculate the impacts of various development scenarios on specific sites.

This report is intended to guide discussions between HRPDC staff and locality staff from the Cities of Norfolk and Suffolk in deciding which policy changes to pursue and what specific changes to make during 2013 and 2014.

SECTION 1: COASTAL PLAIN STORMWATER BMP GUIDE

Virginia has developed statewide stormwater standards to protect water quality that will be implemented by local governments beginning July 1, 2014. Developers will need to employ a mix of site design, runoff reduction, and pollutant control practices in order to comply with the water quality and quantity criteria in the regulations. The physiographic characteristics of the coastal plain can make it challenging to meet the criteria in a cost effective way. The purpose of this document is to highlight the practices that are well suited for the coastal plain and summarize the design modifications that may be necessary. The Virginia Stormwater Handbook is the official guidance document for compliance with the Virginia Stormwater Management Law and Virginia Stormwater Management Permit (VSMP) Regulations. Design specifications for the BMPs that can be utilized to meet the standard are located on the BMP Clearinghouse website[1] and reflect the most recent research on BMP sizing, design and performance.

SUMMARY OF VIRGINIA STORMWATER MANAGEMENT PERMIT (VSMP) REGULATIONS

The revisions to the Virginia Stormwater Management Regulations (SWM) became effective on September 13, 2011 after a significant stakeholder process that began in 2004 with legislation that transferred stormwater regulatory programs for construction activity and municipal permits from the Department of Environmental Quality (DEQ) to the Department of Conservation and Recreation (DCR) and required DCR to issue regulations to establish statewide post construction stormwater criteria to protect water quality. Starting on July 1, 2014, all development subject to permitting under the Virginia Stormwater Management Program (and sites greater than 2,500 square feet in Chesapeake Bay Preservation Act (CBPA) areas) must meet the new water quality and quantity criteria for post construction stormwater runoff. Local governments will be responsible for reviewing site plans for compliance with these post construction criteria. These regulations are also an important part of the state's efforts to protect and restore the Chesapeake Bay.

Virginia's revised water quality criteria of 0.41 pounds of phosphorus per acre per year will be implemented beginning on July 1, 2014. The criteria was developed to be protective of local water

[1] http://vwrrc.vt.edu/swc/

quality and to achieve no net increase in nutrients for new development. The new criterion was calculated using the Runoff Reduction Method rather than the Simple Method and translates to a land cover condition of 10% impervious cover, 30% turf, and 60% forest.

The Runoff Reduction Method for Virginia is focused on site compliance to meet site-based load limits. This means that the proposed Virginia stormwater regulations are aimed at limiting the total load leaving a new development site. This is a departure from water quality computations of the past, in which the analysis focused on comparing the post-development condition to the pre-development, or an average land cover condition.

The central component of the Runoff Reduction method is treatment volume (Tv). The runoff reduction method incorporates recent research that shows that some BMPs are quite effective at reducing the volume of runoff that reaches surface waters. By applying site design, structural, and nonstructural practices, the designer can reduce the treatment volume by reducing the overall volume of runoff leaving a site. Virginia developed a compliance spreadsheet to help designers and plan reviewers quickly evaluate the implementation of BMPs on a given site and verify compliance with the State stormwater requirements. Appendix B of the *Technical Memorandum for the Runoff Reduction Method* describes this research in greater detail and explains the basis for the runoff reduction rates of each BMP. The report, *Land and Water Quality Protection in Hampton Roads, Phase I* [2], explains the new stormwater regulations and the runoff reduction method in greater detail.

OBSTACLES TO MANAGING STORMWATER IN THE COASTAL PLAIN

Traditional stormwater practices were developed for the Piedmont physiographic region and often require adaptations to properly function in the coastal plain. Implementation of these stormwater practices in the coastal plain is constrained by the flat terrain, high water table, and low permeable soils. These characteristics make stormwater management more complex and limit the BMPs that can be implemented to control the quality and quantity of runoff in the coastal plain. This report aims to inform developers about the challenging conditions in the coastal plain, environmental site design techniques, important factors to consider during BMP selection, and design modifications to make

[2] http://hrpdcva.gov/uploads/docs/HRPDCAgendas/2013/March/Website/03212013-PDC-E8G.pdf

certain BMPs feasible in the coastal plain. With careful BMP selection, design, and implementation, development in Hampton Roads can occur without flooding, groundwater contamination, and water quality degradation caused by improper stormwater management.

FLAT TERRAIN

The flat terrain (zero to 3 percent slopes) of the coastal plain creates several site design challenges Flat terrain increases surface water/groundwater interactions and reduces the hydraulic head available to treat the quantity of stormwater produced during the intense rainstorms that are common throughout the region. Many of the stormwater practices discussed in the Structural BMP Implementation section of this report require minimum slopes in order to ensure that runoff will flow to the device and that if an underdrain is present, it will function properly.

Figure 1 illustrates the range of slopes throughout Hampton Roads. Most of the land is classified as flat with 63 percent of the area having a slope less than 3 percent. Twenty five percent of the land area is classified as undulating with slopes between 3 and 8 percent.

Slopes were calculated by applying the ArcGIS slope function to the Seamless Regional Digital Elevation Model documented in Appendix B of *Hampton Roads Coastal Resources Technical Assistance Program Fiscal Year 2011-2012* [3]. The slope function in ArcGIS calculates a single representative value for each cell using its eight neighboring cells. The result is the maximum rate of change between the cell and its neighbors. For this exercise, slope was calculated as a percentage using ten-foot square cells.

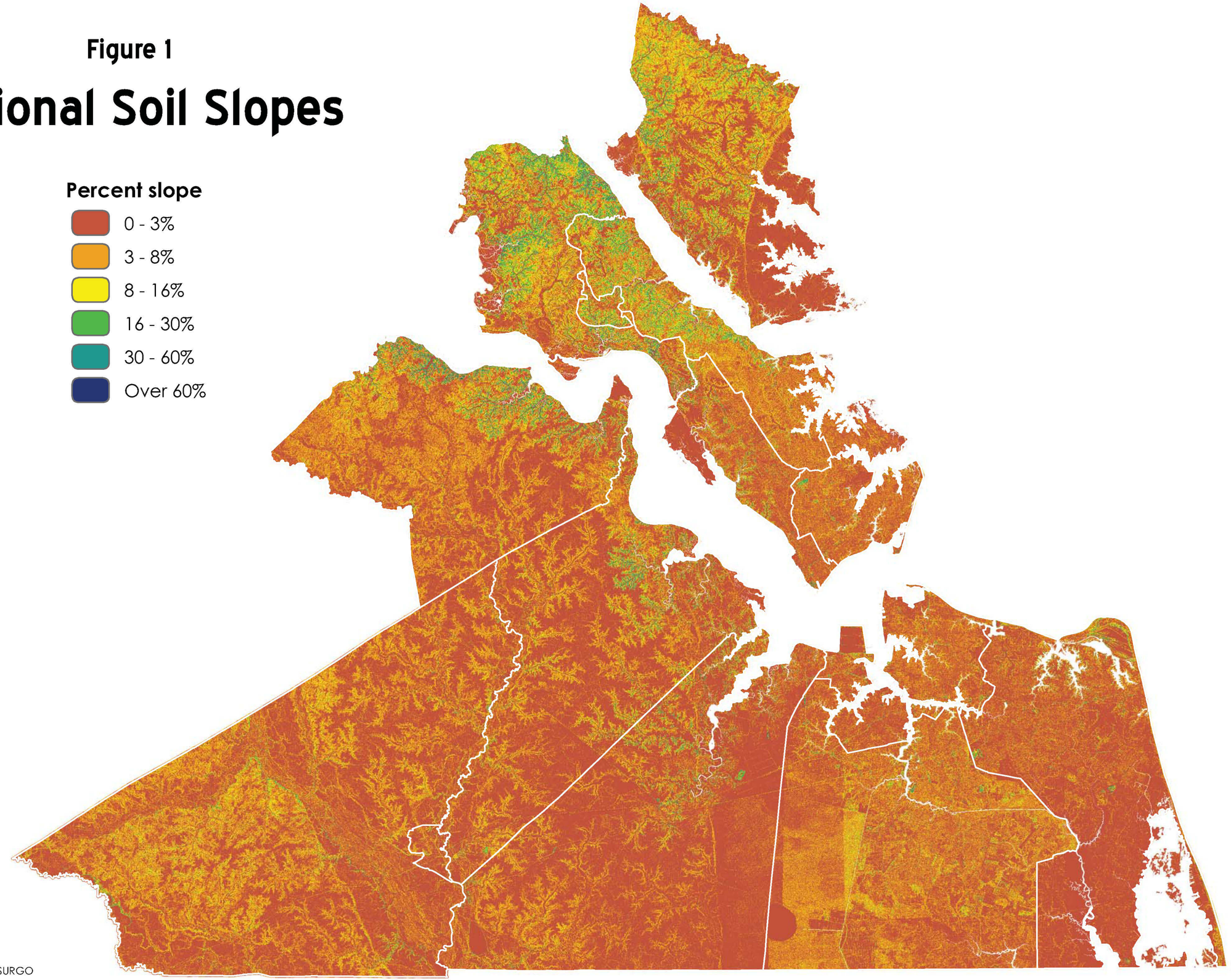
[3] http://hrpdcva.gov/uploads/docs/HRPDCAgendas/2013/April/04182013-PDC-E9K.pdf

Figure 1

Regional Soil Slopes

Percent slope

- 0 - 3%
- 3 - 8%
- 8 - 16%
- 16 - 30%
- 30 - 60%
- Over 60%



Data Source: USDA SSURGO

HAMPTON ROADS PDC PLANNING DISTRICT COMMISSION

POORLY DRAINED SOILS

Soil regulates the processes of surface runoff, infiltration and percolation, and is a major controlling factor in evapotranspiration through the capacity of the soil to store and release water. The characteristics of soils on site should be carefully considered during the development of a stormwater management strategy because runoff volumes and flow rates can be reduced through infiltration and storage in the pore space of the soil substrata and pollutants can be removed from the water column via sorption to soil particles.

The ability of surface soil layers to infiltrate and their capacity to store stormwater are important design parameters that are represented by the hydraulic conductivity and the storage capacity of the soil type. A Regional map of NRCS hydrologic soil groups is provided as Figure 2. This map should only serve as a general guide because soils can be highly heterogeneous. A site specific soils investigation should be conducted to fully evaluate the feasibility of infiltration at a site.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of following four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms:

- **Group A** soils have a high infiltration rate and low runoff potential. These consist mainly of deep, well drained to excessively drained sands or gravelly sands.
- **Group B** soils have a moderate infiltration rate. These consist primarily of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture.
- **Group C** soils have a slow infiltration rate. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture.
- **Group D** soils have a very slow infiltration rate and high runoff potential when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. Only soils that in their natural condition are in group D are assigned to dual classes. The first letter is for drained areas and the second is for undrained areas.

