



**PROJECT SPECIFIC STANDARDS AND SPECIFICATIONS
FOR VIRGINIA**

Submitted by:

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ACRONYMS AND DEFINITIONS

ATWS	Additional Temporary Workspace
BSRF	Belted Silt Retention Fence
BMP	Best Management Practices
Commonwealth	Commonwealth of Virginia
EI	Environmental Inspector
E&ISC	Exotic and Invasive Species Control
ESC	Erosion and Sedimentation Control
FERC	Federal Energy Regulatory Commission
HDD	Horizontal Directional Drilling
LDA	Land-Disturbing Activity
LEI	Lead Environmental Inspector
LOD	Limits of Disturbance
MVP	Mountain Valley Pipeline, LLC
Project	Mountain Valley Pipeline Project
MS4	Municipal Separate Storm Sewer System
NWP12	Nationwide 12 Permit
PLAN	FERC Upland Erosion Revegetation and Maintenance Plan
PROCEDURES	FERC Wetland and Waterbody Construction and Mitigation Procedures
RLD	Responsible Land Disturber
ROW	Right-of-Way
SPCC	Spill Prevention, Containment and Countermeasure
SWM	Stormwater Management
SWMA	Stormwater Management Act
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
VADEQ	Virginia Department of Environmental Quality
VDOT	Virginia Department of Transportation
VESCH	Virginia Erosion and Sediment Control Handbook
VESCP	Virginia Erosion and Sediment Control Program
VRRM	Virginia Runoff Reduction Method

VSMP
WLA

Virginia Stormwater Management Program
Wasteload Allocation

1.0 INTRODUCTION

Mountain Valley Pipeline, LLC (MVP), a joint venture of EQT Midstream Partners, LP, a subsidiary of NextEra Energy, Inc., WGL Holdings, Inc., Vega Energy Partners, Ltd., Con Edison Gas Midstream, LLC, and RGC Midstream, LLC, plans to construct the Mountain Valley Pipeline, an approximately 303-mile, 42-inch diameter natural gas pipeline, to provide timely, cost-effective access to the growing demand for natural gas for use by local distribution companies, industrial users and power generation in the Mid-Atlantic and southeastern markets, as well as potential markets in the Appalachian region. The Project will extend from the existing Equitrans, L.P. transmission system near Mobley in Wetzel County, West Virginia, to Transcontinental Gas Pipe Line Company, LLC's Zone 5 compressor station 165 in Pittsylvania County, Virginia. In Virginia, the pipeline construction activities will be located in Craig, Franklin, Giles, Montgomery, Pittsylvania, and Roanoke counties. Additionally, approximately 60 miles of access roads (AR) in Virginia are anticipated for use in the overall Project. This includes both existing roads and construction of new roads as necessary.

MVP is requesting approval to complete the Mountain Valley Pipeline project (Project) within the Commonwealth of Virginia (Commonwealth) in accordance with these Project Specific Standards and Specifications (Standards and Specifications) prepared at the request of the Virginia Department of Environmental Quality (VADEQ). The Project in the Commonwealth will consist of approximately 106 miles of 42-inch diameter pipeline to be constructed with four separate construction spreads during the course of the Project. Construction is scheduled to begin in late 2017 and continue throughout 2018. Final restoration activities are anticipated to extend into 2019 as needed.

The Project's limits of disturbance (LOD) will typically consist of a 125-foot-wide construction corridor for the majority of the Project. At waterbody and wetland crossings, MVP will typically reduce to a 75-foot-wide construction corridor unless otherwise noted. Additional temporary workspace (ATWS) will be required in certain areas, including adjacent to road, wetland, and waterbody crossings, and areas for material and equipment staging and topsoil segregation. Additional construction components will include temporary contractor yards and pipe storage yards.

MVP proposes to construct, operate, and maintain the Project's natural gas pipeline, appurtenances, and auxiliary facilities in the Commonwealth. The Project facilities will include but not be limited to conventional buried pipelines, valves, meter sites, interconnects, pigging facilities, cathodic protection groundbeds, access roads, etc. MVP will obtain any required federal, state and local permits or approvals prior to the start of land disturbing activities.

Unless otherwise noted in the Project's site-specific erosion and sediment control (ESC) and stormwater management (SWM) plans submitted to VADEQ for review and approval, these Standards and Specifications meet the all applicable requirements of the following:

- Virginia Erosion and Sediment Control Program (VESCP) Regulations (9VAC25-840);
- Virginia ESC and SWM Certification Regulations (9VAC25-850);
- Virginia Stormwater Management Act (SWMA) (Va. Code § 62.1-44.15:24 et seq.);
- Virginia Erosion and Sediment Control Law (Va. Code § 62.1-44.15:51 to 66);
- Virginia Stormwater Management Program (VSMP) Regulation (9VAC25-870);
- Federal Energy Regulatory Commission (FERC) Upland Erosion Revegetation and Maintenance Plan (PLAN); and
- FERC Wetland and Waterbody Construction and Mitigation Procedures (PROCEDURES).

MVP and its construction contractors will implement these Standards and Specifications for all regulated land disturbance activities associated with the Project in the Commonwealth. Figures illustrating the ESC devices to be implemented in these Standards and Specifications are included in Appendix A – STD & SPEC. Figures from the Virginia Erosion and Sedimentation Control Handbook (VESCH), 3rd Ed., 1992 are referenced by their original plate numbers.

2.0 GENERAL REQUIREMENTS

These Standards and Specifications have been prepared for use by MVP and its contractors to identify the means and methods for controlling erosion of surface soils, and to reduce the runoff of sediment to the greatest extent reasonably achievable during and post construction of the approximately 106-mile pipeline project and ancillary facilities.

Unless specifically stated, the BMPs and specifications from the VESCH, along with accompanying technical documents and guidance, have been adopted and included for use.

The Minimum Standards and Specifications (STD & SPECS) from the VESCH typically employed for the construction of natural gas facilities are referenced by number throughout these Standards and Specifications. FERC requirements are also referenced by section. Additional ESC measures in Chapter 3 of VESCH may be implemented if site specific conditions warrant.

Additional ESC BMPs are included in Appendix B – MVP Typical Construction Details. These BMPs will be implemented during Project construction and restoration activities. The MVP Typical Construction Details have been developed by MVP using typical details from similar projects designed, permitted and constructed in the Appalachian region. Should any non-VESCH control measures fail to effectively control soil erosion, sediment deposition, and non-agricultural runoff, then VESCH control measures shall be utilized.

Plan Development, Review, Submittal, Inspection, Implementation, and Reporting

- The plans will be developed under the supervision of a professional engineer licensed to practice engineering in the Commonwealth of Virginia. The plans will adhere to Virginia ESC Regulations (9VAC25-840-40) and Virginia ESC and SWM Certification Regulations (9VAC25-850-50) STD & SPECS as well as the FERC PLAN and PROCEDURES.
- MVP will submit variance requests as part of the ESC plan submission to DEQ in accordance with 9VAC25-840-50.
- The plans will be reviewed prior to submission to VADEQ by an individual(s) who has completed the VADEQ certification process for “Plan Reviewer for Erosion and Sediment Control” and “Plan Reviewer for Stormwater Management”. Any deficiencies identified by the Plan Reviewer(s) will be addressed and followed by further review by the Plan Reviewer(s). This process will continue until the Plan Reviewer(s) is satisfied that the plans meet the standards described in this document.
- Prior to submission of the plans to VADEQ, MVP and the Plan Reviewer(s) will conduct a completeness review to verify each submission is complete.
- Once the plans have been deemed satisfactory and complete by the Plan Reviewer(s), an individual(s) who has completed the “Program Administrator for Erosion and Sedimentation Control” and “Program Administrator for Stormwater Management” requirements will submit all necessary documentation to the VADEQ for review and approval. The Program Administrator(s) will act as the point of contact throughout the Project.
- Following completion of the technical review of the plans by VADEQ and determination the submission meets the requirement of these Standards and Specifications, VADEQ will issue an

approval letter as well as record stamp the approved plan documents. A copy of the approved plan will be maintained in a Project mailbox established for each construction spread. All redline changes will be maintained on this official copy of the plan drawings and presented to the VADEQ inspector during routine inspections.

- A VADEQ-Certified Responsible Land Disturber (RLD), holding a valid RLD Certification, shall be named for each construction spread established for the Project in the Commonwealth. MVP will require, at minimum, one Environmental Inspector per construction spread to obtain/maintain a valid RLD Certification throughout the Project construction and restoration activities.
- Notification

The following information is required to be included in the e-notification (LinearProjects@deg.gov) two weeks prior to initiating a regulated land-disturbing activity (LDA):

- o Project name or Project number;
- o Project location (including nearest intersection, latitude and longitude, access point);
- o On-site project manager name and contact information;
- o Responsible Land Disturber (RLD) name and contact information;
- o Project description;
- o Acreage of disturbance for Project;
- o Project start and finish date; and
- o Any variances/exceptions/waivers associated with this Project.

The Project's Pre-Construction kickoff meeting date, time and location will be provided in the e-notification. During the Project's Pre-Construction kickoff meeting, MVP staff will present the Project's Worker Environmental Awareness Program (WEAP) training. FERC requires that all visitors, agency representatives, contractors and company staff attend the Project specific WEAP training prior to entering the Project work limits. WEAP training will be conducted throughout the Project to facilitate staff additions and visitors as needed.

Copies of the Project permit authorizations will be maintained at each construction spread job trailer/yard in a dedicated Project permit mailbox. Location of the mailbox will be identified during the Project's Pre-Construction kickoff meeting held for each construction spread.

- Inspection Staff Requirements.
 - o The Project will have one Lead Environmental Inspector (LEI) and at least one Environmental Inspector (EI) per construction spread. Inspection staff requirements will be determined by MVP based on the construction activities being undertaken and accessibility to the active areas while providing appropriate coverage to maintain environmental compliance. The LEI and EI will be required to be knowledgeable of environmental permit compliance requirements, be experienced in ESC and SWM BMP installation, operation and maintenance requirements, Project permit conditions and experienced with the FERC's Plan and Procedures. The LEI/EI will review the implementation of this Standards and Specifications and any applicable environmental permits, resolve apparent conflicts between permits and this Standards and Specifications, and coordinate with the Construction Supervisor about additional measures which may be needed to address erosion and sedimentation. The LEI will also keep a daily log of activity documenting Project activities related to environmental permit compliance and corrective measures implemented, site visitors (i.e. non-project staff), waterbody and wetland crossing log and ESC installation and maintenance activities.

- o The Project will have at least one VADEQ-Certified ESC and SWM Inspector per construction spread. These inspectors may be the same LEI and EI described above or a VADEQ-Certified ESC and SWM Inspector from a third party contractor. MVP may enter into agreements or contracts with soil and water conservation districts, adjacent localities, or other public or private entities to carry out or assist with these responsibilities.
- o The Project will also have a FERC third party inspector as required. This inspector will have peer status with all other activity inspectors and shall have the authority to stop activities that violate the environmental conditions of the FERC certificate or other authorizations and order corrective action once approval has been granted by the MVP Project Manager.
- o The Environmental inspection staff's responsibilities include:
 - Ensuring compliance with the requirements of these Standards and Specification Document;
 - Ensuring compliance with all other federal and state permitting conditions relating to environmental compliance related to ESC, SWM, NWP12 and 401WQC;
 - Ensuring compliance with the FERC's PLAN and PROCEDURES, the environmental conditions of the FERC's Project specific CERTIFICATE, the environmental mitigation measures proposed by MVP in the application submitted to FERC, and other environmental permits and approvals issued to MVP;
 - Verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing activities commence;
 - Verifying the location of drainage and irrigation systems;
 - Identifying stabilization needs in all areas;
 - Locating dewatering structures and slope breakers to ensure they will not direct runoff into waterbodies or wetlands, known cultural resource sites or other environmentally sensitive areas;
 - Verifying that trench dewatering activities do not result in the deposition of sand, silt, and/or sediment near the point of discharge into a wetland or waterbody. If such deposition is discovered, the dewatering activity shall be stopped and the design of the discharge shall be changed to prevent reoccurrence;
 - Testing subsoil and topsoil in agricultural and residential areas as necessary to measure compaction and determine the need for corrective action;
 - Advising the Chief Inspector when conditions (such as wet weather) make it advisable to restrict construction activities;
 - Ensuring restoration of contours and topsoil;
 - Approving imported soils for use in agricultural and residential areas;
 - Ensuring that temporary erosion controls are properly installed, inspected and maintained;
 - Conducting inspections of temporary ESC controls and SWM BMPs on at the least following frequencies:
 - In non-TMDL watersheds:
 - At least once every five business days; or
 - At least once every 10 business days and no later than 48 hours following a measurable storm event (or on the next business day

if the storm event occurs when there are more than 48 hours between business days).

- In TMDL watersheds (see Sec. 4.5 below):
 - At least once every four business days; or
 - At least once every five business days and no later than 48 hours following a measurable storm event (or on the next business day if the storm event occurs when there are more than 48 hours between business days).
 - Ensuring compliance with any more stringent plan requirements during construction activities within the Total Maximum Daily Loads (TMDL) watersheds of impaired waters located in Montgomery, Roanoke and Franklin Counties.
 - Ensuring the repair of all ineffective temporary ESC measures within 24 hours of identification, or as soon as conditions allow if compliance with this time frame would result in greater environmental impacts;
 - Keeping records of compliance with the environmental conditions, and the mitigation measures required by Federal or state environmental permits during active construction and restoration; and
 - Establishing a program to monitor the success of restoration. Implementation of this program may be transferred to the company's operating section upon completion of construction and restoration activities.
- MVP will provide weekly e-reporting, via email to the VADEQ linear projects inbox LinearProjects@deq.gov which will then be directed to the appropriate VADEQ representatives and/or applicable regional office. Inspection reports will be submitted based on MVP's construction spread break basis and identified as such. MVP intends to utilize four (4) construction spreads for Project construction activities in the Commonwealth. Weekly reports will be submitted the week following the inspections and will include the weekly inspection report per spread as well as the post-rainfall event inspections that occur during the reporting week. The reports shall include the following:
 - o Inspection reports;
 - o Pictures;
 - o Complaint logs and complaint responses; and
 - o Other compliance documents.
 - Additional project specific requirements for these Standards and Specifications include:
 - o Project records, including approved ESC and SWM plans shall be kept for three (3) years after state permit termination or Project completion;
 - o ESC site inspection and SWM facility inspection records shall be documented and retained for at least five (5) years from the date of inspection. This period of retention shall be extended automatically during the course of any unresolved litigation regarding the regulated activity or regarding control standards applicable to MVP, or as requested by the State Water Control Board or VADEQ;
 - o Construction record drawings shall be maintained in perpetuity.
 - The operator shall make all site documents, including all amendments, modifications, updates, and the Stormwater Pollution Prevention Plan (SWPPP) available upon request by the VADEQ or the operator of a municipal separate storm sewer system (MS4) receiving discharges from the construction activity, if any. This information must be posted electronically for public review.

- The SWPPP shall identify individuals or positions with delegated authority to sign inspection reports or modify the SWPPP.
- o For Total Maximum Daily Load (TMDL) watersheds:
 - o The impaired water(s), approved TMDL(s), and pollutant(s) of concern, when applicable, shall be identified in the SWPPP;
 - o Permanent or temporary soil stabilization shall be applied to disturbed areas within seven (calendar) days of inactivity;
 - o Nutrients shall be applied in accordance with manufacturer's recommendations or an approved nutrient management plan and shall not be applied during precipitation events; and;
 - o The applicable SWPPP inspection requirements shall be amended as follows:
 - Inspections shall be conducted at a frequency of (i) at least once every four business days or (ii) at least once every five business days and no later than 48 hours following any runoff producing storm event. In the event that a measurable storm event occurs when there are more than 48 hours between business days, the inspection shall be conducted on the next business day.
- For revisions to the approved ESC Plans
 - o Minor field-approved revisions that do not increase the LOD or that will increase the effectiveness of ESC and SWM BMPs will be "redlined" on a set of plans that will remain on site for the duration of the Project to allow MVP and VADEQ to ensure compliance with the approved plan and applicable regulatory requirements.
 - MVP will maintain a log documenting all red-line changes per construction spread. The log will be presented to the VADEQ Inspector during project inspections for signoff. Minor redline revisions include (but are not limited to) the following:
 - Adjustment of BMP orientation to ensure proper function and protection of the adjacent resources;
 - Implementation of additional measures to meet changing site conditions or to address areas of potential concern;
 - Adjusting the location of the pipeline centerline within the permitted LOD;
 - Adjusting/lengthening the Temporary Stone Construction Entrance to address weather conditions; and
 - Additional reduction of LOD where necessary.
 - o Major revisions that exit the permitted LOD will be submitted to VADEQ for review and approval prior to implementation of the change. Major revisions include (but are not limited to) the following:
 - Reroutes;
 - Proposed access road additions; and
 - Proposed additional temporary workspace (ATWS) areas.
- The revision log documenting redline changes as well as the redline markup of ESC/SWM drawings will be located in each construction spread permit mailbox.

In an emergency, MVP will respond as needed to prevent harm to persons or property, and will contact (via phone and email) the appropriate agencies as soon as practicable under the circumstances. MVP will immediately implement stabilization and containment measures upon identification of the hazard and develop corrective measures in coordination with the appropriate agencies (including VADEQ). Conducting LDAs in response to a public emergency where the related work requires immediate authorization to avoid

imminent endangerment to human health or the environment is not considered a regulated LDA. In such situations, VADEQ shall be advised of the disturbance within seven (7) days of commencing the land-disturbing activity, and compliance with the administrative requirements of subsection A of § 62.1-44.15:34, which is required within 30 days of commencing the LDA.

MVP developed a Project specific Spill Prevention, Containment, and Countermeasure (SPCC) Plan that meets the requirements of the Commonwealth and federal agencies. A copy of the SPCC plan will be maintained onsite for implementation during Project activities.

2.1 GENERAL DESCRIPTION OF CONSTRUCTION ACTIVITIES

Pipeline or facility construction activities include all activities associated with the Project from the initial planning stages to the final restoration and maintenance of the right-of-way (ROW). Daily activities will be planned and managed in advance to provide sufficient resources and manpower for the work effort to be accomplished in a timely manner.

Cross-country pipeline construction typically proceeds in an assembly line fashion, with multiple stages of construction occurring simultaneously at different locations to minimize the time needed to complete the project. The stages of construction include: survey and planning, mowing and clearing, grubbing and grading, trenching, pipe assembly (including stringing, bending, welding, testing, coating, and lowering-in), backfilling, final grading, and restoration. The ESC measures to be installed for each of these stages are described below. If any denuded area will remain idle for more than 14 days, temporary stabilization (temporary seed or mulch, as directed by the Environmental Inspector) will be applied within seven (7) days (unless otherwise noted) to that area.

Specific areas of the Project (e.g. wetland/water body crossings, residential areas, road or railroad crossings, etc.) requiring specialized construction measures (e.g. boring or directional drilling) will be treated as separate construction entities. Environmental sensitive areas such as stream and wetland areas, ponds, water supply areas (springs, wells, public water intakes), karst features, threatened and endangered species areas, cultural significant areas (cemeteries, historical or archaeological resources) or areas identified by landowners as being of concern may require additional ESC Procedures, as described in Section 3.0 Temporary Erosion Controls and outlined in the Project's ESC plan drawings. Specialized construction techniques often combine several construction stages into one. This reduces the duration earth disturbing activities occur in a specific area and in many cases, reduces the LOD required for implementation of the Project in these specific areas. Segments constructed separately will later be tied into the main pipeline, creating additional small disturbances after these segments have been restored. Final testing (see Section 2.6.1 Hydrostatic Testing) of the facility will be completed after tie-ins are completed.

