

STORMWATER MANAGEMENT NARRATIVE

1. PROJECT DESCRIPTION:

THE MOUNTAIN VALLEY PIPELINE PROJECT (PROJECT) WILL EXTEND FROM THE EXISTING EQUITRANS, L.P TRANSMISSION SYSTEM AND OTHER NATURAL GAS FACILITIES IN WETZEL COUNTY, WEST VIRGINIA TO TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC'S ZONE 5 COMPRESSOR STATION 165 IN PITTSYLVANIA COUNTY, VIRGINIA. IN ADDITION, THE PROJECT WILL INCLUDE THREE COMPRESSOR STATIONS CURRENTLY PLANNED ALONG THE ROUTE, AS WELL AS MEASUREMENT, REGULATION, AND OTHER ANCILLARY FACILITIES REQUIRED FOR THE SAFE AND RELIABLE OPERATION OF THE PIPELINE.

SPREAD 10 CONSISTS OF APPROXIMATELY 28.4 MILES OF 42" NATURAL GAS PIPELINE, CONSTRUCTED WITHIN MONTGOMERY, ROANOKE, AND FRANKLIN COUNTIES. THE SPREAD STARTS JUST SOUTH OF U.S. 11 (LEE HIGHWAY) AND ENDS JUST EAST OF STATE ROUTE 701 (FOGGY RIDGE RD). ACCESS TO THE PIPELINE WILL BE PROVIDED BY EXISTING ROADS, FOR BOTH PERMANENT AND TEMPORARY ACCESS, AS WELL AS XXX PERMANENT AND XXX TEMPORARY GRAVEL ACCESS ROADS WHICH WILL BE CONSTRUCTED. DISTURBED LAND WILL BE RETURNED TO APPROXIMATE PRE-EXISTING CONTOURS.

THE CONSTRUCTION LIMITS OF DISTURBANCE (LOD) WILL BE 125 FEET WIDE, EXCEPT IN AREAS OF WETLAND CROSSINGS AND 50 FEET FROM STREAM CROSSINGS (IN THESE AREAS, THE LOD WILL REDUCE FROM 125 FEET TO 75 FEET), THE TOTAL SPREAD 10 LOD AREA IS 505.4 ACRES. THE PERMANENT RIGHT-OF-WAY (ROW) WILL BE 50 FEET WIDE. THE PERMANENT ROW MAY SHIFT WITHIN THE OVERALL 125-FOOT LOD CORRIDOR AS A RESULT OF FIELD CONDITIONS ENCOUNTERED DURING CONSTRUCTION BUT WILL REMAIN WITHIN THE LOD CORRIDOR SHOWN ON THE PLAN SHEETS. THE PERMANENT ROW WILL NOT MOVE BEYOND THE TEMPORARY LOD DEPICTED ON THE PLAN SHEETS UNLESS PRIOR APPROVAL IS RECEIVED FROM THE AUTHORIZING AGENCIES (DEQ/FERC). ALL STORMWATER BMPS DESIGNED FOR THE ORIGINAL ROW ALIGNMENT WILL BE IMPLEMENTED IN ACCORDANCE WITH THE APPROVED ROW ALIGNMENT.

2. PROPOSED DEVELOPMENT AND SITE RESTORATION

A. TYPICAL PIPELINE CORRIDOR LAND USE

THE TYPICAL 125-FOOT WIDE PIPELINE CONSTRUCTION CORRIDOR WITHIN THE SITE AREA WILL BE RESTORED PER THE POST-CONSTRUCTION CONDITIONS LISTED BELOW. REFER TO THE PROJECT SPECIFIC STANDARDS AND SPECIFICATIONS FOR VIRGINIA TYPICAL PIPELINE CORRIDOR FIGURE (APPENDIX E).

- a. 75-FOOT TEMPORARY CONSTRUCTION ROW WILL BE RESTORED TO PRE-DEVELOPMENT CONDITIONS.
- i. 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).
- ii. IF AGRICULTURAL LAND, POST-DEVELOPMENT CONDITION WILL RETURN THE TEMPORARY ROW TO AGRICULTURAL USE AND WILL BE MODELED AS SUCH IN THE STORMWATER CALCULATIONS.
- iii. IF PRE-DEVELOPMENT CONDITIONS INCLUDE ANY IMPERVIOUS COVER, SUCH AS ASPHALT OR GRAVEL ACCESS ROADS, THESE IMPERVIOUS SURFACES WILL REMAIN IN THE POST-DEVELOPMENT CONDITION.
- iv. 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.

