



Greene County Conservation District

Fort Jackson Building, Mezzanine – 19 South Washington Street – Waynesburg, PA 15370-1839

Phone 724-852-5278 – Fax 724-852-5341

E-Mail: gccd@co.greene.pa.us -- Website: <http://www.co.greene.pa.us/gccd>

July 28, 2011

Equitrans, L.P.
Hanna McCoy
625 Liberty Avenue
Pittsburgh, PA 15222

Re: GCCD# 10538.01
ESCGP-1 Permit # OG30118-004
GP# 053011-005, GP# 073011-001, GP# 083011-006
Sunrise Project
Franklin, Freeport, Gilmore, Jefferson, Wayne, and Whiteley
Townships, Greene County

Ms. McCoy,

Enclosed is the above-referenced ESCGP-1 permit that authorizes the discharge of storm water from the construction activity described in the final approved Erosion and Sediment Control Plan and the permit application. A copy of the approved Erosion and Sediment Control Plan is also enclosed. Please ensure that the Erosion and Sediment Control Plan is fully implemented and available at the construction site.

The Erosion and Sediment Control Plan was reviewed solely to determine whether it is adequate to satisfy the requirements of Chapter 102, Erosion Control rules and regulations. The Greene County Conservation District assumes no responsibility for the implementation of the plan and the proper construction and/or operation of the facilities contained in the plan.

The Conservation District has completed an administrative review, only, of the Post Construction Stormwater Management Plan (PCSMP).

Please read the permit details carefully for the terms and conditions of this authorization. Conservation District staff and/or representatives of the Department of Environmental Protection will inspect this earthmoving activity to determine compliance with applicable permit requirements, Chapters 92, and 102 rules and regulations, and the Clean Streams Law.

Permit requirements and federal regulations at 40 CFR Section 122.21(b) require "...when a facility or activity is owned by one person but is operated by another person, it is the operator's duty to obtain a permit." Please be advised that once an operator (as defined in PA Code Chapter 102 Section 102.1) has been selected for the project, the operator must either be added as a co-permittee; or the permit responsibility must be transferred to the operator.

Enclosed is a Notice of Termination (NOT) form that must be completed and filed with this office within seven (7) working days after earth disturbance activities have ceased and final stabilization has been achieved. The NOT is a permit requirement, as well as a regulatory requirement under PA Code Chapter 102 Section 102.7.

***Please notify the Greene County Conservation District and affected municipalities at least **seven** working days prior to commencing earth disturbance activities. This plan must be fully implemented and available on-site at all times.

This authorization does not relieve the permittee from applying for and obtaining any and all additional permits or approvals from local, state, or federal agencies for the earth disturbance activity described in the permit application.

Also enclosed is the accepted Registration for GP# 053011-005, GP# 073011-001 and GP# 083011-006. This letter serves as authorization for the stream encroachment activity described in the Erosion and Sedimentation Control Plan. A requirement of this stream encroachment permit is the completion of the PASPGP-4 PERMIT COMPLIANCE, SELF CERTIFICATION FORM which will be provided by the Army Corps of Engineers. You must complete this form upon final stabilization of the PASPGP authorized work and mail copies to the US Army Corps of Engineers office indicated on the form as well as the Greene County Conservation District such that a final inspection of the project can be made and the file closed in the GCCD offices.

Note: The GP-5, GP-7, and GP-8 permits have been authorized without Federal Authorization. The PASPGP-4 Permit Compliance will still need to be issued by US ACOE. Mr. Josh Shaffer, Project Manager is now reviewing your application.

No earth disturbance is to take place until the proper PASPGP-4 Federal Authorization has been issued.

Note: ESCGP-1 Permit coverage expires within 5 years of the coverage date.

Coverage approval: July 28, 2011. Expiration date: July 28, 2016.

Any changes or revisions made to this plan must be resubmitted to this office for further review. If you have any questions **please do not hesitate** to call or e-mail the Conservation District.

Any person aggrieved by this section may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.C., Chapter 5 A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the board. The appeal form and the Board's rules of practice and procedure are also available in Braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY OF THE BOARD (717-787-3483) FOR MORE INFORMATION.

Sincerely,
Lindsay Kozlowski



Environmental Program Specialist
Greene County Conservation District
lkozlowski@co.greene.pa.us

cc: Lisa Snider, Manager, Greene County Conservation District
Robbie Matesic, Executive Director, Greene County Planning and Development
Chris Hardie, County Planner, Greene County Planning and Development
PADEP SW Region Technical Permitting Dept.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATERSHED MANAGEMENT
BUREAU OF OIL & GAS MANAGEMENT

APPROVAL OF COVERAGE UNDER THE
EROSION AND SEDIMENT CONTROL GENERAL PERMIT
FOR EARTH DISTURBANCE ASSOCIATED WITH OIL AND GAS
EXPLORATION, PRODUCTION, PROCESSING, OR TREATMENT OPERATIONS
OR TRANSMISSION FACILITIES
ESCGP-1

Approval No: OG 30118-004

In compliance with the provisions of The Clean Streams Law, as amended, 35 P.S. Section 691.1 et seq., the Oil & Gas Act 58 P. S. § § 601.101 et seq., 25 Pa Code Chapters 78, 91, 93 and 102 regulations promulgated thereto, and sections 1905-A, 1917-A and 1920-A of the Administrative Code of 1929 (71 P.S. §§510-5, 510-17 and 510-20) the Department of Environmental Protection (Department) hereby authorizes the permittee to conduct earth disturbance activities at the following location:

PERMITTEE NAME AND ADDRESS

Equitrans, L.P.
Hanna McCoy
625 Liberty Ave.
Pittsburgh, PA 15222

PROJECT NAME AND LOCATION

Sunrise Project - Franklin, Freeport, Gilmore, Jefferson, Wayne,
9 Whiteley Townships, Greene County

This authorization is granted to conduct earth disturbance activities and construct the erosion and sediment control and stormwater management best management practices (BMPs) within the project indicated above, provided that you comply with all representations set forth in your application and its supporting documents and permit conditions attached hereto.

Earth disturbance activities in accordance with the terms and conditions herein may commence on the date of the approval of permit coverage. This approval is valid for a period of five years when conducted pursuant to such terms and conditions the Department may terminate the approval prior to the expiration date upon notice to and approval. No condition of this permit shall release the permittee(s) from any responsibility or requirement under Pennsylvania statutes or regulations.

No condition of this permit shall release the permittee(s) from any responsibility or requirement under Pennsylvania statutes or regulations or local ordinances.

Approval Date: July 28, 2011

Expiration Date: July 28, 2016

Authorized by: Lindsay Kozlowski

Title: Environmental Program Specialist

**EROSION AND SEDIMENT CONTROL GENERAL PERMIT
FOR EARTH DISTURBANCE ASSOCIATED WITH OIL AND GAS
EXPLORATION, PRODUCTION, PROCESSING, OR TREATMENT OPERATIONS
OR TRANSMISSION FACILITIES
(ESCGP-1)**

General Information

1. This permit applies to earth disturbance activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities (oil and gas activities) that disturb five (5) or more acres at one time over the life of the project.
2. This permit is issued 7/28/11. The permit shall expire at midnight 7/28/2016, unless extended in writing by the Department.
3. Persons proposing to conduct earth disturbance activities associated with oil and gas activities that disturb five (5) or more acres at one time over the life of the project, who wish to be covered by this general permit, must submit an administratively complete and acceptable Notice of Intent (NOI) to the Department or authorized County Conservation District ("District") at least 90 days prior to commencing the earth disturbance activity. The NOI shall be filed in accordance with the detailed instructions specified in the NOI package. Earth Disturbance activities cannot begin until the operator receives the permit approval.
4. An Erosion and Sediment Control Plan ("E&S Plan") must be implemented for the activity covered by this permit in accordance with 25 Pa. Code Chapter 78 and Chapter 102. The E&S Plan must be submitted for review and approval to the Department or District when acting as the reviewing entity (collectively "reviewing entity"). Best Management Practices ("BMPs") shall be constructed and maintained under the supervision of a competent individual trained and experienced in erosion and sediment control methods and techniques. The Post Construction Stormwater Management Plan ("PCSM Plan") shall also be implemented for the earth disturbance activity covered by this permit.

Standard Permit Conditions

1. Major modifications to the approved E&S Plan involving new or additional earth disturbance activity and/or the addition of a point source discharge will require prior approval by the reviewing entity and may require the submittal of a new NOI. All minor modifications to the E&S Plan and PCSM Plan shall be noted on the plan shall be noted on the plan that is available at the site and initialed by the Department or Conservation District staff. Minor changes to the E&S Plan or the PCSM Plan may include adjustments to BMPs and locations within the permitted boundary to improve environmental performance within the scope of the approved E&S Plan, change in ownership or address, typographical errors and field adjustments on-site such as the addition or deletion of BMPs to address unforeseen circumstances.
2. If the erosion and sediment control and stormwater management BMPs fail to achieve their intended purpose the permittee(s) shall investigate the reason for the failure and take necessary corrective actions which may include modification to existing BMPs or the design and construction of additional BMPs.
3. Nothing in this permit relieves the permittee(s) of the obligation to obtain any other applicable permits, or of complying with all federal, state, or local laws, regulations or standards for the construction, operation, and maintenance of this project.
4. All relevant conditions of any prior Departmental permits, decrees or orders issued to the permittee(s) or their predecessor shall be continued in full force and effect unless explicitly superseded by this permit. The provisions of this permit shall apply to the permittee's successors, lessees, heirs, and assigns. Permit ownership and/or responsibilities may be transferred or shared after written notice to, and upon approval from the reviewing entity. The notice shall be provided to the reviewing entity at least 30 days prior to the effective date of new ownership or permit responsibility. The transfer does not need to be published.

5. The Department reserves the rights to modify, suspend, revoke or terminate previous coverage under this permit if the permittee(s) shows a lack of ability or intent to comply with the provisions of the permit, or has exhibited a history of non-compliance with the permit conditions.
6. Earth disturbance activities in a watershed, where the designated or existing use is High Quality or Exceptional Value or exceptional value wetland pursuant to 25 Pa Code Chapter 93.4b, shall comply with the anti-degradation requirements of 25 Pa Code Chapter 93.4 Sections 93.4a thru 93.4c and 25 Pa Code Chapter 105.13. Additional BMPs for special protection watersheds are contained in Chapter 4 of the Oil and Gas Operators Manual (No. 550-0300-001), the Stormwater Best Management Practices Manual (363-0300-002) and 25 Pa Code Chapter 102.4(b).
7. Erosion and sediment control and stormwater management BMPs shall be designed and implemented to meet the standards and specifications identified in 25 Pa Code Chapters 78, 93, 102 and any other applicable laws and regulations. Best Management Practices for oil and gas activities are listed in the Department's Oil and Gas Operators Manual, No. 550-0300-001 and Erosion and Sediment Pollution Control Manual, No. 363-2134-008, the Water Quality Antidegradation Guidance No. 391-0300-002 and the Stormwater Best Management Practices Manual No. 363-0300-002. The permittee(s) may use BMPs that are not identified in the foregoing manuals if the permittee(s) demonstrates to the reviewing entity's satisfaction that the proposed BMPs achieve equivalent or superior environmental protection standards.
8. If the earth disturbance activities authorized by this permit at any time create conditions that cause or threaten to cause pollution to waters of the Commonwealth, the permittee(s) shall immediately implement remedial measures to correct the conditions.
9. The permittee(s) shall notify the delegated conservation district or the Department by either telephone or certified mail of the intent to commence earth disturbance activities. The notification must be at least seven days prior to the start of earth disturbance activities. Attendance at a pre-construction conference is required upon request by the District or Department.
10. BMPs must be inspected on a weekly basis and after each measurable stormwater event, including the repair of the BMPs to ensure effective and efficient operation. A written report of each inspection shall be kept to include a summary of site conditions, BMPs, and compliance, corrective action taken and the date, time, and the name of the person conducting the inspection. These documents are to be made available to the Department upon request.
11. Upon completion of the earth disturbance activity the site shall be permanently stabilized according to the requirements of Pa Code Chapter 102. In addition, post construction stormwater management BMPs shall be in place and operating prior to a site being considered permanently stabilized.
12. Procedures which ensure that the proper disposal or recycling of materials associated with or from the project site will be undertaken in an environmentally safe manner, and in accordance with federal and state law and regulations. No waste or similar materials shall be disposed, buried, dumped, or discharged at the site unless it is in accordance with federal and state law and regulations.
13. Issuance of this permit does not authorize earth disturbance activities in wetlands or other water obstructions or encroachments as depicted in the approved E&S Plan. Any changes to the approved E&S Plan resulting from other permits from the Department that authorize activity in wetlands or other water obstructions or encroachments must be submitted to the reviewing entity for review and approval prior to initiating the earth disturbance activity. If hydric soils are present, a wetland identification must be conducted in accordance with Department procedures. All wetlands and watercourses must be included on the E&S Plan.
14. The permittee may not discharge floating materials, oil grease, scum, foam, sheen and substances which produce odor, taste, turbidity, or settle to form deposits in concentrations or amounts sufficient to be, or create a danger of being, harmful to the water uses to be protected or to human, animal, plant or aquatic life.
15. In accordance with 25 Pa. Code § 78.55, operators of oil and gas wells are required to prepare and implement a Preparedness, Prevention, and Contingency plan. A copy of the plan shall be provided to the Department upon request.

16. The Erosion and Sedimentation Control Plan shall include any spoil, borrow or other work area associated with the oil and gas activity.
17. The Department and the District when acting as reviewing entity, reserves the right to require additional monitoring where a danger of water pollution is present, or water pollution is suspected of occurring from an earth disturbance activity subject to this permit. The permittee(s) shall commence such monitoring upon notification from the Department or the authorized conservation district when acting as the reviewing entity.
18. The permittee(s) must comply with all terms and conditions of this permit. Any permit non-compliance constitutes a violation of The Clean Streams Law, Oil and Gas Act, 25 Pa Code Chapters 78, 91, 93 and 102, and is grounds for enforcement action or permit suspension; revocation, modification and reissuance, or denial of a permit. The permittee(s) may be subject to criminal and/or civil penalties for violations of the terms and conditions of this permit under Sections 602 and 605 of The Clean Streams Law, 35 P.S. §§ 691.602 and 691.605 and Sections 503, 505, 506 and 507 of the Oil and Gas Act, P.S. §§ 601.503, 601.505, 601.506 and 601.507.
19. Pursuant to Sections 5(b) and 305 of The Clean Streams Law (35 P.S. §§ 691.5(b) and 691.305), Oil and Gas Act Section 508 (58 P.S. §§ 601.508) and Section 1917-A of the Administrative Code (71 P.S. § 510-17), the permittee(s) shall allow the head of the Department, and/or an authorized representative of the Department, or delegated conservation district, upon the presentation of an authorized identification or other credentials, as may be required under law, to:
 - Enter upon the permittee(s) premises where a regulated activity is located or conducted or where records must be kept under the conditions of this permit;
 - Have access to and copy at reasonable times, any records that must be kept under the terms and conditions of this permit;
 - Inspect any facilities or equipment (including monitoring and control equipment); and
 - Observe or sample any discharge.
20. Prior to the commencement of earth disturbance activities for additional phases or portions of a project, the permittee(s) shall submit a Plan for each additional phase or portion of the project in accordance with Permit Guidelines for Phased NPDES Stormwater Discharges Associated with Construction Activity Permits, Chapter 102 Erosion and Sediment Control Permits and Chapter 105 Waterway Restoration Permits (363-2134-013) for review and approval by the reviewing entity.
21. The permittee(s) shall contact the plan preparer for clarification of any requirements contained in the Erosion and Sediment Control Plan, Post Construction Stormwater Management Plan, Pollution Prevention and Contingency Plan, or other documents related to this permit. If additional clarification is necessary the permittee or co-permittee shall contact the Department or authorized Conservation District.
22. No regulated activity is authorized under this General Permit which is likely to directly or indirectly adversely affect a State or Federal threatened or endangered species or a species proposed for such designation, or which is likely to destroy or adversely modify the critical habitat of such a species, as identified under the Federal Endangered Species Act of 1973; Title 30, Chapter 75 of the Pa. Fish and Boat Code; Title 17, Chapter 25, Conservation of Wild Plants; and Title 31 Chapter 133 Game Wildlife code.

Permit registrations shall include a Pennsylvania Natural Diversity Inventory (PNDI) search receipt. Any "potential impact" must be resolved with the appropriate agency prior to registration of this General Permit. Information on PNDI searches is available through the PA Department of Conservation and Natural Resources, Bureau of Forestry, Ecological Services Section, P.O. Box 8552, Harrisburg, PA 17105-8852, telephone 717-787-3444 and at www.naturalheritage.state.pa.us.

23. Notice of Termination. When all stormwater discharges associated with the earth disturbance activity that are authorized by this permit are eliminated, the disturbed area has been permanently stabilized and BMPs identified in the PCSM Plan have been installed, the permittee or co-permittee of the facility must submit a signed Notice of Termination letter. All Notice of Termination letters are to be sent to the Department or the authorized Conservation District.

PERMIT ISSUED BY:

Director, Bureau of Watershed Management

Director, Bureau of Oil and Gas Management



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATERSHED MANAGEMENT

OFFICIAL USE ONLY

PA _____

**NOTICE OF TERMINATION
OF A GENERAL OR INDIVIDUAL NPDES PERMIT
FOR STORMWATER DISCHARGES ASSOCIATED WITH
CONSTRUCTION ACTIVITIES**

- OR -

FOR AN EROSION AND SEDIMENT CONTROL PERMIT

1. PERMIT INFORMATION:

Check the appropriate boxes.

☐ NPDES Stormwater Permit # _____ ☐ Erosion and Sediment Control Permit # _____

Check one:

☐ I/we am/are no longer the Owner(s) or Operator(s) of the Construction Activity.

☐ Earth disturbance activity has ceased and the site is stabilized.
2. EARTH DISTURBANCE SITE LOCATION:

Facility/Development Name: _____

Municipality: _____ County: _____

Latitude: _____°/ _____'/ _____" Longitude: _____°/ _____'/ _____"

U.S.G.S. Quad Map Name: _____

3. PERMITTEE/CO-PERMITTEE SUBMITTING THIS NOTICE OF TERMINATION:**PERMITTEE****CO-PERMITTEE**

Name: _____

Name: _____

Address: _____

Address: _____

City: _____

City: _____

State: _____ Zip Code: _____

State: _____ Zip Code: _____

Telephone Number: _____

Telephone Number: _____

4. PERMITTEE INFORMATION AND ACKNOWLEDGEMENT (IF APPLICABLE): (This Section must be completed by the permittee to acknowledge that a co-permittee is submitting this Notice. Leave this section blank if a Co-Permittee is not listed in Section 3.)

Name: _____

Address: _____

City: _____

State: _____ Zip Code: _____

Telephone Number: _____

I hereby acknowledge that the co-permittee submitting this Notice (identified in Section 3 above) is withdrawing as a permittee.

Name and Official Title of Permittee

Signature: _____

Date Signed: _____, 20____



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATERSHED MANAGEMENT

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PA _____

TRANSFeree/CO-PERMITTEE APPLICATION FOR A GENERAL OR INDIVIDUAL NPDES PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES

TYPE OR PRINT IN BLOCK LETTERS

A. PERMIT INFORMATION					
<input type="checkbox"/> Check here if applying for permit transfer.			<input type="checkbox"/> Check here if applying to be added as a co-permittee.		
GENERAL OR INDIVIDUAL NPDES PERMIT FOR DISCHARGES OF STORMWATER ASSOCIATED WITH CONSTRUCTION ACTIVITIES FOR WHICH APPLYING AS TRANSFEREE/CO-PERMITTEE.					
PERMIT NO.:		_____		DATE ISSUED: _____	
B. CURRENT PERMITTEE INFORMATION					
DEP Client ID# (if known)			Applicant Type / Code (if known)		
Organization Name or Registered Fictitious Name			Employer ID# (EIN)	Contact Person	
Individual Last Name	First Name	MI	Suffix	SSN	
Additional Individual Last Name	First Name	MI	Suffix	SSN	
Mailing Address Street					
City	State	ZIP+4	County	Phone	
C. SITE INFORMATION					
DEP Site ID# (if known)		Site Name			
DEVELOPMENT NAME (IF APPLICABLE):					
SITE ADDRESS/LOCATION:					
COUNTY: _____			MUNICIPALITY: _____		
DATE OF TRANSFER OF PERMIT RESPONSIBILITY, COVERAGE AND LIABILITY: _____, 20____					
CO-PERMITTEE/TRANSFEREE AGREEMENT: Attach a written agreement signed by all parties involved with the change of operational control. The letter should provide a specific date (not less than 30 days after the date this application is submitted) for the transfer or sharing of permit responsibility, coverage, and liability between the current and new permittee/co-permittee. A SAMPLE Co-Permittee Agreement letter and a SAMPLE Transferee Agreement letter are attached for reference.					

**CO-PERMITTEE AGREEMENT
ASSUMPTION OF RESPONSIBILITY UNDER A GENERAL OR
INDIVIDUAL NPDES PERMIT FOR STORMWATER DISCHARGES ASSOCIATED
WITH CONSTRUCTION ACTIVITIES**

_____	(Permit Number)
_____	(Name of Facility/Project)
_____	(Municipality)
_____	(County)

The following parties agree to a change in ownership and/or operational control under the above referenced permit effective _____ (date) _____.

_____ (New Co-Permittee name and address) hereby assumes joint and severable responsibility, coverage, and liability under the permit for any obligations, duties, responsibilities and violations under said permit. _____ (Current Permittee) shall remain liable under the permit for violations of the permit conditions up to and including the above referenced date AND until a Notice of Termination is filed and acknowledged by the (Conservation District OR DEP Regional Office).

[The following paragraph should be used for multiple co-permittees.]

Attached is a description of site responsibilities and a map or plan drawing depicting the limits of permit responsibility, coverage, and liability for each co-permittee.

(Current Permittee(s))
(Company Name, if applicable)

(New Co-permittee(s))

INSTRUCTIONS FOR THE TRANSFeree / CO-PERMITTEE APPLICATION FORM FOR A GENERAL OR INDIVIDUAL NPDES PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES

Who may file the Transferee/Co-Permittee Application Form: This form may be used by an applicant seeking to apply for either complete or partial operational control of earth disturbance activities at a site which are already authorized by either an Individual or General NPDES Permit. Federal NPDES Regulations at 40 C.F.R. §122.21(b) require that Operator(s) must become a permittee. An operator is a person who meets either of the following criteria: 1.) You have operational control of construction project plans and specifications, including the ability to make modifications to those plans and specifications; **OR** 2.) You have day-to-day operational control (supervision) of those activities at the project that are necessary to ensure compliance with the Erosion and Sediment Control Plan for the site or ensure compliance with other permit conditions, i.e., General Contractors. Subcontractors generally do not have supervisory control over earth disturbance activities and therefore usually **should not** become a permittee or co-permittee. If prior to construction activities, there is no operator, the owner must apply for the permit. Once the operator has been selected, the operator must use this application either to be made a co-permittee or to have the permit transferred to the contractor. **Failure of the operator to be added to the permit is a violation of federal and state law and regulation.**

Where to file the Transferee/Co-Permittee Application Form: Send this form to the reviewing entity, either to the local county conservation district that is participating as the reviewing entity or, if the Department is the reviewing entity, to the appropriate DEP Regional Office, Permitting and Technical Services Section.

When to file the Application: This application must be filed at least 30 days prior to the proposed change of ownership and/or operational control which will result in the transfer of permit responsibility, coverage and liability.

Completing the Application: TYPE OR PRINT IN BLOCK LETTERS IN THE APPROPRIATE SPACES

- Section A. Permit Information** - Check the appropriate box and enter the Permit Number and date of issuance of the existing Individual or General NPDES Permit assigned to the construction activity at the site identified in Section C below.
- Section B. Current Permittee Information** - Enter the full name, address and telephone number of the individual or organization and contact person that is the current permittee. The Regional Office can supply the Client ID # and Applicant Code, if known.
- Section C. Site Information** - Enter the DEP Site ID#, site name, site address/location, county and municipality of the site where the construction activity authorized by the NPDES Permit is located. Include the date on which the transfer of Permit responsibility, coverage and liability will occur. The Regional Office can supply the Site ID #.
- Section D. Transferee/Co-Permittee Information** - Enter the full name, address and telephone number of the individual or organization and contact person that is applying to assume operational control of construction activities at the site. The Regional Office can supply the Client ID # and Applicant Code, if known.
- Section E. Compliance Review** - The individual or organization referenced in Section D must indicate if any other environmental permits have been received or are pending from DEP as well as their past compliance history and if they are currently in compliance with environmental laws, rules and regulations, permits, orders and schedules of compliance.
- Section F. Certification and Signature of Applicant** - The new Transferee/Co-Permittee Applicant (named in Section D) must complete the required certification that the information contained in this application is true, accurate, and complete; the BMPs are or will be designed and fully implemented in accordance with the NPDES Permit requirements and will meet the applicable standards and limitations of the permit; and further that the applicant has read, understands and agrees to abide by the terms and conditions of the permit. The application shall be signed as follows:
 - a. **For a corporation** -- By a responsible corporate officer, which means: (1) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or (2) The manager of one or more manufacturing, production or operating facilities if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;
 - b. **For a partnership or sole proprietorship** -- By a general partner or the proprietor, respectively; or
 - c. **For a municipality, State, Federal or other public agency** -- by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes: (1) the chief executive officer of the agency, or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

The application shall be notarized in the space provided.

July 18, 2011

Ms. Lindsay Kozlowski
Environmental Program Specialist
Greene County Conservation District
19 South Washington Street, Suite 150
Waynesburg, Pennsylvania 15370

**Subject: GCCD #10528.01
ESCGP-1 #OG-3011-004
GP #053011-004, GP #083011-006, & GP #073011-001
Technical Review – ESCGP-1 Revisions
Equitrans Sunrise Project
Wayne, Whiteley, Gilmore, Franklin, and Jefferson Townships, Greene
County**

Dear Ms. Kozlowski:

On behalf of Equitrans L.P. (Equitrans), URS is submitting one (1) set of the revision sheets associated with the Erosion and Sediment Control Plan (E&SCP) and Post Construction Stormwater Management (PCSM) Plan for the proposed Equitrans Sunrise Project (Project), which is located in Greene County, Pennsylvania and Wetzel County, West Virginia. These sheets revisions address the technical comments provided by the Greene County Conservation District (GCCD) for the E&SCP and PCSM plan to URS Corporation (URS) and LA Gates Company (LA Gates) via emails dated July 6, 2011 and July 13, 2011, and a follow-up discussion with Mr. Darl Rosenquest of the Pennsylvania Department of Environmental Protection on July 11, 2011.

Based upon these revisions, no additional disturbed acreage or water resource impacts have been added to the project. Sheet 34 of 174 has been provided due to an alignment change on AR-302-011, which was previously incorporated into revised disturbed and project acreage in the June 10, 2011 submission to your office; however, the alignment shown on the previous submission was not updated to reflect the correct route of the existing access road. Lastly, the 302-127-PY ancillary site has been deleted from the project, which is reflected in revised Sheet 86 of 174.

For ease of review, the GCCD comments are provided below, followed by Equitrans' response in ***bold and italics***.

Pipeline Project Area (Provided by URS)

1. Note that topsoil and subsoil will be segregated for the entire length of the project and label any storage areas for such.

As stated in Step 10 in the General Construction Sequence and BMP Installation on Sheet 2 of 174, topsoil and subsoil segregation shall occur in agricultural, wetland, or residential areas for the entire project. URS amended Step 10 to include the following: topsoil and subsoil segregation will be utilized for the trench excavation within all upland areas in the PA portion of the project, unless specifically requested otherwise by the landowner. Additionally, all top and subsoil stockpiling will be located within the construction ROW. Please refer to Detail 16 on Sheet 21 of 174 for an example of how the topsoil and subsoil will be stockpiled within the construction ROW.

2. Provide a typical installation detail for silt fence that shows it being installed on contour, not running up and down hills along the edge of the right-of-way.

Detail 6 – Filter Fabric Fence on Sheet 15 of 174, Detail 7 – Compost Filter Sock on Sheet 16 of 174, and Detail 8 – Straw Bale Barrier on Sheet 16 of 174 have been revised to indicate installation of the above-referenced sediment barriers on level, existing contour. Also, included in all of these details is the note that these sediment barriers are not to be used to delineate project boundaries.

Jefferson Compressor Station (Provided by LA)

1. Benches can be installed on 3:1 slopes as well and if permanent channels are going to be installed on the fill slope they will have to be sized for the 10-year/1hr storm event, which will likely make them about the same size as the benches when the required freeboard is added in. Plus they would need to have suitable protective liners that are not permeable.

As shown on the Jefferson plan drawing, the fill slope will be constructed on a 3:1 slope without benches in order to minimize the construction footprint. The diversion channels shown on a prior drawing have been removed in lieu of diversion of water through a compost filter sock and diversion berm at the top of slope, into rock lined channels that will function to reduce velocity of flow and minimize erosion during construction. As part of final restoration, the diversion berm and compost filter sock will be removed, allowing surface water to sheet flow over the 3:1 slope.

2. Do they indicate where the channels will outlet and how the discharge will be safely conveyed to a receiving surface water?

The slope diversion channels were removed. This change is reflected on the revised drawings.

3. How will the riprap channel at the bottom of the slope be protected from receiving sediment during construction of the fill?

A compost filter sock at the top of the slope will be installed to remove sediment at the top of the fill. In addition, the fill slope will be stabilized as it is brought up. Implementation of these sediment control measures should significantly reduce the amount of sediment that reaches the outlet of the riprap channel.

4. Please include the construction sequence and maintenance on the plan drawings.

The construction sequence and maintenance details were added to Sheet 3 of the drawings.

5. Remove maintenance from the construction sequence.

Maintenance items were removed from the construction sequence.

6. Add a pumped water filter bag detail to the drawings.

A pumped water filter bag detail was added to Sheet 3 of the drawings.

7. Provide the stabilization types and rates on the drawings.

Stabilization types and rates were added to Sheet 3 of the drawings.

8. Include a note that written inspections and any corrections must be kept on site and available upon request.

A note that written inspections and corrective actions must be maintained and available upon request was added to the maintenance details, and included on Sheet 3 of the drawings.

9. The soil stockpile shown appears to be located on top of a building or compressor.

The topsoil stockpile location shown on the drawing is a temporary storage location that will be utilized during construction of the fill slope. The topsoil pile will be gone before construction of the building.

10. There appears to be a discrepancy as to whether or not there will be an increase in runoff as a result of this project.

There will be an increase in runoff as a result of the construction of impervious structures (buildings). This increased runoff will be stored on-site by BMP's, as shown on the drawings and explained in the narrative. There will not be a net increase in runoff from the project site.

We appreciate your continued efforts in the review of this Project. If you have any questions concerning the above-referenced revisions, please call me at 412-395-3640 or Brook Bertig-Coll of URS Corporation at 412-503-4595.

Sincerely

Equitrans L.P.

URS Corporation



Hanna McCoy
Environmental Supervisor – Permitting



Brook Bertig-Coll
Project Manager/Sr. Environmental Scientist

cc: Josh Schaffer, USACE – Pittsburgh District (letter only)
Darl Rosenquest, P.E., PADEP – California District Office (w/1)

Enclosures

June 10, 2011

Ms. Lindsay Kozlowski
Environmental Program Specialist
Greene County Conservation District
19 South Washington Street, Suite 150
Waynesburg, Pennsylvania 15370

**Subject: GCCD #10528.01
ESCGP-1 #OG-3011-004
GP #053011-004, GP #083011-006, & GP #073011-001
Technical Review – ESCGP-1 Revisions
Equitrans Sunrise Project
Wayne, Whiteley, Gilmore, Franklin, and Jefferson Townships, Greene
County**

Dear Ms. Kozlowski:

On behalf of Equitrans L.P. (Equitrans), URS is submitting one (1) revised copy of the Erosion and Sediment Control Plan (E&SCP) and Post Construction Stormwater Management Plan (PCSM) for the proposed Equitrans Sunrise Project (Project), which is located in Greene County, Pennsylvania and Wetzel County, West Virginia. This revised E&SCP and PCMS addresses the technical comments provided by the Greene County Conservation District (GCCD) in a letter dated April 14, 2011, which was received via email on April 21, 2011 and discussions held during a meeting on May 11, 2011.

Additionally, the following changes/additions to the proposed project have been made by Equitrans:

- Addition of **302-132-RD (Kirby-Vandevender-Williams)** at 0.39 acres of disturbance (Sheet 89 of 174);
- Addition of **302-009-PY CY (Sissly)** at 8.45 acres of disturbance (Sheet 123 of 174);
- An increase in the limit of disturbance for the **Jefferson Compressor Station** 0.76 acres (L.A. Gates E&SCP)
- A change in the alignment of **AR-302-011** (Sheet 91 of 174), resulting in a decrease of 1102 feet in length and decrease in disturbed acreage of 1.26 acres;
- A change in the alignment of **AR-302-047** (Sheets 125 and 12 of 174), resulting in a decrease of 215 feet in length and a decrease in disturbed acreage of 0.25 acres; and,
- A revised location of **AR-302-052** (Sheet 134 of 174), which shifted the alignment approximately 1,000 feet downstream from the original temporary access road crossing on Hamilton Run and added 20 feet to the length of the access road resulting in an addition of 0.02 acres of disturbance. A separate update to the stream impacts table is concurrently submitted under a separate cover for the Pennsylvania Department of

Environmental Protection's Chapter 105 General Permit 5, 7, and 8 application, which was submitted to your office on April 1, 2011.

Based upon these revisions, the addition of 8.00 acres of disturbed acreage has been added to the proposed Project. As directed by your office, we are enclosing two (2) fee checks: one in the amount of \$800 payable to the "Green County Conservation District" for your expedited technical review and one in the amount of \$800 payable to "Commonwealth of Pennsylvania Clean Water Fund" for their technical review.

For ease of review, the GCCD comments are provided below, followed by Equitrans' response in ***bold and italics***.

A. General Comments

1. An updated NOI application will be needed that reflects both the compressor station and pipeline stormwater calculations.

An updated NOI has been submitted for the entire project within the URS ESCGP-1 application, which includes the total disturbed acreage associated with the pipeline, access roads, ancillary sites, interconnects, and the Jefferson Compressor Station. The URS ESCGP-1 application package also includes the Erosion and Sediment Control Plan (E&SCP) and the Post-Construction Stormwater Management Plan (PCSM) for the above-referenced facilities, with the exception of the Jefferson Compressor Station. For the site-specific E&SCP and PCSM for the Jefferson Compressor Station, please refer to the ESCGP-1 application prepared by L.A. Gates, Co., which has also been updated per the GCCD technical review comments and is included as part of this submission.

2. Please provide municipal boundaries on plan maps.

Municipal boundaries were indicated within the Horizontal Stationing band located below the plan view within the originally-submitted plan sheets. Also, the title block indicates the municipalities that are crossed by the project on each plan sheet. The municipal boundaries are indicated on the plan views at the location of the pipeline centerline crossing, as follows:

- ***Jefferson and Whiteley Townships - Station 170+93 on Sheet 32 of 174;***
- ***Whiteley and Franklin Townships – Stations 183+28, 196+43, and 197+07 on Sheet 33 of 174;***
- ***Whiteley and Franklin Townships – Station 228+52 on Sheet 34 of 174;***
- ***Whiteley and Franklin Townships – Station 433+34 on Sheet 38 of 174;***
- ***Franklin and Wayne Townships – Station 552+27 on Sheet 40 of 174;***
- ***Wayne and Jackson Townships – Station 807+17 on Sheet 45 of 174;***
- ***Jackson and Gilmore Townships – Station 858+16 on Sheet 46 of 174;***
and,

- **Gilmore and Freeport Townships – Station 1153+14 on Sheet 52 of 174.**

3. Property owner/parcel number boundaries were not included with this submission.

The plan sheets have been revised to include the property owner information within the Right-of-Way & Ownership Data band, included at the top of each plan sheet. Additionally, a landowner line list is included with the revision package, which includes the landowner information as it relates to the Equitrans parcel identification number listed in the band.

4. What is the status of the Wetland Replacement Plan?

Equitrans and URS are currently working with the Pennsylvania Game Commission (PGC) to develop a mitigation plan consisting of a combination of wetland preservation and enhancement within PGC State Game Lands 179 and 223. Once the plan has been finalized, a copy will be sent to the GCCD and United States Army, Corps of Engineers – Pittsburgh District for review and approval.

5. On Sheet 3 of 109, in the wetland and waterbody maps, there is an access road shown that leads to the compressor station but this road is not shown on any of the plan drawings.

Access Road AR-309-001 leads from Denny Hill Road northwest to the H-111 Interconnect, Metering, and Launcher Site. The H-309 pipeline (0.21 mile) leads from the proposed Jefferson Compressor Station to the H-111 Interconnect, which parallels Access Road AR-309-001 for approximately 450 feet. Plan sheet 80 of 174 has been updated to provide the information for this access road.

B. Pipeline Project Area

6. Please show all planned improvements (i.e. structures, gravel lots, etc.) on the plan drawings.

The plan sheets have been revised to include the proposed improvements. The following additions have been shown on the plan views:

- ***The gravel lot and proposed 20' by 30' building have been included at the H-111 Interconnect , Metering, and Launcher Site on Sheets 27 and 80 of 174;***
- ***Zimmerman Gates will consist of a 50' by 50' gravel lot with above-ground valve settings. The location of Zimmerman Gates and proposed gravel lot is shown on Sheets 37 and 96 of 174; and,***
- ***The proposed Jefferson Compressor Station improvements are shown in L.A. Gates' E&SCP, which is provided as part of this submittal, but under separate cover. The proposed limit of disturbance for the Jefferson Compressor Station has been added to the pipeline E&SCP on Sheets 29 and 81 of 174. The limit of disturbance acreage for this proposed facility has increased by 0.76 acres, from 7.67 to 8.43 acres.***

7. Topographic lines are not labeled at least 10-20 ft. contours should be noted and bolded.

The plan sheets have been revised to include contour elevations at a minimum of 10-foot intervals.

8. Please brighten (bold) wetland boundaries on the plan drawings as they are hard to discern from surrounding vegetation in the aerial overlay.

The aerial background contrast has been adjusted to allow for better visibility of the wetland boundaries.

9. Please call-out stream Chapter 93 designations and naming in the plan drawings and tables provided.

The tables and plan drawings have been revised to include the requested Chapter 93 designations of all of the streams within the proposed construction right-of-way (ROW). In addition the stream names and Chapter 93 designations have been shown on the plan view.

10. On the plan drawings any un-named tributaries can be described as tributary to the receiving stream that has a designated listing. These are listed in the PA Code Title 25 Chapter 93 for the Ohio River basin in PA or available on-line.

The drawings have been revised to include names of all streams crossed by the proposed project, as well as the PA Chapter 93 state water quality classifications. All unnamed tributaries have been renamed to "Tributary to (Receiving Stream)".

11. The table numbers for the streams are not easy to read and do not appear to be in numerical order. Please reconfigure the numbering/naming system of both the streams and wetlands.

The tables were arranged by resource occurrence in relation to pipeline milepost, followed by resource occurrences on access roads and ancillary sites. For ease of review, the tables have been re-organized to show the resource identification, followed by the location by milepost within the first two columns.

12. Please show on the plan drawings High Quality watershed areas that require ABACT controls.

High-Quality – Warm Water Fishery (HQ-WWF) waters were shown within the Environmental Construction Exclusion band located at the top of Sheets 40 and 41 of 174. These specific areas and their associated Anti-degradation Best Available Combination of Technologies (ABACT) have been highlighted to stand out.

13. Reflect in your construction sequence flagging prior to earth disturbance when crossing from WWF to HQ or TSF so that the contractor will be clear what BMP is to be employed within that specific watershed.

Step 2 of the General Construction Sequence and BMP Installation on Sheet 2 of 174 has been revised to indicate the field identification of HQ-WWF watersheds. A waiver of time of year restrictions for TSF has been received from the Pennsylvania Fish & Boat Commission (see Section 8 – PNHP Review in the ESCGP-1 application); therefore, TSF will not be field-identified, but the BMPs to be utilized within TSF watersheds/crossings will be the same as utilized for WWF streams.

14. Rock construction entrances in HQ areas should provide a tire wash along with the RCE.

Rock construction entrances (RCEs) with wash racks are indicated on the plan sheets within the Environmental Construction Exclusion band, located at the top of Sheets 40 and 41 of 174. The information in this band indicates the location of the HQ-WWF watersheds and the associated ABACT best management practices (BMPs) to be utilized within these watersheds, which include RCEs with wash racks. Please refer to Detail 1 the RCE with wash rack typical detail on Sheet 13 of 174.

15. Please show the soil types and limitations and what is being done to address the limitations. You may call out the measures on the horizontal stationing.

The soil types that cross the pipeline centerline are shown within the Environmental Soil Type band, located at the top of the plan view sheets. The limits of the soil types are shown on the plan view, located within the ESCGP-1 boundary, and are denoted as a single black line. The soil types within the project area are provided in the tables on Sheet 6 of 174, which includes the BMPs recommended for addressing the soil limitations.

A note has been added to the Environmental Soil Type band that includes a reference to the above-referenced table on Sheet 6 of 174.

16. Please mark your proposed ESCGP-1 boundary and include all temporary and permanent access roads.

The ESCGP-1 boundary is shown on the plan sheets, identified by the line type provided in the legend. Please refer to the L&E line which was included for all proposed facilities located outside of the ESCGP-1 boundary for the pipeline centerline, such as ancillary sites and access roads that either depart from or are completely outside of the pipeline ESCGP-1 boundary. For these facilities, the L&E line type represents the limit of disturbance, as well as the ESCGP-1 boundary.

17. Please note on the plan drawings any access roads that will be straightened, widened, reshaped or that are adding new or increased pipe sizing for cross drains.

Please refer to Sheets 80 through 174, which provide the plan views for all of the access roads and ancillary sites. For each access road, the existing width was indicated, as well as the proposed modifications (most of which are resurfacing, as necessary).

For ease of review, a summary table that lists each access road and the proposed modifications is included on Sheet 6 of 174.

18. What measures are being taken when road improvements are planned within 50' of a stream channel (HQ or not).

In addition to the drainage controls specified on the access road plans on Sheets 80 through 139 of 174 For road widening, BMPs shall be installed as indicated on Details 2 and 3 on Sheet 13 of 174,. Drainage structures for access road widening shall be in accordance with Details 9, 10, 11, and 12 on Sheets 17 and 18 of 174, which are also called out on the access road plans, Sheets 80 through 139 of 174. The details indicated above address BMPs to be utilized when road improvements are planned within 50' of a stream channel.

Additionally, details 13, 14, 15, and 25, as well as step 16 of the General Construction Sequence and BMP Installation, have been revised to indicate that all disturbed areas within 50' of stream channels will be immediately stabilized with erosion control blanketing. Step 2 of the General Construction Sequence and BMP Installation has been revised to include the requirement that all USACE 404, PADEP Chapter 105, and WVDEP 401 permits are obtained prior to conducting any work in streams and wetlands, within the respective jurisdictions.

19. Regarding stream crossings of the pipeline, 3 ft. of 5 ft. of cover is shown under 'General Construction Sequence Notes' (sheet 19). Which would be correct?

The General Construction Sequence Notes on Sheet 20 have been revised to coincide with the required depth of cover at 3 feet over top of the pipe.

20. Please take off the riprap apron (appears to be unnecessary disturbance) at the discharge area above the stream and possibly use a portable splash pad or discharge into a rocky, stable area of the stream itself (Detail 13, sheet 18).

Detail 13 on Sheet 19 of 174 has been revised to indicate discharge within the stream channel or a stable area.

21. Please number your construction sequence for ease of review and for the field contractor's use.

The General Construction Sequence and BMP Installation on Sheet 2 of 174 has been numbered for ease of review for the field contractor's use.

22. Please specify the installation of necessary BMP's prior to access road construction or other earth disturbance.

Step 5 of the General Construction Sequence and BMP Installation on Sheet 2 of 174 has been revised to indicate that BMPs must be installed prior to access road widening, as indicated on Details 2, 3, 4, and 5 of Sheets 13 and 14 of 174.

23. Please address the handling and disposal of drilling fluids from horizontal boring areas.

EQT's plan for handling drilling fluids from horizontal boring, Horizontal Directional Direction Drill Contingency Plan is provided on Sheet 12 of 174.

24. Please indicate the proper procedure should 'frac-out' occur in a stream or wetland crossing.

EQT's HDD Contingency Plan is provided on Sheet 12 of 174.

25. Please note on the plans which specific areas have the in-stream work restriction for stocked trout streams "TSF" (March 1 through June 15), or provide the GCCD correspondence that a construction variation was granted by the PA Fish & Boat Commission.

The plan sheets have been revised to indicate which streams are TSF. This information is provided within the Environmental Construction Exclusion band, located at the top of each plan sheet.

Additionally, correspondence from the PA Fish & Boat Commission (PFBC) has been received waiving the March 1 through June 15 seasonal restriction for the proposed Project. A copy of the email from Mr. Shervinskie of the PFBC is provided as part of this response package (See Section 8 of the ESCGP-1 Application) and has been included as Appendix E of the PCSM Plan.

26. For rock construction entrances (RCE) at stream and wetland crossings, please show some type of BMP to capture sediments such as a small sediment trap or composted filter sock trap. How do you propose to handle runoff at all stream and wetland crossings?

A note has been added to Detail 1 on Sheet 13 of 174 to indicate that waterbars (Detail 17 on Sheet 22 of 174) are to be installed immediately upslope of any rock construction entrances RCEs that are adjacent to streams and/or wetlands. Additionally, Detail 13 Typical Stream Crossing – Dam and Pump Method on Sheet 19 of 174 and Detail 16 Typical Wetland Crossing on Sheet 21 of 174 have been revised to include the installation of waterbars and mulch socks, as requested, while Details 14 and 15 on Sheet 20 of 174 previously included waterbars as part of the BMPs for those stream crossing methods.

27. Please remove the note in the sequence about completing approx.3,000 ft./day of silt fence or compost filter sock, as it should vary widely with terrain, site conditions and other variables (sheet 2 of 169).

Sheet 2 of 174 has been revised to remove the reference to the daily rate of filter fabric fence or compost filter sock installation.

28. Note that topsoil and subsoil will be segregated for the entire length of the project and label any storage areas for such.

As stated in Step 10 in the General Construction Sequence and BMP Installation on Sheet 2 of 174, topsoil and subsoil segregation shall occur in agricultural, wetland, or residential areas only. Topsoil and subsoil segregation will not be utilized in all other upland areas, unless specifically

requested by the landowner. Additionally, all top and subsoil stockpiling will be located within the construction ROW. Please refer to Detail 16 on Sheet 21 of 174 for an example of how the topsoil and subsoil will be stockpiled within the construction ROW.

29. Any pumping from trenches should first go through a filter bag.

Step 11 of the General Construction Sequence and BMP Installation on Sheet 2 of 174 has been revised to indicate that pumped water filter bags are to be utilized for dewatering any trench.

30. Erosion control blankets (ECB) should be installed when working within 50' of a stream or within 100' of a High Quality watershed (HQ) streams and/or slopes greater than 3:1.

Details 13, 14, and 15 on Sheets 19 and 20 of 174 have been revised to indicate the installation of ECB within 50' and 100' of stream crossings and HQ-WWF stream crossings, respectively. The plan sheets have been modified to indicate the locations of ECB to be utilized on 3:1 or steeper slopes, which is provided within the profile portion of the plan sheets. Additionally, Detail 25 on Sheet 26 of 174 has been revised to indicate the installation of ECB within 50' and 100' of WWF and HQ-WWF stream crossings, respectively.

31. Excess excavated materials that will be spread over the ROW in a 'thin layer' – please specify the maximum thickness here.

Step 20 of the General Construction Sequence and BMP Installation on Sheet 2 of 174 has been revised to indicate that excess material will be spread in a thin layer as to not alter the pre-existing contours and tie into the existing contours to create positive stormwater drainage within the ROW. Any offsite disposal shall be at a facility operation under a current National Pollution Discharge Elimination System permit with an approved E&SCP.

32. Where noted that access roads will be scarified to a depth of 2 feet, please limit this to approx. 6-8" to avoid unnecessary disturbance (sheet 2 of 169).

Step 21 within the General Construction Sequence and BMP Installation on Sheet 2 of 174 has been revised to change the depth of scarification on access roads within the construction ROW from 2 feet to 6 - 8 inches.

33. Under 'BMP Maintenance Schedules' (sheet 3 of 169), erosion control blankets should be "inspected" weekly, not "inserted".

The ECB Maintenance Schedule within the BMP Maintenance Schedule on Sheet 3 of 174 has been revised to correct "inserted" to "inspected".

34. Under the pumped water filter bag maintenance, sediments are not usually "removed" when the bag is "half full". They are usually removed and replaced. Please update the maintenance detail to reflect this comment.

The Pumped Water Filter Bag Maintenance Schedule within the BMP Maintenance Schedule on Sheet 3 of 174 has been revised to indicate that the filter bag is to be removed and replaced when it is half full.

35. Separate out your maintenance schedules for fabric filter fence, compost filter socks, and straw bale barriers.

Separate maintenance schedules have been provided on Sheet 3 of 174 for filter fabric fence, compost filter socks, and straw bale barriers.

36. Compost filter socks are not usually replaced with rock filters but replaced under the manufacturer's recommendations and instruction. Please check the manufacturer's recommendation and update the maintenance.

The compost filter sock maintenance plan has been revised on Sheet 3 of 174 to indicate that the damaged sock should be repaired/replaced according to the manufacturer's specifications. Note that due to the size of the Project, multiple sock manufacturers may be utilized.

37. Please show maintenance plans and locations for the following: erosion control blankets, water bars, filter berms and any sediment traps, vegetated channels, or channels and outlet protection.

The plan sheets have been revised to indicate the location of ECB locations, within the profile band located at the bottom of each plan sheet. Please refer to the ECB maintenance schedule on Sheet 3 of 174.

Water bar locations are provided within the profile band located at the bottom of each plan sheet. Please refer to the Slope Breakers (Waterbars) Maintenance Schedule within the BMP Maintenance Schedules on Sheet 3 of 174.

As indicated on the Erosion, Sediment, and Stormwater Control Plan for Oil and Gas Operations (5500-FM-OF111), Filter berms and Sediment traps are not planned for utilization within this proposed project; therefore, details, locations, and maintenance notes have not been provided as part of this plan.

The locations of vegetated and riprap channels are identified in the tables provided in Details 9 and 10, as well as on the access road plans on Sheets 80 through 139 of 174. Access road drainage and rock apron details are provided in Details 11 and 12 on Sheet 18 of 174, and locations are provided on the access road plans on Sheets 80 through 139 of 174. Maintenance schedules are provided for all of the above-referenced BMPs within the BMP Maintenance Schedules on Sheet 3 of 174.

38. Please note that written records of on-site inspections and maintenance activities (schedules) are now required. This should be noted in the general maintenance section of your plan.

The General Maintenance Note for All BMPs section under the BMP Maintenance Schedules on Sheet 3 of 174 has been revised to indicate that

written records of all inspections and corrective actions shall be maintained and available on-site.

39. Under “Detail 2 and 3”, existing access road modifications are not all listed on the planned drawings as impacts (sheets 79 through 136). They are called: “proposed access road/temporary road/existing road” and would be considered impacts by the DEP due to the road widening and modifications that involve earth disturbance.

Most of the access roads proposed for use will require re-surfacing, with no widening planned. As detailed in comment and response 17, a summary table indicating the proposed access road modifications has been provided for reference on Sheet 6 of 174. Additionally, please refer to the access road plans on Sheets 80 through 139 of 174, which provides the existing conditions of the road, as well as the proposed modification.

40. Road widening at stream locations (as shown on detail 5, sheet 13) would be considered an encroachment and require permitting under a GP application.

All proposed road widening at streams and wetlands has been included as part of the Pennsylvania Department of Environmental Protection’s (PADEP’s) Chapter 105 General Permit (GP) Application, which shall be obtained prior to conducting any work within streams and/or wetlands. Each stream and wetland crossing has been provided within the PADEP’s Multicrossing Table (Section 9 of the GP Application).

41. We would like to see a sediment barrier such as a “hook” or composted filter sock at the outlet end of the slope breakers or water bars (Detail 17, sheet 21).

Detail 17 on Sheet 22 of 174 has been revised to include a depiction of the sediment barrier “hook” to compliment the previously provided note on the typical drawing, which stated “sediment barrier (filter fabric fence, compost filter sock, or straw bale barrier) per Details 6, 7, or 8, respectively”.

42. Filter fabric fence (silt fence) should be shown on the plan drawings and calculation tables need to be provided to account for slope and distance above (proper design).

As previously discussed, due to the scale of the plan sheets (1”=200’), providing the location of filter fabric fence would clutter the plan view and not provide beneficial information regarding the installation of this BMP. Please refer to Details 2, 3, and 4 on Sheet 13 of 174, Detail 5 on Sheet 14 of 174, Detail 13 on Sheet 19 of 174, Details 14 and 15 on Sheet 20 of 174, Detail 16 on Sheet 21 of 174, Detail 17 on Sheet 22 of 174, Detail 20 on Sheet 24 of 184, and Detail 21 on Sheet 25 of 174 for the locations of filter fabric fence installations, which are associated with stream, wetland, and road crossing typicals. For these crossings, waterbars are to be installed immediately upslope of the proposed crossings; thereby, limiting the slope length above the filter fabric fence to 50 feet or less. Considering this application, Equitrans and their contractor(s) will be required to follow the maximum slope lengths provided in the table within Detail 6 on Sheet 15 of 174.

43. Please provide the exact locations of channel linings on the plan drawings.

Please refer to Details 9 and 10 on Sheet 17 of 174, which provide channel lining locations on a station basis specific to the access roads that are proposed for widening. For the station locations of the channel linings, please refer to the following access road plan sheets:

- ***Sheet 86 of 174 – 302-127-PY (Route 21);***
- ***Sheet 108 of 174 - AR-302-033;***
- ***Sheets 112 and 113 of 174 - AR-302-038;***
- ***Sheets 112 and 113 of 174 - AR-302-038A;***
- ***Sheet 114 of 174 - AR-302-039;***
- ***Sheet 115 of 174 - AR-302-040;***
- ***Sheet 116 of 174 - AR-302-041A;***
- ***Sheets 125 and 126 of 174 – AR-302-047;***
- ***Sheet 134 of 174 – AR-302-052; and,***
- ***Sheets 135 of 174 – AR-302-053A.***

44. The Koratich ancillary site does not depict the current conditions of the site.

Sheet 86 of 174 has been revised to correct the aerial background to a more recent depiction of the area proposed for use as ancillary site, 302-127-PY (Route 21).

Temporary diversion channels are provided as indicated on Sheet 17 of 174, and as shown on the plan view located on Sheet 86 of 174.

45. Include the compressor station ESCGP-1 boundary (80 of 169).

The ESCGP-1 boundary provided on Sheet 81 of 174 includes the entire property on which the proposed compressor station is to be constructed. The LOD associated with the proposed compressor station is included within the depicted ESCGP-1 boundary.

46. Include the detail number, pipeline route, E&S plan sheet number, and impact descriptions on the multi-crossing table for all streams and wetlands. Pages 1-4 can be eliminated because the information is repeated.

The PADEP Multi-Crossing Table has been revised to include the detail number (s), pipeline route, E&S plan sheet number, and impact descriptions for all streams and wetlands. The stream and wetland tables on Sheets 7 through 11 of 174 have also been revised to include this information.

The revised PADEP Multi-crossing Table is provided as a separate submission covering the revisions to the PADEP Chapter 105 GP-5, 7, and 8 application, which was previously submitted to your office on April 1, 2011.

47. In areas where the proposed bypass channels are used, how will the second channel not be interrupted by pipe?

The Erosion and Sediment Controls for In-Channel Work on Sheet 5 of 174, included notes on bypass channels, which are not proposed for use in this project.

Please refer to Details 13, 14, and 15 on Sheets 19 and 20 of 174 for the dam and pump, flume pipe, and open cut (no flow conditions only) stream crossing methods; respectively, that are planned for this Project.

The reference to the temporary bypass channel has been removed, per your request.

48. What is Timber Riprap? (5 of 169)

The PADEP's Access Road Wetland Crossing notes on Sheet 5 of 174 have been revised to correct "timber riprap" to "timber matting".

49. Please include all notes and maintenance, culvert sizing requirements, minimum depth of fill, etc. for all stream crossing details.

Culvert installation notes from the PADEP GP-7 typicals are provided in Detail 5 on Sheet 14 of 174.

Maintenance notes for permanent culverts have been provided in the BMP Maintenance Schedules on Sheet 3 of 174.

Culvert type and sizing for all permanent access road stream crossings is provided in table format within Detail 5 for the permanent crossings on Sheet 14 of 174.

Minimum depth of fill is provided in Detail 5 on Sheet 14 of 174.

C. Compressor Station

NOTE: All of the responses referenced below were provided by L.A. Gates Co. regarding the comments on the Jefferson Compressor Station E&SCP.

50. Under the Jefferson Compressor Station project (L.A. Gates Co.) filter fabric fence is shown running up and down hills and not along the contour (sheet 1).

Silt fence that was not following contours was removed.

51. Under Attachment E, Construction Sequence, please address the ephemeral stream flow in the center of the fill slope. An under-drain (pipe) is likely needed here.

An under-drain was added underneath the fill area.

52. Please give consideration to the use of benches (shown in the DEP E&S Manual) in lieu of the fill slope.

Diversions were preferred over benches for the following reasons: 1) benches would require more fill material which consequently would have required more excavation, thereby increasing the footprint of the disturbed area; 2) a 3:1 slope without benches was chosen over a 2:1 slope with benches, due to

increased soil erosion on the steeper slope; 3) diversion of the sheet flow coming off the compressor station pad into the rock lined channels along the toe of the fill, increases the retention time and slowed the velocity and erosion during a 2-year storm event.

53. The top of the slope should have a berm installed instead of silt fence.

Silt fence was replaced with an earthen berm across the top of the slope.

54. Please increase the size of the riprap for the channels to R-5 (instead of R-4).

L.A. Gates, Co.: Rip-rap size was increased to R-5.

55. Please show a limit of disturbance – ESCGP-1 line on the plan drawing (sheet 1). If limit of disturbance is revised to include additional area please include that revision on a corrected NOI.

The topsoil stockpile location was added to the plan drawing.

56. Show the topsoil stockpile location.

The topsoil stockpile location was added to the plan drawing.

57. Please correct item #7 in the construction sequence to read that areas will be stabilized, seeded, and mulched within 4 days of inactivity.

Correction was made to item #7 in the construction sequence, as requested.

58. Under item #12 please specify what E&S devices are needed.

The reference to additional E&S devices was removed; therefore, no specifications are needed.

59. Please place item #16 into the Maintenance program in regard to the necessary inspections that are required.

Necessary inspections were added as item #16 in the Maintenance program.

60. The post construction stormwater management plan (PCSM) should be designed to show no increase in the 2 year, 24-hr. storm event for the compressor area. Please provide all necessary calculations.

Calculations were added to the application, as Attachment F.

61. Where are the compressors/buildings located? Please show on the plan drawings.

All buildings, compressors, and above ground appurtenances were added to the plan drawing.

62. Impervious areas must have stormwater infiltrated to the 2 year, 24-hr. storm and the use of DEP worksheets 1 through 5 and #10 is recommended.

Calculations were added to the application, as Attachment F.

We appreciate your continued efforts in the review of this Project. If you have any questions concerning the above-referenced revisions, please call me at 412-395-3640 or Brook Bertig-Coll of URS Corporation at 412-503-4595.

Sincerely

Equitrans L.P.

URS Corporation



Hanna McCoy
Environmental Supervisor – Permitting



Brook Bertig-Coll
Project Manager/Sr. Environmental Scientist

cc: Kevin Gabig, USACE – Pittsburgh District (letter only)
Darl Rosenquest, P.E., PADEP – California District Office

Enclosures

JUL 28 2011

EQUITRANS SUNRISE PROJECT

EROSION AND SEDIMENT CONTROL GENERAL PERMIT APPLICATION (ESCGP-1)

Prepared for
Equitrans, L.P.
EQT Plaza
625 Liberty Avenue
Pittsburgh, PA 15222

EQUITRANS

URS

URS Corporation
501 Holiday Drive, Suite 300
Pittsburgh, PA 15220

June 2011

THIS PLAN HAS BEEN REVIEWED
for the Department of Environmental Protection

By: Lindsay Kozlowski

Date: 7/28/11

and determined to adequately satisfy the purpose
and requirements of 25 PA Code Chapter 102, to
minimize the potential for accelerated erosion
and sedimentation to the waters of the
Commonwealth.

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Section 1

Notice of Intent (NOI) Administrative

Completeness Checklist



**NOTICE OF INTENT (NOI) ADMINISTRATIVE COMPLETENESS CHECKLIST
EROSION AND SEDIMENT CONTROL GENERAL PERMIT FOR EARTH DISTURBANCE
ASSOCIATED WITH OIL AND GAS EXPLORATION, PRODUCTION, PROCESSING, OR
TREATMENT OPERATIONS OR TRANSMISSION FACILITIES
(ESCGP-1)**

Please check the following list to make sure that you have included all the required information. Place a check mark in the column provided for all items completed and/or provided. Failure to provide all of the requested information will delay the processing of the application, may preclude the use of the expedited review, and may result in the application being placed ON HOLD with NO ACTION, or being considered withdrawn and the application file closed.

THIS CHECKLIST MUST BE COMPLETED AND ENCLOSED WITH YOUR GENERAL PERMIT NOI

✓CHECKLIST FOR EROSION AND SEDIMENT CONTROL GENERAL PERMIT NOI				Minor revisions are not required to be submitted to the regional office for review.	
<input checked="" type="checkbox"/> NEW NOI <input type="checkbox"/> RENEWAL <input type="checkbox"/> SUBSEQUENT PHASE <input type="checkbox"/> Major Revision <input type="checkbox"/> Minor Revision If a Renewal, Subsequent Phase or Revision, identify ESCGP-1 Permit Authorization # _____					
	APPLICANT <u>Equitrans, L.P.</u> PROJECT and PHASE NAME <u>Equitrans Sunrise Project</u>			Applicant Check ✓ if Included	Official Use Only
1.	Fully completed, properly signed and notarized Notice of Intent form (1 original and 2 copies). (Not required for subsequent phases) Section 2			<input checked="" type="checkbox"/>	<input type="checkbox"/>
2.	Complete Erosion and Sediment Control (E&S) Plans. (3 copies) Section 3 NOTE: Identify Location as Drawings (D), Narrative (N). (Identify Not Applicable as "N/A".)			<input checked="" type="checkbox"/>	<input type="checkbox"/>
	a. Topographic features	Location: <u>Section 3</u>	Page: <u>Appendix J</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b. Soils information	Location: <u>Section 3</u>	Page: <u>Appendix D</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c. Proposed alteration	Location: <u>Section 3</u>	Page: <u>Appendix J</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d. Amount of runoff	Location: <u>Section 3</u>	Page: <u>Appendix F</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e. Location of water which may receive runoff and receiving water classification, pursuant to Chapter 93 and the "statewide existing use listing".	Location: <u>Section 3</u>	Page: <u>Appendix J & Appendix C</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	f. Supporting calculations	Location: <u>Section 3</u>	Page: <u>Appendix F</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	g. BMPs used before, during, and after earth disturbance, including special protection BMPs.	Location: <u>Section 3</u>	Page: <u>Appendix J</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	h. Maintenance program	Location: <u>Section 3</u>	Page: <u>Appendix J</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	i. Plan drawings and narratives	Location: <u>Section 3</u>	Page: <u>Appendix J</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	j. Sequence of BMP installation and removal	Location: <u>Section 3</u>	Page: <u>Appendix J</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	k. Recycling and disposal methods	Location: <u>Section 3</u>	Page: <u>Appendix J</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3.	Permit filing fee of \$500 plus \$100/Acre of earth disturbance payable to the appropriate Clean Water Fund. (Not required for subsequent phases) Section 4	Location: <u>Section 4</u>	Page: _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4.	Location map: USGS of scale 1:24,000 indicating project location and boundaries. (3 copies) (Not required for subsequent phases) Section 5	Location: <u>Section 5</u>	Page: _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>

✓CHECKLIST FOR ESCGP-1				Applicant Check ✓ if Included	Official Use Only
5.	Act 14 Municipal Notifications to the local municipality and county governments that specify that the application is for a Erosion and Sediment Control General Permit for Earth Disturbance Associated with Oil and Gas Activities. (3 copies) A "sample" notification letter is provided as Appendix A of the instructions. (Not required for subsequent phases) Section 6	Location: <u>Section 6</u>	Page: _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6.	Proof of receipt of municipal notifications; copies of certified mail receipts or acknowledgment letters from the local municipality and county government. (3 copies) (Not required for subsequent phases) Section 7	Location: <u>Section 7</u>	Page: _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7.	The PNHP Review receipt for the project area. Include impact clearance letters if proof of agency coordination is required. (3 copies) (Not required for subsequent phases if review receipt or impact clearance letters are still valid) Section 8	Location: <u>Section 8</u>	Page: _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8.	Complete Post Construction Stormwater Management (PCSM)/Site Restoration Plan. (3 copies) NOTE: Identify Location(s) by Drawing (D), Narrative (N) and page number(s). Plans must address the following: (Identify Not Applicable as "N/A".) Section 10			<input checked="" type="checkbox"/>	<input type="checkbox"/>
	a. Written Narrative	Location: <u>Section 10</u>	Page: _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	b. Location of BMPs showing final contours	Location: <u>Section 10</u>	Page: <u>Appendix B</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c. Plan drawings of permanent stabilization	Location: <u>Section 10</u>	Page: <u>Appendix B</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d. Plan drawings of BMPs	Location: <u>Section 10</u>	Page: <u>Appendix B</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e. Operation and maintenance procedure	Location: <u>Section 10</u>	Page: <u>Appendix B & Appendix C</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	f. Supporting calculations or measurements	Location: <u>Section 10</u>	Page: <u>Appendix D</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	g. Design frequency storm rainfall amount	Location: <u>Section 10</u>	Page: <u>Appendix D</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	h. Area of impervious surface	Location: <u>Section 10</u>	Page: <u>Appendix D</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	i. Curve Number or Runoff Coefficient	Location: <u>Section 10</u>	Page: <u>Appendix D</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	j. Runoff from the design frequency storm	Location: <u>Section 10</u>	Page: <u>Appendix D</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	k. Volume of water infiltrated through BMPs	Location: <u>Section 10</u>	Page: <u>Appendix D</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	l. Peak discharge rate from the design frequency storm	Location: <u>Section 10</u>	Page: <u>Appendix D</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

9.	Expedited Review	Is the expedited review being requested?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
	If yes all of the following items must be completed:				
	a.	E&S and PCSM/Restoration Plan drawings and narrative sealed by licensed professional	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	b.	Licensed professional prepared, sealed, and certified application/NOI	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	c.	Licensed professional listed location and date of DEP training attended in application/NOI	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	a.	Initial Phase - Is the master plan included?	Yes <input type="checkbox"/> No <input type="checkbox"/>		
	b.	Subsequent Phase – Is the subsequent phase identified on the master plan?	Yes <input type="checkbox"/> No <input type="checkbox"/>		
11.	Certification for Subsequent Phase Expedited Reviews			<input type="checkbox"/>	<input type="checkbox"/>
	Is the activity being conducted as a phased project and is an expedited review being requested?			Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
	If yes all of the following must be completed:				
<p>I do hereby certify to the best of my knowledge, information, and belief, that the Erosion and Sediment Control and PCSM/Site Restoration Plan are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.</p>					
Signature					
Company			URS Corporation		
Address			501 Holiday Drive, Suite 300, Pittsburgh, PA 15220		
Phone			412-503-4616		
Most Recent DEP Training Attended			Location	Indiana, PA	Date
					May 4, 2011
					
EXPEDITED REVIEW PROCESS					
<p>In addition to the certification required above applicants using the expedited permit review process must attach an E&S and PCSM/Site Restoration Plan developed and sealed by a licensed professional engineer, surveyor or professional geologist. The plans shall contain the following certification:</p> <p><i>I do hereby certify to the best of my knowledge, information, and belief, that the Erosion and Sediment Control and PCSM/Site Restoration Plan and Post Construction BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.</i></p>					
12.	Permit Renewals	Is a permit renewal being requested?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	If yes all of the following must be completed:				
	a.	Administratively complete, signed, and notarized Notice of Intent Form, including Items 1-8. (1 signed original and 2 copies of the NOI/application)	<input type="checkbox"/>	<input type="checkbox"/>	
	b.	Permit filing fee of \$500 plus \$100/Acre of earth disturbance payable to the appropriate Clean Water Fund.	<input type="checkbox"/>	<input type="checkbox"/>	

Section 2

**NOI for Coverage under the Erosion and Sediment Control
General Permit (ESCGP-1)**



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATERSHED MANAGEMENT
BUREAU OF OIL AND GAS MANAGEMENT

OFFICIAL USE ONLY

ID # _____

Date Received _____

**NOTICE OF INTENT FOR COVERAGE
UNDER THE EROSION AND SEDIMENT CONTROL GENERAL PERMIT (ESCGP-1)
FOR EARTH DISTURBANCE ASSOCIATED WITH OIL AND GAS EXPLORATION,
PRODUCTION, PROCESSING OR TREATMENT OPERATIONS OR TRANSMISSION
FACILITIES**

READ THE STEP-BY-STEP INSTRUCTIONS PROVIDED IN THIS PERMIT APPLICATION PACKAGE BEFORE COMPLETING THIS FORM.

PLEASE PRINT OR TYPE INFORMATION IN BLACK OR BLUE INK.