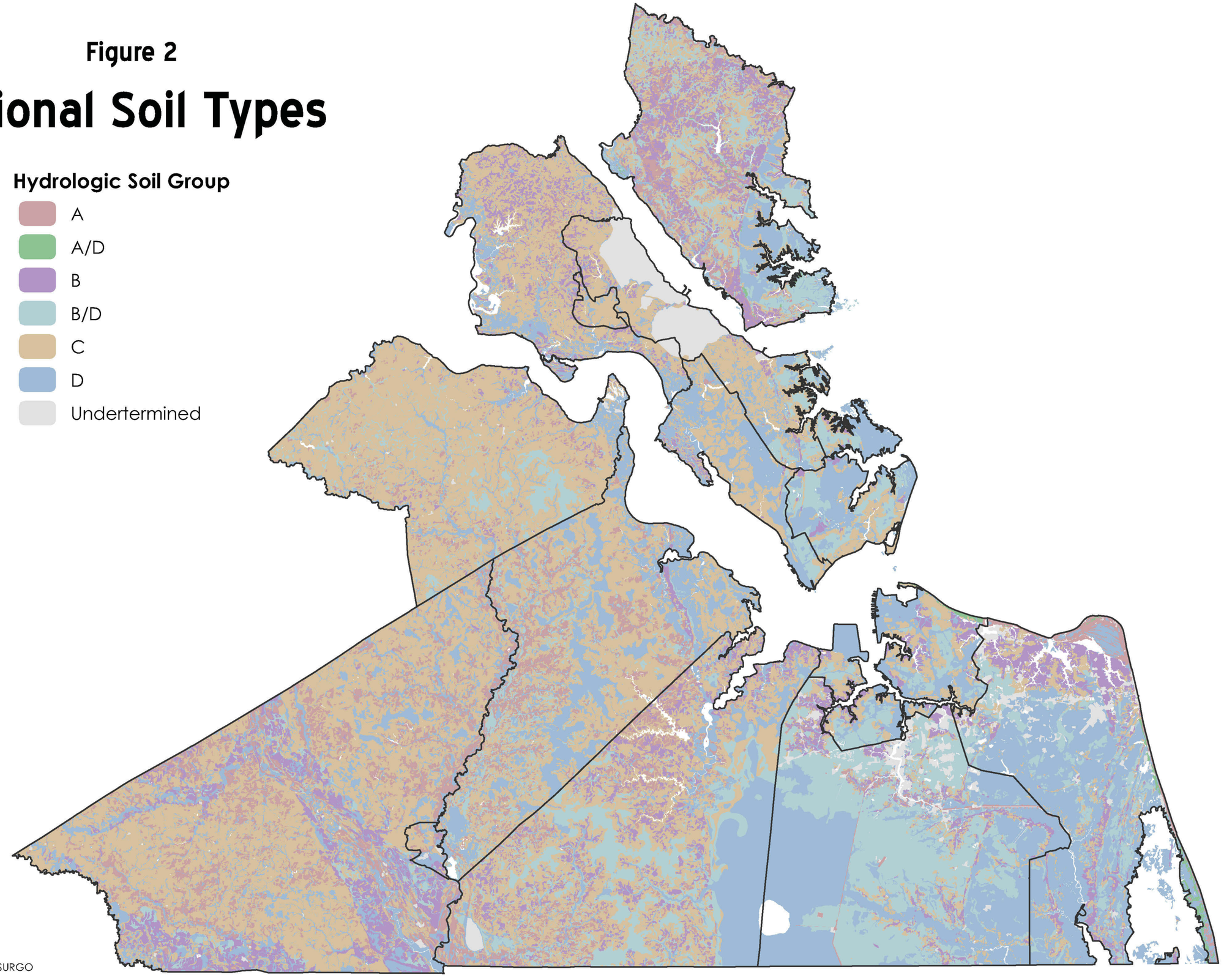
Seventy percent of the soils in Hampton Roads are of hydrologic class C and D, and the majority of the C soils are found in the western half of the Region. Unfortunately, these soils have limited ability to infiltrate stormwater and make large scale infiltration BMPs infeasible. However, small scale infiltration can still be effective at reducing runoff volumes even when native soils have low permeability. The following modifications can be implemented to prevent the BMP from remaining saturated with water: local soils may be amended; alternative outlets, such as underdrains, can be installed; and a gravel layer beneath the underdrain can be added to provide subsurface pore storage.

Figure 2

Regional Soil Types

Hydrologic Soil Group

- A
- A/D
- B
- B/D
- C
- D
- Undertermined



Data Source: USDA SSURGO

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HIGH WATER TABLE

Groundwater is an important element in the hydrologic cycle. During long periods of dry weather, groundwater is the source of baseflow in rivers, canals, and stormwater drainage systems especially in shallow groundwater regions like Hampton Roads. The depth to groundwater is an important factor to consider when selecting and designing a stormwater BMP. Throughout the coastal plain, the water table is within a few feet of the surface (Figure 3). The proximity of the groundwater table to the surface increases the potential for groundwater contamination from stormwater infiltration and diminishes the performance and feasibility of many stormwater BMPs.

The distance between the bottom of the stormwater control practice and the groundwater table, depth and direction of groundwater flow, seasonal groundwater variation, regional geology, and the slope of the water table are important factors to consider when evaluating a site's potential for stormwater infiltration. The soil infiltration properties, groundwater use, and groundwater flow characteristics must all be considered to ensure that the water quality of the groundwater resource is not negatively impacted.

Figure 3 illustrates that 40 percent of the Hampton Roads area has a separation of less than 1 foot between the land surface and the seasonal high groundwater table and 60 percent of land is within 2 feet. Depth to seasonal high groundwater table was calculated using data from the Soil Survey Geographic (SSURGO) Database and assuming that groundwater levels would be highest between January and April. Site specific data should be acquired prior to BMP selection and design.

POLLUTANTS OF CONCERN

Virginia's stormwater regulations are tied to phosphorus control which is frequently the limiting nutrient for fresh water. However, the most common impairment of local water quality in Hampton Roads is bacteria. In addition, coastal plain localities also need to reduce nitrogen and sediment loads in order to comply with the Chesapeake Bay TMDL. In order to protect water quality in the coastal plain and meet TMDL requirements, the ability of a BMP to control pollutants other than phosphorus should be considered when deciding which stormwater practices should be implemented to meet the stormwater regulations. The capacity of each BMP to remove bacteria and nitrogen is presented in the

Structural BMP Implementation section of this report, but the following considerations and modifications can reduce bacteria and nitrogen concentrations in runoff:

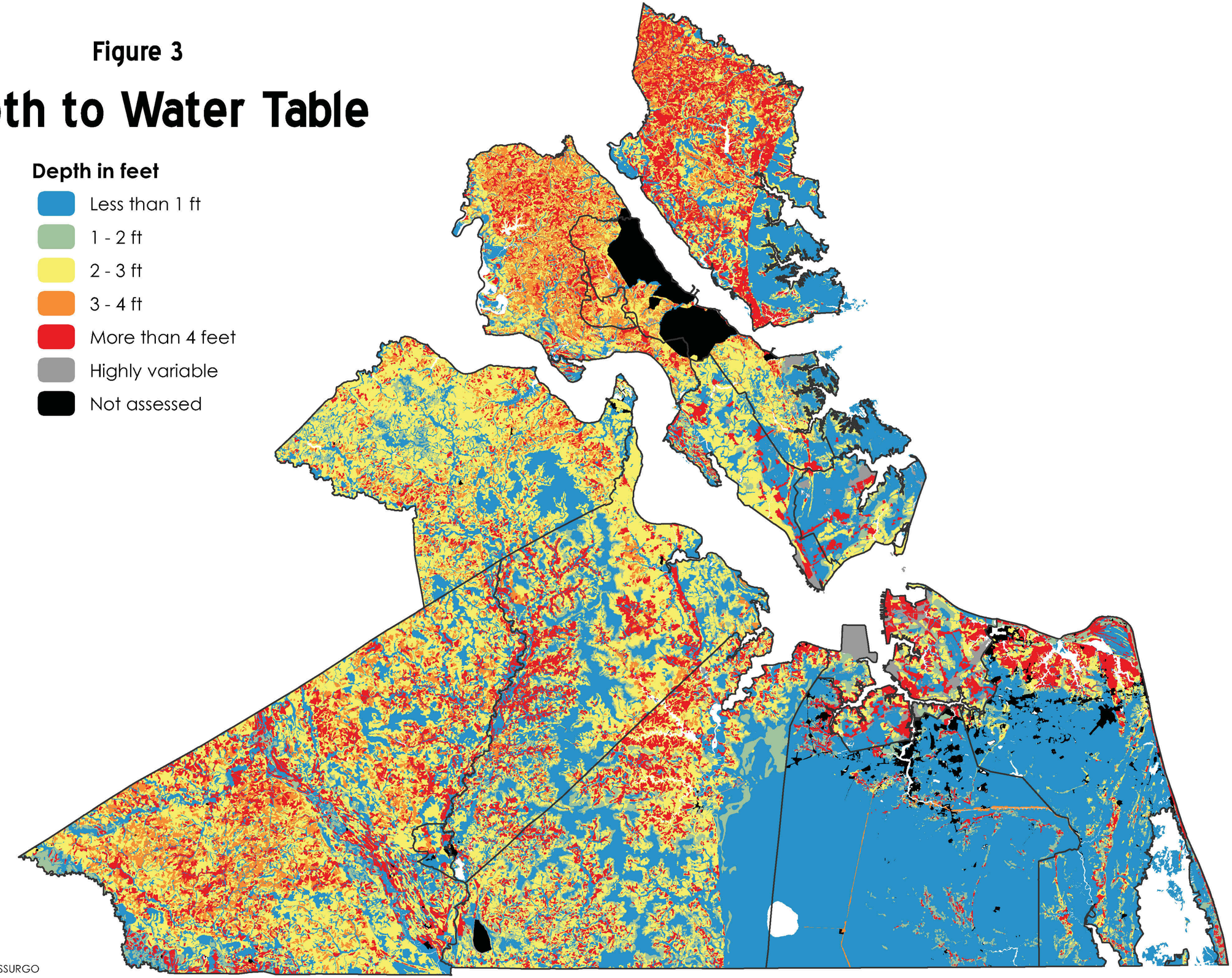
- Maintain setbacks from septic drainfields and connect household waste discharges to the local sanitary sewer system when feasible.
- Use dry or wet swales rather than grass channels.
- Minimize site runoff by utilizing infiltration and filtration practices.
- Avoid using turf around ponds and wetlands. Consider planting taller native vegetation to make shoreline access more difficult for geese and waterfowl.
- Use vegetated filter strips at the edge of riparian buffer areas.
- Use shallow wetlands and benches to create natural micro-predators for bacteria.
- Enhance sand filter media with a layer of organic matter.
- Create high light conditions to promote UV in areas of standing water.
- Design treatment systems to prevent re-suspension of bottom sediments.