- b. 50-FOOT PERMANENT ROW WILL BE SEEDED AND RESTORED TO MEADOW CONDITIONS IF THE PRE-DEVELOPMENT LAND USE IS NOT AGRICULTURAL. IF AGRICULTURAL LAND, THE POST-DEVELOPMENT CONDITION WILL RETURN TO AGRICULTURAL USE. FOR AREAS WITHIN THE 50-FT PERMANENT ROW THAT WILL BE SEEDED AND RESTORED TO MEADOW CONDITIONS.
- i. 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.
- ii. THE FULL WIDTH PERMANENT ROW WILL NOT BE MOWED ANY MORE FREQUENTLY THAN ONCE EVERY THREE (3) YEARS.
- iii. 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.

B. AGRICULTURAL LAND USE

AGRICULTURAL AREAS/FIELDS THAT WILL BE RETURNED TO CROP PRODUCTION, PASTURE, HAY FIELDS, ETC., IN IDENTICAL CONDITION, UPON COMPLETION OF PIPELINE CONSTRUCTION ARE EXEMPT FROM MEETING THE VIRGINIA WATER QUALITY (9VAC25-870-63) AND WATER QUANTITY (9VAC25-870-66) REQUIREMENTS PER § 62.1-44.15:34 AND 9VAC25-870-300.

THE STORMWATER METHODOLOGY/APPROACH USED FOR DRAINAGE AREAS CONTAINING AGRICULTURAL LAND USE CAN BE SUMMARIZED AS FOLLOWS:

- a. 100% AGRICULTURAL LAND USE WITHIN DRAINAGE AREA LOD DRAINAGE AREAS IN WHICH THE ENTIRE LOD EXTENT IS MADE UP OF AGRICULTURAL LAND ARE FULLY EXEMPT FROM THE VIRGINIA WATER QUALITY (9VAC25-870-63) AND WATER QUANTITY (9VAC25-870-66) REQUIREMENTS. FOR SUCH AREAS, THE CALCULATION PACKAGE ONLY INCLUDES A NARRATIVE CLAIMING THE EXEMPTION AND FIGURES 1 AND 2 SHOWING THE DRAINAGE AREA AND LAND USE.
- b. MIXED LAND USE WITHIN DRAINAGE AREA LOD, BUT 100% AGRICULTURAL LAND USE WITHIN SUB-AREAS(S) LOD FOR DRAINAGE AREAS WITH BOTH AGRICULTURAL AND NON-AGRICULTURAL LAND WITHIN THE LOD AND MULTIPLE SUB-AREAS, VRRM CALCULATIONS WERE COMPLETED IN ACCORDANCE WITH 9VAC25-870-63 FOR THE PERMANENT ROW AREA WITHIN THE ENTIRE DRAINAGE AREA. WATER QUANTITY CALCULATIONS DO NOT NEED TO BE COMPLETED FOR SUB-AREA(S) IN WHICH THE ENTIRE LOD EXTENT IS MADE UP OF AGRICULTURAL LAND.
- c. DRAINAGE AREAS / SUB-AREAS WITH BOTH AGRICULTURAL AND NON-AGRICULTURAL LAND USE WITHIN LOD DRAINAGE AREAS / SUB-AREAS WITH BOTH AGRICULTURAL AND NON-AGRICULTURAL LAND WITHIN THE LOD ARE "PARTIALLY EXEMPT" FROM THE VIRGINIA WATER QUALITY (9VAC25-870-63) AND WATER QUANTITY (9VAC25-870-66) REQUIREMENTS. FOR THESE AREAS, CALCULATIONS WERE COMPLETED USING THE FOLLOWING APPROACHES:

- i. COMPLETE VRRM CALCULATIONS FOR THE PERMANENT ROW AREA WITHIN THE ENTIRE DRAINAGE AREA CATEGORIZING AGRICULTURAL AREAS AS FOREST/OPEN SPACE, AND
- ii. COMPLETE WATER QUANTITY CALCULATIONS PER 9VAC25-870-66 USING AN IMPROVEMENT FACTOR (IF) = 1.0 WITHIN THE ENERGY BALANCE METHOD EQUATION.