2.1.1 Site Specific VADEQ Oversight

In addition to the VADEQ-Certification process outlined in Section 2.0 of these Standards and Specifications, VADEQ oversight includes the following:

- All plans will be submitted to the VADEQ for review and approval.
- As authorized by law, the State Water Control Board and VADEQ may enforce approved specifications and charge fees equal to the lower of (i) \$1,000 or (ii) an amount sufficient to cover the costs associated with standard and specification review and approval, project inspections, and compliance.
- Costs associated with the VADEQ review process will include third party plan review.

- VADEQ will perform pre-scheduled as well as random site inspections for the project. Random site inspection or inspections in response to a complaint may be conducted without prior notification to MVP, its contractors and/or inspection staff. Inspections are intended to ensure compliance with the SWMA, the ESC Law and regulations adopted thereunder. The VADEQ may take enforcement actions if areas of non-compliance are identified during the routine inspection or in response to a complaint report.

2.1.2 Construction Work Areas

Construction work areas include all facilities, access roads, staging areas, temporary pipe yards, contractor yards, and the construction ROW. To the extent possible, previously disturbed areas will be used for construction to minimize new impacts. Landowner agreement and appropriate permits will be obtained prior to the use of any area for Project construction activities. These ESC specifications apply to all construction work areas utilized by MVP.

The construction ROW typically will include the 50-foot permanent pipeline ROW and an additional 75-foot temporary ROW for the length of the Project. The Project's LOD will consist of a 125-foot-wide construction corridor for the majority of the Project. At waterbody and wetland crossings, MVP will typically reduce to a 75-foot-wide construction corridor unless otherwise noted. Temporary workspace is typically reduced at waterbody and wetland crossings to the extent feasible. ATWS may be required at specific locations to accommodate road and utility crossings, waterbody and wetland crossings and in steep slope areas, etc. Variations may occur based on the type of facility under construction, landowner conditions, permit conditions, or topographic conditions.

The construction ROW may be widened (subject to compliance with all applicable survey and mitigation requirements, landowner agreements and all other necessary approvals) in areas such as steep slopes and topsoil conservation areas to ensure safe construction and for storage of excess spoil.

After construction is completed, all work areas will be restored with a perennial vegetative cover, unless specifically directed otherwise by the landowner or permit conditions. Following permanent stabilization, temporary work areas will be returned to pre-construction land uses.

2.1.3 Construction Line List and Permits

MVP will provide the contractor with a Construction Line List that describes special requirements (e.g., timber salvage, topsoil segregation, restoration measures, and fencing requirements) requested by landowners. The contractor will comply with these special requirements so long as they do not conflict with the requirements of these Standards and Specifications or any other federal or state permit requirements.

Since MVP is a FERC regulated project, landowner contact information is considered privileged and confidential and is not available for public review including under Freedom of Information Act requests. As a result, parcel identification numbers are provided on the site-specific ESC and SWM plan drawings. Information regarding landowners will be maintained by each construction spread EI as well as in the Project job trailer located at each construction spread yard. This information will be available to the VADEQ during site inspections and as needed throughout the Project construction and restoration activities.

Per Minimum Standard (MS)14 of Virginia ESC Law and Regulations, MVP will obtain all applicable federal, state and local permits pertaining to working in wetlands or crossing live watercourses. In the event permit requirements are more stringent than the requirements of these Standards and Specification, the more restrictive requirements will be implemented.

It will be the construction contractor's responsibility to obtain permits that may be required for specialized activities such as burning, blasting, and transportation activities associated with the Project. This responsibility shall be a condition of each contractor's contract.

Per MS-14, all applicable federal, state and local regulations pertaining to working in or crossing live watercourses shall be met. These may include, for example, the following:

- United States Army Corps of Engineers Nationwide Permit 12
- Virginia Marine Resources Commission Submerged Lands Agreement
- VADEQ 401 Water Quality Certification

2.2 SURVEY AND PLANNING

To the extent practicable, construction work areas will be selected in advance and included in all surveys, landowner negotiations, and permitting. Any new work areas selected by the contractor must receive appropriate review, permitting and applicable agency approval prior to their use. In the event additional workspace (including access roads, expanded temporary ROW, ATWS, etc.) is needed for Project use, MVP will submit additional information to VADEQ for review and approval prior to initiating Project use of these areas. The limits of the approved work areas, boundaries of environmentally sensitive areas and the location of the facilities will be marked in the field and verified prior to the start of mechanized activities.

2.3 MOWING AND CLEARING

The initial mechanized stage of construction involves the clearing of brush, trees, and vegetation from the ROW. Vegetation will be cut off at ground level, and un-merchantable timber (e.g., brush, stumps, slash and tree tops) will be disposed of by chipping and blowing chips off LOD in upland areas (landowner approval required), windrowing, or by burning (if allowed). Burning will only be conducted if appropriate permit approvals are received and activity is authorized by MVP. Merchantable timber will be cut and stacked along the outboard edge of the construction LOD in upland areas as directed by the landowner ROW agreements and approved by MVP Construction Supervisor. If burning is not allowed, residual materials available from clearing and grubbing of the site may be used as temporary ESC in accordance with STD & SPEC 3.06 Brush Barrier (see Appendix A - STD & SPEC). Materials used in this BMP will be small limbs, brush, branches (under 6" diameter), soil, native rock or wood chips to create a barrier. Tree tops and brush may be chipped and spread (blown) uniformly onto undisturbed forest land adjacent to the disturbed ROW if allowed per landowner agreement. Alternately, if wood chips generated from land clearing activities are scattered along the edge of the ROW, the chips will be spread a maximum of 1 ton/acre and an additional application of 11 pounds of nitrogen per ton of wood chips will be made to affected areas.

Clearing of vegetation in wetlands will be limited to trees and shrubs, which will be cut flush with the surface of the ground and removed from the wetland. Stump removal, topsoil segregation, and excavation will be limited to the area immediately over the trench line within the permanent easement per NWP12 Regional Condition 3.b.iii, FERC PROCEDURES and Project's FERC Certificate conditions. Trees located within 15 feet of the pipeline with roots that could compromise the integrity of the pipeline coating may be selectively cut and removed from the permanent ROW. Limited stump removal and grading may be conducted within the permanent easement in wetlands to ensure a safe working environment.

Where requested by the affected landowners, trees of special concern (i.e. located within or immediately adjacent to construction LOD) will be protected by fencing and armoring in accordance with STD & SPEC 3.38 Tree Protection and Preservation as necessary. Trees and shrubs that are not required to be cleared to facilitate construction activities will not be unnecessarily damaged during construction (Plates 3.38-1, -2, -7, -8, -9).

2.3.1 Fence Crossings

Where it is necessary to remove existing fences in the ROW, adequate temporary fences and gates will be installed around the construction area, if required by the landowner. Temporary fences or gates will be provided with suitable fasteners and will be kept closed, except when necessary to be opened for construction purposes. Existing fences will be replaced in kind or as agreed upon with the landowner upon completion of work.

2.4 GRUBBING AND GRADING

The grading operation involves grubbing of stumps, stockpiling topsoil where applicable, and leveling the construction ROW to create a safe operating area for equipment, employees and vehicles. Topsoil and subsoil disturbed during grading operations will be stored separately and will not be mixed with foreign material (e.g., stumps and slash). The disposal methods described in Section 2.3 Mowing and Clearing for clearing debris also apply to stumps. Grading and grubbing will be conducted as a separate construction activity at waterbody and wetland crossings which will be treated as separate construction areas until the contractor is prepared to complete all other construction activities at that site in the shortest practicable time.

Clearing of vegetation in wetlands will be limited to trees and shrubs, which will be cut flush with the surface of the ground and removed from the wetland. Stump removal, topsoil segregation, and excavation will be limited to the area immediately over the trench line within the permanent easement per NWP12 Regional Condition 3.b.iii, FERC PROCEDURES and Project's FERC Certificate conditions (see Appendix B MVP-53). Trees located within 15 feet of the pipeline with roots that could compromise the integrity of the pipeline coating may be selectively cut and removed from the permanent ROW. Limited stump removal and grading may be conducted within the permanent easement in wetlands to ensure a safe working environment.

ESC measures will be installed as a first step in any LDA and will be made functional before upslope land disturbance takes place.

Specifications for temporary ESC measures are discussed below in Section 3.0 Temporary Erosion Control.

2.4.1 Topsoil Conservation (MVP-ES46)

Topsoil will be segregated in all areas of the Project including pastureland, upland forested areas, residential areas, meadowlands, wetlands without standing water or saturated soil, areas requested by the landowner, or where directed by the EI. The topsoil will be stored separately from trench subsoil and replaced on top of the subgrade during final grading. Topsoil will be stored along the edge of the temporary LOD, maintaining a minimum 10-foot setback from waterbody and wetland boundaries. In non-saturated/non-standing water wetland areas, the top 12 inches of wetland soil will be segregated from the trench line during trenching activities to be used during restoration.

In agricultural lands and upland forested areas, topsoil will be stripped from either the full LOD (using additional temporary ROW to store the topsoil in this case) or from the trench line and subsoil storage area. During construction, topsoil storage piles shall be stabilized or protected with sediment trapping measures.

At least 12 inches of topsoil (where available) will be segregated in deep soils. Where soils are shallow, every effort will be made to segregate the entire topsoil layer. In residential areas, topsoil replacement (i.e., importation of topsoil) is an acceptable alternative to topsoil segregation. Topsoil may not be used to fill sandbags or to pad the pipe.

2.4.2 Drain Tiles

The following Procedures apply to locations where existing drain tiles are encountered:

1. Mark drain tile locations identified prior to and during construction.
2. Inspect all drainage tile systems exposed within the area of disturbance to check for damage.
3. Repair drain tiles damaged during construction activities to their original condition. Drain tile repair will be limited to the area damaged within the construction LOD. Do not use filter covered drain tiles without agreement of the local soil conservation authorities and the landowner. The construction contractor, overseen by the EI or construction inspector, will be responsible for testing and repairs.
4. For new pipelines in areas where drain tiles exist or are planned, ensure that the depth of cover over the pipeline is sufficient to avoid interference with drain tile systems. For adjacent pipeline loops in agricultural areas, install the new pipeline with at least the same depth of cover as the existing pipeline(s).

2.4.3 Irrigation

Water flow will be maintained in crop irrigation systems, unless shutoff is coordinated with affected parties.

2.4.4 Access Roads

MVP will utilize both existing roads and newly constructed roads to facilitate implementation of the Project. Typical road widths will be 25-feet but may require temporary widening to facilitate use by large equipment and pipe delivery trucks. Existing roads will be maintained with minor grading and gravel dressing (as needed) to maintain the road surface. Temporary ESC BMPs will be installed in accordance with the Project ESC plan. For existing roads that require waterbody crossing culverts to be replaced due to condition or temporary widening for Project use, MVP will permit the culvert replacement as a permanent impact under the Nationwide Permit 12 application.

Following installation of the Project, existing roads that required temporary widening will be returned to pre-existing contours and conditions. Any drainage culverts damaged will be repaired as needed and returned to pre-existing conditions. Areas of temporary widening will have the temporary road surface reclaimed and the disturbed areas revegetated. The road surface will be returned to the pre-existing width and a top coat of gravel applied (where necessary). Once disturbed areas are permanently stabilized with vegetation or other measures (i.e. gravel, where applicable), temporary ESC BMPs will be removed and properly disposed of at an approved waste disposal site. In the event a landowner requests the temporary widening or other improvements to remain in-place post-construction, additional SWM design and permitting activities will be required.

Newly constructed temporary access roads will be installed in accordance with the Project's ESC permit terms and conditions. Following completion of the Project, temporary access roads will be returned to pre-existing contours and stabilized with permanent vegetation. Temporary ESC BMPs will be maintained on temporary access roads throughout the Project until the disturbed area is restored and permanently stabilized with vegetation. Once the area has been permanently stabilized, the temporary ESC BMPs will be removed and properly disposed. Existing dirt roads, logging roads, and two-track or vegetated agricultural roads will be returned to their pre-construction conditions. No new roads will be constructed unless prior approval has been received from the appropriate agencies (including VADEQ and FERC).

New access roads that are required for permanent operation of the Project will be installed in accordance with the Project's ESC plan terms and conditions. Permanent roads will be installed for construction use and will remain in-place for operation of the facilities. Permanent stormwater controls (as needed) will be designed in accordance with the terms and conditions outlined under Section 4.0 Stormwater Management Requirements of these Standards and Specifications and approved by VADEQ.

2.5 TRENCHING

Trenching consists of excavating the trench for the pipeline, and is typically accomplished with an excavator or a rotary wheel-ditching machine. In areas where soft rock or hard pans are present, a tractor-mounted ripper or excavator mounted hammer can be used to break and loosen consolidated material. Loosened material will then be removed with an excavator. The ditch will be excavated to a minimum practicable width for excavation stability; additional width will be excavated to meet safety standards when work will occur within the excavation such as at tie-ins, bore pits, valve settings, etc. In areas where mechanized means of rock removal is unsuccessful, blasting may be used as needed. MVP prepared a General Blasting Plan (Appendix J) for use during Project activities. MVP will require the Construction Contractor to prepare a site-specific blasting plan to be prepared and approved by MVP prior to implementation. The Contractor will have to obtain all necessary blasting permits prior to implementation of any blasting activities.

2.5.1 Trench Breakers

Temporary trench breakers will be installed in the open trench during trenching, just upslope of every interceptor diversion (at a minimum), to reduce the velocity of storm water flow along the trench and decrease erosive velocity. Trench breakers are not employed in trenchless construction such as conventional boring or horizontal directional drilling, or in non-linear excavations (such as work within a station yard). Temporary trench breakers are typically made of sandbags but may consist of native materials except topsoil. Topsoil shall not be used for trench breakers. Trench breakers will be inspected prior to final back filling of the trench.

MAXIMUM RECOMMENDED SPACING AND MATERIALS FOR PERMANENT TRENCH BREAKERS

Trench Slope	Distance (feet)	Plug Material
0-5%	See Note 1	Concrete Filled Sacks
5-15%	500	Sandbags or Concrete Filled Sacks
15-25%	300	Sandbags or Concrete Filled Sacks
25-35%	200	Sandbags or Concrete Filled Sacks
35-100%	100	Sandbags or Concrete Filled Sacks
>100%	50	Concrete Filled Sacks (Wetted)

NOTE 1: Trench Breakers are required at all waterbody crossings regardless of trench slope. Otherwise, not required at slopes <5%.

Following pipe installation, the temporary trench breakers are replaced with permanent trench breakers to inhibit piping and subsurface erosion in the trench. Materials appropriate for use as permanent trench breakers include sandbags and concrete filled sacks. On steep slope areas, the MVP Construction Supervisor may require that permanent trench breakers be made with wetted cement bags or mortared stone. Permanent trench breakers must be installed at stream banks, at the edge of wetlands, and in road and railroad embankments to minimize the chance of subsidence. Permanent trench breaker installations at waterbody and wetland crossings must be constructed with impervious materials to prevent the trench line from serving as a conduit to convey groundwater away from the resource.

2.6 PIPE ASSEMBLY

Most pipe assembly activities do not require any additional ESC measures; however, all ESC measures will be maintained in good working order where pipe assembly is being conducted.

2.6.1 Hydrostatic Testing

A pipeline must be pressure tested after backfilling and before placing it into operation in order to establish the Maximum Allowable Operating Pressure (MAOP). Pressure testing may also be conducted on a pipe segment prior to lowering-in as directed by the Construction Supervisor. Pressure testing, or hydrostatic testing as it is called when the test is conducted with water, is often conducted while clean-up activities are on-going. The test manifold locations may be restored out of sequence with the rest of the ROW. If portions of the restored ROW must be disturbed again in order to complete pressure testing, ESC measures will be implemented as applied during the rest of construction and as described in these Standards and Specifications.

Hydrostatic test water will be released to upland areas through an energy dissipating dewatering device in accordance with STD & SPEC 3.26 Dewatering Structure (Appendix A) and Typical Construction Detail MVP-ES2 Pumped Water Filter Bag (Appendix B). The dewatering structures will be sized to accommodate the rate and volume of release. These activities will be monitored and regulated to prevent erosion and over pumping of the dewatering structures. Releases will be stopped when necessary to perform maintenance of the dewatering structures and ensure they remain in good working order. No hydrostatic test releases will occur directly to waterbodies, wetlands or other identified environmentally sensitive areas.

Because MVP does not intend to release any hydrostatic test water to waterbodies, the Project does not require coverage under a Virginia Pollutant Discharge Elimination System (VPDES) permit. Nevertheless, as an additional BMP, all upland releases of hydrostatic test water will be conducted in accordance with the sampling, monitoring, and effluent limit conditions (pH of 6.0-9.0, no more than 15.0 mg/l petroleum hydrocarbons and 0.011 total residual chlorine) of the General VPDES Permit for Discharges from Petroleum Contaminated Sites, Groundwater Remediation, and Hydrostatic Tests, VAG83, 9 VAC 25-120-80, applicable to discharges of hydrostatic test water.

2.6.2 Trench Dewatering

The trench will be cleared of debris and dewatered prior to lowering in pipe or equipment. Water from dewatering operations will be filtered through an approved filter bag that will comply with manufacturer's recommendations for inspection and maintenance, passed through a VADEQ standard dewatering structure, and discharged in a manner that does not result in accelerated erosion or adversely affect off-site property. Trench dewatering will be conducted through a filter bag (Appendix B –MVP-ES2) and placed within a dewatering structure (Appendix A – STD & SPEC 3.26-3). Pumped Water Filter Bags should be replaced as often as necessary to maintain function and prevent a failure of the filter bag. Pumps used in the dewatering activity will be placed in a secondary containment to prevent spills of fuel or oil to the ground surface in accordance with the SPCC Plan. Dewatering structures will be constructed in a well vegetated stabilized area away from waterbodies and wetlands and sized according to the intended use. Discharge will be monitored and controlled to prevent erosion and sedimentation from occurring to adjacent areas as well as to prevent over pumping of the dewatering structure. The discharge will be directed away from any waterbody, wetland or other environmentally sensitive areas. The discharge point will be monitored during the activity to ensure that the discharge is thoroughly filtered and no erosion or sedimentation occurs at the discharge point.

2.7 BACKFILLING

Backfilling follows pipe installation and generally consists of replacing the material excavated from the trench. In areas where topsoil has been segregated, the subsoil will be replaced first, and the topsoil will be replaced during final grading. Backfilled trench material will be compacted to stabilize the trench.

As specified above, permanent trench breakers will be installed in accordance with the specifications identified under Section 2.5.1 Trench Breakers to prevent the backfill from sliding or washing on sloping ground.

2.8 FINAL GRADING

Final grading will be completed no later than 20 calendar days after backfilling (10 calendar days in residential areas), soil and weather conditions permitting. These durations may be extended in locations where it is necessary to maintain a travel lane for access to other portions of the Project.

The ROW will be cleared of construction debris, re-graded to pre-construction contours, and topsoil will be replaced. ROW diversions will be installed in accordance with Section 3.5 Temporary Slope Breakers/Temporary Right-of-Way Diversion. All temporary ESC barriers will remain in place until replaced by permanent ESC measures or when a ground cover that is uniform, mature enough to survive, and will inhibit erosion is achieved. In rotated and permanent cropland and pastures, residential areas, and other areas as stipulated by the Construction Supervisor, excess rock greater than four (4) inches in diameter will be removed from at least the top 12 inches of soil to the extent practicable. After final grade is achieved, the size, density, and distribution of rock on the construction work area should be similar to adjacent areas not disturbed by construction. The landowner may approve other rock size provisions in writing.