Figure 3

Depth to Water Table

Depth in feet

- Less than 1 ft
- 1 - 2 ft
- 2 - 3 ft
- 3 - 4 ft
- More than 4 feet
- Highly variable
- Not assessed



Data Source: USDA SSURGO

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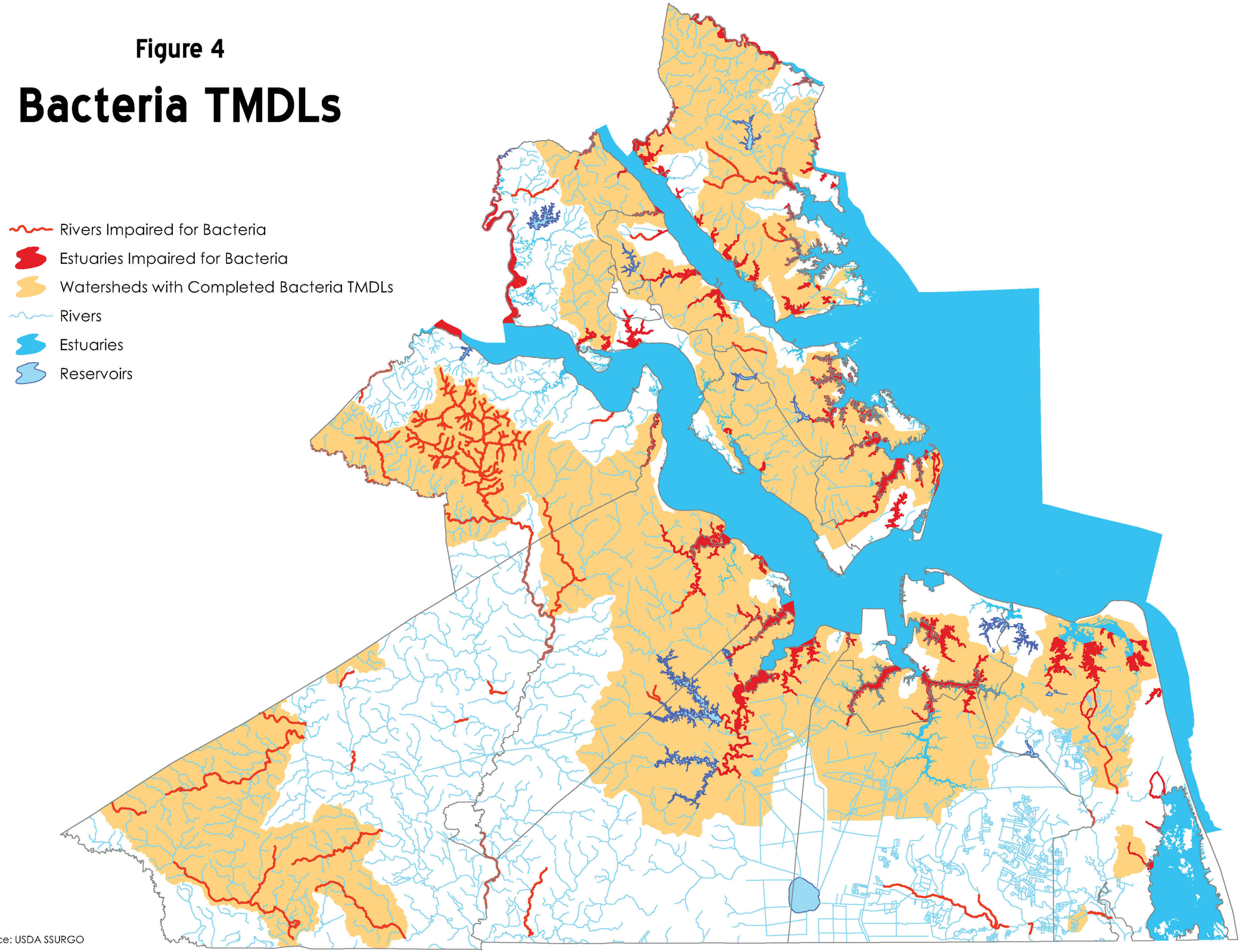
Figure 4

Bacteria TMDLs



Data Source: USDA SSURGO

Appendix 4: Approved Stormwater Management Practices

4A – Norfolk Modifications to the Approved Virginia BMP Clearinghouse Practices

4B – Encased Falling Head Infiltration Testing Procedure for use in the City of Norfolk

4A – Norfolk Modifications to the Approved Virginia BMP Clearinghouse Practices

4A – Norfolk Modifications to the Approved Virginia BMP Clearinghouse Practices

The following modifications, additions, or deletions to the Approved Practices from the Virginia BMP Clearinghouse are hereby incorporated into the Norfolk Design Criteria. For all practices requiring a separation from groundwater, the seasonal high groundwater shall be the point of measurement for separation of practices to groundwater. The groundwater elevation must be determined by on-site measurement and seasonally adjusted.

1. Rooftop (and Impervious Area) Disconnection
    a. **Table 1.4, Revise the following**
        i. **Media Source, Revise to read "Vendor Supplied"**
        ii. **Required Soil Borings, revise to read "Minimum one soil test per lot"**
2. Sheetflow to Open Space and Grass Filter Areas **– No modification**
3. Grass Channels **– No modification**
4. Soils Compost Amendments **– No modification**
5. Vegetated Roofs **– No modification**
6. Rainwater Harvesting **– No modification**
7. Permeable Pavement **– All practices proposed in the City of Norfolk shall incorporate an appropriately sized underdrain**
8. Infiltration
    a. **Replace Appendix 8-A of the Infiltration Practice Standard with the Encased Falling Head Test Criteria from Appendix 4**
    b. **All practices proposed in the City of Norfolk shall incorporate an appropriately sized underdrain**
9. Bioretention (including Urban Bioretention)
    a. **Table 9.3**
        i. **Subsoil Testing – Level 2 Design Criteria shall be utilized**
        ii. **Underdrain – Level 2 Design shall incorporate an underdrain**
    b. **Section 6.2 (pg. 18 of 54) – Notwithstanding the following sentence: "Soil testing is not needed for Level 1 bioretention areas where an underdrain is used." all infiltration and bioretention practices in the City of Norfolk must include site specific infiltration testing at the proposed location of the practice.**
    c. **Section 6.7 (pg. 25 of 54)- Notwithstanding the following sentence: "Some Level 2 designs will not use an underdrain (where soil infiltration rates meet minimum standards; see Section 6.2 and Section 6.3 design tables)." all bioretention and infiltration practices proposed in the City of Norfolk must incorporate an appropriately sized underdrain.**
10. Dry Swales
    a. **Table 10.2**
        i. **Subsoil Testing – Level 2 Design Criteria shall be utilized**
    b. **All practices proposed in the City of Norfolk shall incorporate an appropriately sized underdrain**

11. Wet Swales **– No modification**
12. Filtering Practices **– All practices proposed in the City of Norfolk shall incorporate an appropriately sized underdrain**
13. Constructed Wetlands **– No modification**
14. Wet Ponds **– Table 14.2**
    i. **For either Level I or Level II pond design, landscaping around the pond shall be designed to deter waterfowl.**
15. Dry Extended Detention Ponds **– No modification**

4B – Encased Falling Head Infiltration Testing Procedure for use in the City of Norfolk

Encased Falling Head Test Protocol for use in Norfolk, Virginia

The encased falling head procedure is performed with a 6-inch casing that is embedded approximately 6 inches into the native soil. The goal of this field test is to evaluate the vertical infiltration rate through a 6-inch plug of soil, without allowing any lateral infiltration. The test is not appropriate in gravelly soils or in other soils where a good seal with the casing cannot be established.

1. Embed a solid 6 inch diameter casing into the native soil at the elevation of the proposed facility bottom. Ensure that the embedment provides a good seal around the pipe casing so that percolation will be limited to the 6-inch plug of the material with the casing. The method can also be used when testing within hollow stem augers, provided the driller and tester are reasonably certain that a good seal has been achieved between the soil and auger.
2. Fill the pipe with clean water a minimum of 1 foot above the soil to be tested, and maintain this depth for at least 4 hours (or overnight if clay soils are present) to presoak the native material. Any soil that sloughed into the hole during the soaking period should be removed. In sandy solid with little or no clay or silt, soaking is not necessary. If after filling the whole twice with 12 inches of water, the water seeps completely away in less than 10 minutes, the test can proceed immediately.
3. To conduct the first trial of the test, fill the pipe to approximately 12 inches above the soil and measure the water level to the nearest 0.01 foot (1/8 inch). Alternative water head heights may be used for testing provided the presaturation height is adjusted accordingly and the water head height used in infiltration testing is 50 percent or less than the water head height in the proposed Stormwater system during the design storm event. The level should be measured with a tape or other device with reference to a fixed point. The top of the pipe is often a convenient reference point. Record the exact time.
4. Measure the water level to the nearest 0.01 foot (1/8 inch) at 10- minute intervals for a total period of 1 hour (or 20-minute intervals for 2 hours in slower soils) or until all the water has drained. In faster draining soils (sand and gravels), it may be necessary to shorten the measurement interval in order to obtain a well-defined infiltration rate curve. Constant head test may be substituted for falling head test at the discretion of the professional overseeing the infiltration rate between two successive trials is minimal. The trial should be discounted if the infiltration rate between successive trials increases. At least three trials must be conducted. After each trial, the water level is readjusted to the 12 inch level. Enter results into the data table (see **Exhibit 4B-1**).
5. The average infiltration rate over the last trial should be used to calculate the unfactored infiltration rate. Alternative, the infiltration rate measured over the range of water head applicable to the project Stormwater system design may be used at the discretion of the professional overseeing the testing. The final rate must be reported in inches per hour.
6. Upon completion of the testing, the casing should be pulled and the test pit backfilled.

Reporting requirements

The following information should be included in the Infiltration Testing Report. The Infiltration Testing Report should be attached to the project's Stormwater Management Report.

1. Statement of project understanding (proposed Stormwater system).
2. Summary of subsurface conditions encountered.
3. Summary of infiltration testing including location and number of tests and testing methods used. Discussion on how the test were preformed (i.e. pipe type or diameter or test pit dimensions).
4. Infiltration testing results in inches per hour.
5. Recommended design infiltration rate.

6. Groundwater observations within exploration and an estimate of the depth to seasonal high groundwater.
7. Site plan showing location of infiltrations tests.
8. Boring or test pit logs. The logs should include an associated soil classification consistent with ASTM D2488-00, Standard Practice for classification for description and identification of soils (visual-Manual Procedure). The logs should also include any additional pertinent subsurface information, such as soil moisture conditions, depth and description of undocumented or engineered fill, soil color and mottling conditions, soil stiffness or density, and approximate depth of contact between soil types.
9. Infiltration Test Data Tables (see following pages for example and blank tables)

Exhibit 4B-1: Example Infiltration Test Data Table

Location: Lot 105, Point Heights Subdivision	**Date:** 6/28/2008	**Test Hole Number:** 3
Depth to bottom of hole: 57 inches	**Dimension of hole:** 0.5 feet diameter	**Test Method**: Encased Falling Head
Tester's Name C.J. Tester		
Tester's Company: Tester Company		
Tester's Contact number: 555-1212		

Depth (Feet):	**Soil Texture:**
0-0.5	Black Top Soil
0.5-1.0	Brown SM
1.0-2.2	Brown ML
2.2-5.1	Brown CL

Presaturation Start Time:
Presaturation End Time:

Time	**Time interval (minutes):**	**Measurements (feet):**	**Drop in water level, (feet):**	**Infiltration rate, (inches per hour):**	**Remarks:**
9:00	0	3.75	-		Filled with 6"
9:20	20	3.83	0.08		
9:40	20	3.91	0.08	2.88	
10:00	20	3.98	0.07	2.52	
10:20	20	4.04	0.06	2.16	
10:40	20	4.11	0.07	2.52	
11:00	20	4.17	0.06	2.16	
11:20	20	4.225	0.055	1.98	
					Adjust to 6" level for Trial #2

Calculation is performed for each water level drop
= (Drop in water level/Time interval) x (conversion)
= 0.055ft/20min x (12in/ft.) x (60min/hr.)
= 1.98 inches per hour

Exhibit 4B-2: Blank Infiltration Test Data Table

Location:	**Date:**	**Test Hole Number:**
Depth to bottom of hole:	**Dimension of hole:**	**Test Method**:
Tester's Name:		
Tester's Company:		
Tester's Contact number:		

Depth (Feet):	**Soil Texture:**

Presaturation Start Time:

Presaturation End Time:

Time	**Time interval (minutes):**	**Measurements (feet):**	**Drop in water level, (feet):**	**Infiltration rate, (inches per hour):**	**Remarks:**

Appendix 5: BMP Maintenance Standards

5A – Standard Declaration of Covenants (BMP Maintenance Agreement)

5B – Subdivision Declaration of Covenants

5C – Pollutant Reduction Declaration of Covenants

5D – Appendix H. 1 Virginia Stormwater Management Handbook - BMP Checklist

5A – Standard Declaration of Covenants (BMP Maintenance Agreement)

Site Plan Number:

DECLARATION OF COVENANTS
For Storm and Surface Water Facility
And System Maintenance

THIS DECLARATION OF COVENANTS made this day of _____, 20_____, by _____, hereinafter referred to as the "Covenantor" to and for the benefit of the City of Norfolk, Virginia and its successors and assigns (the "City").