C. ACCESS ROADS

EXISTING ROADS AND TEMPORARY GRAVEL ACCESS ROADS WILL BE RESTORED TO PRE-DEVELOPMENT CONDITIONS FOLLOWING CONSTRUCTION RESULTING IN NO CHANGES IN IMPERVIOUS COVER FROM PRE- TO POST-CONSTRUCTION CONDITIONS. NEWLY CONSTRUCTED PERMANENT ACCESS ROADS (LIST C BELOW) WILL RESULT IN NEW IMPERVIOUS COVER AND, THEREFORE, REQUIRE STORMWATER MANAGEMENT.

THE FOLLOWING IS A COMPLETE LIST OF ALL ACCESS ROADS WITHIN SPREAD 10. REFER TO EROSION AND SEDIMENT CONTROL PLANS FOR LOCATIONS.

- a. EXISTING ROADS USED FOR PERMANENT ACCESS
  - i. MVP-FR-289
  - ii. MVP-FR-292
  - iii. MVP-FR-300
  - iv. MVP-FR-303.01
  - v. MVP-RO-279.01
  - vi. MVP-RO-288

- b. EXISTING ROADS USED FOR TEMPORARY ACCESS

C. PERMANENT ACCESS ROADS

- i. MVP-FR-290
- ii. MVP-FR-291
- iii. MVP-FR-293.01
- iv. MVP-FR-293.02
- v. MVP-FR-299
- vi. MVP-MLV-AR-28
- vii. MVP-MLV-AR-29
- viii. MVP-MLV-AR-30
- ix. MVP-MN-279
- x. MVP-MN-279.01
- xi. MVP-RO-283

d. TEMPORARY ACCESS ROADS

- i. MVP-FR-292.01
- ii. MVP-FR-294
- iii. MVP-FR-295
- iv. MVP-FR-296
- v. MVP-FR-297
- vi. MVP-FR-302
- vii. MVP-FR-305
- viii. MVP-RO-280
- ix. MVP-RO-281
- x. MVP-RO-282
- xi. MVP-RO-285
- xii. MVP-RO-286
- xiii. MVP-RO-287

D. ABOVE GROUND FACILITIES

THERE IS ONE (1) MAIN LINE VALVE SITE IN SPREAD 10: MVP-MLV-30. THE MAINLINE VALVE PAD WILL BE CONSTRUCTED USING GAP GRADED GRAVEL IN ACCORDANCE WITH GENERAL DETAIL MVP-ES33 TO PROVIDE ADDITIONAL STORMWATER DETENTION/STORAGE. DUE TO THE SMALL FOOTPRINT AREA OF THESE FACILITIES IN COMPARISON TO THE SIZE OF THE CORRESPONDING (SUB-)DRAINAGE AREAS, THERE IS NO EFFECT ON THE WEIGHTED CURVE NUMBER SO THE WATER QUANTITY CALCULATIONS ARE NOT AFFECTED.

3. STORMWATER MANAGEMENT CALCULATION PACKAGES

STORMWATER ANALYSES AND BEST MANAGEMENT PRACTICES (BMP) DESIGNS, WHERE NECESSARY, WERE PERFORMED FOR ALL SPREAD 10 DRAINAGE AREAS TO ENSURE THAT THE VIRGINIA STATE REGULATIONS FOR WATER QUALITY (9VAC25-870-63) AND WATER QUANTITY (9VAC25-870-66) HAVE BEEN SATISFIED.

STORMWATER CALCULATIONS AND ASSOCIATED MAPPING ARE PROVIDED UNDER SEPARATE COVER. MINIMAL STORMWATER MANAGEMENT CONTROLS ARE NEEDED IN SPREAD 10 DUE TO THE LACK OF PERMANENT DEVELOPMENT (I.E., PERMANENT ACCESS ROADS AND PERMANENT ABOVE GROUND FACILITIES) AND THE PROPOSED LAND RESTORATION THAT WILL TAKE PLACE WITHIN THE PIPELINE CONSTRUCTION CORRIDOR.

A. WATER QUALITY CALCULATIONS

WATER QUALITY CALCULATIONS INCLUDE THE FOLLOWING:

- a. VRRM SPREADSHEET OUTPUT FOR ALL SPREAD 10 DRAINAGE AREAS XXX, WITH EXCEPTION TO XXX IN WHICH THE ENTIRE LOD EXTENT IS MADE UP OF AGRICULTURAL LAND, AND XXX WHICH DO NOT ENCOMPASS ANY PART OF THE PERMANENT ROW.
- b. CALCULATION OF AREA-WEIGHTED TOTAL PHOSPHOROUS LOAD REDUCTION REQUIREMENT FOR TOTAL PERMANENT SITE AREA BY HUC-8 WATERSHED TO DETERMINE THE OVERALL PROJECT IMPACTS.