In areas where establishing pre-construction contours and conditions are not feasible (i.e. mainline valve locations, meter sites, new access road locations, Transco Interconnect, etc.), MVP will address these areas in the site-specific ESC and SWM plans submitted to VADEQ for review and approval. In the event additional areas are identified (i.e. temporary access roads, etc.), MVP will contact VADEQ to discuss changes via permit modification etc.

2.8.1 Temporary Stabilization

When acceptable final grade cannot be achieved (e.g., during winter or early spring construction), when permanent seeding (see Section 2.9.2 – Permanent Seeding) cannot be applied due to adverse soil and weather conditions, or any time a denuded area will remain idle for more than 14 calendar days, temporary seeding (STD & SPEC 3.31) will be applied to the rough graded area in accordance with Table 3.31-B in Appendix A. ESC measures will be monitored and maintained until conditions improve and final cleanup can be completed in the next recommended planting window.

2.8.2 Permanent Slope Breakers (Right-of-Way Diversions/Waterbars)

Permanent slope breakers are intended to reduce runoff velocity and divert water off the construction ROW. Permanent slope breakers will be constructed in accordance with Typical Construction Detail MVP-17 and MVP-18 (Appendix B). Permanent slope breakers will be constructed and maintained in all areas, except cultivated areas and lawns, using the maximum spacing recommendations in the following table.

**RECOMMENDED MAXIMUM SPACING FOR
PERMANENT SLOPE BREAKERS**

Pipeline Grade	Distance (feet)
<2%	- 1, 2
2-5%	400
6-15%	200
16-30%	100
>31%	50 ³

¹ Permanent Slope Breakers will be installed as needed based on field conditions.

² Permanent Slope Breakers will be installed 25 feet from each waterbody boundary regardless of slope conditions.

³ Slopes greater than 65% may require site specific stabilization measures based on field conditions as approved by MVP Design Engineering and MVP Environmental Inspector.

Permanent slope breakers will be constructed with a 2-percent out slope to divert surface flow to a well vegetated stable area. In the absence of a well vegetated stable area, appropriate energy-dissipating devices will be constructed off the construction ROW (Appendix B MVP-ES42). Slope breakers may extend beyond the edge of the construction ROW up to four (4) feet to direct water off the disturbed area and into a stabilized area and are subject to compliance with all applicable survey requirements.

2.8.3 Soil Compaction Mitigation

During preparation of the LOD and trench excavation, topsoil will be segregated and stockpiled separately from excavated subsoil. During backfill and final grading, topsoil and subsoil will be returned to their original profile. MVP will disc areas disturbed during construction activities to facilitate revegetation of the ROW. This will include discing subsoil to a depth of 4-6" prior to returning topsoil to the ROW. Topsoil will then be disced prior to seed and mulch application. Severely compacted areas may require additional de-compaction activities to be employed on an as needed basis using a plow or other deep tillage implement.

Following discing, seed and mulch will be applied to the prepared seedbed. In lieu of anchoring mulch to the topsoil using tracked equipment, MVP would utilize an agricultural crimper to minimize potential for excessive compaction to occur. As an alternative option in agricultural areas, arrangements can be made with the landowner to plant and plow under a "green manure" crop, such as alfalfa, to decrease soil bulk density and improve soil structure. If subsequent construction and cleanup activities result in further compaction, additional tilling may be required.

Restored soils will be tested for compaction throughout the Project as necessary in areas disturbed by construction activities. Compaction testing locations will be determined by the MVP LEI/EI during restoration activities. Tests will be conducted on the same soil type under similar moisture conditions in undisturbed areas immediately adjacent to the Project site to identify approximate pre-construction conditions. A cone penetrometer or other appropriate devices will be used to conduct tests as necessary.

2.9 RESTORATION

Restoration includes permanent soil stabilization measures, both vegetative and non-vegetative (e.g., rip rap or gabions). A permanent vegetative cover will be established on all disturbed areas of the ROW not otherwise permanently stabilized. Restoration will promptly follow final grading to take advantage of soil

scarification resulting from grading, and will be completed within seven (7) calendar days of final grading, weather and soil conditions permitting.

2.9.1 Cleanup

Final cleanup of an area (including final grading and installation of permanent ESC structures) will be completed within 20 calendar days after backfilling the trench in that area (10 calendar days in residential areas). These durations may be extended in locations where it is necessary to maintain a travel lane for access to other portions of the Project. If this schedule cannot be met, all temporary ESC measures shall be removed within 30 calendar days after final site stabilization or after the temporary measures are no longer needed. In no case will final cleanup be delayed beyond the end of the next recommended seeding season.

Excess rock, including blast rock may be used to backfill the trench to the top of the existing bedrock profile.

Excess rock will be removed from at least the top 12 inches of soil to the extent practicable in all rotated and permanent cropland, hayfields, pastures, residential areas, and other areas at the landowner's request. The size, density, and distribution of rock on the construction work area should be similar to adjacent areas not disturbed by construction. Diligent efforts will be made to remove stones greater than four (4) inches if the off ROW areas do not contain stones greater than (4) inches. The landowner may approve other rock size provisions in writing.

Construction debris will be removed from the ROW and grade the ROW to leave the soil in the proper condition for planting.

2.9.2 Permanent Seeding (MVP-ES11)

The goals of permanent seeding are to establish a dense, self-propagating, low maintenance ground cover that will minimize erosion and sedimentation while providing wildlife habitat benefits. To achieve these many goals requires attention to detail in selecting the seed mix and preparing the seedbed.

MVP will request a variance in regard to STD & SPEC 3.32 (Permanent Seeding) with each ESC and SWM plan submission to VADEQ for review and approval. MVP is partnering with the Wildlife Habitat Council (WHC), a nonprofit organization dedicated to assisting corporations, conservation organizations, and individuals with restoration and enhancement of wildlife habitat. The WHC is working with MVP on their commitment toward restoration of the Project ROW and establishment of perennial vegetation using native seed mixes created in collaboration with local seed supplier, Ernst Conservation Seeds, Inc. State-specific seed mixes recommended for MVP are summarized in Appendix B MVP-ES11.1 through 11.7. These seed mixes incorporate recommendations received from the US Fish and Wildlife Service (USFWS), US Forest Service, VA Department of Conservation and Recreation, Wildlife Habitat Council and MVP's threatened and endangered species consultant will be applied along the Project's ROW except where landowners request a specific seed mix and on state or federal land where agencies request specific seed mixes. In areas where a specific mitigation seed mix is not required, MVP will implement STD & SPEC 3.32 Table 3.32-C (Site Specific Seeding Mixtures for Appalachian/Mountain Area).

For the Project's crossing of US Forest Service (National Forest) Lands, MVP will utilize seed mixes specified in their document SUGGESTED SEED MIXES FOR PIPELINE RIGHTS-OF-WAYS AND ASSOCIATED DISTURBANCES ON THE MONONGAHELA AND GEORGE WASHINGTON-JEFFERSON NATIONAL FORESTS (November 2016) provided in Appendix C. Seed mixes for the National Forest Lands are also provided under Appendix B - MVP-ES12.1 through 12.3.

The low-maintenance seed mix appropriate for the region of the state where the Project is located (see Appendix A – STD & SPEC: Table 3.32-C) will be the default unless otherwise specified in the applicable permit conditions, mitigation specifications or landowner agreements. Certified seed will be used whenever

possible, and will be applied to the ROW within 12 months of the testing date. Legume seed will be treated with an inoculant specific to the species. Slopes steeper than 33% will be seeded immediately after final grading, weather permitting. All disturbed soils will be seeded within seven (7) working days of final grading, weather and soil conditions permitting.

Seedbed preparation includes adding lime and fertilizer, and tilling or disking the top 4-6 inches of the soil, or soil roughening if tilling cannot be accomplished. When hydro seeding is to be used, the seedbed will be scarified to facilitate lodging and germination of the seed. Unless site-specific recommendations are received from the land owners or land management agencies, MVP will incorporate 4,000 lbs./acre of pulverized agricultural grade lime and 1,000 lbs./acre of 10-20-10 fertilizer into the soil. Soil pH modifier and fertilizer will be incorporated into the top two (2) inches of soil as soon as possible after application. Other fertilizer formulations, including slow-release sources of nitrogen (preferred from a water quality standpoint), may be used provided they can supply the same amounts and proportions of plant nutrients). PCB-free hydro seed will be used if available.

Seeding rates will be based on pure live seed and used within 12 months of seed testing. Seed will be uniformly applied using a broadcast seeder, drill, culti-packer seeder or hydroseeder. When dry seeding, the seeding depth should be ¼ to ½ inch. During hydroseeding, it is recommended to add 50% more seed to the tank if a machinery breakdown occurs. If the breakdown exceeds two (2) hours, a full rate of new seed may be necessary. Asphalt binders will not be used when hydroseeding near wetlands or water bodies. Twice the supplier's recommended rate of inoculant will be used on dry seeding, five times the recommended rate if hydroseeded.

The upland seed mix should not be applied within wetlands boundaries. Seeding and mulching in cultivated cropland will conform to the adjacent off ROW area unless otherwise requested by the landowner in writing.

Seeding of permanent vegetation will be performed within the recommended seeding dates in the VESCH. If seeding cannot be done within those dates, appropriate temporary erosion control measures will be used and seeding of permanent vegetation will be performed at the beginning of the next recommended seeding season. Permanent seed may be applied out of the recommended window in addition to temporary seeding; however, the contractor must be prepared to return during the next recommended seeding window to reseed any areas that did not develop adequate permanent cover. Lawns may be seeded on a schedule established with the landowner.

2.9.3 Mulching (MVP-ES45)

Following seed application, mulch will be applied to help the seed stay in place, to hide the seed from animals, and to retain soil moisture. Mulch can consist of straw, erosion control fabric, or some functional equivalent. Mulch will be free of noxious weeds. Hay shall not be used as mulch.

RECOMMENDED LOOSE MULCH AND MATERIALS AND APPLICATION RATES

Mulch Application	Rate (lbs./acre)	Notes
Straw	4000	Free from weeds and coarse matter. Must be anchored. Spread with mulch blower or by hand.
Fiber Mulch	1500	Do not use as mulch for winter cover or during hot, dry periods. Apply as slurry.

Mulch Application	Rate (lbs./acre)	Notes
Corn Stalks	8000-12,000	Cut or shredded in 4-6" lengths. Air-dried. Do not use in fine turf areas. Apply with mulch blower or by hand.
Wood Chips	8000-12,000	Free of coarse matter. Air-dried. Do not use in fine turf areas. Apply with mulch blower, chip handler, or by hand. Apply additional 12 lbs. slow-release nitrogen/ton of wood chips.
Bark Chips or Shredded Bark	50-70 cu. Yds.	Free of coarse matter. Air-dried. Do not use in fine turf areas. Apply with mulch blower, chip handler, or by hand.

Install erosion control fabric, such as jute thatching or bonded fiber blankets, at a minimum, on waterbody banks at the time of final bank re-contouring. Anchor the erosion control fabric with staples or other appropriate devices. Fiber matrix or polyacrylamide based erosion control products (Appendix B – MVP-ES40 and MVP-ES40-1) will be substituted for erosion control blanket in agricultural areas.

Spread mulch uniformly over the area to cover at least 75 percent of the ground surface at a rate of 2 tons/acre of straw or hay or its equivalent. If wood chips are used as mulch, do not use more than 6 tons/acre and add the equivalent of 12 lbs./acre available nitrogen per ton.

Application of liquid mulch binders and tackifiers may be used in place of mechanical crimping/anchoring. Heaviest application will occur on crest of ridges and steep slope areas (including spoil piles) to prevent mulch displacement. MVP will monitor mulch application and function throughout the Project duration. If MVP determines mulch coverage to be sparse due to wind or other factors, reapplication will be conducted as needed.

Ensure that mulch is anchored to minimize loss by wind and water. When anchoring by mechanical means, use a mulch-anchoring tool to properly crimp the mulch to a depth of 2 to 3 inches. When anchoring with liquid mulch binders, use rates recommended by the manufacturer. Do not use liquid mulch binders within 100 feet of wetlands or water bodies.

2.9.4 Soil Stabilization Blankets and Matting

Slopes in excess of 30% will be stabilized with steep slope soil stabilization blankets and matting techniques identified in Appendix A - STD & SPEC 3.36 Soil Stabilization Blankets and Matting. The blanket shall be nontoxic to vegetation and to the germination of seed and shall not be injurious to the unprotected skin of humans. The netting will be entwined with the mulching material/fiber to maximize strength and provide for ease of handling. It is recommended that the mulching material/fibers should interlock or entwine to form a dense layer, which not only resists raindrop impact, but also allow vegetation to penetrate the blanket. Blanket mulches will be started at the top of the slope and unrolled downhill, and adjacent blankets will be overlapped by a minimum of 2 inches. Wire staples 11-gauge or better and a minimum of 6 inches in length will be used to secure the blanket mulch in place in accordance with STD & SPEC 3.36 Soil and Stabilization Blankets & Matting.

In addition to STD & SPEC 3.36 Soil and Stabilization Blankets & Matting, MVP will utilize hydraulically applied soil stabilization blankets and matting (i.e. Earthguard, Flexterra or equivalent) as an alternate to the rolled ESC blanket material identified under STD & SPEC 3.36. Information regarding the hydraulically applied blankets is provided under Appendix B –MVP-ES-40 and MVP-ES40.1.

2.9.5 Mulch Before Seeding

Mulch before seeding if:

- Final cleanup, including final grading and installation of permanent erosion control measures, is not completed in an area within 7 calendar days (per MS-1) after the trench in that area is backfilled; or
- Construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions; if mulching before seeding, increase mulch application on all slopes within 100 feet of waterbodies and wetlands to a rate of 3 tons/acre.

2.9.6 Bare Root Sapling and Shrub Planting

Planting of bare-root saplings and shrubs will occur within select areas of the Project (Appendix B – MVP-ES11.8 and 11.9). The purpose of these plantings is to establish target native tree species comparable to the region, site characteristics (e.g., topography; soil characteristics; adjacent vegetation), and adjacent forest composition in order to encourage the timely reestablishment of habitat removed during Project construction. For small mammals and birds, adequate spacing of planted shrubs can form a large clump or thicket and provide excellent cover, refuge, or brood-rearing habitat often absent in open landscapes. Furthermore, planting a diverse array of native shrubs and saplings with varying blooming periods will provide reliable sources of pollen and nectar for pollinator species during spring, summer, and autumn.

All species planted will be native to the area, and the seed source or ecotype of the saplings and shrubs will be as local as possible with preference given to within-state, then mountainous regions of an adjacent state, followed by within the Appalachian Mountain range.

A variety of factors are considered when planting bare-root seedlings. Storage of seedlings is important to ensure viability and to limit loss of seedlings prior to planting. To the extent practicable, time between delivery of seedlings to the restoration site and planting is limited. In an effort to prevent desiccation and preserve moisture, seedlings are kept in original shipping container (e.g., sack; box) and stored in cool, moist, and shady locations that will not receive direct sunlight, and is sheltered from wind. Refrigerated storage is used when possible.

Immediately prior to planting, seedlings are inspected for damage that may result in seedling mortality. Seedlings are examined and discarded if the following are present: broken stems or main roots, mold or mildew, stems with missing bark, desiccated roots, or a root system less than five (5) inches long. Seedlings deemed suitable are planted using a spade, shovel, or planting bar between October 1 and April 30 following seeding application (i.e., woody plants, forbs, and graminoids).

Holes for seedlings will be dug deep enough to fit the entire bare root system without bending; typically between 8 and 10 inches. If roots are longer than the depth of the typical planting hole, roots shall be pruned. All pruning will take place in a manner to avoid desiccation (e.g., in shade). Following pruning, roots are moistened. Roots shall be treated with root dip absorbent polymers and mycorrhizal root dip inoculates in accordance with manufacturer's recommendations. One seedling will be placed in each hole with the roots inserted to the bottom and then lifted upward slightly so that the root collar is at or slightly below the finished grade. Each seedling is fertilized with a 5-gram tablet of controlled release fertilizer. When filling the planting hole, the seedling is maintained upright. The spade, planting bar, or shovel is inserted behind

the planting hole and tilted back to close the bottom of the planting hole. The tool is then tilted forward to close the top of the hole. Soil is gently packed to fill any remaining voids.

2.9.7 After Restoration

Permanent vegetation will not be considered established until a ground cover is achieved that is uniform and mature enough to survive and inhibit erosion. In general, a stand of vegetation cannot be determined to be fully established until it has been maintained for one full growing season after planting. ESC BMPs will be inspected and maintained until a ground cover that is uniform, mature enough to survive, and will inhibit erosion is achieved and established. Sediment captured by the temporary ESC measures will be cleaned out when the deposited sediment meets 50% of the BMP capacity (height). Soils disturbed during ESC maintenance activities will be permanently seeded and mulched to prevent further erosion. All temporary ESC measures shall be removed within 30 calendar days after the site has been permanently stabilized and the temporary ESC measures are no longer needed, unless written authorization is received from the program authority. Following removal of the ESC measures, all areas disturbed during removal of the ESC measures will be seeded and mulched. MVP anticipates that one full growing season after restoration planting is complete and vegetation has established, construction will be complete and the ROW enters the maintenance cycle (see Section 6.0 - Maintenance of Permanent Right-of-Way).

2.9.8 Off-Road Vehicle Control

At the request of a land management agency, measures may be installed and maintained to control unauthorized vehicle access to the ROW. These measures may include:

- Signs;
- Fences with locking gates;
- Slash and timber barriers, pipe barriers, or a line of boulders across the ROW; and
- Conifers or other appropriate trees or shrubs across the ROW.

3.0 TEMPORARY EROSION CONTROLS

The temporary ESC measures detailed below are those most often used for pipeline construction. Additional detail about the measures described is available in the VESCH, and should be reviewed before implementing these measures. Other measures found in the VESCH may be applied or substituted with the concurrence of the LEI, EI and Construction Supervisor if site-specific conditions warrant. Any measures not included in the VESCH or this plan must receive written approval from the appropriate agencies prior to implementation. All temporary ESC devices will be functional before upslope land disturbance takes place. All ESC structures and systems will be maintained, inspected, and repaired as needed to insure continued performance of their intended function until replaced by permanent ESC devices or restoration is complete. All temporary devices will be removed within 30 days after site stabilization or after the temporary measures are no longer needed.

3.1 SAFETY FENCE (STD & SPEC 3.01)

Construction of temporary safety fencing will be installed as needed along the LOD during grading and excavation at public access points to warn pedestrians of possible hazards. This would include adjacent to public road crossings, trails, recreational areas, cemeteries, places of worship, etc... In addition, lights, signs and other warnings are required at road entrances and road crossings in accordance with Virginia Department of Transportation permits and regulations. For residences that are located within 50 feet of the construction work areas, MVP will install temporary construction safety fencing along the edge of the work

area for a distance of 100 feet on either side of the residence in accordance with the site-specific residential construction plans prepared for the Project.

Construction safety fence will consist of plastic orange construction safety fence typically measuring four (4) feet in height anchored to six (6) foot long metal “T” or “U” posts. Installation will be implemented in accordance with Appendix A – STD & SPEC 3.01 Safety Fence.