APPLICATION TYPE	NEW <input checked="" type="checkbox"/>	RENEWAL <input type="checkbox"/>	REVISED <input type="checkbox"/>	EXPEDITED <input checked="" type="checkbox"/>	
SECTION A. E&S PLANNING REQUIREMENTS					
1. Total Project Area (Acres): <u>1,289</u> Total Disturbed Area (Acres): <u>587</u>					
2. Project Name <u>Equitrans Sunrise Project</u>					
3. Project Type <input type="checkbox"/> Oil/Gas Well <input checked="" type="checkbox"/> Pipeline/Transmission Facility <input type="checkbox"/> Processing Facility <input type="checkbox"/> Treatment Facility <u>Project Description</u> <u>The proposed Project consists of adding approximately 41.5 miles of 24-inch (H-302), 0.21 mile of 20-inch (H-309), and 2.7 miles of 16-inch (H-306) pipeline parallel to existing EQT transmission and gathering pipelines; replacing 2.6 miles of existing 16-inch pipeline (H-111 Reactivation); 4.8 miles of 20-inch pipeline (H-111 uprating with addition of over-pressure protection facilities), and installing a total of approximately 14,205 hp of new compression consisting of three units. The proposed Project will have a total of five interconnections; three to existing EQT facilities and two to foreign pipelines, mainline block valves, launchers and receivers, control systems, and other facilities.</u>					
4. Please provide the latitude and longitude coordinates for the center of the project. The coordinates should be in degrees, minutes and seconds (dd mm ss.ss) Latitude <u>39</u> degrees <u>45</u> minutes <u>57</u> seconds Longitude <u>-80</u> degrees <u>20</u> minutes <u>50</u> seconds Reference Datum: <input type="checkbox"/> North American Datum 1983 <input type="checkbox"/> North American Datum 1927 <input checked="" type="checkbox"/> World Geodetic System 1984 Horizontal Collection Method: <input type="checkbox"/> GPS <input type="checkbox"/> Interpolated from U.S.G.S. topo map <input type="checkbox"/> DEP's eMAP					
5. U.S.G.S. 7.5 min. Quad Map Name <u>PA Quads: Mather; Garards Fort, Oak Forest, Holbrook, New Freeport, and Hundred</u>					
6. Will the project be conducted as a phased permit project? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, Include Master Site Plan Estimated Timetable for Phased Projects <input type="checkbox"/> Additional sheet(s) attached					
Phase No. or Name	Description	Total Area	Disturbed Area	Start Date	End Date

7. Existing and previous land use				
8. Other Pollutants: Will the stormwater discharge contain pollutational substances other than sediment? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, explain and provide any available quantitative data.				
9. Will fuels, chemicals, solvents, other hazardous waste or materials be used or stored on site during earth disturbance activities? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If yes, a PPC Plan is required) Section 9				
10. Receiving Water/Watershed Name <u>Section 3, Appendix C</u> Chapter 93 Designated Use or Existing Use Stream Classification <input checked="" type="checkbox"/> High Quality <input type="checkbox"/> Exceptional Value <input type="checkbox"/> Other Secondary Water		Name of Municipal or Private Separate Storm Sewer Operator N/A		
SECTION B. APPLICANT INFORMATION				
Applicant's Last Name McCoy		First Name Hanna	MI E	Phone 412-395-3640 FAX 412-395-2996
Organization Name or Registered Fictitious Name Equitrans, L.P.			Phone FAX	
Mailing Address 625 Liberty Avenue	City Pittsburgh		State PA	ZIP + 4 15222
Co-Applicant's Last Name		First Name	MI	Phone FAX
Organization Name or Registered Fictitious Name			Phone FAX	
Mailing Address	City		State	ZIP + 4
SECTION C. SITE INFORMATION				
Site Name Equitrans Sunrise Project				
Site Location Greene County, PA				
Site Location -- City Franklin, Freeport, Gilmore, Jefferson, Wayne, and Whiteley Townships		State PA	ZIP+4 15352, 15357, 15362, 15370	
Detailed Written Directions to Site From the Waynesburg exit on I-79 (Exit Number 14), take PA 21 East for 2.2 miles. Turn left at Ridge Road and travel 0.5 miles. Take the second right onto Ridge Road then turn right at Denny Hill Road. After 1.3 miles, you will arrive at the intersection of Denny Hill Road and Ridge Road. This is the location of the proposed Jefferson Compressor Station. From this point, the proposed pipeline runs through Greene County in a southwesterly direction until running into Wetzel County, WV. At this point, the pipeline runs in a south-southwesterly direction until reaching the Logansport Compressor Station. From the Logansport Compressor Station, an additional 2.7 miles of proposed pipeline runs in a southeasterly direction.				
County Greene	Municipality Franklin, Freeport, Gilmore, Jefferson, Wayne, Whiteley		City <input type="checkbox"/>	Boro <input type="checkbox"/>
			Twp <input checked="" type="checkbox"/>	

SECTION D. SITE RESTORATION PLAN AND POST CONSTRUCTION STORMWATER BMPS
See the Attached Instructions on how to Complete This Section

1. Site restoration should be designed to use natural measures to eliminate pollution, infiltrate runoff, not require extensive construction and maintenance efforts, promote pollutant reduction, preserve the integrity of stream channels, and protect the physical, chemical and biological qualities of the receiving water.

Check those that apply:

- ☐ The Site Restoration Plan and PCSM BMPs are developed to be consistent with an Act 167 Stormwater Management Plan approved by the Department after January 2005.
- ☐ The Site Restoration Plan and PCSM BMPs are developed to be consistent with existing local ordinances.
- ☒ The Site Restoration Plan and PCSM BMPs were developed to employ water quality design features and the PCSM BMPs will manage any net increase in stormwater runoff volume resulting from the 2-year/24-hour frequency storm.

2. Site Restoration Plan Contents

- a. Written narrative ☒ Yes ☐ No
- b. Plan drawings ☒ Yes ☐ No
- c. Identification and location of PCSM BMPs. Such PCSM BMPs should address: (1) infiltration; (2) volume and rate control; and (3) water quality treatment ☒ Yes ☐ No
- d. Operation and maintenance procedures ☒ Yes ☐ No
- e. Supporting calculations and measurements (when necessary): ☒ Yes ☐ No

Supporting calculations and measurements are required only if the answers to both questions 1 and 2 below are NO.

- 1) The approximate original contours of the project site will be maintained or replicated insuring the preservation of the pre-construction drainage pattern and features; and the disturbed areas will be re-vegetated or otherwise stabilized with pervious material. ☒ Yes ☐ No
- 2) PCSM BMPs will be employed which: use natural measures to eliminate pollution, do not require extensive construction and maintenance efforts, promote pollutant reduction, and are capable of controlling the net increase in the volume and rate of stormwater runoff from a 2-year/24-hour storm event, and the net increase in the volume of post construction runoff is infiltrated and/or dissipated away from surface waters of the Commonwealth. ☒ Yes ☐ No

If the responses to both questions 1 and 2, above are NO, please provide the requested post construction stormwater information in the Data Table for Supporting Calculations and Measurements below:

3. Explain how post construction stormwater runoff volume will be managed if BMPs will not infiltrate the total net increase in stormwater runoff volume. (Net increase volume = Post construction runoff volume minus Pre-construction runoff volume):

☒ N/A (check N/A only if BMPs **will** infiltrate all of the Net Change in Runoff)

4. Are there existing post construction stormwater management BMPs at this Location/Site? ☐ Yes ☒ No
- Do you plan to use and/or expand these existing post construction stormwater management BMPs? ☐ Yes ☐ No ☒ N/A

5. **SUMMARY TABLE FOR SUPPORTING CALCULATION AND MEASUREMENT DATA**
See the Instructions on how to Complete This Section

☒ Check this box if supporting calculations and measurements are NOT required in accordance with Section D.2.e on the preceding page.

Design storm frequency _____ Rainfall amount _____ inches	Pre-construction	Post Construction	Net Change
Impervious area (acres)			

Application

Volume of stormwater runoff (acre-feet) without planned stormwater BMPs			
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs			
Stormwater discharge rate for the design frequency storm			

SUMMARY DESCRIPTION OF POST CONSTRUCTION STORMWATER BMPs

6. In the lists below, check the BMPs identified in the Site Restoration Plan. The primary function(s) of the BMP listed in the functions column (infiltration/recharge; detention/retention; water quality). Additional functions may be added if applicable to that BMP. List the stormwater volume and area of runoff to be treated by each BMP type when calculations are required. If any BMP in the Site Restoration Plan is not listed below, describe it in the space provided after "Other".

BMP	Function(s)	Volume of stormwater treated	Acres treated
Bio-infiltration areas <input type="checkbox"/> Infiltration Trench <input type="checkbox"/> Infiltration Bed <input type="checkbox"/> Infiltrated Basin	Infiltration/Recharge	_____ _____ _____	_____ _____ _____
Natural Area Conservation <input type="checkbox"/> Streamside Buffer Zone <input type="checkbox"/> Wetland Buffer Zone <input type="checkbox"/> Sensitive Area Buffer Zone <input type="checkbox"/> Pre-Construction Drainage Pattern Intact	Infiltration/Recharge	_____ _____ _____ _____	_____ _____ _____ _____
Stormwater Retention <input type="checkbox"/> Constructed Wetlands <input type="checkbox"/> Wet Ponds <input type="checkbox"/> Retention Basin	Detention/Retention	_____ _____ _____	_____ _____ _____
Sediment and Pollutant Removal <input type="checkbox"/> Vegetated Filter Strips <input type="checkbox"/> Brush Barriers <input type="checkbox"/> Detention Basins	Water Quality Treatment	_____ _____ _____	_____ _____ _____
Access Road Design <input checked="" type="checkbox"/> Road Crowning <input checked="" type="checkbox"/> Ditches <input type="checkbox"/> Turnouts <input type="checkbox"/> Culverts <input type="checkbox"/> Roadside Vegetated Filter Strips	Infiltration/Recharge	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Stormwater Energy Dissipaters <input type="checkbox"/> Level Spreaders <input checked="" type="checkbox"/> Riprap Aprons <input type="checkbox"/> Upslope Diversions <input type="checkbox"/> _____	Infiltration/Recharge	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____

SECTION E: SPECIAL PROTECTION WATERS

List the reasonable and cost effective best management practices (BMPs) that will be used to meet the requirements of 25 Pa. Code Chapter 93. Recommended Special Protection Watershed BMPs are found in the Oil and Gas Operators Manual.

- | | | |
|---|--|---|
| <input checked="" type="checkbox"/> Minimize disturbed area | <input type="checkbox"/> Alternative Site Analysis | <input checked="" type="checkbox"/> Permanently stabilized ditches and Channels |
| <input checked="" type="checkbox"/> Earth Moving activities limited during rainstorms and spring thaw | <input checked="" type="checkbox"/> Roads stabilized with crushed rock and/or vegetation | <input checked="" type="checkbox"/> Rock lined culvert inlets and outlets |

- | | | |
|---|--|--|
| <input checked="" type="checkbox"/> No direct discharge to surface water | <input checked="" type="checkbox"/> Immediate Stabilization | <input checked="" type="checkbox"/> Proper vegetative cover techniques |
| <input checked="" type="checkbox"/> Designed temporary and permanent BMPs for surface water diversion | <input checked="" type="checkbox"/> Prompt site restoration | <input type="checkbox"/> 100 ft. vegetated riparian buffer |
| <input type="checkbox"/> Other | <input checked="" type="checkbox"/> Stabilized Upslope Diversion | |

SECTION F: COMPLIANCE REVIEW

☐ Yes ☒ No

Is the applicant in violation of any existing permit, regulation, order, or schedule of compliance issued by the Department within the last 5 years? If yes, provide the permit number or facility name, a brief description of the violation, the compliance schedule (including dates and steps to achieve compliance) and the current compliance status. (Attach additional information on a separate sheets, when necessary)

SECTION G. CERTIFICATION BY PERSON PREPARING APPLICATION

I do hereby certify to the best of my knowledge, information, and belief, that the Erosion and Sediment Control and PCSM/Site Restoration Plan are true and correct, represent actual field conditions, and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Print Name Robert D. Oates, P.E.

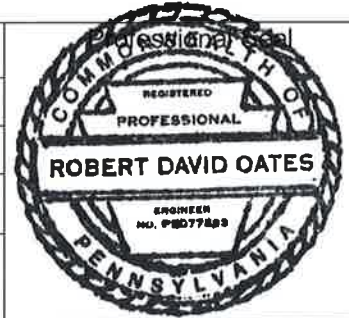
Signature 

Company URS Corporation

Address 501 Holiday Drive, Suite 300, Pittsburgh, PA 15220

Phone 412-503-4616

Most Recent DEP Training Attended Location Indiana, PA Date May 4, 2011



EXPEDITED REVIEW PROCESS

In addition to the certification required above applicants using the expedited permit review process must attach an E&S and PCSM/Site Restoration Plan developed and sealed by a licensed professional engineer, surveyor or professional geologist. The plans shall contain the following certification:

I do hereby certify to the best of my knowledge, information, and belief, that the Erosion and Sediment Control and PCSM/Site Restoration Plan and Post Construction BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

SECTION H. APPLICANT CERTIFICATION

Applicant Certification. I certify under penalty of law that this document and all attachments were prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. The responsible official's signature also verifies that the activity is eligible to participate in the permit, and that the applicant agrees to abide by the terms and conditions of the permit. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Hanna E. McCoy - Supervisor Environmental Permitting

Print Name and Title of Applicant

Print Name and Title of Co-Applicant (if applicable)

Hanna McCoy

Signature of Applicant

Signature of Co-Applicant

6-09-2011

Date Application Signed

Date Application Signed

Notarization

Sworn to and subscribed to before me this

9TH day of JUNE, 20 11

Commonwealth of Pennsylvania

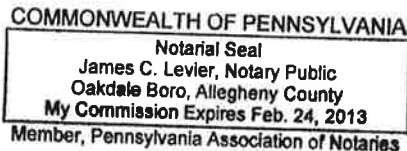
County of WASHINGTON

James C. Levier

Notary Public

My Commission expires FEBRUARY 24, 2013

AFFIX SEAL



NAME, ADDRESS AND PHONE NUMBER OF INDIVIDUAL TO BE CONTACTED
IF ADDITIONAL INFORMATION IS REQUIRED

Name

Address

Phone

Section 3

Erosion and Sedimentation Control Plan (E&SCP)

EQUITRANS SUNRISE PROJECT

EROSION, SEDIMENT AND STORMWATER CONTROL PLAN FOR OIL AND GAS OPERATIONS (PADEP FORM # 5500-FM-0G0111)

Prepared for
Equitrans, L.P.
EQT Plaza
625 Liberty Avenue
Pittsburgh, PA 15222

The Equitrans logo consists of the word "EQUITRANS" in a bold, blue, sans-serif font. The letter "Q" is stylized with a small loop at the bottom.The URS logo consists of the letters "URS" in a bold, blue, sans-serif font.

URS Corporation
501 Holiday Drive, Suite 300
Pittsburgh, PA 15220

June 2011



EROSION, SEDIMENT AND STORMWATER CONTROL PLAN FOR OIL AND GAS OPERATIONS

1. GENERAL INFORMATION

Project Name: Equitrans Sunrise Project Municipality: Franklin, Freeport, Gilmore, Jefferson, Wayne, and Whiteley
Townships: _____ County: Greene

Operator: Equitrans, L.P.

Address: 625 Liberty Avenue City: Pittsburgh State: PA Zip Code: 15222

Latitude: 39 degrees 45 minutes 57 seconds Longitude: -80 degrees 20 minutes 50 seconds

Reference Datum: ☐ North American Datum 1983 ☐ North American Datum 1927 ☒ World Geodetic System 1984

Contour Collection Method: ☐ GPS ☐ Interpolated from U.S.G.S. topo map ☐ DEP's eMAP

Total Project Area (Acres): 1,289 Total Disturbed Area (Acres): 587

Project Type (Check All that Apply)

☐ Oil/Gas Well ☒ Pipeline/Transmission/Compressor Facility ☐ Processing Facility ☐ Treatment Facility ☐ Other

A. PROJECT DESCRIPTION

Will the earth disturbance activity encounter any coal seams? ☐ Yes ☒ No

If yes, have you contacted the local DEP District Mining Office for further assistance? ☐ Yes ☒ No

Provide a narrative description of the project. (Add additional sheets as necessary) The proposed Project consists of adding approximately 41.5 miles of 24-inch (H-302), 0.21 mile of 20-inch (H-309) and 2.7 miles of 16-inch (H-306) pipeline parallel to existing EQT transmission and gathering pipelines; replacing 2.6 miles of existing 16-inch pipeline (H-111 Reactivation); 4.8 miles of 20-inch pipeline (H-111) Upgrading with the addition of over-pressure protection facilities), and installing a total of approximately 14,205 hp of new compression consisting of three units. The proposed Project will have a total of five interconnections; three to existing EQT facilities and two to foreign pipelines, mainline block valves, launchers and receivers, control systems, and other facilities.

B. RECEIVING WATERS

All streams in Pennsylvania are classified based upon their designated and existing uses and water quality criteria. Designated uses for waters of this Commonwealth are found in 25 Pa. Code §93.9a-z at <http://www.pacode.com/secure/data/025/chapter93/chap93toc.html>. Existing uses of waters of this Commonwealth are found at the DEP Web site www.depweb.state.pa.us. Type the phrase "existing use" in the DEP Keyword box. The county conservation district office can also supply this information. List the bodies of water likely to receive direct runoff within or from the oil and gas earth disturbance activity.

Stream Name/Watershed

See Section 3, Appendix C

Designated/Existing Use

See Section 3, Appendix C

C. RESPONSIBLE PARTIES

Person(s) responsible for construction and maintenance of erosion and sediment control BMPs during earth disturbance activities. (NOTE: If duties are assigned to more than one party, list all others under Section 9 of this plan.)

Name: Hanna McCoy Phone: 412-395-3640

Address: 625 Liberty Avenue City: Pittsburgh State: PA Zip Code: 15222

Erosion and Sediment Control Plan prepared by:

Name: URS Corporation, Mr. Robert D. Oates, P.E. Phone: 412-503-4616

Address: 501 Holiday Drive, Suite 300 City: Pittsburgh State: PA Zip Code: 15220

2. MAPS**A. LOCATION MAP**

The map must include the location of the project with respect to roadways, streams, wetlands, lakes, ponds, floodplains, type and extent of vegetation and other identifiable landmarks. A United States Geologic Service (USGS) 7.5 min. quadrangle map may be used to show the existing topographical features of the project site and the immediate surrounding area. **See Section 3, Appendix E**

B. SOIL MAP

A soils map is attached showing the proposed site including access roads, drill pads, impoundments, and pipelines. (Soils information is available from the Natural Resource Conservation Service (NRCS) website <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx> . Soils information should be addressed when determining roadway layout, pad configurations, and appropriate stabilization methods. List all soils that will be encountered and check off all limitations that apply. **See Section 3, Appendix B and Appendix D for Limitations of Pennsylvania soils pertaining to earthmoving projects and complete worksheet 1**

C. PLAN MAP

Attach a site specific map with the site location, site boundaries, topographic features, existing land uses, north arrow and legend. The map must include the location of all earth disturbance activities (roads, drill pads, impoundments, pipelines and other associated activities). The scale and north arrow must be plainly marked. The map scale must be large enough to clearly depict the topographical features of the project. A complete legend of all symbols used on the map must also be included. The following should be clearly shown on the plan maps. In the case where significant cut and fill operations are to occur, the slope should be depicted with contour lines and/or cross-sections. **See Section 3, Appendix J**

•Topographic features	Wetland Crossings
•North Arrow	• Stream Crossings
•Drill Pads	• Access Roads
	Existing Roads
	• Proposed Erosion Control BMPs
	• Receiving surface waters

D. STREAM AND WETLAND CROSSING MAP

A legible photocopy of a USGS 7.5 min. quadrangle map showing the location of the project boundaries and all surface water crossings will be attached to the plan map. Each crossing location as well as any earth disturbance that is to occur within 50 ft of a stream channel must include the type of water obstruction and encroachment permit that is to be secured. At all stream crossing locations, runoff must be directed to a sediment removal area, i.e., filter strip, straw bale, silt fence, sump, a trap for treatment. Waterbars and/or broad based dips should be installed and maintained as required on the approaches to the stream crossing. **See Section 3, Appendix J**

Has application been made for required stream crossing permits? ☒ Yes ☐ No ☐ Not Applicable

3. SCHEDULE AND SEQUENCE OF OPERATIONS**A. PRE CONSTRUCTION**

Starting Date: October 2011

Completion Date: Fourth Quarter 2012

Disturbed Acreage Calculation

	Total Length (ft)		Average Width (ft)		Area (sq ft)			
Access Roads	<u>Varies</u>		<u>Varies</u>	=	<u>12,654,670</u>			
Pipelines/Compressors	<u>172,392</u>		<u>Varies</u>	=	<u>11,271,586</u>			
Drill Pads				=				
Other	<u>Varies</u>		<u>Varies</u>	=	<u>1,642,464</u>			
			Total Area (sq. ft.)	=	<u>25,569,720</u>	÷ 43,560 sq ft/A	=	<u>587</u>

B. SITE CONSTRUCTION/ WELL DRILLING/PRODUCTION CHECKLIST

- ☒ 1. Prior to commencement of any earth disturbance activity including clearing and grubbing, the registrant shall clearly delineate sensitive areas, riparian forest buffer boundaries, areas proposed for infiltration practices, the limits of clearing, and trees that are to be conserved within the project site, and shall install appropriate barriers where equipment may not be parked, staged, operated or located for any purpose.
- ☒ 2. Site access – This is the first land-disturbance activity to take place at the site and should provide BMPs to minimize accelerated erosion and sedimentation from the following areas: entrance to the site, construction routes, and areas designated for equipment or other use at the site including parking, stockpiles.
- ☒ 3. Sediment Barriers – Install perimeter BMPs after the construction site is accessed, keeping associated clearing and grubbing limited to only that amount required for installing perimeter BMPs.
- ☒ 4. Upslope Diversion Channels – including outlet protection are constructed to divert upslope clean water runoff around the disturbed area (when necessary).
- ☐ 5. Sediment Basins and Traps – including outlet protection shall be constructed prior to the remaining clearing/grubbing and other earth disturbance activities.
- ☐ 6. Sediment Laden Water Channels or other Conveyance– used to divert stormwater runoff water to the appropriate BMPs such as traps and ponds should be installed prior to the remaining clearing/grubbing and other earth disturbance activities.
- ☒ 7. Land Clearing and Grading – Implement clearing and grading only after all downslope E&S BMPs have been constructed and stabilized.
- ☒ 8. Surface Stabilization – Apply temporary or permanent stabilization measures immediately to any disturbed areas where work has reached final grade, has been delayed or otherwise temporarily suspended.
- ☒ 9. Construction of Buildings, Utilities, and Paving – During construction, install and maintain any additional erosion and sediment control BMPs, and implement any structural post construction stormwater BMPs that may be required.
- ☒ 10. Final Stabilization, Topsoiling, Trees and Shrubs, After construction is completed, install stabilization BMPs including: permanent seeding, mulching and riprap, and complete implementation of stormwater BMPs in this last construction phase. Stabilize all open areas, including borrow and spoil areas, and remove all temporary BMPs and stabilize any disturbances associated with the removal of the BMP.

Minor modifications to the E & S Plan and Site Restoration Plan shall be noted on the plan that is available at the site and initialed by the appropriate Department staff. Minor changes to the plan may include adjustments to BMPs and locations within the permitted boundary to improve environmental performance, prevent potential pollution, change in ownership or address, typographical errors and on-site field adjustments such as the addition or deletion of BMPs, or alteration of earth disturbance activities to address unforeseen circumstances.

Major modifications to the approved E & S Plan involving new or additional earth disturbance activity other than those described as minor modifications above, and/or the addition of a discharge will require prior approval by the reviewing entity and may require the submittal of a new plan.

C. EROSION CONTROL & STORMWATER BEST MANAGEMENT PRACTICES (BMPs)

The Best Management Practices listed in this plan shall be installed and maintained in accordance with the ***Erosion and Sediment Pollution Control Manual***, No. 363-2134-008, as amended and updated and the ***Oil and Gas Operator's Manual No. 550-0300-001*** as amended and updated. The BMPs contained in this plan shall be installed as shown (or indicated) prior to earth disturbance (including clearing and grubbing) within the drainage area of the BMP in question. Appropriate BMPs shall be provided for each stage of activity (including, but not necessarily limited to, access road construction and maintenance, drilling pad, frac ponds, & pipelines). Each BMP shall be kept functional until all earth disturbances within the drainage area are completed and a minimum vegetative cover (uniform 70% coverage of perennial vegetation over the entire disturbed area) has been achieved or other suitable permanent erosion protection has been installed.

If no, please explain: _____

- | | | |
|--|---|-----------------------------|
| Will all erosion control and stormwater BMPs be installed and maintained as specified in this plan? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| Will all unnecessary disturbed areas be limed, fertilized, seeded and mulched as specified in this plan? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| Will all unnecessary culverts and waterbars be removed as specified in this plan? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| Will all permanent waterbars be installed as specified in this plan? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| Will all unnecessary disturbed areas be regraded, smoothed, limed, fertilized, seeded and mulch as specified in this plan? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |

4. DESCRIPTION OF EROSION AND SEDIMENT/STORMWATER CONTROL BEST MANAGEMENT PRACTICES

The following standard BMPs have been provided to fulfill the requirements of this plan. Additional BMPs are listed in the Erosion and Sediment Pollution Control Manual as well as the Oil and Gas Operator's Manual and *the Underground Utility Line Construction BMP Manual*. BMP construction details are shown in **Appendix A**. If you plan to use any of these recommended BMPs, please check the appropriate boxes. If you plan to use alternative BMPs, you must provide drawings showing the details, specifications and spacing.

A. CROSS-DRAIN CULVERT

Culverts will be installed before the ground freezes. Culverts shall be placed with a slope of 2 to 4 percent and cross the road at a 30-degree downslope angle. Culverts will be 12" pipe or larger.

Will this BMP be used? ☒ Yes ☐ No Will recommended spacing be used? ☒ Yes ☐ No. If no, please explain:

B. WATERBARS

Waterbars will be placed on pipelines and **retired** roadways according to the spacing indicated below.

Will this BMP be used? ☒ Yes ☐ No Will recommended spacing be used? ☒ Yes ☐ No

C. BROAD-BASED DIPS

Broad-based dips will be installed and worked before the ground freezes. Broad-based dips on the road system are planned to be spaced as indicated in **Appendix A**.

Will this BMP be used? ☐ Yes ☒ No Will recommended spacing be used? ☐ Yes ☐ No. If no, please explain:

D. FILTER STRIPS

Filter strip widths vary by slope on land between roads and perennial streams.

The width of the filter strip depends on the slope between the road and the stream.

Will this BMP be used? ☐ Yes ☒ No Will recommended spacing be used? ☐ Yes ☐ No. If no, please explain:

E. FILTER FABRIC FENCE

Filter fabric fence must be installed on contour at the edge of disturbed areas. Both ends of each fence section must be extended upslope at 45 degrees to the main fence alignment. They should not be installed in streams, ditches or other areas of concentrated flow. Install filter fabric fence before the ground freezes.

Will this BMP be used? ☒ Yes ☐ No Will recommended spacing be used? ☐ Yes ☐ No. If no, please explain:

F. TURNOUTS

Channels that drain water away from roads into well-vegetated areas are known as turnouts. Turnouts (see **Appendix A**) are typically located along crowned roadways where runoff cannot sheet flow off of the roadway. Like ditch relief culverts, the purpose of turnouts is to minimize the volume of water in a roadside ditch. Turnouts should be located so as to take advantage of natural drainageways or buffered areas wherever possible. Where a suitable vegetative filter strip is not available, a compost filter sock, rock filter, or other sediment removal BMP should be installed at the outlet of the turnout.

Will this BMP be used? ☒ Yes ☐ No

G. ROADSIDE DITCH

In most cases, the ditches paralleling temporary access roads and haul roads need not be lined if sufficient ditch relief culverts are provided, erosion resistant soils are present, and flow velocities are less than 2 fps. However, protective liners are required for roadside ditches discharging to special protection waters, where they discharge directly to surface waters, or where necessary to prevent the erosion of the channel itself. A typical cross-section for a roadside ditch is shown in **Appendix A**.

Will this BMP be used? ☒ Yes ☐ No

H. CROWNED/INSLOPED ROADWAY

Crowned roadways are typically installed where the topography allows for sheet flow to infiltrate into the surrounding vegetation. In situations where crowned roadways will not function properly an insloped roadway will be constructed.

Will this BMP be used? ☒ Yes ☐ No Crowned ☒ Yes ☐ No Insloped ☒ Yes ☐ No

I. STABILIZED ROAD ENTRANCE

The purpose is to remove mud from tires and keep it off the public road. The construction entrance shall be constantly maintained.

Will this BMP be used? ☒ Yes ☐ No

J. COMPOST FILTER SOCK

Will this BMP be used? ☒ Yes ☐ No

K. CHANNELS

Channels are used for several purposes. Collector channels are used to collect runoff from disturbed areas and convey it to a sediment removal facility (e.g. sediment trap) prior to discharge into receiving surface waters. Diversion channels are used to divert runoff from undisturbed upslope areas and convey it around areas of earth disturbance (i.e. drill pads, impoundments, etc.). Conveyance channels are used to convey discharges from sediment traps & cross drains to receiving surface waters.

Channels should be sized to convey the calculated peak flows as calculated in the table located in **Appendix A**. Otherwise supporting calculations must be attached to show sufficient capacity. They should also be provided with a suitable protective liner to prevent erosion within the channel. Wherever grass is used as a protective liner, a temporary erosion control mat (e.g. rolled fiber blanket) should be firmly anchored to the bottom and sides of the channel to hold soil in place until the vegetation becomes established.

Will this BMP be used? ☒ Yes ☐ No Check all that apply:

Temporary	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Rip-rap	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Permanent	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Diversion	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Vegetative	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Collector	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

L. SEDIMENT TRAPS

Sediment traps may be used to control runoff from drainage areas up to 5.0 acres (disturbed and undisturbed). They must be sized to provide 2,000 cubic feet of total storage capacity for each acre tributary to the trap. The sediment storage zone is considered to be 700 cubic feet per acre. Outlets should be located as far from the inflow as possible. At a minimum, spillway widths should be equal to 6 feet for each acre tributary to the trap.

Will this BMP be used? ☐ Yes ☒ No

M. ALTERNATIVE BMPS

Will alternative BMPs be used? ☐ Yes ☒ No If yes, attach drawings showing the details, specifications and spacing.

N. POST CONSTRUCTION STORMWATER/SITE RESTORATION

Disturbed areas will be seeded and mulched as indicated below. Recommended Seed mixes may be found in **Appendix A**. Mulch will be applied at a rate of 3-4 tons/acre. The Department recommends that a soil test be done to determine proper soil amendment application rates for the proposed seed mixtures. Prior to seeding, soil amendments will be applied as follows:

<u>Soil Amendment</u>	<u>Type</u>	<u>Rate of Application</u>
Fertilizer	10-10-20	1000 – 1200 lbs./AC
Lime	Agricultural Lime	6.0 – 7.0 T/AC

N. POST CONSTRUCTION STORMWATER/SITE RESTORATION (continued)

<u>Area of Disturbance</u>	<u>Seed Mixture</u>	<u>Rate of Application (lb/acre)</u>
Well Pads	_____	_____
Access Roads	See Table 3, Sheet 4 of 174, Appendix J	See Table 3, Sheet 4 of 174, Appendix J
Pipelines	See Table 1, Sheet 4 of 174, Appendix J	See Table 1, Sheet 4 of 174, Appendix J
Impoundments	_____	_____
Compressor Locations	_____	_____
Other	_____	_____

1. *Non-Structural BMPs* which promote the treatment, infiltration, evaporation, and transpiration of stormwater runoff shall be used.
☒ Yes ☐ No
2. *Low Impact, Conservation, and Green Infrastructure Designs* shall be used to minimize the generation of runoff by preserving open space, preserving natural areas, reducing the amount of impervious surface, and other green infrastructure design principles that utilize or mimic infiltration or evapotranspiration.
☒ Yes ☐ No
3. *Infiltration practices* shall include either engineered structures or landscape features designed to capture and infiltrate runoff that mimic pre-construction conditions.
☒ Yes ☐ No
4. *Runoff practices* shall be designed and constructed to convey runoff, increase evaporation, and manage rate. Such practices are to also promote infiltration, filtration, and biological uptake of pollutants.
☒ Yes ☐ No
5. *Filtration practices* shall be used to treat runoff through filter media that are designed to capture pollutants through the processes of physical filtration of solids or cation exchange of dissolved pollutants.
☒ Yes ☐ No

List the Stormwater/Site Restoration BMPs that will be used:

Minimization of Disturbance

Revegetation of Disturbed Areas

O. EROSION CONTROL BLANKETS

Erosion control blanketing (either rolled or sprayed) shall be installed or applied for all slopes 3H:1V or steeper within 50 feet of a surface water or where soil conditions indicate blanketing is needed to achieve the required vegetative cover.

Will this BMP be used? ☒ Yes ☐ No

P. OTHER

Please explain: For wetland, stream and road (paved and unpaved) crossings, see Typical Crossing Details identified on the E&S Drawings. Note that an approved PADEP Chapter 105/ USACE Section 404 permit is required for any temporary or permanent impacts to streams and wetlands.

5. SPECIAL PROTECTION WATERSHEDS

Projects that are located in special protection watersheds that have a designated or existing use of high quality (HQ) or exceptional value (EV), Wild Trout Streams or non-special protection watersheds impaired for sediment or stormwater must demonstrate that all construction and post construction discharges will not degrade the physical, chemical or biological characteristics of the surface waters. Plan preparers should utilize "non-discharge" BMPs in their E&S and PCSM Plans to the greatest extent possible. These BMPs may be found in the Post Construction Stormwater Manual and the Oil and Gas Operator's Manual. Calculations are not necessary if non-discharge BMPs are used, the approximate original contours and the preservation of the preconstruction drainage pattern and features are maintained or replicated and the disturbed areas will be revegetated or stabilized with pervious material (crushed rock and gravel surface are considered pervious material). In addition, if stormwater BMPs will be employed that use natural measures, do not require extensive construction and maintenance, promote pollutant reduction and are capable of controlling the stormwater runoff from a 2-year/24-hour storm event and the net increase of stormwater is infiltrated or dissipated away from the waters of the Commonwealth, calculations are not necessary.

5. SPECIAL PROTECTION WATERSHEDS (CONTINUED)

- a. Is the project located in a Special Protection Watershed? ☒ Yes ☐ No. If yes, provide a detailed description of how the post-construction stormwater runoff will be managed.

A portion of the Project is in a high quality warm water fishery. Structural BMPs such as rock construction entrances with wash racks and non-structural controls such as minimization of disturbance will be utilized in these areas. Revegetation.

- b. Will there be a net increase in accelerated erosion and sedimentation from the construction runoff? ☐ Yes ☒ No

- c. Does the post construction runoff volume equal pre-construction runoff volume for the 2-year/24-hour storm? ☒ Yes ☐ No

- d. Does the rate of post-construction stormwater equal pre-construction runoff rate for the 2, 5, 10, 25, 50 and 100 year storm events? ☒ Yes ☐ No ☐ NA

If NA please explain:

List the Post Construction Stormwater BMPs that will be used

Rock construction entrance
with wash rack

Disturbance Minimization

Revegetation

Erosion Control Blanket

6. MAINTENANCE

BMPs will be inspected on a weekly basis and after each measurable rainfall event during the active construction/drilling phase of the project. ☒ Yes ☐ No

Culverts will be cleaned out, repaired or replaced as necessary. ☒ Yes ☐ No

Filter strips will be maintained. ☐ Yes ☒ No

Earth Disturbance areas will be repaired where signs of accelerated erosion are detected. ☒ Yes ☐ No

Seeding and mulching will be repeated in those areas that appear to be failing or have failed. ☒ Yes ☐ No

Other (describe)

7. SITE CLEANUP

Describe procedures which ensure the proper handling, storage, control, disposal and recycling of well drilling waste, including but not limited to fuels, oil, lubricants and other materials brought to the site or used in the process of drilling.

A Spill Preparedness, Prevention, and Contingency Plan has been included as **Section 9** of this application.

☒ Garbage, fuels or any substance harmful to human, aquatic or fish life, will be prevented from entering springs, streams, ponds, lakes, wetlands or any water course or water body.

☒ Oils, fuels, lubricants and coolants will be placed in suitable containers and disposed properly.

☒ All trash and garbage will be collected and disposed properly.

☐ Other (describe).

8. ADDITIONAL EXPLANATION/COMMENTS (if needed)**9. CERTIFICATION BY PERSON PREPARING APPLICATION**

I do hereby certify to the best of my knowledge, information and belief, that the Erosion and Sediment Control Plan and Site Restoration/ Stormwater Management Plan are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

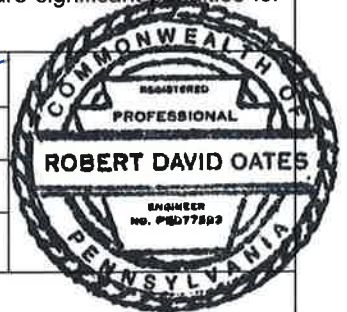
Print Name: Robert David Oates

Signature: 

Company: URS Corporation

Address: 501 Holiday Drive, Pittsburgh, PA 15220

Phone: 412-503-4616

**EXPEDITED REVIEW PROCESS**

In addition to the certification required above applicants using the expedited permit review process must attach an E&S and Site Restoration Plan developed and sealed by a licensed professional engineer, surveyor or professional geologist. The plans shall both contain the following certification:

I do hereby certify to the best of my knowledge, information and belief, that the Erosion and Sediment Control and Site Restoration Plan are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

10. APPLICANT CERTIFICATION

Applicant Certification. I certify under penalty of law that this document and all attachments were prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. The responsible official's signature also verifies that the activity is eligible to participate in the permit, and that the applicant agrees to abide by the terms and conditions of the permit. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Hanna E. McCoy - Supervisor Permitting

Print Name and Title of Applicant

Print Name and Title of Co-Applicant (if applicable)



Signature of Applicant

Signature of Co-Applicant

6-09-2011

Date Application Signed

Date Application Signed

Notarization

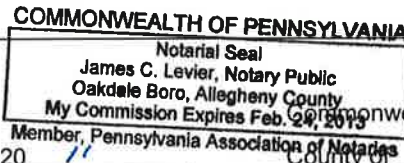
Sworn to and subscribed to before me this

9TH

day of

JUNE

, 20

11

Commonwealth of Pennsylvania

County of

WASHINGTON

Notary Public

My Commission expires

FEBRUARY 24, 2013**NAME, ADDRESS AND PHONE NUMBER OF INDIVIDUAL TO BE CONTACTED
IF ADDITIONAL INFORMATION IS REQUIRED**

Name:

Address:

Phone:

Appendix A

BMP Construction Details

APPENDIX A

BMP CONSTRUCTION DETAILS

A. Cross Drain Culverts

Sizing and Spacing* of Cross Drain Culverts for Temporary Access Roads

Road Grade (%)	Culvert Spacing* (ft)	Length of Upslope Drainage (ft)				
		< 300	300 – 400	400 – 500	500 – 600	>600
		Minimum Culvert Size (in)				
2	300	12	15	15	15	18
3	235	12	15	15	15	18
4	200	12	15	15	15	18
5	180	12	12	15	15	15
6	165	12	12	12	15	15
7	155	12	12	12	12	15
8	150	12	12	12	12	15
9	145	12	12	12	12	15
10	140	12	12	12	12	15
12	135	12	12	12	12	15

Maximum Spacing* of Cross Drain Culverts (18" dia. CMP) For Permanent Access Roads

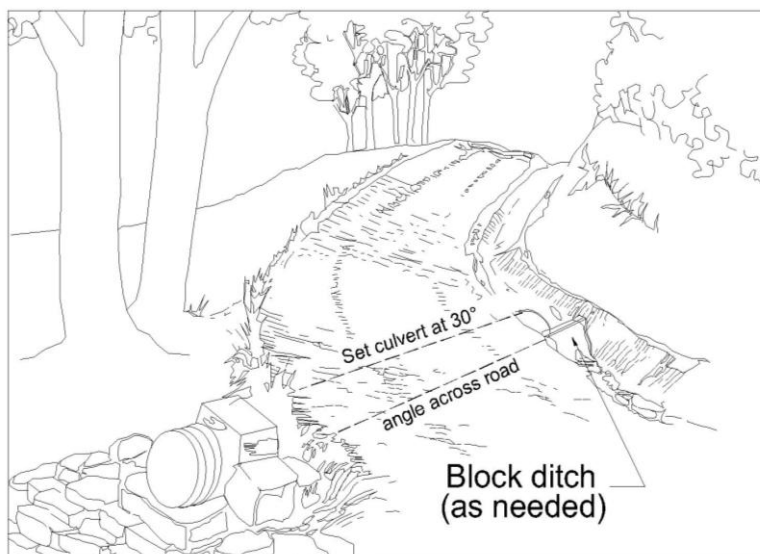
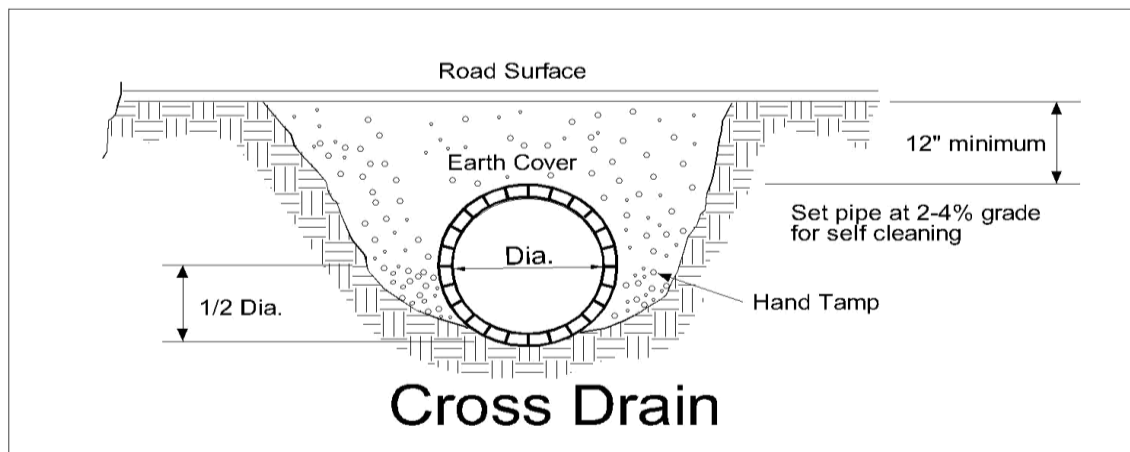
Road Grade Percent	Soil Type in Ditch				
	Gravels, Sandy Gravels, Aggregate Surfacing	Silty Gravels, Clayey Gravels	Plastic and Nonplastic Inorganic Clays	Inorganic Silts, Silty or Clayey Sands	Sands, Silty Sands, and Gravelly Sands
	Feet				
2	390	315	245	170	95
4	335	275	210	145	85
6	285	230	180	125	75
8	240	195	150	105	65
10	200	160	125	90	55
12	160	130	105	75	45
14	135	110	85	60	35

*Spacing may be adjusted slightly to take advantage of natural drainage-ways.

R-4 (Min.) Riprap protection will be provided at all outfalls.

At all stream crossing locations, runoff must be directed to a sediment removal area, i.e., filter strip, straw bale, silt fence, sump, or trap for treatment. Waterbars and/or broad based dips should be installed and maintained as required on the approaches to the stream crossing.

TYPICAL CROSS DRAIN CULVERT

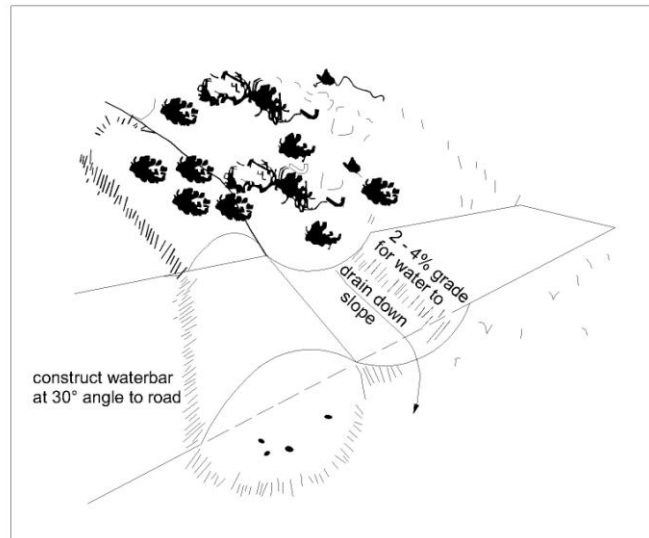


- B. WATERBARS** - Waterbars are typically used to control stormwater runoff on retired access roads as well as pipeline right-of-ways. They are not recommended for active access roads due to the difficulty of moving equipment over them as well as the need for continual maintenance due to damage from traffic. Waterbars will be installed before the ground freezes and will be spaced as indicated below

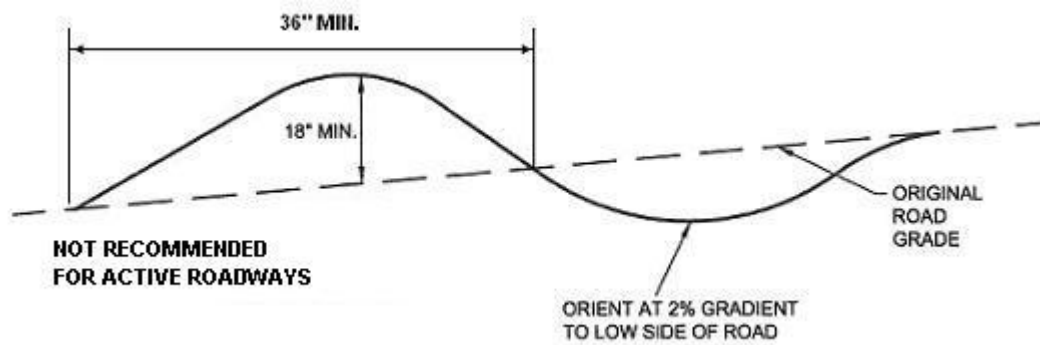
Waterbar Spacing: Circle all that apply

<u>Road Grade (%)</u>	<u>Spacing (FT)</u>
2	250
5	135
10	80
15	60
20	45
25	40
30	35
40	30

TYPICAL WATERBAR



STANDARD CONSTRUCTION DETAIL #3-5 WATERBAR

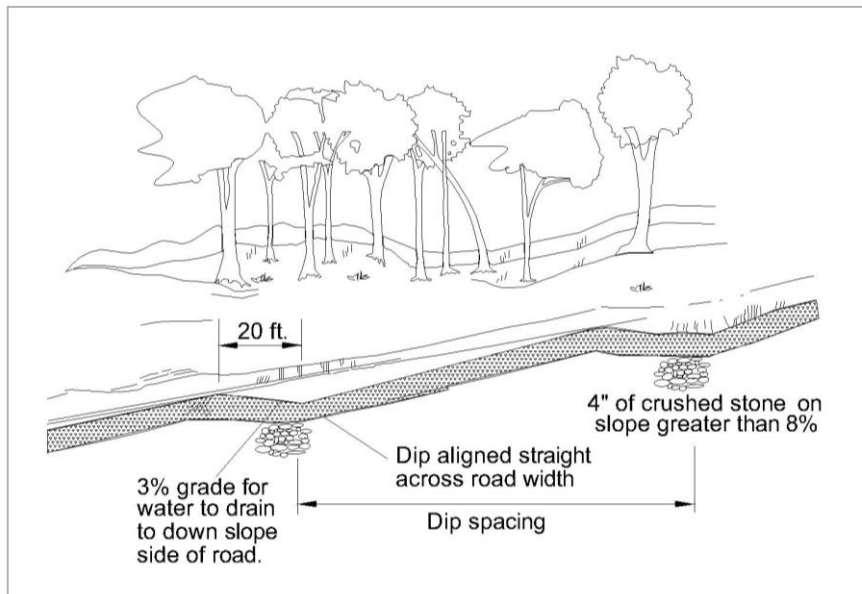


- C. BROAD-BASED DIPS** - Broad-based dips may be used to direct runoff from active access roads to well-vegetated areas or sediment removal BMPs (e.g. sediment traps). Broad-based dips, unlike waterbars, are easily traversed by construction equipment and typically require less maintenance to ensure their integrity. Due to the nature of broad-based dips, they should not be constructed on roads with grades exceeding 10%. Where access roads must exceed 10% gradients, insloping should be used to control runoff.

RECOMMENDED BROAD-BASED DIP SPACING

Road Grade (% Slope)	Recommended Spacing (feet)	Alternative Spacing* (feet)
2	300	_____
3	250	_____
4	200	_____
5	180	_____
6	170	_____
7	160	_____
8	150	_____
9-10	140	_____

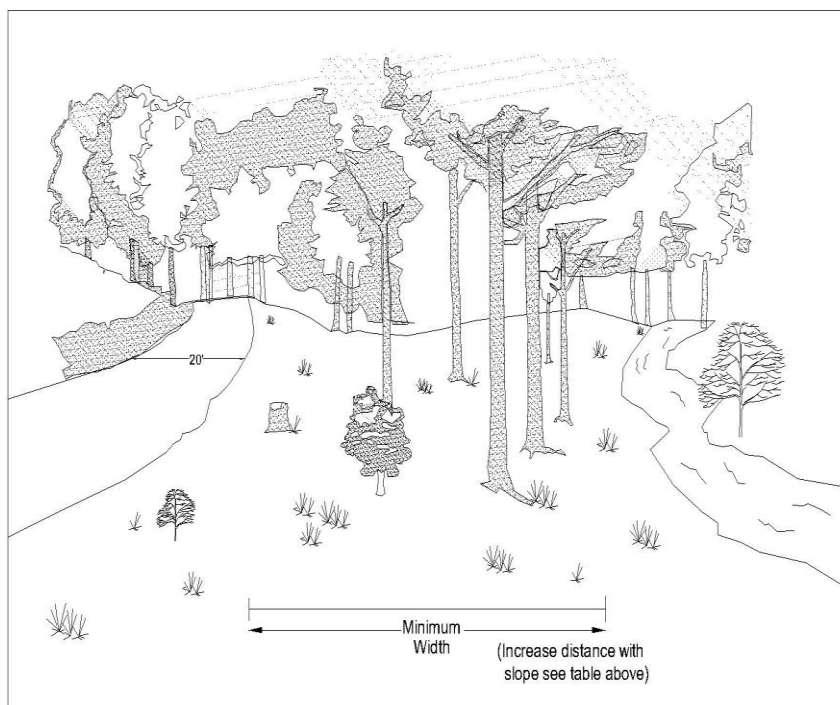
TYPICAL BROAD-BASED DIP



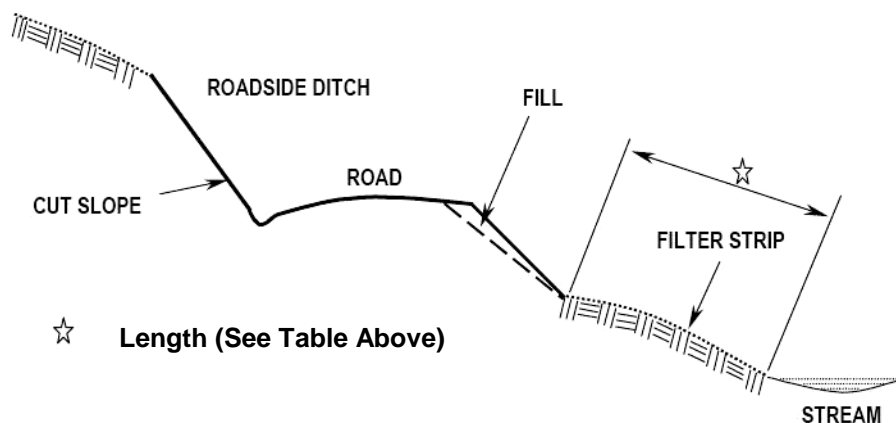
D. FILTER STRIPS

<u>Slope of Land Between Road and Stream (%)</u>	<u>Minimum Length of Filter Strip (feet) +</u>
0	25++
10	45++
20	65
30	85
40	105
50	125
60	145
70	165

- + Lengths should be doubled when the earth disturbance activity is located where receiving waters have a designated use/existing use of High Quality or Exceptional Value or within a municipal water supply, source water area.
- ++ Earth disturbance 50 feet or less from the top of the stream bank (absent evidence to the contrary) requires a water obstruction and encroachment permit from the appropriate DEP Oil and Gas Management Program or Conservation District.

TYPICAL VEGETATIVE FILTER STRIP

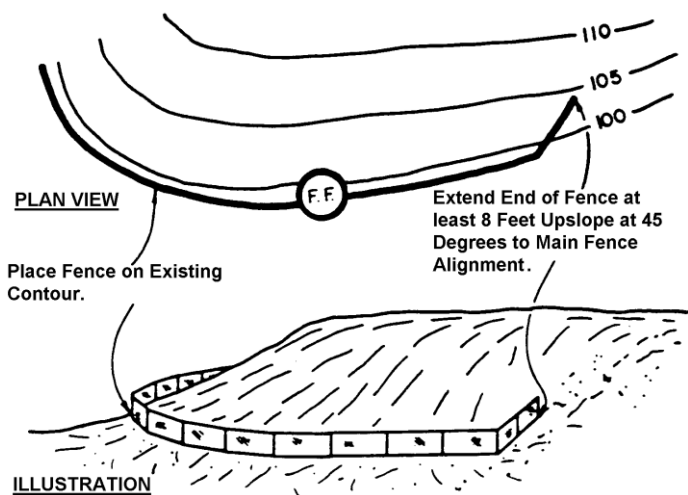
VEGETATIVE FILTER STRIP LENGTH



- E. SILT FENCE** - Silt fence may be used to control runoff from small disturbed areas when it is in the form of sheet flow, and the discharge is to a stable area. Only those fabric types specified for such use by the manufacturer should be used. Standard Filter Fabric width shall be 30" min.; Reinforced and Super Filter Fabric width shall be 42" min. Do not use silt fence in areas of concentrated flows (e.g. channels, swales, erosion gullies, across pipe outfalls, etc.). Silt fence should not be used in areas where rock or rocky soils prevent the full and uniform anchoring of the fence. Forested areas are not recommended unless tree roots can be severed during excavation of the anchor trench.

Silt fence must be installed on existing level grade. Maximum slope length above silt fence may not exceed those shown in the table below.

SILT FENCE ALIGNMENT

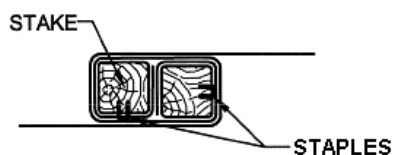


Maximum Slope Lengths for Silt Fence

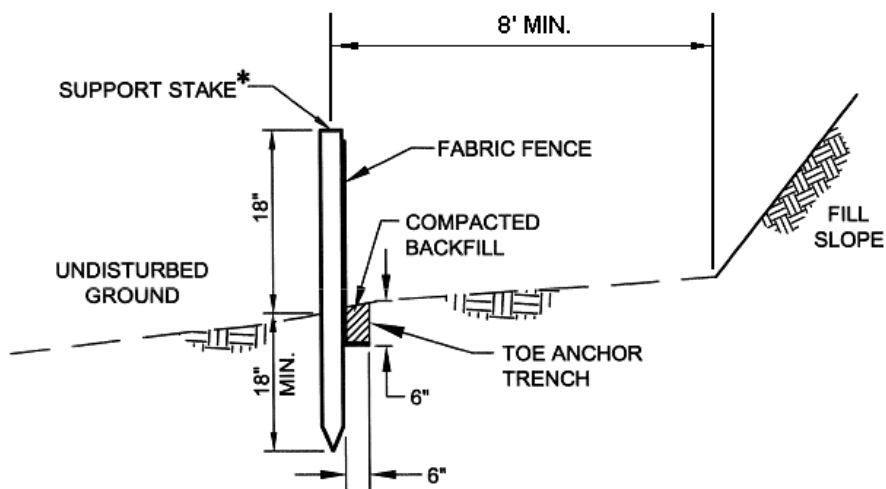
Slope - Percent	Maximum Slope Length (ft) Above Fence		
	Standard (18" High) Silt Fence	Reinforced (30" High) Silt Fence	Super Silt Fence
2 (or less)	150	500	1000
5	100	250	550
10	50	150	325
15	35	100	215
20	25	70	175
25	20	55	135
30	15	45	100
35	15	40	85
40	15	35	75
45	10	30	60
50	10	25	50

STANDARD SILT FENCE (18" HIGH)

*STAKES SPACED @ 8' MAX.
USE 2" x 2" ($\pm 3/8"$) WOOD
OR EQUIVALENT STEEL
(U OR T) STAKES

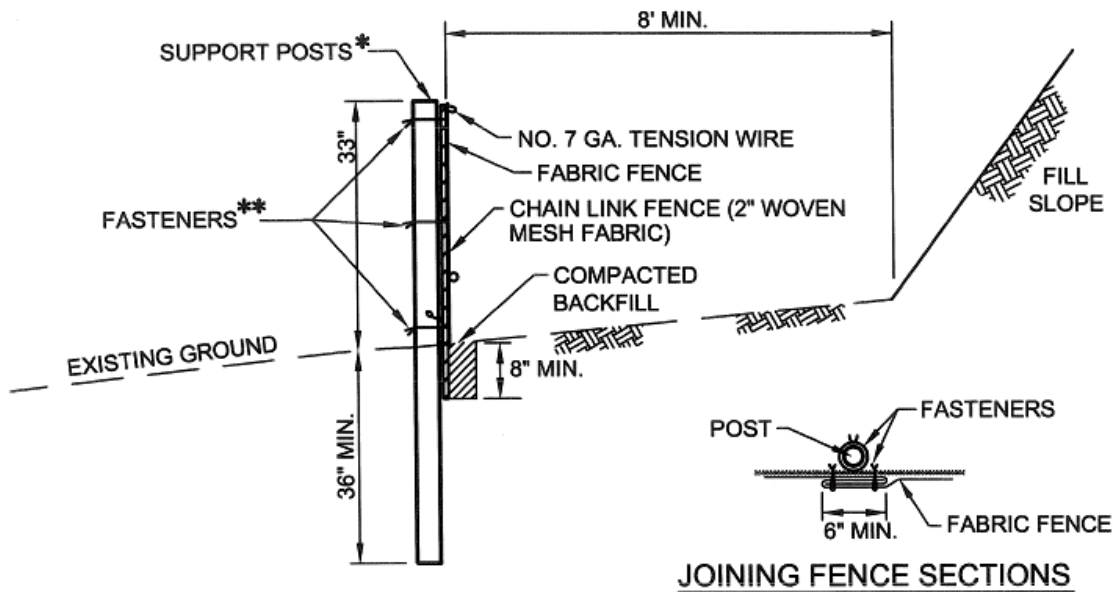
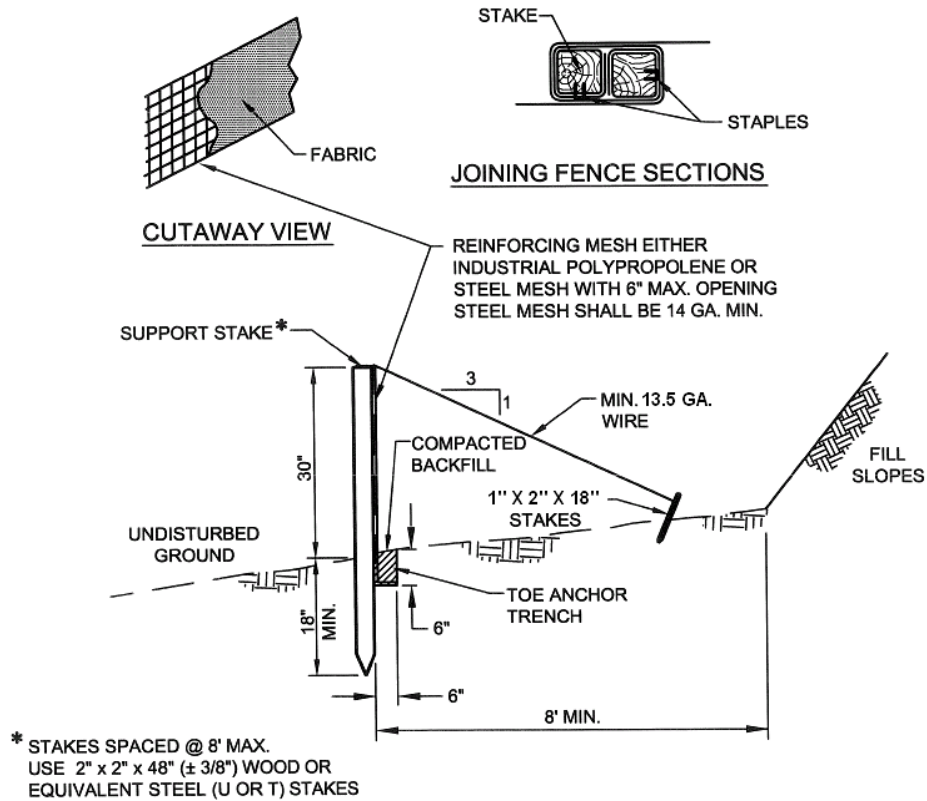


JOINING FENCE SECTIONS



ELEVATION VIEW

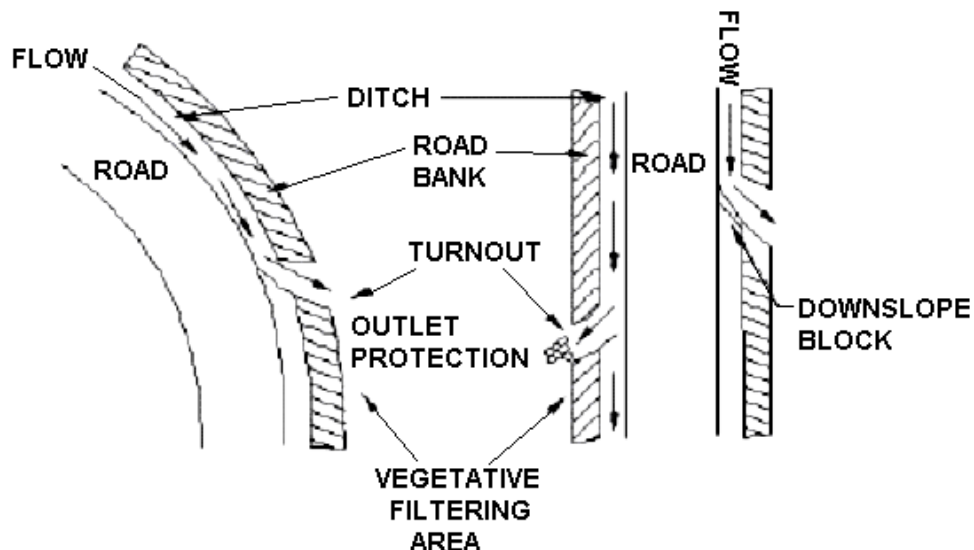
REINFORCED SILT FENCE (30" HIGH)



* POSTS SPACED @ 10' MAX. USE 2 1/2" DIA. HEAVY DUTY GALVANIZED OR ALUMINUM POSTS.

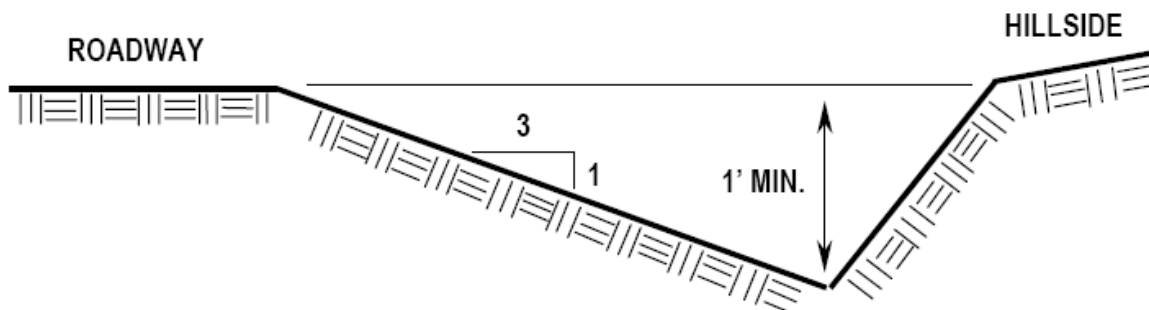
** CHAIN LINK TO POST FASTENERS SPACED @ 14" MAX. USE NO. 9 GA. ALUMINUM WIRE OR NO. 9 GALVANIZED STEEL PRE-FORMED CLIPS. CHAIN LINK TO TENSION WIRE FASTENERS SPACED @ 60" MAX. USE NO. 13.5 GA. GALVANIZED STEEL WIRE. FABRIC TO CHAIN FASTENERS SPACED @ 24" MAX C. TO C.

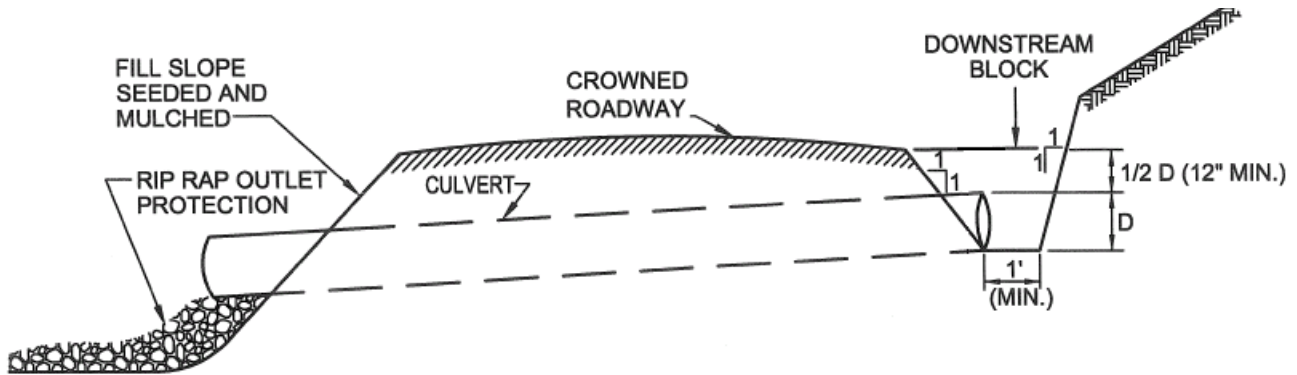
- F. TURNOUT** Turnouts are typically located along crowned roadways where runoff cannot sheet flow off the roadway. Like ditch relief culverts, the purpose of turnouts is to minimize the volume of water in a roadside ditch. Turnouts should be located so as to take advantage of natural drainageways or buffer areas wherever possible. Where a suitable vegetative filter strip is not available, a compost filter sock, rock filter or other sediment removal BMP should be installed at the outlet of the turnout.



- G. ROADSIDE DITCH** - In most cases, the ditches paralleling temporary access roads and haul roads need not be lined if sufficient ditch relief culverts are provided, erosion resistant soils are present, and flow velocities are less than 2 fps. However, protective liners are required for roadside ditches discharging to special protection waters, where the discharging directly to surface waters, or where necessary to prevent the erosion of the channel itself.

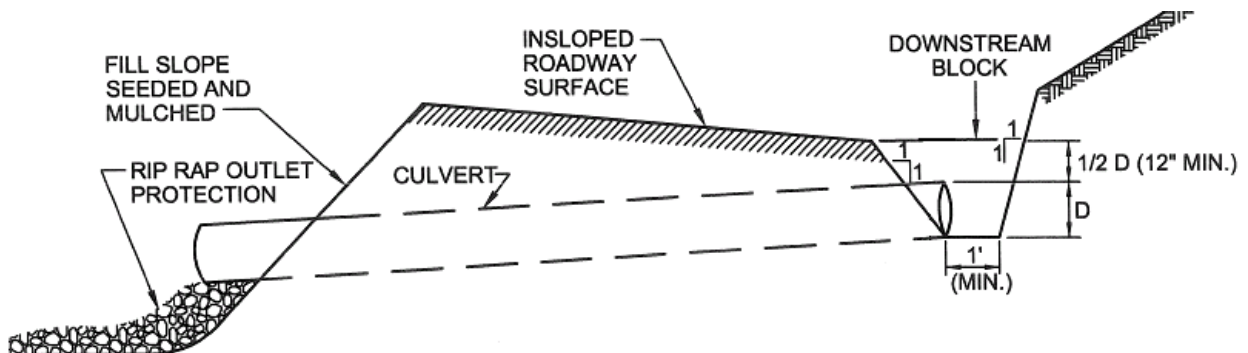
Typical Roadside Ditch Section



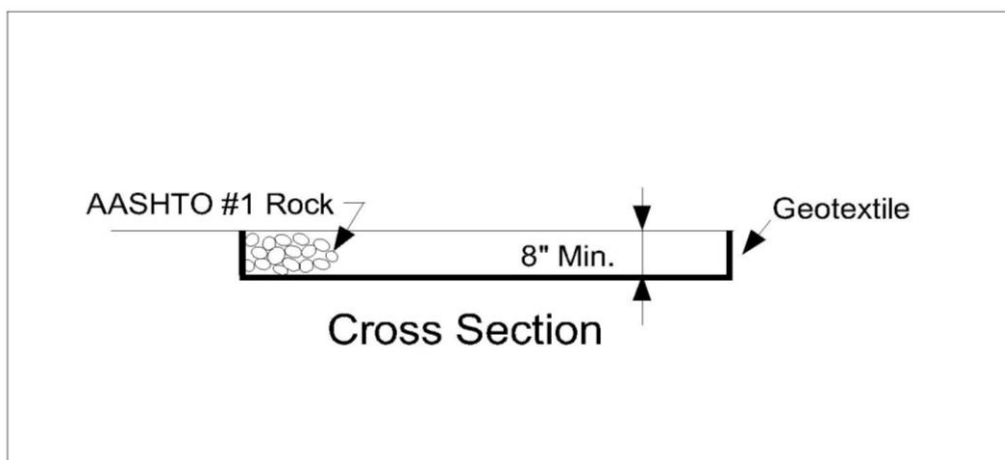
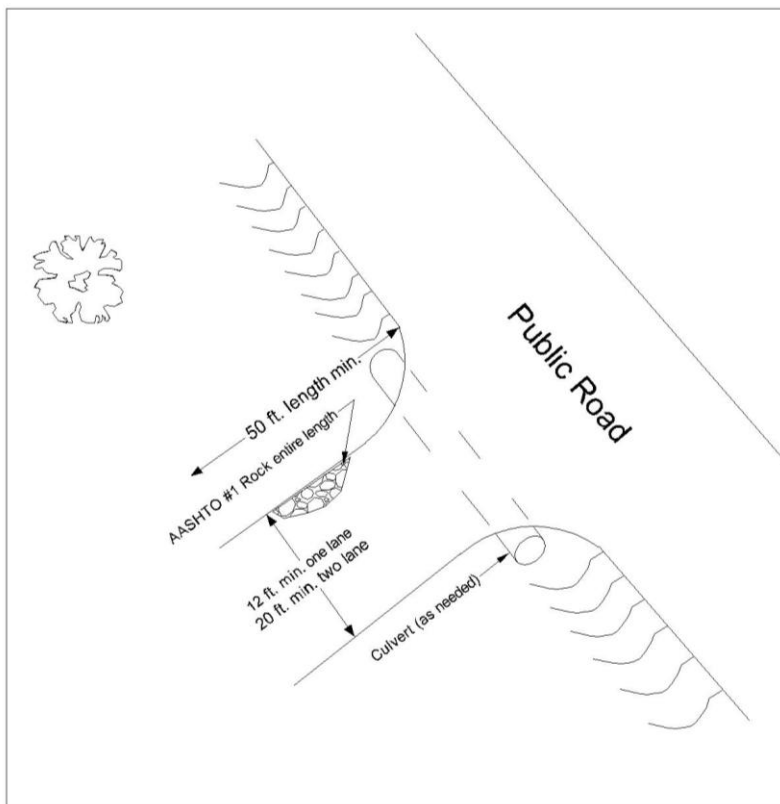
H. CROWNED / INSLOPED ROADWAY

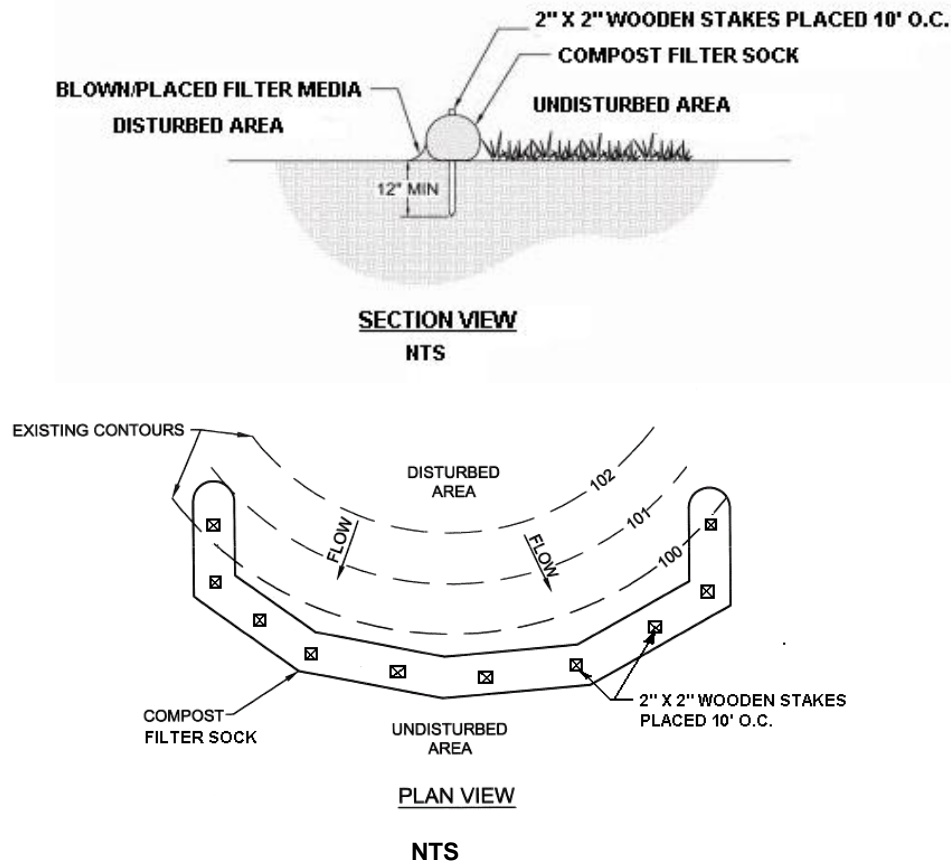
Cut and fill slopes shall be stabilized immediately upon completion of roadway grading. These areas shall be blanketed wherever they are located within 50 feet of a surface water or within 100 feet of a surface water where a suitable vegetative filter strip does not exist. A durable top dressing shall be provided for soils having low strength.