WATER QUALITY WAS EVALUATED ACROSS THE ENTIRE PROJECT TO DETERMINE CUMULATIVE IMPACTS BY HUC-8 WATERSHED AS DISCUSSED IN THE PROJECT SPECIFIC STANDARDS AND SPECIFICATIONS FOR VIRGINIA (APPENDIX D). THE CALCULATED TOTAL PHOSPHOROUS LOAD REDUCTION REQUIREMENT FOR EACH DRAINAGE AREA IS REPORTED IN THE SUMMARY TABLE BELOW. AN AREA-WEIGHTED TOTAL PHOSPHOROUS LOAD REDUCTION REQUIREMENT WAS CALCULATED ACROSS EACH OF THE PERMANENT SITE AREAS (XXX.XX ACRES FOR HUC XXXXXXXX AND XXX.XX ACRES FOR HUC XXXXXXXX) WITHIN EACH OF THE # HUC-8 WATERSHEDS TO CALCULATE THE OVERALL SPREAD 10 IMPACTS.

Drainage Area ID	Permanent Site Area (ac)	HUC-8 Watershed	Total Phosphorus Load Reduction Requirement (lb/yr)
<b>Total</b>			
<b>Total</b>			

B. WATER QUANTITY CALCULATIONS

STORMWATER QUANTITY WAS EVALUATED IN ACCORDANCE WITH THE PROJECT SPECIFIC STANDARDS AND SPECIFICATIONS FOR VIRGINIA (APPENDIX D). IN SOME AREAS, STORMWATER BMPS WERE UTILIZED IN ORDER TO MEET WATER QUANTITY REQUIREMENTS, SPECIFICALLY 9VAC-25-870-66 PART B (ENERGY BALANCE METHOD) OR 9VAC-25-870-66 PART D (SHEET FLOW).

C. PROPOSED STORMWATER MANAGEMENT FACILITIES

FOR SPREAD 10, PROPOSED STORMWATER MANAGEMENT FACILITIES INCLUDE DIVERSION DIKES/WATERBARS WITH COMPOST (GENERAL DETAIL MVP-ES38). A BMP SUMMARY TABLE IS PROVIDED BELOW. THESE BMPS WERE DESIGNED IN ACCORDANCE WITH SPECIFICATIONS FROM THE VIRGINIA STORMWATER BMP CLEARINGHOUSE AS DISCUSSED IN THE PROJECT SPECIFIC STANDARDS AND SPECIFICATIONS FOR VIRGINIA (APPENDIX D). THE FOLLOWING HYDRAULIC CALCULATIONS WERE PERFORMED AS PART OF THE STORMWATER MANAGEMENT FACILITIES DESIGN:

- a. STAGE-STORAGE CALCULATIONS USED IN ROUTING CALCULATIONS FOR DIVERSION DIKES/WATERBARS WITH COMPOST (GENERAL DETAIL MVP-ES38) BMPS.
- b. ROUTING CALCULATIONS FOR DIVERSION DIKES/WATERBARS WITH COMPOST (GENERAL DETAIL MVP-ES38) BMPS.

HYDRAULIC CALCULATIONS WERE ALSO COMPLETED TO SIZE NEW CULVERTS AT STREAM CROSSING LOCATIONS (SEE "FISH FRIENDLY" CULVERT STRUCTURES DETAIL). A SCHEDULE SUMMARIZING THE CULVERT DESIGN AND CORRESPONDING SCOUR PROTECTION IS PROVIDED BELOW.

Drainage Area	Soil Amendment Depth (D) (ft)	Soil Ammendment Width (W) (ft)	Minimum Length of Soil Amendment (ft)
DA-FR-001D	2	3	50
DA-FR-001E	1	2	25
DA-FR-001F	1	2	25
DA-FR-001G	1	2	35
DA-FR-002A	1	2	25
DA-FR-002B	1	2	20
DA-FR-002C	1	2	20
DA-FR-046B	1	3	40
DA-FR-046C	1	3	50