W I T N E S S E T H:

WHEREAS, the City is authorized and required to regulate and control the disposition of storm and surface waters within the City of Norfolk as set forth in the City's ordinances; and

WHEREAS, the Covenantor is the owner of a certain tract or parcel of land more particularly described as:_____ and legally described in **Exhibit A** attached hereto and made a part hereof (the "property"); and

WHEREAS, the Covenantor and/or its assigns desire to construct certain improvements on its property which will alter extant storm and surface water conditions on both the property and adjacent lands; and

WHEREAS, in order to accommodate and regulate these anticipated changes in existing storm and surface water flow conditions, the Covenantor and/or its assigns desire to build and maintain at its expense, a storm and surface water management facility and system ("facility and system") more particularly described and shown on plans titled _____, and dated day of _____, 20_____, which plans are attached hereto as **Exhibit B** and made a part hereof ("plans" or "plan"); and

WHEREAS, the City has reviewed and approved these plans subject to the execution of this agreement.

NOW, THEREFORE, in consideration of the benefits received by the Covenantor and/or its assigns as a result of the City's approval of its plans, Covenantor and/or its assigns, with full authority to execute deeds, deeds of trust, other covenants, and all rights, title and interest in the property described above does hereby covenant with the City as follows:

1. The recitals are made a part of this Declaration.

2. Covenantor and/or its assigns shall construct and perpetually maintain, at its sole expense, the above referenced storm and surface water management facility and system in strict accordance with the plan approval granted by the City, so that it continues to operate as designed and approved. (**Exhibit B)**.

3. Covenantor and/or its assigns shall, at its sole expense, make such changes or modifications to the facility and system as may, in the City's discretion, be determined to

be in accordance with the specifications included in the plans which have which have been reviewed and approved by the City.

4. The City, its agents, employees, and contractors shall have the perpetual right of the ingress and egress over the property of the Covenantor and/or its assigns and the right to inspect at reasonable times and in reasonable manner, the storm and surface water facility and system in order to ensure that the system is being properly maintained and is continuing to perform in an adequate manner.

5. The Covenantor and/or its assigns agree that should it fail to correct any defects in the above-described facility and system within ten (10) days from the receipt of written notice from the City, or shall fail to maintain the facility and system in accordance with the approved design standards, the plans, and with the law and applicable regulations, or should there be an emergency as determined by the City in its sole discretion, the City is authorized to enter the property to make all repairs, and to perform all maintenance, construction, and reconstruction the City deems necessary. The City shall then assess the Covenantor and/or its assigns and/or all landowners served by the facility and system the City's costs of such repairs, maintenance, construction, and reconstruction, and such assessment may be placed on the property tax bills of the properties served by the facility and system, including the property in **Exhibit A**, and collected as ordinary taxes by the City.

6. Covenantor and/or its assigns shall indemnify, save harmless and defend the City from and against any and all claims, demands, suits, liabilities, losses, damages and payments including attorney fees claimed or made by persons not parties to the Declaration against the City that are alleged or proven to result or arise from the failure of the Covenantor and/or its assigns to comply with the appropriate construction, operation, or maintenance of the storm and surface water facility and system that is the subject of this Covenant.

7. The covenants contained herein shall run with the land and the Covenantor and/or it assigns further agree that whenever the property shall be held, sold and/or conveyed, it shall be subject to the covenants, stipulations, agreements and provisions of this Declaration, which shall apply to, bind and be obligatory upon the Covenantor hereto, its heirs, successors and assigns and shall bind all present and subsequent owners of the property.

8. The Covenantor and/or its assigns shall promptly notify the City in writing when the Covenantor and/or its assigns legally transfer any of the Covenantor's and/or its assigns responsibilities for the facility and system. The Covenantor and/or its assigns shall supply the Department of Public Works, Division of Environmental Storm Water Management, 2233 McKann Avenue, Norfolk, VA 23509, with a copy of the "TRANSFER OWNERSHIP OF DECLARATION OF COVENANTS" document attached hereto as **Exhibit C** ("document to transfer"), executed by both parties to the transfer, and a copy of this Declaration of Covenants acknowledged by both parties. Upon the City's receipt of the document to transfer, the conveying owner of the property (whether the Covenantor or its assigns) shall be released from all liability arising under

this Declaration of Covenants subsequent to the date of conveyance, but such conveying owner shall remain liable for any and all obligations that accrue prior to such date.

9. The provisions of the Declaration shall be severable and, if any phrase, clause, sentence of provision is declared unconstitutional, or the applicability thereof to the Covenantor and/or its assigns is held invalid, the remainder of the Covenant shall not be affected thereby.

10. The Declaration shall be recorded at the Clerk's Office of the Circuit Court of the City of Norfolk, Virginia by the City. Covenantor shall provide the City with the information for the Land Record Instrument Cover Sheet – Form A and Land Record Instruments Continuation Cover Sheet- Form B (**Exhibit D**).

11. In the event that the City shall determine at its sole discretion at any future time that the facility and system is no longer required, then the City shall at the request of the Covenantor and/or its assigns execute a release of this Declaration of Covenants which the Covenantor and/or its assigns shall record at its expense.

12. Written notice to the Covenantor and/or its assigns shall be deemed received as of three days from the date notice was sent by certified mail to or shall be deemed received as of the date of posting at _____.

IN WITNESS WHEREOF, the Covenantor has executed this Declaration of Covenants of the day of _____, 20_____. The Covenantor represents and warrants as of the date of this Agreement that:

1. The Covenantor has the right, title, and authority to enter into this Agreement and to perform its obligations hereunder; and

2. The person signing this Agreement has the full and complete authority to do so.

By: _____
(Signature)
Print Name: _____
Title: _____
Mailing Address: _____

STATE OF VIRGINIA
CITY OF NORFOLK, to wit:

The foregoing instrument was acknowledged before me this _____ day of _____, 20_____.

_____ _____
REGISTRATION NUMBER NOTARY PUBLIC

My Commission Expires: _____

Site Plan Number:

EXHIBIT A

LEGAL DESCRIPTION OF THE PROPERTY
SET FORTH IN THE DECLARATION OF COVENANTS

Site Plan Number:

EXHIBIT B

(To be provided upon approval of the plans)

Site Plan Number:

EXHIBIT C

TRANSFER OWNERSHIP OF
DECLARATION OF COVENANTS

To: SUBSEQUENT PURCHASERS OF THE ABOVE-MENTIONED PROPERTY SEEN AND AGREED:

By: _____
(Signature)

Print Name: _____

Title: _____

Mailing Address: _____

STATE OF VIRGINIA
CITY OF NORFOLK, to wit:

The foregoing instrument was acknowledged before me this _____ day of _____, 20_____.

_____ _____
REGISTRATION NUMBER NOTARY PUBLIC

My Commission Expires: _____

Site Plan Number:

EXHIBIT D

LAND RECORD INSTRUMENT
COVER SHEET – FORM A
TAX EXEMPT: ☐ YES ☐ NO CITATION: _____

DATE OF INSTRUMENT: [ ]
INSTRUMENT TYPE: [ ]
NUMBER OF PARCELS: [ ]
NUMBER OF PAGES: [ ]

CITY OF NORFOLK

First & Second Grantors

Last Name (ALL CAPS)	First Name	Middle Name/Initial	Suffix
[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]

First & Second Grantees and/or Trustees

Last Name (ALL CAPS)	First Name	Middle Name/Initial	Suffix
[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]

Grantee and/or Trustee Address:
(Name) [ ]
(Address) [ ]
(City, State, Zip) [ ]

Consideration [ ] Existing Debt [ ] Assumption Balance [ ]
Assessed Value [ ]
Prior Inst. Recorded at: City of Norfolk

Book [ ] Page [ ] Instrument No. [ ]

Short Property Description:

Current Property Address
(Address) [ ]
(City, State, Zip) [ ]

Instrument Prepared By: [ ]
Return Recording to:
(Name) [ ]
(Address) [ ]
(City, State, Zip) [ ]

LAND RECORD INSTRUMENTS
CONTINUATION COVER SHEET – FORM B

Tax Exempt	Grantor	Grantee	Last Name	First Name	Middle Name or Initial	Suffix
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☐	☐	☐				
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☐	☐	☐				
☐	☐	☐				

Prior Inst. Recorded at: City of Norfolk
Book [ ] Page [ ] Instrument No. [ ]
Short Property Description:

Current Property Address
(Address) [ ]
(City, State, Zip) [ ]

5B – Subdivision Declaration of Covenants

Site Plan Number:

DECLARATION OF COVENANTS
For Storm and Surface Water Facility
And System Maintenance

THIS DECLARATION OF COVENANTS made this day of _____, 20_____, by _____, hereinafter referred to as the "Covenantor" to and for the benefit of the City of Norfolk, Virginia and its successors and assigns (the "City").

W I T N E S S E T H:

WHEREAS, the City is authorized and required to regulate and control the disposition of storm and surface waters within the City of Norfolk as set forth in the City's ordinances; and

WHEREAS, the Covenantor is the owner of a certain tract or parcel of land more particularly described as:_____, legally described in **Exhibit A,** and included in the subdivision plat described in **Exhibit B** attached hereto and made a part hereof (the "property"); and

WHEREAS, the Covenantor and/or its assigns desire to construct certain improvements on its property which will alter extant storm and surface water conditions on both the property and adjacent lands; and

WHEREAS, in order to accommodate and regulate these anticipated changes in existing storm and surface water flow conditions, the Covenantor and/or its assigns desire to build and maintain at its expense, a storm and surface water management facility and system ("facility and system") more particularly described and shown on plans titled _____, and dated day of _____, 20 , which plans are attached hereto as **Exhibit C** and made a part hereof ("plans" or "plan"); and

WHEREAS, the City has reviewed and approved these plans subject to the execution of this agreement.