Roadside ditches shall be provided with adequate protective lining. Adequately sized culverts or other suitable cross drains shall be provided at all seeps, springs, and drainageways. Ditch relief culverts shall be provided at the intervals indicated on the Tables below. Roadway shall be inspected weekly and after each runoff event. Damaged roadways, ditches, or cross drains shall be repaired immediately.



- I. **STABILIZED ROAD ENTRANCE** - A rock construction entrance should be installed wherever it is anticipated that construction traffic will exit the project site onto any roadway, public or private. Access to the site should be limited to the stabilized construction entrance(s).



J. COMPOST FILTER SOCK

Compost shall meet the following standards:

Organic Matter Content	80% - 100% (dry weight basis)
Organic Portion	Fibrous and elongated
pH	5.5 – 8.0
Moisture Content	35% – 55%
Particle Size	98% pass through 1" screen
Soluble Salt Concentration	5.0 dS Maximum

Compost Filter Sock shall be placed at existing level grade. Both ends of the sock shall be extended at least 8 feet up slope at 45 degrees to the main sock alignment. Maximum slope length above any 18" diameter sock shall not exceed that shown on above table for reinforced silt fence. Maximum slope length for a 24" diameter sock shall not exceed that for super silt fence.

Traffic shall not be permitted to cross filter socks.

Accumulated Sediment shall be removed when it reaches $\frac{1}{2}$ the above ground height of the sock and disposed in the manner described elsewhere in the plan.

Socks shall be inspected weekly and after each runoff event. Damaged socks shall be repaired according to manufacturer's specifications or replaced within 24 hours of inspection.

Biodegradable filter sock shall be replaced after 6 months; photodegradable socks after 1 year. Polypropylene socks shall be replaced according to manufacturer's recommendations.

Upon stabilization of the area tributary to the sock, stakes shall be removed. The sock may be left in place and vegetated or removed. In the latter case, the mesh shall be cut open and the mulch spread as a soil supplement.

K. CHANNELS

TEMPORARY VEGETATED TRAPEZOIDAL CHANNEL SIZING CHART (2H:1V SIDE SLOPES)										
Tributary Acres	1	2	3	4	5	6	7	8	9	10
Minimum Channel Depth (ft)	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0
Channel Bed Slope (FT/FT)	Minimum Channel Bottom Width (FT)									
≤ 0.04	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
0.05	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0
0.06	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0
0.07	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	4.0
0.08	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	6.0	6.0
0.09	2.0	2.0	2.0	2.0	2.0	2.0	4.0	6.0	6.0	6.0

TEMPORARY VEGETATED TRAPEZOIDAL CHANNEL SIZING CHART (2H:1V SIDE SLOPES) SPECIAL PROTECTION WATERSHED										
Tributary Acres	1	2	3	4	5	6	7	8	9	10
Minimum Channel Depth (ft)	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0
Channel Bed Slope (FT/FT)	Minimum Channel Bottom Width (FT)									
≤ 0.04	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	4.0	6.0
0.05	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	4.0	6.0
0.06	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	6.0	6.0 TRM
0.07	2.0	2.0	2.0	2.0	2.0	4.0	4.0	6.0	6.0 TRM	6.0 TRM
0.08	2.0	2.0	2.0	2.0	2.0	4.0	6.0	6.0	6.0 TRM	6.0 TRM
0.09	2.0	2.0	2.0	2.0	4.0	6.0	6.0	6.0 TRM	6.0 TRM	6.0 TRM

TRM = Turf reinforcement matting

Supporting calculations are attached to show sufficient channel capacity and adequate protective liner. ☐ Yes ☐ No**VEGETATED CHANNEL**

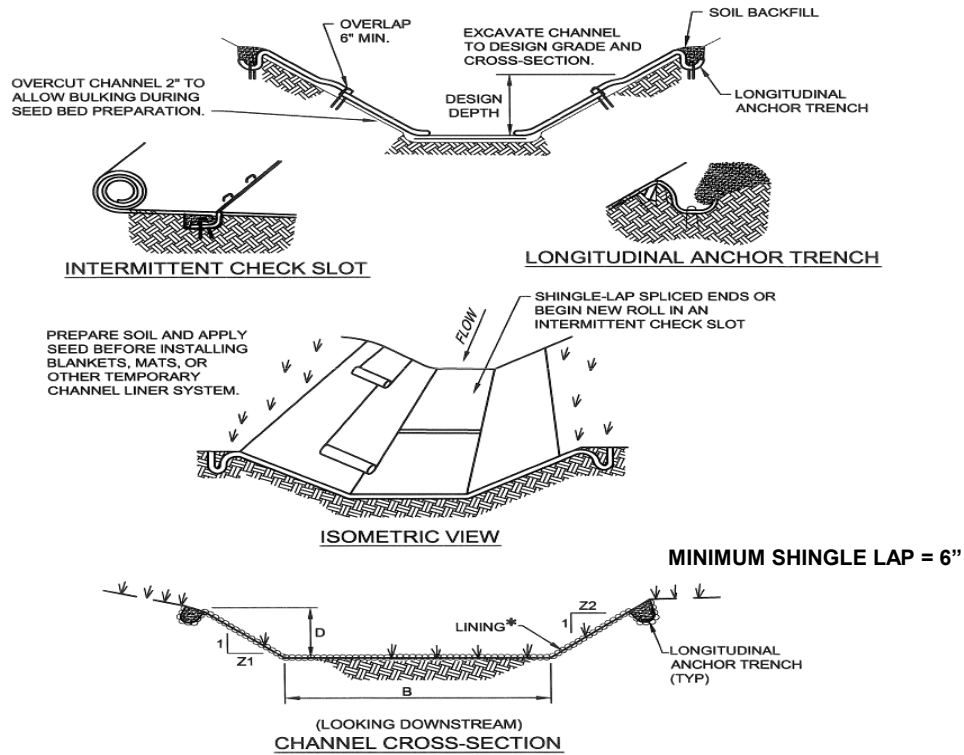
CHANNEL NO.	STATIONS	BOTTOM WIDTH B (FT)	DEPTH D (FT)	TOP WIDTH W (FT)	Left Side Slope Z1 (FT)	Right Side Slope Z2 (FT)	LINING*

Anchor trenches shall be installed at beginning and end of channel in the same manner as longitudinal anchor trenches.

Channel dimensions shall be constantly maintained. Sediment deposits shall be removed within 24 hours of discovery.

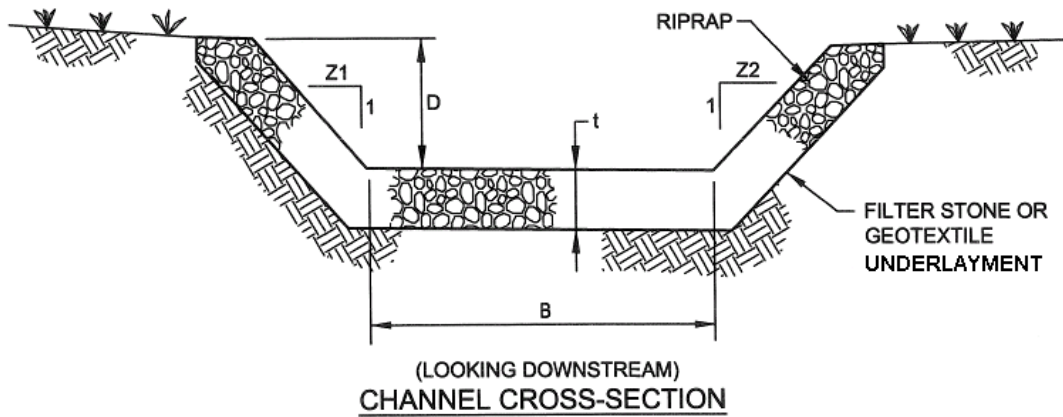
Damaged lining shall be repaired or replaced within 48 hours of discovery.

VEGETATED CHANNEL



RIP-RAP CHANNEL

Channel	Stations	B	D	Z1	Z2	Riprap Gradation	t	Underlayment	Underlayment Thickness



STANDARD DESIGN FOR PERMANENT RIPRAP CHANNELS WITH 2:1 SIDE SLOPES & 2 FOOT TOTAL DEPTH																				
ACRES	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
Bottom Width (Ft)	2	4	2	4	2	4	2	4	2	4	2	4	4	6	4	6	4	6	4	6`
Bed Slope (Ft/Ft)	RIPRAP R-SIZE																			
0.10	R-3	R-3	R-4	R-3	R-5	R-4	R-5	R-4	R-6	R-4	R-6	R-5	R-5	R-4	R-5	R-4	R-5	R-4	R-6	R-5
0.11	R-3	R-3	R-4	R-3	R-5	R-4	R-6	R-4	R-6	R-4	R-7	R-5	R-5	R-4	R-5	R-4	R-5	R-4	R-6	R-5
0.12	R-3	R-3	R-4	R-3	R-5	R-4	R-6	R-4	R-6	R-4	R-7	R-5	R-5	R-4	R-5	R-4	R-5	R-4	R-6	R-5
0.13	R-3	R-3	R-4	R-3	R-5	R-4	R-6	R-4	R-6	R-4	R-7	R-5	R-5	R-4	R-6	R-5	R-6	R-5	R-6	R-5
0.14	R-3	R-3	R-4	R-3	R-5	R-4	R-6	R-4	R-7	R-5	R-7	R-5	R-5	R-4	R-6	R-5	R-6	R-5	R-6	R-5
0.15	R-3	R-3	R-5	R-4	R-5	R-4	R-6	R-4	R-7	R-5	R-7	R-5	R-5	R-4	R-6	R-5	R-6	R-5	R-6	R-5
0.16	R-3	R-3	R-5	R-4	R-5	R-4	R-6	R-4	R-7	R-5	R-7	R-5	R-5	R-4	R-6	R-5	R-6	R-5	R-6	R-5
0.17	R-3	R-3	R-5	R-4	R-5	R-4	R-6	R-4	R-7	R-5	R-7	R-5	R-5	R-4	R-6	R-5	R-6	R-5	R-6	R-5
0.18	R-3	R-3	R-5	R-4	R-5	R-4	R-6	R-4	R-7	R-5	R-7	R-5	R-5	R-4	R-6	R-5	R-6	R-5	R-6	R-5
0.19	R-3	R-3	R-5	R-4	R-5	R-4	R-6	R-4	R-7	R-5	R-7	R-5	R-5	R-4	R-6	R-5	R-6	R-5	R-6	R-5
0.20	R-3	R-3	R-5	R-4	R-6	R-4	R-6	R-4	R-7	R-5	R-7	R-5	R-5	R-4	R-6	R-5	R-6	R-5	R-6	R-5

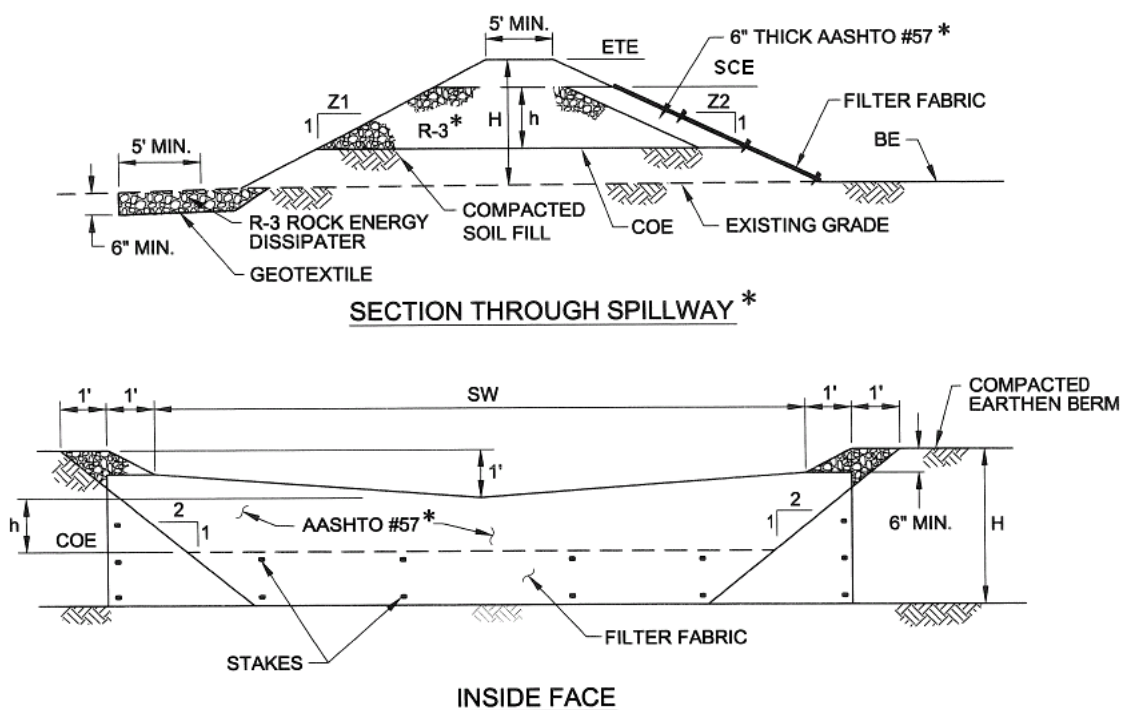
STANDARD DESIGN DIMENSIONS AND LINING FOR A PERMANENT GRASS CHANNEL WITH 2H:1V SIDE SLOPES AND 2 FOOT TOTAL DEPTH																				
ACRES	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
Channel Bottom Width (Ft)	2	4	2	4	2	4	2	4	2	4	4	6	4	6	4	6	4	6	4	6`
Bed Slope	CHANNEL LINER = GRASS PLUS																			
0.01	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB
0.02	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	TRM	ECB	TRM	TRM	TRM	TRM
0.03	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	ECB	TRM	ECB	TRM	ECB	TRM	TRM	TRM	TRM
0.04	ECB	ECB	ECB	ECB	ECB	ECB	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM
0.05	ECB	ECB	ECB	ECB	TRM	ECB	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM
0.06	ECB	ECB	ECB	ECB	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM
0.07	ECB	ECB	TRM	ECB	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM
0.08	ECB	ECB	TRM	ECB	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM
0.09	ECB	ECB	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM	TRM

ECB = Erosion Control Blanket; TRM = Turf reinforcement Matting

L. SEDIMENT TRAPS

Sediment traps may be used to control runoff from drainage areas up to 5.0 acres (disturbed and undisturbed). They must be sized to provide 2,000 cubic feet of total storage capacity for each acre tributary to the trap. The sediment storage zone is considered to be 700 cubic feet per acre. Outlets should be located as far from the inflow as possible. At a minimum, spillway widths should be equal to 6 feet for each acre tributary to the trap

Trap No.	Total Tributary Acres	Required Storage Capacity 2000 X Acres (CF)	Length (FT)	Width (FT)	Depth (FT)	Storage Capacity Provided (CF)



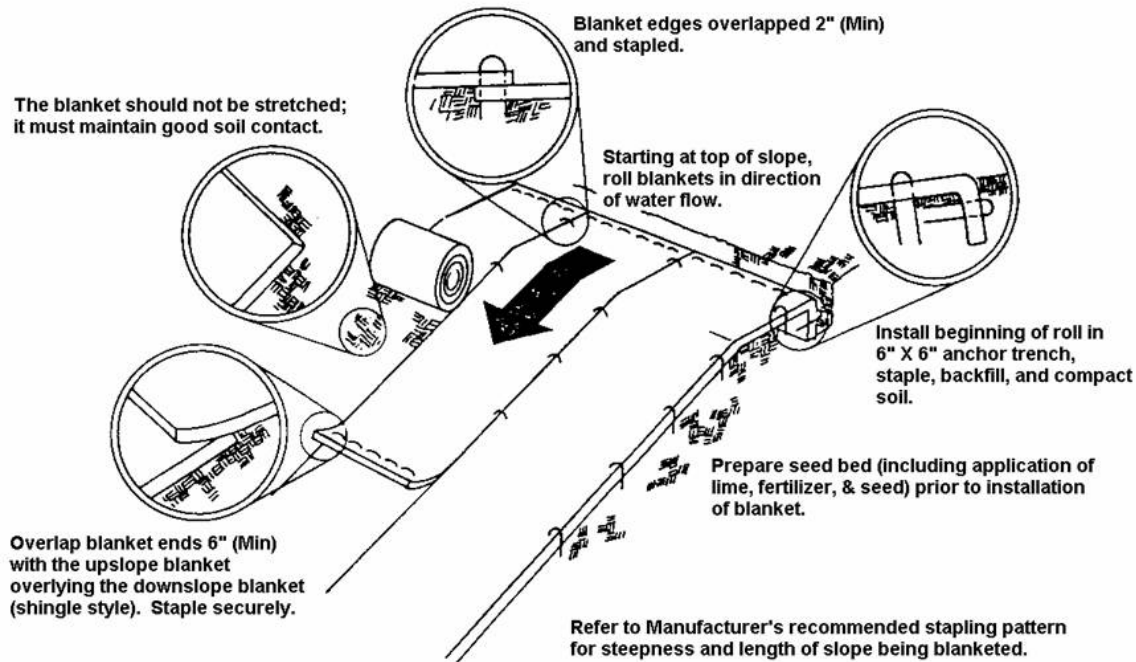
M. SITE STABILIZATION**Recommended Permanent Seed Mixtures Cool and Warm Season Grass**

Mixture Number	Season	Species	Seeding Rate lb./ac.
1	Cool	Tall fescue*, or	79
		Fine fescue, plus	46
		Redtop, or	4
		Perennial ryegrass,	19
		plus Birdsfoot trefoil	8
2	Cool	Birdsfoot trefoil,	8
		plus Tall fescue*	40
3	Cool	Orchardgrass, or	26
		Smooth	33
		bromegrass, plus Birdsfoot trefoil	8
4	Warm	Flatpea, plus	27
		Tall fescue*, or	26
		Perennial ryegrass	25
5	Warm	Deertongue, plus	21
		Birdsfoot treefoil	8
6	Warm	Switchgrass, or	15
		Big Bluestem, plus	15
		Birdsfoot trefoil	8

Recommended Seed Mixtures for Stabilizing Disturbed Areas

Site Condition	Seed Mixture (Select One Mixture)
Cut Slopes and Fills (not mowed) Well-drained Variable drainage	2, 4, or 6 2
Cut Slopes and Fills (mowed)	1
Cut Slopes and Fills (grazed/hay)	1, 2, or 3
Gullies and Eroded Areas	2 or 6
Erosion Control BMPs Channels, Drainage ditches, Trap embankments, etc. For hay or silage	1 or 2 2 or 3
Right-of-way Well-drained Variable drainage Well-drained areas for grazing/hay	4 or 6 2 2 or 3
Strip Mined Areas Spoils, waste areas, fly ash, slag, etc. (lime to soil test) For grazing/hay	2, 4, or 5 2, 3, or 6

N. EROSION CONTROL BLANKETS



Spray-on erosion control blankets (e.g. bonded fiber matrix or flexible growth medium) may be used in lieu of roll-on blankets if manufacturers' recommendations are followed.

Appendix B

Limitations of Pennsylvania Soils Pertaining to Earthmoving Projects

APPENDIX B

LIMITATIONS OF PENNSYLVANIA SOILS PERTAINING TO EARTHMOVING PROJECTS (Absence of an X does not mean "No Potential Limitation")

NOTE: THIS IS NOT NECESSARILY AN ALL-INCLUSIVE LIST.

SOIL NAME	CUTBANKS CAVE	CORROSIVE TO CONCRETE STEEL *	DROUGHTY	EASILY ERODIBLE	FLOODING	DEPTH TO SATURATED ZONE/ SEASONAL HIGH WATER TABLE	HYDRIC/ HYDRIC INCLUSIONS	LOW STRENGTH / LANDSLIDE PRONE	SLOW PERCOLATION	PIPING	POOR SOURCE OF TOPSOIL	FROST ACTION	SHRINK - SWELL	POTENTIAL SINKHOLE	PONDING	WETNESS
Abbottstown	X	C/S		X		X	X	X	X	X	X	X				X
Aeric Epiaquents	X	C/S	X			X	X				X	X				X
Albrights	X	C/S	X	X		X	X	X	X	X	X	X				X
Alden	X	C/S				X	X	X	X	X	X	X	X		X	X
Aldino	X	C/S				X	X	X	X	X		X				
Allegheny	X	C		X			X	X	X	X	X	X				
Allenwood	X	C/S					X	X	X	X	X	X				
Allis	X	X	X			X	X	X	X	X	X	X	X			
Alluvial Land	X	C/S			X	X	X		X	X	X	X		X		X
Alton	X	C	X						X		X	X				
Alvira	X	C/S	X	X		X	X	X	X	X	X	X				X
Amwell	X	C/S		X		X	X	X	X	X		X				
Andover	X	C/S	X	X		X	X	X	X	X	X	X				X
Aquepts	X	C/S				X	X	X	X	X	X	X			X	X
Aquults	X	C/S		X		X		X	X	X	X	X	X			X
Arents							X									
Arendtsville	X	C	X			X			X	X	X	X				X
Armagh	X	C/S				X	X	X	X	X	X	X	X			X
Arnot	X	C	X	X				X	X		X	X				
Ashton	X				X			X	X	X						
Atherton	X	S				X	X	X	X	X	X	X			X	X
Athol	X	C					X		X	X	X	X				
Atkins	X	C/S			X	X	X	X	X	X	X	X				X
Bagtown	X	C				X	X		X		X	X				X
Baile	X	C/S		X		X	X	X	X	X	X	X	X		X	X
Barbour	X	C	X		X	X	X				X	X				X
Basher	X	C/S			X	X	X	X	X	X	X	X				X
Bath	X	C/S				X	X		X		X	X				
Beach & Riverwash	X	C/S				X	X	X		X		X				
Beach Sand	X	C/S			X	X	X		X		X					
Bedington	X	C	X	X			X		X		X	X				
Belmont				X									X			
Beltsville	X	C/S		X		X	X	X	X	X		X				
Benson	X	C	X					X	X	X	X	X				
Berks	X	C	X	X			X		X	X	X					
Bermudian	X	C		X	X	X	X	X		X	X	X				X
Berrien	X	S		X		X	X		X	X		X			X	
Bethesda	X	C/S	X			X	X	X	X		X	X				X
Birdsall	X	C/S				X	X	X	X	X	X	X	X		X	X

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Bowmansville	X	C/S			X	X	X	X	X	X	X	X				X
Birdsboro	X	C/S		X		X	X		X	X	X	X				X
Blairton	X	C/S		X		X	X	X	X	X	X	X				X
Braceville	X	C/S	X	X		X	X	X	X	X	X	X				X
Brandywine	X	C	X	X				X	X		X					
Brecknock	X	C	X						X	X	X	X				
Brinkerton	X	C/S	X	X		X	X	X	X	X	X	X	X			X
Brooke	X	S						X	X		X	X	X			
Brownsburg	X	C		X			X	X	X	X	X	X				
Buchanan	X	C/S	X	X		X	X	X	X	X	X	X				X
Buckingham	X	C/S		X		X	X	X	X	X	X	X				X
Bucks	X	C						X	X	X	X	X	X			
Burgin						X		X	X			X	X			
Butlertown	X	C/S		X		X	X	X	X	X		X				
Califon	X	C/S				X		X	X			X				X
Calvert	X	C/S		X		X	X	X	X	X	X	X	X			X
Calvin	X	C	X	X			X			X		X				
Cambridge	X	C/S		X		X	X	X	X	X		X			X	X
Canadice	X	S		X		X	X	X	X		X	X	X		X	X
Canaseraga	X	C/S		X		X		X	X	X		X				X
Caneadea	X	C/S		X		X	X	X	X		X	X	X			X
Canfield	X	C/S		X		X	X	X	X	X		X				X
Carbo	X	S	X	X				X	X		X		X	X		
Catden	X	S				X		X	X			X			X	X
Carlisle	X	S				X	X		X			X			X	X
Catoctin	X	C/S	X								X					
Cattaraugus	X	C	X			X			X		X	X				
Cavode	X	C/S		X		X	X	X	X	X		X	X			X
Cedarcreek	X	C/S	X			X	X	X			X					
Ceres	X	C						X	X		X	X				
Chagrin	X	C		X	X	X	X	X	X	X		X	X		X	X
Chalfont	X	C/S		X		X	X	X	X	X	X	X				X
Chavies		C		X	X			X		X		X				
Chenango	X	C	X		X	X	X		X	X	X	X				
Chester	X	C		X				X	X	X	X	X				
Chewacla	X	C/S			X	X	X	X	X	X		X				X
Chili	X	C					X	X	X		X	X				
Chippewa	X	C/S	X	X		X	X	X	X	X		X	X		X	
Chrome	X	C/S	X					X	X		X	X	X			
Clarksburg	X	C/S		X		X	X	X	X	X	X	X	X	X		X
Clearbrook	X	C/S	X				X	X	X	X	X	X	X			
Clymer	X	C	X	X			X	X	X	X	X	X				X
Codorus	X	C/S			X	X	X	X	X	X		X				X
Cokesbury	X					X			X	X		X				

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Comus	X	C		X	X		X	X	X	X		X				
Collamer	X	C/S		X		X	X	X	X	X		X				X
Colonie	X	C	X					X	X		X					
Comly	X	C/S	X	X		X	X			X	X	X				
Conestoga	X	C/S						X	X	X		X		X		
Congaree	X	C		X	X		X	X	X	X		X				
Conotton	X	C/S	X	X		X	X	X	X	X	X	X				
Conowingo	X	C/S		X		X		X	X	X		X	X			X
Cookport	X	C/S	X	X		X	X	X	X	X	X	X				X
Covegap	X	C/S							X		X	X		X		
Craigsville	X	C	X		X		X	X			X	X				
Croton	X	C/S		X		X	X	X	X	X	X	X			X	X
Culleoka	X	C		X				X	X	X	X	X				
Culvers	X	C/S	X			X		X	X	X		X				X
Dalton	X	C/S		X		X	X		X	X	X	X			X	
Darien	X	C/S				X		X	X	X	X	X	X			X
Dekalb	X	C	X					X	X	X	X	X				
Delaware	X	C			X		X		X			X				
Deposit	X	C/S	X		X	X	X		X		X					X
Dormont	X	C/S		X		X	X	X	X	X	X	X	X	X		X
Downsville	X	C							X		X	X		X		
Doylestown	X	C/S	X	X		X	X	X	X	X	X	X				X
Drifton	X	C/S		X		X	X	X	X		X	X				
Dryrun	X	C/S		X		X	X		X		X	X				
Duffield	X	C/S		X			X	X	X	X	X		X	X		X
Duncannon	X	C		X				X	X	X		X				
Dunning	X	C/S		X	X	X	X	X	X		X		X	X	X	X
Dystrochrepts	X	C/S	X	X	X	X	X	X	X	X	X	X				
Edgemere	X	C/S				X	X	X	X	X	X	X			X	X
Edgemont	X	C	X				X		X		X	X				
Edom	X	S	X	X				X	X	X	X	X	X	X	X	
Elk	X	C/S		X			X	X	X	X						
Elkins	X	c/s			X	X	X	X	X	X	X	X	X			
Elko	X	C/S	X			X		X	X			X	X			X
Ellery	X	C/S	X			X	X	X	X	X	X	X			X	X
Elliber	X	C	X						X		X	X		X		
Elnora	X	C	X			X			X		X					X
Empyville	X	C	X			X	X		X		X	X				
Erie	X	S	X	X		X	X	X	X	X	X	X			X	X
Ernest	X	C/S		X		X	X	X	X	X	X	X	X			X
Evendale	X	C/S				X	X	X	X	X	X	X	X	X		X
Fairplay	X	S		X	X	X	X	X	X	X	X	X			X	
Fairpoint	X	C/S	X				X	X	X		X	X	X	X		
Fitchville	X	C/S				X	X	X	X	X	X	X	X			X

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Fredon	X	C/S	X	X		X	X	X	X		X	X				X
Fountainville	X	C/S		X		X		X	X	X		X				
Fleetwood	X	C	X					X			X					X
Fluents	X	C/S	X	X	X	X	X			X		X				
Fluvequents	X	C/S	X	X	X	X	X	X		X		X				
Freetown	X	C/S				X	X	X				X			X	
Frenchtown	X	C/S		X		X	X	X	X	X	X	X			X	X
Freshwater Marsh	X	S				X	X	X	X		X	X			X	
Funkstown	X	S		X	X	X		X	X	X		X				X
Gageville	X	C/S		X		X		X	X	X	X	X	X			X
Gaila	X	C/S						X	X		X	X				
Gibraltar	X	C/S		X	X	X	X	X	X	X		X				
Gilpin	X	C	X	X			X	X	X	X	X	X				
Ginat	X	C/S		X		X	X	X	X	X	X	X	X		X	X
Gladstone	X	C		X			X		X			X	X			
Glenelg	X	C		X			X	X	X	X	X	X				X
Gleneyre	X	C/S			X	X	X	X	X	X	X	X			X	X
Glenford	X	C/S				X	X	X	X	X		X	X			
Glenville	X	C/S				X	X	X	X	X	X	X				X
Gresham		X		X			X	X	X	X		X				X
Guernsey	X	C/S		X		X	X	X	X		X	X	X	X		X
Guthrie							X									
Hagerstown	X	S		X		X	X	X	X	X	X	X	X	X		
Halsey	X	C/S		X	X	X	X	X	X	X	X	X				X
Hanover	X	C/S				X	X	X	X	X		X	X			
Harbor	X	C/S				X		X	X			X	X			
Haplaquents							X									
Hartleton	X	C	X					X	X	X	X	X				
Hatboro	X	C/S			X	X	X	X	X	X	X	X				X
Haven	X	C	X					X	X			X				
Hazleton	X	C	X	X			X	X	X	X	X	X				
Henrietta	X					X		X	X		X	X			X	
Highfield	X	C	X				X		X		X	X				
Hollinger	X	C						X	X	X		X		X		
Holly	X	C/S			X	X	X	X	X	X	X	X			X	X
Hornell	X	C/S	X	X		X		X	X		X	X	X			X
Howard	X		X	X			X		X		X	X				
Howell	X	C/S		X		X		X		X		X	X			
Hublersburg	X	C/S						X	X	X	X	X	X			
Huntington	X	C			X	X	X	X				X		X		
Hustontown	X	C/S	X			X	X		X	X		X				
Itmann	X	C/S	X					X	X		X	X				
Ivory	X	C/S		X		X	X	X	X	X	X	X	X			

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Kimbles	X	C/S				X	X	X	X		X	X				X
Jimtown	X	C/S				X	X	X			X	X				X
Joanna	X	C					X	X	X	X		X				
Jugtown	X	S			X	X	X	X	X	X		X		X		
Kedron	X	C/S				X	X	X	X	X	X	X				X
Kanona							X									
Kingsville	X	C/S	X			X	X		X		X	X			X	X
Kinzua	X	C						X	X		X	X				
Klinesville	X	C/S	X	X			X		X		X	X				
Knauers	X	C/S	X		X	X	X	X	X		X	X			X	X
Kreamer	X	C/S		X		X	X	X	X	X		X		X		
Lackawanna	X	C	X			X	X	X			X	X				X
Laidig	X	C/S	X	X		X	X	X	X	X	X	X				
Lakin	X	C	X						X							
Lamington	X	C/S		X		X	X		X	X	X	X			X	X
Langford	X	S	X	X		X	X	X	X		X	X			X	X
Lansdale	X	C	X					X	X		X	X				
Lantz	X	C/S		X	X	X	X	X	X	X	X	X	X			X
Lawrenceville	X	C/S		X		X	X	X	X	X		X				X
Leck Kill	X	C						X	X	X	X	X				X
Leetonia	X	C	X	X			X				X					
Legore	X	C/S	X					X	X	X	X	X	X			
Lehew	X	C	X						X		X					
Lehigh	X	C/S				X	X		X	X	X	X				X
Lewisberry		C								X	X	X				
Library	X	C/S		X		X	X	X	X		X	X	X	X		X
Lickdale	X	C/S		X		X	X	X	X		X	X	X			
Linden	X	C			X	X	X	X	X	X		X				
Lindside	X	S			X	X	X	X	X	X		X		X		X
Lobdell	X	C/S		X	X	X	X	X	X	X		X	X			X
Lordstown	X	C	X	X				X	X	X		X				
Loudonville	X	C/S						X	X	X		X	X			
Lowell	X	C/S						X	X	X	X	X	X	X		
Luray		X		X		X		X	X	X	X	X	X		X	X
Macove	X	C/S						X	X		X	X				
Mahoning	X	C/S		X		X	X	X	X	X	X	X	X		X	X
Manlius	X	C	X				X		X		X	X				
Manor	X	C		X				X	X	X	X	X				
Mardin	X	S	X	X		X	X	X	X	X		X				X
Markes	X	C/S	X			X		X	X		X	X				X
Matapeake	X	C/S		X			X	X	X			X				
Matewan	X	C	X						X		X					
Mattapex	X	C/S		X		X	X	X	X	X		X				

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Miner	X	C/S				X	X	X	X		X	X	X		X	X
Maurertown	X	C/S		X	X	X	X	X	X	X	X	X	X		X	
Meckesville	X	C/S				X		X	X	X	X	X				X
Medihemists	X	S				X	X	X				X			X	X
Medifibrists	X	S				X	X					X			X	X
Medisaprists		S				X	X	X				X			X	X
Melvin	X	S		X	X	X	X	X	X	X	X	X	X	X	X	X
Mertz	X	C/S								X		X				
Middlebury	X	S			X	X	X		X	X		X	X			
Mill	X	C/S				X	X	X	X	X	X	X	X		X	X
Millheim		C/S		X				X	X	X	X		X			
Monongahela	X	C/S		X		X	X	X	X	X		X	X			X
Montalto	X	C/S					X	X	X		X	X	X			
Montevallo		C/S	X				X	X			X	X				
Morris	X	C/S	X	X		X	X	X	X		X	X				X
Morrison	X	C		X				X	X			X		X		
Mt. Airy	X	C	X				X				X	X				
Mt. Lucas	X	C/S				X	X	X	X	X	X	X				X
Mt. Zion	X	C/S		X		X	X	X	X	X	X	X	X			
Muck		X			X	X	X			X					X	X
Muck and Peat	X	S				X	X	X	X		X	X	X		X	X
Murrill	X	C/S					X	X	X	X	X	X		X		
Myersville	X	C/S						X	X	X	X	X				
Nanticoke	X	C			X	X	X	X	X	X	X				X	X
Natalie							X									
Neshaminy	X	C/S				X	X	X	X	X	X	X				
Newark	X	S		X	X	X	X	X	X	X	X	X		X		
Nockamixon	X	C/S		X		X	X	X	X	X		X				X
Nolin	X	C			X	X	X	X	X	X				X		
Nollville	X	C/S						X	X		X	X	X	X		
Nolo	X	C/S	X			X	X	X	X	X	X	X				X
Norwich	X	C/S	X	X		X	X	X	X		X	X			X	X
Ochrepts	X	C	X						X		X	X				
Onoville	X	C/S	X			X		X	X	X	X	X	X			X
Opequon	X	S	X	X				X	X		X	X	X	X		
Oquaga	X	C	X	X			X		X			X				
Orrville	X	C/S			X	X	X	X	X	X		X				X
Otego	X	S		X	X	X		X	X	X		X				X
Othello	X	C/S				X	X	X	X	X	X	X				X
Ottawa	X	C	X						X			X				
Painesville	X	C/S				X	X		X	X	X	X				X
Palms	X	C/S				X	X	X	X		X	X			X	X
Papakating	X	C/S			X	X	X	X	X	X	X	X			X	X
Parker	X	C	X						X		X	X				

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Penn Val	X	C/S							X		X	X				
Paupack	X	S				X	X		X			X			X	X
Pecktonville	X	C/S		X		X		X	X		X	X	X	X		
Pekin					X		X			X		X				
Penlaw	X	C/S		X		X	X	X	X	X	X	X	X	X		X
Penn	X	C	X				X	X		X	X	X				
Pequea	X			X						X	X	X				
Phelps	X	S		X		X	X		X	X	X	X				X
Philo	X	C/S		X	X	X	X	X	X	X	X	X				X
Platea	X	C/S		X		X	X	X	X	X		X				X
Pocono	X	C	X						X		X					
Pope	X	C/S		X	X		X	X	X	X	X	X				
Portville	X	C/S				X	X		X	X	X	X	X			
Potomac	X	C	X		X						X					
Psamments	X	C	X		X	X			X		X					
Purdy	X	C/S		X		X	X	X	X	X	X	X	X			X
Rainsboro	X	X		X		X	X	X	X			X				
Ramsey		C	X						X		X					
Raritan	X	C/S				X	X		X	X	X	X				X
Ravenna		C/S		X		X			X	X	X	X				X
Ravenrock	X	C/S				X			X		X	X				
Rayne	X	C		X				X	X	X	X	X				
Readington	X	C/S		X		X	X	X	X	X	X	X				X
Reaville	X	C/S	X	X		X	X		X	X	X	X				X
Red Hook	X	C/S		X	X	X	X		X	X	X	X				
Rexford	X	C/S	X		X	X	X	X	X	X	X	X				X
Rimer	X	C/S	X	X		X	X		X	X	X	X	X			X
Riverhead	X	C	X					X	X		X	X				X
Riverwash							X									
Rohrersville	X	C/S		X		X	X	X	X	X		X	X			X
Rowland	X	C/S		X	X	X	X	X	X	X	X	X				X
Rubble Land											X					
Rushtown	X	C	X						X							
Ryder	X	C/S						X	X	X		X		X		
Sassafras	X	C						X	X			X				
Scio	X	C/S		X		X	X	X	X	X		X				X
Sciotoville	X	C/S		X		X	X	X	X	X		X	X			X
Sebring	X	C/S				X	X	X	X	X	X	X	X		X	X
Sequatchie		X		X						X						
Sheffield	X	C/S				X	X	X	X	X		X			X	
Shelmadine	X	C/S	X			X	X	X	X	X	X	X				
Shelocta	X	C						X	X		X	X				
Shohola	X	C/S	X			X	X	X	X	X	X	X				X

SOIL NAME	CUTBANKS CAVE	CORROSIVE TO CONCRET STEEL *	DROUGHTY	EASILY ERODIBLE	FLOODING	DEPTH TO SATURATED ZONE/ SEASONAL HIGH WATER TABLE	HYDRIC/ HYDRIC INCLUSIONS	LOW STRENGTH / LANDSLIDE PRONE	SLOW PERCOLATION	PIPING	POOR SOURCE OF TOPSOIL	FROST ACTION	SHRINK - SWELL	POTENTIAL SINKHOLE	PONDING	WETNESS
Sideling	X	C/S				X			X	X	X	X	X			
Shongo	X	C/S				X	X	X	X	X	X	X	X			X
Skidmore	X	C	X		X	X	X		X		X					
Sloan	X	S		X	X	X	X	X	X	X	X	X	X			X
Solon	X	C	X					X			X	X				
Stanhope	X	C/S		X	X	X	X	X	X	X	X	X	X			X
Steff					X	X	X	X				X				
Steinsburg	X	C	X						X		X					
Stoney Land											X					
Swanpond	X	S		X		X		X	X		X	X	X			X
Suncook	X	C	X		X		X		X		X					
Swartswood	X	C	X	X		X		X	X	X	X					
Thorndale	X	C/S				X	X	X	X	X	X	X	X	X		X
Thurmont	X	C/S				X		X	X		X	X				
Tilsit	X	C/S		X		X	X	X	X	X						X
Tioga	X	C		X	X	X	X		X							
Timberville	X	C			X			X	X	X	X	X	X			
Titusville	X	C/S		X		X	X	X	X	X		X	X			X
Towhee	X			X		X	X	X	X	X	X	X	X			
Trego	X	C/S		X		X		X	X		X	X	X			
Trumbull	X	C/S		X		X	X	X	X	X	X	X	X		X	X
Tunkhannock	X	C	X				X		X		X					
Tygart	X	C/S		X		X	X	X	X	X	X	X	X			X
Tyler	X	C/S		X		X	X	X	X	X	X	X	X			X
Udifluents	X	C/S			X	X	X		X	X		X				
Udorthents	X	C/S	X	X				X	X		X	X				
Unadilla	X	C		X			X	X	X	X		X				
Ungers	X	C		X				X	X			X				
Upshur	X	C/S	X	X				X	X		X	X	X			
Urbana						X						X				
Valois	X	C					X	X	X		X	X				
Vandergrift	X	C/S		X			X	X	X		X	X	X			X
Vanderlip	X	C	X						X							
Venango	X	C/S		X		X	X	X	X	X	X	X				X
Volusia	X	C/S	X	X		X	X	X	X	X	X	X				
Wallington	X	C/S		X		X	X	X	X	X	X	X				X
Warners		S		X	X	X	X	X	X		X	X			X	X
Washington	X	S				X	X	X	X	X		X	X	X		
Watchung	X	C/S		X		X	X	X	X	X	X	X	X			X
Watson	X	C/S	X			X	X	X	X	X		X	X			

SOIL NAME	CUTBANKS CAVE	CORROSIVE TO CONCRETE STEEL *	DROUGHTY	EASILY ERODIBLE	FLOODING	DEPTH TO SATURATED ZONE/ SEASONAL HIGH WATER TABLE	HYDRIC/ HYDRIC INCLUSIONS	LOW STRENGTH / LANDSLIDE PRONE	SLOW PERCOLATION	PIPING	POOR SOURCE OF TOPSOIL	FROST ACTION	SHRINK - SWELL	POTENTIAL SINKHOLE	PONDING	WETNESS
Wauseon	X	C/S				X	X	X	X	X	X	X			X	X
Wayland	X	S		X	X	X	X	X	X	X	X	X			X	X
Wehadkee	X	C/S			X	X		X	X	X		X				X
Weikert	X	C/S	X				X	X	X	X	X	X				
Weinbach	X	C/S		X		X	X	X	X	X	X	X	X			X
Wellsboro	X	C/S	X	X		X	X	X	X	X		X				X
Westmoreland	X	C		X				X	X	X		X				
Weverton	X	C/S	X					X	X		X	X				
Wharton	X	C/S		X		X	X	X	X	X	X	X	X			X
Wheeling	X	C						X	X	X		X				
Whiteford																
Whitwell																
Wick	X	C/S		X	X	X	X	X	X	X	X	X				X
Wickham																
Williamson	X	C/S		X		X	X	X	X	X		X				X
Wiltshire					X					X						
Woodglen																
Woodstown	X	C/S				X		X	X	X	X	X				X
Wooster	X	C		X		X		X	X	X	X	X				
Worsham	X	C/S		X		X	X	X	X	X	X	X	X			
Worth	X	C	X	X		X	X		X	X	X	X				
Wurno	X		X					X	X		X	X		X		
Wurstboro	X	C/S				X	X		X		X	X				
Wyalusing	X	C/S			X	X	X	X	X		X	X				X
Wyoming	X	C	X				X		X		X					
Zipp		X				X	X	X		X	X	X	X			
Zoar	X	C/S				X	X	X	X	X		X	X			

WORKSHEET 1

List the soils that will be encountered by earthmoving required to construct the drill pad(s), access road(s), pits, impoundments, collector & feeder lines, or other activities associated with the proposed well site(s).

[illegible]

Appendix C

Streams

Pennsylvania Waterbodies Identified Within the Construction Footprint

Stream ID	Nearest Approximate Milepost	E&SCP Sheet Number	County	Waterbody Name	Stream Classification ^a	Type	Crossing Method ^b	Approximate Length Within Construction ROW	Crossed By Centerline	Approximate Length Within Permanent ROW	Approximate Length Within Ancillary Site	Approximate Length Crossed By Access Road	Estimated Stream Width ^c	Latitude (DD-NAD83)	Longitude (DD-NAD83)	Applicable PADEP Chapter 105 GP
H-309 Pennsylvania																
None																
H-302																
Pennsylvania																
S-TAP-029	0.8	30 of 174	Greene	Tributary to South Fork Tenmile Creek	WWF	Perennial	OCM	81	Yes	52	-	-	Minor - 7 ft.	39.901907	-80.085344	GP-5 and 8
S-TAP-031	1.4	31 of 174	Greene	Tributary to Muddy Creek	WWF	Ephemeral	OCM	101	Yes	67	-	-	Minor - 5 ft.	39.894005	-80.089391	GP-5 and 8
S-TAP-032	1.7	31 of 174	Greene	Tributary to Muddy Creek	WWF	Perennial	OCM	56	No	-	-	-	Minor - 6 ft.	39.89026	-80.091965	GP-8
S-TAP-034	1.7	31 of 174	Greene	Tributary to Muddy Creek	WWF	Perennial	OCM	79	Yes	52	-	-	Minor - 4 ft.	39.890137	-80.091937	GP-5 and 8
S-TAP-037	1.8	31 of 174	Greene	Tributary to Muddy Creek	WWF	Intermittent	OCM	77	Yes	52	-	-	Minor - 3 ft.	39.887738	-80.093486	GP-5 and 8
S-TAP-038	1.8	31 of 174	Greene	Tributary to Muddy Creek	WWF	Ephemeral	OCM	43	No	13	-	-	Minor - 1.5 ft.	39.887732	-80.09357	GP-8
S-TAP-039	1.9	31 of 174	Greene	Tributary to Muddy Creek	WWF	Ephemeral	OCM	47	No	5	-	-	Minor - 1.5 ft.	39.887164	-80.093958	GP-8
S-TAP-036	1.9	31 of 174	Greene	Tributary to Muddy Creek	WWF	Ephemeral	OCM	305	Yes	305	-	-	Minor - 5 ft.	39.887503	-80.093531	GP-5 and 8
S-TAP-040	2.2	31 of 174	Greene	Tributary to Muddy Creek	WWF	Perennial	OCM	60	Yes	60	-	-	Minor - 2 ft.	39.882592	-80.096732	GP-5 and 8
S-TAP-041	2.3	31 of 174	Greene	Tributary to Muddy Creek	WWF	Intermittent	OCM	95	Yes	58	-	-	Minor - 2 ft.	39.882312	-80.097012	GP-5 and 8
S-TAP-042	2.6	32 of 174	Greene	Tributary to Muddy Creek	WWF	Perennial	OCM	7	No	7	-	-	Minor - 1.5 ft.	39.877582	-80.098769	GP-8
S-TAP-033	2.9	32 of 174	Greene	Tributary to Muddy Creek	WWF	Ephemeral	OCM	84	Yes	54	-	-	Minor - 1 ft.	39.873694	-80.102778	GP-5 and 8
S-SRC-142	3.9	33 of 174	Greene	Tributary to Coal Lick Run	WWF	Ephemeral	OCM	36	No	5	-	-	Minor - 3 ft.	39.865399	-80.115559	GP-8
S-SRC-143	3.9	33 of 174	Greene	Tributary to Coal Lick Run	WWF	Ephemeral	OCM	54	No	23	-	-	Minor - 2 ft.	39.865307	-80.115718	GP-8
S-SRC-144	3.9	33 of 174	Greene	Tributary to Coal Lick Run	WWF	Ephemeral	OCM	63	Yes	37	-	-	Minor - 3 ft.	39.865077	-80.116183	GP-5 and 8
S-SRC-145	4	33 of 174	Greene	Tributary to Coal Lick Run	WWF	Intermittent	OCM	20	No	-	-	-	Minor - 3 ft.	39.864824	-80.116923	GP-8
S-SRC-150	4.8	34 of 174	Greene	Mt. Phoebe Run	TSF, ATW	Perennial	OCM	85	Yes	56	-	-	Minor - 4 ft.	39.859207	-80.129943	GP-5 and 8
S-SRC-154	5.4	35 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Ephemeral	OCM	103	Yes	53	-	-	Minor - 1.5 ft.	39.854729	-80.140544	GP-5 and 8
S-SRC-153	5.4	35 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Intermittent	OCM	19	No	19	-	-	Minor - 3 ft.	39.854452	-80.140904	GP-8
S-SRC-152	6.2	35 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Perennial	OCM	59	Yes	59	-	-	Minor - 2 ft.	39.849202	-80.152815	GP-5 and 8
S-SRC-134	6.2	35 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Ephemeral	OCM	88	Yes	52	-	-	Minor - 3 ft.	39.849205	-80.153037	GP-5 and 8
S-SRC-135	6.3	35 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Perennial	OCM	70	Yes	63	-	-	Minor - 5 ft.	39.848214	-80.154894	GP-5 and 8
S-SRC-136	6.3	36 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Perennial	OCM	77	Yes	53	-	-	Minor - 3.5 ft.	39.847912	-80.155791	GP-5 and 8
S-SRC-138	6.7	36 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Intermittent	OCM	86	Yes	51	-	-	Minor - 2 ft.	39.845515	-80.161043	GP-5 and 8
S-SRC-137	6.7	36 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Ephemeral	OCM	100	Yes	59	-	-	Minor - 3 ft.	39.845441	-80.161202	GP-5 and 8
S-SRC-139	7	36 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Ephemeral	OCM	364	No	16	-	-	Minor - 3 ft.	39.842945	-80.166847	GP-8
S-SRC-140	7.1	36 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Perennial	OCM	94	Yes	55	-	-	Minor - 2 ft.	39.842454	-80.167699	GP-5 and 8
S-SRC-141	7.4	37 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Intermittent	OCM	94	Yes	63	-	-	Minor - 8 ft.	39.84018	-80.172923	GP-5 and 8
S-TAP-002	7.5	37 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Perennial	OCM	79	Yes	53	-	-	Minor - 6 ft.	39.839207	-80.175047	GP-5 and 8
S-TAP-005	7.7	37 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Perennial	OCM	50	Yes	50	-	-	Intermediate - 10 ft.	39.837662	-80.177812	GP-5 and 8

Pennsylvania Waterbodies Identified Within the Construction Footprint

Stream ID	Nearest Approximate Milepost	E&SCP Sheet Number	County	Waterbody Name	Stream Classification ^a	Type	Crossing Method ^b	Approximate Length Within Construction ROW	Crossed By Centerline	Approximate Length Within Permanent ROW	Approximate Length Within Ancillary Site	Approximate Length Crossed By Access Road	Estimated Stream Width ^c	Latitude (DD-NAD83)	Longitude (DD-NAD83)	Applicable PADEP Chapter 105 GP
S-TAP-001	7.8	37 of 174	Greene	Dyers Fork	TSF, ATW	Perennial	OCM	321	Yes	321	-	-	Minor - 6 ft.	39.83854	-80.176251	GP-5 and 8
S-TAP-008	8.1	38 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Ephemeral	OCM	29	No	4	-	-	Minor - 5 ft.	39.834887	-80.185113	GP-8
S-TAP-010	8.5	38 of 174	Greene	Tributary to Smith Creek	WWF	Ephemeral	OCM	57	No	20	-	-	Minor - 5 ft.	39.832155	-80.191311	GP-8
S-TAP-011	8.6	38 of 174	Greene	Tributary to Smith Creek	WWF	Perennial	OCM	17	No	-	-	-	Minor - 4 ft.	39.831478	-80.192944	GP-8
S-TAP-012	8.7	38 of 174	Greene	Tributary to Smith Creek	WWF	Ephemeral	OCM	47	No	18	-	-	Minor - 8 ft.	39.831178	-80.193546	GP-8
S-TAP-013	8.7	38 of 174	Greene	Tributary to Smith Creek	WWF	Ephemeral	OCM	11	No	-	-	-	Minor - 8 ft.	39.831182	-80.193651	GP-8
S-TAP-015	9.3	39 of 174	Greene	Tributary to Smith Creek	WWF	Perennial	OCM	77	Yes	52	-	-	Minor - 8 ft.	39.826325	-80.204518	GP-5 and 8
S-TAP-016	9.7	39 of 174	Greene	Tributary to Smith Creek	WWF	Ephemeral	OCM	66	Yes	66	-	-	Minor - 6 ft.	39.823506	-80.210882	GP-5 and 8
S-TAP-017	9.7	39 of 174	Greene	Tributary to Smith Creek	WWF	Intermittent	OCM	79	Yes	52	-	-	Minor - 4 ft.	39.823395	-80.210994	GP-5 and 8
S-TAP-018	9.7	39 of 174	Greene	Tributary to Smith Creek	WWF	Perennial	OCM	81	Yes	55	-	-	Minor - 6 ft.	39.82334	-80.211381	GP-5 and 8
S-TAP-019	9.9	39 of 174	Greene	Smith Creek	WWF	Perennial	OCM	96	Yes	56	-	-	Minor - 8 ft.	39.822387	-80.213521	GP-5 and 8
S-TAP-020	10	39 of 174	Greene	Tributary to Smith Creek	WWF	Perennial	OCM	172	Yes	115	-	-	Minor - 3 ft.	39.821328	-80.216151	GP-5 and 8
S-TAP-021	10.1	40 of 174	Greene	Tributary to Smith Creek	WWF	Ephemeral	OCM	52	No	-	-	-	Minor - 6 ft.	39.821117	-80.216583	GP-8
S-TAP-022	10.5	40 of 174	Greene	Tributary to Stewart Run	HQ-WWF	Perennial	OCM	459	Yes	414	-	-	Minor - 6 ft.	39.818109	-80.223346	GP-5 and 8
S-TAP-022	10.5	40 of 174	Greene	Tributary to Stewart Run	HQ-WWF	Perennial	OCM		Yes		-	-	Minor - 12 ft.	39.817569	-80.224413	GP-5 and 8
S-TAP-022	10.5	40 of 174	Greene	Tributary to Stewart Run	HQ-WWF	Perennial	OCM		Yes		-	-	Minor - 4 ft.	39.817416	-80.224914	GP-5 and 8
S-SRC-079	10.7	40 of 174	Greene	Stewart Run	HQ-WWF	Perennial	OCM	79	Yes	53	-	-	Minor - 4 ft.	39.816886	-80.226167	GP-5 and 8
S-SRC-080	10.9	40 of 174	Greene	Tributary to Stewart Run	HQ-WWF	Perennial	OCM	78	Yes	52	-	-	Minor - 4 ft.	39.815359	-80.229623	GP-5 and 8
S-SRC-082	10.9	40 of 174	Greene	Tributary to Stewart Run	HQ-WWF	Ephemeral	OCM	77	Yes	51	-	-	Minor - 2 ft.	39.815291	-80.229792	GP-5 and 8
S-SRC-083	11.4	41 of 174	Greene	Tributary to Maple Run	HQ-WWF	Intermittent	OCM	103	Yes	63	-	-	Minor - 4 ft.	39.81188	-80.238231	GP-5 and 8
S-DJA-024	11.5	41 of 174	Greene	Tributary to Maple Run	HQ-WWF	Perennial	OCM	32	Yes	29	-	-	Minor - 2.5 ft.	39.811084	-80.239349	GP-5 and 8
S-DJA-025	11.8	41 of 174	Greene	Tributary to Maple Run	HQ-WWF	Perennial	OCM	55	Yes	51	-	-	Minor - 5 ft.	39.809006	-80.244123	GP-5 and 8
S-DJA-002	11.9	41 of 174	Greene	Tributary to Pursley Creek	HQ-WWF	Perennial	OCM	77	Yes	51	-	-	Minor - 6 ft.	39.807753	-80.247165	GP-5 and 8
S-SRC-031	12.9	42 of 174	Greene	Tustin Run	WWF	Perennial	OCM	88	Yes	58	-	-	Minor - 2 ft.	39.801494	-80.262136	GP-5 and 8
S-SRC-029	13.3	43 of 174	Greene	Tributary to Tustin Run	WWF	Perennial	OCM	90	Yes	59	-	-	Minor - 4 ft.	39.798248	-80.268619	GP-5 and 8
S-SRC-030	13.3	43 of 174	Greene	Tributary to Tustin Run	WWF	Perennial	OCM	51	Yes	51	-	-	Minor - 7 ft.	39.798205	-80.268366	GP-5 and 8
S-SRC-028	13.3	43 of 174	Greene	Tributary to Tustin Run	WWF	Intermittent	OCM	28	No	-	-	-	Minor - 2 ft.	39.798079	-80.269564	GP-8
S-SRC-025	13.7	43 of 174	Greene	Tributary to Tustin Run	WWF	Intermittent	OCM	227	Yes	152	-	-	Minor - 3 ft.	39.795836	-80.27564	GP-5 and 8
S-SRC-024	13.8	43 of 174	Greene	Tributary to Tustin Run	WWF	Perennial	OCM	77	Yes	51	-	-	Intermediate - 10 ft.	39.794949	-80.278252	GP-5 and 8
S-SRC-023	14.2	44 of 174	Greene	Tributary to Hoovers Run	WWF	Ephemeral	OCM	17	No	-	-	-	Minor - 3 ft.	39.792094	-80.284258	GP-8
S-SRC-021	14.3	44 of 174	Greene	Tributary to Hoovers Run	WWF	Intermittent	OCM	1	No	1	-	-	Minor - 2 ft.	39.791523	-80.285053	GP-8
S-SRC-020	14.3	44 of 174	Greene	Tributary to Hoovers Run	WWF	Intermittent	OCM	17	No	-	-	-	Minor - 4 ft.	39.791678	-80.285179	GP-8
S-SRC-019	14.3	44 of 174	Greene	Tributary to Hoovers Run	WWF	Perennial	OCM	107	Yes	53	-	-	Minor - 4.5 ft.	39.791638	-80.285157	GP-5 and 8
S-SRC-018	14.6	44 of 174	Greene	Hoovers Run	WWF	Perennial	OCM	111	Yes	55	-	-	Intermediate - 12 ft.	39.789515	-80.289897	GP-5 and 8
S-SRC-012	15.1	45 of 174	Greene	Tributary to Toms Run	WWF	Ephemeral	OCM	174	Yes	132	-	-	Minor - 4 ft.	39.785781	-80.298528	GP-5 and 8

Pennsylvania Waterbodies Identified Within the Construction Footprint

Stream ID	Nearest Approximate Milepost	E&SCP Sheet Number	County	Waterbody Name	Stream Classification ^a	Type	Crossing Method ^b	Approximate Length Within Construction ROW	Crossed By Centerline	Approximate Length Within Permanent ROW	Approximate Length Within Ancillary Site	Approximate Length Crossed By Access Road	Estimated Stream Width ^c	Latitude (DD-NAD83)	Longitude (DD-NAD83)	Applicable PADEP Chapter 105 GP
S-SRC-014	15.1	45 of 174	Greene	Tributary to Toms Run	WWF	Ephemeral	OCM	44	No	13	-	-	Minor - 4 ft.	39.785788	-80.298646	GP-8
S-SRC-015	15.1	45 of 174	Greene	Tributary to Toms Run	WWF	Ephemeral	OCM	66	No	-	-	-	Minor - 1 ft.	39.785999	-80.298263	GP-8
S-SRC-011	15.1	45 of 174	Greene	Tributary to Toms Run	WWF	Intermittent	OCM	95	Yes	63	-	-	Minor - 1 ft.	39.78548	-80.29919	GP-5 and 8
S-SRC-009	15.1	45 of 174	Greene	Tributary to Toms Run	WWF	Intermittent	OCM	30	No	-	-	-	Minor - 2 ft.	39.78544	-80.29955	GP-8
S-SRC-008	15.1	45 of 174	Greene	Tributary to Toms Run	WWF	Perennial	OCM	80	Yes	52	-	-	Minor - 3 ft.	39.785377	-80.299516	GP-5 and 8
S-SRC-007	15.6	45 of 174	Greene	Tributary to Toms Run	WWF	Ephemeral	OCM	34	No	5	-	-	Minor - 8 ft.	39.782545	-80.306227	GP-8
S-SRC-006	15.6	45 of 174	Greene	Tributary to Toms Run	WWF	Intermittent	OCM	126	Yes	99	-	-	Minor - 2 ft.	39.782356	-80.306524	GP-5 and 8
S-SRC-005	15.6	45 of 174	Greene	Tributary to Toms Run	WWF	Perennial	OCM	163	Yes	108	-	-	Minor - 4.5 ft.	39.782081	-80.307128	GP-5 and 8
S-SRC-004	15.6	45 of 174	Greene	Tributary to Toms Run	WWF	Perennial	OCM	80	Yes	54	-	-	Minor - 3 ft.	39.781883	-80.30757	GP-5 and 8
S-SRC-003	16	45 of 174	Greene	Tributary to Toms Run	WWF	Ephemeral	OCM	70	No	29	-	-	Minor - 1 ft.	39.779314	-80.313653	GP-8
S-SRC-002	16	46 of 174	Greene	Tributary to Toms Run	WWF	Ephemeral	OCM	4	No	4	-	-	Minor - 1.5 ft.	39.77891	-80.314226	GP-8
S-SRC-001	16.1	46 of 174	Greene	Tributary to Toms Run	WWF	Perennial	OCM	237	Yes	149	-	-	Minor - 2.5 ft.	39.778979	-80.314299	GP-5 and 8
S-SRC-033	16.4	46 of 174	Greene	Toms Run	WWF	Perennial	HDD	52	Yes	52	-	-	Intermediate - 18 ft.	39.776473	-80.319243	GP-5 and 8
S-SRC-034	16.5	46 of 174	Greene	Tributary to Toms Run	WWF	Perennial	HDD	59	Yes	59	-	-	Minor - 3.5 ft.	39.775884	-80.321448	GP-5 and 8
S-SRC-035	17.4	47 of 174	Greene	Blockhouse Run	WWF	Perennial	OCM	98	Yes	56	-	-	Intermediate - 20 ft.	39.765979	-80.329236	GP-5 and 8
S-SRC-037	17.4	47 of 174	Greene	Tributary to Blockhouse Run	WWF	Perennial	OCM	62	Yes	62	-	-	Minor - 1.5 ft.	39.765878	-80.329232	GP-5 and 8
S-SRC-039	18.4	49 of 174	Greene	Tributary to Roberts Run	WWF	Perennial	OCM	77	Yes	51	-	-	Minor - 5 ft.	39.765227	-80.346357	GP-5 and 8
S-SRC-041	18.7	49 of 174	Greene	Tributary to Roberts Run	WWF	Intermittent	OCM	37	No	9	-	-	Minor - 3 ft.	39.762748	-80.352371	GP-8
S-SRC-040	18.7	49 of 174	Greene	Roberts Run	WWF	Perennial	OCM	187	Yes	161	-	-	Minor - 6 ft.	39.762662	-80.352367	GP-5 and 8
S-SRC-042	19.1	50 of 174	Greene	Tributary to Roberts Run	WWF	Perennial	OCM	139	Yes	96	-	-	Minor - 1.5 ft.	39.760086	-80.358565	GP-5 and 8
S-SRC-043	19.1	50 of 174	Greene	Tributary to Roberts Run	WWF	Perennial	OCM	371	Yes	371	-	-	Minor - 2.5 ft.	39.759878	-80.358884	GP-5 and 8
S-SRC-043	19.1	50 of 174	Greene	Tributary to Roberts Run	WWF	Perennial	OCM		Yes		-	-	Minor - 2.5 ft.	39.759878	-80.358884	GP-5 and 8
S-SRC-044	19.4	50 of 174	Greene	Tributary to Bloody Run	WWF	Intermittent	OCM	15	No	-	-	-	Minor - 2 ft.	39.758278	-80.362749	GP-8
S-SRC-046	19.5	50 of 174	Greene	Tributary to Bloody Run	WWF	Intermittent	OCM	47	No	28	-	-	Minor - 4 ft.	39.757468	-80.364543	GP-8
S-SRC-045	19.5	50 of 174	Greene	Tributary to Bloody Run	WWF	Perennial	OCM	87	Yes	61	-	-	Minor - 4 ft.	39.757342	-80.364626	GP-5 and 8
S-SRC-047	19.6	50 of 174	Greene	Tributary to Bloody Run	WWF	Intermittent	OCM	109	Yes	67	-	-	Minor - 4 ft.	39.756985	-80.365609	GP-5 and 8
S-DJA-017	19.9	50 of 174	Greene	Tributary to Bloody Run	WWF	Intermittent	OCM	41	Yes	41	-	-	Minor - 3.5 ft.	39.75438	-80.371532	GP-5 and 8
S-DJA-013	20.3	51 of 174	Greene	Tributary to Bloody Run	WWF	Perennial	OCM	46	Yes	46	-	-	Minor - 8 ft.	39.75158	-80.378209	GP-5 and 8
S-DJA-010	20.7	51 of 174	Greene	Tributary to Garrison Fork	WWF	Perennial	OCM	41	Yes	41	-	-	Minor - 8 ft.	39.748951	-80.384369	GP-5 and 8
S-SRC-051	21.1	52 of 174	Greene	Tributary to Garrison Fork	WWF	Intermittent	OCM	65	No	-	-	-	Minor - 3 ft.	39.746362	-80.390305	GP-8
S-SRC-049	21.2	52 of 174	Greene	Garrison Fork	WWF	Perennial	OCM	77	Yes	52	-	-	Minor - 4 ft.	39.74547	-80.392188	GP-5 and 8
S-SRC-048	21.5	52 of 174	Greene	Tributary to Garrison Fork	WWF	Ephemeral	OCM	31	Yes	28	-	-	Minor - 3 ft.	39.74333	-80.397409	GP-5 and 8
S-DJA-005	22	52 of 174	Greene	Tributary to Hamilton Run	WWF	Ephemeral	OCM	131	Yes	86	-	-	Minor - 8 ft.	39.74009	-80.405004	GP-5 and 8
S-DJA-003	22	52 of 174	Greene	Tributary to Hamilton Run	WWF	Perennial	OCM	262	Yes	223	-	-	Minor - 2.5 ft.	39.739875	-80.405542	GP-5 and 8
S-DJA-006	22.1	53 of 174	Greene	Tributary to Hamilton Run	WWF	Intermittent	OCM	75	Yes	50	-	-	Minor - 4 ft.	39.738845	-80.407705	GP-5 and 8

Pennsylvania Waterbodies Identified Within the Construction Footprint

Stream ID	Nearest Approximate Milepost	E&SCP Sheet Number	County	Waterbody Name	Stream Classification ^a	Type	Crossing Method ^b	Approximate Length Within Construction ROW	Crossed By Centerline	Approximate Length Within Permanent ROW	Approximate Length Within Ancillary Site	Approximate Length Crossed By Access Road	Estimated Stream Width ^c	Latitude (DD-NAD83)	Longitude (DD-NAD83)	Applicable PADEP Chapter 105 GP
S-DJA-007	22.2	53 of 174	Greene	Hamilton Run	WWF	Perennial	OCM	206	Yes	101	-	-	Minor - 4 ft.	39.738462	-80.408081	GP-5 and 8
S-SRC-059	22.8	53 of 174	Greene	Tributary to Hamilton Run	WWF	Ephemeral	OCM	93	Yes	67	-	-	Minor - 2.5 ft.	39.735822	-80.41821	GP-5 and 8
S-SRC-057	22.8	53 of 174	Greene	Tributary to Hamilton Run	WWF	Intermittent	OCM	75	Yes	50	-	-	Minor - 4 ft.	39.735236	-80.41929	GP-5 and 8
S-SRC-055	22.9	53 of 174	Greene	Tributary to Hamilton Run	WWF	Intermittent	OCM	124	Yes	73	-	-	Minor - 2 ft.	39.735003	-80.419668	GP-5 and 8
S-SRC-053	23	53 of 174	Greene	Tributary to Hamilton Run	WWF	Perennial	OCM	113	Yes	79	-	-	Minor - 7 ft.	39.734669	-80.420952	GP-5 and 8
S-SRC-052	23	53 of 174	Greene	Tributary to Hamilton Run	WWF	Ephemeral	OCM	185	No	95	-	-	Minor - 4 ft.	39.734414	-80.421445	GP-8
S-SRC-060	23.4	54 of 174	Greene	Tributary to Cappel Run	WWF	Ephemeral	OCM	88	Yes	82	-	-	Minor - 4 ft.	39.730671	-80.426976	GP-5 and 8
S-SRC-061	23.5	54 of 174	Greene	Tributary to Cappel Run	WWF	Perennial	OCM	80	Yes	53	-	-	Minor - 9 ft.	39.730041	-80.42868	GP-5 and 8
S-SRC-064	23.8	54 of 174	Greene	Tributary to Cappel Run	WWF	Perennial	OCM	90	Yes	59	-	-	Minor - 6 ft.	39.728457	-80.432418	GP-5 and 8
S-SRC-066	23.8	54 of 174	Greene	Tributary to Cappel Run	WWF	Perennial	OCM	92	Yes	58	-	-	Minor - 2 ft.	39.728112	-80.4332	GP-5 and 8
S-DJA-018	24.7	55 of 174	Greene	Rockcamp Run	WWF	Perennial	OCM	82	Yes	55	-	-	Minor - 4 ft.	39.722767	-80.446063	GP-5 and 8
S-DJA-019	24.8	55 of 174	Greene	Tributary to Rockcamp Run	WWF	Ephemeral	OCM	120	Yes	70	-	-	Minor - 2 ft.	39.72173	-80.448483	GP-5 and 8
H-302 Pennsylvania Subtotal						112		10,115		6,685						
H-111 Pennsylvania																
S-SRC-150	4.8	34 of 174	Greene	Mt. Phoebe Run	TSF, ATW	Perennial	OCM	42	Yes	42	-	-	Minor - 4 ft.	39.859064	-80.129935	GP-5 and 8
S-SRC-148	5.1	34 of 174	Greene	Tributary to Mt Phoebe Run	TSF, ATW	Perennial	OCM	9	No	9	-	-	Minor - 4.5 ft.	39.856776	-80.135245	GP-8
S-SRC-149	5.1	34 of 174	Greene	Tributary to Mt Phoebe Run	TSF, ATW	Perennial	OCM	13	No	13	-	-	Minor - 4 ft.	39.856851	-80.135088	GP-8
S-SRC-154	5.4	35 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Ephemeral	OCM	21	Yes	21	-	-	Minor - 1.5 ft.	39.854635	-80.14051	GP-5 and 8
S-SRC-153	5.4	35 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Intermittent	OCM	22	Yes	22	-	-	Minor - 3 ft.	39.854452	-80.140904	GP-5 and 8
S-SRC-152	6.2	35 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Perennial	OCM	63	Yes	63	-	-	Minor - 2 ft.	39.849202	-80.152815	GP-5 and 8
S-SRC-134	6.2	35 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Ephemeral	OCM	21	Yes	21	-	-	Minor - 3 ft.	39.849152	-80.152963	GP-5 and 8
S-SRC-135	6.3	35 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Perennial	OCM	25	Yes	25	-	-	Minor - 5 ft.	39.848259	-80.154887	GP-5 and 8
S-SRC-136	6.3	36 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Perennial	OCM	23	Yes	23	-	-	Minor - 3.5 ft.	39.84787	-80.155729	GP-5 and 8
S-SRC-138	6.7	36 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Intermittent	OCM	20	Yes	20	-	-	Minor - 2 ft.	39.845444	-80.161008	GP-5 and 8
S-SRC-137	6.7	36 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Ephemeral	OCM	23	Yes	23	-	-	Minor - 3 ft.	39.845401	-80.1611	GP-5 and 8
S-SRC-140	7.1	36 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Perennial	OCM	23	Yes	23	-	-	Minor - 2 ft.	39.842385	-80.167689	GP-5 and 8
H-111 Subtotal						12		305		305						
Pipeline Total						124		10,420		6,990						
H-309 Access Roads Pennsylvania																
None																
H-302 Access Roads																
Pennsylvania																
S-SRC-155	2.4	85 of 174	Greene	Muddy Creek	WWF	Perennial	-	-	No	-	-	21	Intermediate - 10 ft.	39.87823	-80.093595	GP-8

Pennsylvania Waterbodies Identified Within the Construction Footprint

Stream ID	Nearest Approximate Milepost	E&SCP Sheet Number	County	Waterbody Name	Stream Classification ^a	Type	Crossing Method ^b	Approximate Length Within Construction ROW	Crossed By Centerline	Approximate Length Within Permanent ROW	Approximate Length Within Ancillary Site	Approximate Length Crossed By Access Road	Estimated Stream Width ^c	Latitude (DD-NAD83)	Longitude (DD-NAD83)	Applicable PADEP Chapter 105 GP
S-SRC-157	2.5	87 of 174	Greene	Tributary to Muddy Creek	WWF	Ephemeral	-	-	No	-	-	20	Minor - 1 ft.	39.880212	-80.101146	GP-8
S-SRC-158	2.6	87 of 174	Greene	Tributary to Muddy Creek	WWF	Ephemeral	-	-	No	-	-	15	Minor - 1 ft.	39.879337	-80.103195	GP-8
S-SRC-160	4.7	91 of 174	Greene	Tributary to Mt Phoebe Run	TSF, ATW	Ephemeral	-	-	No	-	-	16	Minor - 2.5 ft.	39.858853	-80.128649	GP-7, 24" CMP
S-SRC-150	4.8	91 of 174	Greene	Mt. Phoebe Run	TSF, ATW	Perennial	-	-	No	-	-	16	Minor - 4 ft.	39.85784	-80.129591	GP-8
S-SRC-135	6.3	94 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Perennial	-	-	No	-	-	15	Minor - 5 ft.	39.849341	-80.15453	GP-8
S-TAP-006	7.7	97 of 174	Greene	Tributary to Dyers Fork	TSF, ATW	Perennial	-	-	No	-	-	13	Minor - 4 ft.	39.83712	-80.178316	GP-8
S-AR124-CRE-007	9.3	101 of 174	Greene	Tributary to Smith Creek	WWF	Perennial	-	-	No	-	-	15	Minor - 8 ft.	39.828679	-80.205704	GP-8
S-TAP-017	9.7	102 of 174	Greene	Tributary to Smith Creek	WWF	Intermittent	-	-	No	-	-	31	Minor - 4 ft.	39.82319	-80.210551	GP-7, 24" CMP
S-TAP-019	9.9	102 of 174	Greene	Smith Creek	WWF	Perennial	-	-	No	-	-	15	Minor - 8 ft.	39.822317	-80.213437	GP-7, 60" CMP
S-TAP-020	10	103 of 174	Greene	Tributary to Smith Creek	WWF	Perennial	-	-	No	-	-	21	Minor - 3 ft.	39.821396	-80.214691	GP-8
S-SRC-030	13.3	109 of 174	Greene	Tributary to Tustin Run	WWF	Perennial	-	-	No	-	-	30	Minor - 7 ft.	39.798161	-80.268362	GP-8
S-AR26-MDT-076	15.1	111 of 174	Greene	Tributary to Toms Run	WWF	Perennial	-	-	No	-	-	16	Minor - 2 ft.	39.77906	-80.293459	GP-8
S-AR28 SRC-260	15.7	113 of 174	Greene	Tributary to Toms Run	WWF	Intermittent	-	-	No	-	-	11	Minor - 3 ft.	39.779995	-80.307261	GP-8
S-AR28 SRC-261	15.8	113 of 174	Greene	Tributary to Toms Run	WWF	Perennial	-	-	No	-	-	10	Minor - 4 ft.	39.77829	-80.308605	GP-8
S-AR28 SRC-262	15.9	112 of 174	Greene	Tributary to Toms Run	WWF	Ephemeral	-	-	No	-	-	10	Minor - 3 ft.	39.776691	-80.310012	GP-8
S-AR28 SRC-263	16	112 of 174	Greene	Tributary to Toms Run	WWF	Ephemeral	-	-	No	-	-	10	Minor - 2 ft.	39.77596	-80.310696	GP-8
S-AR28 SRC-264	16.3	112 of 174	Greene	Tributary to Toms Run	WWF	Perennial	-	-	No	-	-	12	Minor - 6 ft.	39.771219	-80.315121	GP-8
S-SRC-033	16.4	115 of 174	Greene	Toms Run	WWF	Perennial	-	-	No	-	-	16	Intermediate - 18 ft.	39.775989	-80.318954	GP-8
S-AR27-MDT-051	16.4	115 of 174	Greene	Tributary to Toms Run	WWF	Perennial	-	-	No	-	-	16	Minor - 2 ft.	39.775597	-80.318712	GP-8
S-SRC-051	21.1	131 of 174	Greene	Tributary to Garrison Fork	WWF	Intermittent	-	-	No	-	-	11	Minor - 3 ft.	39.775597	-80.318712	GP-8
S-DJA-007	22.2	134 of 174	Greene	Hamilton Run	WWF	Perennial	-	-	No	-	-	8	Minor - 4 ft.	39.738791	-80.413218	GP-8
S-AR36-CRE-002	22.7	135 of 174	Greene	Tributary to Hamilton Run	WWF	Ephemeral	-	-	No	-	-	10	Minor - 4 ft.	39.736888	-80.417386	GP-7, 24" CMP
S-SRC-058	22.8	135 of 174	Greene	Tributary to Hamilton Run	WWF	Ephemeral	-	-	No	-	-	10	Minor - 1 ft.	39.735827	-80.419684	GP-7, 24" CMP
S-AR36-CRE-005	22.8	135 of 174	Greene	Tributary to Hamilton Run	WWF	Ephemeral	-	-	No	-	-	46	Minor - 4 ft.	39.736127	-80.419282	GP-7, 24" CMP
S-AR36-CRE-004	22.8	135 of 174	Greene	Tributary to Hamilton Run	WWF	Ephemeral	-	-	No	-	-	10	Minor - 4 ft.	39.736421	-80.418644	GP-7, 24" CMP
S-SRC-053	23	135 of 174	Greene	Tributary to Hamilton Run	WWF	Perennial	-	-	No	-	-	17	Minor - 7 ft.	39.735329	-80.420087	GP-7, 36" CMP
S-SRC-056	23	135 of 174	Greene	Tributary to Hamilton Run	WWF	Intermittent	-	-	No	-	-	10	Minor - 2 ft.	39.735178	-80.419996	GP-7, 24" CMP
H-302 Access Road Pennsylvania Subtotal						28						451				
H-111 Access Road Pennsylvania																
None																
Pennsylvania Access Road Total						28						451				
Ancillary Sites Pennsylvania																
None																

Pennsylvania Waterbodies Identified Within the Construction Footprint

Stream ID	Nearest Approximate Milepost	E&SCP Sheet Number	County	Waterbody Name	Stream Classification ^a	Type	Crossing Method ^b	Approximate Length Within Construction ROW	Crossed By Centerline	Approximate Length Within Permanent ROW	Approximate Length Within Ancillary Site	Approximate Length Crossed By Access Road	Estimated Stream Width ^c	Latitude (DD-NAD83)	Longitude (DD-NAD83)	Applicable PADEP Chapter 105 GP
Additional Temporary Work Space Pennsylvania																
None																
PENNSYLVANIA PROJECT TOTAL						152		10,420		6,990		451				

Notes:

^a Pennsylvania State Water Classifications:
WWF = Warm Water Fishery
ATW = Approved Trout Water
TSF = Trout Stocked Fishery
HQ-WWF = High Quality-Warm Water Fishery

Environmental Sensitivity:
(WWF, HQ-WWF, ATW, **TSF**) = Protected Pennsylvania Water Use for identified stream (Highlighted).
HQ-WWF:

^b Crossing Method: OCM = Open Cut Method, HDD = Horizontal Directional Drill.