Stream ID	Access Road Station	Drainage Area (ac)	10-Year Design Flow (cfs)	Culvert Length (ft)	Existing Inlet Cover (ft) <sup>3</sup>	Existing Outlet Cover (ft) <sup>3</sup>	Proposed Inlet Cover (ft) <sup>4</sup>	Proposed Outlet Cover (ft) <sup>4</sup>	Lidar Elevation at Inlet (ft) <sup>1</sup>	Lidar Elevation at Outlet (ft)	Invert Elevation at Inlet (ft) <sup>2</sup>	Invert Elevation at Outlet (ft) <sup>2</sup>	Culvert Slope	Replacement Culvert Type	Replacement Culvert Material	Culvert Dimensions (Span/Rise)	Embedment Depth (in)	Scour Protection
S-D14	7 + 16.47	31.44	1.907	8	0.5	0.5	1.5	1.5	1630.212	1627.804	1627.337	1624.929	30.1%	Box Culvert	Concrete	3/3'	28.5	AASHTO Riprap Class A

<sup>1</sup>Roadway crest elevation based on Lidar elevation at inlet + required fill.  
<sup>2</sup>Calculated culvert invert based on Lidar elevations adjusted for stream depth from wetland data sheets.  
<sup>3</sup>Based on wetland data sheet maximum top of bank height (assumed measurement from bottom of stream to top of road).  
<sup>4</sup>Fill required to accommodate box culvert.

D. STORMWATER IMPACTS ON DOWNSTREAM PROPERTIES

THE 10-YEAR PEAK FLOWS CALCULATED FOR THE PRE-DEVELOPMENT AND POST-DEVELOPMENT CONDITIONS WERE COMPARED FOR ALL AREAS OF CONCENTRATED FLOW AFFECTED BY THE CONSTRUCTION OF SPREAD 10 IN ACCORDANCE WITH 9VAC-25-870-66 PARTS B AND C. IN MOST CASES THERE IS NO INCREASE IN THE 10-YEAR PEAK FLOWS FOLLOWING CONSTRUCTION, SO NO FURTHER EVALUATION WAS REQUIRED; IN SOME CASES THERE IS AN INCREASE FOLLOWING CONSTRUCTION, BUT SINCE THE INCREASE IS MINIMAL THE ASSOCIATED IMPACT ON FLOODING IS NEGLIGIBLE AND NO FURTHER EVALUATION WAS REQUIRED. A COMPARISON OF THE 10-YEAR PEAK FLOWS FOR SPREAD 10 IS PROVIDED IN THE TABLE BELOW.

Drainage Area ID	Sub-Area ID	Pre- Peak Flow, Q 10-yr (cfs)	Post- Peak Flow, Q 10-yr (cfs)	Flow Differential
				0.00

4. BMP CONSTRUCTION, MAINTENANCE AND INSPECTIONS

A. SOIL COMPOST AMENDMENTS (GENERAL DETAIL MVP-ES38)

REFER TO SECTIONS 8 AND 9 OF VIRGINIA BMP CLEARINGHOUSE SPECIFICATION NO. 4, AS WELL AS THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP), FOR INFORMATION REGARDING CONSTRUCTION, MAINTENANCE AND INSPECTIONS. THE FOLLOWING IS AN ABBREVIATED LIST OF KEY ITEMS OF NOTE.

- 1. HEAVY EQUIPMENT IS NOT PERMITTED ON COMPOST AMENDED AREAS DURING CONSTRUCTION TO PREVENT COMPACTION.
- 2. TEST PITS TO VERIFY COMPOST INTEGRATION DEPTH ARE REQUIRED EVERY 10,000 SQUARE FEET.
- 3. INSPECTIONS SHALL OCCUR AFTER EACH STORM EVENT EXCEEDING ¼-INCH RAINFALL WITHIN THE FIRST SIX MONTHS FOLLOWING OF THE END OF CONSTRUCTION.
- 4. BARE OR ERODING SOIL AREAS IDENTIFIED DURING INSPECTIONS MUST BE RESEDED.

NO.	DATE	BY:	CHKD.:	APPD.:	DESCRIPTION:

**Mountain Valley Pipeline**  
**EROSION AND SEDIMENT CONTROL PLANS**  
**MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE**

**MOUNTAIN VALLEY PIPELINE, LLC**  
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 CANONSBURG, PA 15317

**TETRA TECH**  
 complex world | CLEAR SOLUTIONS™

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GENERAL DETAILS SET

COMMONWEALTH OF PENNSYLVANIA  
 DAVID J. WALLNER  
 Lic. No. 0402057593  
 PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	2/19/2016
SCALE:	AS SHOWN
NARRATIVE	1 OF 1