NOW, THEREFORE, in consideration of the benefits received by the Covenantor and/or its assigns as a result of the City's approval of its plans, Covenantor and/or its assigns, with full authority to execute deeds, deeds of trust, other covenants, and all rights, title and interest in the property described above does hereby covenant with the City as follows:

1. The recitals are made a part of this Declaration.

2. Covenantor and/or its assigns shall construct and perpetually maintain, at its sole expense, the above referenced storm and surface water management facility and system in strict accordance with the plan approval granted by the City, so that it continues to operate as designed and approved. (**Exhibit C**)

3. Covenantor and/or its assigns shall, at its sole expense, make such changes or modifications to the storm drainage facility and system as may, in the City's discretion,

be determined to be in accordance with the specifications included in the plans which have which have been reviewed and approved by the City.

4. The City, its agents, employees, and contractors shall have the perpetual right of the ingress and egress over the property of the Covenantor and/or its assigns and the right to inspect at reasonable times and in reasonable manner, the storm and surface water facility and system in order to ensure that the system is being properly maintained and is continuing to perform in an adequate manner.

5. The Covenantor and/or its assigns agree that should it fail to correct any defects in the above-described facility and system within ten (10) days from the receipt of written notice from the City, or shall fail to maintain the facility in accordance with the approved design standards, the plans, and with the law and applicable regulations, or should there be an emergency as determined by the City in its sole discretion, the City is authorized to enter the property to make all repairs, and to perform all maintenance, construction, and reconstruction the City deems necessary. The City shall then assess the Covenantor and/or its assigns and/or all landowners served by the facility and system the City's costs of such repairs, maintenance, construction, and reconstruction, and such assessment may be placed on the property tax bills of the properties served by the facility and system, including the property in **Exhibits A and B**, and collected as ordinary taxes by the City.

6. Covenantor and/or its assigns shall indemnify, save harmless and defend the City from and against any and all claims, demands, suits, liabilities, losses, damages and payments including attorney fees claimed or made by persons not parties to the Declaration against the City that area alleged or proven to result or arise from the failure of the Covenantor and/or its assigns to comply with the appropriate construction, operation, or maintenance of the storm and surface water facility and system that is the subject of this Covenant.

7. The covenants contained herein shall run with the land and the Covenantor and/or it assigns further agree that whenever the property shall be held, sold and/or conveyed, it shall be subject to the covenants, stipulations, agreements and provisions of this Declaration, which shall apply to, bind and be obligatory upon the Covenantor hereto, its heirs, successors and assigns and shall bind all present and subsequent owners of the property served by the facility.

8. The Covenantor and/or its assigns shall promptly notify the City in writing when the Covenantor and/or its assigns legally transfer any of the Covenantor's and/or its assigns responsibilities for the facility and system. The Covenantor and/or its assigns shall supply the Department of Public Works, Division of Environmental Storm Water Management, 2233 McKann Avenue, Norfolk, VA 23509, with a copy of the "TRANSFER OWNERSHIP OF DECLARATION OF COVENANTS" document attached hereto as **Exhibit D** ("document to transfer"), executed by both parties to the transfer, and a copy of this Declaration acknowledged by both parties. Upon the City's receipt of the document to transfer, the conveying owner of the property (whether the Covenantor or its assigns) shall be released from all liability arising under this

Declaration of Covenants subsequent to the date of conveyance, but such conveying owner shall remain liable for any and all obligations that accrue prior to such date.

9. The provisions of the Declaration shall be severable and, if any phrase, clause, sentence of provision is declared unconstitutional, or the applicability thereof to the Covenantor and/or its assigns is held invalid, the remainder of the Covenant shall not be affected thereby.

10. The Declaration shall be recorded at the Clerk's Office of the Circuit Court of the City of Norfolk, Virginia by the City. Covenantor shall provide the City with the information for the Land Record Instrument Cover Sheet – Form A and Land Record Instruments Continuation Cover Sheet- Form B (**Exhibit E**).

11. In the event that the City shall determine at its sole discretion at any future time that the facility and system is no longer required, then the City shall at the request of the Covenantor and/or its assigns execute a release of this Declaration of Covenants which the Covenantor and/or its assigns shall record at its expense.

12. Written notice to the Covenantor and/or its assigns shall be deemed received as of three days from the date notice was sent by certified mail to or shall be deemed received as of the date of posting at _____.

IN WITNESS WHEREOF, the Covenantor has executed this Declaration of Covenants of the day of _____, 20_____. The Covenantor represents and warrants as of the date of this Agreement that:

1. The Covenantor has the right, title, and authority to enter into this Agreement and to perform its obligations hereunder; and

2. The person signing this Agreement has the full and complete authority to do so.

By: _____
(Signature)
Print Name: _____
Title: _____
Mailing Address: _____

STATE OF VIRGINIA
CITY OF NORFOLK, to wit:

The foregoing instrument was acknowledged before me this _____day of _____, 20_____.

_____ _____
REGISTRATION NUMBER NOTARY PUBLIC

My Commission Expires: _____

Site Plan Number:

EXHIBIT A

LEGAL DESCRIPTION OF THE PROPERTY
SET FORTH IN THE DECLARATION OF COVENANTS

Site Plan Number:

EXHIBIT B

SUBDIVISION PLAT OF THE PROPERTY
SET FORTH IN THE DECLARATION OF COVENANTS

Site Plan Number:

EXHIBIT C

(To be provided upon approval of the plans)

Site Plan Number:

EXHIBIT D

TRANSFER OWNERSHIP OF
DECLARATION OF COVENANTS

To: SUBSEQUENT PURCHASERS OF THE ABOVE-MENTIONED PROPERTY SEEN AND AGREED:

By: _____
(Signature)

Print Name: _____

Title: _____

Mailing Address: _____

STATE OF VIRGINIA
CITY OF NORFOLK, to wit:

The foregoing instrument was acknowledged before me this _____ day of _____, 20_____.

_____ _____
REGISTRATION NUMBER NOTARY PUBLIC

My Commission Expires: _____

Site Plan Number:

EXHIBIT E

LAND RECORD INSTRUMENT
COVER SHEET – FORM A
TAX EXEMPT: ☐ YES ☐ NO CITATION: _____

DATE OF INSTRUMENT: [ ]
INSTRUMENT TYPE: [ ]
NUMBER OF PARCELS: [ ]
NUMBER OF PAGES: [ ]

CITY OF NORFOLK

First & Second Grantors

Last Name (ALL CAPS)	First Name	Middle Name/Initial	Suffix
[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]

First & Second Grantees and/or Trustees

Last Name (ALL CAPS)	First Name	Middle Name/Initial	Suffix
[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]

Grantee and/or Trustee Address:
(Name) [ ]
(Address) [
(City, State, Zip) [ ]

Consideration [ ] Existing Debt [ ] Assumption Balance [ ]
Assessed Value [ ]
Prior Inst. Recorded at: City of Norfolk

Book [ ] Page [ ] Instrument No. [ ]

Short Property Description:

Current Property Address
(Address) [ ]
(City, State, Zip) [ ]

Instrument Prepared By: [ ]
Return Recording to:
(Name) [ ]
(Address) [ ]
(City, State, Zip) [ ]

LAND RECORD INSTRUMENTS
CONTINUATION COVER SHEET – FORM B

Tax Exempt	Grantor	Grantee	Last Name	First Name	Middle Name or Initial	Suffix
☐	☐	☐	______	______	______	______
☐	☐	☐	______	______	______	______
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☐	☐	☐	______	______	______	______
☐	☐	☐	______	______	______	______

Prior Inst. Recorded at: City of Norfolk
Book [ ] Page [ ] Instrument No. [ ]
Short Property Description:

Current Property Address
(Address) [ ]
(City, State, Zip) [ ]

5C – Pollutant Reduction Declaration of Covenants

Site Plan Number: _____

DECLARATION OF COVENANTS
10% Reduction of Pollutant Load

THIS DECLARATION OF COVENANTS made this day of _____, 20_____, by , hereinafter referred to as the "Covenantor" to and for the benefit of the City of Norfolk, Virginia and its successors and assigns (the "City").

W I T N E S S E T H:

WHEREAS, the City is authorized and required to regulate and control the disposition of storm and surface waters within the City of Norfolk as set forth in the City's ordinances; and

WHEREAS, the Covenantor is the owner of a certain tract or parcel of land more particularly described as: and legally described in **Exhibit A** attached hereto and made a part hereof (the "property"); and

WHEREAS, the Covenantor and/or its assigns desire to construct certain improvements on its property which will alter extant storm and surface water conditions on both the property and adjacent lands; and

WHEREAS, in order to accommodate and regulate these anticipated changes in existing storm and surface water flow conditions, the Covenantor and/or its assigns desire to maintain a 10% reduction in pollutant load as described in **Exhibit B,** Performance Base Water Quality Calculations**,** attached hereto and made a part hereof, and as shown on city-approved plans titled_____, and dated _____ day of _____, 20_____, in-lieu of construction of a storm and surface water management facility ("plans" or "plan"); and

WHEREAS, the City has reviewed and approved these plans subject to the execution of this agreement.

NOW, THEREFORE, in consideration of the benefits received by the Covenantor and/or its assigns as a result of the City's approval of its plans, Covenantor and/or its assigns, with full authority to execute deeds, deeds of trust, other covenants, and all rights, title and interest in the property described above does hereby covenant with the City as follows:

1. The recitals are made a part of this Declaration.

2. Covenantor and/or its assigns shall ensure the 10% reduction in strict accordance with the plan approval granted by the City, so that it remains as designed and approved. (**Exhibit B**).

3. Covenantor and/or its assigns shall, at its sole expense, make such changes or modifications to the site as may, in the City's discretion, be determined to be in accordance with the specifications included in the plans which have been reviewed and

approved by the City to incorporate the 10% reduction in pollutant removal either by the reduction in impervious area or the installation of a storm and surface water management facility.

4. The City, its agents, employees, and contractors shall have the perpetual right of the ingress and egress over the property of the Covenantor and/or its assigns and the right to inspect at reasonable times and in reasonable manner, the site in order to ensure that the site has remained as designed and approved to include the 10% reduction requirements.

5. The Covenantor and/or its assigns agree that should it fail to maintain the designated site in accordance with the approved design standards in the above-described site within ten (10) days from the receipt of written notice from the City, the City is authorized to enter the property to make all repairs, and to perform all maintenance, construction, and reconstruction the City deems necessary. The City shall then assess the Covenantor and/or its assigns and/or all landowners of the property the City's costs of such repairs, maintenance, construction, and reconstruction, and such assessment may be placed on the property tax bills of the property and collected as ordinary taxes by the City.

6. Covenantor and/or its assigns shall indemnify, save harmless and defend the City from and against any and all claims, demands, suits, liabilities, losses, damages and payments including attorney fees claimed or made by persons not parties to the Declaration against the City that are alleged or proven to result or arise from the failure of the Covenantor and/or its assigns to comply with the appropriate construction, operation, or maintenance of the site that is the subject of this Covenant.

7. The covenants contained herein shall run with the land and the Covenantor and/or it assigns further agree that whenever the property shall be held, sold and/or conveyed, it shall be subject to the covenants, stipulations, agreements and provisions of this Declaration, which shall apply to, bind and be obligatory upon the Covenantor hereto, its heirs, successors and assigns and shall bind all present and subsequent owners of the property.