^c Width: Minor = Stream that is less than 10 feet wide, Intermediate = Streams between 10 and 99 feet wide, and Major = waterbodies over 100 feet wide.

Appendix D

Soils Information and Erosion Mitigation Measures

(Taken From Resource Report 7 –
FERC Filing Date 1-27-11 Docket # CP11-68-000)

Appendix D

Soils Information and Erosion Mitigation Measures

Project Soil Types and Characteristics

Soils occurring along the proposed Project route by milepost and characteristics are described in the following tables 7.1-1 and 7.1-3. Soils occurring in areas of aboveground facilities are described in the following tables 7.1-2 and 7.1-4.

Erosion Potential

Soils with a high percentage of silt and fine sand, as well as those that occur at steeper slopes along the proposed Project route, are more susceptible to erosion than those with a high clay content and in relatively flat areas. Over half of the soils along the proposed Project route are classified as highly erodible or potentially highly erodible, primarily due to the relatively steep slopes. Approximately 56 percent of soil crossed by the H-302 line and 94 percent crossed by the H-111 reactivation line are considered highly erodible. The erosion potential of soil mapping units crossed by the proposed Project is identified in tables 7.1-1 and 7.1-2.

Erosion Mitigation Measures

Erosion is a continuing natural process that can be accelerated by human disturbance. Factors that influence the degree of erosion include the time the construction area is exposed to the elements, soil texture, structure, length and percent of slope, vegetative cover, and rainfall or wind intensity. Soils most susceptible to erosion by water are typified by bare or sparse vegetative cover, non-cohesive soil particles with low infiltration rates, and moderate to steep slopes. Wind erosion processes are less affected by slope angles. Clearing, grading, and equipment movement accelerates the erosion process, and without adequate protection, results in transport of sediment to waterbodies and wetlands. Soil loss due to erosion could also reduce soil fertility and impair revegetation.

Approximately 60 percent of the soils along the proposed pipeline route are considered potentially highly erodible. The majority of the proposed Project area soils have an average slope more than 15 percent. The occurrence of highly erodible soils in the proposed Project area is primarily a factor of the relatively steep slopes over most of the proposed Project.

Timely erosion controls will be implemented during construction and maintained in accordance with the Federal Energy Regulatory Commission's (FERC's) *Plan and Procedures*. Controls will meet erosion control requirements of the Plan and are consistent with the expected U.S. Army Corps of Engineers (USACE) 404 permit requirements and state and local guidelines.

During construction, the effectiveness of temporary erosion control devices will be monitored by third party Environmental Inspectors (EI). The effectiveness of revegetation and permanent erosion control devices will be monitored by Equitrans operating personnel during the long-term operation and maintenance of the pipeline system. Except in active agricultural areas, erosion control devices will be maintained until the ROW is successfully revegetated. Following successful revegetation of construction areas, temporary erosion control devices will be removed.

Temporary erosion controls, including interceptor diversions and sediment filter devices (e.g., hay bales and silt fences), will be installed following initial ground disturbance. As required, temporary trench plugs will be installed following ditch excavation. Temporary erosion control devices will be inspected on a routine basis in accordance with the *Plan and Procedures*.

Minimizing sediment transport to streams and waterbodies crossed by the proposed Project is a primary objective of the erosion control measures. Equitrans proposes to minimize the adverse impacts associated with erosion and sediment transport to waterbodies by augmenting the standard erosion control procedures in the *Plans and Procedures* in designated critical slope areas.

Slope Breakers – Equitrans will construct slope breakers across the pipeline construction ROW to slow the velocity of runoff and move water off the ROW. Temporary slope breakers (e.g., hay bales, silt fence, and earthen berms) will be used during construction, and permanent slope breakers will be installed during final grading. Permanent slope breakers will not be installed on active agricultural lands unless requested by landowners. The spacing of slope breakers will be according to the *Plan and Procedures*. In highly sensitive areas and in designated critical slope areas, the spacing of slope breakers may be decreased to minimize sediment transport to streams if considered necessary by the EI.

Temporary Sediment Barriers – Sediment barriers (e.g., silt fences and staked hay or straw bales) protect surface waters and roadways by controlling the flow of sediment on the construction ROW and by preventing the flow of sediment off the construction ROW. Equitrans will install and maintain these devices at the base of slopes adjacent to road crossings, waterbody crossings, and wetlands, as appropriate, and in other areas as necessary, until permanent revegetation measures have been judged successful and the potential for siltation has been minimized.

Permanent Trench Breakers – Trench breakers consisting of sacks of soil or sand, polyurethane foam, or bentonite clay bags will be installed around the pipe in the trench to prevent subsurface channeling of water along the trench. In actively cultivated agricultural lands, trench breakers will be installed to a depth that does not encroach into the typical plow zone. Topsoil will not be used for trench breakers. Permanent trench breakers will be installed on slopes just before backfilling. Trench breakers will also be installed on slopes greater than 5 percent that are adjacent to waterbodies and wetlands. The spacing of permanent trench breakers will be according to the *Plan and Procedures*.

Timing – To minimize the duration of soil disturbance, Equitrans will attempt to complete final cleanup and installation of permanent erosion control measures in an area within 30 days after backfilling the trench in that area, weather and soil conditions permitting. The construction and restoration activities are currently planned to coincide with the normal growing season in the proposed Project area. However, if it appears that circumstances will require field work beyond the normal growing season, Equitrans will prepare a winter contingency plan. In no case will restoration of an area be delayed beyond the next available seeding season.

Revegetation – Equitrans will make every effort to ensure the rapid, successful establishment of vegetation on areas requiring revegetation. Following final grading and cleanup, Equitrans will condition the construction ROW for planting including the preparation of a seedbed and application and incorporation of soil amendments at rates agreed to by the landowner. Equitrans will seed areas to be revegetated in accordance with written recommendations for seed mixes, rates, and dates obtained from the appropriate soil conservation authorities.

Potential for Poor Revegetation of Disturbed Areas

There is the potential for disturbed areas not to revegetate adequately after proposed Project construction is complete. No soil types occurring in the proposed Project area were specifically identified as being prone to poor revegetation. However, areas with steep slopes and where topsoil is thin may be more difficult to establish vegetative cover. Equitrans EIs will review these problem areas and will provide additional attention in ensuring that erosion control devices are working properly during clearing/construction and again, focus additional attention during restoration/revegetation phases.

In many areas of steep and rough terrain, the soil profile is very thin. To maximize successful restoration of these areas, Equitrans may utilize soil amendments to increase coverage potential. Additionally, curlex/jute may be installed as necessary to control erosion. If post-construction grading is completed after the end of the growing season, the area will be mulched and seeding will take place during the next growing season. If necessary, a winterization plan will be prepared to address how restoration and revegetation would proceed if seeding could not be completed before the onset of winter. Unless requested by a landowner, no areas will be left unseeded beyond the next available seeding season. Post-construction inspections will be conducted in accordance with the *Plan* and *Procedures* to ensure that revegetation is adequate.

**Table 7.1-1
Pipeline Route Soil Map Units and Descriptions**

Soil Series	Approximate Percent of Route by Series	County	Map Unit Description	Hydric	Farmland	Erodibility	Drainage	Topographic Setting	Slope %	Shrink-Swell Potential
H-302										
Culleoka	14.18	Greene	Culleoka silt loam, 3 to 8 percent slopes	No	All areas are prime farmland	Potentially highly erodible	Well drained	hills	6.0	Low to Moderate
		Greene	Culleoka silt loam, 15 to 25 percent slopes	No	Not prime farmland	Highly erodible land	Well drained	hillslopes	20.0	Low to Moderate
		Greene	Culleoka silt loam, 8 to 15 percent slopes	No	Farmland of statewide importance	Potentially highly erodible land	Well drained	hillslopes	12.0	Low to Moderate
		Greene	Culleoka-Upshur complex, 8 to 15 percent slopes	No	Farmland of statewide importance	Highly erodible land	Well drained	hillslopes	12.0	Low to Moderate
		Greene	Culleoka-Upshur complex, 15 to 25 percent slopes	No	Not prime farmland	Highly erodible land	Well drained	hillslopes	20.0	Low to Moderate
		Greene	Dormont-Culleoka silt loams, 15 to 25 percent slopes	No	Not prime farmland	Highly erodible land	Well drained	hillslopes	20.0	Low to Moderate
Dormont	39.42	Greene	Dormont silt loam, 3 to 8 percent slopes	No	All areas are prime farmland	Potentially highly erodible land	Moderately well drained	hills	4.0	Low to Moderate
		Greene	Dormont silt loam, 8 to 15 percent slopes	No	Farmland of statewide importance	Potentially highly erodible land	Moderately well drained	hillslopes	12.0	Low to Moderate
		Greene	Dormont silt loam, 15 to 25 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	20.0	Low to Moderate
		Greene	Dormont-Culleoka silt loams, 25 to 50 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	38.0	Low to Moderate
Fluvaquents	3.56	Greene	Fluvaquents, loamy	No	Not prime farmland	Not highly erodible land	Somewhat poorly drained	flood plains	2.0	Low to Moderate

**Table 7.1-1
Pipeline Route Soil Map Units and Descriptions**

Soil Series	Approximate Percent of Route by Series	County	Map Unit Description	Hydric	Farmland	Erodibility	Drainage	Topographic Setting	Slope %	Shrink-Swell Potential
Glenford	0.34	Greene	Glenford silt loam, 3 to 8 percent slopes	No	All areas are prime farmland	Potentially highly erodible land	Moderately well drained	terraces	6.0	Low to Moderate
Guernsey	0.22	Greene	Guernsey silt loam, 3 to 8 percent slopes	No	All areas are prime farmland	Potentially highly erodible land	Moderately well drained	hills	5.0	Low to Moderate
Newark	0.46	Greene	Newark silt loam	No	Farmland of statewide importance	Not highly erodible land	Somewhat poorly drained	flood plains	1.0	Low to Moderate
Purdy	0.05	Greene	Purdy silt loam	Yes	Not prime farmland	Not highly erodible land	Poorly drained	terraces	1.0	Low to Moderate
Skidmore	1.87	Greene	Skidmore gravelly loam	No	Farmland of statewide importance	Not classified	Well drained		2.0	Low to Moderate
Weikert	1.69	Greene	Weikert-Culleoka complex, 3 to 8 percent slopes	No	Farmland of statewide importance	Potentially highly erodible land	Somewhat excessively drained	hillslopes	6.0	Low to Moderate
		Greene	Weikert-Culleoka complex, 8 to 15 percent slopes	No	Not prime farmland	Highly erodible land	Somewhat excessively drained	hillslopes	12.0	Low to Moderate
		Greene	Weikert-Culleoka complex, 15 to 25 percent slopes	No	Not prime farmland	Highly erodible land	Somewhat excessively drained	hillslopes	20.0	Low to Moderate
H-306 – Does not cross PA										
H-309										
Dormont	62.83	Greene	Dormont silt loam, 8 to 15 percent slopes	No	Farmland of statewide importance	Potentially highly erodible land	Moderately well drained	hillslopes	12.0	Low to Moderate
		Greene	Dormont-Culleoka silt loams, 25 to 50 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	38.0	Low to Moderate

**Table 7.1-1
Pipeline Route Soil Map Units and Descriptions**

Soil Series	Approximate Percent of Route by Series	County	Map Unit Description	Hydric	Farmland	Erodibility	Drainage	Topographic Setting	Slope %	Shrink-Swell Potential
Weikert	37.17	Greene	Weikert-Culleoka complex, 8 to 15 percent slopes	No	Not prime farmland	Highly erodible land	Somewhat excessively drained	hillslopes	12.0	Low to Moderate
H-111 Reactivation										
Culleoka	23.47	Greene	Culleoka silt loam, 8 to 15 percent slopes	No	Farmland of statewide importance	Potentially highly erodible land	Well drained	hillslopes	12.0	Low to Moderate
		Greene	Culleoka-Upshur complex, 15 to 25 percent slopes	No	Not prime farmland	Highly erodible land	Well drained	hillslopes	20.0	Low to Moderate
		Greene	Dormont-Culleoka silt loams, 15 to 25 percent slopes	No	Not prime farmland	Highly erodible land	Well drained	hillslopes	20.0	Low to Moderate
Dormont	67.51	Greene	Dormont silt loam, 3 to 8 percent slopes	No	All areas are prime farmland	Potentially highly erodible land	Moderately well drained	hills	4.0	Low to Moderate
		Greene	Dormont silt loam, 8 to 15 percent slopes	No	Farmland of statewide importance	Potentially highly erodible land	Moderately well drained	hillslopes	12.0	Low to Moderate
		Greene	Dormont silt loam, 15 to 25 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	20.0	Low to Moderate
		Greene	Dormont-Culleoka silt loams, 25 to 50 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	38.0	Low to Moderate
Fluvaquents	5.56	Greene	Fluvaquents, loamy	No	Not prime farmland	Not highly erodible land	Somewhat poorly drained	flood plains	2.0	Low to Moderate
Guernsey	3.45	Greene	Guernsey silt loam, 3 to 8 percent slopes	No	All areas are prime farmland	Potentially highly erodible land	Moderately well drained	hills	5.0	Low to Moderate

Sources: Data Generated from Equitrans Checked Shapefiles 01 20 2011 provided by HEI.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2003. Soil Survey Geographic (SSURGO) Database.

Notes: Percentages may not add up to exactly 100% due to rounding

**Table 7.1-2
Aboveground Facilities Soil Units and Descriptions**

Facility Name(s)	Soil Series	Approximate % of Facility by Series	County	Map Unit Description	Hydric	Farmland	Erodibility	Drainage	Topographic Setting	Slope %	Shrink-Swell Potential
Compressor Stations											
Jefferson Compressor Station (H-302)	Culleoka	23.16	Greene	Dormont-Culleoka silt loams, 15 to 25 percent slopes	No	Not prime farmland	Highly erodible land	Well drained	hillslopes	20.0	Low to Moderate
	Dormont	69.26		Dormont silt loam, 3 to 8 percent slopes	No	All areas are prime farmland	Potentially highly erodible land	Moderately well drained	hills	4.0	Low to Moderate
				Dormont silt loam, 8 to 15 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	20.0	Low to Moderate
				Dormont-Culleoka silt loams, 25 to 50 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	38.0	Low to Moderate
	Weikert	7.58		Weikert-Culleoka complex, 8 to 15 percent slopes	No	Not prime farmland	Highly erodible land	Somewhat excessively drained	hillslopes	12.0	Low to Moderate
Meter Stations											
Receipt Meters											
Equitrans, LP Interconnect #3, H-111 Interconnect (H-309)	Dormont	13.82	Greene	Dormont silt loam, 8 to 15 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	20.0	Low to Moderate
	Guernsey	86.18		Guernsey silt loam, 3 to 8 percent slopes	No	All areas are prime farmland	Potentially highly erodible land	Moderately well drained	hills	5.0	Low to Moderate
Delivery Meters											
Texas Eastern Transmission	Dormont	100	Greene	Dormont silt loam, 8 to 15	No	Not prime	Highly	Moderately	hillslopes	20.0	Low to

**Table 7.1-2
Aboveground Facilities Soil Units and Descriptions**

Facility Name(s)	Soil Series	Approximate % of Facility by Series	County	Map Unit Description	Hydric	Farmland	Erodibility	Drainage	Topographic Setting	Slope %	Shrink-Swell Potential
(TETCO) Interconnect #1 (H-302)				percent slopes		farmland	erodible land	well drained			Moderate
				Dormont-Culleoka silt loams, 25 to 50 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	38.0	Low to Moderate
Dominion Transmission (DTI) Interconnect #2 (H-302)	Culleoka	1.47	Greene	Dormont-Culleoka silt loams, 15 to 25 percent slopes	No	Not prime farmland	Highly erodible land	Well drained	hillslopes	20.0	Low to Moderate
	Dormont	98.53		Dormont silt loam, 15 to 25 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	20.0	Low to Moderate
				Dormont-Culleoka silt loams, 25 to 50 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	38.0	Low to Moderate
Launchers and Receivers											
H-302, Jefferson CS Receiver	Dormont	100	Greene	Dormont silt loam, 8 to 15 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	20.0	Low to Moderate
				Dormont-Culleoka silt loams, 25 to 50 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	38.0	Low to Moderate
Mainline Block Valves											
H-302, Gouker/Milliken Run Road, Mainline Valve Setting	Dormont	100	Greene	Dormont-Culleoka silt loams, 25 to 50 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	38.0	Low to Moderate
H-302, Blockhouse Road, Mainline Valve Setting	Dormont	100	Greene	Dormont-Culleoka silt loams, 25 to	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	38.0	Low to Moderate

**Table 7.1-2
Aboveground Facilities Soil Units and Descriptions**

Facility Name(s)	Soil Series	Approximate % of Facility by Series	County	Map Unit Description	Hydric	Farmland	Erodibility	Drainage	Topographic Setting	Slope %	Shrink-Swell Potential
				50 percent slopes							
H-302, White Barn, Mainline Valve Setting	Dormont	98.62	Greene	Dormont-Culleoka silt loams, 25 to 50 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	38.0	Low to Moderate
	Fluvaquents	1.38		Fluvaquents, loamy	No	Not prime farmland	Not highly erodible land	Somewhat poorly drained	flood plains	2.0	Low to Moderate
H-302, Bayard Gates, Mainline Valve Setting	Fluvaquents	100	Greene	Fluvaquents, loamy	No	Not prime farmland	Not highly erodible land	Somewhat poorly drained	flood plains	2.0	Low to Moderate
H-302, Jefferson CS, Mainline Valve Setting with Receiver	Udorthents	100	Greene	Udorthents, smoothed	No	Not prime farmland	Not classified	Well drained	cuts (road, railroad, etc.), fills	8.0	Low to Moderate
H-309, Tap on line H-111, Mainline Valve Setting	Dormont	13.82	Greene	Dormont silt loam, 8 to 15 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	20.0	Low to Moderate
	Guernsey	86.18		Guernsey silt loam, 3 to 8 percent slopes	No	All areas are prime farmland	Potentially highly erodible land	Moderately well drained	hills	5.0	Low to Moderate
H-309, Jefferson CS, Mainline Valve Setting	Dormont	100	Greene	Dormont silt loam, 8 to 15 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	20.0	Low to Moderate
				Guernsey silt loam, 3 to 8 percent slopes	No	All areas are prime farmland	Potentially highly erodible	Moderately well drained	hills	5.0	Low to Moderate
H-111 Reactivation, Zimmerman Gates, Mainline Valve Setting	Dormont	100	Greene	Dormont silt loam, 8 to 15 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	20.0	Low to Moderate
				Dormont-Culleoka silt loams, 25 to 50 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	38.0	Low to Moderate

**Table 7.1-2
Aboveground Facilities Soil Units and Descriptions**

Facility Name(s)	Soil Series	Approximate % of Facility by Series	County	Map Unit Description	Hydric	Farmland	Erodibility	Drainage	Topographic Setting	Slope %	Shrink-Swell Potential
Over-pressure Protection											
H-111 Over Pressure Protection at Zimmerman Gates	Dormont	100	Greene	Dormont silt loam, 8 to 15 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	20.0	Low to Moderate
				Dormont-Culleoka silt loams, 25 to 50 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	38.0	Low to Moderate
H-111 Interconnect	Dormont	13.82	Greene	Dormont silt loam, 8 to 15 percent slopes	No	Not prime farmland	Highly erodible land	Moderately well drained	hillslopes	20.0	Low to Moderate
	Guernsey	86.18		Guernsey silt loam, 3 to 8 percent slopes	No	All areas are prime farmland	Potentially highly erodible land	Moderately well drained	hills	5.0	Low to Moderate

Sources: Equitrans 2010 and 2011.

Data Generated from Equitrans Checked Shapefiles 01 20 2011 provided by HEI.

**Table 7.1-3
Pipeline Soils by Milepost**

Beginning Milepost	End Milepost	County	State	Map Unit Symbol	Soil Map Unit
H-302					
0.0	0.1	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
0.1	0.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.1	0.1	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
0.1	0.1	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
0.2	0.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.2	0.3	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
0.3	0.3	Greene	PA	GdB	Glenford silt loam, 3 to 8 percent slopes
0.3	0.4	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
0.4	0.4	Greene	PA	Py	Purdy silt loam
0.4	0.5	Greene	PA	GdB	Glenford silt loam, 3 to 8 percent slopes
0.5	0.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.5	0.5	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
0.5	0.6	Greene	PA	GdB	Glenford silt loam, 3 to 8 percent slopes
0.6	0.6	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
0.6	0.6	Greene	PA	WeC	Weikert-Culleoka complex, 8 to 15 percent slopes
0.6	0.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.7	1.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
1.0	1.2	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
1.2	1.2	Greene	PA	DoB	Dormont silt loam, 3 to 8 percent slopes
1.2	1.3	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
1.3	1.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
1.3	1.3	Greene	PA	DoB	Dormont silt loam, 3 to 8 percent slopes
1.3	1.4	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
1.4	1.4	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
1.5	1.5	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
1.5	1.6	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
1.6	1.6	Greene	PA	Fa	Fluvaquents, loamy
1.6	1.6	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
1.6	1.7	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
1.7	1.7	Greene	PA	Fa	Fluvaquents, loamy
1.7	1.7	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
1.8	1.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
1.8	1.8	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
1.9	2.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.0	2.0	Greene	PA	WeD	Weikert-Culleoka complex, 15 to 25 percent slopes
2.0	2.1	Greene	PA	DoB	Dormont silt loam, 3 to 8 percent slopes
2.1	2.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.1	2.2	Greene	PA	WeD	Weikert-Culleoka complex, 15 to 25 percent slopes
2.2	2.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.2	2.2	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
2.2	2.3	Greene	PA	Nw	Newark silt loam
2.3	2.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.3	2.3	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
2.3	2.3	Greene	PA	Nw	Newark silt loam

**Table 7.1-3
Pipeline Soils by Milepost**

Beginning Milepost	End Milepost	County	State	Map Unit Symbol	Soil Map Unit
2.4	2.4	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
2.4	2.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.5	2.5	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
2.5	2.6	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
2.6	2.6	Greene	PA	Nw	Newark silt loam
2.6	2.7	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
2.7	2.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.7	2.8	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
2.8	2.8	Greene	PA	DoB	Dormont silt loam, 3 to 8 percent slopes
2.8	2.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.9	2.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.9	3.0	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
3.0	3.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
3.0	3.1	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
3.1	3.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
3.1	3.1	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
3.1	3.2	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
3.2	3.4	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
3.4	3.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
3.4	3.4	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
3.4	3.4	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
3.4	3.5	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
3.5	3.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
3.5	3.6	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
3.6	3.6	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
3.6	3.7	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
3.7	3.8	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
3.8	3.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
3.8	3.8	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
3.9	4.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
4.3	4.4	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
4.4	4.4	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
4.4	4.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
4.4	4.5	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
4.5	4.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
4.7	4.7	Greene	PA	Fa	Fluvaquents, loamy
4.7	4.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
4.8	4.9	Greene	PA	Fa	Fluvaquents, loamy
4.9	4.9	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
4.9	5.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
5.0	5.0	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
5.1	5.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
5.1	5.2	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
5.2	5.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
5.2	5.3	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes

**Table 7.1-3
Pipeline Soils by Milepost**

Beginning Milepost	End Milepost	County	State	Map Unit Symbol	Soil Map Unit
5.3	5.3	Greene	PA	DoB	Dormont silt loam, 3 to 8 percent slopes
5.3	5.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
5.3	5.4	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
5.4	5.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
5.4	5.6	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
5.6	5.6	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
5.6	5.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
5.6	5.7	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
5.7	5.7	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
5.7	5.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
5.7	5.8	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
5.8	5.8	Greene	PA	GeB	Guernsey silt loam, 3 to 8 percent slopes
5.9	5.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
5.9	5.9	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
5.9	5.9	Greene	PA	GeB	Guernsey silt loam, 3 to 8 percent slopes
5.9	6.0	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
6.0	6.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
6.0	6.0	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
6.0	6.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
6.1	6.1	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
6.1	6.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
6.2	6.3	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
6.3	6.3	Greene	PA	Fa	Fluvaquents, loamy
6.3	6.4	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
6.4	6.4	Greene	PA	Fa	Fluvaquents, loamy
6.4	6.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
6.4	6.5	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
6.5	6.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
6.5	6.5	Greene	PA	DoB	Dormont silt loam, 3 to 8 percent slopes
6.5	6.6	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
6.6	6.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
6.6	6.6	Greene	PA	DoB	Dormont silt loam, 3 to 8 percent slopes
6.6	6.7	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
6.7	6.7	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
6.7	6.7	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
6.7	6.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
6.8	6.8	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
6.8	6.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
6.9	6.9	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
6.9	7.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
7.0	7.0	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
7.0	7.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
7.1	7.1	Greene	PA	Fa	Fluvaquents, loamy
7.1	7.1	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
7.1	7.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes

**Table 7.1-3
Pipeline Soils by Milepost**

Beginning Milepost	End Milepost	County	State	Map Unit Symbol	Soil Map Unit
7.2	7.2	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
7.2	7.2	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
7.2	7.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
7.3	7.3	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
7.3	7.4	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
7.4	7.4	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
7.4	7.4	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
7.4	7.5	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
7.5	7.5	Greene	PA	Fa	Fluvaquents, loamy
7.5	7.6	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
7.6	7.8	Greene	PA	Fa	Fluvaquents, loamy
7.8	7.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
7.8	7.9	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
7.9	7.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
7.9	8.0	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
8.0	8.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
8.0	8.1	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
8.1	8.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
8.1	8.2	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
8.2	8.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
8.2	8.3	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
8.3	8.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
8.3	8.4	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
8.4	8.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
8.7	8.7	Greene	PA	WeC	Weikert-Culleoka complex, 8 to 15 percent slopes
8.7	8.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
8.8	8.8	Greene	PA	WeC	Weikert-Culleoka complex, 8 to 15 percent slopes
8.8	8.8	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
8.8	8.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
8.9	9.0	Greene	PA	DoB	Dormont silt loam, 3 to 8 percent slopes
9.0	9.0	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
9.0	9.1	Greene	PA	DoB	Dormont silt loam, 3 to 8 percent slopes
9.1	9.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
9.1	9.2	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
9.2	9.2	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
9.2	9.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
9.3	9.3	Greene	PA	Fa	Fluvaquents, loamy
9.3	9.3	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
9.3	9.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
9.4	9.4	Greene	PA	Fa	Fluvaquents, loamy
9.4	9.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
9.4	9.5	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
9.5	9.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
9.5	9.6	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
9.6	9.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes

**Table 7.1-3
Pipeline Soils by Milepost**

Beginning Milepost	End Milepost	County	State	Map Unit Symbol	Soil Map Unit
9.6	9.7	Greene	PA	WeB	Weikert-Culleoka complex, 3 to 8 percent slopes
9.7	9.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
9.7	9.7	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
9.7	9.8	Greene	PA	WeB	Weikert-Culleoka complex, 3 to 8 percent slopes
9.8	9.9	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
9.9	9.9	Greene	PA	Fa	Fluvaquents, loamy
9.9	9.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
9.9	10.0	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
10.0	10.0	Greene	PA	Fa	Fluvaquents, loamy
10.0	10.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
10.0	10.2	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
10.2	10.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
10.2	10.2	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
10.2	10.2	Greene	PA	WeD	Weikert-Culleoka complex, 15 to 25 percent slopes
10.2	10.2	Greene	PA	WeC	Weikert-Culleoka complex, 8 to 15 percent slopes
10.2	10.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
10.3	10.3	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
10.3	10.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
10.4	10.4	Greene	PA	WeB	Weikert-Culleoka complex, 3 to 8 percent slopes
10.4	10.5	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
10.5	10.5	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
10.5	10.5	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
10.5	10.5	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
10.5	10.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
10.6	10.6	Greene	PA	Fa	Fluvaquents, loamy
10.6	10.7	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
10.7	10.7	Greene	PA	Fa	Fluvaquents, loamy
10.7	10.7	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
10.7	10.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
10.8	10.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
10.8	10.9	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
10.9	10.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
10.9	10.9	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
10.9	11.0	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
11.0	11.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
11.1	11.1	Greene	PA	WeB	Weikert-Culleoka complex, 3 to 8 percent slopes
11.1	11.1	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
11.1	11.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
11.2	11.2	Greene	PA	WeB	Weikert-Culleoka complex, 3 to 8 percent slopes
11.3	11.3	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
11.3	11.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
11.4	11.4	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
11.4	11.5	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
11.5	11.5	Greene	PA	Fa	Fluvaquents, loamy
11.5	11.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes

**Table 7.1-3
Pipeline Soils by Milepost**

Beginning Milepost	End Milepost	County	State	Map Unit Symbol	Soil Map Unit
11.5	11.6	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
11.6	11.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
11.7	11.7	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
11.7	11.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
11.8	11.8	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
11.8	11.8	Greene	PA	WeB	Weikert-Culleoka complex, 3 to 8 percent slopes
11.8	11.8	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
11.8	11.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
11.9	11.9	Greene	PA	WeB	Weikert-Culleoka complex, 3 to 8 percent slopes
11.9	11.9	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
11.9	12.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
12.0	12.0	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
12.0	12.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
12.1	12.1	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
12.1	12.1	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
12.1	12.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
12.2	12.2	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
12.2	12.2	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
12.3	12.3	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
12.3	12.4	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
12.4	12.4	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
12.4	12.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
12.4	12.4	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
12.4	12.5	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
12.5	12.5	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
12.6	12.6	Greene	PA	DoB	Dormont silt loam, 3 to 8 percent slopes
12.6	12.7	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
12.7	12.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
12.7	12.8	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
12.8	12.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
12.8	12.8	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
12.8	19.2	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
12.9	12.9	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
12.9	12.9	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
12.9	13.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
13.0	13.1	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
13.1	13.1	Greene	PA	WeB	Weikert-Culleoka complex, 3 to 8 percent slopes
13.1	13.2	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
13.2	13.2	Greene	PA	Fa	Fluvaquents, loamy
13.2	13.2	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
13.2	13.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
13.2	13.3	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
13.3	13.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
13.3	13.3	Greene	PA	Fa	Fluvaquents, loamy
13.4	13.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes

**Table 7.1-3
Pipeline Soils by Milepost**

Beginning Milepost	End Milepost	County	State	Map Unit Symbol	Soil Map Unit
13.5	13.6	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
13.6	13.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
13.6	13.7	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
13.7	13.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
13.7	13.8	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
13.8	13.8	Greene	PA	Fa	Fluvaquents, loamy
13.8	13.9	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
13.9	13.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
13.9	14.0	Greene	PA	Fa	Fluvaquents, loamy
14.0	14.0	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
14.0	14.0	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
14.0	14.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
14.1	14.1	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
14.2	14.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
14.2	14.2	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
14.2	14.3	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
14.3	14.4	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
14.4	14.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
14.4	14.5	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
14.5	14.5	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
14.5	14.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
14.6	14.7	Greene	PA	Fa	Fluvaquents, loamy
14.7	14.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
14.8	14.8	Greene	PA	WeC	Weikert-Culleoka complex, 8 to 15 percent slopes
14.8	14.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
14.9	15.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
15.0	15.0	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
15.0	15.0	Greene	PA	WeB	Weikert-Culleoka complex, 3 to 8 percent slopes
15.0	15.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
15.1	15.1	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
15.2	15.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
15.2	15.3	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
15.3	15.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
15.3	15.3	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
15.3	15.5	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
15.5	15.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
15.5	15.5	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
15.5	15.6	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
15.6	15.7	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
15.7	15.7	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
15.7	15.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
15.8	15.8	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
15.8	15.9	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
15.9	15.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
15.9	16.0	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes

**Table 7.1-3
Pipeline Soils by Milepost**

Beginning Milepost	End Milepost	County	State	Map Unit Symbol	Soil Map Unit
16.0	16.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
16.2	16.2	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
16.2	16.3	Greene	PA	WeB	Weikert-Culleoka complex, 3 to 8 percent slopes
16.3	16.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
16.3	16.3	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
16.3	16.4	Greene	PA	Nw	Newark silt loam
16.4	16.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
16.4	16.5	Greene	PA	Nw	Newark silt loam
16.5	16.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
16.6	16.6	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
16.6	16.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
16.7	16.7	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
16.7	16.8	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
16.8	16.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
16.8	16.8	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
16.8	16.9	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
16.9	17.0	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
17.0	17.0	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
17.0	17.2	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
17.2	17.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
17.2	17.3	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
17.3	17.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
17.3	17.4	Greene	PA	Nw	Newark silt loam
17.4	17.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
17.4	17.5	Greene	PA	Nw	Newark silt loam
17.5	17.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
17.6	17.8	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
17.8	17.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
17.8	17.9	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
17.9	17.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
17.9	18.0	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
18.0	18.0	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
18.0	18.1	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
18.1	18.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
18.1	18.3	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
18.3	18.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
18.3	18.4	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
18.4	18.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
18.4	18.5	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
18.5	18.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
18.5	18.6	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
18.6	18.6	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
18.6	18.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
18.6	18.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
18.7	18.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes

**Table 7.1-3
Pipeline Soils by Milepost**

Beginning Milepost	End Milepost	County	State	Map Unit Symbol	Soil Map Unit
18.8	18.8	Greene	PA	Fa	Fluvaquents, loamy
18.8	19.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
19.1	19.2	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
19.2	19.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
19.2	19.2	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
19.2	19.3	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
19.3	19.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
19.3	19.4	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
19.4	19.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
19.5	19.6	Greene	PA	Fa	Fluvaquents, loamy
19.6	19.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
19.6	19.7	Greene	PA	Fa	Fluvaquents, loamy
19.7	19.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
19.9	19.9	Greene	PA	Fa	Fluvaquents, loamy
19.9	20.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
20.2	20.2	Greene	PA	WeB	Weikert-Culleoka complex, 3 to 8 percent slopes
20.2	20.2	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
20.2	20.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
20.3	20.4	Greene	PA	Fa	Fluvaquents, loamy
20.4	20.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
20.4	20.5	Greene	PA	Fa	Fluvaquents, loamy
20.5	20.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
20.5	20.6	Greene	PA	WeC	Weikert-Culleoka complex, 8 to 15 percent slopes
20.6	20.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
20.6	20.7	Greene	PA	WeC	Weikert-Culleoka complex, 8 to 15 percent slopes
20.7	20.7	Greene	PA	Fa	Fluvaquents, loamy
20.7	20.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
20.7	20.8	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
20.8	20.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
20.9	20.9	Greene	PA	WeB	Weikert-Culleoka complex, 3 to 8 percent slopes
20.9	21.0	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
21.0	21.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
21.0	21.0	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
21.0	21.2	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
21.2	21.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
21.2	21.2	Greene	PA	Fa	Fluvaquents, loamy
21.2	21.2	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
21.2	21.4	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
21.4	21.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
21.4	21.5	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
21.5	21.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
21.5	21.6	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
21.6	21.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
21.7	21.8	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
21.8	21.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes

**Table 7.1-3
Pipeline Soils by Milepost**

Beginning Milepost	End Milepost	County	State	Map Unit Symbol	Soil Map Unit
21.8	21.8	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
21.8	21.9	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
21.9	22.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
22.0	22.0	Greene	PA	WeD	Weikert-Culleoka complex, 15 to 25 percent slopes
22.0	22.0	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
22.0	22.1	Greene	PA	WeD	Weikert-Culleoka complex, 15 to 25 percent slopes
22.1	22.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
22.1	22.2	Greene	PA	WeD	Weikert-Culleoka complex, 15 to 25 percent slopes
22.2	22.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
22.2	22.3	Greene	PA	Fa	Fluvaquents, loamy
22.3	22.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
22.3	22.4	Greene	PA	Fa	Fluvaquents, loamy
22.4	22.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
22.5	22.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
22.6	22.7	Greene	PA	Fa	Fluvaquents, loamy
22.7	22.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
22.7	22.8	Greene	PA	Fa	Fluvaquents, loamy
22.8	22.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
22.9	23.0	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
23.0	23.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
23.0	23.1	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
23.1	23.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
23.1	23.2	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
23.2	23.2	Greene	PA	CkC	Culleoka-Upshur complex, 8 to 15 percent slopes
23.2	23.3	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
23.3	23.4	Greene	PA	WeC	Weikert-Culleoka complex, 8 to 15 percent slopes
23.4	23.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
23.4	23.4	Greene	PA	WeC	Weikert-Culleoka complex, 8 to 15 percent slopes
23.4	23.5	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
23.5	23.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
23.5	23.6	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
23.6	23.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
23.6	23.6	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
23.6	23.7	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
23.7	23.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
23.7	23.7	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
23.7	23.8	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
23.8	23.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
23.8	23.9	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
23.9	23.9	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
23.9	24.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
24.1	24.2	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
24.2	24.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
24.2	24.2	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
24.2	24.3	Greene	PA	CkC	Culleoka-Upshur complex, 8 to 15 percent slopes

**Table 7.1-3
Pipeline Soils by Milepost**

Beginning Milepost	End Milepost	County	State	Map Unit Symbol	Soil Map Unit
24.3	24.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
24.3	23.4	Greene	PA	CkC	Culleoka-Upshur complex, 8 to 15 percent slopes
24.4	24.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
24.4	24.4	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
24.4	24.5	Greene	PA	CaB	Culleoka silt loam, 3 to 8 percent slopes
24.5	24.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
24.5	24.5	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
24.5	24.6	Greene	PA	CaD	Culleoka silt loam, 15 to 25 percent slopes
24.6	24.7	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
24.7	24.7	Greene	PA	Sk	Skidmore gravelly loam
24.7	24.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
24.9	24.9	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
H-309					
0.0	0.1	Greene	PA	WeC	Weikert-Culleoka complex, 8 to 15 percent slopes
0.1	0.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.1	0.1	Greene	PA	WeC	Weikert-Culleoka complex, 8 to 15 percent slopes
0.1	0.2	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
H-111 Line Reactivation					
0.0	0.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.0	0.1	Greene	PA	Fa	Fluvaquents, loamy
0.1	0.1	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
0.1	0.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.2	0.2	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
0.3	0.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.3	0.4	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
0.4	0.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.4	0.5	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
0.5	0.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.5	0.6	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
0.6	0.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.6	0.8	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
0.8	0.8	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
0.8	0.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.8	0.9	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
0.9	0.9	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
0.9	0.9	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
0.9	1.0	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
1.0	1.1	Greene	PA	GeB	Guernsey silt loam, 3 to 8 percent slopes
1.1	1.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
1.1	1.1	Greene	PA	GeB	Guernsey silt loam, 3 to 8 percent slopes
1.1	1.2	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
1.2	1.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
1.2	1.2	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
1.2	1.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
1.3	1.3	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes

**Table 7.1-3
Pipeline Soils by Milepost**

Beginning Milepost	End Milepost	County	State	Map Unit Symbol	Soil Map Unit
1.3	1.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
1.4	1.5	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
1.5	1.5	Greene	PA	Fa	Fluvaquents, loamy
1.5	1.6	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
1.6	1.6	Greene	PA	Fa	Fluvaquents, loamy
1.6	1.6	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
1.6	1.6	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
1.6	1.7	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
1.7	1.7	Greene	PA	DoB	Dormont silt loam, 3 to 8 percent slopes
1.7	1.8	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
1.8	1.8	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
1.8	1.8	Greene	PA	DoB	Dormont silt loam, 3 to 8 percent slopes
1.8	1.9	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
1.9	1.9	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
1.9	1.9	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
1.9	2.0	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.0	2.0	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
2.0	2.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.1	2.1	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
2.1	2.2	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.2	2.2	Greene	PA	CaC	Culleoka silt loam, 8 to 15 percent slopes
2.2	2.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.3	2.3	Greene	PA	Fa	Fluvaquents, loamy
2.3	2.3	Greene	PA	DoD	Dormont silt loam, 15 to 25 percent slopes
2.3	2.4	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.4	2.4	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes
2.4	2.4	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes
2.4	2.5	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes
2.5	2.5	Greene	PA	CkD	Culleoka-Upshur complex, 15 to 25 percent slopes
2.5	2.6	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes

Sources:

Data Generated from Equitrans Checked Shapefiles 01 20 2011 provided by HEI.

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). 2003. Soil Survey Geographic (SSURGO) Database.

**Table 7.1-4
Aboveground Facilities Soils by Milepost**

Facility Name(s)	Line	Milepost	County	State	Map Unit Symbol	Soil Map Unit	Operation Acres
Compressor Stations							
Jefferson Compressor Station	H-302	0	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes	5.9
					DoB	Dormont silt loam, 3 to 8 percent slopes	
					DoC	Dormont silt loam, 8 to 15 percent slopes	
					DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes	
					WeC	Weikert-Culleoka complex, 8 to 15 percent slopes	
Meter Stations							
Equitrans, LP Interconnect #3, H-111 Interconnect Receipt Meter	H-309	0.21	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes	0.9
					GeB	Guernsey silt loam, 3 to 8 percent slopes	
Texas Eastern Transmission (TETCO) Interconnect #1 Delivery Meter	H-302	0	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes	Part of Jefferson CS
					GeB	Dormont-Culleoka silt loams, 25 to 50 percent slopes	
Dominion Transmission (DTI) Interconnect #2 Delivery Meter	H-302	0	Greene	PA	DtD	Dormont-Culleoka silt loams, 15 to 25 percent slopes	Part of Jefferson CS
					DoC	Dormont silt loam, 15 to 25 percent slopes	
					DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes	
Launchers and Receivers							
Jefferson CS Receiver	H-302	0	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes	0.2
					DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes	

**Table 7.1-4
Aboveground Facilities Soils by Milepost**

Facility Name(s)	Line	Milepost	County	State	Map Unit Symbol	Soil Map Unit	Operation Acres
Mainline Block Valves							
Gouker/Milliken Run Road, Mainline Valve Setting	H-302	22.1	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes	0.2
Blockhouse Road, Mainline Valve Setting	H-302	17.3	Greene	PA	DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes	0.2
White Barn, Mainline Valve Setting	H-302	9.2	Greene	PA	Fa	Fluvaquents, loamy	0.2
					DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes	
Bayard Gates, Mainline Valve Setting	H-302	4.7	Greene	PA	Fa	Fluvaquents, loamy	0.2
Jefferson CS, Mainline Valve Setting with Receiver	H-302	0	Greene	PA	Us	Udorthents, smoothed	0.2
Tap on line H-111, Mainline Valve Setting	H-309	0.21	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes	0.2
					GeB	Guernsey silt loam, 3 to 8 percent slopes	
Jefferson CS, Mainline Valve Setting	H-309	0	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes	0.2
					GeB	Guernsey silt loam, 3 to 8 percent slopes	
Zimmerman Gates Mainline Valve Setting	H-111 Reactivation	0	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes	0.2
					DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes	
Over-pressure Protection							
H-111 Over Pressure Protection at Zimmerman Gates	H-111 Reactivation	0	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes	0.2
					DtF	Dormont-Culleoka silt loams, 25 to 50 percent slopes	
H-111 Interconnect	H-309	0.21	Greene	PA	DoC	Dormont silt loam, 8 to 15 percent slopes	0.2
					GeB	Guernsey silt loam, 3 to 8 percent slopes	

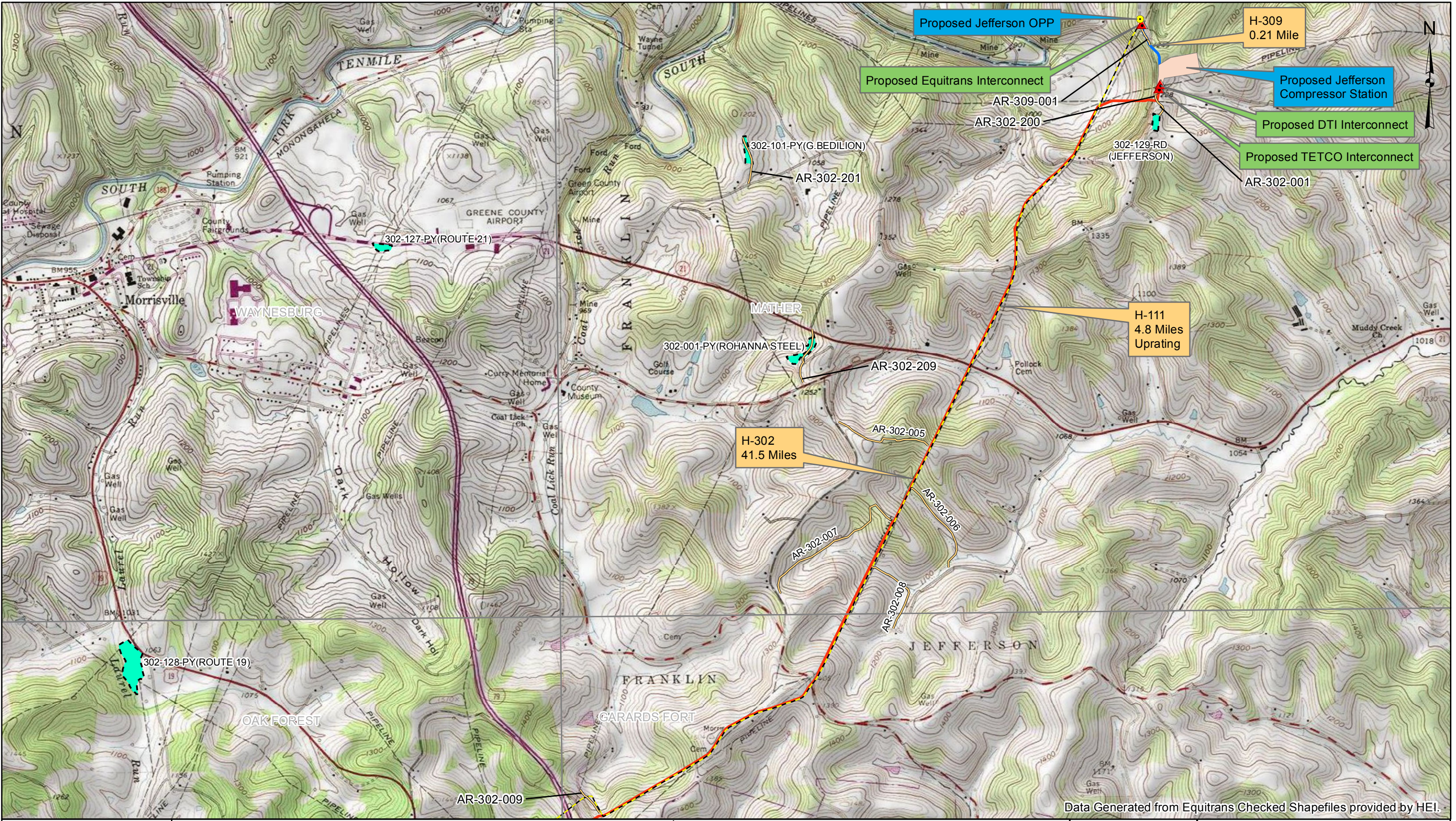
Sources:

Data Generated from Equitrans Checked Shapefiles 01 20 2011 provided by HEI.

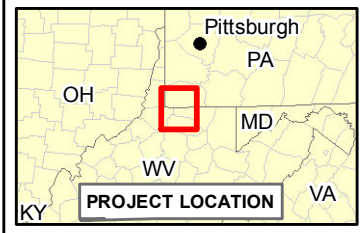
U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2003. Soil Survey Geographic (SSURGO) Database.

Appendix E

Location Map



Data Generated from Equitrans Checked Shapefiles provided by HEI.



Legend

Proposed H-302 Alignment

Proposed H-306 Alignment

Proposed H-309 Alignment

H-111 Uprating

Proposed H-111 Lift & Lay

Access Roads

Ancillary Site

02,0004,0008,000

Feet

00.250.51

Miles

Map Source: USGS, 1:24,000 Digital Raster Graphics

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EQUITRANS SUNRISE PROJECT

Date: 6/8/2011

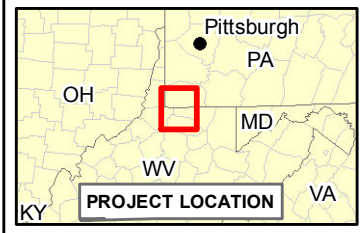
URS

Route Overview Map

Sheet 1 of 10



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Legend

Proposed H-302 Alignment

Proposed H-306 Alignment

Proposed H-309 Alignment

H-111 Uprating

Proposed H-111 Lift & Lay

Access Roads

Ancillary Site

0 2,000 4,000 8,000 Feet

0 0.25 0.5 1 Miles

Map Source: USGS, 1:24,000 Digital Raster Graphics

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EQUITRANS SUNRISE PROJECT

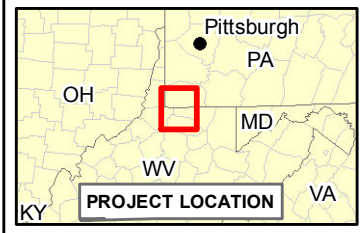
Date: 6/8/2011

URS

Route Overview Map
Sheet 3 of 10



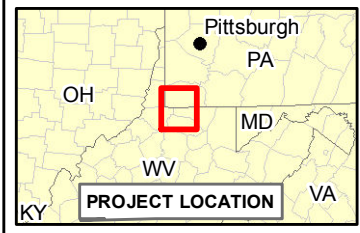
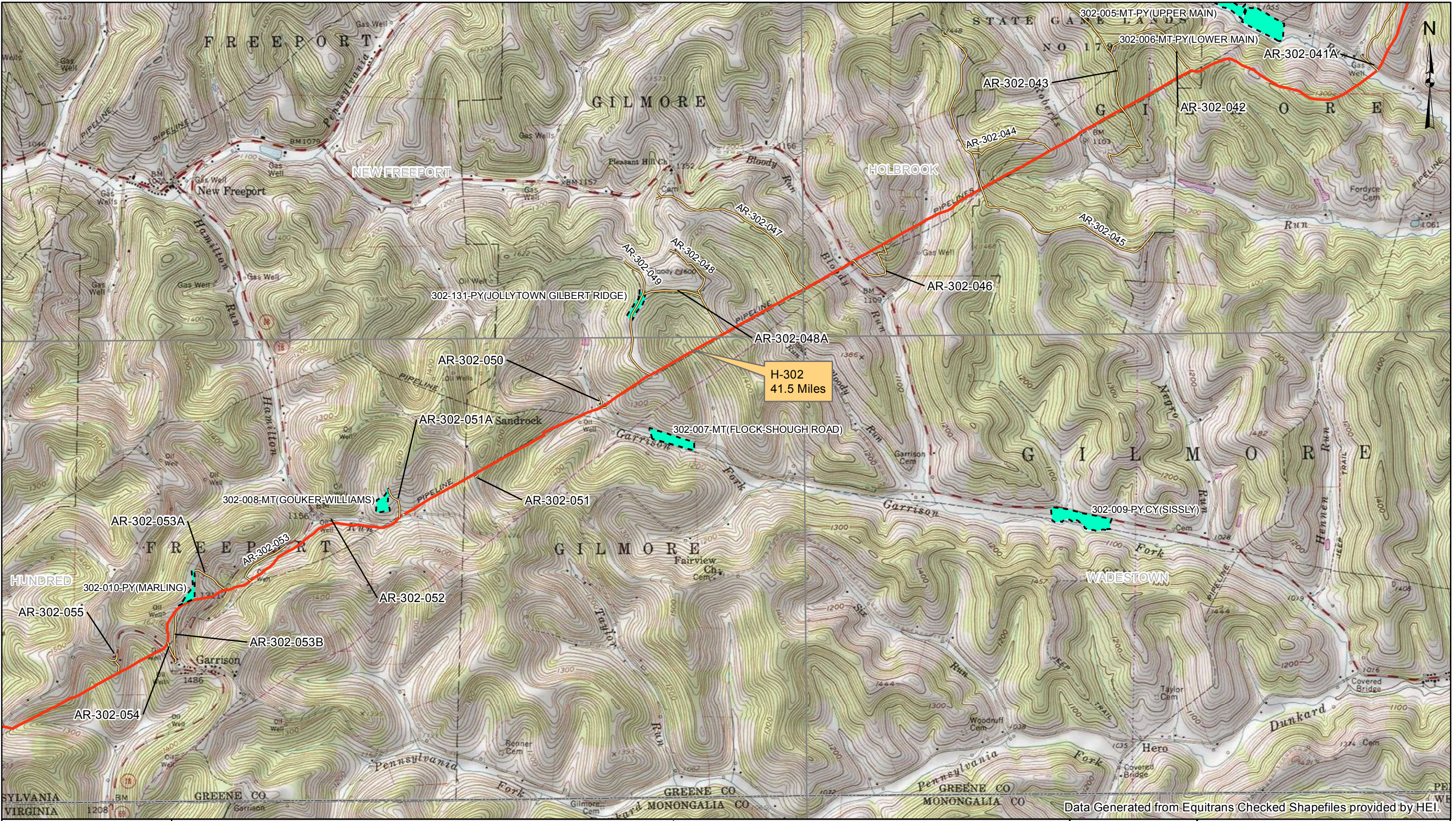
Data Generated from Equitrans Checked Shapefiles provided by HEI.