Construction safety fencing may also be used to identify environmentally sensitive areas to be protected during construction or to highlight hazards along the right-of-way (e.g., a single-strand electric fence). Safety fencing may not be substituted for wire fencing in active pastures.

3.2 CONSTRUCTION ENTRANCE (STD & SPEC 3.02)

A construction entrance will be constructed at any point where construction equipment leaves the ROW and enters a paved public road or other paved surface. Typically, they are comprised of geotextile fabric overlain by 6 inches of coarse aggregate (VDOT #1) extending a minimum of 70 feet from the edge of the pavement. The construction entrance must function to remove mud from vehicles and equipment leaving the ROW. As mud accumulates on the entrance, clean stone must be added or the tire mats lifted and shaken to remove mud. Any mud that is carried onto the pavement must be thoroughly removed by the end of the day by shoveling or sweeping. The mud will be returned to the ROW. If the EI determines that the construction entrance is not adequately removing mud from vehicles and equipment leaving the ROW, the construction entrance will be extended in 70-foot increments until the matter is alleviated. Another option in place of the 70-foot extensions would be to install a wash rack (see Appendix A – STD & SPEC: Plate 3.02-1).

3.3 SEDIMENT BARRIERS (STD & SPEC 3.04, 3.05, 3.06 AND 3.27)

Sediment barriers such as silt fence or brush barrier will be used to temporarily intercept and detain small amounts of sediment from disturbed areas of limited extent and to decrease the velocity of sheet flows. Temporary sediment barriers will be installed at the base of slopes adjacent to road crossings until disturbed vegetation has been reestablished. Temporary sediment barriers will also be installed to prevent siltation into waterbodies or wetlands crossed by or near the construction work area where appropriate. Brush barriers may not be used within 50 feet of a wetland or waterbody. None of these devices is suitable for blocking flow in a stream channel but may be used to filter runoff in an interceptor diversion as well as along the edge of the work area. Sediment barriers will typically be installed along the contour with the ends turned upslope enough to prevent end runs. Sediment barriers will be inspected to identify damage incurred during construction and after each rainfall, and necessary repairs will be made immediately. Sediment barriers that are not functioning properly must be cleaned out and restored to good working condition or replaced.

Straw bales are intended mostly to filter sheet flow leaving the perimeter of a work area. In order to be effective, they must be installed a minimum of 4 inches below the ground surface to minimize undercutting, oriented so the bindings (strings or wires) go around the sides rather than over the top and bottom. Each bale must be staked with at least 2 stakes and firmly butted against the adjacent bale so that runoff passes through the straw rather than between the bales (see Appendix A – STD & SPEC: Plate 3.04-1).

Silt fence provides improved sediment filtration over straw bales, though it cannot be adapted for use in rocky areas. Silt fence may be applied to filter sheet flow from the perimeter of the work area, or to filter flow in minor swales that cross the work area. Silt fence must also be installed at least 4 inches below grade, and the flap along the lower edge turned upslope and buried in order to prevent undercutting. Silt fence should be used with extra-strength filter cloth and stakes spaced 6 feet apart. In areas of heavy sedimentation, silt fence may require additional support. In these areas, wire-backed silt fence (sometimes

called super silt fence) may be used or existing silt fence may be backed with a line of staked bales (not necessarily dug in as they are providing structural support) on the downslope side (see Appendix A – STD & SPEC: Plates 3.05-1 and -2).

Priority One Belted Silt Retention (BSRF) fence may be utilized for additional ESC measures in areas where additional controls are warranted. BSRF is a patented product constructed of a 36-inch wide gray continuous filament polyester non-woven fabric, needle-punched to entangle the continuous filaments, and containing an internal scrim incorporated into the fabric for additional strength and durability. The system utilizes wood stakes and “J” shaped fabric configuration in the anchor trench (See Appendix B – MVP-ES9).

The compost filter sock is a tubular mesh sleeve filled with compost that is installed with stakes downslope at the perimeter of the disturbed area to filter run-off from the construction area. The compost filter sock is a linear, land-based treatment that removes stormwater pollutants through filtration of soluble pollutants and sediments and by deposition of suspended solids. The compost filter sock is typically available in 8-inch (200 mm), 12-inch (300 mm), 18-inch (450 mm), and 24-inch (600 mm) diameters (see Appendix B - MVP-ES3).

Brush barriers consist of small diameter (under 6 inches in diameter) mixed brush, slash and rocks piled along the outboard edge of the work area. Brush barriers will not be used in agricultural areas, wetlands, or other environmentally sensitive areas. Brush will not be obtained from areas outside the approved ROW to create the brush barrier. A brush barrier is particularly useful on the downslope edge of the ROW in side slope areas where heavier debris may commonly roll off the ROW. Brush barriers should be a minimum of 3 feet high, a minimum of 5 feet thick at the base. Brush barriers may be constructed with or without filter fabric cover. Gaps will be left in the brush barrier at approximately 100-foot intervals (see Appendix A – STD & SPEC 3.06) to allow for wildlife passage.

A broad based dip is utilized as an alternative to cross drain culverts to remove water across and off access roads. Broad based dips are designed to be used on outsloped roads and for grades of less than 10%. The broad based dip consists of a section of road reverse graded to 3% for 20-feet followed by an 80-foot section of regularly graded road. On slopes between 8 and 10% the broad based dip should be surfaced with 4-inches of crushed stone (see Appendix B - MVP-ES5).

Turbidity curtains are a floating system that is used to contain sediment and silt that may be suspended in water when working in streams and lakes. The system consists of a series of floatation elements connected to each other with an attached fabric skirt hanging below that is anchored to the stream or lake bed (see Appendix A – STD & SPEC 3.27)

3.4 TEMPORARY DIVERSION DIKE (STD & SPEC 3.09)

A temporary diversion dike is intended to divert overland sheet flow to a stabilized outlet or a sediment-trapping facility during construction and during the establishment of permanent stabilization on sloping disturbed areas. When used at the top of a slope, the structure protects exposed slopes by keeping upland run-on (sheetflow) from entering the disturbed area. When used at the base of a slope, the structure protects downslope areas by diverting sediment laden runoff to a sediment trapping facility.

The temporary diversion dike will be stabilized to prevent erosion during construction and the gradient of the channel behind the dike will be positive to assure drainage. The channel will be either parabolic or trapezoidal to inhibit high velocity that can occur with a v-ditch. The diversion ditch will be “turned out” to an outlet at a spacing of no greater than 150-feet between outlets. The outlets will be protected with a sediment sump and compost filter sock or silt fence. Additional construction details include:

- Rolled erosion control product and/or mulching shall be used to stabilize the temporary compacted soil berm, diversion ditch, and temporary fill slope.

- Spoil from the pipeline trench to be used to construct the temporary soil berm.
- Outlet trench to be cut from the pipeline trench to the diversion ditch at trench plugs/breakers and at low points in the pipeline trench.
- Temporary fill slope to be constructed no steeper than 2h:1v.
- Side slopes of temporary soil berm and diversion ditch shall be no steeper than 2h:1v.
- Ends of compost filter sock at sump outlet to be turned upslope and butted up against the berm to prevent flow from passing around compost filter sock.
- Outlets shall be spaced no more than 150 feet.
- This device shall not be used on any areas that have a pipeline slope exceeding 12%.

See Appendix A –STD & SPEC: Plate 3.09 and associated additional details.

3.5 TEMPORARY SLOPE BREAKERS/TEMPORARY RIGHT-OF-WAY DIVERSION (STD & SPEC 3.11)

Temporary slope breakers, ROW diversions or waterbars, are intended to reduce runoff velocity and divert storm water off the construction ROW. Temporary diversions may be constructed of soil from the site, gravel (provided the gravel can be completely removed at the end of construction), or with a line of staked bales (see sediment barriers described above) or sand bags where conditions prohibit using compacted soil (e.g., on a rocky slope with insufficient soil to create interceptor diversions). The minimum dimensions of an interceptor diversion are 18 inches tall and 6 feet wide at the base (see Appendix A – STD & SPEC: Plate 3.11-1).

Temporary diversions will be spaced according to the maximum spacing as identified below. In addition, they will be located 25 feet from the edge of waterbodies and at the base of slopes adjacent to road or railroad crossings. Temporary slope breakers will discharge to an undisturbed heavily vegetated area when possible or the discharge point will be stabilized to prevent erosion and trap sediment (use a sediment barrier described in Section 3.0). Care will be taken not to locate discharge points at or adjacent to wetlands, waterbodies or other environmentally sensitive areas. Temporary diversions will be inspected daily and repaired at the end of each workday as necessary to maintain function and prevent erosion. Interceptor diversions may be damaged, even removed, during daily construction operations, but will be restored at the close of each workday.

In addition to the temporary installations, some slope breakers will remain as permanent BMPs particularly in steep slopes, in forested areas and adjacent to streams and wetlands to provide long-term protection from erosion and sedimentation. Finally, as described in Section 4.0 – Stormwater Management Requirements some slope breakers will be designed to include post construction stormwater management features (i.e. compost amended soil to remove phosphorous and aid in retention).

Outlet protection, if needed, will be installed per STD & SPEC 3.18 Outlet Protection.

The spacing for Temporary Right-of-Way Diversions presented in STD & SPEC 3.11 Table 3.11A is outlined below:

SPACING OF TEMPORARY RIGHT-OF-WAY DIVERSIONS

Pipeline Grade	Distance (feet)
<7%	100
Between 7% and 25%	75
Between 25% and 40%	50
Greater than 40%	25

MVP will submit a variance request at the time of plan submission in accordance with VESCL Sec.10.1-563(B).

3.6 TEMPORARY STREAM CROSSING (EQUIPMENT CROSSING) (STD & SPEC 3.24)

When a watercourse (any channel with defined banks, flowing or otherwise) on the ROW or on an access road must be crossed more than twice for construction, a temporary stream crossing (or equipment crossing) will be installed. Clearing equipment is permitted to ford stream crossings (one pass in and one pass out) because temporary stream crossings cannot be installed until grading is done; however, no other equipment is permitted to ford across streams. Small channels can be spanned with timber mats. Larger channels must be filled with flume pipe sufficient to carry a 10-year storm flow (see Appendix A – STD & SPEC 3.24: Table 3.24-A) and covered with 6 inches of coarse aggregate (VDOT #1). Minimum culvert size is 18 inches and the culvert must extend past the edges of the temporary stream crossing such that mud is not deposited in the stream channel. All materials used to construct a temporary stream crossing must be removed once the crossing is no longer needed for construction unless additional state and federal permits have been acquired for a permanent bridge (see Appendix A – STD & SPEC: Plates 3.24-1 and -2).

The following design criteria will be used for Temporary Stream Crossings for Equipment:

1. Temporary Bridge Crossing
 - a. Structures may be designed in various configurations. However, the materials used to construct the bridge must be able to withstand the anticipated loading of the construction traffic.
 - b. Crossing Alignment – The temporary waterway crossing shall be at right angles to the stream. Where approach conditions dictate, the crossing may vary 15 degrees from a line drawn perpendicular to the centerline of the stream at the intended crossing location.
 - c. The centerline of both roadway approaches shall coincide with the crossing alignment centerline for a minimum distance of 50 feet from each bank of the waterway being crossed. If physical or ROW restraints preclude the 50 feet minimum, a shorter distance may be provided. All fill materials associated with the roadway approach shall be limited to a maximum height of 2 feet above the existing flood plain elevation.
 - d. A water diverting structure such as a dike or swale shall be constructed (across the roadway on both roadway approaches) 50 feet (maximum) on either side of the waterway crossing. This will prevent roadway surface runoff from directly entering the waterway. The 50 feet is measured from the top of the waterway bank. Design criteria for this diverting structure shall be in accordance with STD & SPEC 3.11, Temporary

Right of Way Diversion. If the roadway approach is constructed with a reverse grade away from the waterway, a separate diverting structure is not required.

- e. Appropriate perimeter controls such as Silt Fence (STD & SPEC 3.05) or Turbidity Curtain (STD & SPEC 3.27) must be employed when necessary along banks of stream parallel to the same.
- f. All crossings shall have one traffic lane. The minimum width shall be 12 feet with a maximum width of 20 feet.
- g. Further design/construction recommendations for temporary bridge construction may be found in Construction Specifications.

2. Temporary Culvert Crossing

- a. Where culverts are installed, VDOT #1 Coarse Aggregate or larger will be used to form the crossing. The depth of stone cover over the culvert shall be equal to one-half the diameter of the culvert or 12 inches, whichever, is greater. To protect the sides of the diversion from erosion, riprap shall be used and designed in accordance with STD & SPEC 3.19 – Riprap (see Appendix A – STD & SPEC: Plate 3.24-2).
- b. If the structure will remain in place for up to 14 calendar days, the culvert shall be large enough to convey the flow from a 2-year frequency storm without appreciably altering the stream flow characteristics. See Table 3.24-A (Appendix A) for aid in selecting an appropriate culvert size (note all assumptions). If the structure will remain in place 14 days to one year, the culvert shall be large enough to convey the flow from a 10-year frequency storm. In this case, the hydrologic calculation and subsequent culvert size must be done for the specific watershed characteristics. If the structure must remain in place over 1 year, it must be designed as a permanent measure by a qualified professional.
- c. Multiple culverts may be used in place of one large culvert if they have the equivalent capacity of the larger one. The minimum-sized culvert that may be used is 18 inches.
- d. All culverts shall be strong enough to support their cross-sectioned area under maximum expected loads.
- e. The length of the culvert shall be adequate to extend the full width of the crossing, including side slopes.
- f. The slope of the culvert shall be at least 0.25 inches per foot.
- g. Crossing Alignment – The temporary waterway crossing shall be at right angles to the stream. Where approach conditions dictate, the crossing may vary 15 degrees from a line drawn perpendicular to the centerline of the stream at the intended crossing location.
- h. The centerline of both roadway approaches shall coincide with the crossing alignment centerline for a minimum distance of 50 feet from each bank of the waterway being crossed. If physical or ROW restraints preclude the 50 feet minimum, a shorter distance may be provided. All fill materials associated with the roadway approach shall be limited to a maximum height of 2 feet above the existing flood plain elevation.
- i. The approaches to the structure shall consist of stone pads meeting the following specifications:
 - i. Stone: VDOT #1.
 - ii. Minimum thickness: 6 inches
 - iii. Minimum width: equal to the width of the structure

- j. A water diverting structure such as a swale shall be constructed (across the roadway on both roadway approaches) 50 feet (maximum) on either side of the waterway crossing. This will prevent roadway surface runoff from directly entering the waterway. The 50 feet is measured from the top of the waterway bank. Design criteria for this diverting structure shall be in accordance with STD & SPEC 3.11, Temporary Right of Way Diversions. If the roadway approach is constructed with a reverse grade away from the waterway, a separate diverting structure is not required.

A copy of Tables 3.24-A (Pipe Diameter (Inches) for Stream Crossings) of the VESCH is provided in Appendix A.

The above-stated stream-crossing procedures will be altered if required to conform to any incompatible or more stringent requirement imposed by the United States Army Corps of Engineers, Virginia Marine Resource Commission, or other appropriate federal or state authority.

3.7 DEWATERING STRUCTURE (STD & SPEC 3.26)

A dewatering structure filters sediment from water pumped out of excavations. The style most commonly used for pipeline construction is an above-grade pit made of staked bales, filter fabric, and gravel; however, other structures (or a combination thereof) are available. In certain instances, a pumped water filter bag will be placed in the dewatering structure to provide additional sediment control. An alternative to a dewatering structure is to use a pumped water filter bag over the discharge end of the hose. The Environmental Inspector will monitor use of filter bags to ensure that they are changed frequently enough to ensure proper functioning (see Appendix A – STD & SPEC: Plates 3.26-1, -2, and -3, and Appendix B - MVP-ES2). Used filter bags will be disposed of at an authorized waste facility.

3.8 ROCK CHECK DAM (STD & SPEC 3.20)

Rock check dams are used in drainage ditches and small channels on and around LDAs until final stabilization is complete. They should be installed immediately following construction of the drainage ditch, but prior to any adjacent disturbance.

Rock check dams should not be used in a live stream or any waterbody that meets the definition of a Waters of the United States.

Check dams should be checked for sediment accumulation after each runoff-producing storm event. Sediment should be removed when it reaches one half of the original height of the measure.

Regular inspections should be made to insure that the center of the dam is lower than the edges. Erosion caused by high flows around the edges of the dam should be corrected immediately.

3.9 OUTLET PROTECTION (STD & SPEC 3.18)

Outlet protection is used to prevent scour at stormwater outlets, to protect the outlet structure, and to minimize the potential for downstream erosion by reducing the velocity and energy of concentrated stormwater flows.

The outlets of pipes and structurally lined channels are points of critical erosion potential. Stormwater which is transported through man-made conveyance systems at design capacity generally reaches a velocity which exceeds the capacity of the receiving channel or area to resist erosion. To prevent scour at stormwater outlets, a flow transition structure is needed which will absorb the initial impact of the flow and reduce the flow velocity to a level which will not erode the receiving channel or area.

Design of all Outlet Protection Devices shall be in accordance with STD & SPEC 3.18 of VESCH.

3.10 EQUIPMENT CLEANING STATIONS

In order to limit the potential for the spread of noxious weeds, MVP will establish equipment cleaning stations throughout the Project areas. These facilities will be used to ensure equipment is free of debris before being transported to a new construction spread. During construction, the EI will ensure all contractors clean the tracks, tires, and blades of equipment by hand or compressed air to remove any excess soil and vegetative materials prior to movement of equipment out of known weed or soil-borne pest infested areas.

In addition, prior to mobilization, MVP will require contractors to thoroughly clean all construction equipment prior to moving equipment to the Project area. Equipment will be cleaned of soil, vegetative matter and other construction materials to limit the spread of noxious weeds, insects, or other soil-borne pests.

4.0 STORMWATER MANAGEMENT REQUIREMENTS

In addition to the approved Erosion and Sedimentation Control Plans, since the Project creates a land disturbance of greater than 1 acre and is located outside of Chesapeake Bay Preservation Areas, MVP will demonstrate compliance with design criteria requirements water quantity Guidance Memo No. 16-2001 (9VAC-25-870-66). The stormwater quality and quantity compliance demonstrations will be performed using the methodologies and assumptions as described below. For additional details on the methodology see Appendix D.

4.1 POST-DEVELOPMENT CONDITION

The typical 125-foot wide pipeline construction corridor within the site area will be restored as follows in accordance with MVP's planned maintenance and restoration activities detailed in Sections 2.4.1 and 2.9.2 as well as Appendix E – Post Development Figure, of this document:

- 75-foot temporary construction ROW will be restored to pre-development conditions.
 - o If forested, post-development condition will be brush consisting of woody species (seeded and allowed to naturally return to forest condition subject to landowner actions).
 - o If agricultural land, post-development condition will return the temporary ROW to agricultural use and will be modeled as such in the stormwater calculations.
 - o If pre-development conditions included any impervious cover, such as asphalt or gravel access roads, these impervious surfaces will remain in the post-development condition.
 - o Other pre-development conditions such as meadow, wetland, lawn, etc. will be restored to pre-development conditions and will be modeled as such in the stormwater calculations.
- 50-foot permanent ROW will be seeded and restored to meadow conditions
 - o Mowing and general maintenance will be consistent with the Forest & Open Space practices listed in the Virginia Runoff Reduction Method (VRRM) Compliance Spreadsheet User's Guide & Documentation (April 2016) Table 1. Land Cover Guidance for VRRM Compliance Spreadsheets.
 - o The full width permanent ROW will not be mowed any more frequently than once every three (3) years.
 - o A corridor not exceeding 10 feet in width located directly over the pipeline will be mowed annually for inspection purposes in accordance with FERC PLAN and PROCEDURES.