8. The Covenantor and/or its assigns shall promptly notify the City in writing when the Covenantor and/or its assigns legally transfer any of the Covenantor's and/or its assigns responsibilities under this Declaration. The Covenantor and/or its assigns shall supply the Department of Public Works, Division of Environmental Storm Water Management, 2233 McKann Avenue, Norfolk, VA 23509, with a copy of the "TRANSFER OWNERSHIP OF DECLARATION OF COVENANTS" document attached hereto as **Exhibit C** ("document to transfer"),, executed by both parties to the transfer, and a copy of this Declaration of Covenants acknowledged by both parties. Upon the City's receipt of the document to transfer, the conveying owner of the property (whether the Covenantor or its assigns) shall be released from all liability arising under this Declaration of Covenants subsequent to the date of conveyance, but such conveying owner shall remain liable for any and all obligations that accrue prior to such date.

9. The provisions of the Declaration shall be severable and, if any phrase, clause, sentence of provision is declared unconstitutional, or the applicability thereof to the Covenantor and/or its assigns is held invalid, the remainder of the Covenant shall not be affected thereby.

10. The Declaration shall be recorded at the Clerk's Office of the Circuit Court of the City of Norfolk, Virginia by the City. Covenantor shall provide the City with the information for the Land Record Instrument Cover Sheet – Form A and Land Record Instruments Continuation Cover Sheet- Form B (**Exhibit D**).

11. In the event that the City shall determine at its sole discretion at any future time that the 10% reduction is no longer required, then the City shall at the request of the Covenantor and/or its assigns execute a release of this Declaration of Covenants which the Covenantor and/or its assigns shall record at its expense.

12. Written notice to the Covenantor and/or its assigns shall be deemed received as of three days from the date notice was sent by certified mail to or shall be deemed received as of the date of posting at _____.

IN WITNESS WHEREOF, the Covenantor has executed this Declaration of Covenants of the _____ day of _____, 20_____. The Covenantor represents and warrants as of the date of this Agreement that:

1. The Covenantor has the right, title, and authority to enter into this Agreement and to perform its obligations hereunder; and

2. The person signing this Agreement has the full and complete authority to do so.

By: _____
(Signature)
Print Name:
Title:
Mailing Address: _____

STATE OF VIRGINIA
CITY OF NORFOLK, to wit:

The foregoing instrument was acknowledged before me this _____day of _____, 20_____.

_____ _____
REGISTRATION NUMBER NOTARY PUBLIC

My Commission Expires: _____

Site Plan Number: _____

EXHIBIT A

LEGAL DESCRIPTION OF THE PROPERTY
SET FORTH IN THE DECLARATION OF COVENANTS

Site Plan Number: _____

EXHIBIT B

PERFORMANCE BASED WATER QUALITY CALCULATIONS
SET FORTH IN THE DECLARATION OF COVENANTS

Site Plan Number:

EXHIBIT C

TRANSFER OWNERSHIP OF
DECLARATION OF COVENANTS

To: SUBSEQUENT PURCHASERS OF THE ABOVE-MENTIONED PROPERTY SEEN AND AGREED:

By: _____
(Signature)

Print Name: _____

Title: _____

Mailing Address: _____

STATE OF VIRGINIA
CITY OF NORFOLK, to wit:

The foregoing instrument was acknowledged before me this _____ day of _____, 20_____.

_____ _____
REGISTRATION NUMBER NOTARY PUBLIC

My Commission Expires: _____

Site Plan Number:

EXHIBIT D

LAND RECORD INSTRUMENT
COVER SHEET – FORM A
TAX EXEMPT: YES NO CITATION: _____

DATE OF INSTRUMENT: [ ]
INSTRUMENT TYPE: [ ]
NUMBER OF PARCELS: [ ]
NUMBER OF PAGES: [ ]

CITY OF NORFOLK

First & Second Grantors

Last Name (ALL CAPS)	First Name	Middle Name/Initial	Suffix
[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]

First & Second Grantees and/or Trustees

Last Name (ALL CAPS)	First Name	Middle Name/Initial	Suffix
[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]

Grantee and/or Trustee Address:
(Name) [ ]
(Address) [ ]
(City, State, Zip) [ ]

Consideration [ ] Existing Debt [ ] Assumption Balance [ ]
Assessed Value [ ]
Prior Inst. Recorded at: City of Norfolk

Book [ ] Page [ ] Instrument No. [ ]

Short Property Description:

Current Property Address
(Address) [ ]
(City, State, Zip) [ ]

Instrument Prepared By: [ ]
Return Recording to:
(Name) [ ]
(Address) [ ]
(City, State, Zip) [ ]

LAND RECORD INSTRUMENTS
CONTINUATION COVER SHEET – FORM B

Tax Exempt	**Grantor**	**Grantee**	**Last Name**	**First Name**	**Middle Name or Initial**	**Suffix**
☐	☐	☐	______	______	______	______
☐	☐	☐	______	______	______	______
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☐	☐	☐	______	______	______	______

Prior Inst. Recorded at: City of Norfolk
Book [ ] Page [ ] Instrument No. [ ]
Short Property Description:

Current Property Address
(Address) [ ]
(City, State, Zip) [ ]

5D – Appendix H. 1 Virginia Stormwater Management Handbook - BMP Checklist

Information on BMP Checklist can be found in the Virginia Stormwater Management Handbook or at [Document Viewer | Virginia Stormwater Management Handbook (encodeplus.com)]

Appendix 6: Norfolk Sample Forms

6A – Land Disturbance Permit Application

6B – Agreement in Lieu of a Soil Erosion Control and Stormwater Management Plan- Single Family

6C – Stormwater Pre-Construction Checklist

6D – Stormwater Best Management Practice Reporting Form

6E – Stormwater As-Built Checklist

6F- City of Norfolk Standard Erosion & Sediment Control Notes

6A – Land Disturbance Permit Application

The most current version of the Permit Application may be found at

https://www.norfolk.gov/DocumentCenter/View/3835/Land_Disturbing_Permit_App?bidId=#:~:text=The%20following%20conditions%20shall%20apply%20to%20all%20land-disturbing,a%20variance%20has%20been%20granted%20in%20writing%202.

DEPARTMENT OF CITY PLANNING
BUREAU OF ENVIRONMENTAL SERVICES

508 City Hall Bldg • Norfolk, VA 23510 • (757) 664-4365

Land Disturbance Permit Application

Date:_____ Project Name:_____CBPA (circle): Yes or No

Site Plan #:_____ CGP #:_____ Project Address:_____

I. Brief Description of Land Disturbing Activity *(attach erosion and sediment control plan)*

_____

_____

Total size of tract, lot, or subdivision: _____

Total disturbed area: _____

II. Owner _____ Phone_____

Address _____

III. Contractor/Agent _____Phone _____

Address _____

IV. On-Site Contact for E&S Controls_____Phone _____

V. STANDARD CONDITIONS

The following conditions shall apply to all land-disturbing activity permits:

1. *All projects shall conform to the standards and specifications and other criteria adopted by the City of Norfolk unless a variance has been granted in writing*
2. *This permit, as well as the approved erosion and sediment control plan, must be kept on the work site and shown on request.*
3. *The Bureau of Environmental Services must be given at least 48 hours notice before work commences and upon completion of the project.*
4. *Erosion and sediment control measures shall be maintained in satisfactory operating condition until final, permanent stabilization is achieved. If work stops, site must be stabilized within 30 days.*
5. *Failure to comply with these conditions and with the approved plan may cause this land-disturbing activity permit to be revoked and/or subject the applicant to the penalty provisions under the City's erosion and sediment control ordinance.*

VI. APPLICANT CERTIFICATION

I certify that I fully understand the provisions of the City of Norfolk erosion and sediment control ordinance, and that I accept responsibility for implementing the attached erosion and sediment control plan for the above referenced project as stamped approved by the City of Norfolk on _____ .

I also grant the designated personnel of the City of Norfolk the right-of-entry onto this property for the purpose of conducting erosion and sediment control inspections and to ensure compliance with the City's ordinance.

I understand that an approved land-disturbing activity permit does not constitute a building permit or site plan approval, and that other permits or plan approvals may be required.

The Land Disturbance Permit expires one (1) year after land disturbance begins. The permit expiration date may be extended upon receipt of written notification prior to expiration date.

_____	_____	_____
Printed Name	Signature	Date

VII. APPROVAL

_____	_____	_____
Printed Name: Manager	Signature	Date
_____	_____	_____
Printed Name: Plan Reviewer	Signature	Date

6B – Agreement in Lieu of a Soil Erosion Control and Stormwater Management Plan- Single Family

Agreement in Lieu of Soil Erosion Control and Stormwater Management Plan – Single Family

This form is not intended to replace a Common Plan of Development.

The Applicant, identified in their signature below and who is the owner or permittee of the address identified herein, and the City of Norfolk enter into the following Agreement in Lieu of a Plan as permitted by Virginia Code § 62.1-44.15:24 *et seq*. For and in consideration of the promises set forth herein and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the City and Applicant hereby agree to the following terms and conditions, effective as of the date of execution:

Address of Single-Family Residential Structure:

_____

_____ New Construction _____Demolition

Is this lot located within a subdivision with a prior approved plan? Yes _____ No_____

Site Plan # _____

Subdivision Name: _____

Contact Person (owner/builder/permittee):

Name: _____

Address: _____

Phone Number: _____

Email Address: _____

In lieu of the submission of a Soil Erosion Control and Stormwater Management Plan, where a single-family stand-alone residence is constructed, the Applicant shall submit this documentation stating compliance with the Grading and Drainage Requirements for Single-Family Dwellings, the City of Norfolk City Code Section 42-20.2 and 42-20.3, and the Virginia Erosion and Stormwater Management Regulation (9VAC25-875-10 through 9VAC25-875-1420, effective July 1, 2024). This document shall be **required** for all single-family residence that are separately built and not part of a larger common plan of development.

As required by the Construction General Permit (VAR10), a copy of this signed and dated "Agreement in Lieu of a Plan" shall be maintained in Applicant's Stormwater Pollution Prevention Plan (SWPPP) for the construction activity.

Storm Water Management: Applicant agrees post-construction runoff from the property shall be minimized to the maximum extent practicable and shall be controlled to prevent flooding or erosion damage from occurring on adjacent or downstream properties. In meeting this requirement, Applicant agrees to direct:

1. Runoff from rooftops as non-erosive sheet flow to well-vegetated areas on the property to the maximum extent practicable,

2. Runoff from on-lot impervious surfaces (e.g., driveways, parking areas, sidewalks) as non-erosive sheet flow to well-vegetated areas on the property to the maximum extent practicable, and

3. Runoff from lawns as non-erosive sheet flow to undisturbed naturally-vegetated areas on the property to the maximum extent practicable.

Pollution Prevention Plan: Applicant agrees compliance with this Pollution Prevention Plan is required to minimize the discharge of pollutants. By Applicant's initial next to each item in space provided, Applicant agrees that they and any of their agents, contractors, subcontractors, and employees will:

____ Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other was waters. Wash waters must be treated in a sediment basin or alternative control that provide 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.

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

____ Use effective best management practices to prohibit the following discharges:

1. Wastewater from washout of concrete.
2. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, retarders for exposed aggregate finishes, and other construction materials.
3. Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance.
4. Soaps or solvents used in vehicle and equipment washing.
5. Discharges from dewatering activities, including discharges from dewatering of trenches and excavation, unless managed by appropriate controls.