Legend		
Proposed H-302 Alignment	H-111 Uprating	Access Roads
Proposed H-306 Alignment	Proposed H-111 Lift & Lay	Ancillary Site
Proposed H-309 Alignment		

0	2,000	4,000	8,000
Feet			
0	0.25	0.5	1
Miles			
Map Source: USGS, 1:24,000 Digital Raster Graphics			

Date: 6/8/2011 URS	EQUITRANS EQUITRANS SUNRISE PROJECT
	Route Overview Map Sheet 4 of 10



Legend

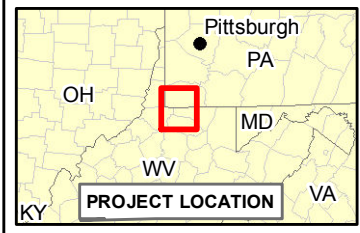
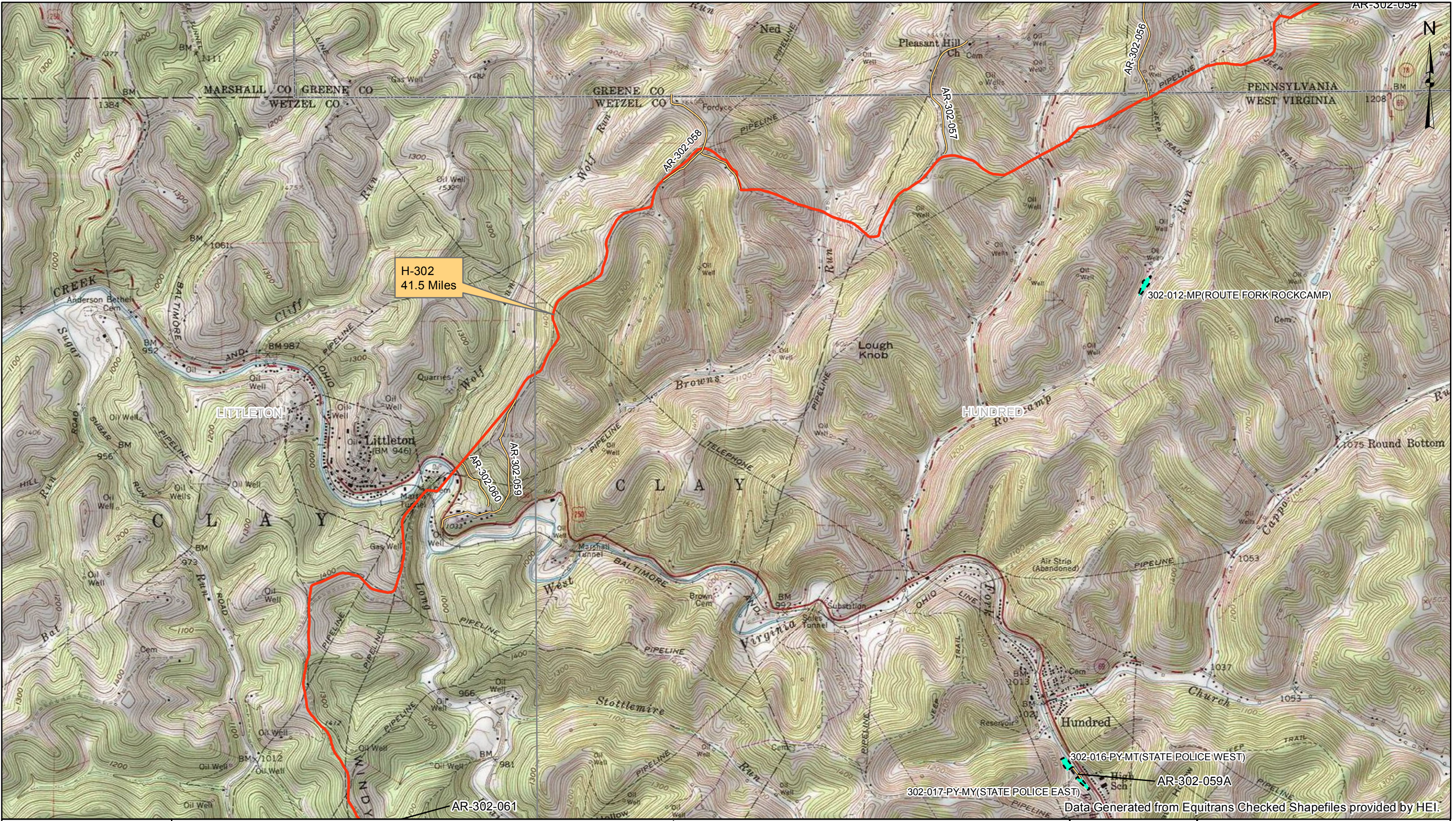
Proposed H-302 Alignment	H-111 Uprating	Access Roads
Proposed H-306 Alignment	Proposed H-111 Lift & Lay	Ancillary Site
Proposed H-309 Alignment		

0 2,000 4,000 8,000 Feet

0 0.25 0.5 1 Miles

Map Source: USGS, 1:24,000 Digital Raster Graphics

EQUITRANS SUNRISE PROJECT	
Date: 6/8/2011	Route Overview Map Sheet 5 of 10



Legend

Proposed H-302 Alignment	H-111 Uprating	Access Roads
Proposed H-306 Alignment	Proposed H-111 Lift & Lay	Ancillary Site
Proposed H-309 Alignment		

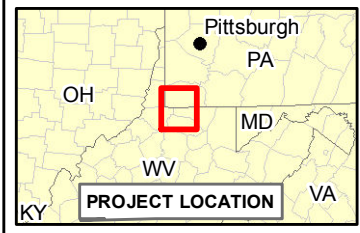
0 2,000 4,000 8,000 Feet

0 0.25 0.5 1 Miles

Map Source: USGS, 1:24,000 Digital Raster Graphics

EQUITRANS SUNRISE PROJECT	
Date: 6/8/2011	Route Overview Map Sheet 6 of 10

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Legend

Proposed H-302 Alignment

Proposed H-306 Alignment

Proposed H-309 Alignment

H-111 Uprating

Proposed H-111 Lift & Lay

Access Roads

Ancillary Site

0 2,000 4,000 8,000 Feet

0 0.25 0.5 1 Miles

Map Source: USGS, 1:24,000 Digital Raster Graphics

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Date: 6/8/2011

URS

Route Overview Map
Sheet 7 of 10



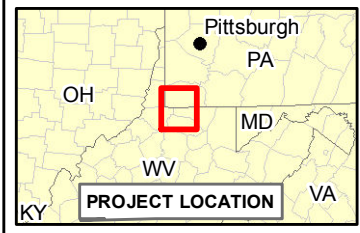
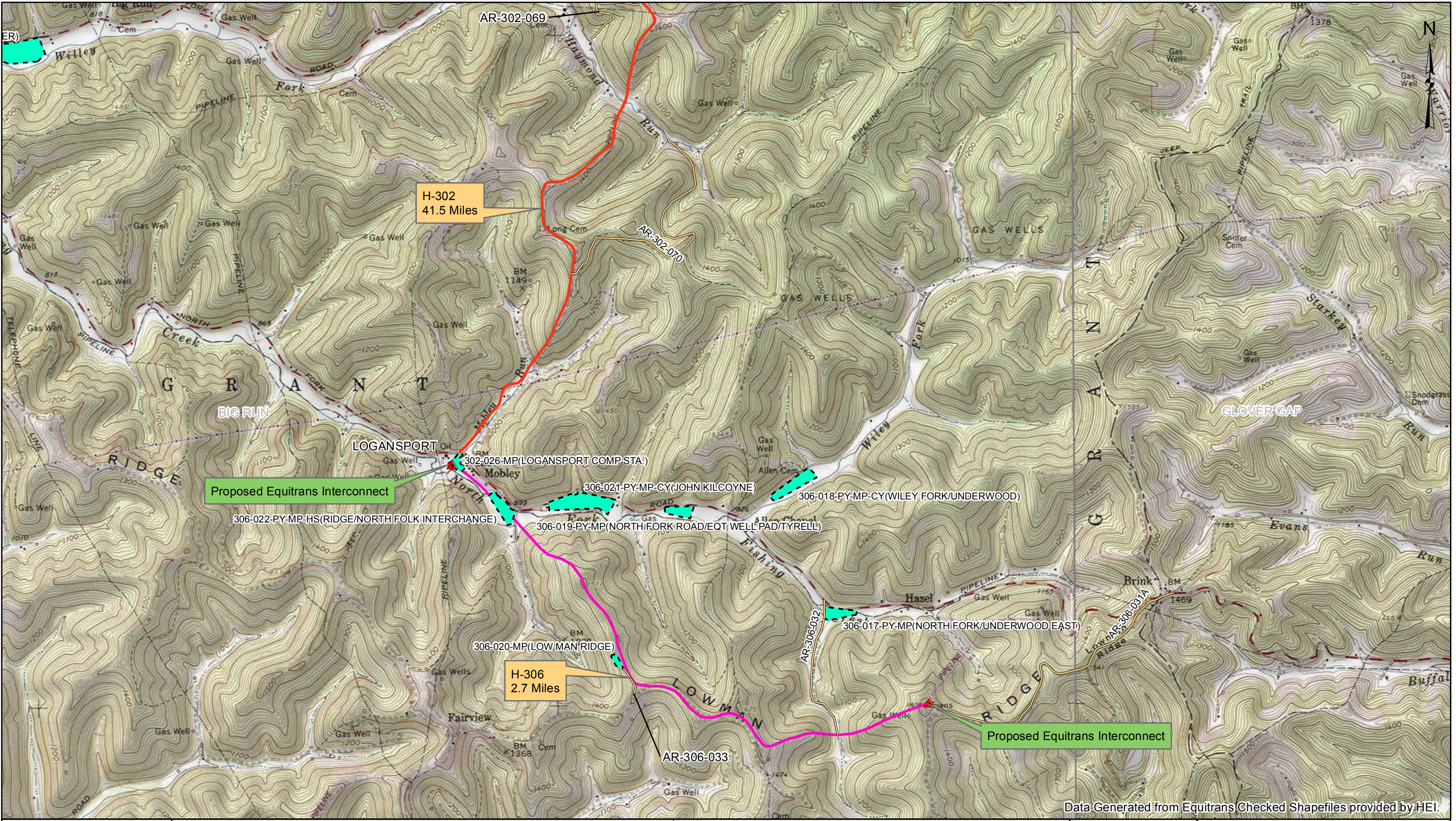
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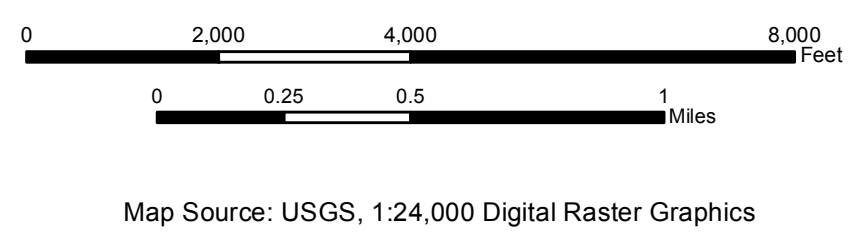
Legend			
— Proposed H-302 Alignment	— H-111 Uprating	— Access Roads	
— Proposed H-306 Alignment	— Proposed H-111 Lift & Lay	■ Ancillary Site	
— Proposed H-309 Alignment			

0	2,000	4,000	8,000
Feet			
0	0.25	0.5	1
Miles			
Map Source: USGS, 1:24,000 Digital Raster Graphics			

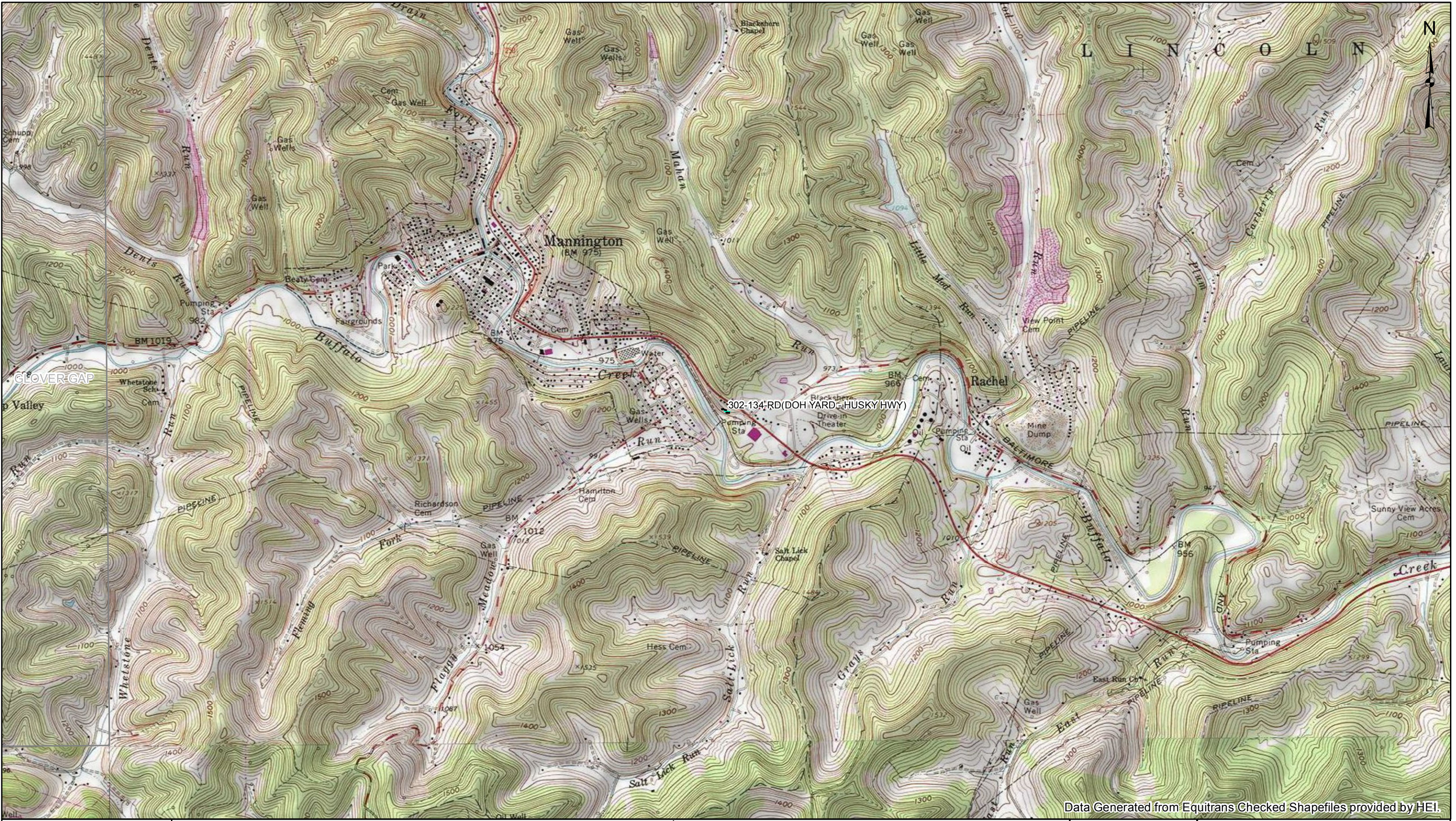
EQUITRANS	EQUITRANS SUNRISE PROJECT
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URS	Route Overview Map Sheet 8 of 10



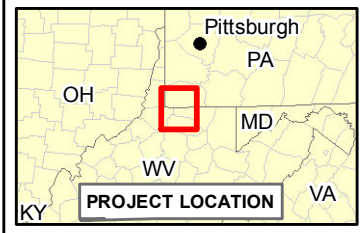
Legend			
— Proposed H-302 Alignment	--- H-111 Uprating	— Access Roads	
— Proposed H-306 Alignment	— Proposed H-111 Lift & Lay	 Ancillary Site	
— Proposed H-309 Alignment			



		EQUITRANS SUNRISE PROJECT	
Date: 6/8/2011		Route Overview Map	
		Sheet 9 of 10	



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Legend

Proposed H-302 Alignment

Proposed H-306 Alignment

Proposed H-309 Alignment

H-111 Uprating

Proposed H-111 Lift & Lay

Access Roads

Ancillary Site

0 2,000 4,000 8,000 Feet

0 0.25 0.5 1 Miles

Map Source: USGS, 1:24,000 Digital Raster Graphics

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Date: 6/8/2011

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Route Overview Map
Sheet 10 of 10

Appendix F

Calculations and Design Guidance

PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 10,720 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 0.25 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	Culleoka, Dormont	C	Fair	10,720	0.2	79	19.4
Totals					0.25		19.4

Weighted Runoff Curve Number, CN_w = 79 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 2.7 [$S = (1000/CN) - 10$]
Runoff, Q = 0.91 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 809 ft³ ($V = Q \times A$)

Post-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
gravel	-	-	Good	9,376	0.2	73.5	15.8
Impervious building				1,344	0.031	98	3.0
Totals					0.25		18.8

Weighted Runoff Curve Number, CN_w = 77 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.1 [$S = (1000/CN) - 10$]
Runoff, Q = 0.78 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 699 ft³ ($V = Q \times A$)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event =					-109 ft ³		
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BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

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BY: MAM
DATE: 6/7/2011
CHECK: RDO
DATE: 6/7/2011

PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 54,467 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 1.25 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	CaD, DoB, DoC, DtD, DtF	C	Good	54,467	1.25	74	92.5
	-	-					
Totals					1.25		92.5

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.67 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 3,020 ft³ ($V = Q \times A$)

Post-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Access Roads (gravel)	-	-	Good	7,071	0.2	73.5	11.9
Pasture	CaD, DoB, DoC, DtD, DtF	C	Good	47,396	1.1	74	80.5
Totals					1.25		92.4

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.66 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 3,007 ft³ ($V = Q \times A$)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event = -13 ft³

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AR-309-001
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 1,706 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 0.04 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	Culleoka, Dormont	C	Good	1,229	0.0	74	2.1
Access Road (gravel)	-	-	Good	0,477	0.0	73.5	0.8
Totals					0.04		2.9

Weighted Runoff Curve Number, CN_w = 74 (CN_w = "A x CN" / A)
Storage Capacity, S = 3.5 [S = (1000/CN) - 10]
Runoff, Q = 0.66 inches [Q = (P - 0.2*S)² / (P + 0.8*S)]
Runoff Volume, V = 94 ft³ (V = Q*A)

Post-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Access Roads (gravel)	-	-	Good	0,477	0.0	73.5	0.8
Pasture	Culleoka, Dormont	C	Good	1,229	0.0	74	2.1
Totals					0.04		2.9

Weighted Runoff Curve Number, CN_w = 74 (CN_w = "A x CN" / A)
Storage Capacity, S = 3.5 [S = (1000/CN) - 10]
Runoff, Q = 0.66 inches [Q = (P - 0.2*S)² / (P + 0.8*S)]
Runoff Volume, V = 94 ft³ (V = Q*A)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event =	0 ft ³
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BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

DRAINAGE AREA NO. 1 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 127,063 ft² (reference "Drainage Areas" Figure)
Drainage Area = 2.92 acres
Drainage Area = 0.0046 mi²

Time of Concentration, T_c = 19.21 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Woods			C	103,833	2.38	0.13	0.31
Meadow			C	23,230	0.53	0.28	0.15
Totals					2.92		0.46

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)
For C Values: (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.16 (C_w = "A x C" / A)
Time of Concentration, T_c = 19.21 min (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 4.03 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 1.85 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.16 (C_w = "A x C" / A)
Time of Concentration, T_c = 19.21 min (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 2.93 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 1.34 cfs (Q = C x I x A)

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BY:	MAM
DATE:	6/4/2011
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DATE:	6/8/2011

ERSION CHANNEL SIZING: TEMPORARY – SYNTHETIC MAT

Required Flow Capacity, Qr =	1.34 cfs	
Manning's n =	0.036	Synthetic Mat : Reference E&S Table 6.5
Bottom Width, b =	1.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.060 ft/ft	
Try - Actual Flow Depth, d =	0.27 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	0.42 sq ft	
Hydraulic Radius, R =	0.19 ft	
Actual Velocity, V =	3.30 ft/s	

Actual Flow at Flow Depth d, Q =	1.37 cfs	
Required Flow , Qr =	1.34 cfs	OK

Critical Slope, Sc =	0.07	
.7Sc =	0.05	
1.3Sc =	0.09	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.07 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.77 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, Ta =	2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, Td =	1.01 ft/s	

OK

ERSION CHANNEL SIZING: PERMANENT

Required Flow Capacity, Qr =	1.85 cfs		
Manning's n =	0.049	$n = 0.047 * ((62.4 * R * S))^{-0.4}$	E&S Manual: pg 111 (mannings n for vegetated channels)
Bottom Width, b =	1.00 ft		
Slope Invert, Z =	2.00		
Bed Slope, S =	0.060 ft/ft		
Try - Actual Flow Depth, d =	0.37 ft		
Vegetative Lining Retardance =	C		
Area, A =	0.64 sq ft		
Hydraulic Radius, R =	0.24 ft		
Actual Velocity, V =	2.88 ft/s		

Actual Flow at Flow Depth d, Q =	1.86 cfs	
Required Flow , Qr =	1.85 cfs	OK

Critical Slope, Sc =	0.10	
.7Sc =	0.07	
1.3Sc =	0.13	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.09 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.87 ft
Use Design Depth of D =	1.00 ft

Allowable Velocity (Grass), V =	4.00 ft/s	(reference E&S Manual: Table 6.4 vegetation established by seeding)
Actual Velocity at depth of flow, V =	2.87 ft/s	

OK

EQT
302-127-PY
GREENE COUNTY, PA

BY: MAM
DATE: 6/4/2011
CHECK: DAG
DATE: 6/8/2011

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 1

Reference: Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Segment 1: Sheet Flow

Surface Description: Forest
Manning's n = 0.600 (reference E&S Manual: Table 5.3)
Flow Length, L = 100 ft
Land Slope, s = 0.18 ft/ft
T = 8.369 min $T = [(2 * L * n) / (3 * (s^{1/2}))] ^{0.4673}$

Segment 2: Shallow Concentrated Flow

Surface Description: Forest
Flow Length, L = 780 ft
Watercourse Slope, s = 0.170 ft/ft
Average Velocity, V = 1.2 ft/s (reference E&S Manual: Figure 5.1)
T = 10.833 min $\{T = (L / V) / 60 \}$

Segment 3: Open Channel Flow

Cross Sectional Area, A = 4.00 ft²
Wetted Perimeter, P = 6.47 ft
Hydraulic Radius, R = 0.62 ft
Flow Length, L = 232 ft
Watercourse Slope, s = 0.060 ft/ft
Manning's n = 0.036 Assumes Synthetic Mat Lining
Average Velocity, V = 7.3 ft/s
T = 0.009 min $\{T = (L / V) / 60 \}$

Total Watershed T_c =	19.211 min
--	-------------------

DRAINAGE AREA NO. 2 CALCULATIONS

References: Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)
Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 526,739 ft² (reference "Drainage Areas" Figure)
Drainage Area = 12.09 acres
Drainage Area = 0.0189 mi²

Time of Concentration, T_c = 43.44 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Woods			C	452,825	10.40	0.13	1.35
Meadow			C	73,914	1.70	0.28	0.48
Totals					12.09		1.83

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)
For C Value (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.15 (C_w = "A x C" / A)
Time of Concentration, T_c = 43.44 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 2.56 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 4.67 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.15 (C_w = "A x C" / A)
Time of Concentration, T_c = 43.44 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 1.75 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 3.20 cfs (Q = C x I x A)

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302-127-PY
GREENE COUNTY, PA

BY:	MAM
DATE:	6/4/2011
CHECK:	DAG
DATE:	6/8/2011

VERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, Q_r =	3.20 cfs	
Manning's n =	0.036	Synthetic Mat : Reference E&S Table 6.5
Bottom Width, b =	2.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.030 ft/ft	
Try - Actual Flow Depth, d =	0.38 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	1.05 sq ft	
Hydraulic Radius, R =	0.28 ft	
Actual Velocity, V =	3.07 ft/s	

Actual Flow at Flow Depth d , Q =	3.22 cfs	
Required Flow, Q_r =	3.20 cfs	OK

Critical Slope, Sc =	0.07	
.7 Sc =	0.05	
1.3 Sc =	0.09	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.10 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.88 ft
Use Design Depth of D =	1.50 ft

Allowable Shear Stress, T_a =	2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, T_d =	0.71 ft/s	

OK

VERSION CHANNEL SIZING: PERMANENT

Required Flow Capacity, Q_r =	4.67 cfs		
Manning's n =	0.053	$n = 0.047 * ((62.4 * R * S))^{-0.4}$	E&S Manual: pg 111
Bottom Width, b =	2.00 ft		(mannings n for vegetated channels)
Slope Invert, Z =	2.00		
Bed Slope, S =	0.030 ft/ft		
Try - Actual Flow Depth, d =	0.58 ft		
Vegetative Lining Retardance =	C		
Area, A =	1.83 sq ft		
Hydraulic Radius, R =	0.40 ft		
Actual Velocity, V =	2.63 ft/s		

Actual Flow at Flow Depth d , Q =	4.83 cfs	
Required Flow, Q_r =	4.67 cfs	OK

Critical Slope, Sc =	0.11	
.7 Sc =	0.08	
1.3 Sc =	0.14	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.15 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	1.08 ft
Use Design Depth of D =	1.50 ft

Allowable Velocity (Grass), V =	4.00 ft/s	(reference E&S Manual: Table 6.4 vegetation established by seeding)
Actual Velocity at depth of flow, V =	2.55 ft/s	

OK

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 2

Reference: Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Segment 1: Sheet Flow

Surface Description:	Forest	
Manning's n =	0.600	(reference E&S Manual: Table 5.3)
Flow Length, L =	100 ft	
Land Slope, s =	0.09 ft/ft	
T =	9.840 min	$T = [(2 \cdot L \cdot n) / (3 \cdot (s^{1/2}))] \wedge 0.4673$

Segment 2A: Shallow Concentrated Flow (13% Slope)

Surface Description:	Forest	
Flow Length, L =	156 ft	
Watercourse Slope, s =	0.130 ft/ft	
Average Velocity, V =	0.8 ft/s	(reference E&S Manual: Figure 5.1)
T =	3.250 min	$\{T = (L / V) / 60\}$

Segment 2B: Shallow Concentrated Flow (6% Slope)

Surface Description:	Forest	
Flow Length, L =	632 ft	
Watercourse Slope, s =	0.060 ft/ft	
Average Velocity, V =	0.6 ft/s	(reference E&S Manual: Figure 5.1)
T =	17.556 min	$\{T = (L / V) / 60\}$

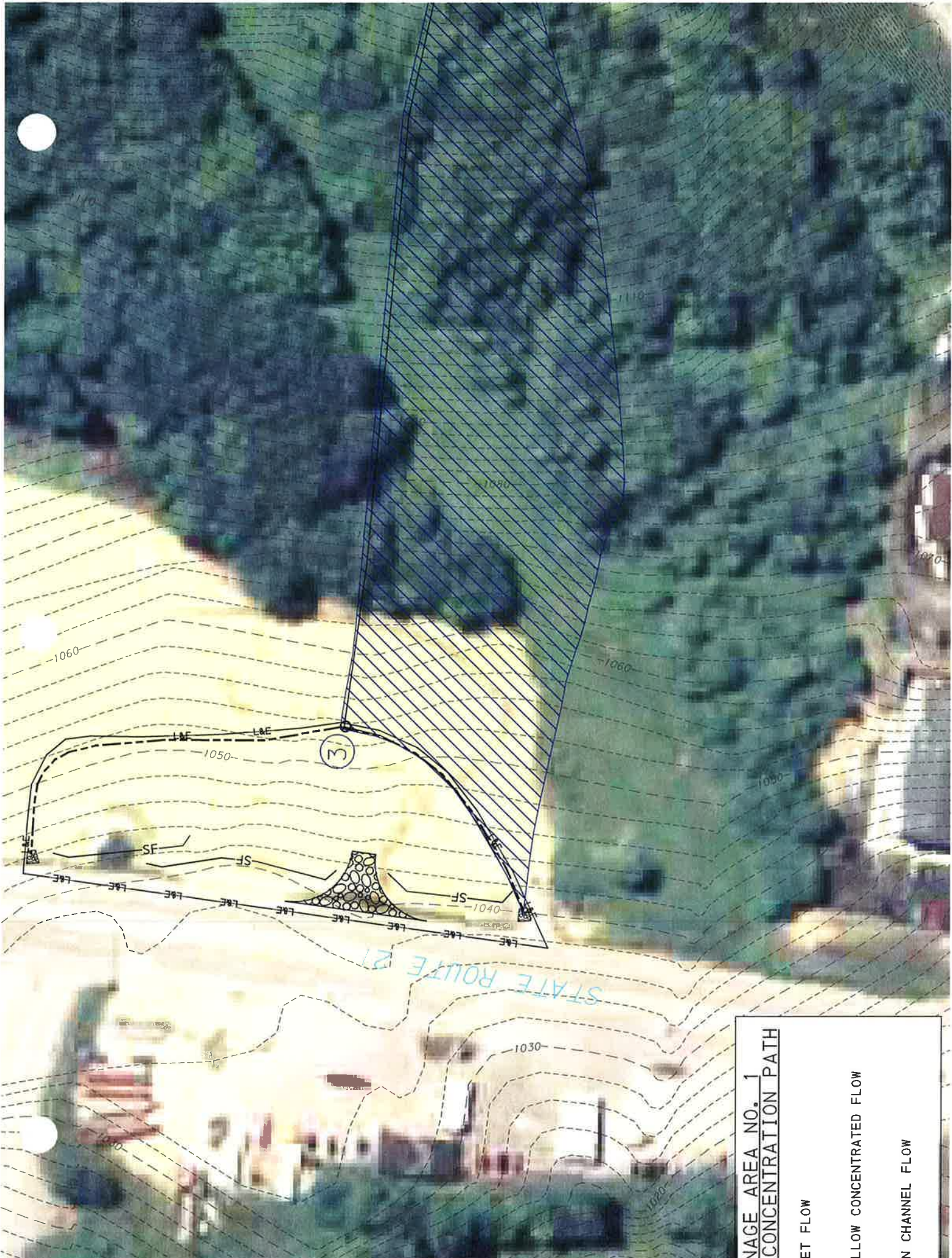
Segment 2C: Shallow Concentrated Flow (17% Slope)

Surface Description:	Forest	
Flow Length, L =	920 ft	
Watercourse Slope, s =	0.170 ft/ft	
Average Velocity, V =	1.2 ft/s	(reference E&S Manual: Figure 5.1)
T =	12.778 min	$\{T = (L / V) / 60\}$

Segment 3: Open Channel Flow

Cross Sectional Area, A=	4.00 ft ²	
Wetted Perimeter, P=	6.47 ft	
Hydraulic Radius, R=	0.62 ft	
Flow Length, L =	320 ft	
Watercourse Slope, s =	0.030 ft/ft	
Manning's n =	0.036	Assumes Synthetic Mat lining
Average Velocity, V =	5.2 ft/s	
T =	0.017 min	$\{T = (L / V) / 60\}$

Total Watershed T_c =	43.440 min
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NAGE AREA NO. 1
CONCENTRATION PATH

NET FLOW

ALLOW CONCENTRATED FLOW

IN CHANNEL FLOW



AINAGE AREA NO. 2
OF CONCENTRATION PATH

SHEET FLOW

- ALLOW CONCENTRATED FLOW (13%)
- SHALLOW CONCENTRATED FLOW (6%)
- ALLOW CONCENTRATED FLOW (17%)

PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 52,785 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 1.21 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	Culleoka, Dormont	C	Good	37,035	0.9	74	62.9
Access Road (gravel)	-	-	Good	15,750	0.4	73.5	26.6
Totals					1.21		89.5

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.66 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 2,898 ft³ ($V = Q \times A$)

Post-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Access Roads (gravel)	-	-	Good	15,750	0.4	73.5	26.6
Pasture	Culleoka, Dormont	C	Good	37,035	0.9	74	62.9
Totals					1.21		89.5

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.66 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 2,898 ft³ ($V = Q \times A$)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event =	0 ft³
--	-------------------------

EQT
AR-302-010
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 102,659 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 2.36 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	Culleoka, Dormont	C	Good	15,680	0.4	74	26.6
Access Road (gravel)	-	-	Good	30,000	0.7	73.5	50.6
Woods	Culleoka, Dormont	C	Good	56,979	1.3	74	96.8
Totals					2.36		174.1

Weighted Runoff Curve Number, CN_w = 74 (CN_w = "A x CN" / A)
Storage Capacity, S = 3.5 [S = (1000/CN) - 10]
Runoff, Q = 0.66 inches [Q = (P - 0.2*S)² / (P + 0.8*S)]
Runoff Volume, V = 5,637 ft³ (V = Q*A)

Post-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Woods	Culleoka, Dormont	C	Good	56,979	1.3	74.0	96.8
Access Roads (gravel)	-	-	Good	30,000	0.7	73.5	50.6
Pasture	Culleoka, Dormont	C	Good	15,680	0.4	74	26.6
Totals					2.36		174.1

Weighted Runoff Curve Number, CN_w = 74 (CN_w = "A x CN" / A)
Storage Capacity, S = 3.5 [S = (1000/CN) - 10]
Runoff, Q = 0.66 inches [Q = (P - 0.2*S)² / (P + 0.8*S)]
Runoff Volume, V = 5,637 ft³ (V = Q*A)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event =	0 ft ³
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EQT
AR-302-024
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

$CN = 73.53$

PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 55,749 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 1.28 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	Culleoka, Dormont	C	Good	55,749	1.3	74	94.7
Totals					1.28		94.7

Weighted Runoff Curve Number, CN_w = 74 (CN_w = "A x CN" / A)
Storage Capacity, S = 3.5 [S = (1000/CN) - 10]
Runoff, Q = 0.67 inches [Q = (P - 0.2*S)² / (P + 0.8*S)]
Runoff Volume, V = 3,091 ft³ (V = Q*A)

Post-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Access Roads (gravel)	-	-	Good	16,455	0.4	73.5	27.8
Pasture	Culleoka, Dormont	C	Good	39,294	0.9	74	66.8
Totals					1.28		94.5

Weighted Runoff Curve Number, CN_w = 74 (CN_w = "A x CN" / A)
Storage Capacity, S = 3.5 [S = (1000/CN) - 10]
Runoff, Q = 0.66 inches [Q = (P - 0.2*S)² / (P + 0.8*S)]
Runoff Volume, V = 3,061 ft³ (V = Q*A)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event =				-30 ft ³
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EQT
AR-302-033
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

$CN = 73.53$

DRAINAGE AREA NO. 1 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 80,795 ft² (reference "Drainage Areas" Figure)
Drainage Area = 1.85 acres
Drainage Area = 0.0029 mi²

Time of Concentration, T_c = 6.49 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	70,820	1.63	0.28	0.46
Access Roads (gravel)				9,975	0.23	0.35	0.08
Totals					1.85		0.54

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)
For C Value: (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.29 (C_w = "A x C" / A)
Time of Concentration, T_c = 6.49 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 5.76 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 3.09 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.29 (C_w = "A x C" / A)
Time of Concentration, T_c = 6.49 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 4.51 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 2.42 cfs (Q = C x I x A)

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AR-302-033
GREENE COUNTY, PA

BY: MAM
DATE: 3/1/2011
CHECK: JAS
DATE: 3/5/2011

DIVERSION CHANNEL SIZING: SLOPE 8.8%
DIVERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, $Q_r =$ 2.42 cfs
Manning's $n =$ 0.036 Synthetic Mat : Reference E&S Table 6.5
Bottom Width, $b =$ 2.00 ft
Slope Invert, $Z =$ 2.00
Bed Slope, $S =$ 0.088 ft/ft
Try - Actual Flow Depth, $d =$ 0.24 ft
Vegetative Lining Retardance = N/A
Area, $A =$ 0.60 sq ft
Hydraulic Radius, $R =$ 0.19 ft
Actual Velocity, $V =$ 4.08 ft/s

Actual Flow at Flow Depth d , $Q =$ 2.43 cfs
Required Flow, $Q_r =$ 2.42 cfs **OK**

Critical Slope, $Sc =$ 0.10
.7 $Sc =$ 0.07
1.3 $Sc =$ 0.14 **STABLE FLOW**

Freeboard Based on Unstable Flow = NA ft
Freeboard Based on Stable Flow = 0.06 ft
Minimum Required Freeboard = 0.50 ft

Actual Total Depth, $D =$ 0.74 ft
Use Design Depth of $D =$ 1.00 ft

Allowable Shear Stress, $T_a =$ 2.00 lb/ft² (reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, $T_d =$ 1.32 ft/s

OK

DIVERSION CHANNEL SIZING: PERMANENT

Required Flow Capacity, $Q_r =$ 3.09 cfs
Manning's $n =$ 0.042 $n = 0.047 * ((62.4 * R * S))^{-0.4}$ E&S Manual: pg 111
Bottom Width, $b =$ 2.00 ft (mannings n for vegetated channels)
Slope Invert, $Z =$ 2.00
Bed Slope, $S =$ 0.088 ft/ft
Try - Actual Flow Depth, $d =$ 0.31 ft
Vegetative Lining Retardance = C
Area, $A =$ 0.81 sq ft
Hydraulic Radius, $R =$ 0.24 ft
Actual Velocity, $V =$ 4.02 ft/s

Actual Flow at Flow Depth d , $Q =$ 3.27 cfs
Required Flow, $Q_r =$ 3.09 cfs **OK**

Critical Slope, $Sc =$ 0.11
.7 $Sc =$ 0.08
1.3 $Sc =$ 0.15 **STABLE FLOW**

Freeboard Based on Unstable Flow = NA ft
Freeboard Based on Stable Flow = 0.08 ft
Minimum Required Freeboard = 0.50 ft

Actual Total Depth, $D =$ 0.81 ft
Use Design Depth of $D =$ 1.00 ft

Allowable Velocity (Grass), $V =$ 4.00 ft/s (reference E&S Manual: Table 6.4 vegetation established by seeding)
Actual Velocity at depth of flow, $V =$ 3.80 ft/s

OK

EQT
AR-302-033
GREENE COUNTY, PA

BY: MAM
DATE: 3/1/2011
CHECK: JAS
DATE: 3/5/2011

DIVERSION CHANNEL SIZING: SLOPE 20.8%

DIVERSION CHANNEL SIZING: TEMPORARY – SYNTHETIC MAT

Required Flow Capacity, Q_r =	2.42 cfs	Synthetic Mat : Reference E&S Table 6.5
Manning's n =	0.036	
Bottom Width, b =	2.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.208 ft/ft	
Try - Actual Flow Depth, d =	0.19 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	0.45 sq ft	
Hydraulic Radius, R =	0.16 ft	
Actual Velocity, V =	5.48 ft/s	

Actual Flow at Flow Depth d , Q =	2.48 cfs	OK
Required Flow, Q_r =	2.42 cfs	

Critical Slope, Sc =	0.13	STABLE FLOW
.7 Sc =	0.09	
1.3 Sc =	0.17	

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.05 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.69 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, T_a =	2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, T_d =	2.47 ft/s	

INSUFFICIENT

line with riprap
see below

DIVERSION CHANNEL SIZING: PERMANENT

Bed Slope > 10% Line with Riprap Use Riprap R - 6 see calculations performed by :
North American Green Erosion Control Materials Design Software 4.3

EQT
AR-302-033
GREENE COUNTY, PA

BY: MAM
DATE: 3/1/2011
CHECK: JAS
DATE: 3/5/2011

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 1

Reference: Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Segment 1: Sheet Flow

Surface Description: Meadow
Manning's n = 0.400 (reference E&S Manual: Table 5.3)
Flow Length, L = 50 ft
Land Slope, s = 0.06 ft/ft
T = 6.474 min $T = [(2 * L * n) / (3 * (s^{1/2}))] ^ 0.4673$

Segment 2A: Open Channel Flow

Cross Sectional Area, A = 4.00 ft²
Wetted Perimeter, P = 6.47 ft
Hydraulic Radius, R = 0.62 ft
Flow Length, L = 297 ft
Watercourse Slope, s = 0.088 ft/ft
Manning's n = 0.036 Assumes Synthetic Mat lining
Average Velocity, V = 8.9 ft/s
T = 0.009 min $\{T = (L / V) / 60\}$

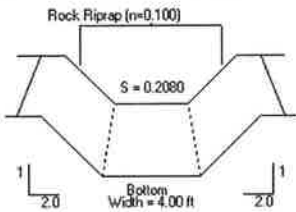
Segment 2B: Open Channel Flow

Cross Sectional Area, A = 4.00 ft²
Wetted Perimeter, P = 6.47 ft
Hydraulic Radius, R = 0.62 ft
Flow Length, L = 337 ft
Watercourse Slope, s = 0.208 ft/ft
Manning's n = 0.036 Assumes Synthetic Mat lining
Average Velocity, V = 13.7 ft/s
T = 0.007 min $\{T = (L / V) / 60\}$

Total Watershed T_c =	6.490 min
-------------------------	-----------

North American Green - ECMDS Version 4.3		3/1/2011	02:24 PM	COMPUTED BY: MAM
PROJECT NAME: AR-302-033		PROJECT NO.:		
FROM STATION/REACH:	TO STATION/REACH:	DRAINAGE AREA:	DESIGN FREQUENCY:	

HYDRAULIC RESULTS					
Discharge (cfs)	Peak Flow Period (hrs)	Velocity (fps)	Area (sq ft)	Hydraulic Radius (ft)	Normal Depth (ft)
3.1	24.0	2.56	1.21	0.23	0.27



LINER RESULTS

Reach	Matting Type	Stability Analysis	Vegetation Characteristics				Permissible Shear Stress (psf)	Calculated Shear Stress (psf)	Safety Factor	Remarks
	Staple Pattern		Phase	Class	Type	Density				
Straight	Rock Riprap	Unvegetated					4.00	3.46	1.16	STABLE
	12in									

Not to Scale

RTH AMERICAN GREEN EROSION CONTROL MATERIALS DESIGN SOFTWARE VERSION 4.3
RTH AMERICAN GREEN CHANNEL PROTECTION - ENGLISH/S.I.
ER SPECIFIED CHANNEL LINING BACK-UP COMPUTATIONS

OBJECT NAME: AR-302-033	PROJECT NO.:
COMPUTED BY: MAM	DATE: 3/1/2011
FROM STATION/REACH:	TO STATION/REACH:
CHANNEL AREA:	DESIGN FREQUENCY:

INPUT PARAMETERS

Channel Discharge : 3.1 cfs (.09 m³/s)
Design Flow Period : 24 hours
Channel Slope : 0.208 ft/ft (0.208 m/m)
Channel Bottom Width : 4.0 ft (1.22 m)
Left Side Slope : 2:1
Right Side Slope : 2:1

Channel Lining : Rock Riprap 12in
Design Shear(Tp) : 4.00 psf (191.5 Pa)
Phase = 0

CALCULATIONS

Initial Depth Estimate = $0.16 * (3.1 / (0.208^{0.5}))^{0.375} = 0.33 \text{ ft } (.10 \text{ m})$
Final Channel Depth (after 7 iterations) = .27 ft (0.08 m)
Flow Area = $(4.0 * 0.3) + (0.5 * 0.27^2 * (2.0 + 2.0)) = 1.2 \text{ sq.ft } (0.1 \text{ m}^2)$
Hydraulic Perimeter = $4.0 + (0.3 * (((2.0^2) + 1)^{.5} + ((2.0^2) + 1)^{.5})) = 5.2 \text{ ft } (1.6 \text{ m})$
Hydraulic Radius = $(1.2 / 5.2) = 0.2 \text{ ft } (0.1 \text{ m})$
Channel Velocity = $(1.486 / 0.100) * (0.2^{0.667}) * (0.208^{.5}) = 2.6 \text{ fps } (0.8 \text{ m/s})$

Channel Effective Manning's Roughness	= 0.100
Design Shear (Td) = $62.4 * 0.27 * 0.208$	= 3.46 psf (165.7 Pa)
Safety Factor = $(Tp / Td) = (4.00 / 3.46)$	= 1.16

DRAINAGE AREA NO. 2 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 5,816 ft² (reference "Drainage Areas" Figure)
Drainage Area = 0.13 acres
Drainage Area = 0.0002 mi²

Time of Concentration, T_c = 5.51 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	3,791	0.09	0.28	0.02
Access Roads (gravel)				2,025	0.05	0.35	0.02
Totals					0.13		0.04

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)
For C Values (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.30 (C_w = "A x C" / A)
Time of Concentration, T_c = 5.51 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 5.96 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 0.24 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.30 (C_w = "A x C" / A)
Time of Concentration, T_c = 5.51 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 4.71 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 0.19 cfs (Q = C x I x A)

EQT
AR-302-033
GREENE COUNTY, PA

BY: MAM
DATE: 3/1/2011
CHECK: JAS
DATE: 3/5/2011

ERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, $Q_r =$ 0.19 cfs
Manning's $n =$ 0.036 Synthetic Mat : Reference E&S Table 6.5
Bottom Width, $b =$ 2.00 ft
Slope Invert, $Z =$ 2.00
Bed Slope, $S =$ 0.096 ft/ft
Try - Actual Flow Depth, $d =$ 0.06 ft
Vegetative Lining Retardance = N/A
Area, $A =$ 0.13 sq ft
Hydraulic Radius, $R =$ 0.06 ft
Actual Velocity, $V =$ 1.86 ft/s

Actual Flow at Flow Depth d , $Q =$ 0.24 cfs
Required Flow, $Q_r =$ 0.19 cfs **OK**

Critical Slope, $Sc =$ 0.47
.7 $Sc =$ 0.33
1.3 $Sc =$ 0.61 **STABLE FLOW**

Freeboard Based on Unstable Flow = NA ft
Freeboard Based on Stable Flow = 0.02 ft
Minimum Required Freeboard = 0.50 ft

Actual Total Depth, $D =$ 0.56 ft
Use Design Depth of $D =$ 1.00 ft

Allowable Shear Stress, $T_a =$ 2.00 lb/ft² (reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, $T_d =$ 0.36 ft/s

OK

ERSION CHANNEL SIZING: PERMANENT

Required Flow Capacity, $Q_r =$ 0.24 cfs
Manning's $n =$ 0.063 $n = 0.047 * ((62.4 * R * S))^{-0.4}$ E&S Manual: pg 111
Bottom Width, $b =$ 2.00 ft (mannings n for vegetated channels)
Slope Invert, $Z =$ 2.00
Bed Slope, $S =$ 0.096 ft/ft
Try - Actual Flow Depth, $d =$ 0.09 ft
Vegetative Lining Retardance = C
Area, $A =$ 0.20 sq ft
Hydraulic Radius, $R =$ 0.08 ft
Actual Velocity, $V =$ 1.37 ft/s

Actual Flow at Flow Depth d , $Q =$ 0.27 cfs
Required Flow, $Q_r =$ 0.24 cfs **OK**

Critical Slope, $Sc =$ 0.88
.7 $Sc =$ 0.61
1.3 $Sc =$ 1.14 **STABLE FLOW**

Freeboard Based on Unstable Flow = NA ft
Freeboard Based on Stable Flow = 0.02 ft
Minimum Required Freeboard = 0.50 ft

Actual Total Depth, $D =$ 0.59 ft
Use Design Depth of $D =$ 1.00 ft

Allowable Velocity (Grass), $V =$ 4.00 ft/s (reference E&S Manual: Table 6.4 vegetation established by seeding)
Actual Velocity at depth of flow, $V =$ 1.24 ft/s

OK

EQT
AR-302-033
GREENE COUNTY, PA

BY: MAM
DATE: 3/1/2011
CHECK: JAS
DATE: 3/5/2011

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 2

Reference: Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Segment 1: Sheet Flow

Surface Description: Meadow
Manning's n = 0.400 (reference E&S Manual: Table 5.3)
Flow Length, L = 50 ft
Land Slope, s = 0.12 ft/ft
T = 5.506 min $T = [(2 * L * n) / (3 * (s^{1/2}))] ^{0.4673}$

Segment 3: Open Channel Flow

Cross Sectional Area, A = 4.00 ft²
Wetted Perimeter, P = 6.47 ft
Hydraulic Radius, R = 0.62 ft
Flow Length, L = 135 ft
Watercourse Slope, s = 0.096 ft/ft
Manning's n = 0.036 Assumes Synthetic Mat lining
Average Velocity, V = 9.3 ft/s
T = 0.004 min $\{T = (L / V) / 60\}$

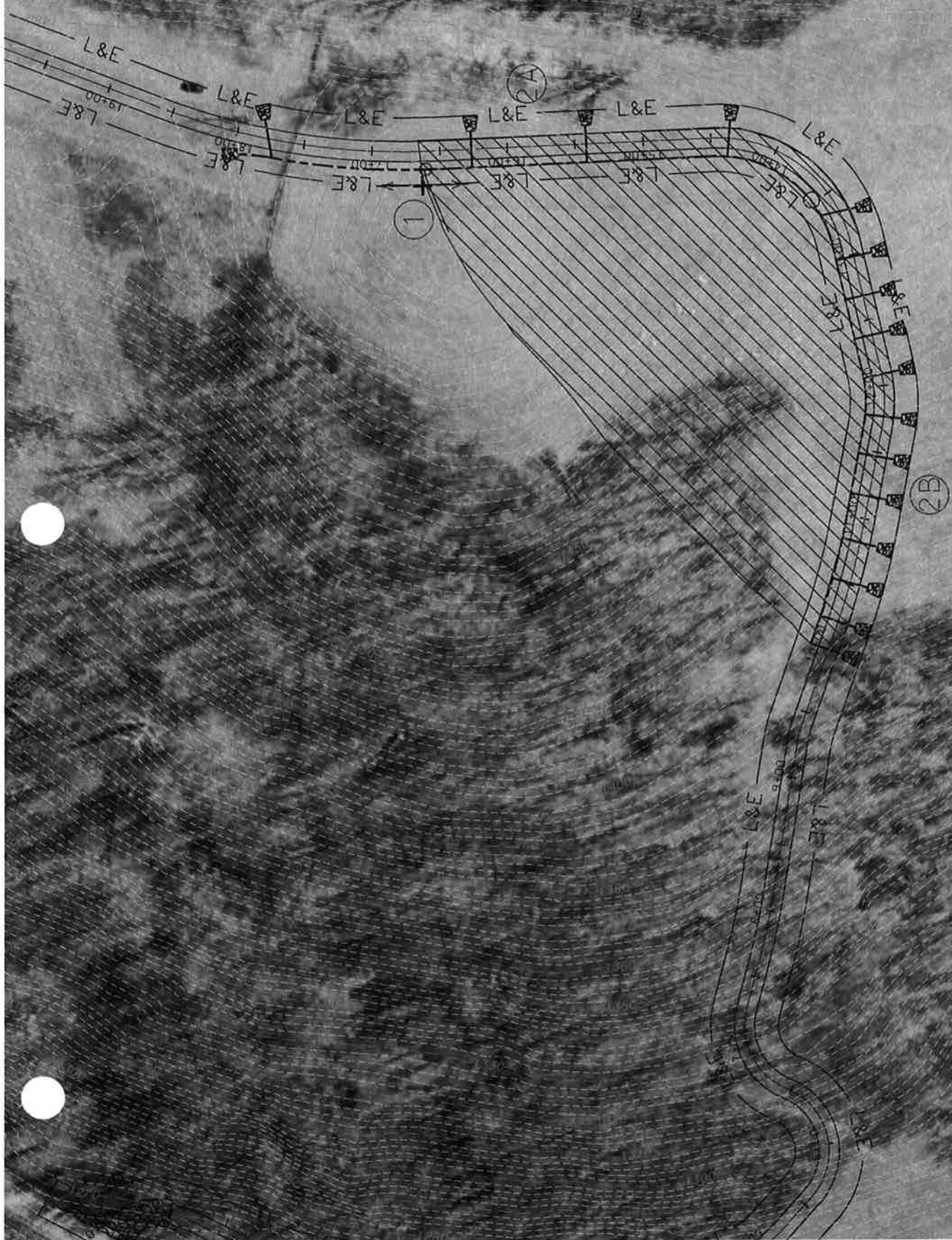
Total Watershed T_c =	5.510 min
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DRAWING
TIME OF

1 s

2A oi

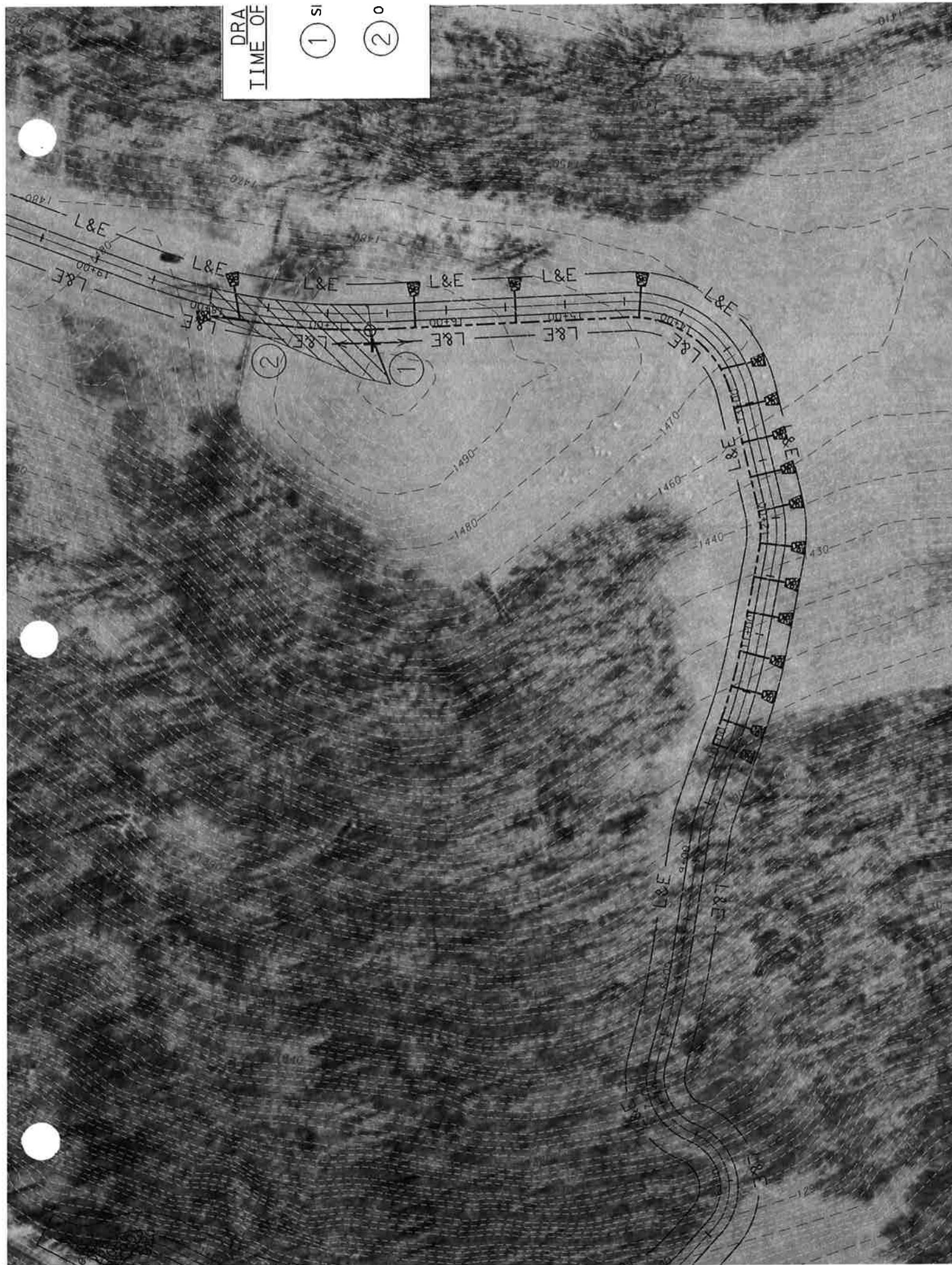
2B o



DRA
TIME OF

1 si

2 o



PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 83,773 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 1.92 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	Culleoka, Dormont	C	Good	83,773	1.9	74	142.3
Totals					1.92		142.3

Weighted Runoff Curve Number, CN_w = 74 (CN_w = "A x CN" / A)
Storage Capacity, S = 3.5 [S = (1000/CN) - 10]
Runoff, Q = 0.67 inches [Q = (P - 0.2*S)² / (P + 0.8*S)]
Runoff Volume, V = 4,644 ft³ (V = Q*A)

Post-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Access Roads (gravel)	-	-	Good	16,212	0.4	73.5	27.4
Pasture	Culleoka, Dormont	C	Good	67,561	1.6	74	114.8
Totals					1.92		142.1

Weighted Runoff Curve Number, CN_w = 74 (CN_w = "A x CN" / A)
Storage Capacity, S = 3.5 [S = (1000/CN) - 10]
Runoff, Q = 0.66 inches [Q = (P - 0.2*S)² / (P + 0.8*S)]
Runoff Volume, V = 4,615 ft³ (V = Q*A)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event = -29 ft³

EQT
AR-302-038
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

DRAINAGE AREA NO. 1 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 44,662 ft² (reference "Drainage Areas" Figure)
Drainage Area = 1.03 acres
Drainage Area = 0.0016 mi²

Time of Concentration, T_c = 7.98 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	29,295	0.67	0.28	0.19
Access Roads (gravel)				15,367	0.35	0.35	0.12
Totals					1.03		0.31

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)

For C Values: (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.30 (C_w = "A x C" / A)
Time of Concentration, T_c = 7.98 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 5.49 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 1.71 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.30 (C_w = "A x C" / A)
Time of Concentration, T_c = 7.98 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 4.24 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 1.32 cfs (Q = C x I x A)

EQT
AR-302-038
GREENE COUNTY, PA

BY:	MAM
DATE:	3/1/2011
CHECK:	JAS
DATE:	3/2/2011

DIVERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, Q_r =	1.32 cfs	
Manning's n =	0.036	Synthetic Mat : Reference E&S Table 6.5
Bottom Width, b =	2.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.230 ft/ft	
Try - Actual Flow Depth, d =	0.13 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	0.29 sq ft	
Hydraulic Radius, R =	0.11 ft	
Actual Velocity, V =	4.62 ft/s	

Actual Flow at Flow Depth d , Q =	1.36 cfs	
Required Flow , Q_r =	1.32 cfs	OK

Critical Slope, Sc =	0.19	
.7 Sc =	0.14	
1.3 Sc =	0.25	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.03 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.63 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, T_a =	2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, T_d =	1.87 ft/s	

OK

DIVERSION CHANNEL SIZING: PERMANENT

Bed Slope > 10%	Line with Riprap	Use Riprap R - 5	see calculations performed by :
			North American Green Erosion Control Materials Design Software 4.3

EQT
AR-302-038
GREENE COUNTY, PA

BY: MAM
DATE: 3/1/2011
CHECK: JAS
DATE: 3/2/2011

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 1A

Reference:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Segment 1: Sheet Flow

Surface Description: Meadow
Manning's n = 0.400 (reference E&S Manual: Table 5.3)
Flow Length, L = 100 ft
Land Slope, s = 0.28 ft/ft
T = 6.245 min $T = [(2 * L * n) / (3 * (s^{1/2}))] ^{0.4673}$

Segment 2: Shallow Concentrated Flow

Surface Description: Pasture
Flow Length, L = 206 ft
Watercourse Slope, s = 0.210 ft/ft
Average Velocity, V = 2 ft/s (reference E&S Manual: Figure 5.1)
T = 1.717 min $\{T = (L / V) / 60\}$

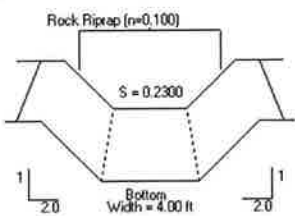
Segment 3: Open Channel Flow

Cross Sectional Area, A = 4.00 ft²
Wetted Perimeter, P = 6.47 ft
Hydraulic Radius, R = 0.62 ft
Flow Length, L = 1100 ft
Watercourse Slope, s = 0.230 ft/ft
Manning's n = 0.036 Assumes Synthetic Mat lining
Average Velocity, V = 14.4 ft/s
T = 0.021 min $\{T = (L / V) / 60\}$

Total Watershed T_c =	7.983 min
--	------------------

North American Green - ECMDS Version 4.3		3/1/2011	04:00 PM	COMPUTED BY: MAM
PROJECT NAME: AR-302-038		PROJECT NO.:		
FROM STATION/REACH:	TO STATION/REACH:	DRAINAGE AREA:	DESIGN FREQUENCY:	

HYDRAULIC RESULTS					
Discharge (cfs)	Peak Flow Period (hrs)	Velocity (fps)	Area (sq ft)	Hydraulic Radius (ft)	Normal Depth (ft)
11.7	24.0	2.14	0.79	0.16	0.18



LINER RESULTS

Reach	Motting Type	Stability Analysis	Vegetation Characteristics				Permissible Shear Stress (psf)	Calculated Shear Stress (psf)	Safety Factor	Remarks
	Staple Pattern		Phase	Class	Type	Density				
Straight	Rock Riprap	Unvegetated					3.00	2.61	1.15	STABLE
	9in									

Not to Scale

 RTH AMERICAN GREEN EROSION CONTROL MATERIALS DESIGN SOFTWARE VERSION 4.3
 RTH AMERICAN GREEN CHANNEL PROTECTION - ENGLISH/S.I.
 USER SPECIFIED CHANNEL LINING BACK-UP COMPUTATIONS

OBJECT NAME: AR-302-038 PROJECT NO.:
 COMPUTED BY: MAM DATE: 3/1/2011
 FROM STATION/REACH: TO STATION/REACH:
 DRAINAGE AREA: DESIGN FREQUENCY:

 INPUT PARAMETERS

Channel Discharge : 1.7 cfs (.05 m³/s)
 Peak Flow Period : 24 hours
 Channel Slope : 0.23 ft/ft (0.23 m/m)
 Channel Bottom Width : 4.0 ft (1.22 m)
 Left Side Slope : 2:1
 Right Side Slope : 2:1

Channel Lining : Rock Riprap 9in
 Unit Shear(Tp) : 3.00 psf (143.6 Pa)
 Phase = 0

 CALCULATIONS

Initial Depth Estimate = $0.16 * (1.7 / (0.230^{0.5}))^{0.375}$ = 0.26 ft (.08 m)
 Final Channel Depth (after 8 iterations) = .18 ft (0.06 m)
 Wetted Area = $(4.0 * 0.2) + (0.5 * 0.18^2 * (2.0 + 2.0))$ = 0.8 sq.ft (0.1 m²)
 Wetted Per. = $4.0 + (0.2 * (((2.0^2) + 1)^{1.5} + ((2.0^2) + 1)^{1.5}))$ = 4.8 ft (1.5 m)
 Hydraulic Radius = $(0.8 / 4.8)$ = 0.2 ft (0.1 m)
 Channel Velocity = $(1.486 / 0.100) * (0.2^{0.667}) * (0.230^{0.5})$ = 2.1 fps (0.7 m/s)
 Channel Effective Manning's Roughness = 0.100
 Calculated Shear (Td) = $62.4 * 0.18 * 0.230$ = 2.61 psf (124.9 Pa)
 Safety Factor = $(Tp / Td) = (3.00 / 2.61)$ = 1.15

PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 14,844 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 0.34 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	Culleoka, Dormont	C	Good	14,844	0.3	74	25.2
Totals					0.34		25.2

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.67 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 823 ft³ ($V = Q \times A$)

Post-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Access Roads (gravel)	-	-	Good	2,840	0.1	73.5	4.8
Pasture	Culleoka, Dormont	C	Good	12,004	0.3	74	20.4
Totals					0.34		25.2

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.66 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 818 ft³ ($V = Q \times A$)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event = -5 ft³

EQT
AR-302-038A
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

DRAINAGE AREA NO. 1 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 65,743 ft² (reference "Drainage Areas" Figure)
Drainage Area = 1.51 acres
Drainage Area = 0.0024 mi²

Time of Concentration, T_c = 9.17 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	57,704	1.32	0.28	0.37
Access Roads (gravel)				8,039	0.18	0.35	0.06
Totals					1.51		0.44

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)
For C Value (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.29 (C_w = "A x C" / A)
Time of Concentration, T_c = 9.17 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 5.28 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 2.30 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.29 (C_w = "A x C" / A)
Time of Concentration, T_c = 9.17 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 4.05 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 1.76 cfs (Q = C x I x A)

EQT
AR-302-038A
GREENE COUNTY, PA

BY:	MAM
DATE:	2/28/2011
CHECK:	JAS
DATE:	3/1/2011

DIVERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, Qr =	1.76 cfs	
Manning's n =	0.036	Synthetic Mat : Reference E&S Table 6.5
Bottom Width, b =	2.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.005 ft/ft	
Try - Actual Flow Depth, d =	0.45 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	1.31 sq ft	
Hydraulic Radius, R =	0.33 ft	
Actual Velocity, V =	1.38 ft/s	

Actual Flow at Flow Depth d, Q =	1.79 cfs	
Required Flow , Qr =	1.76 cfs	OK

Critical Slope, Sc =	0.06	
.7Sc =	0.04	
1.3Sc =	0.08	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.11 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.95 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, Ta =	2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, Td =	0.14 ft/s	

OK

DIVERSION CHANNEL SIZING: PERMANENT

Required Flow Capacity, Qr =	2.30 cfs		
Manning's n =	0.095	$n = 0.047 * ((62.4 * R * S))^{-0.4}$	E&S Manual: pg 111 (mannings n for vegetated channels)
Bottom Width, b =	2.00 ft		
Slope Invert, Z =	2.00		
Bed Slope, S =	0.005 ft/ft		
Try - Actual Flow Depth, d =	0.86 ft		
Vegetative Lining Retardance =	C		
Area, A =	3.18 sq ft		
Hydraulic Radius, R =	0.55 ft		
Actual Velocity, V =	0.73 ft/s		

Actual Flow at Flow Depth d, Q =	2.33 cfs	
Required Flow , Qr =	2.30 cfs	OK

Critical Slope, Sc =	0.28	
.7Sc =	0.19	
1.3Sc =	0.36	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.21 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	1.36 ft
Use Design Depth of D =	1.50 ft

Allowable Velocity (Grass), V =	4.00 ft/s	(reference E&S Manual: Table 6.4 vegetation established by seeding)
Actual Velocity at depth of flow, V =	0.72 ft/s	

OK

EQT
AR-302-038A
GREENE COUNTY, PA

BY: MAM
DATE: 2/28/2011
CHECK: JAS
DATE: 3/1/2011

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 1A

Reference: Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Segment 1: Sheet Flow

Surface Description: Meadow
Manning's n = 0.400 (reference E&S Manual: Table 5.3)
Flow Length, L = 100 ft
Land Slope, s = 0.28 ft/ft
T = 6.245 min $T = [(2 * L * n) / (3 * (s^{1/2}))] ^{0.4673}$

Segment 2: Shallow Concentrated Flow

Surface Description: Pasture
Flow Length, L = 437 ft
Watercourse Slope, s = 0.277 ft/ft
Average Velocity, V = 2.5 ft/s (reference E&S Manual: Figure 5.1)
T = 2.913 min $\{T = (L / V) / 60\}$

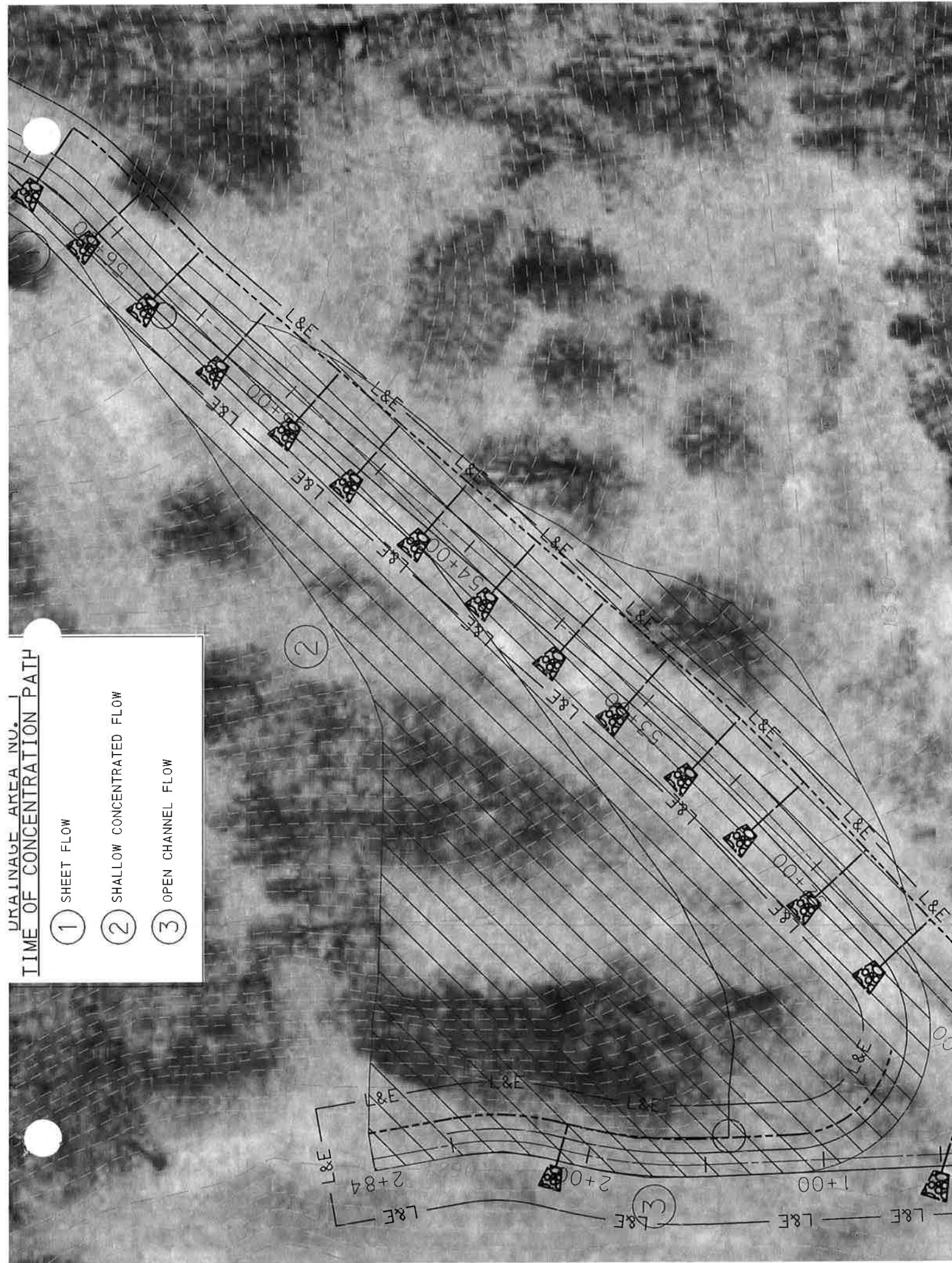
Segment 3: Open Channel Flow

Cross Sectional Area, A = 4.00 ft²
Wetted Perimeter, P = 6.47 ft
Hydraulic Radius, R = 0.62 ft
Flow Length, L = 69 ft
Watercourse Slope, s = 0.005 ft/ft
Manning's n = 0.036 Assumes Synthetic Mat lining
Average Velocity, V = 2.1 ft/s
T = 0.009 min $\{T = (L / V) / 60\}$

Total Watershed T_c =	9.167 min
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WRA INAGE AREA NU. 1

- ① SHEET FLOW



PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 85,961 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 1.97 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	CaD, DoB, DoC, DtD, DtF	C	Good	57,167	1.3	74	97.1
	-	-					
Woods	CaD, DoB, DoC, DtD, DtF	C	Good	28,794	0.7	74	48.9
Totals					1.97		146.0

Weighted Runoff Curve Number, CN_w = 74 (CN_w = "A x CN" / A)
Storage Capacity, S = 3.5 [S = (1000/CN) - 10]
Runoff, Q = 0.67 inches [Q = (P - 0.2*S)² / (P + 0.8*S)]
Runoff Volume, V = 4,766 ft³ (V = Q*A)

Post-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Access Roads (gravel)	-	-	Good	25,839	0.6	73.5	43.6
Pasture	CaD, DoB, DoC, DtD, DtF	C	Good	60,122	1.4	74	102.1
Totals					1.97		145.7

Weighted Runoff Curve Number, CN_w = 74 (CN_w = "A x CN" / A)
Storage Capacity, S = 3.5 [S = (1000/CN) - 10]
Runoff, Q = 0.66 inches [Q = (P - 0.2*S)² / (P + 0.8*S)]
Runoff Volume, V = 4,719 ft³ (V = Q*A)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event =	-47 ft³
--	---------------------------

EQT
AR-302-039
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

DRAINAGE AREA NO. 1 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 41,108 ft² (reference "Drainage Areas" Figure)
Drainage Area = 0.94 acres
Drainage Area = 0.0015 mi²

Time of Concentration, T_c = 8.30 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	24,328	0.56	0.28	0.16
Access Roads (gravel)				16,780	0.39	0.35	0.13
Totals					0.94		0.29

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)
For C Value: (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.31 (C_w = "A x C" / A)
Time of Concentration, T_c = 8.30 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 5.43 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 1.58 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.31 (C_w = "A x C" / A)
Time of Concentration, T_c = 8.30 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 4.19 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 1.22 cfs (Q = C x I x A)

EQT
AR-302-039
GREENE COUNTY, PA

BY:	MAM
DATE:	2/1/2011
CHECK:	JAS
DATE:	2/15/2011

DIVERSION CHANNEL SIZING: TEMPORARY – SYNTHETIC MAT

Required Flow Capacity, Q_r =	1.22 cfs	
Manning's n =	0.036	Synthetic Mat : Reference E&S Table 6.5
Bottom Width, b =	3.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.210 ft/ft	
Try - Actual Flow Depth, d =	0.10 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	0.32 sq ft	
Hydraulic Radius, R =	0.09 ft	
Actual Velocity, V =	3.85 ft/s	

Actual Flow at Flow Depth d , Q =	1.23 cfs	
Required Flow, Q_r =	1.22 cfs	OK

Critical Slope, S_c =	0.36	
.7 S_c =	0.25	
1.3 S_c =	0.47	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.03 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.60 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, T_a =	2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, T_d =	1.31 ft/s	

OK

DIVERSION CHANNEL SIZING: PERMANENT

Bed Slope > 10% Line with Riprap Use Riprap R - 5 see calculations performed by :
North American Green Erosion Control Materials Design Software 4.3

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 1

Reference: Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
Number 363-2134-008)

(Technical Guidance

Segment 1: Sheet Flow

Surface Description: Meadow
Manning's n = 0.400 (reference E&S Manual: Table 5.3)
Flow Length, L = 100 ft
Land Slope, s = 0.12 ft/ft
T = 7.612 min $T = [(2 * L * n) / (3 * (s^{1/2}))] ^{0.4673}$

Segment 2: Shallow Concentrated Flow

Surface Description: Meadow
Flow Length, L = 101 ft
Watercourse Slope, s = 0.120 ft/ft
Average Velocity, V = 2.5 ft/s (reference E&S Manual: Figure 5.1)
T = 0.673 min $\{T = (L / V) / 60 \}$

Segment 3: Open Channel Flow

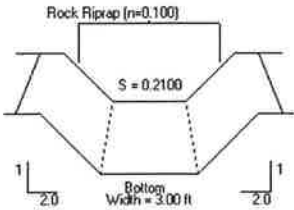
Cross Sectional Area, A = 5.00 ft²
Wetted Perimeter, P = 7.47 ft
Hydraulic Radius, R = 0.67 ft
Flow Length, L = 856 ft
Watercourse Slope, s = 0.210 ft/ft
Manning's n = 0.036 Assumes Synthetic Mat lining
Average Velocity, V = 14.5 ft/s
T = 0.016 min $\{T = (L / V) / 60 \}$

Total Watershed T_c =	8.302 min
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North American Green - ECMD5 Version 4.3		3/2/2011	10:39 AM	COMPUTED BY: MAM
PROJECT NAME: AR-302-039		PROJECT NO.:		
FROM STATION/REACH:		TO STATION/REACH:	DRAINAGE AREA:	DESIGN FREQUENCY:

HYDRAULIC RESULTS

Discharge (cfs)	Peak Flow Period (hrs)	Velocity (fps)	Area (sq.ft)	Hydraulic Radius (ft)	Normal Depth (ft)
11.6	24.0	2.20	0.73	0.18	0.21



LINER RESULTS

Not to Scale

Reach	Matting Type	Stability Analysis	Vegetation Characteristics				Permissible Shear Stress (psf)	Calculated Shear Stress (psf)	Safety Factor	Remarks
	Staple Pattern		Phase	Class	Type	Density				
Straight	Rock Riprap	Unvegetated					3.00	2.78	1.08	STABLE
	9in									

RTH AMERICAN GREEN EROSION CONTROL MATERIALS DESIGN SOFTWARE VERSION 4.3
RTH AMERICAN GREEN CHANNEL PROTECTION - ENGLISH/S.I.
USER SPECIFIED CHANNEL LINING BACK-UP COMPUTATIONS

OBJECT NAME: AR-302-039	PROJECT NO.:
COMPUTED BY: MAM	DATE: 3/2/2011
FROM STATION/REACH:	TO STATION/REACH:
DESIGN AREA:	DESIGN FREQUENCY:

INPUT PARAMETERS

Channel Discharge : 1.6 cfs (.05 m³/s)
Peak Flow Period : 24 hours
Channel Slope : 0.21 ft/ft (0.21 m/m)
Channel Bottom Width : 3.0 ft (.91 m)
Left Side Slope : 2:1
Right Side Slope : 2:1

Channel Lining : Rock Riprap 9in
Design Shear(Tp) : 3.00 psf (143.6 Pa)
Phase = 0

CALCULATIONS

Initial Depth Estimate = $0.16 * (1.6 / (0.210^{0.5}))^{0.375} = 0.26 \text{ ft } (.08 \text{ m})$
Final Channel Depth (after 7 iterations) = .21 ft (0.06 m)
Flow Area = $(3.0 * 0.2) + (0.5 * 0.21^2 * (2.0 + 2.0)) = 0.7 \text{ sq.ft } (0.1 \text{ m}^2)$
Hydraulic Perim. = $3.0 + (0.2 * (((2.0^2) + 1)^{.5} + ((2.0^2) + 1)^{.5})) = 3.9 \text{ ft } (1.2 \text{ m})$
Hydraulic Radius = $(0.7 / 3.9) = 0.2 \text{ ft } (0.1 \text{ m})$
Channel Velocity = $(1.486 / 0.100) * (0.2^{0.667}) * (0.210^{.5}) = 2.2 \text{ fps } (0.7 \text{ m/s})$

Channel Effective Manning's Roughness	= 0.100
Design Shear (Td) = $62.4 * 0.21 * 0.210$	= 2.78 psf (133.1 Pa)
Velocity Factor = $(Tp / Td) = (3.00 / 2.78)$	= 1.08

DRAINAGE AREA = 41,108 SF

DRAINAGE AREA NO. 1
TIME OF CONCENTRATION PATH

①	SHEET FLOW
②	SHALLOW CONCENTRATED FLOW
③	OPEN CHANNEL FLOW



Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event =	-8 ft ³
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EQT
AR-302-040
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

DRAINAGE AREA NO. 1 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 63,378 ft² (reference "Drainage Areas" Figure)
Drainage Area = 1.45 acres
Drainage Area = 0.0023 mi²

Time of Concentration, T_c = 8.60 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	58,083	1.33	0.28	0.37
Access Roads (gravel)				5,295	0.12	0.35	0.04
Totals					1.45		0.42

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)

For C Values: (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.29 (C_w = "A x C" / A)
Time of Concentration, T_c = 8.60 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 5.38 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 2.24 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.29 (C_w = "A x C" / A)
Time of Concentration, T_c = 8.60 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 4.14 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 1.72 cfs (Q = C x I x A)

EQT
AR-302-040
GREENE COUNTY, PA

BY:	MAM
DATE:	3/2/2011
CHECK:	JAS
DATE:	3/4/2011

DIVERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, Q_r =	1.72 cfs	Synthetic Mat : Reference E&S Table 6.5
Manning's n =	0.036	
Bottom Width, b =	2.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.100 ft/ft	
Try - Actual Flow Depth, d =	0.20 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	0.48 sq ft	
Hydraulic Radius, R =	0.17 ft	
Actual Velocity, V =	3.92 ft/s	

Actual Flow at Flow Depth d , Q =	1.88 cfs	OK
Required Flow, Q_r =	1.72 cfs	

Critical Slope, Sc =	0.12	STABLE FLOW
.7 Sc =	0.09	
1.3 Sc =	0.16	

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.05 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.70 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, T_a =	2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, T_d =	1.25 ft/s	OK

ERSION CHANNEL SIZING: PERMANENT

Required Flow Capacity, Q_r =	2.24 cfs	$n = 0.047 * ((62.4 * R * S))^{-0.4}$	E&S Manual: pg 111 (mannings n for vegetated channels)
Manning's n =	0.043		
Bottom Width, b =	2.00 ft		
Slope Invert, Z =	2.00		
Bed Slope, S =	0.100 ft/ft		
Try - Actual Flow Depth, d =	0.25 ft		
Vegetative Lining Retardance =	C		
Area, A =	0.61 sq ft		
Hydraulic Radius, R =	0.20 ft		
Actual Velocity, V =	3.67 ft/s		

Actual Flow at Flow Depth d , Q =	2.25 cfs	OK
Required Flow, Q_r =	2.24 cfs	

Critical Slope, Sc =	0.15	STABLE FLOW
.7 Sc =	0.10	
1.3 Sc =	0.19	

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.06 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.75 ft
Use Design Depth of D =	1.00 ft

Allowable Velocity (Grass), V =	4.00 ft/s	(reference E&S Manual: Table 6.4 vegetation established by seeding)
Actual Velocity at depth of flow, V =	3.65 ft/s	OK

DRAINAGE AREA NO. 2 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 14,535 ft² (reference "Drainage Areas" Figure)
Drainage Area = 0.33 acres
Drainage Area = 0.0005 mi²

Time of Concentration, T_c = 9.14 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	10,855	0.25	0.28	0.07
Access Roads (gravel)				3,680	0.08	0.35	0.03
Totals					0.33		0.10

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)
For C Values: (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.30 (C_w = "A x C" / A)
Time of Concentration, T_c = 9.14 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 5.29 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 0.53 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.30 (C_w = "A x C" / A)
Time of Concentration, T_c = 9.14 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 4.05 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 0.40 cfs (Q = C x I x A)

EQT
AR-302-040
GREENE COUNTY, PA

BY:	MAM
DATE:	3/2/2011
CHECK:	JAS
DATE:	3/4/2011

VERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, Qr =	0.40 cfs	
Manning's n =	0.036	Synthetic Mat : Reference E&S Table 6.5
Bottom Width, b =	2.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.050 ft/ft	
Try - Actual Flow Depth, d =	0.11 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	0.23 sq ft	
Hydraulic Radius, R =	0.09 ft	
Actual Velocity, V =	1.89 ft/s	

Actual Flow at Flow Depth d, Q =	0.44 cfs	
Required Flow , Qr =	0.40 cfs	OK

Critical Slope, Sc =	0.24	
.7Sc =	0.17	
1.3Sc =	0.32	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.03 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.61 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, Ta =	2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, Td =	0.33 ft/s	

OK

VERSION CHANNEL SIZING: PERMANENT

Required Flow Capacity, Qr =	0.53 cfs		
Manning's n =	0.065	$n = 0.047 * ((62.4 * R * S))^{0.4}$	E&S Manual: pg 111
Bottom Width, b =	2.00 ft		(mannings n for vegetated channels)
Slope Invert, Z =	2.00		
Bed Slope, S =	0.050 ft/ft		
Try - Actual Flow Depth, d =	0.17 ft		
Vegetative Lining Retardance =	C		
Area, A =	0.40 sq ft		
Hydraulic Radius, R =	0.14 ft		
Actual Velocity, V =	1.40 ft/s		

Actual Flow at Flow Depth d, Q =	0.56 cfs	
Required Flow , Qr =	0.53 cfs	OK

Critical Slope, Sc =	0.47	
.7Sc =	0.33	
1.3Sc =	0.61	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.04 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.67 ft
Use Design Depth of D =	1.00 ft

Allowable Velocity (Grass), V =	4.00 ft/s	(reference E&S Manual: Table 6.4 vegetation established by seeding)
Actual Velocity at depth of flow, V =	1.32 ft/s	

OK

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 2

Reference: Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
Number 363-2134-008)

(Technical Guidance

Segment 1: Sheet Flow

Surface Description:	Meadow	
Manning's n =	0.400	(reference E&S Manual: Table 5.3)
Flow Length, L =	100 ft	
Land Slope, s =	0.22 ft/ft	
T =	6.607 min	$T = [(2 * L * n) / (3 * (s^{1/2}))] ^ 0.4673$

Segment 2: Shallow Concentrated Flow

Surface Description:	Meadow	
Flow Length, L =	68 ft	
Watercourse Slope, s =	0.290 ft/ft	
Average Velocity, V =	2.5 ft/s	(reference E&S Manual: Figure 5.1)
T =	0.453 min	$\{T = (L / V) / 60 \}$

Segment 2: Shallow Concentrated Flow

Surface Description:	Meadow	
Flow Length, L =	105 ft	
Watercourse Slope, s =	0.095 ft/ft	
Average Velocity, V =	1.4 ft/s	(reference E&S Manual: Figure 5.1)
T =	1.250 min	$\{T = (L / V) / 60 \}$

Segment 2: Shallow Concentrated Flow

Surface Description:	Meadow	
Flow Length, L =	129 ft	
Watercourse Slope, s =	0.350 ft/ft	
Average Velocity, V =	2.6 ft/s	(reference E&S Manual: Figure 5.1)
T =	0.827 min	$\{T = (L / V) / 60 \}$

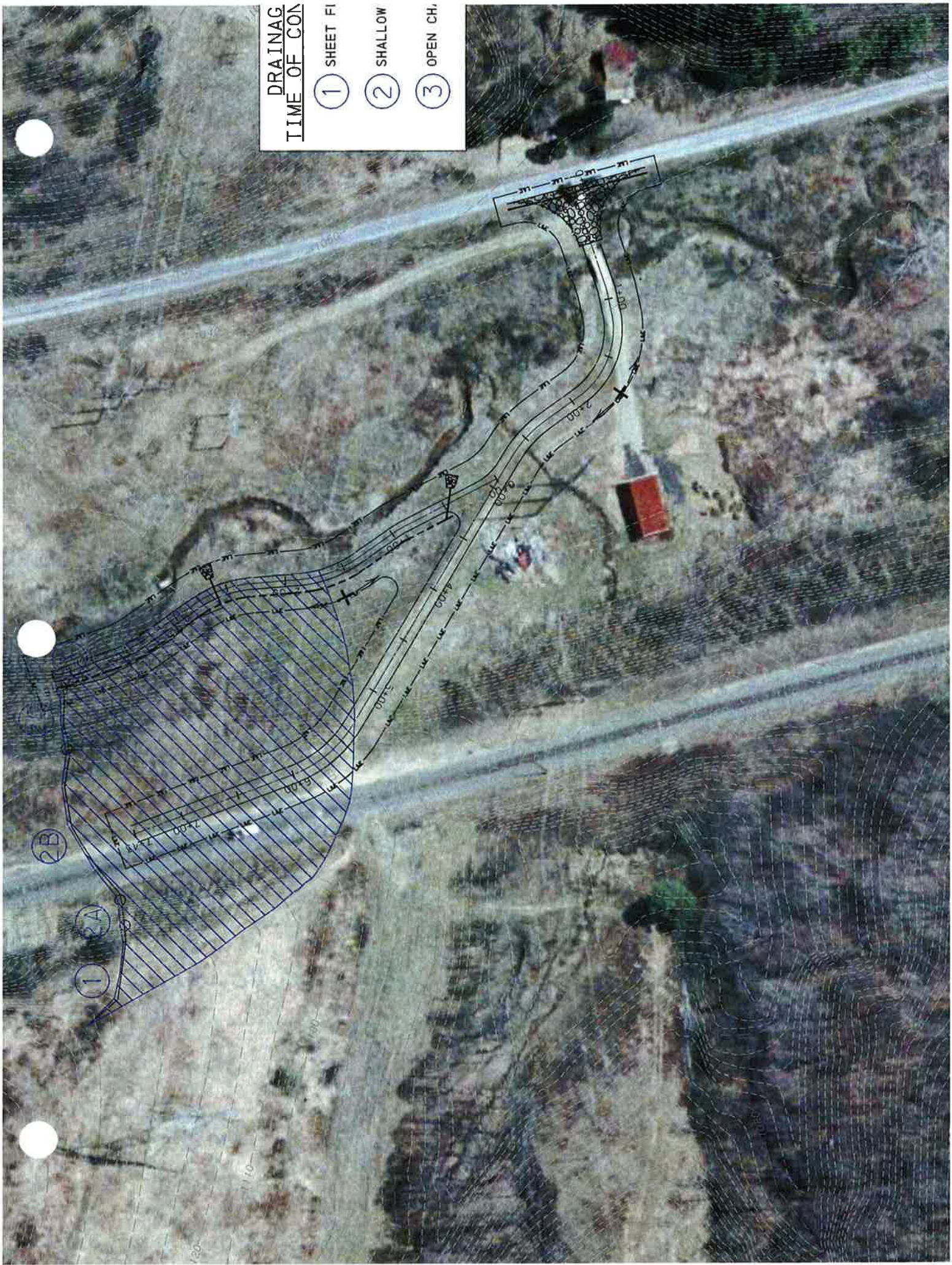
Segment 3: Open Channel Flow

Cross Sectional Area, A=	4.00 ft ²	
Wetted Perimeter, P=	6.47 ft	
Hydraulic Radius, R=	0.62 ft	
Flow Length, L =	113 ft	
Watercourse Slope, s =	0.050 ft/ft	
Manning's n =	0.036	Assumes Synthetic Mat lining
Average Velocity, V =	6.7 ft/s	
T =	0.005 min	$\{T = (L / V) / 60 \}$

Total Watershed T_c =	9.142 min
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**DRAINAGE
TIME OF CON**

- ① SHEET PILE
- ② SHALLOW
- ③ OPEN CH.