4.2 PRECIPITATION VALUES

Precipitation values used in stormwater calculations will be tailored to the Project.

4.2.1 Annual Precipitation

Annual precipitation values range from 35 to 60 inches along the length of the Project. Therefore, local annual precipitation values will be used when performing water quality calculations (per DEQ, Stormwater Management Technical Meeting, 29 November 2016, Virginia Department of Environmental Quality, Richmond, VA). Refer to Figures 1 and 2 below for local annual precipitation values obtained from PRISM weather stations.

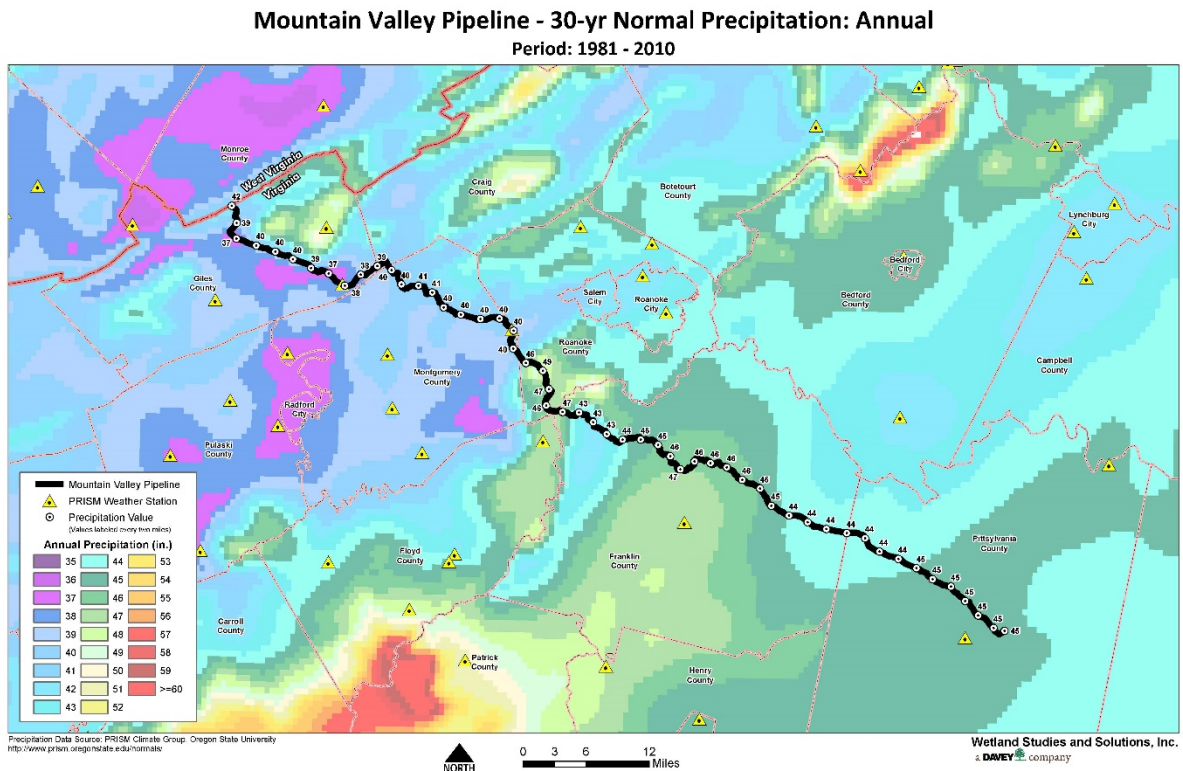


Figure 1. 30-year Annual Normal Precipitation – Raw Data

Mountain Valley Pipeline - 30-yr Normal Precipitation: Annual
Period: 1981 - 2010

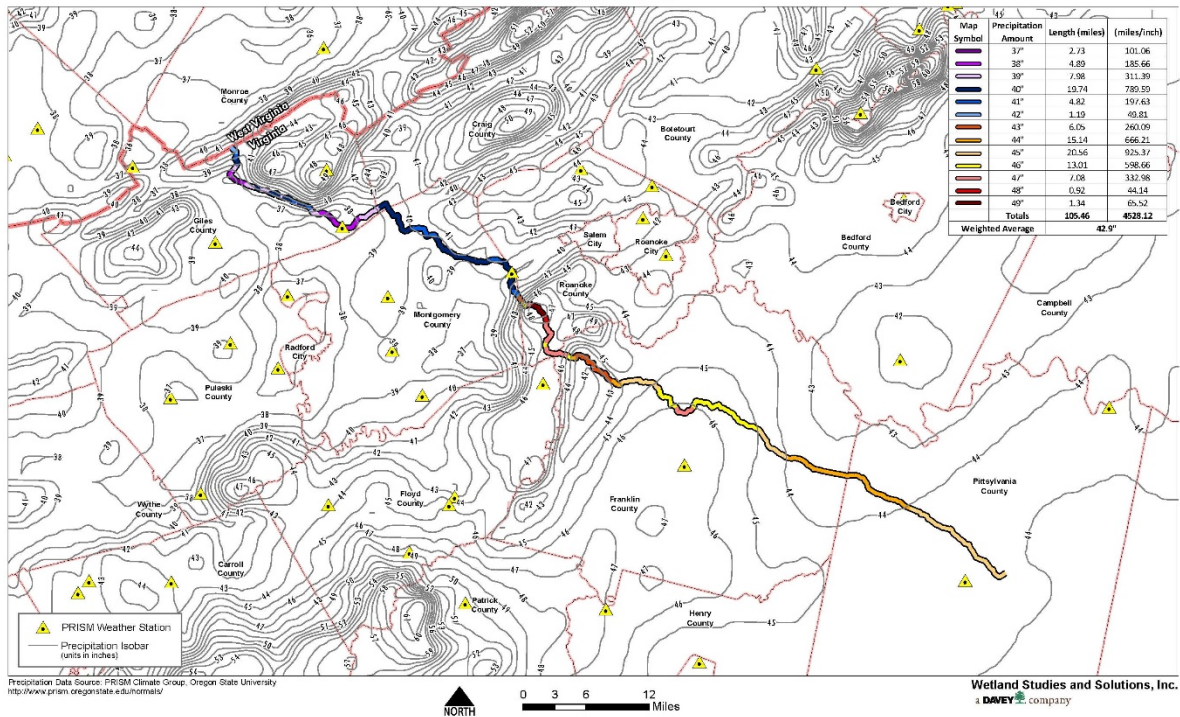


Figure 2. 30-year Annual Normal Precipitation – Pipeline Weighted Average Precipitation with isobars

4.2.2 Design Storms

Design storm values for the 1-, 2- and 10-year 24-hour storms were compiled from multiple sources including local code, the Virginia Stormwater Handbook 1999 Edition, the Virginia Stormwater Handbook DRAFT 2013 Edition, and the NOAA Atlas 14 data for the stations closest to the current pipeline alignment. To meet stormwater management requirements, projects are typically subject to the most stringent regulation. Therefore, the maximum rainfall intensity of the four sources will be used in stormwater calculations as presented in Tables 1-6 below.

Tables 1-6. Design Storm Values by County

Giles County, VA		Roanoke County, VA		Pittsylvania County, VA	
Frequency Storm	24-Hour Rainfall	Frequency Storm	24-Hour Rainfall	Frequency Storm	24-Hour Rainfall
1-Year	2.40	1-Year	3.00	1-Year	2.80
2-Year	2.90	2-Year	3.50	2-Year	3.50
5-Year	3.90	5-Year	4.50	5-Year	4.50
10-Year	4.70	10-Year	5.00	10-Year	5.20
25-Year	5.00	25-Year	6.00	25-Year	6.30
50-Year	5.90	50-Year	6.70	50-Year	7.29
100-Year	6.40	100-Year	7.50	100-Year	8.38

**Montgomery County,
VA**

Frequency Storm	24-Hour Rainfall
1-Year	2.60
2-Year	3.20
5-Year	4.00
10-Year	5.00
25-Year	5.80
50-Year	6.60
100-Year	7.60

Franklin County, VA

Frequency Storm	24-Hour Rainfall
1-Year	3.30
2-Year	3.70
5-Year	4.70
10-Year	5.70
25-Year	6.40
50-Year	7.40
100-Year	8.50

Craig County, VA

Frequency Storm	24-Hour Rainfall
1-Year	2.60
2-Year	3.14
5-Year	4.00
10-Year	4.70
25-Year	5.72
50-Year	6.57
100-Year	7.50

4.3 STORMWATER QUALITY CALCULATIONS

Stormwater quality will be evaluated using the Virginia Runoff Reduction Method (VRRM). The stormwater quality evaluation will demonstrate that the total phosphorous load does not exceed the threshold of 0.41 lbs/acre-year for new development. New impervious cover within the Project LOD will include access roads and pad sites. In instances where existing impervious areas, such as access roads, are to be used or improved for the Project, VRRM for re-development calculations will demonstrate either 10% or 20% reduction from predevelopment phosphorus loads based on land disturbance less than or greater than one acre, respectively.

To utilize the site specific annual rainfall values, noted in Section 4.2.1, Version 2.8 of the VRRM spreadsheet will be used for design. At the Transco Interconnect site in Pittsylvania County, Version 3.0 of the VRRM spreadsheet will be used for design (per DEQ, Project Standards and Specifications Meeting, 09 March 2017, Virginia Department of Environmental Quality, Richmond, VA), because the V3.0 Redevelopment VRRM spreadsheet accounts for lower total phosphorus loading rates for projects containing pre- and post-construction forested areas.

Only the site area, or the area within the LOD, will be considered when evaluating stormwater quality in each drainage area. Appropriate post-developed land covers will be used to calculate phosphorous loading per the VRRM spreadsheet. For pre-developed forested areas, under normal operating conditions, the post construction ROW will be considered Forest/Open Space land cover for water quality calculations. For pre-developed non-forested areas, under normal operating conditions these areas will revert to pre-developed land use (e.g. agricultural uses including tilling, pasture, hayfield, etc.). Therefore, the post construction ROW in non-forested areas will be based on Table 1: Land Cover Guidance for VRRM Compliance Spreadsheets, Virginia Runoff Reduction Method Compliance Spreadsheet User's Guide & Documentation dated April 2016.

For the majority of this Project, stormwater BMPs will treat runoff to achieve the VRRM calculated total phosphorus load limits. MVP will utilize specifications from the published 2011 Virginia Stormwater BMP Clearinghouse for BMP design. Although all BMPs will be considered for use to satisfy quality requirements, the specifications listed below are those most likely to be implemented with this Project:

- Specification No. 2 Sheet flow to a vegetated filter strip or conserved open space
- Specification No. 3 Grass channels
- Specification No. 4 Soil compost amendment

4.4 STORMWATER QUANTITY CALCULATIONS

Stormwater quantity will be modeled using the Hydraflow Hydrographs extension for AutoCAD Civil 3D. The Natural Resource Conservation Service (NRCS; formerly Soil Conservation Service [SCS]) Technical Release 55 (TR-55) methods will be utilized to analyze site hydrology in Hydraflow Hydrographs for the 1-, 2-, and 10-year 24-hour storm events.

4.4.1 Energy Balance Method

The resulting peak flow rates and runoff volumes for the 1-year 24-hour storm event will be used as inputs when completing the energy balance method calculations, as detailed in 9VAC25-870-66. B.3.a and below.

Equation 1

$$Q_{Developed} \leq I.F.* (Q_{Pre-developed} * RV_{Pre-developed})/RV_{Developed}$$

where:	$Q_{Developed}$	=	The allowable peak flow rate of runoff from the developed site
	I.F.	=	Improvement Factor (0.8 for sites > 1 acre; 0.9 for sites ≤ 1 acre)
	$RV_{Developed}$	=	Volume of runoff from the site in the developed condition
	$Q_{Pre-Developed}$	=	The peak flow rate of runoff from the pre-developed site
	$RV_{Pre-Developed}$	=	Volume of runoff from the site in pre-developed condition

- The majority of improvement factors will be 0.8.
- The majority of pre-developed conditions are forested.

Post-development peak flows must always be less than or equal to pre-development peak flows.

Equation 2

$$Q_{Developed} \leq Q_{pre-developed}$$

However, post-development peak flows ($Q_{Developed}$) need never be less than the following:

Equation 3

$$(Q_{Forest} * RV_{Forest})/RV_{Developed}$$

where:	Q_{Forest}	=	The peak flow rate of runoff from the site assuming a forest condition
	RV_{Forest}	=	Volume of runoff from the site assuming a forest condition
	$RV_{Developed}$	=	Volume of runoff from the site in the developed condition

With the improvement factor, the majority of drainage areas (being forested) will results in a $Q_{Developed}$ from Equation 1 lower than the $Q_{Developed}$ value determined using Equation 3. Therefore, Equation 3 will be used for the majority of the Project to determine compliance with the Energy Balance Method and stormwater quantity requirements.

Runoff volume (RV) and peak flow rate (Q) are calculated in Hydraflow Hydrographs using TR-55 methodology, and the computed values corresponding to the 1-year 24-hour storm event for the pre-developed, developed, and forest conditions are used to determine if the energy balance requirements (i.e., Equations 1 through 3 above) have been satisfied.

Stormwater quantity BMP design will be an iterative process during which BMPs will be added across the drainage area as necessary until the energy balance requirements are satisfied.

4.4.2 Curve Numbers

MVP will utilize curve numbers for the appropriate pre- and post-development cover type, in good condition, and hydrologic soil group (HSG) as listed in the TR-55 Tables 2-2a-d, excerpted below:

Table 7. Post-Development Condition Curve Numbers

Post-Development Condition within the LOD		Hydrologic Soil Group			
Description	TR-55 Land Use	A	B	C	D
Undisturbed Forest	Woods, Good Condition	30	55	70	77
Re-forested	Woods, Good Condition	30	55	70	77
Unmaintained ROW	Brush, Good Condition	30	48	65	73
Maintained ROW	Meadow	30	58	71	78
Gravel Access Road (with ROW)	Impervious Area, Gravel	76	85	89	91
Compacted Well-Graded Gravel (no ROW)	Impervious Area, Paved	98	98	98	98
Asphalt Access Road (with ROW)	Impervious Area, Paved, open ditches	83	89	92	93
Asphalt Access Road (no ROW)	Impervious Area, Paved	98	98	98	98
Concrete Pads	Impervious Area, Paved	98	98	98	98

For pre-developed wooded areas, the post-development cover types will be modeled, per Section 4.1 Post-Development Condition, as the following:

- Brush in good condition for the 75-foot temporary construction ROW/workspace areas; and
- Meadow for the 50-foot permanent ROW.

4.4.3 Drainage Area Delineation

Drainage areas along the proposed pipeline route will be delineated based on rivers and tributaries that have been delineated by, and are therefore recognized by, the VADEQ. The portion of the corresponding VADEQ river/tributary drainage area that runs on to the Project LOD will be considered for quantity requirements. For pipeline sections that run across/through valleys (i.e., in the vicinity of stream crossings), the drainage area considered will be limited to the LOD for quality.

4.4.4 Time of Concentration

For the pre-developed condition, the time of concentration will be calculated in accordance with TR-55 using the flow path from the most remote location within the drainage area to the outlet. For the developed condition, the time of concentration will be calculated in accordance with TR-55 using a flow path that is representative of the hydrologic changes following construction (i.e., changes in surface water runoff due to permanent waterbars, stormwater BMPs, etc.).

4.4.5 Sheetflow

If pre-development runoff conditions include sheetflow, and sheetflow can be maintained in the post-development condition, stormwater quantity regulations will be satisfied demonstrating no adverse effects on downstream properties per 9VAC-25-870-66.D.

No adverse effects will be demonstrated by calculating the sheet flow velocity for the post-development 2-year 24-hour storm and comparing it to permissible velocities. Travel time will be calculated using Manning's kinematic solution:

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5}s^{0.4}}$$

where: T_t = Travel time (hours)
 n = Manning's roughness coefficient
 L = Flow length (feet)
 P_2 = 2-year 24-hour rainfall (inches)
 s = Slope of hydraulic grade line (foot/foot)

The sheet flow travel time will then be converted to velocity via the following equation:

$$V = \frac{L}{3600T_t}$$

where: V = Average velocity (foot/second)
3600 = Conversion from hours to seconds

Calculated post-development sheet flow velocities will be less than the permissible velocities as shown in VESCH Tables 5-14 Permissible Velocities for Grass Lined Channels and Table 5-22 Permissible Velocities for Unlined Earthen Channels (reproduced below).

Table 5-14 Permissible Velocities for Grass-Lined Channels		
Channel Slope	Lining	Velocity* (ft/sec)
0-5%	Bermudagrass	6
	Reed Canarygrass	5
	Tall Fescue	
	Kentucky bluegrass	
	Grass-legume mixture	4
	Red fescue	2.5
	Redtop	
	Sericea lespedeza	
	Annual lespedeza	
	Small grains	
	Temporary vegetation	
5-10%	Bermudagrass	5
	Reed Canarygrass	4
	Tall Fescue	
	Kentucky bluegrass	
Greater than 10%	Grass-legume mixture	3
	Bermudagrass	4
	Reed Canarygrass	3
	Tall Fescue	
Greater than 10%	Kentucky bluegrass	

* For highly erodible soils, decrease permissible velocities by 25%

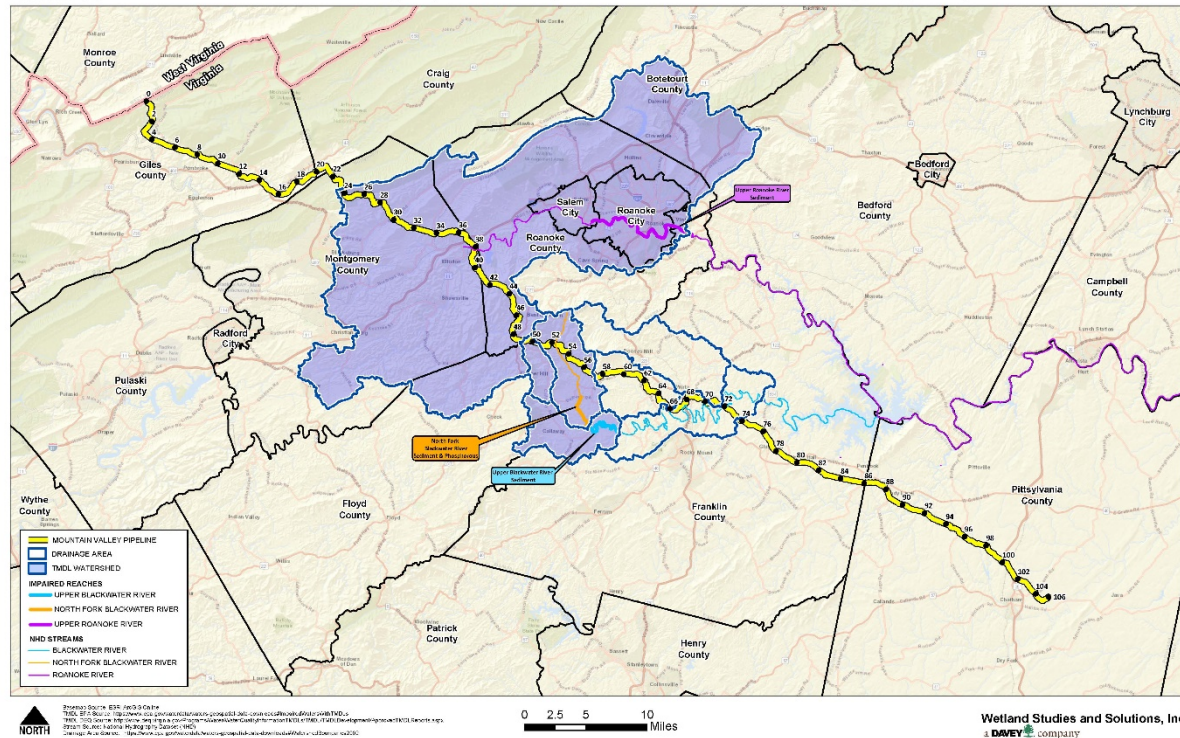


Table 5-22
Permissible Velocities for Unlined Earthen Channels

Soil Types	Permissible Velocity (ft/sec)
Fine Sand (noncolloidal)	2.5
Sandy Loam (noncolloidal)	2.5
Silt Loam (noncolloidal)	3.0
Ordinary Firm Loam	3.5
Fine Gravel	5.0
Stiff Clay (very colloidal)	5.0
Graded, Loam to Cobbles (noncolloidal)	5.0
Graded, Silt to Cobbles (noncolloidal)	5.5
Alluvial Silts (noncolloidal)	3.5
Alluvial Silts (colloidal)	5.0
Coarse Gravel (noncolloidal)	6.0
Cobbles and Shingles	5.5
Shales and Hard Pans	6.0

Source: American Society of Civil Engineers

If necessary to dissipate concentrated flow into sheet flow, level spreaders will be designed per VESCH STD & SPEC 3.21 (see Appendix A)

4.5 TOTAL MAXIMUM DAILY LOADS

MVP has reviewed federal, state and local regulations applicable to the six (6) counties within the Project for impaired waterbodies that have an established Total Maximum Daily Loads (TMDL) for certain pollutants. The pollutants of potential concern are nutrients, including nitrogen and phosphorous, (during post-construction) and sediment (during construction and post-construction). The Project traverses the watersheds of impaired waterbodies with TMDLs noted below in Figure 4 and Table 8.