Applicant understands failure to comply with the requirements listed above within a reasonable time specified by City of Norfolk staff may result in enforcement actions. Violations that are not corrected within the allowed time may result in a violation of City Code 41.1-4, *Pollution of the storm water system.* A violation of this code is a class 1 misdemeanor, punishable by a maximum penalty of $2500/day and/or up to 12 months in jail.

Erosion and Sediment Control Plan: This Agreement in Lieu is an acceptable alternative to the preparation of an individual erosion control plan.

Applicant agrees to comply with the limitations and conditions of this agreement to limit and control off-site sedimentation, including but not limited to use of effective best management practices as follows.

Use of effective best management practices to prohibit sedimentation from leaving the site include the follow:

1. Unless otherwise indicated, all vegetative and structural erosion and sediment control practices will be constructed and maintained according to minimum standards and

specifications of the Virginia Erosion and Sediment Control Handbook (3rd Edition, 1992) and the City of Norfolk erosion and sediment control ordinance.

2. The contractor shall contact the City of Norfolk, Bureau of Environmental Services (664-4368) at least 48 hours prior to any land disturbing activity (including demolition) so that a preconstruction conference can be scheduled.

3. The contractor shall apply permanent or temporary soil stabilization to all denuded or disturbed areas within 7 days after final grade is reached on any portion of the site. Soil stabilization must also be applied to denuded or disturbed areas which may not be at final grade but which will remain undisturbed for longer than 14 days. Soil stabilization measures include vegetative establishment, mulching and the early application of gravel base material on areas to be paved.

4. All erosion and sediment control measures are to be placed prior to or as the first step in construction.

5. The contractor shall inspect all erosion control measures periodically and after each runoff producing rainfall event. Any necessary repairs to maintain the effectiveness of the erosion control devices and cleanup of sedimentation are the responsibility of the contractor and shall be made immediately.

6. The contractor shall limit site access by construction vehicles to entrances protected by a stone construction entrance (VESCH Std. & Spec. 3.02) or an approved comparable control measure. Sediment shall be removed from paved areas on a daily basis.

7. Stock piles of soil and other erodible materials shall be stabilized or protected with sediment trapping measures. The contractor is responsible for the temporary protection and permanent stabilization for stockpiles on site as well as for materials transported from the project site.

8. The contractor shall monitor and take precautions to control dust including (but not limited to) use of water, mulch, or chemical dust adhesives and control of construction site traffic.

9. Effluent from de-watering operations shall be filtered or passed through an approved sediment trapping device, or both, and discharged in a manner that does not adversely affect adjacent properties, wetlands, waterways or the storm drainage system.

10. The contractor is responsible for installation and maintenance of any additional control measures necessary to prevent erosion and sedimentation as determined necessary by the plan approving authority.

11. Temporary erosion and sediment control measures are not to be removed until all disturbed areas are stabilized. After stabilization is complete, all measures shall be removed within 30 days. Trapped sediment shall be spread and seeded.

In addition, Applicant agrees to comply with all requirements determined necessary by any City of Norfolk Inspector if, upon field inspection, the measures employed on-site are found to be ineffective at controlling off-site sedimentation. Such requirements shall be based on the standards contained in the City of Norfolk's Erosion and Sediment Control Ordinances (Norfolk City Code, Chapter 15) and the City of Norfolk’s Virginia Erosion and Stormwater Management Program. These standards represent the minimum practices necessary to provide adequate control of erosion and sedimentation resulting from this project.

Applicant understands failure to comply with the conditions of this agreement could result in citations for violations of the Uniform Statewide Building Code, Erosion and Sediment Control Ordinances (Norfolk City Code, Chapter 15), and other applicable City codes.

Applicant fully understands that not complying may result in the revocation of this "Agreement in Lieu of a Plan" and that the submission of a project-specific Soil Erosion Control and Stormwater Management Plan in accordance with 9VAC25-875-110 of the Virginia Erosion and Stormwater Management Regulation may be required.

APPLICANT

By_____

Printed Name _____

Select one or both: ☐Owner ☐Permittee

CITY OF NORFOLK

By_____
City Manager

Date_____

ATTEST:

_____
City Clerk

APPROVED AS TO CONTENT:

_____
Director, Department of City Planning

APPROVED AS TO FORM AND CORRECTNESS:

_____
Assistant City Attorney

6C – Stormwater Pre-Construction Checklist

Storm Water Pre-Construction Meeting

Site Plan # _____ Date of Meeting: _____

Site Plan Name: _____

Name, Company & Phone of Contractor attending Pre-Construction Meeting: _____

_____

Failure to install a storm water best management practice as shown on an approved site plan is a class 1 misdemeanor as per City Code 41.1.

Based on the requirement outlined on your approved site plan, 48 hours prior to installation of any storm water best management practice, a pre-construction meeting must be arranged with the Division of Environmental Storm Water Management at 757-823-4000. During this meeting the following items are addressed:

□ **Type & Location of BMP** reviewed _____

□ **Deviations from the approved site plan** - All deviations must be approved by the Division of Environmental Storm Water Management Engineer and Project Design Engineer prior to work being completed.

□ **"Tie-In" to City Storm Water System from Private Storm Water System** - Prior to covering any "tie-in" to the City storm water system from a private storm water system, the contractor must notify the Division to arrange on on-site inspection of the pipes at 757-823-4000. The Division's Civil Engineer II or his designee will perform the inspection to any tie-in from a private storm water system to the city storm water system. If the tie-in is covered prior to inspection, Division staff may require the tie-in to be uncovered for inspection purposes.

□ **BMP must be installed based on the set of city-approved site plans** - The Division Environmental Specialist must inspect the site to ensure the storm water BMPs are installed based on approved site plans and working properly as designed. If the storm water BMP is installed based on the approved site plan, but is not working properly as designed, the Project Design Engineer must be consulted for possible redesign of the BMP. Deviations or revisions to the plans must be approved by the Project Design Engineer and the Division's Storm Water Engineer. A revised set of plans must be submitted to the Division prior to issuance of the final occupancy permit.

□ **Declaration of Covenants or BMP Maintenance Agreement must be on file.** A copy of the signed BMP Maintenance Agreement (Declaration of Covenants) must be on file with the City Clerk's Office, and a copy must be supplied to the Division, prior to issuance of the final occupancy permit. If the document is not on file with the Division, a final occupancy permit will not be issued.

□ **Grading & Drainage** - Grading & Drainage for the site must correlate with compliance worksheet "C". If the grading on the site does not drain to the BMP as designed on the approved site plan or sheet flows to adjacent properties, the site will not be approved by the Division. It may be necessary to install swales along the parameters to prevent runoff to adjacent properties or to divert water flow to the BMP. If a property's drainage is not correct, a final occupancy permit will not be issued until the issue has been resolved.

□ **Policy on Inspection of BMP** - Prior to installation of any underground BMP, the contractor shall notify the Division at 823-4000 to arrange an on-site inspection of the BMP **PRIOR** to covering it with any fill material. If an underground BMP is installed prior to inspection, the BMP may need to be uncovered to ensure compliance. This may include removing concrete or landscaping.

Infiltration or any other type of underground BMP will be inspected multiple times by the Division's Environmental Specialist throughout the installation process.

1. Once the BMP is dug to the final depth, an inspection will need to be performed by the Environmental Specialist.
    a. Check to ensure depth & location on site is accurate.
    b. The BMP must be in a soil layer that is permeable. If the BMP is in a soil layer that is impermeable such as clay at the dept designated on the site plan, the contractor must go back to the Engineer who designed the plan for further instruction.
    c. The BMP cannot be in the ground water table. If there is water entering the BMP at the designated depth on the site plan, you must go back to the Engineer who designed the plans for further instruction.

City of Norfolk / Division of Environmental Storm Water Management
2233 McKann Avenue / Norfolk, VA 23509
Office: (757) 823-4000 / Fax: (757) 441-2402

2. Material-Filled BMP (stone or sand)
    a. Check to ensure filter fabric is installed based on approved plans.
    b. Check to ensure fill material is correct size and type (stone or sand).
    c. Check to ensure pipe is installed based on approved plans when applicable.
    d. Check to ensure monitoring well is installed based on approved plans when applicable.
3. Completion of BMP
    a. Final grade is correct
    b. Stabilization of property to prevent runoff has been completed.
    c. Drainage to adjacent property is not occurring.

□ **Review details for BMP installation based on approved site plan** (i.e. – filter fabric, monitoring wells, stone size, fill material, etc.) If the contractor does not understand the details as drawn on the approved site plan, he/she must go to the engineer who designed the plans for further instruction.

□ **BMP not working as designed** (Ex: Dry pond, dry 48 hours after a rain event to work properly)
The Division of Environmental Storm Water Management inspectors are required to ensure the storm water BMPs are installed based on approved site plans and working properly as designed. If the storm water BMP is installed based on the approved site plan, but is not working properly as designed, the Project Design Engineer must be consulted for possible redesign of the BMP.

□ **"As-Built" Submission** - An "As-Built" must be submitted to the Division for any open BMPs (i.e. Retention Ponds, Detention Ponds, Dry Ponds, etc.) AND for any structures that fall along the property lines. The as-built must show elevations at the base of the BMP, along the banks of the BMP and at the structures within the BMP such as the inlet or outflow structures. The as-built must be submitted to the Division's Civil Engineer II for review and comparison to the approved site plan. Discrepancies noted must be corrected prior to the issuance of a final occupancy permit.

Open BMPs will be inspected by the Division's Environmental Specialist at the end of the construction process, prior to issuance of the final occupancy permit. The following items will be inspected.

a. Check to ensure depth & location on site is accurate.
b. Check to ensure the BMP is functioning as designed. (i.e. Dry Ponds must be dry, Wet Ponds must hold water)
c. Check Inlet / Outlet structures are installed properly, cleaned and free from debris.
d. Check to ensure the banks are stabilized to prevent erosion.
e. Check to ensure there is no erosion or animal burrows.

□ **Manufactured BMPs -** For manufactured BMPs or proprietary BMPs (i.e. Vortechnics, Filterra, etc.) a signed and dated letter must be submitted to the Division's Environmental Specialist certifying that the structure is installed and functioning as designed. If the letter is not submitted, the final occupancy permit will not be issued.

□ **Policy on Final Occupancy Inspection for BMP**
Prior to receiving a final occupancy permit from the City of Norfolk, the contractor must set up a meeting48-hours in advance with the Division of Environmental Storm Water Management to conduct a BMP Inspection for final occupancy release. The BMP must be installed according to the approved site plan and must be working as designed. For all BMPs that require special equipment to inspect (i.e. – large tops removed, special bolts removed, etc.), the contractor must ensure the BMP is accessible for scheduled inspection

□ **Other Comments**

_____

_____

_____

I here-by certify that all the items described above were reviewed by me during a pre-construction meeting with a representative/inspector from the City of Norfolk, Division of Environmental Storm Water Management. I understand and acknowledge all the pre-construction requirements described, and agree to abide by those requirements set forth. I also agree failure to abide by the requirements in this agreement could result in a delay of final occupancy permits issued by the City of Norfolk, Planning Department (757-664-6513).