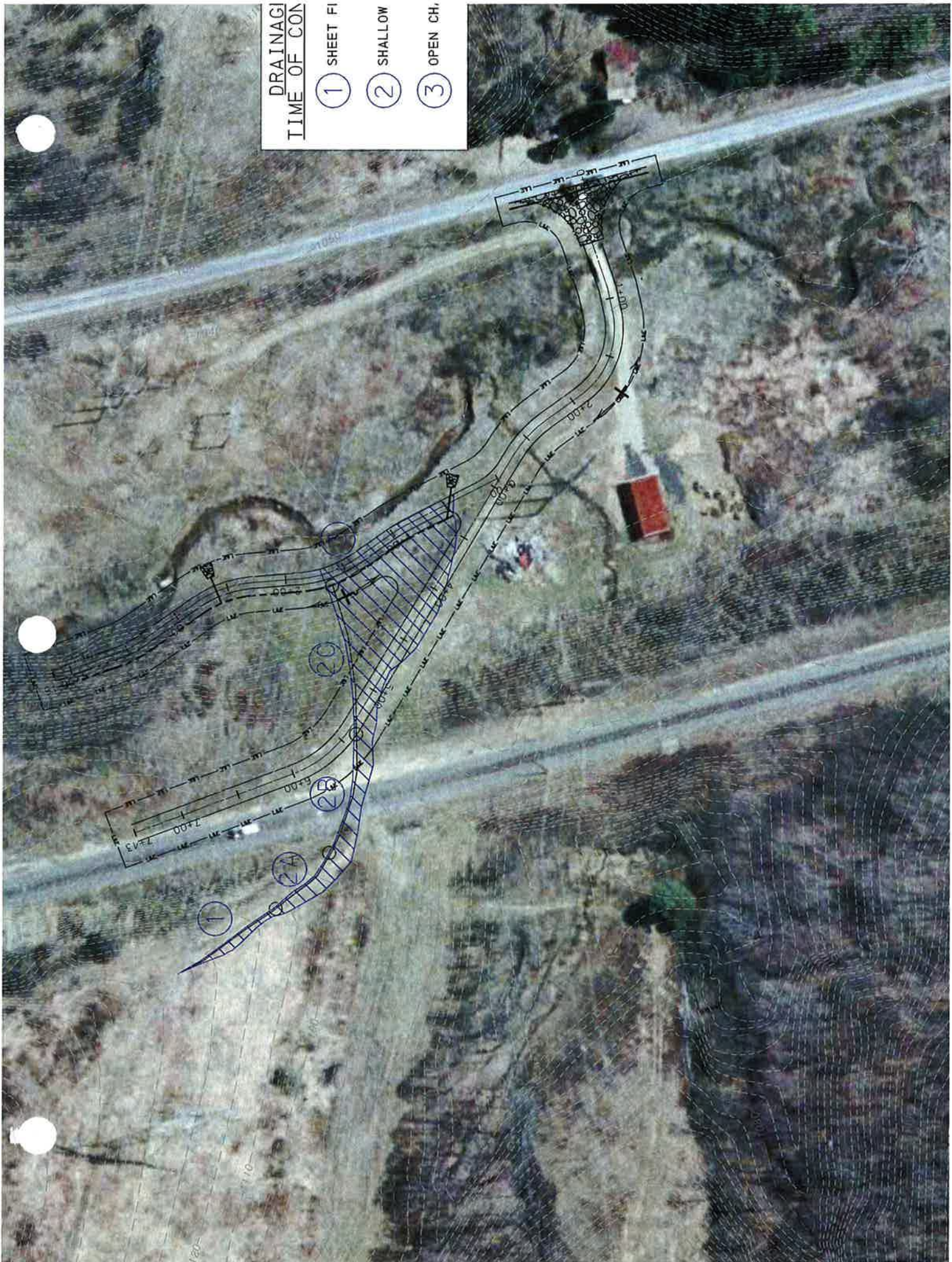


DRAINAGE
TIME OF CON

① SHEET FI

② SHALLOW

③ OPEN CH.



PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 28,586 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 0.66 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	Culleoka, Dormont	C	Good	28,586	0.7	74	48.6
Totals					0.66		48.6

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.67 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 1,585 ft³ ($V = Q \times A$)

Post-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Access Roads (gravel)	-	-	Good	10,960	0.3	73.5	18.5
Pasture	Culleoka, Dormont	C	Good	17,626	0.4	74	29.9
Totals					0.66		48.4

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.66 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 1,565 ft³ ($V = Q \times A$)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event = -20 ft³

EQT
AR-302-041A
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

DRAINAGE AREA NO. 1 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 231,359 ft² (reference "Drainage Areas" Figure)
Drainage Area = 5.31 acres
Drainage Area = 0.0083 mi²

Time of Concentration, T_c = 16.99 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Woods			C	171,949	3.95	0.13	0.51
Access Roads (gravel)				10,960	0.25	0.35	0.09
Meadow			C	48,450	1.11	0.28	0.31
Totals					5.31		0.91

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)

For C Values: (reference E&S Manual: Table 5.2)

manent:

Weighted Runoff Coefficient, C_w = 0.17 (C_w = "A x C" / A)
Time of Concentration, T_c = 16.99 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 4.25 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 3.88 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.17 (C_w = "A x C" / A)
Time of Concentration, T_c = 16.99 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 3.12 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 2.85 cfs (Q = C x I x A)

EQT
AR-302-041A
GREENE COUNTY, PA

BY:	MAM
DATE:	2/11/2011
CHECK:	JAS
DATE:	2/14/2011

ERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, Qr =	2.85 cfs	
Manning's n =	0.036	Synthetic Mat : Reference E&S Table 6.5
Bottom Width, b =	2.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.009 ft/ft	
Try - Actual Flow Depth, d =	0.50 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	1.50 sq ft	
Hydraulic Radius, R =	0.35 ft	
Actual Velocity, V =	1.95 ft/s	

Actual Flow at Flow Depth d, Q =	2.93 cfs	
Required Flow , Qr =	2.85 cfs	OK

Critical Slope, Sc =	0.06	
.7Sc =	0.04	
1.3Sc =	0.07	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.13 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	1.00 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, Ta =	2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, Td =	0.28 ft/s	

OK

ERSION CHANNEL SIZING: PERMANENT

Required Flow Capacity, Qr =	3.88 cfs		
Manning's n =	0.076	$n = 0.047 * ((62.4 * R * S))^{-0.4}$	E&S Manual: pg 111 (mannings n for vegetated channels)
Bottom Width, b =	2.00 ft		
Slope Invert, Z =	2.00		
Bed Slope, S =	0.009 ft/ft		
Try - Actual Flow Depth, d =	0.85 ft		
Vegetative Lining Retardance =	C		
Area, A =	3.15 sq ft		
Hydraulic Radius, R =	0.54 ft		
Actual Velocity, V =	1.24 ft/s		

Actual Flow at Flow Depth d, Q =	3.89 cfs	
Required Flow , Qr =	3.88 cfs	OK

Critical Slope, Sc =	0.17	
.7Sc =	0.12	
1.3Sc =	0.23	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.21 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	1.35 ft
Use Design Depth of D =	1.50 ft

Allowable Velocity (Grass), V =	4.00 ft/s	(reference E&S Manual: Table 6.4 vegetation established by seeding)
Actual Velocity at depth of flow, V =	1.23 ft/s	

OK

EQT
AR-302-041A
GREENE COUNTY, PA

BY: MAM
DATE: 2/11/2011
CHECK: JAS
DATE: 2/14/2011

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 1

Reference: Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Segment 1: Sheet Flow

Surface Description: Forest
Manning's n = 0.600 (reference E&S Manual: Table 5.3)
Flow Length, L = 100 ft
Land Slope, s = 0.15 ft/ft
T = 8.733 min $T = [(2 * L * n) / (3 * (s^{1/2}))] ^{0.4673}$

Segment 2: Shallow Concentrated Flow

Surface Description: Forest
Flow Length, L = 617 ft
Watercourse Slope, s = 0.340 ft/ft
Average Velocity, V = 1.25 ft/s (reference E&S Manual: Figure 5.1)
T = 8.227 min $\{T = (L / V) / 60 \}$

Segment 3: Open Channel Flow

Cross Sectional Area, A = 4.00 ft²
Wetted Perimeter, P = 6.47 ft
Hydraulic Radius, R = 0.62 ft
Flow Length, L = 265 ft
Watercourse Slope, s = 0.009 ft/ft
Manning's n = 0.036 Assumes Synthetic Mat lining
Average Velocity, V = 2.8 ft/s
T = 0.026 min $\{T = (L / V) / 60 \}$

Total Watershed T_c =	16.985 min
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PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 111,488 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 2.56 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	CaD, DoB, DoC, DtD, DtF	C	Good	21,885	0.5	74	37.2
Woods	CaD, DoB, DoC, DtD, DtF	C	Good	89,603	2.1	74	152.2
Totals					2.56		189.4

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.67 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 6,181 ft³ ($V = Q \times A$)

Post-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Access Roads (gravel)	-	-	Good	20,923	0.5	73.5	35.3
Pasture	CaD, DoB, DoC, DtD, DtF	C	Good	90,565	2.1	74	153.9
Totals					2.56		189.2

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.66 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 6,143 ft³ ($V = Q \times A$)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event = -38 ft³

EQT
AR-302-047
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

DRAINAGE AREA NO. 1 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 45,654 ft² (reference "Drainage Areas" Figure)
Drainage Area = 1.05 acres
Drainage Area = 0.0016 mi²

Time of Concentration, T_c = 10.77 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	40,404	0.93	0.28	0.26
Access Roads (gravel)				5,250	0.12	0.35	0.04
Totals					1.05		0.30

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)

For C Values: (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.29 (C_w = "A x C" / A)
Time of Concentration, T_c = 10.77 min (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 5.03 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 1.52 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.29 (C_w = "A x C" / A)
Time of Concentration, T_c = 10.77 min (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 3.82 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 1.15 cfs (Q = C x I x A)

EQT
AR-302-047
GREENE COUNTY, PA

BY:	MAM
DATE:	6/4/2011
CHECK:	DAG
DATE:	6/8/2011

ERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, Q_r =	1.15 cfs	
Manning's n =	0.036	Synthetic Mat : Reference E&S Table 6.5
Bottom Width, b =	2.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.140 ft/ft	
Try - Actual Flow Depth, d =	0.14 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	0.32 sq ft	
Hydraulic Radius, R =	0.12 ft	
Actual Velocity, V =	3.76 ft/s	

Actual Flow at Flow Depth d , Q =	1.20 cfs	
Required Flow, Q_r =	1.15 cfs	OK

Critical Slope, Sc =	0.18	
.7 Sc =	0.13	
1.3 Sc =	0.23	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.04 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.64 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, T_a =	2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, T_d =	1.22 ft/s	

OK

ERSION CHANNEL SIZING: PERMANENT

Bed Slope > 10%	Line with Riprap	Use Riprap R - 5	see calculations performed by :
			North American Green Erosion Control Materials Design Software 4.3

EQT
AR-302-047
GREENE COUNTY, PA

BY: MAM
DATE: 6/4/2011
CHECK: DAG
DATE: 6/8/2011

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 1

Reference: Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Segment 1: Sheet Flow

Surface Description: Meadow
Manning's n = 0.400 (reference E&S Manual: Table 5.3)
Flow Length, L = 100 ft
Land Slope, s = 0.12 ft/ft
T = 7.612 min $T = [(2 * L * n) / (3 * (s^{1/2}))] ^ {0.4673}$

Segment 2: Shallow Concentrated Flow

Surface Description: Meadow
Flow Length, L = 302 ft
Watercourse Slope, s = 0.140 ft/ft
Average Velocity, V = 1.6 ft/s (reference E&S Manual: Figure 5.1)
T = 3.146 min $\{T = (L / V) / 60 \}$

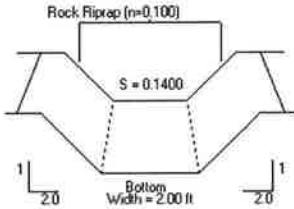
Segment 3: Open Channel Flow

Cross Sectional Area, A = 4.00 ft²
Wetted Perimeter, P = 6.47 ft
Hydraulic Radius, R = 0.62 ft
Flow Length, L = 350 ft
Watercourse Slope, s = 0.140 ft/ft
Manning's n = 0.036 Assumes Synthetic Mat lining
Average Velocity, V = 11.2 ft/s
T = 0.009 min $\{T = (L / V) / 60 \}$

Total Watershed T_c =	10.767 min
--	-------------------

HYDRAULIC RESULTS

Discharge (cfs)	Peak Flow Period (hrs)	Velocity (fps)	Area (sq.ft)	Hydraulic Radius (ft)	Normal Depth (ft)
1.3	24.0	1.96	0.66	0.21	0.26



LINER RESULTS

Not to Scale

Reach	Mailing Type	Stability Analysis	Vegetation Characteristics				Permissible Shear Stress (psf)	Calculated Shear Stress (psf)	Safety Factor	Remarks
	Staple Pattern		Phase	Class	Type	Density				
Straight	Rock Riprap	Unvegetated					3.00	2.30	1.31	STABLE
	5m									

RTH AMERICAN GREEN EROSION CONTROL MATERIALS DESIGN SOFTWARE VERSION 4.3
RTH AMERICAN GREEN CHANNEL PROTECTION - ENGLISH/S.I.
USER SPECIFIED CHANNEL LINING BACK-UP COMPUTATIONS

OBJECT NAME: AR-302-047	PROJECT NO.:
COMPUTED BY: MAM	DATE: 6/4/2011
FROM STATION/REACH:	TO STATION/REACH:
DRAINAGE AREA:	DESIGN FREQUENCY:

INPUT PARAMETERS

Channel Discharge : 1.3 cfs (.04 m³/s)
Peak Flow Period : 24 hours
Channel Slope : 0.14 ft/ft (0.14 m/m)
Channel Bottom Width : 2.0 ft (.61 m)
Left Side Slope : 2:1
Right Side Slope : 2:1

Channel Lining : Rock Riprap 9in
Ult. Shear(Tp) : 3.00 psf (143.6 Pa)
Phase = 0

CALCULATIONS

Initial Depth Estimate = $0.16 * (1.3 / (0.140^{0.5}))^{0.375} = 0.26 \text{ ft } (.08 \text{ m})$
Final Channel Depth (after 6 iterations) = .26 ft (0.08 m)
Flow Area = $(2.0 * 0.3) + (0.5 * 0.26^2 * (2.0 + 2.0)) = 0.7 \text{ sq.ft } (0.1 \text{ m}^2)$
Hydraulic Per. = $2.0 + (0.3 * (((2.0^2) + 1)^{.5} + ((2.0^2) + 1)^{.5})) = 3.2 \text{ ft } (1.0 \text{ m})$
Hydraulic Radius = $(0.7 / 3.2) = 0.2 \text{ ft } (0.1 \text{ m})$
Channel Velocity = $(1.486 / 0.100) * (0.2^{0.667}) * (0.140^{.5}) = 2.0 \text{ fps } (0.6 \text{ m/s})$

Channel Effective Manning's Roughness	= 0.100
Calculated Shear (Td) = $62.4 * 0.26 * 0.140$	= 2.30 psf (109.9 Pa)
Velocity Factor = $(Tp / Td) = (3.00 / 2.30)$	= 1.31

DRAINAGE AREA NO. 2 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 125,778 ft² (reference "Drainage Areas" Figure)
Drainage Area = 2.89 acres
Drainage Area = 0.0045 mi²

Time of Concentration, T_c = 10.85 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	80,436	1.85	0.28	0.52
Woods			C	45,342	1.04	0.13	0.14
Gravel (access road)			-	4,500	0.10	0.35	0.04
Totals					2.99		0.69

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)

For C Values: (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.23 (C_w = "A x C" / A)
Time of Concentration, T_c = 10.85 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 5.02 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 3.46 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.23 (C_w = "A x C" / A)
Time of Concentration, T_c = 10.85 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 3.81 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 2.62 cfs (Q = C x I x A)

EQT
AR-302-047
GREENE COUNTY, PA

BY:	MAM
DATE:	6/4/2011
CHECK:	DAG
DATE:	6/8/2011

ERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, Q_r =	2.62 cfs	
Manning's n =	0.036	Synthetic Mat : Reference E&S Table 6.5
Bottom Width, b =	2.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.140 ft/ft	
Try - Actual Flow Depth, d =	0.22 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	0.54 sq ft	
Hydraulic Radius, R =	0.18 ft	
Actual Velocity, V =	4.89 ft/s	

Actual Flow at Flow Depth d , Q =	2.63 cfs	
Required Flow, Q_r =	2.62 cfs	OK

Critical Slope, S_c =	0.11	
.7 S_c =	0.08	
1.3 S_c =	0.15	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.06 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.72 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, T_a =	2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, T_d =	1.92 ft/s	

OK

DIVERSION CHANNEL SIZING: PERMANENT

Bed Slope > 10% Line with Riprap Use Riprap R - 7

see calculations performed by :
North American Green Erosion Control Materials Design Software 4.3

EQT
AR-302-047
GREENE COUNTY, PA

BY: MAM
DATE: 6/4/2011
CHECK: DAG
DATE: 6/8/2011

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 2

Reference: Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Segment 1: Sheet Flow

Surface Description: Meadow
Manning's n = 0.400 (reference E&S Manual: Table 5.3)
Flow Length, L = 100 ft
Land Slope, s = 0.05 ft/ft
T = 9.340 min $T = [(2 * L * n) / (3 * (s^{1/2}))] ^{0.4673}$

Segment 2: Shallow Concentrated Flow

Surface Description: Meadow
Flow Length, L = 676 ft
Watercourse Slope, s = 0.120 ft/ft
Average Velocity, V = 1.5 ft/s (reference E&S Manual: Figure 5.1)

Segment 3: Open Channel Flow

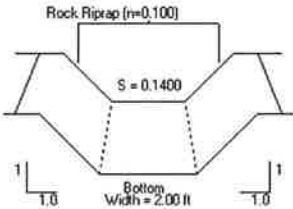
Cross Sectional Area, A = 4.00 ft²
Wetted Perimeter, P = 6.47 ft
Hydraulic Radius, R = 0.62 ft
Flow Length, L = 300 ft
Watercourse Slope, s = 0.140 ft/ft
Manning's n = 0.036 Assumes Synthetic Mat lining
Average Velocity, V = 11.2 ft/s
T = 0.007 min $\{T = (L / V) / 60\}$

Total Watershed T_c =	10.847 min
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North American Green - ECMS Version 4.3		6/8/2011	10:48 AM	COMPUTED BY: MAM
PROJECT NAME: AR-302-047		PROJECT NO.:		
FROM STATION/REACH:		TO STATION/REACH:	DRAINAGE AREA:	DESIGN FREQUENCY:

HYDRAULIC RESULTS

Discharge (cfs)	Peak Flow Period (hrs)	Velocity (fps)	Area (sq ft)	Hydraulic Radius (ft)	Normal Depth (ft)
3.5	24.0	2.83	1.24	0.36	0.50



LINER RESULTS

Not to Scale

Reach	Matting Type	Stability Analysis	Vegetation Characteristics				Permissible Shear Stress (psf)	Calculated Shear Stress (psf)	Safety Factor	Remarks
	Staple Pattern		Phase	Class	Type	Density				
Straight	Rock Riprap	Unvegetated					5.00	4.33	1.16	STABLE
	15in									

RTH AMERICAN GREEN EROSION CONTROL MATERIALS DESIGN SOFTWARE VERSION 4.3
RTH AMERICAN GREEN CHANNEL PROTECTION - ENGLISH/S.I.
USER SPECIFIED CHANNEL LINING BACK-UP COMPUTATIONS

PROJECT NAME: AR-302-047	PROJECT NO.:
COMPUTED BY: MAM	DATE: 6/8/2011
FROM STATION/REACH:	TO STATION/REACH:
DESIGN AREA:	DESIGN FREQUENCY:

INPUT PARAMETERS

Channel Discharge : 3.5 cfs (.10 m³/s)
Peak Flow Period : 24 hours
Channel Slope : 0.14 ft/ft (0.14 m/m)
Channel Bottom Width : 2.0 ft (.61 m)
Left Side Slope : 1:1
Right Side Slope : 1:1

Channel Lining : Rock Riprap 15in
Ult. Shear(Tp) :5.00 psf (239.4 Pa)
Phase = 0

CALCULATIONS

Initial Depth Estimate = $0.16 * (3.5 / (0.140^{0.5}))^{0.375} = 0.37 \text{ ft } (.11 \text{ m})$
Final Channel Depth (after 8 iterations) = .5 ft (0.15 m)
Flow Area = $(2.0 * 0.5) + (0.5 * 0.50^2 * (1.0 + 1.0)) = 1.2 \text{ sq.ft } (0.1 \text{ m}^2)$
Hydraulic Per. = $2.0 + (0.5 * (((1.0^2) + 1)^{1.5} + ((1.0^2) + 1)^{1.5})) = 3.4 \text{ ft } (1.0 \text{ m})$
Hydraulic Radius = $(1.2 / 3.4) = 0.4 \text{ ft } (0.1 \text{ m})$
Channel Velocity = $(1.486 / 0.100) * (0.4^{0.667}) * (0.140^{0.5}) = 2.8 \text{ fps } (0.9 \text{ m/s})$

Channel Effective Manning's Roughness	= 0.100
Calculated Shear (Td) = $62.4 * 0.50 * 0.140$	= 4.33 psf (207.2 Pa)
Velocity Factor = $(Tp/Td) = (5.00 / 4.33)$	= 1.16

DRAINAGE AREA NO. 3 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 177,134 ft² (reference "Drainage Areas" Figure)
Drainage Area = 4.07 acres
Drainage Area = 0.0064 mi²

Time of Concentration, T_c = 12.13 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	51,051	1.17	0.28	0.33
Woods			C	114,833	2.64	0.13	0.34
Gravel (access road)			-	11,250	0.26	0.35	0.09
Totals					4.07		0.76

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)
For C Values: (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.19 (C_w = "A x C" / A)
Time of Concentration, T_c = 12.13 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 4.84 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 3.68 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.19 (C_w = "A x C" / A)
Time of Concentration, T_c = 12.13 (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 3.64 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 2.77 cfs (Q = C x I x A)

EQT
AR-302-047
GREENE COUNTY, PA

BY:	MAM
DATE:	6/4/2011
CHECK:	DAG
DATE:	6/8/2011

ERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, Qr =	2.77 cfs	
Manning's n =	0.036	Synthetic Mat : Reference E&S Table 6.5
Bottom Width, b =	2.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.140 ft/ft	
Try - Actual Flow Depth, d =	0.23 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	0.57 sq ft	
Hydraulic Radius, R =	0.19 ft	
Actual Velocity, V =	5.02 ft/s	

Actual Flow at Flow Depth d, Q =	2.84 cfs	
Required Flow , Qr =	2.77 cfs	OK

Critical Slope, Sc =	0.11	
.7Sc =	0.08	
1.3Sc =	0.14	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.06 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.73 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, Ta =	2.00 lb/ft^2	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, Td =	2.01 ft/s	

INSUFFICIENT

See Riprap Below

DIVERSION CHANNEL SIZING: PERMANENT

Bed Slope > 10% Line with Riprap Use Riprap R - 7

see calculations performed by :
North American Green Erosion Control Materials Design Software 4.3

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 3

Reference: Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Segment 1: Sheet Flow

Surface Description: Meadow
Manning's n = 0.400 (reference E&S Manual: Table 5.3)
Flow Length, L = 100 ft
Land Slope, s = 0.03 ft/ft
T = 10.524 min $T = [(2 * L * n) / (3 * (s^{1/2}))] ^{0.4673}$

Segment 2A: Shallow Concentrated Flow

Surface Description: Meadow
Flow Length, L = 132 ft
Watercourse Slope, s = 0.140 ft/ft
Average Velocity, V = 1.6 ft/s (reference E&S Manual: Figure 5.1)

Segment 2B: Shallow Concentrated Flow

Surface Description: Meadow
Flow Length, L = 365 ft
Watercourse Slope, s = 0.080 ft/ft
Average Velocity, V = 1.3 ft/s (reference E&S Manual: Figure 5.1)

Segment 2C: Shallow Concentrated Flow

Surface Description: Woods
Flow Length, L = 51 ft
Watercourse Slope, s = 0.340 ft/ft
Average Velocity, V = 1.5 ft/s (reference E&S Manual: Figure 5.1)

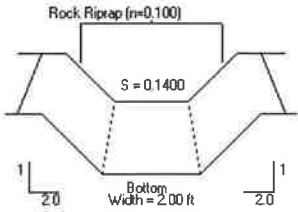
Segment 3: Open Channel Flow

Cross Sectional Area, A = 4.00 ft²
Wetted Perimeter, P = 6.47 ft
Hydraulic Radius, R = 0.62 ft
Flow Length, L = 400 ft
Watercourse Slope, s = 0.140 ft/ft
Manning's n = 0.036 Assumes Synthetic Mat lining
Average Velocity, V = 11.2 ft/s
T = 0.010 min $\{T = (L / V) / 60\}$

Total Watershed T_c =	12.134 min
---	-------------------

HYDRAULIC RESULTS

Discharge (cfs)	Peak Flow Period (hrs)	Velocity (fps)	Area (sq ft)	Hydraulic Radius (ft)	Normal Depth (ft)
3.7	24.0	2.69	1.38	0.34	0.47



LINER RESULTS

Not to Scale

Reach	Matting Type	Stability Analysis	Vegetation Characteristics				Permissible Shear Stress (psf)	Calculated Shear Stress (psf)	Safety Factor	Remarks
	Staple Pattern		Phase	Class	Type	Density				
Straight	Rock Riprap	Unvegetated					5.00	4.09	1.22	STABLE
	15in									

RTH AMERICAN GREEN EROSION CONTROL MATERIALS DESIGN SOFTWARE VERSION 4.3
RTH AMERICAN GREEN CHANNEL PROTECTION - ENGLISH/S.I.
USER SPECIFIED CHANNEL LINING BACK-UP COMPUTATIONS

OBJECT NAME: AR-302-047	PROJECT NO.:
COMPUTED BY: MAM	DATE: 6/8/2011
FROM STATION/REACH:	TO STATION/REACH:
CHANNEL AREA:	DESIGN FREQUENCY:

INPUT PARAMETERS

Channel Discharge : 3.7 cfs (.10 m³/s)
Design Flow Period : 24 hours
Channel Slope : 0.14 ft/ft (0.14 m/m)
Channel Bottom Width : 2.0 ft (.61 m)
Left Side Slope : 2:1
Right Side Slope : 2:1

Channel Lining : Rock Riprap 15in
Design Shear(Tp) : 5.00 psf (239.4 Pa)
Phase = 0

CALCULATIONS

Initial Depth Estimate = $0.16 * (3.7 / (0.140^{0.5}))^{0.375} = 0.38 \text{ ft } (.12 \text{ m})$
Final Channel Depth (after 8 iterations) = .47 ft (0.14 m)
Flow Area = $(2.0 * 0.5) + (0.5 * 0.47^2 * (2.0 + 2.0)) = 1.4 \text{ sq.ft } (0.1 \text{ m}^2)$
Hydraulic Per. = $2.0 + (0.5 * (((2.0^2) + 1)^{.5} + ((2.0^2) + 1)^{.5})) = 4.1 \text{ ft } (1.2 \text{ m})$
Hydraulic Radius = $(1.4 / 4.1) = 0.3 \text{ ft } (0.1 \text{ m})$
Channel Velocity = $(1.486 / 0.100) * (0.3^{0.667}) * (0.140^{.5}) = 2.7 \text{ fps } (0.8 \text{ m/s})$

Channel Effective Manning's Roughness	= 0.100
Design Shear (Td) = $62.4 * 0.47 * 0.140$	= 4.09 psf (196.0 Pa)
Velocity Factor = $(Tp/Td) = (5.00 / 4.09)$	= 1.22

**DRAINAGE
TIME OF CONC**

- ① SHEET FLO
- ② SHALLOW C
- ③ OPEN CHAN



DRAINAGE
TIME OF CONC

- ① SHEET FLO
- ② SHALLOW C
- ③ OPEN CHAN



**DRAINAGE
TIME OF CONC**

- ① SHEET FLO
- ②A SHALLOW CON
- ②B SHALLOW C
- ②C SHALLOW CONC
- ③ OPEN CHAN



EQT
AR-302-052
GREENE COUNTY, PA

BY: MAM
DATE: 6/4/2011
CHECK: RDO
DATE: 6/7/2011

PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 7,970 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 0.18 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	CaD, DoB, DoC, DtD, DtF	C	Good	7,970	0.2	74	13.5
	-	-					
Totals					0.18		13.5

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.67 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 442 ft³ ($V = Q \times A$)

Post Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Access Roads (gravel)	-	-	Good	2,252	0.1	73.5	3.8
Pasture	CaD, DoB, DoC, DtD, DtF	C	Good	5,718	0.1	74	9.7
Totals					0.18		13.5

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.66 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 438 ft³ ($V = Q \times A$)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event = -4 ft³

EQT
AR-302-052
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

DRAINAGE AREA NO. 1 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 2,252 ft² (reference "Drainage Areas" Figure)
Drainage Area = 0.05 acres
Drainage Area = 0.0001 mi²

Time of Concentration, T_c = 0.00 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	1,682	0.04	0.28	0.01
Access Roads (gravel)				570	0.01	0.35	0.00
Totals					0.05		0.02

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)

For C Values: (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.30 (C_w = "A x C" / A)
Time of Concentration, T_c = 0.004 min (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 7.39 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 0.11 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.30 (C_w = "A x C" / A)
Time of Concentration, T_c = 0.004 min (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 6.23 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 0.10 cfs (Q = C x I x A)

EQT
AR-302-052
GREENE COUNTY, PA

BY:	MAM
DATE:	6/4/2011
CHECK:	DAG
DATE:	6/8/2011

DIVERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, Qr =	0.10 cfs	
Manning's n =	0.036	Synthetic Mat : Reference E&S Table 6.5
Bottom Width, b =	1.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.020 ft/ft	
Try - Actual Flow Depth, d =	0.10 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	0.12 sq ft	
Hydraulic Radius, R =	0.08 ft	
Actual Velocity, V =	1.10 ft/s	

Actual Flow at Flow Depth d, Q =	0.13 cfs	
Required Flow , Qr =	0.10 cfs	OK

Critical Slope, Sc =	0.16	
.7Sc =	0.11	
1.3Sc =	0.20	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.03 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.60 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, Ta =	2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, Td =	0.12 ft/s	

OK

DIVERSION CHANNEL SIZING: PERMANENT

Required Flow Capacity, Qr =	0.11 cfs		
Manning's n =	0.097	$n = 0.047 * ((62.4 * R * S))^{-0.4}$	E&S Manual: pg 111 (mannings n for vegetated channels)
Bottom Width, b =	1.00 ft		
Slope Invert, Z =	2.00		
Bed Slope, S =	0.020 ft/ft		
Try - Actual Flow Depth, d =	0.17 ft		
Vegetative Lining Retardance =	C		
Area, A =	0.23 sq ft		
Hydraulic Radius, R =	0.13 ft		
Actual Velocity, V =	0.55 ft/s		

Actual Flow at Flow Depth d, Q =	0.12 cfs	
Required Flow , Qr =	0.11 cfs	OK

Critical Slope, Sc =	0.71	
.7Sc =	0.50	
1.3Sc =	0.92	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.04 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.67 ft
Use Design Depth of D =	1.00 ft

Allowable Velocity (Grass), V =	4.00 ft/s	(reference E&S Manual: Table 6.4 vegetation established by seeding)
Actual Velocity at depth of flow, V =	0.50 ft/s	

OK

EQT
AR-302-052
GREENE COUNTY, PA

BY:	MAM
DATE:	6/4/2011
CHECK:	DAG
DATE:	6/8/2011

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 1

Reference:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Segment 1: Open Channel Flow

Cross Sectional Area, A=	3.00 ft ²	
Wetted Perimeter, P=	5.47 ft	
Hydraulic Radius, R=	0.55 ft	
Flow Length, L=	63 ft	
Watercourse Slope, s=	0.020 ft/ft	
Manning's n=	0.036	Assumes Synthetic Mat lining
Average Velocity, V=	3.9 ft/s	
T=	0.004 min	{ $T = (L / V) / 60$ }

Total Watershed T_c =	0.004 min
---	------------------

DRAINAGE AREA NO. 2 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 8,209 ft² (reference "Drainage Areas" Figure)
Drainage Area = 0.19 acres
Drainage Area = 0.0003 mi²

Time of Concentration, T_c = 7.38 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	7,219	0.17	0.28	0.05
Access Roads (gravel)				0,990	0.02	0.35	0.01
Totals					0.19		0.05

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)
For C Values: (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.29 (C_w = "A x C" / A)
Time of Concentration, T_c = 7.38 min (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 5.60 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 0.30 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.29 (C_w = "A x C" / A)
Time of Concentration, T_c = 7.38 min (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 4.35 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 0.24 cfs (Q = C x I x A)

VERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, $Q_r =$ 0.24 cfs
Manning's $n =$ 0.036 Synthetic Mat : Reference E&S Table 6.5
Bottom Width, $b =$ 1.00 ft
Slope Invert, $Z =$ 2.00
Bed Slope, $S =$ 0.090 ft/ft
Try - Actual Flow Depth, $d =$ 0.10 ft
Vegetative Lining Retardance = N/A
Area, $A =$ 0.12 sq ft
Hydraulic Radius, $R =$ 0.08 ft
Actual Velocity, $V =$ 2.34 ft/s

Actual Flow at Flow Depth d , $Q =$ 0.28 cfs
Required Flow, $Q_r =$ 0.24 cfs **OK**

Critical Slope, $Sc =$ 0.16
.7 $Sc =$ 0.11
1.3 $Sc =$ 0.20 **STABLE FLOW**

Freeboard Based on Unstable Flow = NA ft
Freeboard Based on Stable Flow = 0.03 ft
Minimum Required Freeboard = 0.50 ft

Actual Total Depth, $D =$ 0.60 ft
Use Design Depth of $D =$ 1.00 ft

Allowable Shear Stress, $T_a =$ 2.00 lb/ft ²	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, $T_d =$ 0.56 ft/s	OK

VERSION CHANNEL SIZING: PERMANENT

Required Flow Capacity, $Q_r =$ 0.30 cfs
Manning's $n =$ 0.057 $n = 0.047 * ((62.4 * R * S))^{-0.4}$ E&S Manual: pg 111
Bottom Width, $b =$ 1.00 ft (mannings n for vegetated channels)
Slope Invert, $Z =$ 2.00
Bed Slope, $S =$ 0.090 ft/ft
Try - Actual Flow Depth, $d =$ 0.14 ft
Vegetative Lining Retardance = C
Area, $A =$ 0.18 sq ft
Hydraulic Radius, $R =$ 0.11 ft
Actual Velocity, $V =$ 1.79 ft/s

Actual Flow at Flow Depth d , $Q =$ 0.32 cfs
Required Flow, $Q_r =$ 0.30 cfs **OK**

Critical Slope, $Sc =$ 0.29
.7 $Sc =$ 0.20
1.3 $Sc =$ 0.37 **STABLE FLOW**

Freeboard Based on Unstable Flow = NA ft
Freeboard Based on Stable Flow = 0.04 ft
Minimum Required Freeboard = 0.50 ft

Actual Total Depth, $D =$ 0.64 ft
Use Design Depth of $D =$ 1.00 ft

Allowable Velocity (Grass), $V =$ 4.00 ft/s	(reference E&S Manual: Table 6.4 vegetation established by seeding)
Actual Velocity at depth of flow, $V =$ 1.70 ft/s	OK

EQT
AR-302-052
GREENE COUNTY, PA

BY: MAM
DATE: 6/4/2011
CHECK: DAG
DATE: 6/8/2011

TIME OF CONCENTRATION (T_c) CALCULATIONS FOR DRAINAGE AREA NO. 2

Reference:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Segment 1: Sheet Flow

Surface Description: Meadow

Manning's n = 0.400 (reference E&S Manual: Table 5.3)
Flow Length, L = 100 ft
Land Slope, s = 0.34 ft/ft
T = 5.968 min $T = [(2 * L * n) / (3 * (s^{1/2}))] ^{0.4673}$

Segment 2: Shallow Concentrated Flow

Surface Description: Meadow

Flow Length, L = 220 ft
Watercourse Slope, s = 0.340 ft/ft
Average Velocity, V = 2.6 ft/s (reference E&S Manual: Figure 5.1)
T = 1.410 min $\{T = (L / V) / 60\}$

Segment 3: Open Channel Flow

Cross Sectional Area, A = 3.00 ft²
Wetted Perimeter, P = 5.47 ft
Hydraulic Radius, R = 0.55 ft
Flow Length, L = 62 ft
Watercourse Slope, s = 0.090 ft/ft
Manning's n = 0.036 Assumes Synthetic Mat lining
Average Velocity, V = 8.3 ft/s
T = 0.002 min $\{T = (L / V) / 60\}$

Total Watershed T_c =	7.380 min
--	------------------

DRAINAGE AREA NO. 3 CALCULATIONS

References:

Erosion and Sediment Pollution Control Program Manual, Best Management Practice Manual
(Technical Guidance Number 363-2134-008)

Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts (PDT-IDF), Department of Civil Engineering and Institute for Research on Land and Water Resources, The Pennsylvania State University, Pennsylvania Department of Transportation and Federal Highway Administration, May 1986

Drainage Area = 14,726 ft² (reference "Drainage Areas" Figure)
Drainage Area = 0.34 acres
Drainage Area = 0.0005 mi²

Time of Concentration, T_c = 6.87 min (reference TOC calcs)

PEAK FLOW:

Cover Type			Hydraulic Soil Classification	Area (sf)	Area, A (acres)	C VALUE	A x C
Meadow			C	14,726	0.34	0.28	0.09
Totals					0.34		0.09

For Hydraulic Soil Classification: (reference USDA NRCS Hydrologic Soils Classification)

For C Values: (reference E&S Manual: Table 5.2)

Permanent:

Weighted Runoff Coefficient, C_w = 0.28 (C_w = "A x C" / A)
Time of Concentration, T_c = 6.87 min (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 5.69 in/hr (reference E&S Manual 2-yr storm: I = 170 / (T_c + 23))
Peak Discharge, Q = 0.54 cfs (Q = C x I x A)

Temporary:

Weighted Runoff Coefficient, C_w = 0.28 (C_w = "A x C" / A)
Time of Concentration, T_c = 6.87 min (reference Time of Concentration Calcs below)
Rainfall Intensity, I = 4.44 in/hr (reference E&S Manual 10-yr storm: I = 106 / (T_c + 17))
Peak Discharge, Q = 0.42 cfs (Q = C x I x A)

EQT
AR-302-052
GREENE COUNTY, PA

BY:	MAM
DATE:	6/4/2011
CHECK:	DAG
DATE:	6/8/2011

VERSION CHANNEL SIZING: TEMPORARY -- SYNTHETIC MAT

Required Flow Capacity, Qr =	0.42 cfs	
Manning's n =	0.036	Synthetic Mat : Reference E&S Table 6.5
Bottom Width, b =	1.00 ft	
Slope Invert, Z =	2.00	
Bed Slope, S =	0.090 ft/ft	
Try - Actual Flow Depth, d =	0.13 ft	
Vegetative Lining Retardance =	N/A	
Area, A =	0.16 sq ft	
Hydraulic Radius, R =	0.10 ft	
Actual Velocity, V =	2.71 ft/s	

Actual Flow at Flow Depth d, Q =	0.44 cfs	
Required Flow , Qr =	0.42 cfs	OK

Critical Slope, Sc =	0.12	
.7Sc =	0.09	
1.3Sc =	0.16	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.03 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.63 ft
Use Design Depth of D =	1.00 ft

Allowable Shear Stress, Ta =	2.00 lb/ft^2	(reference E&S Manual: Table 6.2)
Shear Stress at Flow Depth, Td =	0.73 ft/s	

OK

VERSION CHANNEL SIZING: PERMANENT

Required Flow Capacity, Qr =	0.54 cfs		
Manning's n =	0.052	$n = 0.047 * ((62.4 * R * S))^{-0.4}$	E&S Manual: pg 111 (mannings n for vegetated channels)
Bottom Width, b =	1.00 ft		
Slope Invert, Z =	2.00		
Bed Slope, S =	0.090 ft/ft		
Try - Actual Flow Depth, d =	0.18 ft		
Vegetative Lining Retardance =	C		
Area, A =	0.24 sq ft		
Hydraulic Radius, R =	0.14 ft		
Actual Velocity, V =	2.23 ft/s		

Actual Flow at Flow Depth d, Q =	0.55 cfs	
Required Flow , Qr =	0.54 cfs	OK

Critical Slope, Sc =	0.20	
.7Sc =	0.14	
1.3Sc =	0.25	STABLE FLOW

Freeboard Based on Unstable Flow =	NA ft
Freeboard Based on Stable Flow =	0.05 ft
Minimum Required Freeboard =	0.50 ft

Actual Total Depth, D =	0.68 ft
Use Design Depth of D =	1.00 ft

Allowable Velocity (Grass), V =	4.00 ft/s	(reference E&S Manual: Table 6.4 vegetation established by seeding)
Actual Velocity at depth of flow, V =	2.20 ft/s	

OK

TIME OF CONCENTRATION PATH

1 OPEN

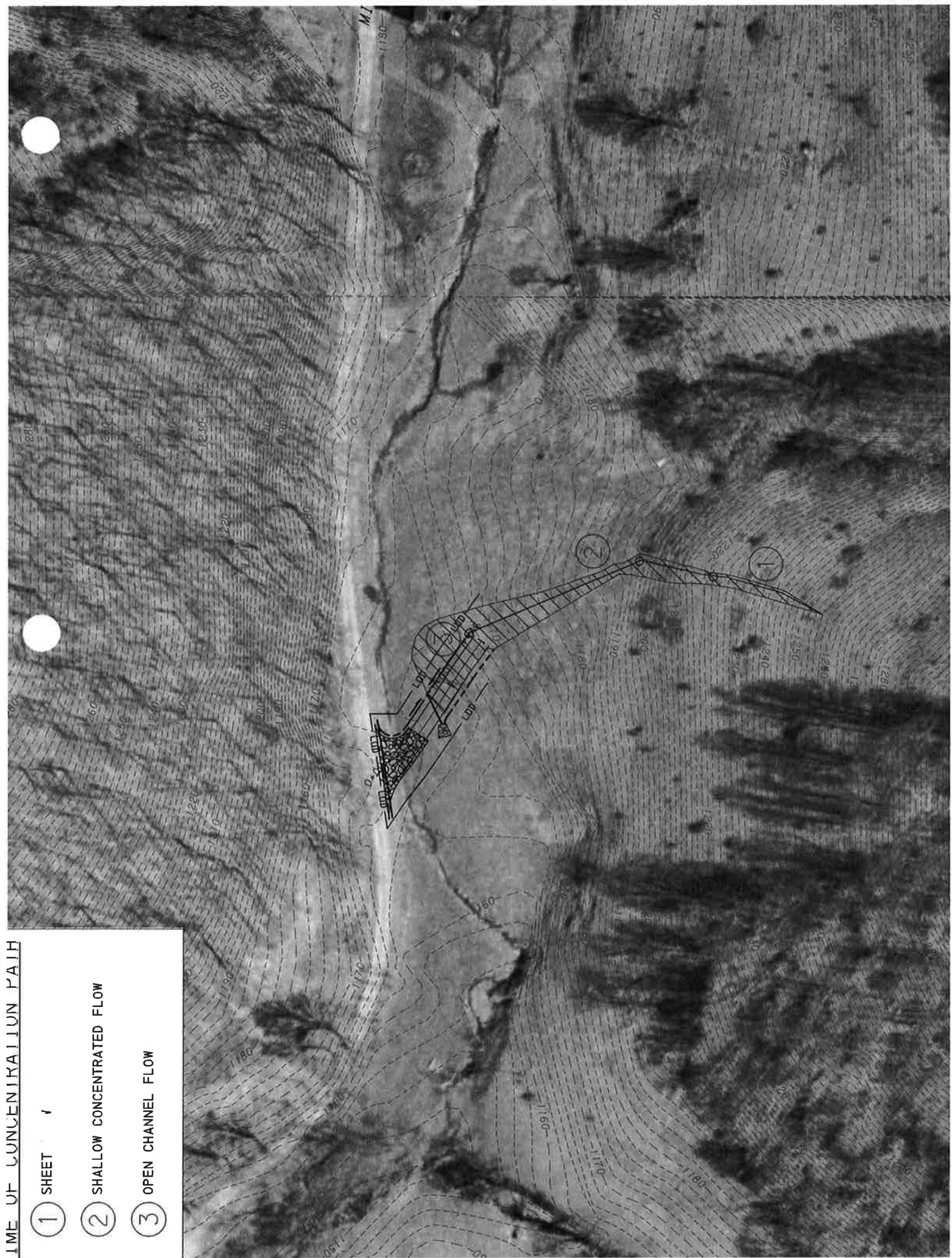
WEL FLOW



① SHEET

② SHALLOW CONCENTRATED FLOW

③ OPEN CHANNEL FLOW



LINE OF CONCENTRATION PATH

① SHEET W

② SHALLOW CONCENTRATED FLOW

③ OPEN CHANNEL FLOW



BY: MAM
DATE: 3/18/2011
CHECK: JAS
DATE: 3/18/2011

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event =	0 ft ³
---	-------------------

EQT
AR-302-053
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

PRE- AND POST-CONSTRUCTION STORMWATER RUNOFF VOLUME CALCULATIONS

Reference: Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds as published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), June 1986

Area of Disturbance, A = 29,627 ft² (reference "During Development Conditions" Plan)
Area of Disturbance, A = 0.68 acres
2-Year/24-Hour Rainfall, P = 2.60 in. (reference TR-55 and PA E&S Manual)

Pre-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Pasture	Culleoka, Dormont	C	Good	24,227	0.6	74	41.2
Access Road (gravel)	-	-	Good	5,400	0.1	73.5	9.1
Totals					0.68		50.3

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.66 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 1,633 ft³ ($V = Q \times A$)

Post-Construction Conditions:

Cover Type	Soil Type	Hydrologic Soil Group	Hydrologic Condition	Area (sf)	Area, A (acres)	CN	A x CN
Access Roads (gravel)	-	-	Good	5,400	0.1	73.5	9.1
Pasture	Culleoka, Dormont	C	Good	24,227	0.6	74	41.2
Totals					0.68		50.3

Weighted Runoff Curve Number, CN_w = 74 ($CN_w = "A \times CN" / A$)
Storage Capacity, S = 3.5 [$S = (1000/CN) - 10$]
Runoff, Q = 0.66 inches [$Q = (P - 0.2 \times S)^2 / (P + 0.8 \times S)$]
Runoff Volume, V = 1,633 ft³ ($V = Q \times A$)

Net Change in the Runoff Volume from a 2-Year/24-hour Storm Event = 0 ft³

EQT
AR-302-054
GREENE COUNTY, PA

BY: TPF
DATE: 4/21/2010
CHECK: JAS
DATE: 6/24/2010

Curve Number Determination for Gravel

Retention of Gravel Pad

Depth of gravel = 12 inches @ 30% voids
 $S_T = 12 \times 0.30 = 3.60$

Retention of Gravel Pad

$CN = 1000 / (S_T + 10)$

CN = 73.53

Appendix G

Geological Resources and Erosion Mitigation Measures
(Taken From Resource Report 6 – FERC Filing Date 1-27-11 Docket
#CP11-68-000)

Appendix G – Geological Resources and Erosion Mitigation Measures

Coal

The Sewickley, Freeport, and Pittsburgh Seams of coal are considered to be mineable reserves along the length of the proposed Project. Alpha Natural Resources and Consol Energy, Inc. own the majority of these mineable interests in Greene County, PA. Western Pocahontas purportedly owns portions of the mineral rights along the proposed Project route in Wetzel County, WV. Table 6.3-3 shows the mineral right information by milepost. In the proposed Project area, both surface and deep mining are prevalent.

The Pennsylvania Department of Environmental Protection-District Mining Office (PADEP-DMO) in California, Pennsylvania provided geographic information system (GIS) layers depicting active permit boundaries, mined out areas, and longwall operations for deep mines within the proposed Project area. Table 6.3-3 summarizes the active deep mine permits, longwall mining operations, and mined areas in the vicinity of the proposed Project route in Greene County, Pennsylvania. Figure 6.3-3 shows the active and abandoned permitted areas in Greene County along the proposed Project route.

The H-302 pipeline is anticipated to cross three active deep mines in Greene County, Pennsylvania:

- Emerald Mine: Located in Greene County, PA between MP 1.5 through 6.3 and 7.6 through 9.9.
- Cumberland West Mine: Located in Greene County, PA between MP 6.3 through 7.6 and 9.9 through 14.4.
- Blacksville #2 Mine: Located in Greene County, Pennsylvania between MP 14.4 through 19.3.

The Pennsylvania Department of Environmental Protection-District Mining Office (PADEP-DMO) in Greensburg, Pennsylvania provided topographic maps depicting active and inactive surface mines in Greene County, Pennsylvania. The surface mine maps show that there are no surface mines located within a 0.25 mile radius of the proposed Project area.

Table 6.3-3
Coal Mine Operations in Pennsylvania¹

Coal Reserve Ownership and Permitting along Proposed Project Route Line H-302							
Begin MP	End MP	County	Permitted	Mineral Rights Owner		Status	
0.0	1.2	Greene	YES	Mather Collieries		Abandoned	
1.2	1.5	Greene	NO	Unidentified		NA	
1.5	14.4	Greene	YES	Foundation Coal		Active	
14.4	19.3	Greene	YES	Consolidation Coal		Active	
19.3	24.9	Greene	NO	Alpha Natural Resources, Consol Energy, Inc.		NA	
Active Underground (Longwall) Mine Permits - Pennsylvania							
Begin MP	End MP	County	Permit	Mine	Operator	Year Active	Status
1.5	6.3	Greene	30841307	Emerald 1	Foundation Coal	2010	Active
6.3	7.6	Greene	30831303	Cumberland	Foundation Coal	2010	Active
7.6	9.9	Greene	30841307	Emerald 1	Foundation Coal	2010	Active
9.9	14.4	Greene	30831303	Cumberland	Foundation Coal	2010	Active
14.4	19.3	Greene	30841312	Blacksville 2	Consolidation Coal	2010	Active
Longwall Mining Operations - Pennsylvania							
Begin MP	End MP	Panel	Permit	Mine	Operator	Year Complete	Status
2.4	2.6	C-2	30841307	Emerald	Foundation Coal	0	Active
2.7	2.9	C-1	30841307	Emerald	Foundation Coal	2008	Completed
3.0	3.2	B-1	30841307	Emerald	Foundation Coal	2004	Completed
3.3	3.7	B-2	30841307	Emerald	Foundation Coal	2005	Completed
3.7	4.1	B-3	30841307	Emerald	Foundation Coal	2006	Completed
4.1	4.5	B-4	30841307	Emerald	Foundation Coal	2006	Completed
4.6	4.9	B-5	30841307	Emerald	Foundation Coal	2007	Completed
5.4	5.7	9 North	30841307	Emerald	Foundation Coal	2002	Completed
5.7	6.0	10 North	30841307	Emerald	Foundation Coal	2003	Completed
6.0	6.3	11 North	30841307	Emerald	Foundation Coal	2003	Completed
6.4	6.7	LW-48	30831303	Cumberland	RAG Cumberland	2003	Completed
6.7	6.9	LW-47	30831303	Cumberland	RAG Cumberland	2003	Completed
Longwall Mining Operations - Pennsylvania							
Begin MP	End MP	Panel	Permit	Mine	Operator	Year Complete	Status
7.8	7.9	E Panel	30841307	Emerald	Foundation Coal	1995	Completed
7.1	7.3	LW-46	30831303	Cumberland	RAG Cumberland	2003	Completed
8.1	8.2	F Panel	30841307	Emerald	Foundation Coal	1996	Completed
8.3	8.5	G Panel	30841307	Emerald	Foundation Coal	1997	Completed
8.6	8.8	H Panel	30841307	Emerald	Foundation Coal	1997	Completed
8.8	9.1	I Panel	30841307	Emerald	Foundation Coal	1998	Completed
9.1	9.4	J Panel	30841307	Emerald	Foundation Coal	1998	Completed
9.4	9.6	k Panel	30841307	Emerald	Foundation Coal	1999	Completed
14.5	14.9	22-M	30841312	Blacksville 2	Consolidation Coal Co.	2006	Completed
14.9	15.3	21-M	30841312	Blacksville 2	Consolidation Coal Co.	2007	Completed
15.3	15.7	20-M	30841312	Blacksville 2	Consolidation Coal Co.	2008	Completed
15.7	16.0	19M	30841312	Blacksville 2	Consolidation Coal Co.	2009	Completed

**Table 6.3-3
Coal Mine Operations in Pennsylvania¹**

16.7	16.8	17-M	30841312	Blacksville 2	Consolidation Coal Co.	1995	Completed
16.9	17.0	16-M	30841312	Blacksville 2	Consolidation Coal Co.	1994	Completed
Room and Pillar Mined Out Areas - Pennsylvania							
Begin MP	End MP	County	Permit	Mine	Operator	Year Closed	Status
0.0	1.2	Greene	N/A	Mather	Mather Collieries	N/A	Abandoned
2.3	2.4	Greene	30841307	Emerald	Foundation Coal	N/A	Active
2.6	6.3	Greene	30841307	Emerald	Foundation Coal	N/A	Active
6.4	7.5	Greene	30831303	Cumberland	RAG Cumberland	N/A	Active
7.7	9.7	Greene	30841307	Emerald	Foundation Coal	N/A	Active
9.9	10.0	Greene	30831303	Cumberland	RAG Cumberland	N/A	Active
14.5	17.5	Greene	30841312	Blacksville 2	Consolidation Coal Co.	N/A	Active

Source: PADEP, 2010.

Data Generated from Equitrans Checked Shapefiles 01 20 2011 provided by HEI.

Notes:

1. No active or inactive surface mines were reported by PADEP to be within the project area in Pennsylvania.

Impacts to Geologic Resources and Mitigation

Because of the narrow construction footprint of the proposed Project, impacts to the recovery of aggregates and coal will be minimal. Due to the surficial nature of the proposed construction activities, the risk of contamination of the area from coal discharges should be relatively insignificant. Should mine drainage be encountered during construction, the drainage will be isolated and treated immediately to minimize impact to the surrounding area.

Appendix H

Discussion of Recent 25 PA Code Chapter 102 With Regard to Submitted Plan

APPENDIX H	
REQUIRED E&S PLAN CONTENT	E&S PLAN SECTION
1. The existing topographic features of the project site and the immediate surrounding area.	Appendix E and Appendix J
2. The types, depth, slope, locations, and limitations of the soils.	Appendix D and Appendix J
3. The characteristics of the earth disturbance activity, including the past, present, and proposed land uses and the proposed alteration to the project site.	Appendix J
4. The volume and rate of runoff from the project site and its upstream watershed area.	Appendix F
5. The location of all surface waters, which may receive runoff within or from the project site, and their classification pursuant to Chapter 93.	Appendix C and Appendix J
6. A narrative description of the location and type of perimeter and on site BMPs used before, during, and after the earth disturbance activity.	Appendix J
7. A sequence of BMP installation and removal in relation to the scheduling of earth disturbance activities, prior to, during, and after earth disturbance activities that ensure the proper functioning of all BMPs.	Appendix J
8. Supporting calculations and measurements.	Appendix F
9. Plan drawings.	Appendix J
10. A maintenance program, which provides for the operation and maintenance of BMPs and the inspection of BMPs on a weekly basis and after each stormwater event, including the repair of the BMPs to ensure effective and efficient operation. The program must provide for completion of a written report documenting each inspection and all BMP repair and maintenance activities.	Appendix J
11. Procedures which ensure that the proper measures for the recycling or disposal of materials associated with or from the project site will be undertaken in accordance with Department regulations.	Appendix J

APPENDIX H	
REQUIRED E&S PLAN CONTENT	E&S PLAN SECTION
12. Identify natural occurring geologic formations or soil conditions that may have the potential to cause pollution during earth disturbance activities and include BMPs to avoid or minimize potential pollution and its impacts from such formations.	Appendix G
13. Evaluate the potential for thermal impacts to surface waters from the earth disturbance activity and include BMPs to avoid, minimize or mitigate potential pollution from thermal impacts.	The lack of addition of impervious surface in the project minimizes the potential for thermal impacts.
14. The E & S Plan shall be planned, designed, and implemented to be consistent with the PCSM Plan under Section 102.8 (relating to PCSM requirements).	See PCSM under separate cover and Appendix J.
15. Identify existing and proposed riparian forest buffers.	Riparian forest buffers do not apply for earth disturbance activities associated with this natural gas pipeline project. Site reclamation or restoration is part of the permit authorization in Chapters 78 and 86-90 and Chapter 102 of PA Code provided that existing riparian buffer is undisturbed to the extent practicable.

Appendix I

Preparer Qualifications

RECORD OF TRAINING AND EXPERIENCE
IN EROSION AND SEDIMENTATION CONTROL METHODS AND TECHNIQUES

NAME OF PLAN PREPARER: Robert D. Oates, PE

FORMAL EDUCATION:

Name of college or technical institution: The Pennsylvania State University

Curriculum or program: Agricultural and Biological Environmental Engineering, The College of Engineering

Dates of attendance: From: 8/93 to 6/98

Degree received: BS Agricultural and Biological Environmental Engineering

OTHER TRAINING:

Name of training: ESCGP-1 Training, May 4, 2011, Indiana, PA

Presented by: PADEP

Date: May 4, 2011

EMPLOYMENT HISTORY:

Current employer: URS Corporation

Telephone: (412) 503-4616

Previous employer: Environmental Resources Management

Telephone: (724) 933-5444

RECENT EROSION AND SEDIMENTATION CONTROL PLANS PREPARED:

	#1	#2	#3
Name of project:	Cabot Fraser to Hawley (Laser-11-002) Pipeline Project	Cabot Zone 1 – Permit 3 Hunter Road to Hoover 1/2H Pipeline Project	Cabot Zone 3 Pipeline Project
County:	Susquehanna	Susquehanna	Susquehanna
Municipality: Galilee	Forest Lake Twp.	Dimock Twp.	Brooklyn, Bridgewater, & Dimock Twps.
EDP Number: (if applicable)	_____	_____	_____
Approving agency:	PADEP – Northcentral Regional Office	PADEP – Northcentral Regional Office	PADEP – Northcentral Regional Office

Appendix J

Erosion and Sediment Control Plans Set

(Submitted Under Separate Cover)

Appendix K

Horizontal Directional Drill Contingency Plan

1.0 Introduction

1.1 This HDD Contingency Plan provides procedures and steps to address the inadvertent release of drilling mud during horizontal directional drilling beneath wetlands and waterbodies. Drilling mud consists primarily of fresh water, with high yield bentonite added to achieve the necessary properties, such as viscosity. Bentonite is composed of clay minerals mined primarily in Wyoming reserves and is not considered a hazardous material by the U.S. Environmental Protection Agency. Therefore, in the event of a release into a wetland or waterbody, there will be no adverse environmental impact other than a temporary increase in turbidity from the bentonite and the efforts to contain and collect the release. While drilling parameters will be established to maximize circulation and minimize risk of these inadvertent releases, the possibility of lost circulation and releases cannot be eliminated. Therefore, the following plan has been prepared to address containment procedures in the event of an inadvertent release. Unless otherwise specified, EQT will implement the following plan in consultation with the Contractor, Construction Inspector, and Environmental Inspector.

1.2 Elements of this plan include:

1.2.1 Monitoring and Sampling Procedures

1.2.2 Notification Procedures

1.2.3 Corrective Action

1.2.4 Abandonment

2.0 Monitoring Procedures

2.1 Horizontal directional drilling activities will be closely and continually monitored by the Contractor, the Construction Inspector, and the Environmental Inspector, or any combination of the three. Monitoring and sampling procedures will include:

2.1.1 Visual and pedestrian field inspection shall occur along the drill path, to the extent allowable by the terrain, including monitoring the wetlands and waterbodies for evidence of a release.

2.1.2 Continuous monitoring of drilling mud, drilling mud pressures and returns flows by the Contractor.

2.1.3 Periodic recording of drill status information regarding drill conditions, pressures, returns and progress during the course of drilling activities.

3.0 Notification Procedures

3.1 For all inadvertent releases of drilling mud, the Construction Inspector or Environmental Inspector will immediately notify EQT's Construction Manager. Coordination will immediately be initiated with the FERC Project Manager and the Third Party FERC Monitor.

3.2 Upon detection of an inadvertent mud release to ground surface or waterbody, EQT will contain the release as described below in the Corrective Action section (Section 4.0).

3.3 EQT will notify the appropriate state and federal agencies immediately upon discovery by telephone, e-mail, and/or facsimile of an inadvertent wetland or waterbody release, detailing the location and nature of the release, corrective actions being taken, and whether the release poses any threat to public health and safety.

4.0 Corrective Action

4.1 EQT will address an inadvertent release immediately upon discovery. Containment equipment including portable pumps, underwater booms, hand tools, sand, hay bales, silt fencing, and lumber will be readily available and stored at the drill site.

4.2 If public health and safety are threatened by an inadvertent release, drilling operations will be shut down until the threat is eliminated.

4.3 EQT will evaluate the release to determine if containment structures are warranted and can effectively contain the release. When making this determination, EQT will also consider if placement of containment structures will cause additional adverse environmental impact.

4.4 EQT will place containment structures at the affected area to prevent migration of the release.

4.5 If the amount of the release is large enough to allow collection, the drilling mud released into containment structures will be collected and returned to either the drilling operations or a disposal site by hose or tanker.

4.6 If the amount of the release is not large enough to allow collection, the affected area will be diluted with fresh water and allowed to dry. Steps will be taken to prevent silt-laden water from flowing into a wetland or waterbody.

4.7 If a wetland or waterbody release occurs, an inspection will be initiated to determine the potential movement of released drilling mud within the wetland or waterbody.

4.8 If a wetland or waterbody release occurs, collection of drilling mud returns at the drill entry location will be collected for future analysis, as required.

4.9 If a wetland or waterbody release occurs, monitoring of the release will be documented by the Environmental Inspector. EQT will keep photographs of release events on record.

4.10 Upon completion of the drilling operations, EQT will consult with applicable regulatory agencies to determine any final clean-up requirements for the inadvertent release.

4.11 The following measures will be implemented to minimize or prevent further release, contain the release, and clean up the affected area:

4.12 The Contractor will determine and implement any modifications to the drilling technique or composition of drilling fluid (e.g., viscosity of mud by increasing mineral content) to minimize or prevent further releases of drilling mud.

4.13 If a release occurs within the wetland or waterbody, reasonable measures, within the limitation of directional drilling technology and Contractor's capability, will be taken to re-establish drilling mud circulation.