Figure 4. Impaired Watersheds

Table 8. TMDL Waterbodies

County	Basin Name	Waterbody Name	Pollutant(s)
Craig	N/A	N/A	N/A
Giles	N/A	N/A	N/A
Montgomery	Roanoke River	Upper Roanoke River	Sediment
Roanoke	Roanoke River	Upper Roanoke River	Sediment
Franklin	Roanoke River	North Fork Blackwater River Upper Blackwater River	Sediment, Total Phosphorous Sediment
Pittsylvania	N/A	N/A	N/A

The total point source wasteload allocation (WLA) for the impaired waterbodies can be found in Table 9 below.

Table 9. Total Wasteload Allocations

Stream Name	TMDL Title	City/ County	WBID ¹	Pollutant	WLA	Units
North Fork Blackwater River	Total Maximum Daily Load (TMDL) Development for the Upper Blackwater River Watershed	Franklin	L08R	Sediment	0	T/YR
North Fork Blackwater River	Total Maximum Daily Load (TMDL) Development for the Upper Blackwater River Watershed	Franklin	L08R	Phosphorus	0	T/YR
Upper Blackwater River	Total Maximum Daily Load (TMDL) Development for the Upper Blackwater River Watershed	Franklin	L08R	Sediment	0.526	T/YR
Roanoke River	Benthic TMDL Development for the Roanoke River, Virginia	Roanoke, Montgomery	L04R	Sediment	5,189	T/YR

¹WBID = Waterbody Identification Number

For all work performed within the boundaries of the impaired waters listed above, the measures listed below will be implemented.

- The impaired water(s), approved TMDL(s), and pollutant(s) of concern, when applicable, shall be identified in the SWPPP;
- Permanent or temporary soil stabilization shall be applied to denuded areas within seven days after final grade is reached on any portion of the site, soil and weather conditions permitting;
- Fertilizers shall be applied in accordance with manufacturer's recommendations or an approved nutrient management plan and shall not be applied during rainfall events; and

- The applicable ESC control and SWM BMP inspection frequency shall be increased as noted in Section 2.0 above.

5.0 SPECIAL PROCEDURES

MVP will implement specialized construction procedures in areas deemed an environmentally sensitive area such as waterbody and wetland crossings, areas of steep slopes and other areas of concern as identified below.

5.1 WATERBODY AND WETLAND CROSSINGS

Wetlands and waterbodies are natural resources given additional protection under the law because they provide important ecological benefits which may be altered or harmed by construction activities. Wetlands are areas where the plants have adapted to saturated soil conditions for extended periods of time. Wetlands often do not have standing water or even saturated soil at all times during the year, and may host plants from flowers and grasses to common shrubs and trees. Waterbody is a term used for any permanent standing or flowing water, or defined channel, such as streams, rivers, ponds and reservoirs. Streams (the area from top of bank to top of bank) may be one of the following: perennial, meaning they typically have some flowing water year round (except in cases of drought), intermittent, meaning they only have flowing water during high flow periods such as spring but they have defined banks and stream bed, and ephemeral, meaning they only exists for a short period following precipitation or snowmelt.

A qualified professional (i.e. wetland and stream biologist) will identify all wetland and water body crossings during the planning and survey phase of the Project.

For every waterbody and wetland, a buffer will be added to both sides of each crossing to ensure that any transitional area is also treated as an environmentally sensitive area. Buffers will extend 50 feet where possible, or as far as topographic conditions permit, along the right-of-way from where the trench centerline enters the wetland and waterbody.

To minimize impacts to waterbody and wetland crossings, they will be treated as separate construction entities, except during clearing activities, and efforts will be made to cross these areas during low flow. Once grubbing and grading starts at a waterbody or wetland crossing it will be actively conducted for consecutive days until the crossing is completed and the work area restored. In general, the same measures as already discussed for upland construction also apply to waterbody and wetland crossings. Exceptions and Procedures of special emphasis are discussed below. Permits may include conditions that further modify these requirements. Crossings will be constructed as close to perpendicular to the axis of the waterbody channel as engineering and routing conditions permit. If the pipeline parallels a waterbody, at least 15 feet of undisturbed vegetation will be maintained between the waterbody and the right-of-way, if possible, except at the crossing location. Where waterbodies meander or have multiple channels, the pipeline will be routed to minimize the number of waterbody crossings.

The methods described in this section will be employed unless incompatible or more stringent requirements are imposed by the U.S. Army Corps of Engineers, Virginia Marine Resources Commission, or other appropriate federal or state authority.

Time Windows for Construction: If the below indicated species is present within the waterbody, no in-stream construction activities will be conducted during the following time windows unless written approval is received from the appropriate federal or state agency:

- Coldwater Fisheries - March 1 – June 30; and
- Warmwater Fisheries - April 15 – July 15

- Natural Trout Streams October 1 - March 31 for Brown Trout (*Salmo trutta*) and Brook Trout (*Salvelinus fontinalis*) waters, and March 15 - May 15 for Rainbow Trout (*Oncorhynchus mykiss*) waters;
- Stockable Trout Streams - there is no time of year restrictions for stockable trout; however, as required by the VDGIF, MVP will consult with the VDGIF regional offices before constructing in stockable trout streams.
- Roanoke Log Perch (*Percina rex*) and Orangefin madtom (*Noturus gilberti*) waters - March 15 - June 30.
- Atlantic pigtoe (*Fusconaia masoni*) and James spinymussel (*Pleurobema collina*) – May 15 – July 31
- Green floater (*Lasmigona subviridis*) and Yellow lampmussel (*Lampsilis cariosa*)– April 15 – June 15 and August 15 - September 30

Planning and Survey: MVP intends to employ one of the Utility Stream Crossing (STD & SPEC 3.25) methods to complete open water crossings utilizing these dry-ditch methods. The method selected during planning and surveying may need to be altered based on field conditions at the time of construction. Alterations must be approved by the Construction Supervisor and the LEI/EI prior to implementation. MVP will contact the Plan-approving Authority if necessary.

The principal methods of crossing waterbodies in the Commonwealth will be open-cut dry-ditch. These methods include Flume Pipe Crossing (Appendix A – STD & SPEC: Plate 3.25-3), Cofferdam Crossing (Appendix A – STD & SPEC: Plate 3.25-4) and Dam and Pump (Appendix B –MVP-15). MVP does not propose to conduct any waterbody crossings via directional drill methods. In the event a directional drill method is needed, the crossing would be conducted in accordance with these details following approval of necessary federal and state permitting requirements.

For crossings of all state-designated fisheries as well as waterbodies with sensitive species concerns, all construction equipment will cross the waterbody on an equipment bridge. Equipment bridges are not required at minor waterbodies that do not have a state-designated fishery classification (for example, agricultural or intermittent drainage ditches).

For crossings of waterbodies greater than 10 feet in width, use of equipment operating in the waterbody will be limited to that needed to construct the crossing. All other construction equipment must cross on an equipment bridge. Every attempt will be made if wet-ditch open-cut crossing is utilized to complete trenching and backfill work within the waterbody (not including blasting) within 48 hours, unless site-specific conditions make completion within 48 hours infeasible.

Wetland crossings will be constructed using standard trench-and-backfill methods. Heavy equipment working in wetlands will utilize equipment mats or other suitable methods to minimize soil disturbance and compaction.

Staging areas for waterbody and wetland crossings will be located outside the buffer areas and will be the minimum necessary to stage the waterbody or wetland crossing. No refueling, hazardous materials storage, equipment maintenance, or equipment parking will take place within 100 feet of the waterbody or wetland crossing. If pumps are being used within the waterbody or wetland crossing, small quantities of fuel in Gerry cans may be stored on site within a spill containment device, otherwise fuel may not be stored within waterbody and wetland crossings. Equipment and vehicles will not be washed in any waterways. The LEI/EI will specify additional stabilization measures as needed to prevent equipment from rutting within waterbody and wetland crossings.

Waterbody and wetland crossings will be clearly marked in the field prior to the start of tree clearing activities.

Additional Temporary Workspace (ATWS) and Access Roads: Clearing of vegetation between extra work areas and the edge of the wetland will be limited to the permitted construction ROW. The size of extra work areas will be limited to the minimum needed to construct the waterbody crossing. The only access roads, other than the construction right-of-way, that will be used in wetlands are those existing roads that can be used with minimal or no modification to the wetland.

Temporary Erosion and Sediment Control: Sediment barriers will be installed immediately after initial disturbance of the waterbody or adjacent upland. Sediment barriers will be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Sediment barriers will be installed across the entire construction right-of-way at all waterbody crossings. Where waterbodies are adjacent to the construction right-of-way, sediment barriers will be installed along the edge of the construction right-of-way as necessary to contain spoil and sediment within the ROW. Trench plugs will be used at all waterbody crossings to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody. Trench plugs will be of sufficient size to withstand upslope water pressure.

Clearing: Clearing operations will be permitted for two (2) passes through each waterbody or wetland crossing, but no grubbing or grading will be conducted until the contractor is prepared to install the pipe and backfill. Care will be taken during clearing operations not to deposit mud in open water, and to minimize rutting of the right-of-way. All woody debris will be removed from within the waterbody or wetland crossing for disposal. Vegetation will be cut off at ground level, leaving existing root systems in place, and removed from the wetland for disposal. Timber riprap may be employed to stabilize the equipment work area provided all timber is obtained from within the approved construction work area. All timber riprap must be installed to facilitate removal upon completion of construction. Any disturbed soil will be mulched before the clearing crew leaves the waterbody or wetland crossing. MVP reduced the construction LOD at wetland crossings from 125 feet to 75 feet to minimize impacts. Clearing activities within wetland areas will be restricted to the 75-foot temporary construction LOD.

Grubbing and Grading: Before grading begins and as grubbing progresses, sediment barriers (staked bales or silt fence, compost filter socks, etc.) will be installed across the construction area at the edge of the water or the edge of the wetland, and along the sides of the construction work area as needed to prevent the flow of spoil into the waterbody or wetland. Clearing of vegetation in wetlands would be limited to trees and shrubs, which would be cut flush with the surface of the ground and removed from the wetland. Stump removal, topsoil segregation, and excavation would be limited to the area immediately over the trench line within the 50-foot permanent ROW easement per NWP12 Regional Condition 3.b.iii, FERC PROCEDURES and Project's FERC Certificate conditions (see Appendix B MVP-53). Trees located within 15 feet of the pipeline with roots that could compromise the integrity of the pipeline coating may be selectively cut and removed from the permanent ROW. A limited amount of stump removal and grading may be conducted within the permanent ROW easement in wetlands to ensure a safe working environment. In wetlands, very little grading is expected, as topography is generally flat and low-lying.

Per MS-13, when a live waterbody must be crossed by construction vehicles more than twice in a 6-month period, a temporary stream crossing of non-erodible material must be provided. If a flume crossing is planned, the flume to carry the stream flow across the ditch may also be installed at this time. The stream crossing process using a flume would include the installation of the flume, continuing with the trench excavation, the pipeline installation, backfilling of the trench and ending with the stabilization of the stream bank. This process will be completed within a 72-hour period from flume installation to stabilization of the stream bank. If blasting is required, and not intended to be included in the 72-hour time limit, then a variance may be required from the VADEQ.

Temporary ROW diversions (interceptor diversions) will be installed at the ends of the waterbody or wetland crossing.

Equipment Bridges: Only clearing equipment may cross waterbodies before installation of equipment bridges. The number of such crossings of each waterbody will be limited to one per piece of equipment. Soil will not be used to construct or stabilize equipment bridges. Equipment bridges will be constructed using one of the following methods:

- Equipment pads and culvert(s);
- Clean rock fill and culvert(s) that conforms to the requirements in STD & SPEC 3.24 (Appendix A – STD & SPEC: Plate 3.24-2)
- Flexi-float or portable bridge(s) (Appendix A – STD & SPEC: Plate 3.24-1).

Each equipment bridge will be designed and maintained to withstand and pass the highest flow that would occur while the bridge is in place and prevent soil from entering the waterbody. Equipment bridges will be removed following completion of restoration of the ROW permanent seeding unless it is authorized to remain as a permanent bridge. If there will be more than 30 days between final cleanup and the beginning of permanent seeding and reasonable alternative access to the right-of-way is available, equipment bridges will be removed as soon as possible after final cleanup.

Trenching: Trenching activities will begin promptly after grading is completed. If trenching of adjacent upland areas has been completed but will not be backfilled before the waterbody or wetland crossing is trenched, a trench plug will be left in place at the end of the waterbody or wetland crossing to prevent storm water runoff from entering the waterbody or wetland by way of the trench. During excavation, the top one-foot of wetland soil or streambed substrate will be segregated and stockpiled separate from the trench spoil. This segregated material will be utilized during restoration of the waterbody or wetland to enhance restoration with the native seedbank and substrate materials.

Any water that must be removed from the work area will be discharged through a dewatering structure. Discharge points will be located in an upland area, including the buffer, whenever possible. The discharge will be carefully monitored to prevent erosion and sedimentation in the waterbody or wetland, and in such a manner that no heavily silt-laden water flows into any waterbody.

A minimum of the top one (1) foot of topsoil will be conserved from over the trench in wetlands without standing water or saturated soil.

If standing water or saturated soils are present, low-ground-weight construction equipment, will be used or normal equipment will be operated on timber riprap, prefabricated equipment mats, or geotextile fabric overlain with gravel. Geotextile fabric used for this purpose must be strong enough to allow removal of all gravel and fabric from the wetland.

Spoil Pile Placement and Control: All spoil from waterbody crossings will be placed in the construction right-of-way at least 10 feet from the water's edge or in additional extra work area as described above. Sediment barriers will be used to prevent the flow of spoil into any waterbody.

Pipe Installation: For smaller crossings, the pipe string will be assembled outside the waterbody or wetland crossing and carried or floated into position, depending on site conditions. For larger crossings, pipe assembly will be conducted outside of the waterbody or wetland crossing except for those crossings that utilize the porta-dam crossing method. For all large porta-dam crossing methods, assembly will be conducted in the dry area behind the porta-dam. All welding and coating debris will be fully removed from the waterbody or wetland crossing prior to retuning flow to the waterbody. MVP will utilize saddle bags filled with clean pea gravel or sand for pipe weights within waterbody or wetland crossings to insure negative buoyancy.

Backfilling: Backfilling will begin promptly after pipe installation is completed. Permanent trench breakers will be installed in the banks of stream channels and at the ends of wetlands. In trout streams, the top 12 inches of backfill will be made with clean native stream substrate.

Final Grading: Final grading will begin promptly after backfilling is completed. If final grade is reached on any portion of the site, vegetation will be established to prevent erosion. Temporary seeding will be applied within 7 days if any portion of the site will remain dormant for more than 14 days to prevent erosion. Disturbed areas will be restored to pre-construction contours, and in wetlands, topsoil will be replaced preserving the native seed bank which will enable restoration with native plant species. Sediment barriers at the edge of the wetland or edge of the water will be repaired or replaced as necessary. Permanent ROW diversions (interceptor diversions) will be installed at the edge of the buffer area or base of the slope nearest the waterbody and wetland. All materials used to stabilize the equipment work area will be removed (e.g. timber riprap or timber mats). Permanent or temporary soil stabilization shall be applied to denuded areas within seven days after final grade is reached on any portion of the site.

If soil and weather conditions prevent final grade to be established (e.g. if the permit specified a winter construction window), a temporary approximate grade will be established. ESC measures will be restored or replaced as needed, and temporary stabilization will be applied.

Restoration: Restoration will begin immediately after final grade is established. Stream banks will be restored by vegetative stabilization (STD & SPEC 3.22) where site conditions warrant or by riprap (STD & SPEC 3.19) where banks slope are 3h:1v or steeper. Vegetative stabilization generally includes planting a perennial conservation seed mix from Table 3.32-B (see Appendix A). If grubbing has not been extensive, then native shrub and tree species are expected to sprout and regenerate naturally. Stream banks will be seeded prior to mulch application. A sediment barrier will be maintained at the edge of the water until revegetation of the streambank is successful.

Wetlands will be temporarily seeded in accordance with Typical Construction Detail MVP-ES11.4 (Appendix B) and mulched with clean straw (where required), then allowed to revegetate with native seedbank present in the segregated topsoil. A sediment barrier will be maintained around the restored area until revegetation is successful.

In wetlands where saturated conditions or standing water is present, topsoil segregation will be conducted to the extent practicable. Following installation of the pipeline, the trench will be backfilled using native wetland soils and restored to preexisting conditions. No soil or rock will be imported for use during backfilling of the trench. Annual ryegrass will be applied to wetland areas to temporarily stabilize the area while the native wetland seedbank reestablishes the area with native vegetation. No seeding should be conducted in areas of standing water. The riparian buffers will be restored using the procedures discussed above for upland areas.

For all affected forested wetlands, restoration activities will be conducted in accordance with the Project's approved permit conditions and mitigation requirements. If saplings are required to be planted within the temporary ROW areas, this will be conducted in accordance with Section 2.9.6 – Bare Root Seeding Sapling and Shrub Planting (see Appendix A – STD & SPEC: Plates 3.37-4, 3.38-8, and 3.38-9) unless otherwise specified by applicable permit conditions.

5.2 SPECIALIZED CROSSING PROCEDURES

MVP has considered specialized procedures for use during Project planning, permitting and implementation at waterbody and wetland crossings. A discussion of these construction procedures that may be implemented during construction is included in the following sections.