_____ _____
Signature of Contractor Date Signed

_____ _____
Signature of Representative/Inspector for the Division of Environmental Storm Water Management Date Signed

City of Norfolk / Division of Environmental Storm Water Management
2233 McKann Avenue / Norfolk, VA 23509
Office: (757) 823-4000 / Fax: (757) 441-2402

6D – Stormwater Best Management Practice Reporting Form

THE CITY OF NORFOLK
PUBLIC WORKS

Stormwater Best Management Practice Reporting Form

Please submit one form for each BMP on site

Site Name	
Plan Number	
Site Area (ac)	
Site Imp Area (ac)	
Seasonal High Ground Water Level (ft)	

BMP Type **(use DEQ class if applicable)**		
BMP Compliance Purpose **(check all that apply)**	☐Water Quality ☐Resilience Quotient	☐Water Quantity ☐Other _____
BMP Latitude (decimal degrees)		
BMP Longitude (decimal degrees)		
BMP Drainage Area (ac)		
BMP Pervious Area Treated (ac)		
BMP Imperious Area Treated (ac)		
Phosphorous Reduced (lbs/yr)		
Nitrogen Reduced (lbs/yr)		
Sediment Reduced (lbs/yr)		
Treatment Volume (ft^3)		
Storage Volume (ft^3)		

Prepared By: _____ _____
(Name) (Company)

6E – Stormwater As-Built Checklist

As-Built/Closeout Checklist

Per the approved site plan, the stormwater management/BMP facility and associated stormwater conveyance system or systems as proposed for this project will require the submission, review and approval of a record drawing, or “as-built”. The as-built document is a stand-alone document, independent of the approved site plan. This document is required prior to release of a permanent Certificate of Occupancy. The record drawing and construction certification are required to be recorded and verified by a licensed PE or surveyor.

The reviewing engineer has 5 business days to provide a response for a commercial/industrial site plans and 48-hours for a single-family construction. Failure to provide any required information in an accurate and timely manner will result in delays issuing a Certificate of Occupancy.

The following items, at a minimum, are required to be shown on records drawings to be considered for approval:

As-Built:

_____ Record drawings should be overlaid on a page of the approved site plan that correlates to the information being shown. Record drawings can be provided in either a hard copy format or a digital format.

___ All new measurements should be shown in red and should portray a design vs actual format.

___ All deviations from the approved suite plan should be bubbled in red.

___ All MTD’s or proprietary facilities (i.e. Filterra, Vortechnics, etc..) require a certification document that must be signed and dated by the manufacturer/supplier to accompany the drawings. This certification letter must verify that the structure has been installed and is functioning as designed.

___Provide a schedule that shows all pipe size, material, inverts, and that shows all structures and inverts in the entire project area to each City stormwater system tie-in.

___ As-Builts shall be prepared and stamped by a Professional Engineer or Licensed Surveyor.

Closeout:

___A thorough description of each type of stormwater management facility shall be provided. For each type of stormwater management facility, the survey shall show inverts and in profile, both the topography and bathymetry of the complete feature, any observation ports, and any maintenance access ports.

___Any facilities that require media require fill tickets to be submitted to inspector at time of installation, as well as a cross section included to show what was installed.

___ If the stormwater management facility includes plantings, documentation in the form of an invoice of installation of plants shall be included.

___ All MTD's or proprietary facilities (i.e. Filterra, Vortechnics, etc..) require a certification document that must be signed and dated by the manufacturer/supplier to accompany the drawings. This certification letter must verify that the structure has been installed and is functioning as designed.

Record drawings must be submitted, either in pdf format or paper format, to the Stormwater Construction Inspector and subsequently the reviewing engineer for approval. Any deficiencies in the information presented on the record drawing must be corrected and the document resubmitted for approval. For each additional submission, the reviewing engineer has 5 business days to provide a response for a commercial/industrial site plans and 48-hours for a single-family construction.

6F – City of Norfolk Standard Erosion & Sediment Control Notes

City of Norfolk

City of Norfolk Standard Erosion & Sediment Control Notes

1. Unless otherwise indicated, all vegetative and structural erosion and sediment control practices will be constructed and maintained according to minimum standards and specifications of the Virginia Erosion and Sediment Control Handbook (3rd Edition, 1992) and the City of Norfolk erosion and sediment control ordinance.

2. The contractor shall contact the City of Norfolk, Bureau of Environmental Services (664-4368) at least 48 hours prior to any land disturbing activity (including demolition) so that a preconstruction conference can be scheduled.

3. The contractor shall apply permanent or temporary soil stabilization to all denuded or disturbed areas within 7 days after final grade is reached on any portion of the site. Soil stabilization must also be applied to denuded or disturbed areas which may not be at final grade but which will remain undisturbed for longer than 14 days. Soil stabilization measures include vegetative establishment, mulching and the early application of gravel base material on areas to be paved.

4. All erosion and sediment control measures are to be placed prior to or as the first step in construction.

5. The contractor shall inspect all erosion control measures periodically and after each runoff producing rainfall event. Any necessary repairs to maintain the effectiveness of the erosion control devices and cleanup of sedimentation are the responsibility of the contractor and shall be made immediately.

6. The contractor shall limit site access by construction vehicles to entrances protected by a stone construction entrance (VESCH Std. & Spec. 3.02) or an approved comparable control measure. Sediment shall be removed from paved areas on a daily basis.

7. Stock piles of soil and other erodible materials shall be stabilized or protected with sediment trapping measures. The contractor is responsible for the temporary protection and permanent stabilization for stockpiles on site as well as for materials transported from the project site.

8. The contractor shall monitor and take precautions to control dust including (but not limited to) use of water, mulch, or chemical dust adhesives and control of construction site traffic.

9. Effluent from de-watering operations shall be filtered or passed through an approved sediment trapping device, or both, and discharged in a manner that does not adversely affect adjacent properties, wetlands, waterways or the storm drainage system.

10. The contractor is responsible for installation and maintenance of any additional control measures necessary to prevent erosion and sedimentation as determined necessary by the plan approving authority.

11. Temporary erosion and sediment control measures are not to be removed until all disturbed areas are stabilized. After stabilization is complete, all measures shall be removed within 30 days. Trapped sediment shall be spread and seeded.

Appendix 7: Stormwater Program Fees

(As set forth annually by the Norfolk City Council)

Virginia Erosion and Stormwater Management Program (VESMP) Authority Permit Issuance Fee:

The following fees are assessed to an applicant that is applying for coverage under the VESMP Authority Permit. All required fees shall be paid by the applicant to the City of Norfolk prior to the issuance of the coverage under the VESMP Authority Permit.

When a site or sites are purchased for development within a previously permitted common plan of development or sale, the applicant shall be subject to fees in accordance with the disturbed acreage of their site or sites according to the following table:

Permit Issuance Fee:

Fee Type	Permit Fee
Single Family Residential Home with land disturbance greater than 1 acre, but less than 5 acres.	$290
Small Construction Activity / Land Clearing within common plan of development or sale with land disturbance less than 1 acre.	$290
Small Construction Activity / Land Clearing with land disturbance greater than 1 acre, but less than 5 acres.	$2,700
Large Construction Activity / Land Clearing with land disturbance greater than 5 acres, but less than 10 acres.	$3,400
Large Construction Activity / Land Clearing with land disturbance greater than 10 acres, but less than 50 acres.	$4,500
Large Construction Activity / Land Clearing with land disturbance greater than 50 acres, but less than 100 acres.	$6,100
Large Construction Activity / Land Clearing with land disturbance greater than 100 acres	$9,600

The City shall furnish the following administrative portion of the VESMP Authority Permit Issuance Fees, based on land disturbance associated with the site, to the Department of Environmental Quality, on a routine basis:

Fee Type	DEQ Fee
Single Family Residential Home with land disturbance greater than 1 acre, but less than 5 acres.	$0
Small Construction Activity / Land Clearing within common plan of development or sale with land disturbance greater than 2500 square feet, but less than 1 acre.	$81
Small Construction Activity / Land Clearing with land disturbance greater than 1 acre, but less than 5 acres.	$756
Large Construction Activity / Land Clearing with land disturbance greater than 5 acres, but less than 10 acres.	$952
Large Construction Activity / Land Clearing with land disturbance greater than 10 acres, but less than 50 acres.	$1,260
Large Construction Activity / Land Clearing with land disturbance greater than 50 acres, but less than 100 acres.	$1,708

Large Construction Activity / Land Clearing with land disturbance greater than 100 acres.	$2,688

VESMP Authority Permit Modification or Transfer Fee:

The following fees apply to modifications or transfer of individual VESMP Authority permits. If the VESMP Authority Permit modifications result in changes to the storm water management plans that require additional review by the City, such reviews shall be subject to the fees set out in this section. The fee assessed shall be based on the total disturbed acreage of the site. In addition to the VESMP Authority Permit modification fee, modifications resulting in an increase in total disturbed acreage shall pay the difference in the initial VESMP Authority permit fee paid and the VESMP Authority permit fee that would have applied for the total disturbed acreage.

Permit Modification or Transfer Fee:

Fee Type	Permit Fee
Single Family Residential Home with land disturbance greater than 1 acre, but less than 5 acres.	$20
Small Construction Activity / Land Clearing within common plan of development or sale with land disturbance greater than 2500 square feet, but less than 1 acre.	$20
Small Construction Activity / Land Clearing with land disturbance greater than 1 acre, but less than 5 acres.	$200
Large Construction Activity / Land Clearing with land disturbance greater than 5 acres, but less than 10 acres.	$250
Large Construction Activity / Land Clearing with land disturbance greater than 10 acres, but less than 50 acres.	$300
Large Construction Activity / Land Clearing with land disturbance greater than 50 acres, but less than 100 acres.	$450
Large Construction Activity / Land Clearing with land disturbance greater than 100 acres.	$700

VESMP Authority Permit Annual Maintenance Fee:

The following annual permit maintenance fees apply to each VESMP Authority permit identified below, including expired permits that have been administratively continued. With respect to the VESMP Authority Permit activities, these fees shall apply until the VESMP Authority Permit coverage is terminated. The following annual maintenance fees shall be applied on the permit anniversary date and based on the land disturbance activity of the site:

Permit Maintenance Fee:

Fee Type	Permit Fee
Single Family Residential Home with land disturbance greater than 1 acre, but less than 5 acres.	$0
Small Construction Activity / Land Clearing within common plan of development or sale with land disturbance greater than 2500 square feet, but less than 1 acre.	$50

Small Construction Activity / Land Clearing with land disturbance greater than 1 acre, but less than 5 acres.	$400
Large Construction Activity / Land Clearing with land disturbance greater than 5 acres, but less than 10 acres.	$500
Large Construction Activity / Land Clearing with land disturbance greater than 10 acres, but less than 50 acres.	$650
Large Construction Activity / Land Clearing with land disturbance greater than 50 acres, but less than 100 acres.	$900
Large Construction Activity / Land Clearing with land disturbance greater than 100 acres.	$1,400

Virginia Erosion and Stormwater Management Program (VESMP) Fund

The fees collected for the VESMP Authority Permit shall be deposited in the stormwater utility fund. The fees collected under the terms of the VESMP Authority Permit shall be used exclusively to provide services and facilities related to the administration and implementation of the VESMP Authority Permit compliance. The deposited monies shall be used for the following expenditures:

(a) Costs associated with the administration and implementation of the VESMP Authority Permit.

(b) Costs associated with erosion and sediment control and storm water management site plan review.

(c) Costs associated with erosion and sediment control, construction and post-construction storm water best management practice, and VESMP Authority Permit compliance inspections.

(d) Administrative, accounting and overhead costs related to tracking and reporting the VESMP.

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