5.0 Contingency Plan

If the corrective actions described above do not correct the problem, EQT may opt to abandon the drill hole and consider alternate measures. An HDD attempt will be considered failed if circulation is insufficient to maintain the integrity of the borehole, if circulation losses present an imminent risk to human health or the environment, or if the borehole location can not be maintained within the required limits. In the event of borehole failure, the borehole will be properly abandoned as described in 5.1 below, and a decision will be made regarding whether to re-attempt a HDD crossing, or use another crossing method, as described in 5.2 below. Abandonment procedures and alternative crossings are described in the following sections.

5.1 Abandonment

Abandonment procedures and alternative measures both will be discussed with appropriate permitting and regulatory agencies and approvals will be secured. In the event the drill hole is to be abandoned the following procedures will be implemented to seal the abandoned drill hole:

5.1.1 Grout will be pumped into the hole to completely seal and fill the upper 30 feet of hole entirely with grout;

5.1.2 Compacted soil will be placed in the top 5 feet of the hole

5.1.3 The location will be graded to the original contour.

5.2 Alternate Crossing Locations

Before any determination of alternate crossing locations, an attempt will be made to identify and assess the reason for the drill failure as this may be critical for selection of the alternate. Considerations of alternative locations include but are not limited to:

5.2.1 Horizontal relocation of the drill hole

5.2.2 Changing of the drill profile (depth of hole);

5.2.3 Changing drill procedures (mud viscosity/pressure/flow velocity, bit rotation/velocity, etc).

5.2.4 Open cut from banks with pipe pulled across

5.2.5 Dam and Pump open cut crossing

5.3 Considerations for Evaluating Alternate Crossings

The following factors will be considered and discussed with appropriate regulatory agencies so as to minimize environmental and public convenience aspects and secure appropriate approvals. Final selection will be submitted to FERC with supporting data:

5.3.1 Stream bank type, flow width, depth, velocity and flow volume

5.3.2 Surrounding topography

5.3.3 Condition of riparian areas

5.3.4 Condition and extent of wetlands, if any, on each side

5.3.5 Aquatic biota

5.3.6 Downstream water uses

Section 4

Greene County Conservation District

Project Review Application and Fee



Greene County Conservation District

19 South Washington Street, Suite 150

Waynesburg, PA 15370

Phone: 724-852-5278 Fax: 724-852-5341

Project Review Application

Office Use Only	
GCCD#	Fees/INV#
Date RCVD	Date COMP
Reviewer	QA/QC
NPDES#	GP#
GP#	GP#

Project Information		Applicant Information		Preparer Information	
Name:		Company:		Company:	
Address:		Contact:		Contact:	
		Address:		Address:	
Municipality:					
Total Acres:		Phone:		Phone:	
Disturbed Acres:		E-Mail:		E-Mail:	

Additional Project Details ² - Non-Mandatory Items	
Receiving Streams & Ch. 93 Designation	
GPS Coordinates	
Landowner ²	
Anticipated Start Date ²	
Quad Map Name	
On-Site Contact ²	
Name:	
Phone:	

Fee Information

Disturbed Acreage Fee	
Elective Acceleration Fee?	
105 Permit Review Fee	
Tertiary Review Fee?	
Total:	

Check to "Greene County Conservation District"

General NPDES Permit	
Individual NPDES Permit	
NPDES/ESCGP-1 Disturbance Fee	
Total:	

Check to "Greene County Conservation District and/or PA Commonwealth Clean Water Fund"

Required E&S Plan Narrative Components and Attachments	
Project Introduction	
Preparer Qualifications	
Existing Topographic Features	
Past, Present, and Proposed Land Uses	
Soils Information with Resolutions to Limitations	
Information on Receiving Streams (CH. 93)	
Detailed Construction Sequence	
BMP Maintenance Program	
Waste Disposal Program	
Copies of Act 14, 67, 68 & 127 Letters	
PNDI Search Receipt	
Watershed Area (GP-7, GP-8 & GP-9)	
Review and Address Current GCCD Policy(11-1-2010)	
Refer to Title 25 Chapter 102.4(b)(5) if needed	

Required E&S Plan Map and Drawing Components	
Copy of USGS Quad Map (or equivalent) ¹	
Copy of NRCS Soils Map ¹	
BMP Location Detail (Temporary & Permanent)	
Topo Map Indicating Watershed Size	
BMP Construction Details	
Delineated Upstream Watershed Sizes on Stream Encroachments	
Review and Address Current GCCD Policy(11-1-2010)	
(¹ - Delineate Project Area)	

Site Dependent Plan Attachments	
Calculations as Needed	
PNDI Resolution Letter as Needed	
Project Photos as Needed or Volunteered	

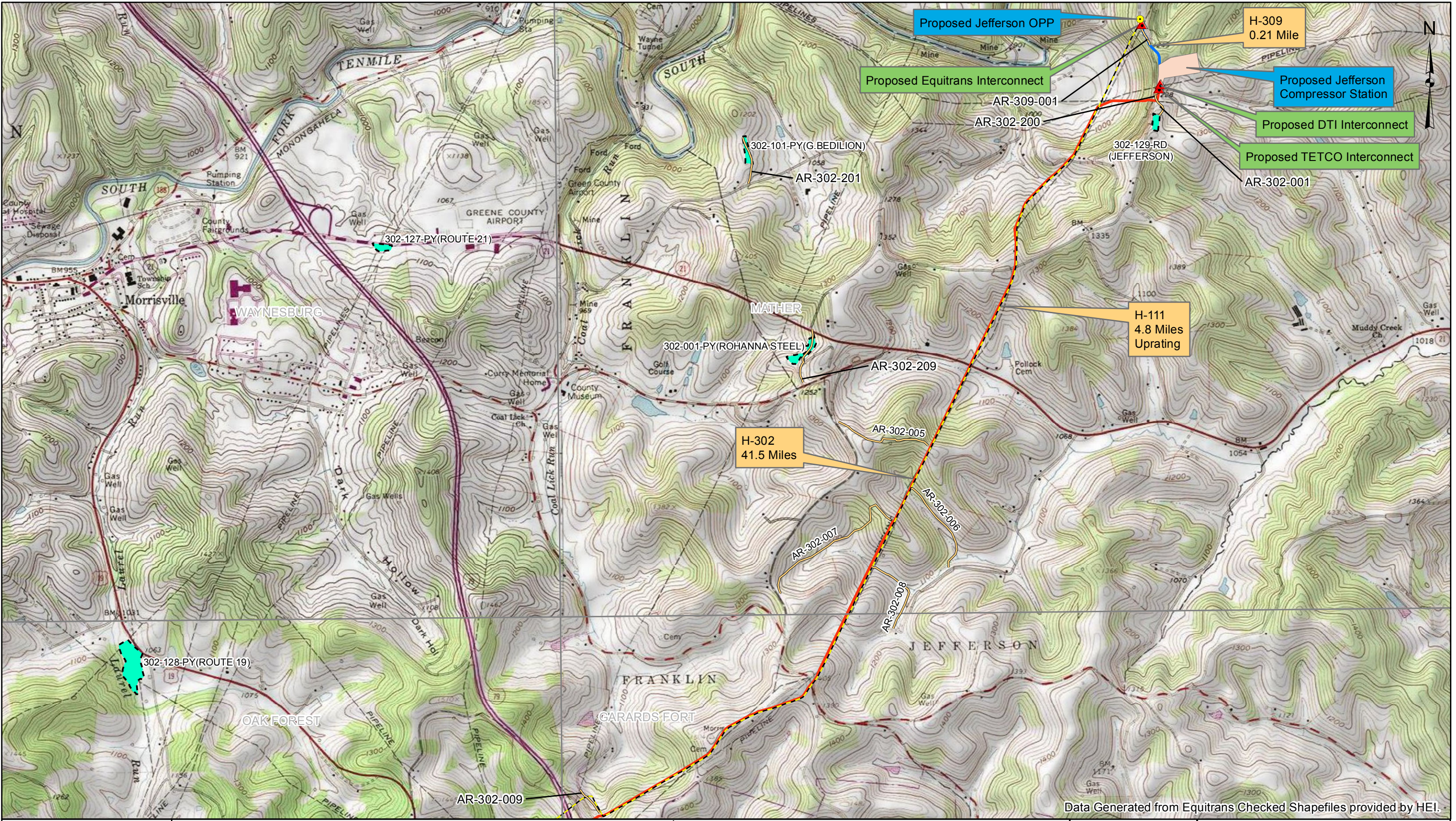
--Please check <http://www.co.greene.pa.us/gccd> periodically for updates to this form--

You can E-Mail our E&S Technician at lkozlowski@co.greene.pa.us

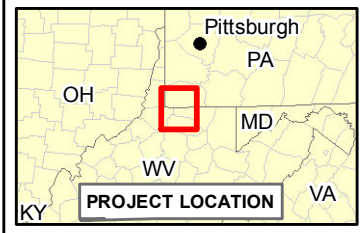
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Section 5

Location Map



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Legend

—

Proposed H-302 Alignment

—

Proposed H-306 Alignment

—

Proposed H-309 Alignment

—

H-111 Uprating

—

Proposed H-111 Lift & Lay

—

Access Roads

□

Ancillary Site

02,0004,0008,000

Feet

00.250.51

Miles

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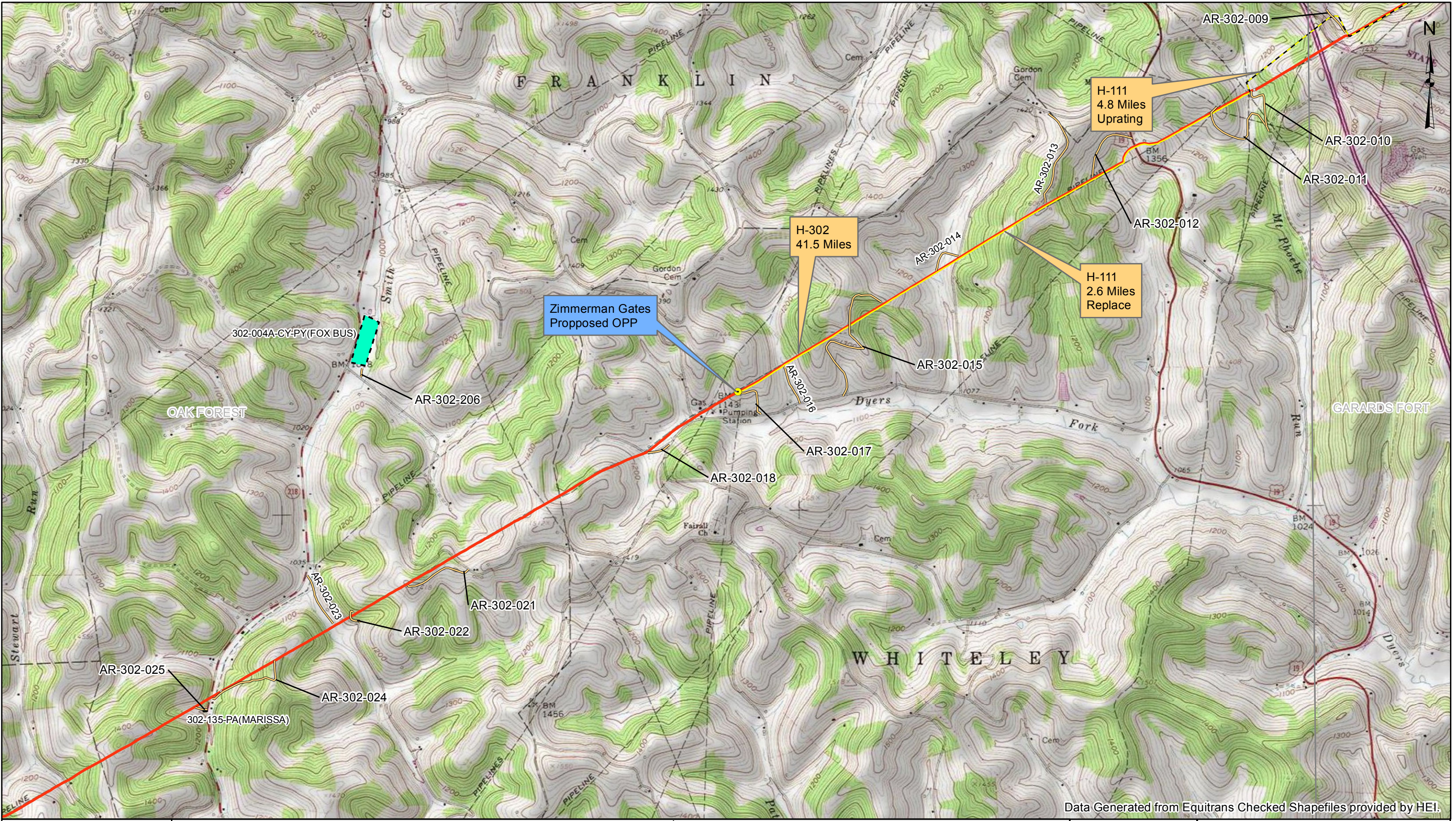
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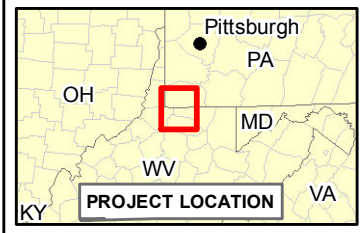
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Route Overview Map

Sheet 1 of 10



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Legend

Proposed H-302 Alignment

Proposed H-306 Alignment

Proposed H-309 Alignment

H-111 Uprating

Proposed H-111 Lift & Lay

Access Roads

Ancillary Site

0 2,000 4,000 8,000 Feet

0 0.25 0.5 1 Miles

Map Source: USGS, 1:24,000 Digital Raster Graphics

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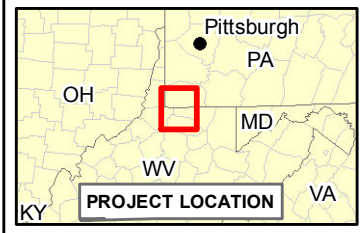
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Route Overview Map
Sheet 2 of 10



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Legend

Proposed H-302 Alignment

Proposed H-306 Alignment

Proposed H-309 Alignment

H-111 Uprating

Proposed H-111 Lift & Lay

Access Roads

Ancillary Site

02,0004,0008,000

Feet

00.250.51

Miles

Map Source: USGS, 1:24,000 Digital Raster Graphics

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EQUITRANS SUNRISE PROJECT

Date: 6/8/2011

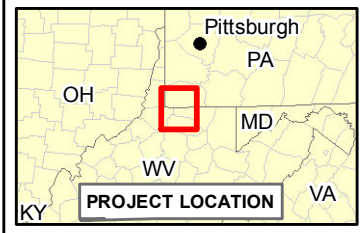
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Route Overview Map

Sheet 3 of 10



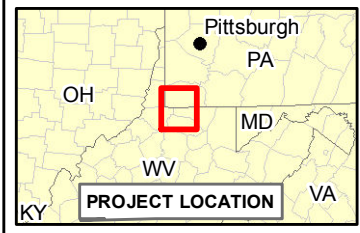
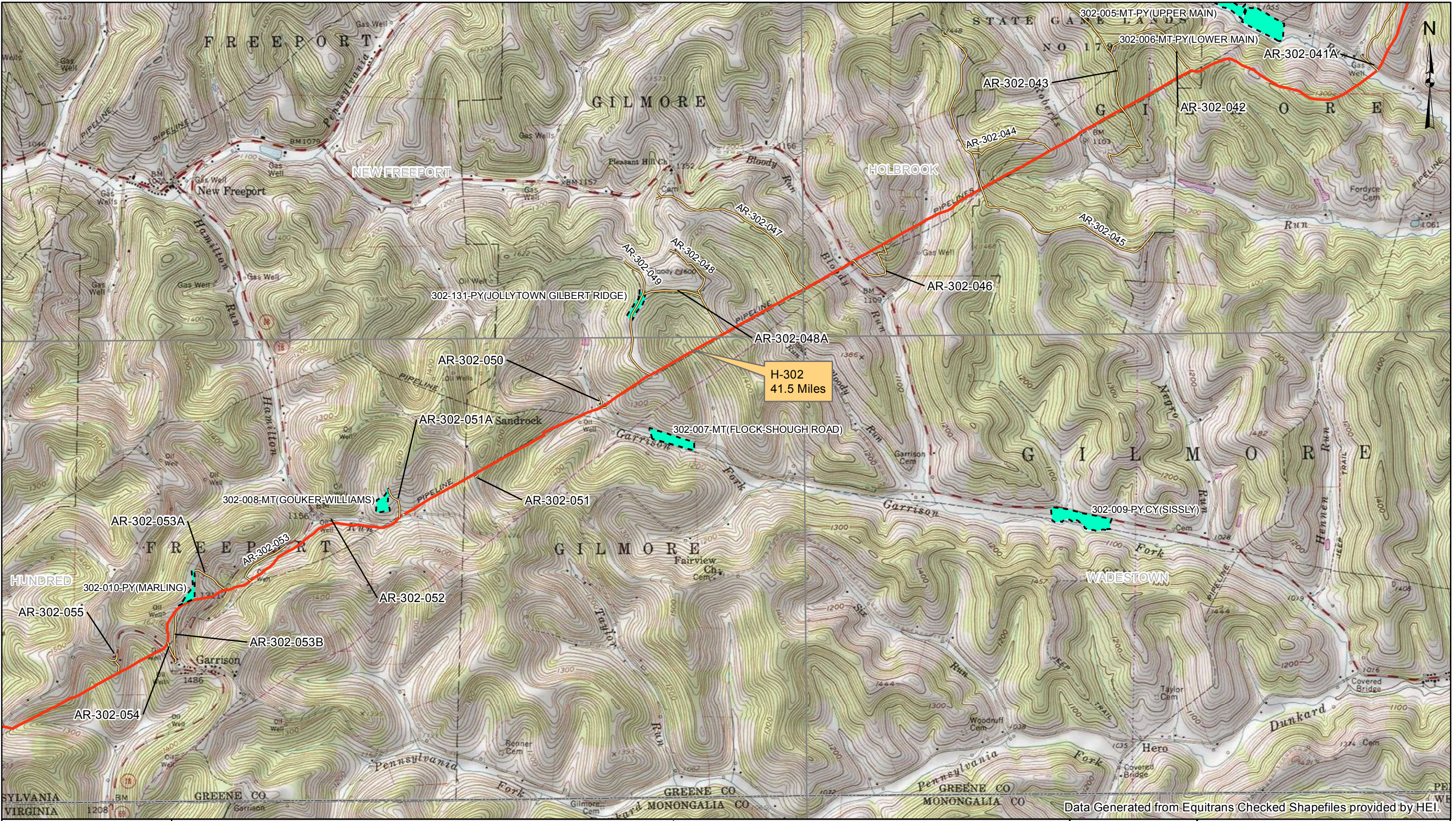
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Legend		
— Proposed H-302 Alignment	— H-111 Uprating	— Access Roads
— Proposed H-306 Alignment	— Proposed H-111 Lift & Lay	■ Ancillary Site
— Proposed H-309 Alignment		

0	2,000	4,000	8,000
Feet			
0	0.25	0.5	1
Miles			
Map Source: USGS, 1:24,000 Digital Raster Graphics			

Date: 6/8/2011 URS	EQUITRANS EQUITRANS SUNRISE PROJECT
	Route Overview Map Sheet 4 of 10



Legend

Proposed H-302 Alignment

Proposed H-306 Alignment

Proposed H-309 Alignment

H-111 Uprating

Proposed H-111 Lift & Lay

Access Roads

Ancillary Site

0 2,000 4,000 8,000 Feet

0 0.25 0.5 1 Miles

Map Source: USGS, 1:24,000 Digital Raster Graphics

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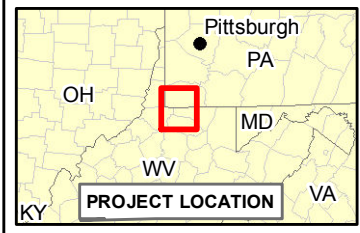
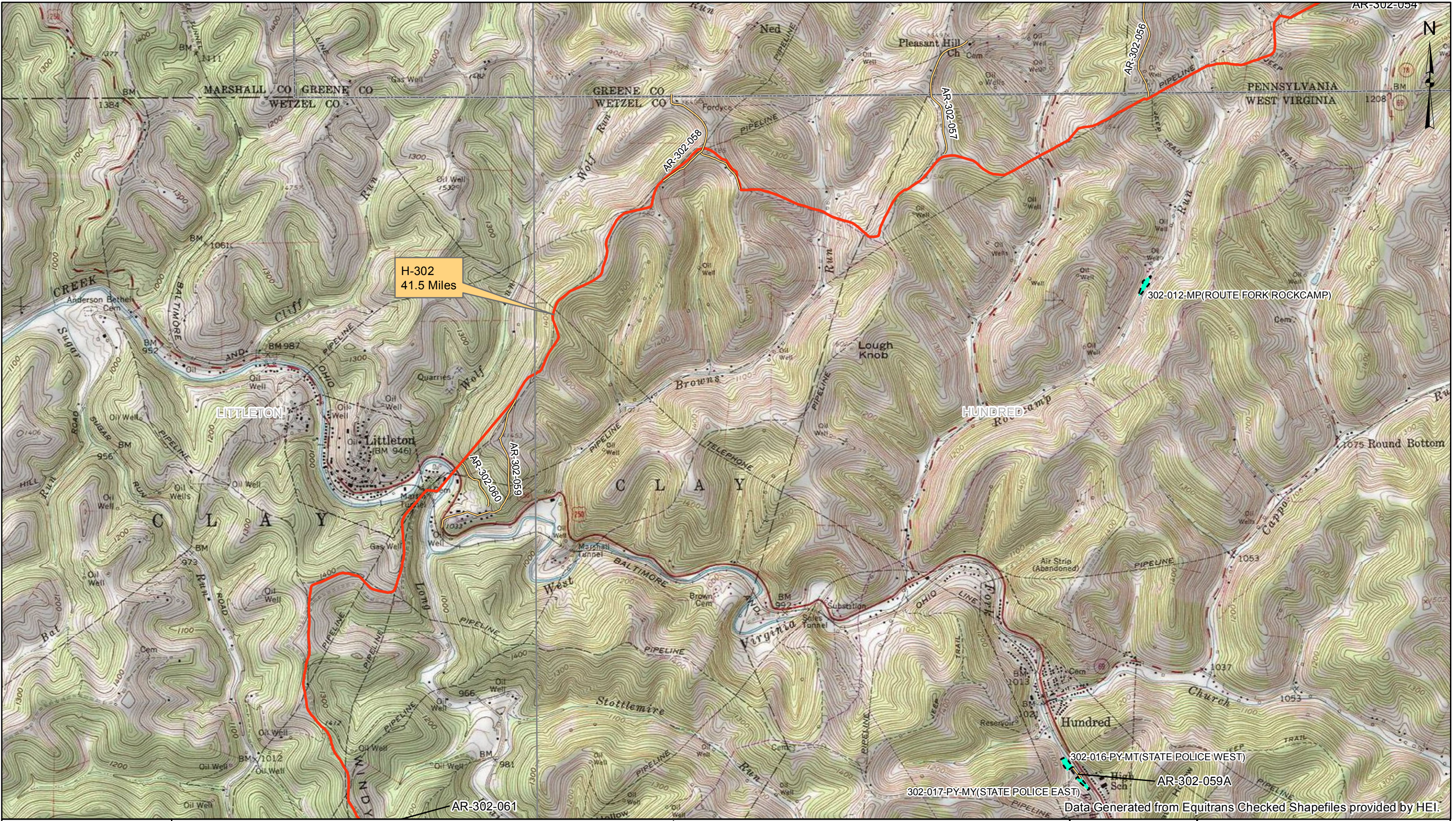
EQUITRANS SUNRISE PROJECT

Date: 6/8/2011

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Route Overview Map
Sheet 5 of 10

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Legend

Proposed H-302 Alignment	H-111 Uprating	Access Roads
Proposed H-306 Alignment	Proposed H-111 Lift & Lay	Ancillary Site
Proposed H-309 Alignment		

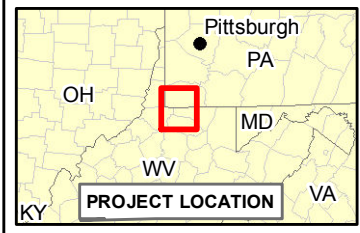
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0 0.25 0.5 1 Miles

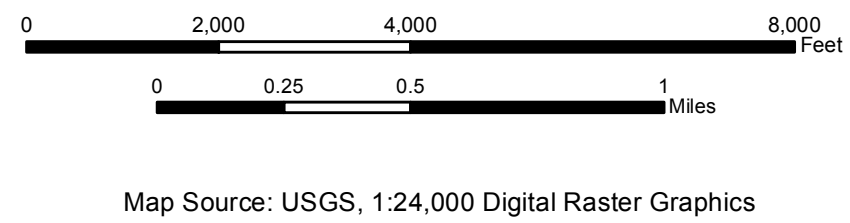
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EQUITRANS SUNRISE PROJECT	
Date: 6/8/2011	Route Overview Map Sheet 6 of 10

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- Legend**
- Proposed H-302 Alignment
 - Proposed H-306 Alignment
 - Proposed H-309 Alignment
 - H-111 Uprating
 - Proposed H-111 Lift & Lay
 - Access Roads
 - Ancillary Site



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	EQUITRANS SUNRISE PROJECT
Date: 6/8/2011	Route Overview Map
	Sheet 7 of 10



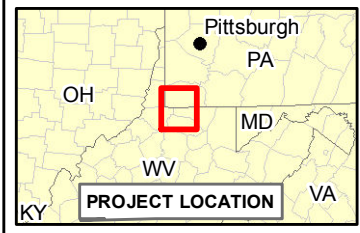
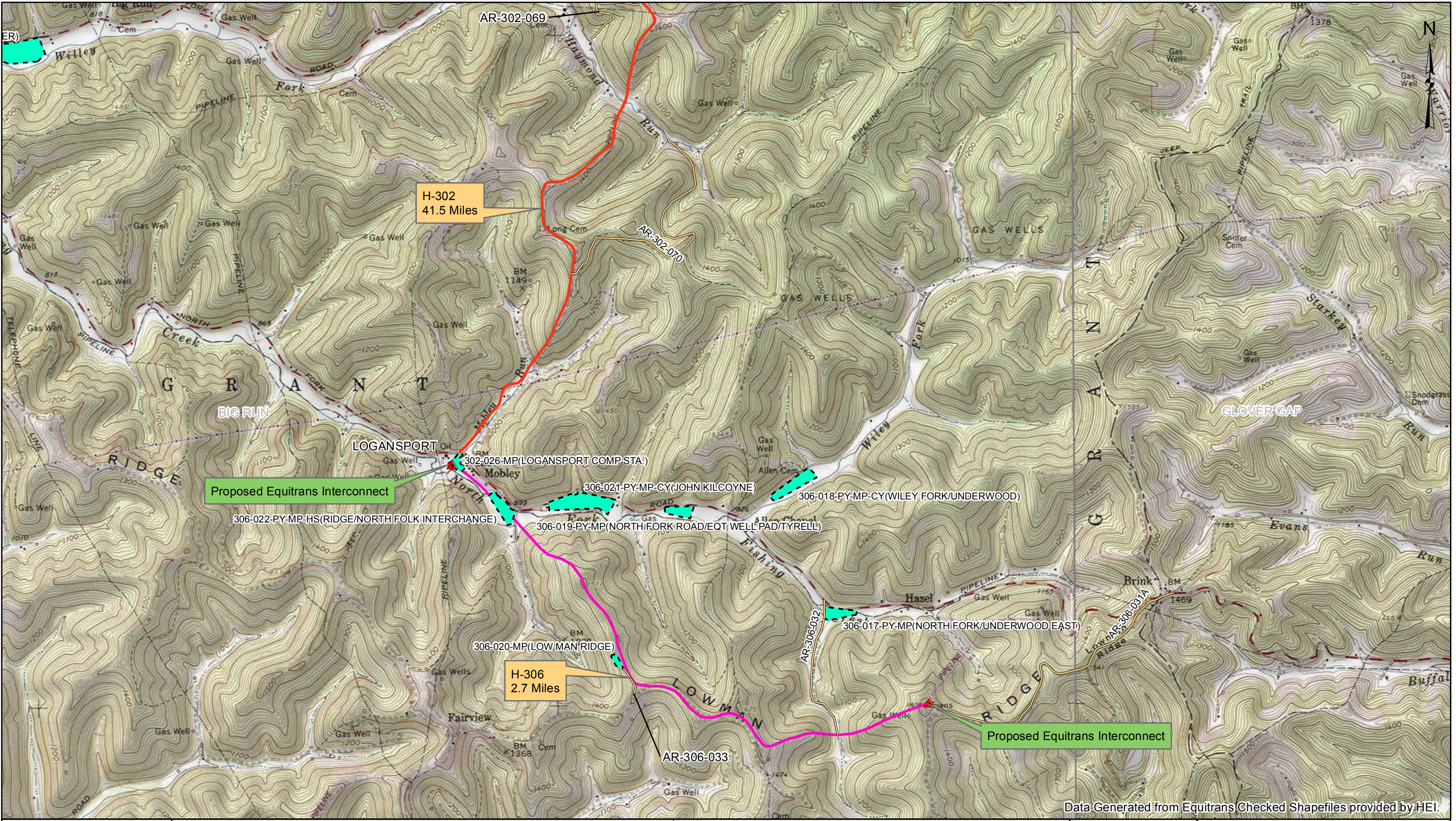
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Legend			
— Proposed H-302 Alignment	— H-111 Uprating	— Access Roads	
— Proposed H-306 Alignment	— Proposed H-111 Lift & Lay	■ Ancillary Site	
— Proposed H-309 Alignment			

0	2,000	4,000	8,000
Feet			
0	0.25	0.5	1
Miles			
Map Source: USGS, 1:24,000 Digital Raster Graphics			

EQUITRANS	EQUITRANS SUNRISE PROJECT
Date: 6/8/2011	
URS	Route Overview Map Sheet 8 of 10



Legend

Proposed H-302 Alignment

Proposed H-306 Alignment

Proposed H-309 Alignment

H-111 Upgrading

Proposed H-111 Lift & Lay

Access Roads

Ancillary Site

0 2,000 4,000 8,000 Feet

0 0.25 0.5 1 Miles

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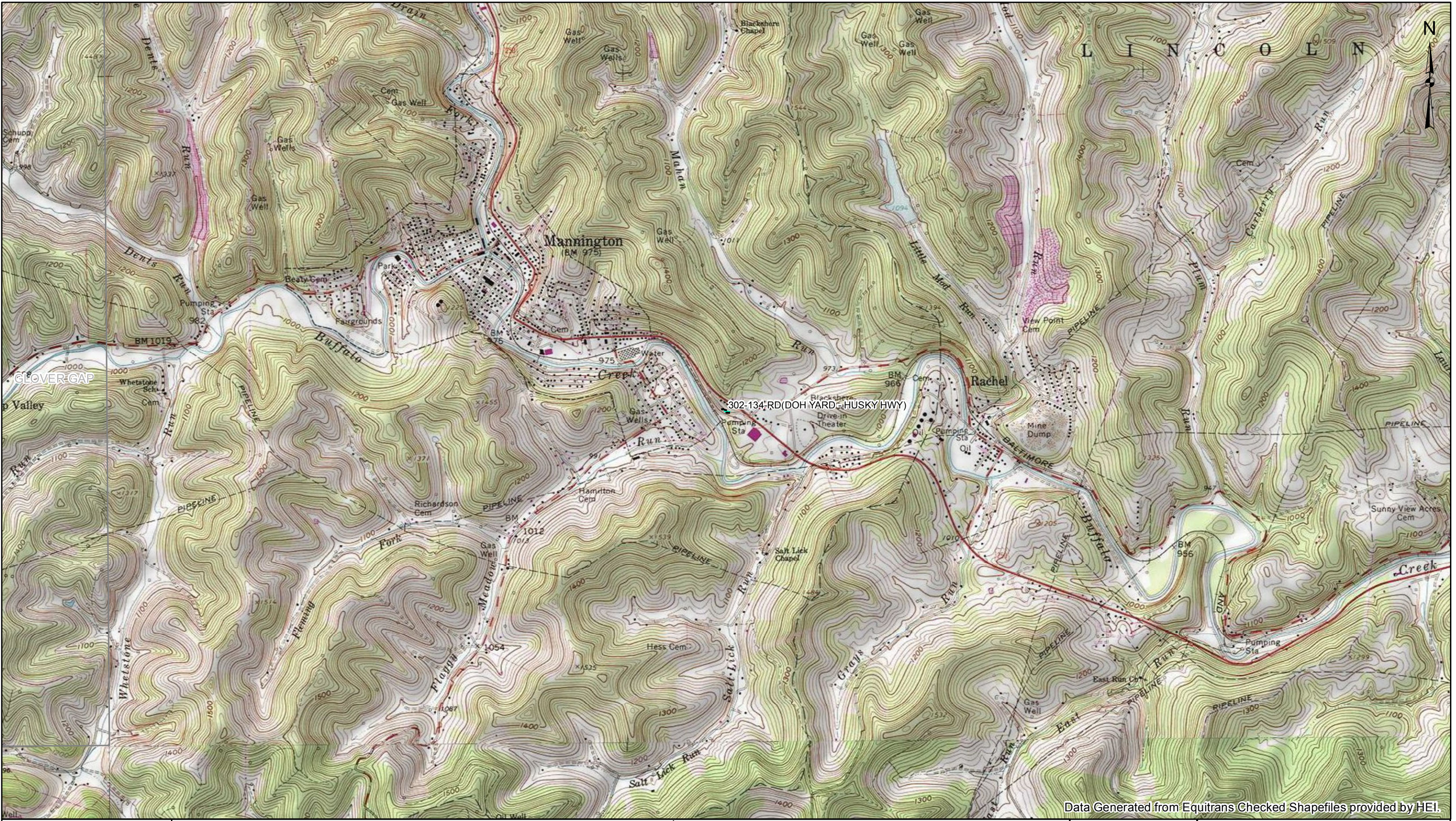
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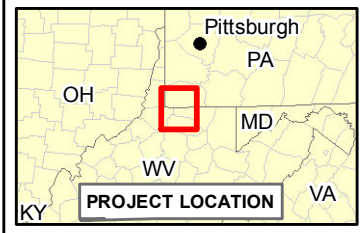
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Route Overview Map
Sheet 9 of 10



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Legend

Proposed H-302 Alignment

Proposed H-306 Alignment

Proposed H-309 Alignment

H-111 Uprating

Proposed H-111 Lift & Lay

Access Roads

Ancillary Site

0 2,000 4,000 8,000 Feet

0 0.25 0.5 1 Miles

Map Source: USGS, 1:24,000 Digital Raster Graphics

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EQUITRANS SUNRISE PROJECT

Date: 6/8/2011

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Route Overview Map
Sheet 10 of 10

Section 6

Act 14 Municipal Notifications



February 8, 2011

Franklin Township
Attn: Mr. T. Reed Kiger, Chairman
Board of Supervisors
Franklin Township Municipal Building
568 Rolling Meadows Road
Waynesburg, PA 15370

**Re: Act 14 Notification
Equitrans Sunrise Project**

Dear Mr. Kiger:

On behalf of Equitrans, L.P. (Equitrans), URS Corporation is submitting this letter to inform you of Equitrans' intent to submit applications for a Pennsylvania Department of Environmental Protection (PADEP) Chapter 102 Erosion and Sediment Control General Permit 1 and a PADEP Chapter 105 Water Obstruction and Encroachment General Permit 5 – Utility Line Crossing, General Permit 7 – Minor Road Crossing, and General Permit 8 – Temporary Road Crossing for the Equitrans Sunrise Project. Equitrans is seeking authorization from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act (NGA) to construct and operate the proposed project.

Proposed Project: Equitrans Sunrise Project

Project Description: The proposed project consists of approximately 41.5 miles of 24-inch diameter pipeline (H-302), 0.21-mile of 20-inch pipeline (H-309) and 2.7 miles of 16-inch pipeline (H-306) parallel to existing EQT transmission and gathering pipelines; replacing a 2.6 mile section of inactive 16-inch pipeline with new 20-inch pipeline (H-111) including appropriate over-pressure protection (OPP) facilities; upgrading 4.8 miles of 20-inch pipeline (H-111) with the addition of appropriate OPP facilities; installing one 14,205 horsepower (hp) new compressor station (Jefferson) consisting of three units, aboveground sites for interconnections, mainline block valves, launchers and receivers, control systems, and other facilities. Please refer to the project overview (Figure 1-1) within Attachment B of the enclosed General Information Form (GIF) for the locations of these proposed construction activities. The new pipelines will be routed to maximize the use of existing corridors and minimize environmental impacts, leveraging existing land rights to the greatest extent possible. Construction is targeted to commence the third quarter of 2011.

Applicant Name: Equitrans, L.P.

Applicant Contact: Ms. Hanna E. McCoy, EQT Corporation, 412-395-3640
625 Liberty Avenue
Pittsburgh, PA 15222

URS Corporation
Foster Plaza 4
501 Holiday Drive, Suite 300
Pittsburgh, PA 15220
Tel: 412-503-4700
Fax: 412-503-4701



Mr. T. Reed Kiger, Chairman
February 8, 2011

Page 2 of 2

Project Location: Greene County, PA and Wetzel County, West Virginia
PA Municipalities: Franklin, Freeport, Gilmore, Jefferson, Wayne, and Whiteley Townships,
Greene County, PA

Section 1905-A of the Commonwealth Administrative Code as amended by Act 14, requires that each applicant for a PADEP permit give written notice to the municipality(ies) and the county(ies) in which the permitted activity is located. The written notices shall be received by the municipality(ies) and county(ies) at least 30 days before the PADEP may issue or deny the permit.

Acts 67 and 68, which amended the Municipalities Planning Code to support sound land use practices and planning efforts, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities or infrastructure, and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code.

Enclosed is a completed GIF for this proposed project. The PADEP invites you to review the attached GIF and comment on the land use aspects of this project; please be specific to the PADEP when identifying any areas of concern. If you wish to submit comments to the PADEP regarding land use review of this project, you must respond within 30 days to the PADEP regional office listed below. If land use comments are not received by the end of the comment period, the PADEP will assume that there are not substantive land use conflicts and proceed with the normal application review process.

Please submit any comments concerning this proposed project within 30 days from the date of receipt of this letter to the PADEP Permitting and Technical Services Section at Southwest Regional Office, 400 Waterfront Drive, Pittsburgh, PA, 15222-4745.

If you should have any questions or need additional information, please contact me at 412-503-4595 or Hanna McCoy of Equitrans at 412-395-3640. Additional information regarding the land use review process is available at the PADEP website www.depweb.state.pa.us (Keyword: Land Use Reviews).

Sincerely,

URS CORPORATION

A handwritten signature in cursive script that reads "Brook Bertig-Coll".

Brook Bertig-Coll
Project Environmental Scientist

Enclosure: Completed GIF and attachments



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

**GENERAL INFORMATION FORM -- AUTHORIZATION APPLICATION
APPLICANT'S CHECKLIST**

This final checklist is to assist the applicant in assuring that all requests for responses, contacts, additional documentation, etc. have been addressed. Please check the following list to make sure that you have included all the required information. Failure to provide all of the requested information will delay the processing of the application and may result in the application being placed on hold with no action, or will be considered withdrawn and the application file closed. This applicant's checklist need not be returned to DEP with your completed application.

REQUIREMENTS

- ☒ **1. ATTACHMENTS.** The completion of the GIF may require the submission of some or all of the following. Where appropriate, include the appropriate attachment(s) with the completed GIF.
- ☒ **a) Site Information, Written Directions to Site** - Attach additional sheets as necessary.
 - ☒ **b) Facility Information, Latitude/Longitude** – Attach additional sheets as necessary.
 - ☒ **c) Project Information, Project Description** – Attach additional sheets as necessary.
 - ☒ **d) Project Information, Time Schedules** -- Attach additional sheets as necessary.
 - ☒ **e) Land Use Information** – Please attached completed County and Municipal Land Use Letters. If County and Municipal Land Use Letters are not included, please attach documentation indicating zoning approval (for early opt-out option), or certified mail receipts indicating that requests for County and Municipal Land Use Letters were sent to the county and municipality. For more information, see GIF Instructions and the Department's Policy for Consideration of Local Comprehensive Plans and Zoning Ordinances in DEP Review of Authorizations for Facilities and Infrastructure - Document ID: 012-0200-001.
 - ☒ **f) Coordination Information** - If land is disturbed, it may be the applicant's responsibility to also notify the PA Historical and Museum Commission, Bureau of Historic Preservation, 400 North Street, Floor 2, Harrisburg, PA 17120-0093, (717) 787-3362.
PHMC notification is required for:
 - 1) purposes of construction activities for Individual NPDES permits disturbing 10 or more acres; and
 - 2) Erosion & Sediment Control permits.General NPDES permits disturbing 10 or more acres are exempt from PHMC notification. For additional information, see Cultural Resource Notice instructions to determine whether submission of information to PHMC is required for this permit application.
 - ☐ **g) Coordination Information, Question 9.0.1** – Attach copy– Act 537 Approval Letter. Note: Approval required prior to 105/NPDES approval.
 - ☐ **h) Coordination Information, Question 16.0.2** – Attach copy - Public Water Supplier's Agreement Letter to Serve the Project.
- ☒ **2. CONTACTS MADE.** According to information provided in the Coordination Information section, the appropriate DEP office may need to be contacted; as well as some agencies outside DEP. See the Instructions document for appropriate contact per coordination question.
In addition to contacts referenced above, prior to proceeding with any project, DEP encourages applicants to be in touch with municipal and county governments to get information on and secure, if possible, any local permits or approvals that might be required for the project. By doing so, potential conflicts at the local level can be resolved prior to application submission to DEP.
- ☒ **3. BEFORE YOU DIG -- CONTACT.** Pennsylvania One Call System at 1-800-242-1776.
- ☒ **4. APPLICATION SUBMITTED.** Application has been completed and properly signed according to instructions and type codes; and will be submitted to the appropriate DEP office.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

GENERAL INFORMATION FORM – AUTHORIZATION APPLICATION

Before completing this General Information Form (GIF), read the step-by-step instructions provided in this application package. This version of the General Information Form (GIF) must be completed and returned with any program-specific application being submitted to the Department.

Related ID#s (If Known)		DEP USE ONLY	
Client ID# _____	APS ID# _____	Date Received & General Notes	
Site ID# _____	Auth ID# _____		
Facility ID# _____			

CLIENT INFORMATION

DEP Client ID#		Client Type / Code PACOR	
Organization Name or Registered Fictitious Name Equitrans, L.P.		Employer ID# (EIN) 25-1776875	Dun & Bradstreet ID#
Individual Last Name McCoy	First Name Hanna	MI E	Suffix SSN
Additional Individual Last Name N/A	First Name	MI	Suffix SSN
Mailing Address Line 1 EQT Plaza, 625 Liberty Avenue		Mailing Address Line 2	
Address Last Line – City Pittsburgh	State PA	ZIP+4 15222	Country USA
Client Contact Last Name McCoy	First Name Hanna	MI E	Suffix
Client Contact Title Environmental - Supervisor Permitting		Phone 412-395-3640	Ext
Email Address HMcCoy@eqt.com		FAX 412-395-2996	

SITE INFORMATION

DEP Site ID#	Site Name Sunrise Pipeline Project		
EPA ID#	Estimated Number of Employees to be Present at Site	588 Temp. Emp.	
Description of Site See Attachment A			
County Name Greene	Municipality Franklin, Freeport, Gilmore	City <input type="checkbox"/>	Boro <input type="checkbox"/>
County Name Greene	Municipality Jefferson, Wayne, Whiteley	City <input type="checkbox"/>	Boro <input type="checkbox"/>
County Name Greene	Municipality Jefferson, Wayne, Whiteley	Twp <input checked="" type="checkbox"/>	State PA
County Name Greene	Municipality Jefferson, Wayne, Whiteley	Twp <input type="checkbox"/>	State PA
Site Location Line 1 See Attachment B		Site Location Line 2	
Site Location Last Line – City	State	ZIP+4	
Detailed Written Directions to Site See Attachment C			
Site Contact Last Name McCoy	First Name Hanna	MI E	Suffix
Site Contact Title Environmental Supervisor		Site Contact Firm Equitrans, L.P.	
Mailing Address Line 1 EQT Plaza, 625 Liberty Avenue		Mailing Address Line 2	
Mailing Address Last Line – City Pittsburgh	State PA	ZIP+4 15222	

Phone 412-395-3640	Ext	FAX 412-395-2996	Email Address HMcCoy@eqt.com
NAICS Codes (Two- & Three-Digit Codes – List All That Apply) 22, 23, & 48			6-Digit Code (Optional) 221210, 237120, & 486210
Client to Site Relationship OWNOP & LESOP			

FACILITY INFORMATION

Modification of Existing Facility		Yes	No
1.	Will this project modify an existing facility, system, or activity?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2.	Will this project involve an addition to an existing facility, system, or activity?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
If "Yes", check all relevant facility types and provide DEP facility identification numbers below.			
Facility Type	DEP Fac ID#	Facility Type	DEP Fac ID#
<input type="checkbox"/> Air Emission Plant		<input type="checkbox"/> Industrial Minerals Mining Operation	
<input type="checkbox"/> Beneficial Use (water)		<input type="checkbox"/> Laboratory Location	
<input type="checkbox"/> Blasting Operation		<input type="checkbox"/> Land Recycling Cleanup Location	
<input type="checkbox"/> Captive Hazardous Waste Operation		<input type="checkbox"/> MineDrainageTrmt/LandRecyProjLocation	
<input type="checkbox"/> Coal Ash Beneficial Use Operation		<input type="checkbox"/> Municipal Waste Operation	
<input type="checkbox"/> Coal Mining Operation		<input type="checkbox"/> Oil & Gas Encroachment Location	
<input type="checkbox"/> Coal Pillar Location		<input type="checkbox"/> Oil & Gas Location	
<input type="checkbox"/> Commercial Hazardous Waste Operation		<input type="checkbox"/> Oil & Gas Water Poll Control Facility	
<input type="checkbox"/> Dam Location		<input type="checkbox"/> Public Water Supply System	
<input type="checkbox"/> Deep Mine Safety Operation -Anthracite		<input type="checkbox"/> Radiation Facility	
<input type="checkbox"/> Deep Mine Safety Operation -Bituminous		<input type="checkbox"/> Residual Waste Operation	
<input type="checkbox"/> Deep Mine Safety Operation -Ind Minerals		<input type="checkbox"/> Storage Tank Location	
<input type="checkbox"/> Encroachment Location (water, wetland)		<input type="checkbox"/> Water Pollution Control Facility	
<input type="checkbox"/> Erosion & Sediment Control Facility		<input type="checkbox"/> Water Resource	
<input type="checkbox"/> Explosive Storage Location		<input checked="" type="checkbox"/> Other: Natural Gas Pipeline and Associated Facilities	

Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
	39	45	57	-80	20	50
Horizontal Accuracy Measure	Feet	2	--or--	Meters		
Horizontal Reference Datum Code	<input type="checkbox"/> North American Datum of 1927 <input type="checkbox"/> North American Datum of 1983 <input checked="" type="checkbox"/> World Geodetic System of 1984					
Horizontal Collection Method Code	GISDR					
Reference Point Code	CNTAR					
Altitude	Feet	1325	--or--	Meters		
Altitude Datum Name	<input checked="" type="checkbox"/> The National Geodetic Vertical Datum of 1929 <input type="checkbox"/> The North American Vertical Datum of 1988 (NAVD88)					
Altitude (Vertical) Location Datum Collection Method Code	TOPO					
Geometric Type Code	POINT					
Data Collection Date	February 4, 2011					
Source Map Scale Number	1	Inch(es)	=	2000	Feet	
	--or--	Centimeter(s)	=		Meters	

PROJECT INFORMATION

Project Name Sunrise Pipeline Project			
Project Description See Attachment D			
Project Consultant Last Name Bertig-Coll	First Name Brook	MI M	Suffix
Project Consultant Title Project Environmental Scientist		Consulting Firm URS Corporation	
Mailing Address Line 1 Foster Plaza 4		Mailing Address Line 2 501 Holiday Drive, Suite 300	
Address Last Line – City Pittsburgh		State PA	ZIP+4 15220

Phone	Ext	FAX	Email Address
412-503-4595		412-503-4701	brook_bertig-coll@urscorp.com

Time Schedules	Project Milestone (Optional)
October 2011	Start Construction
September 2012	End Construction

1. Have you informed the surrounding community and addressed any concerns prior to submitting the application to the Department? ☒ Yes ☐ No

2. Is your project funded by state or federal grants? ☐ Yes ☒ No

Note: If "Yes", specify what aspect of the project is related to the grant and provide the grant source, contact person and grant expiration date.

Aspect of Project Related to Grant

Grant Source: _____

Grant Contact Person: _____

Grant Expiration Date: _____

3. Is this application for an authorization on Appendix A of the Land Use Policy? (For referenced list, see Appendix A of the Land Use Policy attached to GIF instructions) ☒ Yes ☐ No

Note: If "No" to Question 3, the application is not subject to the Land Use Policy.

If "Yes" to Question 3, the application is subject to this policy and the Applicant should answer the additional questions in the **Land Use Information** section.

LAND USE INFORMATION

Note: Applicants are encouraged to submit copies of local land use approvals or other evidence of compliance with local comprehensive plans and zoning ordinances.

1. Is there an adopted county or multi-county comprehensive plan? ☒ Yes ☐ No

2. Is there an adopted municipal or multi-municipal comprehensive plan? ☒ Yes ☐ No

3. Is there an adopted county-wide zoning ordinance, municipal zoning ordinance or joint municipal zoning ordinance? ☒ Yes ☐ No

Note: If the Applicant answers "No" to either Questions 1, 2 or 3, the provisions of the PA MPC are not applicable and the Applicant does not need to respond to questions 4 and 5 below.

If the Applicant answers "Yes" to questions 1, 2 and 3, the Applicant should respond to questions 4 and 5 below.

4. Does the proposed project meet the provisions of the zoning ordinance or does the proposed project have zoning approval? If zoning approval has been received, attach documentation. ☒ Yes ☐ No

5. Have you attached Municipal and County Land Use Letters for the project? ☒ Yes ☐ No

COORDINATION INFORMATION

Note: The PA Historical and Museum Commission must be notified of proposed projects in accordance with DEP Technical Guidance Document 012-0700-001 and the accompanying Cultural Resource Notice Form.

If the activity will be a mining project (i.e., mining of coal or industrial minerals, coal refuse disposal and/or the operation of a coal or industrial minerals preparation/processing facility), respond to questions 1.0 through 2.5 below.

If the activity will not be a mining project, skip questions 1.0 through 2.5 and begin with question 3.0.

1.0	Is this a coal mining project? If "Yes", respond to 1.1-1.6. If "No", skip to Question 2.0. (DEP Use/48y1)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
1.1	Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be equal to or greater than 200 tons/day? (DEP Use/4x70)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
1.2	Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be greater than 50,000 tons/year? (DEP Use/4x70)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
1.3	Will this coal mining project involve coal preparation/ processing activities in which thermal coal dryers or pneumatic coal cleaners will be used? (DEP Use/4x70)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
1.4	For this coal mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters? (DEP Use/4x62)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
1.5	Will this coal mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet? (DEP Use/3140)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
1.6	Will this coal mining project involve underground coal mining to be conducted within 500 feet of an oil or gas well? (DEP Use/4z41)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
2.0	Is this a non-coal (industrial minerals) mining project? If "Yes", respond to 2.1-2.6. If "No", skip to Question 3.0. (DEP Use/48y1)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
2.1	Will this non-coal (industrial minerals) mining project involve the crushing and screening of non-coal minerals other than sand and gravel? (DEP Use/4x70)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
2.2	Will this non-coal (industrial minerals) mining project involve the crushing and/or screening of sand and gravel with the exception of wet sand and gravel operations (screening only) and dry sand and gravel operations with a capacity of less than 150 tons/hour of unconsolidated materials? (DEP Use/4x70)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
2.3	Will this non-coal (industrial minerals) mining project involve the construction, operation and/or modification of a portable non-metallic (i.e., non-coal) minerals processing plant under the authority of the General Permit for Portable Non-metallic Mineral Processing Plants (i.e., BAQ-PGPA/GP-3)? (DEP Use/4x70)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
2.4	For this non-coal (industrial minerals) mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters? (DEP Use/4x62)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
2.5	Will this non-coal (industrial minerals) mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet? (DEP Use/3140)	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No

3.0	Will your project, activity, or authorization have anything to do with a well related to oil or gas production, have construction within 200 feet of, affect an oil or gas well, involve the waste from such a well, or string power lines above an oil or gas well? If "Yes", respond to 3.1-3.3. If "No", skip to Question 4.0. (DEP Use/4z41)	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
3.1	Does the oil- or gas-related project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water (including wetlands)? (DEP Use/4z41)	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
3.2	Will the oil- or gas-related project involve discharge of industrial wastewater or stormwater to a dry swale, surface water, ground water or an existing sanitary sewer system or storm water system? If "Yes", discuss in <i>Project Description</i> . (DEP Use/4z41)	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
3.3	Will the oil- or gas-related project involve the construction and operation of industrial waste treatment facilities? (DEP Use/4z41)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
4.0	Will the project involve a construction activity that results in earth disturbance? If "Yes", specify the total disturbed acreage. (DEP Use/4x66)	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
4.0.1	Total Disturbed Acreage 634.3 (PA & WV)				
5.0	Does the project involve any of the following? If "Yes", respond to 5.1-5.3. If "No", skip to Question 6.0. (DEP Use/4x10)	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
5.1	Water Obstruction and Encroachment Projects – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water? (DEP Use /4x10).	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
5.2	Wetland Impacts – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a wetland? (DEP Use/4x10).	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
5.3	Floodplain Projects by the commonwealth, a Political Subdivision of the commonwealth or a Public Utility – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a floodplain? (DEP Use /4x10).	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
6.0	Will the project involve discharge of stormwater or wastewater from an industrial activity to a dry swale, surface water, ground water or an existing sanitary sewer system or separate storm water system? (DEP Use/4x62)	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
7.0	Will the project involve the construction and operation of industrial waste treatment facilities? (DEP Use/4x62)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
8.0	Will the project involve construction of sewage treatment facilities, sanitary sewers, or sewage pumping stations? If "Yes", indicate estimated proposed flow (gal/day). Also, discuss the sanitary sewer pipe sizes and the number of pumping stations/treatment facilities/name of downstream sewage facilities in the <i>Project Description</i> , where applicable. (DEP Use/4x62)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
8.0.1	Estimated Proposed Flow (gal/day)				
9.0	Will the project involve the subdivision of land, or the generation of 800 gpd or more of sewage on an existing parcel of land or the generation of an additional 400 gpd of sewage on an already-developed parcel, or the generation of 800 gpd or more of industrial wastewater that would be discharged to an existing sanitary sewer system? (DEP Use/4x61).	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
9.0.1	Was Act 537 sewage facilities planning submitted and approved by DEP? If "Yes" attach the approval letter. Approval required prior to 105/NPDES approval.	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
10.0	Is this project for the beneficial use of biosolids for land application within Pennsylvania? If "Yes" indicate how much (i.e. gallons or dry tons per year). (DEP Use/4X62)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
10.0.1	Gallons Per Year (residential septage)				
10.0.2	Dry Tons Per Year (biosolids)				

11.0	Does the project involve construction, modification or removal of a dam? If "Yes", identify the dam. (DEP Use/3140)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
11.0.1	Dam Name				
12.0	Will the project interfere with the flow from, or otherwise impact, a dam? If "Yes", identify the dam. (DEP Use/3140)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
12.0.1	Dam Name				
13.0	Will the project involve operations (excluding during the construction period) that produce air emissions (i.e., NOX, VOC, etc.)? If "Yes", identify each type of emission followed by the amount of that emission. (DEP Use/4x70)	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
13.0.1	Enter all types & amounts of emissions; separate each set with semicolons. See Attachment E				
14.0	Does the project include the construction or modification of a drinking water supply to serve 15 or more connections or 25 or more people, at least 60 days out of the year? If "Yes", check all proposed sub-facilities. (DEP Use/4x81)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
14.0.1	Number of Persons Served				
14.0.2	Number of Employee/Guests				
14.0.3	Number of Connections				
14.0.4	Sub-Fac: Distribution System	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
14.0.5	Sub-Fac: Water Treatment Plant	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
14.0.6	Sub-Fac: Source	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
14.0.7	Sub-Fac: Pump Station	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
14.0.8	Sub Fac: Transmission Main	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
14.0.9	Sub-Fac: Storage Facility	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
15.0	Will your project include infiltration of storm water or waste water to ground water within one-half mile of a public water supply well, spring or infiltration gallery? (DEP Use/4x81) and 4x52).	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
16.0	Is your project to be served by an existing public water supply? If "Yes", indicate name of supplier and attach letter from supplier stating that it will serve the project. (DEP Use/4x81)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
16.0.1	Supplier's Name				
16.0.2	Letter of Approval from Supplier is Attached	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
17.0	Will this project involve a new or increased drinking water withdrawal from a stream or other water body? If "Yes", should reference both Water Supply and Watershed Management. (DEP Use/4x81 and 4x10)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
17.0.1	Stream Name				
18.0	Will the construction or operation of this project involve treatment, storage, reuse, or disposal of waste? If "Yes", indicate what type (i.e., hazardous, municipal (including infectious & chemotherapeutic), residual) and the amount to be treated, stored, re-used or disposed. (DEP/Use4x32)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
18.0.1	Type & Amount				
19.0	Will your project involve the removal of coal, minerals, etc. as part of any earth disturbance activities? (DEP Use/48y1)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
20.0	Does your project involve installation of a field constructed underground storage tank? If "Yes", list each Substance & its Capacity. Note: Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
20.0.1	Enter all substances & capacity of each; separate each set with semicolons.				
21.0	Does your project involve installation of an aboveground storage tank greater than 21,000 gallons capacity at an existing facility? If "Yes", list each Substance & its Capacity. Note: Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570)	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
21.0.1	Enter all substances & capacity of each; separate each set with semicolons.				

- 22.0 Does your project involve installation of a tank greater than 1,100 gallons which will contain a highly hazardous substance as defined in DEP's Regulated Substances List, 2570-BK-DEP2724?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570) ☐ Yes ☒ No
- 22.0.1 Enter all substances & capacity of each; separate each set with semicolons.** One (1) 10,000 gallon tank for pipeline liquids, two (2) 5,000 gallon tanks for new lube oil, one (1) 4,000 gallon tank for waste oil, one (1) 2,000 gallon tank for new engine mono-ethylene glycol (MEG), one (1) 2,000 gallon tank for used engine MEG, one (1) 10,000 gallon tank for new dehydration unit TEG, and one (1) 10,000 gallon tank for used dehydration unit TEG.
- 23.0 Does your project involve installation of a storage tank at a new facility with a total AST capacity greater than 21,000 gallons?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570) ☐ Yes ☒ No
- 23.0.1 Enter all substances & capacity of each; separate each set with semicolons.** One (1) 10,000 gallon tank for pipeline liquids, two (2) 5,000 gallon tanks for new lube oil, one (1) 4,000 gallon tank for waste oil, one (1) 2,000 gallon tank for new engine mono-ethylene glycol (MEG), one (1) 2,000 gallon tank for used engine MEG, one (1) 10,000 gallon tank for new dehydration unit TEG, and one (1) 10,000 gallon tank for used dehydration unit TEG.
- 24.0 Will the intended activity involve the use of a radiation source?** (DEP Use/4x90). ☐ Yes ☒ No

CERTIFICATION

I certify that I have the authority to submit this application on behalf of the applicant named herein and that the information provided in this application is true and correct to the best of my knowledge and information.

Type or Print Name Brook Bertig-Coll

Brook Bertig-Coll

Project Environmental Scientist

2/8/2011

Signature

Title

Date

Attachment A

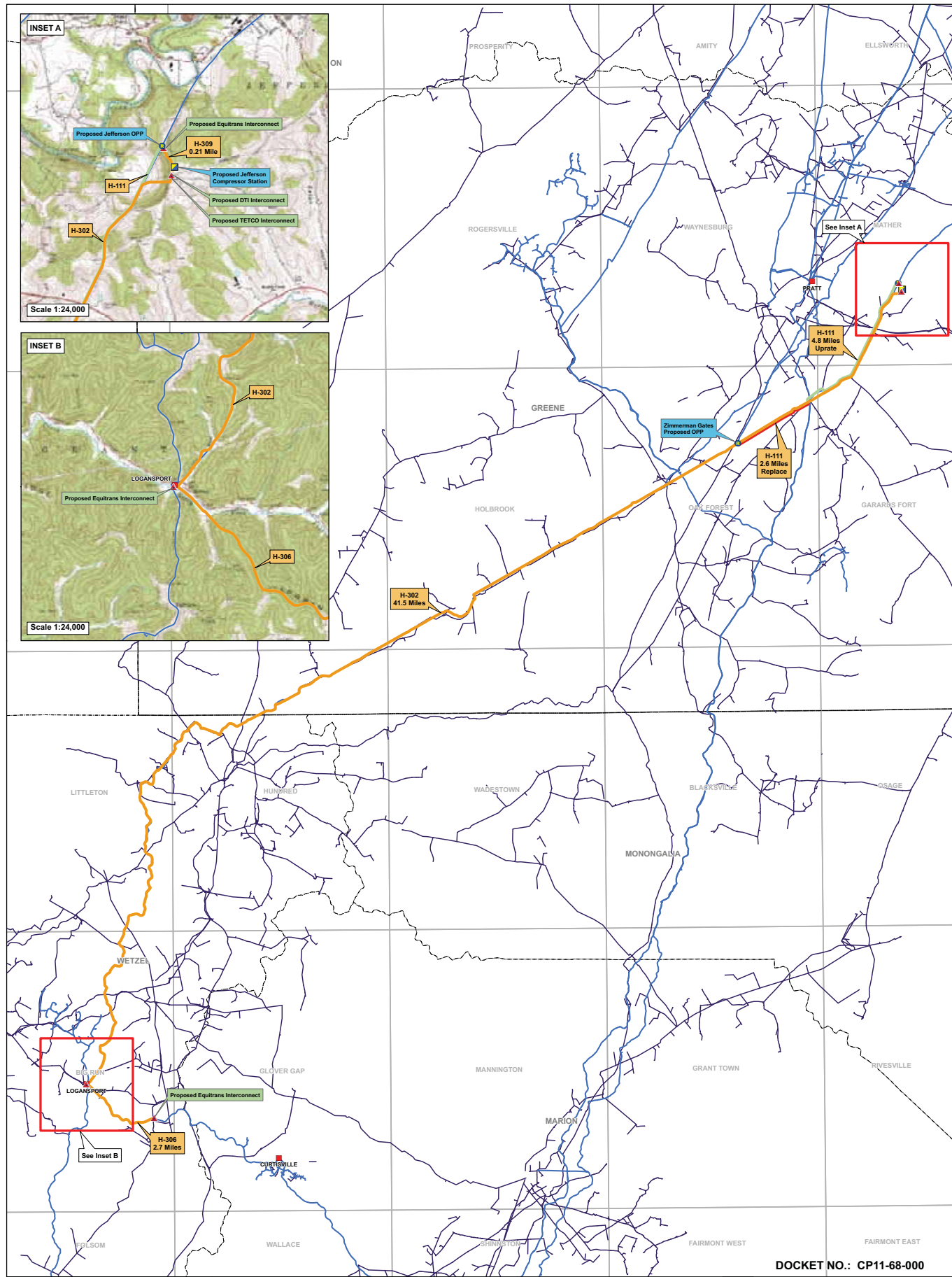
Site Description

Attachment A – Site Description

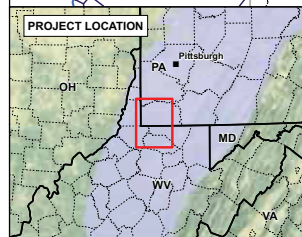
The proposed project begins approximately six miles east of Waynesburg, PA at the proposed Jefferson Compressor Station. From this point, the pipeline runs in a southwesterly direction until entering Wetzel County, WV. Within Greene County, the proposed project typically runs through agricultural and forested areas. Equitrans has taken advantage of existing pipeline and other utility corridors during the planning and routing of its proposed project to the maximum extent feasible. As a result, most of the proposed project route will closely parallel portions of existing Equitrans, TCO, and DTI pipelines. Route modifications (variations and alternatives) are required along approximately 0.2 miles of the 47.0-mile length of the new construction (H-302, H-306, H-309, and H-111) for the proposed project. The H-111 pipeline uprating will occur within existing Equitrans right-of-way (ROW); therefore, will not require any route modifications. These route variations generally follow, but are not directly adjacent to, existing ROW and are required for constructability reasons and to minimize environmental, cultural or public impacts. Some of the constraints for pipeline routing adjacent to existing facilities included proximity to residences, well pads, ponds, wetlands, and multiple foreign pipeline crossings.

Attachment B

Site Location Map



DOCKET NO.: CP11-68-000



EQUITRANS

**EQUITRANS, L.P.
SUNRISE PROJECT
ROUTE OVERVIEW MAP**

DATE: JANUARY 24, 2011

DRAWN BY: BAL - EQT MIDSTREAM

EQT










FIGURE 1-1
SUNRISE PROJECT OVERVIEW

REV 7.1

PAGE 1 OF 1



LEGEND

-  Equitrans, LP Compressor Station
-  Proposed Compressor Station
-  Proposed Interconnect Site
-  Proposed Overpressure Protection
-  Equitrans, LP Transmission Pipeline
-  EQT Gathering Pipeline
-  Proposed Sunrise Pipeline Route
-  Proposed H-111 Pipeline Replace
-  Proposed H-111 Pipeline Upgrade

BASE MAP SOURCE: USGS 7.5 Minute Topographic Maps

Attachment C

Directions to Project Site

Attachment C – Directions to Project Site

From the Waynesburg exit on I-79 (Exit Number 14), take PA 21 East for 2.2 miles. Turn left at Ridge Road and travel 0.5 miles. Take the second right onto Ridge Road then turn right at Denny Hill Road. After 1.3 miles, you will arrive at the intersection of Denny Hill Road and Ridge Road. This is the location of the proposed Jefferson Compressor Station. From this point, the proposed pipeline runs through Greene County in a southwesterly direction until running into Wetzel County, WV. At this point, the pipeline runs in a south-southwesterly direction until reaching the Logansport Compressor Station. From the Logansport Compressor Station, an additional 2.7 miles of proposed pipeline runs in a southeasterly direction.

Attachment D

Project Description

Attachment D – Project Description

Equitrans, L.P. (Equitrans) is seeking authorization from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act (NGA) to construct and operate the proposed Sunrise Project (Project or Sunrise). Equitrans is a subsidiary of EQT Corporation. Equitrans will seek authorization to construct and operate this Project which will be located in Pennsylvania and West Virginia. This application for the Project requires the submittal of an Environmental Report (ER) to FERC, consisting of 13 Resource Reports as specified in 18 *Code of Federal Regulations* (CFR) § 157.14(a)(6-a), 380.3, and 380.12. Each Resource Report will evaluate potential effects on a particular aspect of the environment.

The proposed FERC jurisdictional facilities described in this report will consist of approximately 41.5 miles of 24-inch diameter pipeline, 0.21-mile of 20-inch pipeline and 2.7 miles of 16-inch pipeline parallel to existing EQT transmission and gathering pipelines; replacing a 2.6 mile section of inactive 16-inch pipeline with new 20-inch pipeline including appropriate over- pressure protection (OPP) facilities; uprating 4.8 miles of 20-inch pipeline with the addition of appropriate OPP facilities; installing one 14,205 horsepower (hp) new compressor station consisting of three units, aboveground sites for interconnections, mainline block valves, launchers and receivers, control systems, and other facilities.

The proposed pipeline, compressor station, and interconnect facilities are summarized below:

1. Pipeline – Facilities would include:

- a. H-302 - Installation of 41.5 miles of 24-inch pipeline with a 1200 pounds per square inch gauge (psig) maximum allowable operating pressure (MAOP) (initial maximum operating pressure [MOP] of 1000 psig), with portions of the line paralleling the existing Equitrans pipelines: H-515, H-512, and H-111. The pipeline will be located in Greene County, PA and Wetzel County, WV. The pipeline will have mainline valves (MLVs) installed roughly every 10 miles. The H-302 pipeline will transport gas from Equitrans' Logansport facility and gathering/production companies along the pipeline to the proposed Jefferson Compressor Station for delivery to the Texas Eastern Transmission (TETCO) and Dominion Transmission, Incorporated (DTI) interconnects.

- b. H-306 - Installation of 2.7 miles of 16-inch pipeline with a 1200 PSIG MAOP (initial MOP of 1000 PSIG), paralleling the existing Equitrans pipeline: H-562 (GSF-912). The pipeline will be located in Wetzel County, WV. The pipeline will have MLVs installed at each end of the pipeline. The H-306 will interconnect with the H-302 pipeline, the yard piping at the existing Equitrans' Logansport facility and Equitrans pipeline H-562 (GSF-912) at Equitrans' Pickenpaw facility. The H-306 pipeline will transport gas from Equitrans' Logansport facility and gathering/production companies along the pipeline to Equitrans' Pickenpaw facility for delivery to existing Equitrans facilities or transport gas from Equitrans pipeline H-562 (GSF-912) gas to the TETCO/DTI interconnects via the H-302 pipeline and the proposed Jefferson Compressor Station.
- c. H-309 - Installation of 0.21 mile of 20-inch pipeline with a 720 PSIG MAOP (initial MOP of 655 PSIG). The pipeline will be located in Greene County, PA. The pipeline will have MLVs installed at each end of the pipeline. The H-309 pipeline will interconnect with the Equitrans H-111 pipeline and will transport gas from gathering/production companies along the existing Equitrans Mainline Transmission System for delivery to the TETCO/DTI interconnects via the proposed Jefferson Compressor Station.
- d. H-111 Reactivation – Replace approximately 2.6 miles of inactive 16-inch pipeline with a new, 20-inch 655 PSIG MAOP pipeline on the existing Equitrans H-111 pipeline right-of-way (ROW). The H-111 pipeline replacement section is located in Greene County, PA between the previous location of Equitrans Zimmerman Gates and the existing location of Equitrans Bayard Gates facilities. The pipeline will include a new MLV setting installed at the Zimmerman Gates location. An existing valve setting will be used at the Bayard Gates location. The H-111 pipeline will transport gas from gathering/production companies along the existing Equitrans Mainline Transmission System for delivery to the TETCO/DTI interconnects via the H-309 pipeline and the proposed Jefferson Compressor Station. OPP will be installed at Zimmerman Gates to protect the 605 PSIG MAOP section of the H-111 (Low Pressure West System) pipeline from 655 PSIG MAOP H-111/H-115 (Low Pressure East System) pipelines. The OPP will be designed to allow for bi-directional flow of gas on the H-111 to the existing Pratt Compressor Station or to the proposed Jefferson Compressor Station.

- e. H-111 Upgrading and OPP Facilities – Requalify approximately 4.8 miles of the existing 20-inch Equitrans H-111 pipeline for a 655 PSIG MAOP. The H-111 pipeline uprate section is located in Greene County, PA between the Bayard Gates and the Mainline Valve to be installed for the line H-309. This section will have a new MLV installed at the H-309 end. The H-111 pipeline will transport gas from gathering/production companies along the existing Equitrans Mainline Transmission System for delivery to the TETCO/DTI interconnects via the H-309 pipeline and the proposed Jefferson Compressor Station. OPP will be installed at the H-309 Mainline Valve setting to protect the 216 PSIG MAOP section of the H-111 pipeline, north of the tap for H-309, from the 655 PSIG MAOP H-111 pipeline, south of the tap for H-309. The existing OPP at Bayard Gates will be removed.
- 2. Compression – The Equitrans Sunrise project will consist of the construction of one new compressor station; the Jefferson Compressor Station.
 - a. Jefferson Compressor Station - Equitrans will install three (3) natural gas combustion engine reciprocating compressors totaling approximately 14,205 hp at a location near to the TETCO corridor in Greene County, PA. The engine model will be a Caterpillar G3616LE rated at 4,735 hp each. The compressors will be Ariel KBU/6 units. Discharge piping will interconnect with TETCO operated pipelines. The work location is in Jefferson Township, Greene County, PA.
- 3. Interconnections – Sunrise will have a total of five (5) interconnections; three (3) to existing Equitrans facilities (H-111 at Jefferson, H-562 (GSF-912) at Pickenpaw and the yard piping at Logansport CS) and two (2) to foreign pipelines (TETCO/DTI).