5.2.1 Horizontal Directional Drilling

Horizontal directional drilling (HDD) is a method that allows for trenchless construction across an area by pre-drilling a hole below the depth of a conventional pipeline lay and then pulling the pipeline through the pre-drilled borehole. Although HDD can be an appropriate method in some situations, MVP has evaluated this option and concluded that it is not practicable at any location along the MVP route. The length of pipeline that can be installed by HDD depends upon soil conditions and pipe diameters and is limited by available technology and equipment sizes. The HDD method also requires large staging areas on both sides of the crossing to accommodate the necessary equipment and materials. In addition, because it is necessary to prefabricate a section of pipe aboveground that is equal to the length of the HDD, and because existing surface features such as roads and railroads could restrict the length of the prefabricated section to less than that of the HDD, the HDD method may not be appropriate for every site condition encountered. Due to a relatively greater risk of inadvertent returns and increased environmental sensitivity, the use of HDD in karst areas was excluded from consideration. Due to design limitations inherent with the size of the pipe and the difficult terrain, often not allowing adequate pullback space, in conjunction with other material considerations, MVP determined through an alternatives analysis that the HDD method is not preferred for any location along the MVP route. Therefore, MVP does not plan to utilize HDD at any location along the proposed route, including in areas of karst terrain. If implementation of an HDD becomes necessary for reasons beyond MVP's control, an HDD contingency plan will be developed and geotechnical investigations will be conducted. Should this occur, MVP will conduct further consultation with VADEQ and other regulatory agencies.

5.2.2 Conventional Bore Method

Some waterbodies crossed by the Project are directly associated with or adjacent to roads or railroads. Where these roads or railroads are to be crossed using a horizontal boring machine, the waterbody will typically be included within the length of the bore. Some elevated or channelized waterbodies, such as irrigation ditches, may also be successfully bored, depending upon the groundwater level in the area. To complete a horizontal bore, two pits will be excavated, one on each side of the feature to be bored. A boring machine will be lowered into one pit, and a horizontal hole will be bored to a diameter equal to the diameter of the pipe (or casing, if required) at the depth of the pipeline installation. The pipeline section and/or casing will then be pushed through the bore to the opposite pit. If additional pipeline sections are required to span the length of the bore, they will be welded to the first section of the pipeline in the bore pit before being pushed through the bore (see Appendix B –MVP-51 Typical Waterbody Conventional Bore).

5.2.3 Flume Pipe Method

If the stream crossing is less than ten feet wide the flume pipe method may be used. The flume pipe method is typically used in combination with an equipment crossing and starts with the installation of the dam, pump, and flume, continuing with the trench excavation, the pipeline installation, backfilling of the trench and ending with the stabilization of the stream bank. This process will be completed as fast as practicable from flume installation to stabilization of the stream bank. The flume pipe crossing must be made operational prior to the start of construction in the stream. No material will be removed from the stream until the flume is in place. The flume is sandbagged at each end to direct the stream flow through the flume, and the outlet is protected with riprap to minimize scour. The pipeline trench can then be excavated (while dry), the pipe installed and backfilling completed with the flume pipe in place. Spoil piles will be kept a minimum of 10 feet from the water's edge and will be contained by sediment barriers. Trenching and backfilling must be completed and the disturbed stream banks must be stabilized with riprap or vegetation before the flumes for the pipeline and equipment crossings are removed (see Appendix A – STD & SPEC: 3.23 and STD & SPEC 3.25: Plate 3.25-3, respectively).

5.2.4 Cofferdam (Porta-dam) Method

This method may be used for crossing channels 10 feet or wider, and will be designed so as not to prevent the flow of the stream. A cofferdam will be constructed within the construction ROW (using cofferdam products, etc.), enclosing approximately 60% the streambed in a semi-circle (see Appendix A – STD & SPEC: Plate 3.25-4). The cofferdam should seal tightly to the streambed to minimize water from entering the construction area. Pumps will be needed to keep water out of excavations. All earth disturbance will occur in the dry area behind the cofferdam. The pipe will be installed and the disturbed area backfilled and stabilized. Sediment barriers at the waterline should be in good working order before the cofferdam is removed. Stabilization will be with either riprap or vegetation. The cofferdam is then set up from the opposite bank and extends far enough to include the tie-in point in mid-stream. The remainder of the pipe is installed and the tie-in weld is made. Clean up follows the same procedures described above.

5.2.5 Pump-Around (Dam and Pump) Method

The pump-around method is a “dry ditch” construction technique utilizing pumps and hoses to convey waterbody flow around the excavation area (see Appendix B - MVP-ES8). The following restrictions apply when using the pump-around method.

- Sandbag bulkheads or porta-dams shall be constructed above and below the area of excavation.
- Stand-by pump(s) and hose(s) must be on-site during the crossing.
- Pumps shall have secondary containment in accordance with the SPCC Plan.
- Downstream flow must be maintained throughout trenching, pipe laying and backfilling operations.
- Screening (intake hose) must meet the minimum specification per agency requirements.
- Dewater structure with energy dissipater shall be utilized to prevent scour and increased sedimentation.
- Filter bags can be used to maintain clean water.

5.3 AREAS OF SPECIAL CONCERN

MVP has identified areas of special concern that exist with the Project area. A discussion of these areas follows.

5.3.1 Steep Slope Areas

Slope gradients will be identified on the Project ESC plans in steep slope areas. Potential for erosion may be present in areas of steep slopes and increases as slope length increases. Additional erosion and sediment control measures may be necessary in these areas based upon field conditions at the time of construction. Refer to Table 10 for the slope ranges and erosion hazard.

Table 10. Erosion Hazard Ratings

Slope Gradient	Length of Slope	Erosion Hazard Rating
0-7%	< 300 feet	Low
7-15%	< 150 feet	Moderate
0-7%	> 300 feet	High
7-15%	> 150 feet	
≥15%	> 75 feet	

Additionally, steep slopes are defined differently for each of the six counties within the Project, detailed in Table 11 below.

County	Steep Slope Definition	Source	Notes
Craig	Not defined	N/A	No local definitions found
Giles	> 20%	Giles Co. 2012 Comp Plan	Revision adopted 2012; Natural Resources-Slope
Montgomery	> 25%	Montgomery Co. 2025 Comp Plan	Adopted 2004, revised 2011; Planning and Land Use Policies, PLU 1.2; also mentioned in Co. Code Sec 10-39(h)4
Roanoke	> 33%	Roanoke Co. Code	Sec. 8.1.3 – Definitions; Chapter 12 Stormwater Design Manual
Franklin	> 25%	Franklin Co. 2025 Comp Plan	Adopted 2007; also mentioned in Co. Code Sec 25-189(f)(4) in regards to required open space for residential cluster development
Pittsylvania	> 25%	Pittsylvania Co. 2010 Comp Plan	Chapter 2 -Natural and Cultural Environment

Construction activities within areas considered as steep slope conditions will be conducted in accordance with the BMPs presented in the Project's Landslide Mitigation Plan and MVP's steep slope typical details (see Appendices F and B, respectively).

5.3.2 Soils Properties

Soils mapping information for soils crossed by the Project will be provided on the Existing Conditions plan drawing set included as part of the ESC/SWM packages for each Project construction spread submitted to VADEQ for review. The soil erodibility factor (K) denotes the sensitivity of different soils to the forces of erosion. Areas that have a high erodibility rating will be noted as a critical area on the Project's Existing Conditions plans. Additional erosion and sediment control measures may be necessary in these areas based upon field conditions at the time of construction. Refer to Table 12 for the erodibility factors.

Table 12. Erodibility Factor

Erodibility Factor (K)	Erodibility Rating
≤ 0.23	Low
0.23 - 0.36	Moderate
≥ 0.36	High

The soil reactivity (pH) is a major factor in the establishment of vegetation and permanent stabilization of the disturbed areas. The surface soil pH and associated lime application rate are specified in Section 2.9.2 (Permanent Seeding) and will be noted on the Project ESC plans. Additional information regarding acid forming materials (soils/rock) are detailed below in Section 5.3.4 and under Appendix G.

Sensitive soils such as agricultural soils (prime farmlands or farmland soils of statewide importance), wetland soils and topsoil in all areas of the Project will be segregated during implementation of the Project. During preparation of the LOD and trench excavation, topsoil will be segregated and stockpiled separately from excavated subsoil. Topsoil will be temporarily stabilized with mulch and seeded (as needed) in accordance with typical construction detail MVP-ES45 (Appendix B). Following installation of the pipeline and backfilling of the trench with subsoil, MVP will disc the subsoil in accordance with Section 2.8.3 (Soil Compaction Mitigation) to enhance revegetation of the ROW. During backfill and final grading, topsoil and subsoil will be returned to their original profile. Permanent slope breakers will be installed in accordance with typical construction detail MVP-17 and MVP-18 (Appendix B). Once the topsoil has been returned to its original profile, additional soil compaction mitigation will be conducted over the full LOD followed by permanent seed and mulch installation. No impacts to sensitive soils are anticipated.

While there are no glacially derived soils in Virginia and lacustrine derived soils are minimal, none were identified in the surficial geologic review of the pipeline corridor. MVP has identified soils along the pipeline with similar characteristics that may result in high silt content, high water tables, poor drainage characteristics and that are sometimes hydric. In addition, soils that contain fragipan may restrict infiltration and form discontinuous perched water tables. These soil conditions will be addressed in the ESC/SWM plans prepared for each Project construction spread.

5.3.3 Landslide Prone Areas

Many portions of the Project route are located in landslide susceptible areas. Landslides in the Project area occur primarily in weathered bedrock or colluvial soil and within old landslide debris located on steep slopes. MVP developed the Landslide Mitigation Plan (LMP) to address areas of concern identified prior to construction and present mitigation strategies that may be implemented at other areas during construction. The LMP areas were identified by reviewing available historic aerial photographs, soils data, and topographic maps. Construction operations will be staffed with geotechnical personnel who will identify additional areas in which the LMP mitigation measures will be implemented (and additional mitigation measures, as necessary). A copy of the LMP is located in Appendix F.

5.3.4 Acidic Soils Areas

Areas of acidic soils are known to occur within portions of the Project area in Virginia. In order to identify and mitigate potential impacts should these soils be encountered, MVP developed an Acid Forming Materials Identification and Testing Work (AFM) Plan for implementation during Project activities. The AFM Plan is provided under Appendix G.

5.3.5 Karst Areas

Portions of the Project route are located in areas containing karst and features within ¼-mile (generally termed the secondary karst buffer) and within 150 feet (corresponding to the construction easement) of the proposed route were identified through desktop review of public and proprietary data. Field confirmation was completed on properties where landowners allowed access in order to verify the desktop review results and identify previously unmapped karst features.

MVP prepared a Karst Hazards Assessment that described construction methods to mitigate or eliminate potential impacts (see Appendix H) for karst features that cannot be avoided through minor variations within the construction easement. Mountain Valley will deploy Karst Specialist inspection teams during construction to monitor karst features and provide recommendations for avoidance or mitigation. Locations of all karst features identified during Project investigations will be included on the ESC and SWM plan drawings submitted to VADEQ for each construction spread.

5.3.6 Waterbody And Wetland Areas

During planning, routing and design phases of the Project, MVP conducted desktop analysis and field delineations to identify waterbody and wetland areas within the Project study corridor. Identified waterbody resources include: streams (unnamed as well as named tributaries), springs/seeps, water supply wells, ponds and other surface impoundments as well as wetlands. Desktop review as well as field verification was utilized to identify private ponds located within 1,500 feet downslope of the Project LOD. All waterbody and wetland resources identified within the Project LOD and areas immediately adjacent to the LOD (including temporary workspaces, ATWS, contractor yards, access roads, etc.) will be depicted on the Project ESC and SWM plan drawings. All waterbody and wetland areas disturbed by Project construction activities will be permitted under the US Army Corps of Engineers / VADEQ NWP12-Joint Permit Application process.

Project ESC plans are designed with appropriate BMPs to protect all crossed and adjacent resources including waterbody and wetland areas from potential sedimentation as result of Project construction activities.

5.3.7 Other Environmentally Sensitive Areas

During routing, field investigations and design of the Project, MVP identified other environmentally sensitive areas through portions of the Project. Other environmentally sensitive areas include but not limited to the following: threatened and endangered species areas, cultural significant areas (cemeteries, historical or archaeological resources), or areas identified by landowners as being of concern. Since environmentally sensitive areas are treated as confidential for the protection of those resources, specific identification of these resources are not provided. MVP will comply with all mitigation requirements imposed by the relevant federal or state agencies with authority for these resources – such as any requirements developed through the Endangered Species Act and National Historic Preservation Act consultation processes – and will utilize appropriate BMPs deployed during construction as an additional level of protection for these areas.

5.3.8 Water Supply Sources

MVP developed a Water Resources Identification and Testing Plan which outlines procedures for identification and testing of both private and public water supply. MVP identified public water supply sources within three miles downstream of the Project as well as private water supply resources (springs/wells) within 150 feet of the Project LOD in non-karst areas and within 500 feet of the LOD in karst areas. MVP conducted desktop reviews supplemented by field verification (where access has been granted) as well as in discussions with property owners to identify locations of private water supplies. Landowners and public water suppliers with water supply resources located within the parameters listed

above are being contacted regarding access to request permission for MVP to complete baseline testing prior to Project construction activities. As noted in Section 5.3.6, these resources will be identified on the ESC Plans.

5.3.9 Subsurface Drainage Areas

Project activities in Virginia are likely to encounter subsurface drainage features during construction activities. These include drain tiles and irrigation lines. Locations of these resources are identified during routing, landowner discussions during ROW acquisition and when exposed during construction implementation of the Project. Locations will be identified during pre-construction stakeout (when known). All drain tiles including septic (sewer) drain field lines, drain tiles and irrigation lines damaged or disturbed during construction will be repaired and returned to their original condition and function. Any disruption to service and alternative mitigation measures will be coordinated with the affected landowner.

During construction of the Project, MVP will install permanent trench breaker drains to facilitate removal of accumulated groundwater from the pipeline trench. Permanent trench breaker drains will be installed and maintained in accordance with typical construction details MVP-20 Typical Trench Breaker and MVP-35 Trench Breaker Daylight Drain (Appendix B). In addition, MVP will install cutoff drains to convey subsurface flow/groundwater through the permanent ROW in areas of side-hill construction per typical construction details MVP-36 through MVP-38 and MVP-43 and MVP-44 (Appendix B), respectively. Appropriate outlet protection will be installed as needed. All trench breaker drains and cut-off drain installations will be noted on the ESC/SWM drawings following installation.

5.3.10 Drainage Features

Non-jurisdictional drainage features such as roadside ditches, swales, diversion ditches and diversion terraces will be crossed during construction activities. During construction, MVP will maintain service through these drainage features during Project construction activities. This will include installation of temporary culverts or pump around contingency if water is present at time of crossing installation. Following installation of the Project, all non-jurisdictional drainage features will be returned to pre-construction contours and conditions.

5.3.11 Utility Line Crossings

Portions of the Project route will cross existing public and private utility corridors. Many of the locations were identified during field routing activities and during property owner negotiations. Locations of these utilities are not depicted on the Project ECS plans to minimize potential for misidentification of the utility location. In order to accurately depict utility locations prior to commencement of Project earth disturbing activities, Mountain Valley's contractors will notify Miss Utility of Virginia at www/va811.com or 1-800-552-7001 to have existing utility line locations delineated. For distribution and service lines that are not covered by the VA811 notice, MVP will coordinate with the property owner to identify approximate line locations. In addition, MVP contractors will utilize appropriate line locating equipment to identify locations of buried service lines (gas/water/electric) that are not covered by the VA811 system. Appropriate signage will be installed to identify locations of existing utilities prior to commencing construction.

Aboveground utility lines including electric (distribution and transmission), telephone, tv cable, or other will be appropriately delineated. Aboveground utility locations are typically identified using a combination of signage, dedicated spotter and physical barriers placed in proximity to the utility line. Examples include use of ground signage and hazard or car lot ribbon tied to non-conductive goal posts placed on either side of the LOD. Locations of overhead utility crossings that require identification are determined during pre-construction stakeout of the LOD and appropriate marking installed at that time.

6.0 MAINTENANCE OF PERMANENT RIGHT-OF-WAY

6.1 MONITORING AND MAINTENANCE

Follow-up inspections of all disturbed areas after the first and second growing seasons will be conducted to determine the success of revegetation. In general, revegetation cannot be determined to be fully established until it has been maintained for one full year after planting. Permanent vegetation shall not be considered established until a ground cover is achieved that is uniform, mature enough to survive and will inhibit erosion. If vegetative cover and density is not acceptable or there are excessive noxious weeds after two full growing seasons, a professional agronomist will determine the need for additional restoration measures (such as fertilizing or reseeding). When necessary, the measures recommended by the agronomist will be implemented. In agricultural areas, revegetation shall be considered successful when upon visual survey, crop growth and vigor are similar to adjacent undisturbed portions of the same field, unless the easement agreement specifies otherwise.

Drainage and irrigation systems will be monitored and problems resulting from pipeline construction in active agricultural areas will be corrected. Trench breaker drains and cut-off drains installed within the pipeline trench will be monitored and maintained functional during operation of the Project. Outlet locations will be field identified via appropriate measures (i.e. signage, flagging, etc.).

Normally, the entire permanent ROW will be maintained. Maintaining this width is necessary for the following reasons:

- Access for routine pipeline patrols and corrosion surveys.
- Access in the event that emergency repairs of the pipeline are needed.
- Visibility during aerial patrols. The full width of the ROW will be kept clear where overhanging foliage decreases visibility.

Vegetation maintenance adjacent to waterbodies will be limited to allow a riparian strip at least 25-feet wide, as measured from the waterbody's ordinary high water mark, to permanently revegetate with native plant species across the entire ROW. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide will be mowed annually and may be maintained in an herbaceous state. In addition, trees that are located within 15 feet of the pipeline and are greater than 15 feet in height may be cut and removed from the ROW.

The success of wetland revegetation will be monitored in accordance with the FERC PLAN AND PROCEDURES and any other requirements from the U.S. Army Corps of Engineers.

Shrubs or other vegetation used to screen long sections of the ROW from public view will be properly maintained. Efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, will continue throughout the life of the Project. Signs, gates, and vehicle trails will be maintained as necessary.

6.1.1 Long Term Responsibility and Maintenance

Upon completion of any Project MVP will provide the VADEQ with a document with the following information:

- The responsible parties that will provide for the long term maintenance of the Project;
- Maintenance Agreements, with DEQ review and approval, for any applicable structural BMPs; and
- MVP will comply with Table 1 – Forest & Open Space from the Virginia Runoff Reduction Method Compliance Spreadsheet User's Guide & Documentation (April 2016), in regards to mowing and general maintenance.

6.2 MAINTENANCE TECHNIQUES

6.2.1 Mowing

ROW will be maintained in compliance with Table 1 – Forest & Open Space from the Virginia Runoff Reduction Method Compliance Spreadsheet User's Guide & Documentation (April 2016), in regards to mowing and general maintenance. However, to facilitate periodic corrosion and leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be maintained annually in an herbaceous state (brush hogged no more than annually). Full ROW clearing is to occur no more frequently than once every 3 years. In no case shall routine vegetation maintenance clearing occur between April 15 and August 1 of any year.

In wetland areas, no routine vegetation mowing or clearing will be conducted over the full width of the permanent ROW in wetlands. In order to facilitate periodic inspections, a corridor centered over the pipeline and up to 10 feet wide may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In addition, trees within 15 feet of the pipeline with roots that could compromise the integrity of the pipeline coating may be selectively cut and removed from the permanent ROW. Native herbaceous and woody shrub species will be allowed to reestablish in wetland ROW as noted above.