Equitrans has taken advantage of existing pipeline and other utility corridors during the planning and routing of its proposed Project to the maximum extent feasible. As a result, most of the proposed Project route will closely parallel portions of existing Equitrans, Columbia Gas Transmission (TCO), and DTI pipelines. Route modifications (variations and alternatives) are required along approximately 0.3 miles of the 47.0-mile length of the new construction (H-302, H-306, H-309, and H-111) for the proposed Project. The H-111 pipeline upgrading will occur within existing Equitrans ROW and therefore, will not require any route modifications. These route variations generally follow, but are not directly adjacent to, existing ROW and are required for constructability reasons and to minimize environmental, cultural or public impacts. Some of the constraints for pipeline

routing adjacent to existing facilities included proximity to residences, well pads, ponds, wetlands, and multiple foreign pipeline crossings.

Equitrans is committed to implementing the best management practices and mitigation measures included in the FERC *Upland Erosion Control, Revegetation and Maintenance Plan (Plan)* and FERC *Wetland and Waterbody Construction and Mitigation Procedures (Procedures)*. Equitrans will request site-specific variances to FERC, as necessary, providing a location-specific justification for each requested variance.

Attachment E

Operations Emissions Summary from the Proposed Jefferson Compressor Station

Attachment E – Operational Emissions Summary from the Proposed Jefferson Compressor Station

ID No.	Description	Emissions (tons per year)										Formaldehyde	CO ₂ e	Total for all HAPs
		Criteria Pollutants												
		NO _x	CO	VOC	SO ₂	PM ₁₀	PM _{2.5}							
Jefferson Compressor Station														
C1-3	Compressor Engines (3)	68.6	18.8	25.9	0.2	4.1	4.1	4.1	48,000	5.5		13.5		
Gen	Generator Engine	6.7	13.3	4.7	0.02	0.52	0.52	0.52	3,100	0.05		0.4		
Deh1-2	Glycol Dehydration Units with Reboilers & Flares (2)	6.0	5.0	4.5	0.04	0.45	0.45	0.45	7,600	NA		0.9		
GH1	Fuel Gas Heater	0.10	0.08	0.01	0.00	0.01	0.01	0.01	2,700	0.00		0.00		
	Fugitive & Blowdown	N/A	N/A	7.8	N/A	0.31	0.08	0.08	1,000	N/A		0.02		
Total Controlled Emissions		81.3	37.2	43.0	0.3	5.2	5.1	5.1	62,400	5.5		14.8		
PSD/NSR Major Stationary Source Thresholds		100	250	50	250	250	250	250	100,000	N/A		N/A		
Title V Major Source Threshold		100	100	50	100	100	100	100	100,000	10		25		

Source: Trinity Consultants, Inc.

Note: CO_{2e} is the sum of all greenhouse gas emissions in carbon dioxide equivalents (CO_{2e}), using the Global Warming Potential factors for methane (CH₄: 21) and nitrous oxide (N₂O: 310) as reported in USEPA's proposed greenhouse gas (GHG) reporting rule (74 FR 16448; April 10, 2009).

Note: Per 5/13/2010 Tailoring Rule, newly-constructed sources that trigger PSD for pollutant other than GHG in 1/2/2011 - 6/30/2011 timeframe would be subject to PSD for GHG if ≥ 75,000 tpy threshold. Starting 7/1/2011, first time construction projects that emit GHG ≥ 100,000 tpy would trigger PSD for GHG (regardless of other pollutants).



February 8, 2011

Freeport Township
Attn: Ms. Barbara Cunningham, Chairman
Board of Supervisors
773 Golden Oaks Road
New Freeport, PA 15352

**Re: Act 14 Notification
Equitrans Sunrise Project**

Dear Ms. Cunningham:

On behalf of Equitrans, L.P. (Equitrans), URS Corporation is submitting this letter to inform you of Equitrans' intent to submit applications for a Pennsylvania Department of Environmental Protection (PADEP) Chapter 102 Erosion and Sediment Control General Permit 1 and a PADEP Chapter 105 Water Obstruction and Encroachment General Permit 5 – Utility Line Crossing, General Permit 7 – Minor Road Crossing, and General Permit 8 – Temporary Road Crossing for the Equitrans Sunrise Project. Equitrans is seeking authorization from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act (NGA) to construct and operate the proposed project.

Proposed Project: Equitrans Sunrise Project

Project Description: The proposed project consists of approximately 41.5 miles of 24-inch diameter pipeline (H-302), 0.21-mile of 20-inch pipeline (H-309) and 2.7 miles of 16-inch pipeline (H-306) parallel to existing EQT transmission and gathering pipelines; replacing a 2.6 mile section of inactive 16-inch pipeline with new 20-inch pipeline (H-111) including appropriate over-pressure protection (OPP) facilities; upgrading 4.8 miles of 20-inch pipeline (H-111) with the addition of appropriate OPP facilities; installing one 14,205 horsepower (hp) new compressor station (Jefferson) consisting of three units, aboveground sites for interconnections, mainline block valves, launchers and receivers, control systems, and other facilities. Please refer to the project overview (Figure 1-1) within Attachment B of the enclosed General Information Form (GIF) for the locations of these proposed construction activities. The new pipelines will be routed to maximize the use of existing corridors and minimize environmental impacts, leveraging existing land rights to the greatest extent possible. Construction is targeted to commence the third quarter of 2011.

Applicant Name: Equitrans, L.P.

Applicant Contact: Ms. Hanna E. McCoy, EQT Corporation, 412-395-3640
625 Liberty Avenue
Pittsburgh, PA 15222

URS Corporation
Foster Plaza 4
501 Holiday Drive, Suite 300
Pittsburgh, PA 15220
Tel: 412-503-4700
Fax: 412-503-4701



Ms. Barbara Cunningham, Chairman
February 8, 2011

Page 2 of 2

Project Location: Greene County, PA and Wetzel County, West Virginia
PA Municipalities: Franklin, Freeport, Gilmore, Jefferson, Wayne, and Whiteley Townships,
Greene County, PA

Section 1905-A of the Commonwealth Administrative Code as amended by Act 14, requires that each applicant for a PADEP permit give written notice to the municipality(ies) and the county(ies) in which the permitted activity is located. The written notices shall be received by the municipality(ies) and county(ies) at least 30 days before the PADEP may issue or deny the permit.

Acts 67 and 68, which amended the Municipalities Planning Code to support sound land use practices and planning efforts, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities or infrastructure, and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code.

Enclosed is a completed GIF for this proposed project. The PADEP invites you to review the attached GIF and comment on the land use aspects of this project; please be specific to the PADEP when identifying any areas of concern. If you wish to submit comments to the PADEP regarding land use review of this project, you must respond within 30 days to the PADEP regional office listed below. If land use comments are not received by the end of the comment period, the PADEP will assume that there are not substantive land use conflicts and proceed with the normal application review process.

Please submit any comments concerning this proposed project within 30 days from the date of receipt of this letter to the PADEP Permitting and Technical Services Section at Southwest Regional Office, 400 Waterfront Drive, Pittsburgh, PA, 15222-4745.

If you should have any questions or need additional information, please contact me at 412-503-4595 or Hanna McCoy of Equitrans at 412-395-3640. Additional information regarding the land use review process is available at the PADEP website www.depweb.state.pa.us (Keyword: Land Use Reviews).

Sincerely,

URS CORPORATION

A handwritten signature in cursive script that reads "Brook Bertig-Coll".

Brook Bertig-Coll
Project Environmental Scientist

Enclosure: Completed GIF and attachments



February 8, 2011

Gilmore Township
Attn: Mr. Jeffery L. Rode, Chairman
Board of Supervisors
190 Crabapple Valley
New Freeport, PA 15352

**Re: Act 14 Notification
Equitrans Sunrise Project**

Dear Mr. Rode:

On behalf of Equitrans, L.P. (Equitrans), URS Corporation is submitting this letter to inform you of Equitrans' intent to submit applications for a Pennsylvania Department of Environmental Protection (PADEP) Chapter 102 Erosion and Sediment Control General Permit 1 and a PADEP Chapter 105 Water Obstruction and Encroachment General Permit 5 – Utility Line Crossing, General Permit 7 – Minor Road Crossing, and General Permit 8 – Temporary Road Crossing for the Equitrans Sunrise Project. Equitrans is seeking authorization from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act (NGA) to construct and operate the proposed project.

Proposed Project: Equitrans Sunrise Project

Project Description: The proposed project consists of approximately 41.5 miles of 24-inch diameter pipeline (H-302), 0.21-mile of 20-inch pipeline (H-309) and 2.7 miles of 16-inch pipeline (H-306) parallel to existing EQT transmission and gathering pipelines; replacing a 2.6 mile section of inactive 16-inch pipeline with new 20-inch pipeline (H-111) including appropriate over-pressure protection (OPP) facilities; upgrading 4.8 miles of 20-inch pipeline (H-111) with the addition of appropriate OPP facilities; installing one 14,205 horsepower (hp) new compressor station (Jefferson) consisting of three units, aboveground sites for interconnections, mainline block valves, launchers and receivers, control systems, and other facilities. Please refer to the project overview (Figure 1-1) within Attachment B of the enclosed General Information Form (GIF) for the locations of these proposed construction activities. The new pipelines will be routed to maximize the use of existing corridors and minimize environmental impacts, leveraging existing land rights to the greatest extent possible. Construction is targeted to commence the third quarter of 2011.

Applicant Name: Equitrans, L.P.

Applicant Contact: Ms. Hanna E. McCoy, EQT Corporation, 412-395-3640
625 Liberty Avenue
Pittsburgh, PA 15222

URS Corporation
Foster Plaza 4
501 Holiday Drive, Suite 300
Pittsburgh, PA 15220
Tel: 412-503-4700
Fax: 412-503-4701



Mr. Jeffery L. Rode, Chairman
February 8, 2011

Page 2 of 2

Project Location: Greene County, PA and Wetzel County, West Virginia
PA Municipalities: Franklin, Freeport, Gilmore, Jefferson, Wayne, and Whiteley Townships,
Greene County, PA

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If you should have any questions or need additional information, please contact me at 412-503-4595 or Hanna McCoy of Equitrans at 412-395-3640. Additional information regarding the land use review process is available at the PADEP website www.depweb.state.pa.us (Keyword: Land Use Reviews).

Sincerely,

URS CORPORATION

A handwritten signature in cursive script that reads "Brook Bertig-Coll".

Brook Bertig-Coll
Project Environmental Scientist

Enclosure: Completed GIF and attachments



February 8, 2011

Greene County
Attn: Ms. Pam Snyder, Chairman
County Office Building
93 East High Street
Waynesburg, PA 15370

**Re: Act 14 Notification
Equitrans Sunrise Project**

Dear Ms. Snyder:

On behalf of Equitrans, L.P. (Equitrans), URS Corporation is submitting this letter to inform you of Equitrans' intent to submit applications for a Pennsylvania Department of Environmental Protection (PADEP) Chapter 102 Erosion and Sediment Control General Permit 1 and a PADEP Chapter 105 Water Obstruction and Encroachment General Permit 5 – Utility Line Crossing, General Permit 7 – Minor Road Crossing, and General Permit 8 – Temporary Road Crossing for the Equitrans Sunrise Project. Equitrans is seeking authorization from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act (NGA) to construct and operate the proposed project.

Proposed Project: Equitrans Sunrise Project

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Applicant Name: Equitrans, L.P.

Applicant Contact: Ms. Hanna E. McCoy, EQT Corporation, 412-395-3640
625 Liberty Avenue
Pittsburgh, PA 15222

URS Corporation
Foster Plaza 4
501 Holiday Drive, Suite 300
Pittsburgh, PA 15220
Tel: 412-503-4700
Fax: 412-503-4701



Ms. Pam Snyder, Chairman
February 8, 2011

Page 2 of 2

Project Location: Greene County, PA and Wetzel County, West Virginia
PA Municipalities: Franklin, Freeport, Gilmore, Jefferson, Wayne, and Whiteley Townships,
Greene County, PA

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If you should have any questions or need additional information, please contact me at 412-503-4595 or Hanna McCoy of Equitrans at 412-395-3640. Additional information regarding the land use review process is available at the PADEP website www.depweb.state.pa.us (Keyword: Land Use Reviews).

Sincerely,

URS CORPORATION

A handwritten signature in cursive script that reads "Brook Bertig-Coll".

Brook Bertig-Coll
Project Environmental Scientist

Enclosure: Completed GIF and attachments



February 8, 2011

Jefferson Township
Attn: Mr. Richard L. Tekavec, Chairman
Board of Supervisors
Jefferson Township Municipal Building
173 Goslin Road
Rices Landing, PA 15357

**Re: Act 14 Notification
Equitrans Sunrise Project**

Dear Mr. Tekavec:

On behalf of Equitrans, L.P. (Equitrans), URS Corporation is submitting this letter to inform you of Equitrans' intent to submit applications for a Pennsylvania Department of Environmental Protection (PADEP) Chapter 102 Erosion and Sediment Control General Permit 1 and a PADEP Chapter 105 Water Obstruction and Encroachment General Permit 5 – Utility Line Crossing, General Permit 7 – Minor Road Crossing, and General Permit 8 – Temporary Road Crossing for the Equitrans Sunrise Project. Equitrans is seeking authorization from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act (NGA) to construct and operate the proposed project.

Proposed Project: Equitrans Sunrise Project

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Applicant Name: Equitrans, L.P.

Applicant Contact: Ms. Hanna E. McCoy, EQT Corporation, 412-395-3640
625 Liberty Avenue
Pittsburgh, PA 15222

URS Corporation
Foster Plaza 4
501 Holiday Drive, Suite 300
Pittsburgh, PA 15220
Tel: 412-503-4700
Fax: 412-503-4701



Mr. Richard L. Tekavec, Chairman
February 8, 2011

Page 2 of 2

Project Location: Greene County, PA and Wetzel County, West Virginia
PA Municipalities: Franklin, Freeport, Gilmore, Jefferson, Wayne, and Whiteley Townships,
Greene County, PA

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If you should have any questions or need additional information, please contact me at 412-503-4595 or Hanna McCoy of Equitrans at 412-395-3640. Additional information regarding the land use review process is available at the PADEP website www.depweb.state.pa.us (Keyword: Land Use Reviews).

Sincerely,

URS CORPORATION

A handwritten signature in cursive script that reads "Brook Bertig-Coll".

Brook Bertig-Coll
Project Environmental Scientist

Enclosure: Completed GIF and attachments



February 8, 2011

Wayne Township
Attn: Mr. Tim V. Chapman, Chairman
Board of Supervisors
132 Spraggs Road
Spraggs, PA 15362

**Re: Act 14 Notification
Equitrans Sunrise Project**

Dear Mr. Chapman:

On behalf of Equitrans, L.P. (Equitrans), URS Corporation is submitting this letter to inform you of Equitrans' intent to submit applications for a Pennsylvania Department of Environmental Protection (PADEP) Chapter 102 Erosion and Sediment Control General Permit 1 and a PADEP Chapter 105 Water Obstruction and Encroachment General Permit 5 – Utility Line Crossing, General Permit 7 – Minor Road Crossing, and General Permit 8 – Temporary Road Crossing for the Equitrans Sunrise Project. Equitrans is seeking authorization from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act (NGA) to construct and operate the proposed project.

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Applicant Name: Equitrans, L.P.

Applicant Contact: Ms. Hanna E. McCoy, EQT Corporation, 412-395-3640
625 Liberty Avenue
Pittsburgh, PA 15222

URS Corporation
Foster Plaza 4
501 Holiday Drive, Suite 300
Pittsburgh, PA 15220
Tel: 412-503-4700
Fax: 412-503-4701



Mr. Tim V. Chapman, Chairman
February 8, 2011

Page 2 of 2

Project Location: Greene County, PA and Wetzel County, West Virginia
PA Municipalities: Franklin, Freeport, Gilmore, Jefferson, Wayne, and Whiteley Townships,
Greene County, PA

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If you should have any questions or need additional information, please contact me at 412-503-4595 or Hanna McCoy of Equitrans at 412-395-3640. Additional information regarding the land use review process is available at the PADEP website www.depweb.state.pa.us (Keyword: Land Use Reviews).

Sincerely,

URS CORPORATION

A handwritten signature in cursive script that reads "Brook Bertig-Coll".

Brook Bertig-Coll
Project Environmental Scientist

Enclosure: Completed GIF and attachments



February 8, 2011

Whiteley Township
Attn: Mr. Mark E. Lemley, Chairman
Board of Supervisors
Whiteley Township Municipal Building
1426 Kirby Road
Waynesburg, PA 15370

**Re: Act 14 Notification
Equitrans Sunrise Project**

Dear Mr. Lemley:

On behalf of Equitrans, L.P. (Equitrans), URS Corporation is submitting this letter to inform you of Equitrans' intent to submit applications for a Pennsylvania Department of Environmental Protection (PADEP) Chapter 102 Erosion and Sediment Control General Permit 1 and a PADEP Chapter 105 Water Obstruction and Encroachment General Permit 5 – Utility Line Crossing, General Permit 7 – Minor Road Crossing, and General Permit 8 – Temporary Road Crossing for the Equitrans Sunrise Project. Equitrans is seeking authorization from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act (NGA) to construct and operate the proposed project.

Proposed Project: Equitrans Sunrise Project

Project Description: The proposed project consists of approximately 41.5 miles of 24-inch diameter pipeline (H-302), 0.21-mile of 20-inch pipeline (H-309) and 2.7 miles of 16-inch pipeline (H-306) parallel to existing EQT transmission and gathering pipelines; replacing a 2.6 mile section of inactive 16-inch pipeline with new 20-inch pipeline (H-111) including appropriate over-pressure protection (OPP) facilities; upgrading 4.8 miles of 20-inch pipeline (H-111) with the addition of appropriate OPP facilities; installing one 14,205 horsepower (hp) new compressor station (Jefferson) consisting of three units, aboveground sites for interconnections, mainline block valves, launchers and receivers, control systems, and other facilities. Please refer to the project overview (Figure 1-1) within Attachment B of the enclosed General Information Form (GIF) for the locations of these proposed construction activities. The new pipelines will be routed to maximize the use of existing corridors and minimize environmental impacts, leveraging existing land rights to the greatest extent possible. Construction is targeted to commence the third quarter of 2011.

Applicant Name: Equitrans, L.P.

Applicant Contact: Ms. Hanna E. McCoy, EQT Corporation, 412-395-3640
625 Liberty Avenue
Pittsburgh, PA 15222

URS Corporation
Foster Plaza 4
501 Holiday Drive, Suite 300
Pittsburgh, PA 15220
Tel: 412-503-4700
Fax: 412-503-4701



Mr. Mark E. Lemley, Chairman
February 8, 2011

Page 2 of 2

Project Location: Greene County, PA and Wetzel County, West Virginia
PA Municipalities: Franklin, Freeport, Gilmore, Jefferson, Wayne, and Whiteley Townships,
Greene County, PA

Section 1905-A of the Commonwealth Administrative Code as amended by Act 14, requires that each applicant for a PADEP permit give written notice to the municipality(ies) and the county(ies) in which the permitted activity is located. The written notices shall be received by the municipality(ies) and county(ies) at least 30 days before the PADEP may issue or deny the permit.

Acts 67 and 68, which amended the Municipalities Planning Code to support sound land use practices and planning efforts, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities or infrastructure, and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code.

Enclosed is a completed GIF for this proposed project. The PADEP invites you to review the attached GIF and comment on the land use aspects of this project; please be specific to the PADEP when identifying any areas of concern. If you wish to submit comments to the PADEP regarding land use review of this project, you must respond within 30 days to the PADEP regional office listed below. If land use comments are not received by the end of the comment period, the PADEP will assume that there are not substantive land use conflicts and proceed with the normal application review process.

Please submit any comments concerning this proposed project within 30 days from the date of receipt of this letter to the PADEP Permitting and Technical Services Section at Southwest Regional Office, 400 Waterfront Drive, Pittsburgh, PA, 15222-4745.

If you should have any questions or need additional information, please contact me at 412-503-4595 or Hanna McCoy of Equitrans at 412-395-3640. Additional information regarding the land use review process is available at the PADEP website www.depweb.state.pa.us (Keyword: Land Use Reviews).

Sincerely,

URS CORPORATION

A handwritten signature in cursive script that reads "Brook Bertig-Coll".

Brook Bertig-Coll
Project Environmental Scientist

Enclosure: Completed GIF and attachments

Section 7

Proof of Receipt of Act 14 Municipal Notifications

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Greene County Commissioners
Attn: Ms. Pam Snyder, Chairman
County Office Building
93 East High Street
Waynesburg, PA 15370

2. Article Number

(Transfer from service label)

7009 1410 0001 7025 0380

PS Form 3811, February 2004

Domestic Return Receipt

102595-02-M-1540

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X

Michael

☐ Agent☐ Addressee

B. Received by (Printed Name)

Michael

C. Date of Delivery

2/9

D. Is delivery address different from item 1?

If YES, enter delivery address below:

☐ Yes☐ No

3. Service Type

☒ Certified Mail☐ Express Mail☐ Registered☒ Return Receipt for Merchandise☐ Insured Mail☐ C.O.D.

4. Restricted Delivery? (Extra Fee)

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1. Article Addressed to:

Jefferson Township
Attn: Mr. Richard L. Tekavec, Chairman
Board of Supervisors
Jefferson Township Municipal Building
173 Goslin Road
Rices Landing, PA 15357

2. Article Number

(Transfer from service label)

7009 1410 0001 7025 0397

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Bailey

☐ Agent☐ Addressee

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BAILEY

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2-9-11

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3. Service Type

☒ Certified Mail☐ Express Mail☐ Registered☒ Return Receipt for Merchandise☐ Insured Mail☐ C.O.D.

4. Restricted Delivery? (Extra Fee)

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SENDER: COMPLETE THIS SECTION

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1. Article Addressed to:

Wayne Township
Attn: Mr. Tim V. Chapman, Chairman
Board of Supervisors
132 Spraggs Road
Spraggs, PA 15362

2. Article Number

(Transfer from service label)

7009 1410 0001 7025 0410

PS Form 3811, February 2004

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John A. Wells Jr

☐ Agent☐ Addressee

B. Received by (Printed Name)

John A. Wells Jr

C. Date of Delivery

2/9/11

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3. Service Type

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- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Franklin Township
Attn: Mr. T. Reed Kiger, Chairman
Board of Supervisors
Franklin Township Municipal Building
568 Rolling Meadows Road
Waynesburg, PA 15370

2. Article Number
(Transfer from service label)

7009 1410 0001 7025 0359

PS Form 3811, February 2004

Domestic Return Receipt

102595-02-M-1540

COMPLETE THIS SECTION ON DELIVERY

A. Signature

- ☐
- Agent
-
- ☐
- Addressee

B. Received by (Printed Name)

CAROL KRAFT

C. Date of Delivery

2/9/11

D. Is delivery address different from item 1?

If YES, enter delivery address below:

- ☐
- Yes
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- ☐
- No

3. Service Type

- ☒
- Certified Mail
- ☐
- Express Mail
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- ☐
- Registered
- ☒
- Return Receipt for Merchandise
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- Insured Mail
- ☐
- C.O.D.

4. Restricted Delivery? (Extra Fee)

- ☐
- Yes

SENDER: COMPLETE THIS SECTION

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- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Freeport Township
Attn: Ms. Barbara Cunningham, Chairman
Board of Supervisors
773 Golden Oaks Road
New Freeport, PA 15352

2. Article Number
(Transfer from service label)

7009 1410 0001 7025 0366

PS Form 3811, February 2004

Domestic Return Receipt

102595-02-M-1540

COMPLETE THIS SECTION ON DELIVERY

A. Signature

- ☐
- Agent
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- ☐
- Addressee

B. Received by (Printed Name)

Lisa L. Gatrell

C. Date of Delivery

2-9-11

D. Is delivery address different from item 1?

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- ☐
- Yes
-
- ☐
- No

3. Service Type

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- Certified Mail
- ☐
- Express Mail
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- ☐
- Registered
- ☒
- Return Receipt for Merchandise
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4. Restricted Delivery? (Extra Fee)

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- Yes

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- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Gilmore Township
Attn: Mr. Jeffery L. Rode, Chairman
Board of Supervisors
190 Crabapple Valley
New Freeport, PA 15352

2. Article Number
(Transfer from service label)

7009 1410 0001 7025 0373

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COMPLETE THIS SECTION ON DELIVERY

A. Signature

- ☐
- Agent
-
- ☐
- Addressee

B. Received by (Printed Name)

Lisa L. Gatrell

C. Date of Delivery

2-9-11

D. Is delivery address different from item 1?

If YES, enter delivery address below:

- ☐
- Yes
-
- ☐
- No

3. Service Type

- ☒
- Certified Mail
- ☐
- Express Mail
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- ☐
- Registered
- ☒
- Return Receipt for Merchandise
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- ☐
- Insured Mail
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- C.O.D.

4. Restricted Delivery? (Extra Fee)

- ☐
- Yes

SENDER: COMPLETE THIS SECTION

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- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Whiteley Township
Attn: Mr. Mark E. Lemley, Chairman
Board of Supervisors
Whiteley Township Municipal Building
1426 Kirby Road
Waynesburg, PA 15370

2. Article Number*(Transfer from service label)*

7009 1410 0001 7025 0403

PS Form 3811, February 2004

Domestic Return Receipt

COMPLETE THIS SECTION ON DELIVERY**A. Signature**

X

Jeffery R. Raddish☐ Agent☐ Addressee**B. Received by (Printed Name)**

J RADDISH

C. Date of Delivery

2-9-11

D. Is delivery address different from item 1?☐ Yes

If YES, enter delivery address below:

☒ No**3. Service Type**☒ Certified Mail☐ Express Mail☐ Registered☒ Return Receipt for Merchandise☐ Insured Mail☐ C.O.D.**4. Restricted Delivery? (Extra Fee)**☐ Yes

102595-02-M-1540

Section 8

Pennsylvania Natural Heritage Program Review

(Pennsylvania Natural Diversity Inventory)



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850



February 25, 2011

Jason Duffey
Environmental Solutions and Innovations, Inc.
4525 Este Avenue
Cincinnati, Ohio 45232

RE: USFWS Project #2010-0686

Dear Mr. Duffey:

This responds to your letter of January 7, 2011, requesting our review of mist-net survey results for the proposed Equitrans Sunrise Revision 7 Natural Gas Pipeline project, located in Greene County, Pennsylvania; and Wetzel County, West Virginia. The following comments are provided pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to ensure the protection of endangered and threatened species.

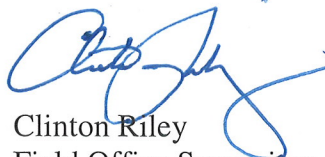
The proposed project is located within the range of the Indiana bat (*Myotis sodalis*), a species that is federally listed as endangered. Due to proposed forest clearing associated with construction of the pipeline, mist-netting was recommended to determine whether Indiana bats are present. According to the Summer 2010 survey report of the Revision 7 pipeline alignment, surveys were conducted at 110 sites within the project area from May 15 to July 2, 2010 and continued from August 2 to August 4, 2010, in accordance with the Fish and Wildlife Service's Indiana bat mist-net survey guidelines. During these surveys, 368 bats of six species were captured, but this did not include any Indiana bats. Based on these survey results, we have concluded that Indiana bats are either not present in the project area, or are present in such low densities that they were not detected. Consequently, we have determined that tree-clearing related to installation of the proposed natural gas pipeline construction project is not likely to adversely affect the Indiana bat.

This response relates only to endangered or threatened species under our jurisdiction, based on an office review of the proposed project's location. No field inspection of the project area has been conducted by this office. Consequently, this letter is not to be construed as addressing potential Service concerns under the Fish and Wildlife Coordination Act or other authorities.

To avoid potential delays in reviewing your project, please use the above-referenced USFWS project tracking number in any future correspondence regarding this project.

If you have any questions regarding this matter, please contact Kim Faulds of my staff at 814-234-4090.

Sincerely,



Clinton Riley
Field Office Supervisor



Division of Environmental
Planning and Habitat
Protection
717-783-5957

COMMONWEALTH OF PENNSYLVANIA
Pennsylvania Game Commission

2001 ELMERTON AVENUE
HARRISBURG, PA 17110-9797

*"To manage all wild birds, mammals and their habitats
for current and future generations."*

ADMINISTRATIVE BUREAUS:

ADMINISTRATION.....717-787-5670
HUMAN RESOURCES.....717-787-7836
FISCAL MANAGEMENT.....717-787-7314
CONTRACTS AND
PROCUREMENT.....717-787-6594
LICENSING.....717-787-2084
OFFICE SERVICES.....717-787-2116
WILDLIFE MANAGEMENT.....717-787-5529
INFORMATION & EDUCATION.....717-787-6286
WILDLIFE PROTECTION.....717-783-6526
WILDLIFE HABITAT
MANAGEMENT.....717-787-6818
REAL ESTATE DIVISION.....717-787-6568
AUTOMATED TECHNOLOGY
SERVICES.....717-787-4076

www.pgc.state.pa.us

March 4, 2011

Large Project PNDI Review

Ms. Brook Bertig-Coll
URS Corporation
501 Holiday Drive, Suite 300
Pittsburgh, PA 15220

Re: Equitrans, LP – Sunrise Project (REVISED)
*H-302 Pipeline Construction, H-309 Pipeline Construction, H-111 Pipeline Replacement &
Requalification, Jefferson Compressor Station and Associated Access Roads, Workspaces & Facilities*
State Game Lands No. 179
Greene County, PA

Dear Ms. Bertig-Coll,

Thank you for submitting your Pennsylvania Natural Diversity Inventory (PNDI) Large Project Environmental Review request. The Pennsylvania Game Commission (PGC) screened this revised project for potential impacts to species and resources of concern under PGC responsibility, which includes birds and mammals only.

Potential Impact Anticipated

The PGC has received and thoroughly reviewed the information that you provided to this office, as well as PNDI data, and has determined that there are no known occurrences of state listed **threatened or endangered** bird or mammal species associated with your project. However, the January 7, 2011 Indiana bat summer mist net survey report completed by Environmental Solutions & Innovation, Inc. indicates that a **species of special concern** is located within the project area. As a result, potential impacts to the species listed below are associated with your project, and additional measures are recommended to avoid those impacts.

Conservation Measure

The following is a species of special concern, and therefore, is not a target species for additional surveys:

Scientific Name	Common Name
<i>Myotis septentrionalis</i>	Northern Myotis

However, because of their ecological significance, the following seasonal restriction is suggested to avoid potential impacts to roosting northern myotis:

- *All trees or dead snags greater than 5 inches in diameter at breast height that need to be harvested to facilitate the project (including any access roads or off-R.O.W. work spaces) shall be cut between November 1 and March 31.*

This response represents the most up-to-date summary of the PNDI data files and is valid for one (1) year from the date of this letter. An absence of recorded information does not necessarily imply actual conditions on site. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered.

Should the proposed work continue beyond the period covered by this letter, please resubmit the project to this agency as an "Update" (including an updated PNDI receipt, project narrative and accurate map). If the proposed work has not changed and no additional information concerning listed species is found, the project will be cleared for PNDI requirements under this agency for an additional year.

This finding applies to impacts to birds and mammals only. To complete your review of state and federally-listed threatened and endangered species and species of special concern, please be sure that the U.S. Fish and Wildlife Service, the PA Department of Conservation and Natural Resources, and/or the PA Fish and Boat Commission have been contacted regarding this project as directed by the online PNDI ER Tool found at www.naturalheritage.state.pa.us.

A portion of the proposed project is located on State Game Lands No. 179. If you have not done so already, please contact Mr. Barry Zaffuto, Land Management Supervisor, at 724-238-9523 to discuss and coordinate the project on State Game Lands.

Sincerely,



Nathan P. Havens
Division of Environmental Planning & Habitat Protection
Bureau of Wildlife Habitat Management
Phone: 717-787-4250, Extension 3606
Fax: 717-787-6957
E-mail: nhavens@state.pa.us

A PNHP Partner



NPH/nph

cc: Anderson (via e-mail)
Zaffuto (via e-mail)
Leiendecker (via e-mail)
Trusso (via e-mail)
Itle (via e-mail)
Speelman (via e-mail)
Ms. Kimberley D. Bose, FERC (via www.ferc.gov – eFiling)
File, F:\OILGASMINERALS\179
File, PNDI

BUREAU OF FORESTRY

March 2, 2011

PNDI Number: 20685

Hanna McCoy
Equitrans

FAX: 412-553-5757 (hard copy WILL NOT follow)

CC: Jim Kooser
URS Corporation
FAX: 216-622-2428

Re: Equitrans Project Sunrise – FERC Natural Gas Pipeline Project (Docket No. CP11-68-000)
Franklin, Freeport, Gilmore, Jackson, Jefferson, Wayne, Whiteley Townships; Greene County

Dear Hanna,

Thank you for submission of the Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review Receipt Number 20685 and subsequent botanical survey report for review. PA Department of Conservation and Natural Resources screened this project for potential impacts to species and resources of concern under DCNR's responsibility, which includes plants, terrestrial invertebrates, natural communities, and geologic features only. **DCNR appreciates the work of Equitrans and URS Corporation to help conserve PA Plant Species of Special Concern.**

A botanical survey was conducted on August 3-6 and 17-18, 2010 by URS Corporation for *Oxydendrum arboreum*, *Scutellaria saxatilis*, *Senna marilandica*, and *Smallanthus uvedalis* (*Polymnia uvedalia*), as well as the host plants for the PA Critically Imperiled Invertebrate Species *Amblyscirtes vialis* and *Chlosyne nycteis*.

NO IMPACT ANTICIPATED AS PER SURVEY AND CONSERVATION MEASURES:

URS Corporation identified one individual of *Oxydendrum arboreum* during the botanical surveys. However, this individual was found approximately 90 feet south of the proposed right-of-way. **Therefore this individual will not be impacted by the proposed pipeline. This individual was found along a road which may be used to access portions of the project. Therefore, DCNR recommends no road widening within this portion of Shough Ridge Road.**

URS Corporation also identified two populations of *Senna marilandica* along the proposed pipeline route. One population (shown on map G-4 in the Mitigation Plan) is located beyond the proposed project right-of-way and is unlikely to be impacted by this project. The second population (shown on map JA-2 in the Mitigation Plan) is currently located within the proposed right-of-way. **As a result, DCNR and Equitrans have agreed upon a mitigation plan which will transplant individuals from this area to another nearby location with State Gamelands 179.**

Details of this plan are as follows:

1. Collecting baseline data on the both *Senna marilandica* populations.

- In early September 2011, field crews will re-visit these populations to establish photo documentation and collect further data regarding the number and size of plants and stems, the numbers of fruits and flowers per plant, evidence of plant stress, and habitat characteristics.

2. Removing live *S. marilandica* plants from the proposed right-of-way near MP 15.3, and transplanting these individuals to a area to be selected by DCNR and URS Corporation within State Gamelands 179 (after receiving PA Game Commission approval).

- Each of the *S. marilandica* plants near MP 15.3 will be carefully excavated and removed. Plants will not be removed from the other population near MP 18.4. Collectors will dig deeply enough to capture the taproot, which may approach 50 centimeters for tall plants (up to 2 meters). Excavated plants and soil will be placed in appropriate sized containers, which will be watered and transported to the off-site location.
- All excavated plants will be transported to an area to be selected on State Game Land 179 (Figure 2). The area should be appropriate for *S. marilandica* in terms of light availability, soil type and moisture, and physiographic position. The site should be accessible to researchers carrying equipment, but should not be located where disturbance during the transplant period is likely. Plants will be watered immediately after transplanting.

- The transplant site will be inspected weekly from the transplant date until the plants begin to senesce, likely in November. Plants will be watered during the inspection if signs of wilting or other water stress are seen.
- Furthermore, the transplant site is on public lands, may be unprotected, and may be susceptible to unpredictable disturbances. PA DCNR has acknowledged this, and agreed to hold Equitrans blameless for damage to the plants at the transplant site if affected by this type of disturbance. An overall goal of 80% survival of all transplanted *S. marilandica* plants is reasonable for the Sunrise project.

3. Seed collection from transplanted *S. marilandica* individuals within the project area.

- All seeds will be collected from the transplanted *S. marilandica* plants. Seeds will be stored cold at URS Cleveland. The collected seeds will be scarified before 20 days before planting. Scarification may be accomplished by gently rubbing seeds between sheets of 80 to 120 grit sandpaper. Scarified seeds will be cold/moist stratified. Seeds will be placed into plastic bags or containers. Sand or peat moss will be added to cover the seeds. The substrate/seed mixture will be moistened, and stored at 20 to 25°C for 20 days.
- Seeds will be planted in the vicinity of the original *S. marilandica* population location. Seeds should be sown along the edges of the right-of-way in compartment Jackson 03, near MP 15.3. Seeds will be scattered in small groups, with 10 to 20 seeds per group. The soil should be scarified using hand implements, seeds should be sown at depths of approximately 6 inches. Seeds will be covered, and the soil lightly compacted. Sown areas will be watered thoroughly. Sown areas will be mapped using a hand-held GPS receiver.

4. Monitoring of the transplanted *S. marilandica* individuals and the planted seed will take place following construction and annually through 2014.

- The planting and seed sowing sites should be visited once a week for the first three weeks after planting. At each visit, the overall health of the transplanted *S. marilandica* plants will be assessed. Crews should be prepared to water transplanted plants and seeded areas if necessary.
- In early September 2012, 2013 and 2014, crews will visit both *S. marilandica* populations to accomplish the following tasks:
 - 1) Photos will be taken at the permanent photo station established during the baseline monitoring.
 - 2) Field data will be collected for both *S. marilandica* populations (the undisturbed population near MP 18.4 and the transplanted population at MP 15.3). Data collected should include: the number of plants and stems per plant; heights of all stems; number of flowers, leaves and fruits per plant; evidence of plant stress or herbivory; general observations regarding plant health; and habitat conditions including observations regarding the canopy cover and soil texture.

Success will be achieved if 80% of the transplanted *S. marilandica* plants survive at the end of the third monitoring year. Note that there are factors beyond the control of Equitrans, which could influence the survival of the transplanted population near MP 15.3. *S. marilandica* seems to have several productive years, after which the plants go into decline. Data gathered at the undisturbed population near MP 18.4 will serve as a check on the health and status of *S. marilandica* in the general area.

Equitrans will prevent access roads, structures or other disturbances associated with pipeline activities to impact the populations resulting from the seeding. The final location of the *S. marilandica* individuals that germinate in compartment Jackson 03 will be mapped. The location will be made known to all maintenance crews working in the area. Equitrans will agree to prevent herbicide use within 50 feet of *S. marilandica* plants found in compartment Jackson 03. An annual report will be prepared and submitted to PA DCNR by 30 November of each monitoring year.

conserve

sustain

enjoy

DCNR recommends the following VOLUNTARY steps to help prevent the spread of invasive species:

- The area of disturbance should be minimized to the fullest extent that would allow for pipeline construction; this will help to lessen the area of soil and vegetation disturbance associated with this project.
- If possible, please clean all construction equipment and vehicles thoroughly (especially the undercarriage and wheels) before they are brought on site, this will remove invasive plant seeds from the equipment and undercarriages of the vehicles that may have been picked up at other sites.
- Avoid using seed mixes that include invasive plant species (like Crown vetch) to re-vegetate the area. Please also attempt to use weed-free straw or hay mixes when possible. A complete list of all Pennsylvania invasive plants can be found here: <http://www.dcnr.state.pa.us/forestry/wildplant/invasivelist.aspx>

This response represents the most up-to-date summary of the PNDI data files and is valid for one (1) year from the date of this letter. An absence of recorded information does not necessarily imply actual conditions on-site. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered. Should the proposed work continue beyond the period covered by this letter, please resubmit the project to this agency as an "Update" (including an updated PNDI receipt, project narrative and accurate map).

This finding applies to impacts to DCNR only. To complete your review of state and federally-listed threatened and endangered species and species of special concern, please be sure the U.S. Fish and Wildlife Service, PA Game Commission, and the Pennsylvania Fish and Boat Commission have been contacted regarding this project as directed by the online PNDI ER Tool found at www.naturalheritage.state.pa.us.

Sincerely,



Mr. Kelly L. Stich, Environmental Review Specialist FOR Chris Firestone, Wild Plant Program Mgr.
Ph: 717-425-5370 ~ Fax: 717-772-0271 ~ c-ksitch@state.pa.us

conserve

sustain

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BUREAU OF FORESTRY

March 2, 2011

PNDI Number: 20895

Hanna McCoy
Equitrans

FAX: 412-553-5757 (hard copy WILL NOT follow)

CC: Jim Kooser
URS Corporation
FAX: 216-622-2428Re: Equitrans Project Sunrise – Jefferson Compressor Station
Jefferson Township; Greene County

Dear Hanna,

Thank you for submission of the Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review Receipt Number 20895 and subsequent botanical survey report for review. PA Department of Conservation and Natural Resources screened this project for potential impacts to species and resources of concern under DCNR's responsibility, which includes plants, terrestrial invertebrates, natural communities, and geologic features only. **DCNR appreciates the work of Equitrans and URS Corporation to help conserve PA Plant Species of Special Concern.**

NO IMPACT ANTICIPATED AS PER SURVEY:

PNDI records indicate species or resources of concern are located in the vicinity of the project. However, based on the information you submitted concerning the nature of the project, the immediate location, and our detailed resource information, DCNR has determined that no impact is likely.

No impacts are anticipated as a result of this project as per survey conducted on August 3-6 and 17-18, 2010 by URS Corporation for *Aplectrum hyemale*, *Scutellaria saxatilis*, and *Tipularia discolor*. No PA Plant Species of Special Concern were found within the project location.

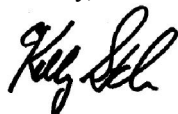
DCNR recommends the following VOLUNTARY steps to help prevent the spread of invasive species:

- The area of disturbance should be minimized to the fullest extent that would allow for compressor station construction; this will help to lessen the area of soil and vegetation disturbance associated with this project.
- If possible, please clean all construction equipment and vehicles thoroughly (especially the undercarriage and wheels) before they are brought on site, this will remove invasive plant seeds from the equipment and undercarriages of the vehicles that may have been picked up at other sites.
- Avoid using seed mixes that include invasive plant species (like Crown vetch) to re-vegetate the area. Please also attempt to use weed-free straw or hay mixes when possible. A complete list of all Pennsylvania invasive plants can be found here: <http://www.dcnr.state.pa.us/forestry/wildplant/invasivelist.aspx>

This response represents the most up-to-date summary of the PNDI data files and is valid for one (1) year from the date of this letter. An absence of recorded information does not necessarily imply actual conditions on-site. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered. Should the proposed work continue beyond the period covered by this letter, please resubmit the project to this agency as an "Update" (including an updated PNDI receipt, project narrative and accurate map).

This finding applies to impacts to DCNR only. To complete your review of state and federally-listed threatened and endangered species and species of special concern, please be sure the U.S. Fish and Wildlife Service, PA Game Commission, and the Pennsylvania Fish and Boat Commission have been contacted regarding this project as directed by the online PNDI ER Tool found at www.naturalheritage.state.pa.us.

Sincerely,



Mr. Kelly L. Sitch, Environmental Review Specialist FOR Chris Firestone, Wild Plant Program Mgr.


Ph: 717-425-5370 ~ Fax: 717-772-0271 ~ c-ksitch@state.pa.us**conserve****sustain****enjoy**

P.O. Box 8552, Harrisburg, PA 17105-8552 717-787-3444 (fax) 717-772-0271



"Shervinskie, Thomas"
<tshervinsk@state.pa.us>
05/26/2011 11:15 AM

To "Steven_ Crescenzo@URSCorp.com"
<Steven_ Crescenzo@URSCorp.com>
cc
bcc
Subject RE: Sunrise Environmental: TSF Time of Year Restrictions

History:  This message has been replied to and forwarded.

Steven,

I have reviewed the attached resource summary table and other information for the Sunrise Project in Greene County. The Pennsylvania Fish and Boat Commission manages Whitely Creek as a stocked trout stream. The proposed crossings are on tributaries greater than ½ mile upstream of the confluence of the tributaries and Whitely Creek. The PFBC will not require time of year seasonal construction restriction periods for these crossings. I trust all earth disturbance work for this project will comply with the approved Erosion and Sedimentation Plan authorized under state permitting guidance. I suggest that you contact the Department of Environmental Protection and the Pennsylvania Fish and Boat Commission should activities related to the project result in impacts to water quality.

If you have any questions, do not hesitate to contact me,

Tom

Tom Shervinskie, Fisheries Biologist
PA Fish & Boat Commission
Division of Environmental Services
450 Robinson Lane, Bellefonte, PA 16823
p: 814-359-5228 / f: 814-359-5175

Sometimes even the simple things can become complicated

From: Steven_Crescenzo@URSCorp.com [mailto:Steven_Crescenzo@URSCorp.com]
Sent: Tuesday, May 24, 2011 10:53 AM
To: Shervinskie, Thomas
Subject: Sunrise Environmental: TSF Time of Year Restrictions

Mr. Shervinsky,

Good morning. As a follow-up to our phone conversation yesterday morning, below is a listing of the TSF waterbody crossings associated with the proposed Equitrans Sunrise Project in Greene County, PA. The tentative construction schedule for these crossings is to begin August/September 2011. The pipeline crossings will be conducted as per the attached details on Sheets 18 and 19. Access roads will be crossed via the details on Sheet 13.

Currently, this project is under review for coverage under the PADEP Chapter 102 ESCGP-1 and Chapter

105 GP-5, 7, and 8, and is also being reviewed by the USACE Pittsburgh District.

This email includes a PDF of the crossing locations, an Excel spreadsheet with information on each crossing, and the associated details for crossing methods. Please review and comment on the time of year restrictions associated with the identified crossings. If you should have any questions, comments, or concerns, please contact me.

Thank you in advance for your time and assistance.

Steven R. Crescenzo
Senior Scientist

URS Corporation
Foster Plaza 4
501 Holiday Drive, Suite 300
Pittsburgh, PA 15220
Ph. (412) 503-4629 (direct)
Fax (412) 503-4701

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PFBC Table 05-24-2011.xls



EQT_Trout Stocked Fisheries.pdf

Equitrans Sunrise Project

Trout Stocked Fisheries Crossed by the Proposed Project

County	Stream Field ID Name	Latitude (NAD83)	Longitude (NAD83)	Type	Waterbody Name	Approx. H-302 Milepost	Pipeline Route	Approx. Length W/in Construction ROW	Approx. Length W/in Permanent ROW	Crossed By Centerline	Crossing Method ^a	Width ^b	State Water Classification and/or Environmental Sensitivity ^c	TSF TOYR (March 1 to June 15)	PFBC ATW TOYR (March 1 to June 15)	FERC WWF TOYR (December 1 to May 31)
Pipeline Crossings																
Greene	S-SRC-150	39.859207	-80.129943	Perennial	Mt. Phoebe Run	4.8	H-302	85	56	Yes	OCM - Sheets 18 and 19	Minor - 4 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-150	39.859064	-80.129935	Perennial	Mt. Phoebe Run	4.8	H-111	42	42	Yes	OCM - Sheets 18 and 19	Minor - 4 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-148	39.856776	-80.135245	Perennial	Tributary to Mt Phoebe Run	5.1	H-111	9	9	No	OCM - Sheet 13	Minor - 4.5 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-149	39.856851	-80.135088	Perennial	Tributary to Mt Phoebe Run	5.1	H-111	13	13	No	OCM - Sheet 13	Minor - 4 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-154	39.854729	-80.140544	Ephemeral	Tributary to Dyers Fork	5.4	H-302	103	53	Yes	OCM - Sheets 18 and 19	Minor - 1.5 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-154	39.854635	-80.140510	Ephemeral	Tributary to Dyers Fork	5.4	H-111	21	21	Yes	OCM - Sheets 18 and 19	Minor - 1.5 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-153	39.854452	-80.140904	Intermittent	Tributary to Dyers Fork	5.4	H-302	19	19	No	OCM - Sheet 13	Minor - 3 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-153	39.854452	-80.140904	Intermittent	Tributary to Dyers Fork	5.4	H-111	22	22	Yes	OCM - Sheets 18 and 19	Minor - 3 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-152	39.849202	-80.152815	Perennial	Tributary to Dyers Fork	6.2	H-302	59	59	Yes	OCM - Sheets 18 and 19	Minor - 2 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-152	39.849202	-80.152815	Perennial	Tributary to Dyers Fork	6.2	H-111	63	63	Yes	OCM - Sheets 18 and 19	Minor - 2 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-134	39.849205	-80.153037	Ephemeral	Tributary to Dyers Fork	6.2	H-302	88	52	Yes	OCM - Sheets 18 and 19	Minor - 3 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-134	39.849152	-80.152963	Ephemeral	Tributary to Dyers Fork	6.2	H-111	21	21	Yes	OCM - Sheets 18 and 19	Minor - 3 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-135	39.848214	-80.154894	Perennial	Tributary to Dyers Fork	6.3	H-302	70	63	Yes	OCM - Sheets 18 and 19	Minor - 5 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-135	39.848259	-80.154887	Perennial	Tributary to Dyers Fork	6.3	H-111	25	25	Yes	OCM - Sheets 18 and 19	Minor - 5 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-136	39.847912	-80.155791	Perennial	Tributary to Dyers Fork	6.3	H-302	77	53	Yes	OCM - Sheets 18 and 19	Minor - 3.5 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-136	39.847870	-80.155729	Perennial	Tributary to Dyers Fork	6.3	H-111	23	23	Yes	OCM - Sheets 18 and 19	Minor - 3.5 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-138	39.845515	-80.161043	Intermittent	Tributary to Dyers Fork	6.7	H-302	86	51	Yes	OCM - Sheets 18 and 19	Minor - 2 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-138	39.845444	-80.161008	Intermittent	Tributary to Dyers Fork	6.7	H-111	20	20	Yes	OCM - Sheets 18 and 19	Minor - 2 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-137	39.845441	-80.161202	Ephemeral	Tributary to Dyers Fork	6.7	H-302	100	59	Yes	OCM - Sheets 18 and 19	Minor - 3 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-137	39.845401	-80.161100	Ephemeral	Tributary to Dyers Fork	6.7	H-111	23	23	Yes	OCM - Sheets 18 and 19	Minor - 3 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-139	39.842945	-80.166847	Ephemeral	Tributary to Dyers Fork	7	H-302	364	16	No	OCM - Sheet 13	Minor - 3 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-140	39.842454	-80.167699	Perennial	Tributary to Dyers Fork	7.1	H-302	94	55	Yes	OCM - Sheets 18 and 19	Minor - 2 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-140	39.842385	-80.167689	Perennial	Tributary to Dyers Fork	7.1	H-111	23	23	Yes	OCM - Sheets 18 and 19	Minor - 2 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-141	39.840180	-80.172923	Intermittent	Tributary to Dyers Fork	7.4	H-302	94	63	Yes	OCM - Sheets 18 and 19	Minor - 8 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-TAP-002	39.839207	-80.175047	Perennial	Tributary to Dyers Fork	7.5	H-302	79	53	Yes	OCM - Sheets 18 and 19	Minor - 6 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-TAP-005	39.837662	-80.177812	Perennial	Tributary to Dyers Fork	7.7	H-302	50	50	Yes	OCM - Sheets 18 and 19	Intermediate - 10 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-TAP-001	39.838540	-80.176251	Perennial	Dyers Fork	7.8	H-302	321	321	Yes	OCM - Sheets 18 and 19	Minor - 6 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-TAP-008	39.834887	-80.185113	Ephemeral	Tributary to Dyers Fork	8.1	H-302	29	4	No	OCM - Sheets 18 and 19	Minor - 5 ft.	AL, WS, R (TSF, ATW)	X	X	X
Access Road Crossings																
Greene	S-SRC-160	39.858853	-80.128649	Ephemeral	Tributary to Mt Phoebe Run	4.7	H-302	-	-	No	Permanent Access Road - Sheet 13	Minor - 2.5 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-150	39.857840	-80.129591	Perennial	Mt. Phoebe Run	4.8	H-302	-	-	No	Temporary Access Road - Sheet 13	Minor - 4 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-SRC-135	39.849341	-80.154530	Perennial	Tributary to Dyers Fork	6.3	H-302	-	-	No	Temporary Access Road - Sheet 13	Minor - 5 ft.	AL, WS, R (TSF, ATW)	X	X	X
Greene	S-TAP-006	39.837120	-80.178316	Perennial	Dyers Fork	7.7	H-302	-	-	No	Temporary Access Road - Sheet 13	Minor - 4 ft.	AL, WS, R (TSF, ATW)	X	X	X

Notes:

a Crossing Method: OCM = Open Cut Method, HDD = Horizontal Directional Drill

b Width: Minor = Waterbodies that is less than 10 feet wide, Intermediate = Waterbodies between 10 and 99 feet wide, and Major = waterbodies over 100 feet wide.

^c Pennsylvania State Water Classifications:

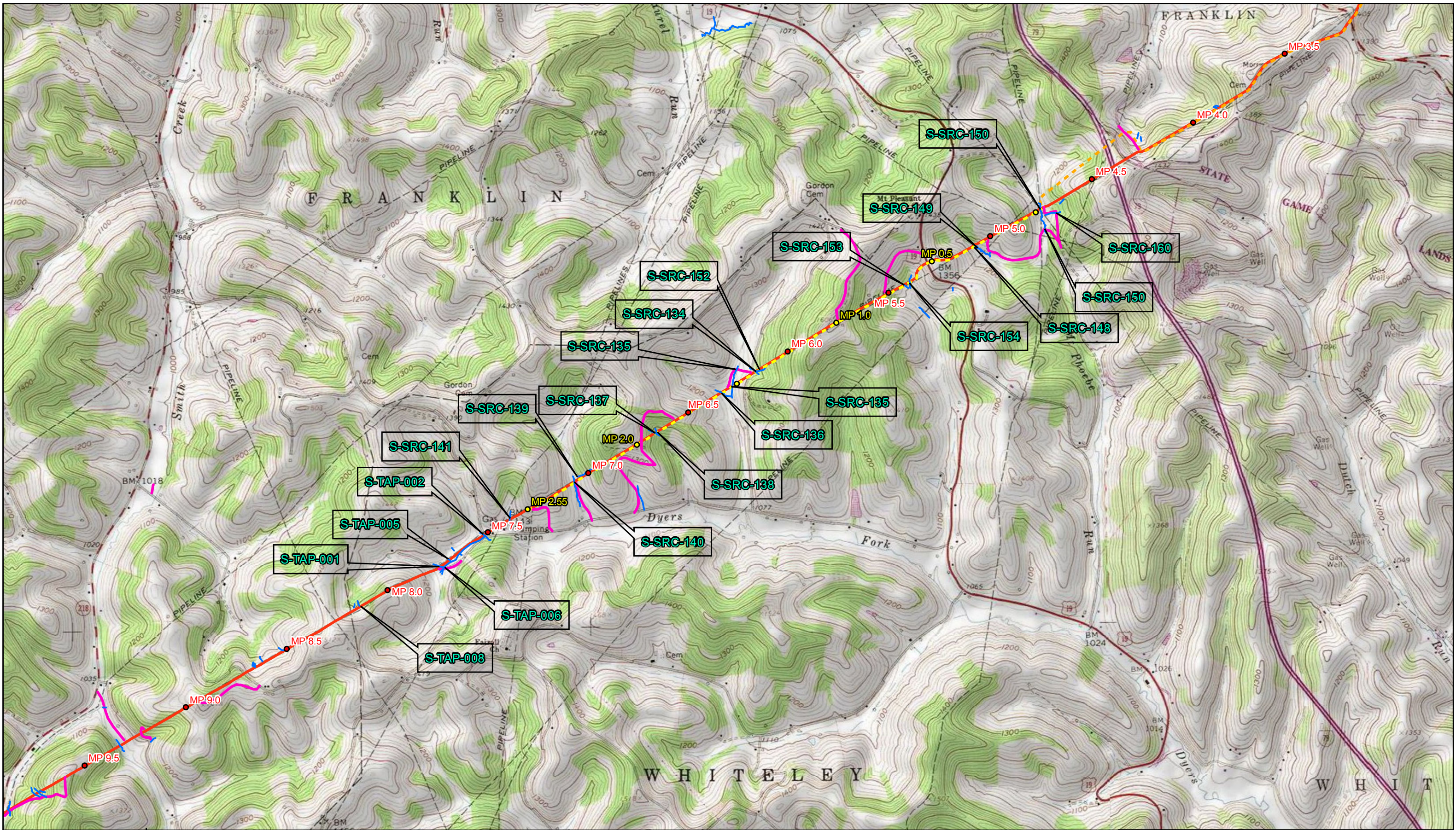
AL = Aquatic Life includes: warm water fishes (WWF), high quality-warm water fishes (HQ-WWF), approved trout water (ATW), trout stocked fishery (TSF)

WS = Water Supply includes: potable water supply (PWS), industrial water supply (IWS), livestock water supply (LWS), wildlife water supply (AWS), irrigation (IRS)

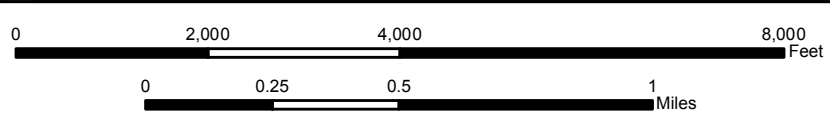
R = Recreation includes: boating (B), fishing (F), water contact sports (WC), and esthetics (E)

Environmental Sensitivity:

(WWF, HQ-WWF, ATW, TSF) = Protected Pennsylvania Water Use for identified stream.



Legend		
● H-111 Mile Posts	● H-302 Mile Posts	— Access Road
— H-111 Alignment(Uprating)	— H-302 Alignment	— Stream
- - - H-111 Lift & Lay		



Map Source: USGS, 1:24,000 Digital Raster Graphics

EQUITRANS EQUITRANS SUNRISE PROJECT	
Date: 5/24/2011	Trout Stocked Fisheries Crossed by the Proposed Project
URS	



Pennsylvania Fish & Boat Commission

Division of Environmental Services
Natural Diversity Section
450 Robinson Lane
Bellefonte, PA 16823-9620
(814) 359-5237 Fax: (814) 359-5175

June 28, 2010

IN REPLY REFER TO
SIR # 33830

HANNA MCCOY
EQUITRANS
625 LIBERTY AVE.
SUITE 1700
PITTSBURGH, PA 15222-3111

RE: Species Impact Review (SIR) - Rare, Candidate, Threatened and Endangered Species
EQUITRANS SUNRISE PROJECT - FERC GAS PIPELINE PROJECT
GREENE County, Pennsylvania

This responds to your inquiry about a Pennsylvania Natural Diversity Inventory (PNDI) Internet Database search "potential conflict" or a threatened and endangered species impact review. These projects are screened for potential conflicts with rare, candidate, threatened or endangered species under Pennsylvania Fish & Boat Commission jurisdiction (fish, reptiles, amphibians, aquatic invertebrates only) using the Pennsylvania Natural Diversity Inventory (PNDI) database and our own files. These species of special concern are listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, and the Pennsylvania Fish & Boat Code (Chapter 75), or the Wildlife Code. The absence of recorded information from our files does not necessarily imply actual conditions on site. Future field investigations could alter this determination. The information contained in our files is routinely updated. A Species Impact Review is valid for one year only.

X NO ADVERSE IMPACTS EXPECTED FROM THE PROPOSED PROJECT

X Except for occasional transient species, rare, candidate, threatened or endangered species under our jurisdiction are not known to exist in the vicinity of the project area. Therefore, no biological assessment or further consultation regarding rare species is needed with the Commission. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

 An element occurrence of a rare, candidate, threatened, or endangered species under our jurisdiction is known from the vicinity of the proposed project. However, given the nature of the proposed project, the immediate location, or the current status of the nearby element occurrence(s), no adverse impacts are expected to the species of special concern.

If you have any questions regarding this review, please contact the biologist indicated below:

<u> </u> Doug Fischer	814-359-5195	<u> </u> Kathy Gipe	814-359-5186
<u> </u> Nevin Welte	814-359-5234	<u>X</u> Bob Morgan	814-359-5129

Thank you in advance for your cooperation and attention to this important matter of species conservation all future and habitat protection.

SIGNATURE: _____

Christopher A. Urban
Chief, Natural Diversity Section

DATE: June 28, 2010

Our Mission:

www.fish.state.pa.us

To protect, conserve and enhance the Commonwealth's aquatic resources and provide fishing and boating opportunities.



Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

10 March 2011

Christopher Bergman
Principal Archaeologist
URS
36 East Seventh Street, Suite 2300
Cincinnati, OH 45202

Re: ER# 2010-0536-059-E
FERC: Phase I Cultural Resources
Report, Equitrans LP Sunrise Pipeline
Expansion Project, Green County

Dear Mr. Bergman:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999 and 2004. These regulations require consideration of the project's potential effect upon both historic and archaeological resources.

Archaeology:

This report meets our standards and specifications as outlined in *Guidelines for Archaeological Investigations in Pennsylvania* (BHP 2008) and the Secretary of the Interior's Guidelines for Archaeological Documentation. We agree with the recommendations of this report. It is our opinion that the following sites are not eligible for the National Register of Historic Places: 36GR0360, 36GR0361, 36GR0362, 36GR0363, 36GR0364, 36GR0366, and 36GR0369. No further work is necessary for these site areas. For site 36GR0365, it is our opinion that the portion of the site within the Area of Potential Effect (APE) would not contribute to the overall eligibility of the site and no further work is necessary.

It is our understanding that site 36GR0170 will be avoided by construction through the removal of this area from construction plans. Provided the site area will not be impacted, no further work is necessary. Should plans change and avoidance of the site area will no longer be possible, Phase II investigation should be undertaken.

It is our opinion that site 36GR0370 should be avoided or Phase II archaeological investigation should be conducted of this site area. Should you choose to avoid this site, please provide an avoidance plan, including a 100 foot buffer area, to our office for review.

No further archaeological work is necessary for the remainder of this project area.

Please send four copies of the final report (one unbound and all with original photographs) for our files and distribution to the various repositories. Please include the mapping as provided via email by Ken Duerksen on March 4, 2011. Also, please correct the photo captions in Appendix I to reflect the correct site numbers.

Historic Structures:

Your request does not include sufficient information. We are unable to proceed with our review for historic structures until the following information provided.

Please complete the first two pages of the Historic Resource Survey Form for the following properties. It is not acceptable to only complete the Cemetery Form or the Agriculture Form, they are only in addition to the regular form.

1. McMasters & Smith Cemetery, Jefferson Twp., Greene County
2. Smith & Headley Cemetery, Gilmore Twp., Greene County
3. Wildman Cemetery, Gilmore Twp., Greene County

Please submit the missing first two pages of the Historic Resource Survey form for the following property.

4. 1179 Oak Forest Roac, Wayne Twp., Greene County

If the following resources are historically related they need to use a common boundary, please revise the form to address the whole resource.

5. 281 Tower Road and Morris Cemetery, Whiteley and Franklin Twps.,
Greene County

In addition, please submit a CD of these forms for placement in our database and GIS systems. Likewise, in the future please submit separate, non-bound copies of the Historic Resource Survey Forms.

If you need further information regarding archaeological resources, please contact Kira Heinrich at (717) 705-0700. If you need further information concerning historic structures, please contact Susan Zacher at (717) 783-9920.

Sincerely,



Douglas C. McLearen, Chief
Division of Archaeology &
Protection

DCM/kmh



Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

April 25, 2011

Tammy Seiter
URS Corporation
36 East 7th Street, Suite 2300
Cincinnati, Ohio 45202

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

Re: ER 2010-0536-059-I
FERC: Equitrans-Sunrise Project: A Natural Gas Pipeline Project
in Greene County, Pennsylvania

Dear Ms. Seiter:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999 and 2004. These regulations require consideration of the project's potential effect upon both historic and archaeological resources.

Thank you for supplying the additional information we requested so that we could complete our review of the following properties. In our opinion, these properties are not eligible for the National Register of Historic Places. They are not historically or architecturally significant.

1. McMasters & Smith Cemetery, Jefferson Township, Greene County
2. Wildman Cemetery, Gilmore Township, Greene County
3. Smith & Headley Cemetery, Gilmore Township, Greene County
4. Schultz/Morris Property & Cemetery, Franklin & Whiteley Township, Greene County
5. Adamson Farmstead, 1179 Oak Forest Road, Wayne Township, Greene County

If you need further information in this matter please consult Susan Zacher at (717) 783-9920.

Sincerely,

Andrea L. MacDonald, Chief
Division of Preservation Services

AM/smz



Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

18 July 2011

Christopher Bergman
Principal Archaeologist
URS
36 East Seventh Street, Suite 2300
Cincinnati, OH 45202

Re: ER# 2010-0536-059-J
FERC: Phase I Cultural Resources Report,
Addendum 1 Project Area, Equitrans LP Sunrise
Pipeline Expansion Project, Green County

Dear Mr. Bergman:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999 and 2004. These regulations require consideration of the project's potential effect upon both historic and archaeological resources.

Archaeology:

This report meets our standards and specifications as outlined in *Guidelines for Archaeological Investigations in Pennsylvania* (BHP 2008) and the Secretary of the Interior's Guidelines for Archaeological Documentation. We agree with the recommendations of this report. For site 36GR0365, it is our opinion that the portion of the site within the Area of Potential Effect (APE) would not contribute to the overall eligibility of the site and no further work is necessary. No further work is necessary for the remainder of the Phase I Addendum project areas.

Please send four copies of the final report (one unbound and all with original photographs) for our files and distribution to the various repositories. Please include the report summary form as provided via email by Ken Duerksen on July 18, 2011.

Historic Structures:

There may be historic buildings/structures/districts/objects eligible for the National Register of Historic Places located in the Addendum 1 project area. However, in our opinion,

Page 2
7/18/2011
Mr. Bergman
ER 2010-0536-059-J

the activity described in your proposal should have no effect on such resources. Should the scope and/or nature of the project activities change, the Bureau for Historic Preservation should be contacted immediately.

If you need further information regarding archaeological resources, please contact Kira Heinrich at (717) 705-0700. If you need further information concerning historic structures, please contact Ann Safley at (717) 787-9121.

Sincerely,

A handwritten signature in dark ink, appearing to read "Douglas C. McLearen". The signature is fluid and cursive, with a large initial "D" and "M".

Douglas C. McLearen, Chief
Division of Archaeology &
Protection

DCM/kmh

Section 9

Spill Preparedness, Prevention, and Contingency Plan

SPILL PREPAREDNESS, PREVENTION, AND COUNTERMEASURES PLAN FOR CONSTRUCTION ACTIVITIES

1.1 SPILL PREVENTION METHODS

Construction activities related to natural gas pipelines and aboveground facilities sometimes require storage of hazardous and non-hazardous products and wastes. All efforts will be made to prevent spills of any amount of these products. The scope of this plan is intended to cover activities related to construction of aboveground facilities, associated pipelines and appurtenances. The following items will be followed to help avoid spills and minimize the impact of spills that accidentally occur:

- All employees handling fuels and other hazardous materials will be properly trained.
- All equipment is in good operating order and inspected on a regular basis.
- Fuel trucks transporting fuel to on-site equipment travel only on approved access roads;
- Concrete coating activities are not performed within 100 feet of a wetland or waterbody boundary, unless the location is an existing industrial site designated for such use.
- Bulk quantities of both diesel fuel and gasoline may be stored at the work area in aboveground tanks, which will be diked or be of double-wall secondary containment design, or smaller containers. No underground tanks will be used. A Material Safety Data Sheet for each hazardous material will be on site.
- Fuel will be stored at the equipment staging area within secondary containment and as much as practical all equipment will be refueled there. Any equipment that must be refueled in the field will be fueled from tanks carried to the work area and returned to secondary containment when refueling is complete.
- Lesser quantities of fuel and solvents and lubricants (i.e., motor oils, hydraulic fluid) may be stored at the work area as necessary to service equipment provided that this storage does not conflict with other parts of this plan. Secondary containment will be provided for these storage areas.
- All fuel storage areas will be located at least 200 feet from active private water wells, and at least 400 feet from municipal water wells. Equipment servicing, lubricating, and refueling will also be in accordance with these requirements whenever possible.
- Use of hazardous materials for vehicle maintenance will follow the same requirements mentioned above for equipment refueling. Impervious or sorbent materials will be placed under the work area before the work begins. Additional sorbent materials will also be readily available. Waste materials created during maintenance (i.e., used oil)

will be collected for proper disposal. The work site and the vehicle will be inspected after the maintenance work is complete to ensure that all hazardous materials are properly contained. All waste material, including partially used or empty containers, discarded parts, dirty rags, and used sorbent material, as well as discarded hazardous materials containers (i.e., oil cans, grease tubes) will be collected and placed in open-top drums for proper disposal.

- All motor fuel, lube oil, chemicals, and other polluting substances will be tightly sealed and clearly labeled during transportation and storage.
- Fuel trucks, pumps, mechanics' vehicles, and contractor personnel vehicles will be equipped with spill kits containing absorbent materials approved for petroleum products.
- Runoff resulting from construction equipment washing operations will not be permitted to directly enter any waterbody or wetland area.
- Construction equipment, vehicles, materials, hazardous materials, chemicals, fuels, lubricating oils, and petroleum products will be parked, stored, or serviced 100 feet from all waterbodies and wetlands when not in use and when possible.

1.2 MITIGATION AND CLEANUP METHODS

In the event of a spill into or in the vicinity of waterbodies or wetlands, the following will occur:

- the source will be immediately stopped;
- the spill will be contained by placing sorbent booms or constructing dikes;
- the spill will be collected with sorbent materials, skimmed off water surfaces with booms, and/or the contaminated soil will be excavated; and
- the waste materials will be properly disposed in accordance with EQT's policy and agency-approved facilities, as required;
- After completing cleanup as coordinated with the necessary contacts, the affected areas will be restored as close as possible to their previous conditions.

All spills must be reported immediately to the Environmental Department at EQT:

Ms. Hanna McCoy, Environmental Coordinator

412-395-3640 (office)
412-216-9316 (cell)

The Environmental Department will contact State and/or Federal environmental agencies (if applicable) for notification requirements. If personnel in the Environmental Department cannot be contacted, then the EQT Project Supervisor should make the necessary notifications.

1.3 STATE AND FEDERAL AGENCY CONTACT INFORMATION

Pennsylvania

- PaDEP Central Office (Harrisburg): 800-541-2050
(Available 24 hours a day, seven days per week)
- PaDEP Southwestern Regional Office: 412-442-4000
(Available 24 hours a day)
- Greene County
Emergency Management Coordinator: 724-627-5387

West Virginia

- WVDEP Central Office (Charleston): 304-926-0470 or 0495
- WVDEP Report a Spill or Accidental Discharge 800-642-3074
(Available 24 hours a day, seven days per week)
- WVDEP Fairmont Office: 304-368-3960
- Wetzel County
Emergency Management Coordinator: 304-455-6960

Federal

- National Response Center: 800-424-8802

Section 10

Post Construction Stormwater Management

and

Site Restoration Plan

for

Equitrans Sunrise Project

(Submitted Under Separate Cover)