In order to control spread of exotic, noxious and invasive plant species during operation of the Project, MVP developed and will implement the MVP Exotic and Invasive Species Control (E&ISC) Plan (dated July 2016). The E&ISC Plan is provided in Appendix I. Herbicides or pesticides will not be used in or within 100 feet of a wetland, except as allowed by the appropriate federal or state agency.

6.2.2 Wetland Right-of-Ways

Maintenance of permanent ROW in wetlands will be performed in compliance with all applicable wetland permit conditions as well as Section 2.9.7 – After Restoration of these Standards and Specifications, and FERC's PLAN AND PROCEDURES. There will be no herbicides or pesticides applied in or within 100 feet of a wetland boundary, except as allowed by the appropriate federal or state agency.

6.3 EROSION CONTROL

Erosion issues identified on the pipeline ROW during facility operations will be reported to the local MVP Operations Supervisor and addressed accordingly. These reports may originate from landowners, agencies, or MVP personnel performing routine patrols. Corrective measures will be performed as needed.

6.3.1 Routine Pipeline Patrol

Routine pipeline ROW inspections will be performed to ensure that MVP can maintain continuous, reliable service to its customers. During these inspections, all permanent ESC devices installed during construction will be inspected to ensure that they are functioning properly. In addition, attention should be given to:

- Fallen timber or other perils to the pipeline;
- Signs of ground settlement/movement that might endanger the pipeline or adjacent lands;
- Signs of encroachment on the pipeline or pipeline ROW;
- Missing or damaged line markers or fence enclosures;
- Emergency contact information is posted on all enclosures and line markers verification;
- Areas of erosion and washouts across the ROW;
- Permanent ROW diversions (Slope Breakers);
- Waterbody crossings; and

- Any other conditions that could imperil the pipeline or conflict with MVP's rights under existing ROW agreements.

The local MVP Operations Supervisor will be notified of any conditions that need attention. Corrective measures taken will be documented and performed on a priority or as needed basis.

6.4 REPORTING

The project administrator shall maintain records that identify by milepost:

1. Method of application, application rate, and type of fertilizer, pH modifying agent, seed, and mulch used;
2. Acreage treated;
3. Dates of backfilling and seeding; and
4. Names of landowners requesting special seeding treatment and a description of the follow-up actions.
5. Weekly e-reporting to the applicable VADEQ regional office.

7.0 VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS (9VAC25-840-40) MINIMUM STANDARDS

An erosion and sediment control program adopted by an operator must be consistent with the following criteria, techniques and methods:

Minimum Standard 1 – Permanent or temporary soil stabilization shall be applied to denuded areas within seven days after final grade is reached on any portion of the site. Temporary soil stabilization shall be applied within seven days to denuded areas that may not be at final grade but will remain dormant for longer than 14 days. Permanent stabilization shall be applied to areas that are to be left dormant for more than one year.

Minimum Standard 2 – During construction of the project, soil stockpiles and borrow areas shall be stabilized or protected with sediment trapping measures. The applicant is responsible for the temporary protection and permanent stabilization of all soil stockpiles on site as well as borrow areas and soil intentionally transported from the project site.

Minimum Standard 3 – A permanent vegetative cover shall be established on denuded areas not otherwise permanently stabilized. Permanent vegetation shall not be considered established until a ground cover is achieved that is uniform, mature enough to survive and will inhibit erosion.

Minimum Standard 4 – Sediment basins and traps, perimeter dikes, sediment barriers and other measures intended to trap sediment shall be constructed as a first step in any land-disturbing activity and shall be made functional before upslope land disturbance takes place.

Minimum Standard 5 – Stabilization measures shall be applied to earthen structures such as dams, dikes and diversions immediately after installation.

Minimum Standard 6 – Sediment traps and sediment basins shall be designed and constructed based upon the total drainage area to be served by the trap or basin.

- A. The minimum storage capacity of a sediment trap shall be 134 cubic yards per acre of drainage area and the trap shall only control drainage areas less than three acres.
- B. Surface runoff from disturbed areas that is comprised of flow from drainage areas greater than or equal to three acres shall be controlled by a sediment basin. The minimum storage capacity of a sediment basin shall be 134 cubic yards per acre of drainage area. The outfall system shall, at a

minimum, maintain the structural integrity of the basin during a 25-year storm of 24-hour duration. Runoff coefficients used in runoff calculations shall correspond to a bare earth condition or those conditions expected to exist while the sediment basin is utilized.

Minimum Standard 7 – Cut and fill slopes shall be designed and constructed in a manner that will minimize erosion. Slopes that are found to be eroding excessively within one year of permanent stabilization shall be provided with additional slope stabilizing measures until the problem is corrected.

Minimum Standard 8 – Concentrated runoff shall not flow down cut or fill slopes unless contained within an adequate temporary or permanent channel, flume or slope drain structure.

Minimum Standard 9 – Whenever water seeps from a slope face, adequate drainage or other protection shall be provided.

Minimum Standard 10 – All storm sewer inlets that are made operable during construction shall be protected so that sediment-laden water cannot enter the conveyance system without first being filtered or otherwise treated to remove sediment.

Minimum Standard 11 – Before newly constructed stormwater conveyance channels or pipes are made operational, adequate outlet protection and any required temporary or permanent channel lining shall be installed in both the conveyance channel and receiving channel.

Minimum Standard 12 – When work in a live watercourse is preformed, cautions shall be taken to minimize encroachment, control sediment transport and stabilize the work area to the greatest extent possible during construction. Non-erodible material shall be used in the construction of causeways and cofferdams. Earthen fill may be used for these structures if armored by non-erodible cover materials.

Minimum Standard 13 – When a live water course must be crossed by construction vehicles more than twice in any six-month period, a temporary vehicular stream crossing constructed of non-erodible material shall be provided.

Minimum Standard 14 – All applicable federal, state and local regulations pertaining to working in or crossing live watercourses shall be met.

Minimum Standard 15 – The bed and banks of a watercourse shall be stabilized immediately after work in the watercourse is completed.

Minimum Standard 16 – Underground utility lines shall be installed in accordance with the following standards in addition to other applicable criteria.

- A. No more than 500 linear feet of trench may be opened at one time. NOTE: MVP has requested a variance with regard to Minimum Standard 16-A.
- B. Excavated material shall be placed on the uphill side of trenches. NOTE: MVP has requested a variance with regard to Minimum Standard 16-B.
- C. Effluent from dewatering devices shall be filtered or passed through an approved sediment trapping device, or both and discharged in a manner that does not adversely affect flowing streams or offsite property.
- D. Material used for backfilling trenches shall be properly compacted in order to minimize erosion and promote stabilization.
- E. Restabilization shall be accomplished in accordance with these regulations.
- F. Applicable safety regulations shall be complied with.

Minimum Standard 17 – Where construction vehicle access routes intersect paved or public roads, provisions shall be made to minimize the transport of sediment by vehicular tracking onto the paved surface.

Where sediment is transported onto a paved or public road surface, the road surface shall be cleaned thoroughly at the end of each day. Sediment shall be moved from the roads by shoveling or sweeping and transported to a sediment control disposal area. Street washing shall be allowed only after sediment has been removed in this manner. This provision shall apply to individual development lots as well as to larger land-disturbing activities.

Minimum Standard 18 – All temporary erosion and sediment control measures shall be removed within 30 days after final site stabilization or after the temporary measures are no longer needed, unless otherwise authorized by the VESCP authority. Trapped sediment and the disturbed soil areas resulting from the disposition of temporary measures shall be permanently stabilized to prevent further erosion and sedimentation.

Minimum Standard 19 – Properties and waterways downstream from development sites shall be protected from sediment deposition, erosion and damage due to increases in volume, velocity and peak flow rate of stormwater runoff for the stated frequency storm of 24-hour duration in accordance with the following standards and criteria. Stream restoration and relocation project that incorporate natural channel design concepts are not man-made channels and shall be exempt from any flow rate capacity and velocity requirements for natural or man-made channels:

- A. Concentrated stormwater runoff leaving a development site shall be discharged directly into an adequate natural or man-made receiving channel, pipe or storm sewer system. For those sites where runoff is discharged into a pipe or pipe system, downstream stability analyses at the outfall of the pipe or pipe system shall be performed.
- B. Adequacy of all channels and pipes shall be verified in the following manner:
 - 1. The applicant shall demonstrate that the total drainage area to the point of analyses within the channel is one hundred times greater than the contributing drainage area of the project in question; or
 - 2. (a) Natural channels shall be analyzed by the use of a 2-year storm to verify that stormwater will not overtop channel banks nor cause erosion of channel bed or banks
 - (b) All previously constructed man-made channels shall be analyzed by the use of a 10-year storm to verify that stormwater will not overtop its banks and by the use of a 2-year storm to demonstrate that stormwater will not cause erosion of channel bed or banks; and
 - (c) Pipes and storm sewer systems shall be analyzed by the use of a 10-year storm to verify that stormwater will be contained within the pipe or system.
- C. If existing natural receiving channels or previously constructed man-made channels or pipes are not adequate, the applicant shall:
 - (1) Improve the channels to a condition where a 10-year storm will not overtop the banks and a 2-year storm will not cause erosion to the channel, the bed, or the banks; or
 - (2) Improve the pipe or pipe system to a condition where the 10-year storm is contained within the appurtenances;
 - (3) Develop a site design that will not cause the pre-development peak runoff rate from a 2-year storm to increase when runoff outfalls into a natural channel or will not cause the pre-development peak runoff rate from a 10-year storm to increase when runoff outfalls into a man-made channel; or
 - (4) Provide a combination of channel improvement, stormwater detention or other measures which is satisfactory to the VESCP authority to prevent downstream erosion.

- D. The applicant shall provide evidence of permission to make the improvements.
- E. All hydrologic analyses shall be based on the existing watershed characteristics and the ultimate development of the subject project.
- F. If the applicant chooses an option that includes stormwater detention, the applicant shall obtain approval from the VESCP of a plan for maintenance of the detention facilities. The plan shall set forth the maintenance requirements of the facility and the person responsible for performing the maintenance.
- G. Outfall from a detention facility shall be discharged to a receiving channel, and energy dissipaters shall be placed at the outfall of all detention facilities as necessary to provide a stabilized transition from the facility to the receiving channel.
- H. All on-site channels must be verified to be adequate.
- I. Increased volumes of sheet flows that may cause erosion or sedimentation on adjacent property shall be diverted to a stable outlet, adequate channel, pipe or pipe system or to a detention facility.
- J. In applying these SWM criteria, individual lots or parcels in a residential, commercial or industrial development shall not be considered to be separate development projects. Instead, the development, as a whole, shall be considered to be a single development project. Hydrologic parameters that reflect the ultimate development condition shall be used in all engineering calculations.
- K. All measures used to protect properties and waterways shall be employed in a manner which minimizes impacts on the physical, chemical and biological integrity of rivers, streams and other waters of the state.
- L. Any plan approved prior to July 1, 2014, that provides for stormwater management that addresses any flow rate capacity and velocity requirements for natural or man-made channels shall satisfy the flow rate capacity and velocity requirements for natural or man-made channels if the practices are designed to (i) detain the water quality volume and to release it over 48 hours; (ii) detain and release over a 24-hour period the expected rainfall resulting from the one year, 24-hour storm; and (iii) reduce the allowable peak flow rate resulting from the 1.5, 2, and 10-year, 24-hour storms to a level that is less than or equal to the peak flow rate from the site assuming it was in a good forested condition, achieved through multiplication of the forested peak flow rate by a reduction factor that is equal to the runoff volume from the site when it was in a good forested condition divided by the runoff volume from the site in its proposed condition, and shall be exempt from any flow rate capacity and velocity requirements for natural or man-made channels as defined in any regulations promulgated pursuant to § 62.1-44.15:54 or 62.1-44.15:65 of the Act.
- M. For plans approved on and after July 1, 2014, the flow rate capacity and velocity requirements of § 62.1-44.15:52 A of the Act and this subsection shall be satisfied by compliance with water quantity requirements in the Stormwater Management Act (§ 62.1-44.15:24 et seq. of the Code of Virginia) and attendant regulations, unless such land-disturbing activities (i) are in accordance with provisions for time limits on applicability of approved design criteria in 9VAC25-870-47 or grandfathering in 9VAC25-870-48 of the Virginia Stormwater Management Program (VSMP) Regulation, in which case the flow rate capacity and velocity requirements of § 62.1-44.15:52 A of the Act shall apply, or (ii) are exempt pursuant to § 62.1-44.15:34 C 7 of the Act.
- N. Compliance with the water quantity minimum standards set out in 9VAC25-870-66 of the Virginia Stormwater Management Program (VSMP) Regulation shall be deemed to satisfy the requirements of this subdivision 19. *Note: The Energy Balance Method (EBM) is included within the water quantity minimum standards (9VAC25-870-66) as section 9VAC25-870-66.B.3. MVP will meet all*

EBM requirements per Section 2.11.5 of these Standards & Specifications. Satisfying EBM will satisfy water quantity minimum standards and, therefore, satisfy subdivision MS-19.

In addition to the minimum erosion and sedimentation control standards and specifications, MVP is required to complete and submit SWM calculations regarding water quantity per Section 9VAC25-870-66 and water quality per Section 9VAC25-870-65 and -96 of the Virginia Stormwater Management Program Regulation. The calculations will be provided under separate cover along with the design elements required to meet stormwater quantity and quality requirements which will be depicted on the Project ESC plans.

7.1 TABLE OF VESCH STANDARDS AND SPECIFICATIONS

(From Chapter 3 of Virginia Erosion and Sediment Control Handbook)

Control Measure	Ref.	Purpose
Safety Fence	3.01	To prohibit undesirable uses of erosion control measures.
Temporary Stone Construction Road	3.02	To reduce the soil transported onto public roads and other paved areas.
Construction Road Stabilization	3.03	To reduce erosion caused by vehicles during wet weather.
Straw Bale Barrier	3.04	To intercept and detain sediment and decrease flow velocities from limited sized drainage areas temporarily (Max effective life = 3 months).
Silt Fence	3.05	To intercept and detain sediment and decrease flow velocities from limited sized drainage areas temporarily (Max effective life = 6 months).
Brush Barrier	3.06	To intercept and detain sediment and decrease flow velocities from limited sized drainage areas temporarily.
Storm Drain Inlet Protection	3.07	To trap sediment around drop inlets or curb inlet structures from limited sized drainage area (less than one acre).
Culvert Inlet Protection	3.08	To trap sediment at the inlet to storm sewer culverts.
Temporary Diversion Dike	3.09	To divert sediment laden runoff to a sediment trapping structure (Max effective life =18 months).
Temporary Fill Diversion	3.10	To divert runoff away from the unprotected fill slope to a stabilized outlet or sediment trapping structure (Max effective life = 7 days).
Temporary Right-of-way Diversion	3.11	To shorten the flow length within the disturbed strip of right-of-way and divert the runoff to stabilized outlet.
Diversion	3.12	To reduce slope length and intercept and divert stormwater runoff to stabilized outlet at non-erosive velocities by constructing a permanent channel.
Temporary Sediment Trap	3.13	To detain sediment-laden runoff from small disturbed areas for enough time to allow most of the suspended solids to settle out in a small ponding area.

Control Measure	Ref.	Purpose
Temporary Sediment Basin	3.14	To detain sediment-laden runoff from drainage areas 3 acres or greater for enough time to allow most of the suspended solids to settle out in a dam with a controlled stormwater release structure.
Temporary Slope Drain	3.15	To conduct concentrated runoff safely from the top to the bottom of a disturbed slope without causing erosion on or below the slope by installing flexible tubing before permanent drainage structure.
Paved Flume	3.16	To conduct concentrated runoff safely from the top to the bottom of a disturbed slope without causing erosion on or below the slope by constructing a permanent concrete lined channel.
Stormwater Conveyance Channel	3.17	A permanent channel designed to carry concentrated flows without erosion.
Outlet Protection	3.18	To reduce erosion and under-cutting from scouring at outlets and to reduce flow velocities before stormwater enters receiving channels below these outlets.
Riprap	3.19	To prevent erosion wherever soil conditions, water turbulence and velocity, expected vegetative cover, etc., are such that soil may erode under design flow conditions.
Rock Check Dams	3.20	To reduce the velocity of concentrated flows, reducing erosion of the swale or ditch by constructing small temporary stone dams.
Level Spreader	3.21	To convert concentrated, sediment-free runoff to sheet flow and release it onto areas of undisturbed soil that is stabilized by existing vegetation.
Vegetative Streambank Stabilization	3.22	To protect the banks from erosion by establishing appropriate vegetation.
Structural Streambank Stabilization	3.23	To protect the banks from erosion with permanent structural measures.
Temporary Vehicular Stream Crossing	3.24	To provide vehicular access to construction activities on either side of the stream while keeping the sediment out of the stream and preventing damage to the channel bed and banks.
Utility Stream Crossing	3.25	To prevent sediment from entering affected watercourse and minimize the amount of disturbance within the stream itself.
Dewatering Structure	3.26	To establish a temporary settling and filtering device for water which is discharged from dewatering activities.
Turbidity Curtain	3.27	To provide sedimentation protection for a watercourse from upslope land disturbance or from dredging or filling

Control Measure	Ref.	Purpose
		within the watercourse or to minimize sediment transport from a disturbed area adjacent to or within a body of water
Subsurface Drain	3.28	To intercept and convey groundwater by installing a perforated conduit beneath the ground. To prevent sloping soils from becoming excessively wet. To improve the quality of the vegetative growth medium in excessively wet areas.
Surface Roughing	3.29	To reduce runoff velocity, to provide sediment trapping and to increase infiltration to facilitate vegetation establishment on exposed slopes.
Topsoiling	3.30	To provide a suitable growth medium for vegetation used to stabilize disturbed areas by preserving and using the topsoil.
Temporary Seeding	3.31	To establish temporary on vegetative cover on disturbed areas that will not be brought to final grade for periods of 14 days to one year by seeding permanently.
Permanent Seeding	3.32	To establish perennial vegetative cover by planting seed on rough-grade areas that will not be brought to final grade for a year or more or where permanent vegetative cover is needed on final-graded areas.
Sodding	3.33	To provide immediate protection against erosion by establishing permanent grass stands with sod in grassed swales and waterways or in areas where an immediate aesthetic effect is desirable.
Bermuda grass and Zoysia grass Establishment	3.34	To stabilize final-graded areas where establishment by sod is not preferred.
Mulching	3.35	To prevent erosion and reduce overland flow velocities by applying plant residues or other suitable materials to disturbed surfaces.
Soil Stabilization Blankets and Matting	3.36	To prevent erosion by installing a protective blanket (Treatment 1) or a soil stabilization mat (Treatment 2) on a prepared planting of a steep slope, channel or shoreline.
Trees, Shrubs, Vines, and Ground Covers	3.37	To stabilize disturbed areas by planting trees, shrubs, vines, and ground covers where turf is not preferred.
Tree Preservation and Protection	3.38	To ensure the survival of desirable trees where they will be effective for erosion and sediment control and provide other environmental and aesthetic benefits.
Dust Control	3.39	To prevent soil loss and reduce the presence of potentially harmful airborne substance by reducing surface and air movement of dust during land disturbances and construction activities.

LIST OF STDS & SPECS

Virginia E&S Control Handbook Standard Details

By referencing these VESCH Plates, Drawings, and Details, these Standards and Specifications shall be in compliance with all other applicable control measure information as laid out in the VESCH.

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