Transcontinental Gas Pipe Line Company, LLC

Section 2-3 E&SC Plan Narrative and Drawings

Regional Energy Access Expansion Project –
Compressor Station 200

April 2021
(Revised July 2021)
(Revised March 2022)

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SECTION 2.3.1
NARRATIVE

1. Project Description

Transcontinental Gas Pipe Line Company, LLC (Transco), indirectly owned by the Williams Companies, Inc. (Williams) is seeking authorization from the Federal Energy Regulatory Commission (FERC) under Section 7(c) of the Natural Gas Act and Part 157 of the Commissions regulations, to construct, own, operate, and maintain the proposed Project facilities associated with the Regional Energy Access Expansion Project (Project). The Project is an expansion of Transco's existing natural gas transmission system that will enable Transco to provide an incremental 829,400 dekatherms per day (Dth/d) of year-round firm transportation capacity from the Marcellus Shale production area in northeastern Pennsylvania to multiple delivery points along Transco's Leidy Line in PA and Mainline in PA, NJ, and MD.

The existing Compressor Station 200 component of the Project is located in East Whiteland Township, Chester County. Proposed are compressor station modifications to connect the existing Transco Mainline A into suction to support south flow.

The Erosion & Stormwater Control (E&SC) Plan shall be designed and implemented to be consistent with the Post Construction Stormwater Management (PCSM) Plan under 25 Pa. Code § 102.8 (relating to PCSM requirements). Transco will use and implement the practices, measures and details outlined herein to control soil erosion and off-site sedimentation. All work and disturbed areas are located within Transco property, existing easements, or legally obtained workspace. The limit of disturbance (LOD) for the Compressor Station 200 site will be approximately 3.16 acres. Subject to FERC's certification of the Project and receipt of the necessary permits and authorizations, Transco anticipates construction of the Project to start in second quarter 2023 to meet a proposed in-service date in fourth quarter 2024.

2. Topographic Features of The Area

A Project Location Map for Compressor Station 200 is included in Attachment 1. This map shows the topographical features of the general site vicinity and is based on the USGS 7.5 Minute topographical mapping of the Malvern, Pennsylvania quadrangles.

3. Receiving Surface Waters

The following table (Table 1) lists each watershed located in Compressor Station 200 Project Area, its Chapter 93 Water Quality Standards, and Pennsylvania Fish and Boat Commission classifications. A Wetland and Watercourse Delineation Report is included in Attachment A of the ESCP permit application.

Table 1 – Receiving Waters			
Watershed Name	**Designated Use**	**Existing Use**	**PFBC Classification**
Valley Creek (East)*	EV, MF	-	Naturally Producing Wild Trout Stream
Valley Creek (West)	CWF, MF	-	-
MF: Migratory Fishes, CWF: Cold Water Fishes, EV: Exceptional Value			

*Disturbance located in this watershed only.

4. Types, Depth, Slope, Locations & Limitation of the Soils and Geologic Formations

The soil associations on site were identified by soil map units as mapped in the Web Soil Survey website (https://websoilsurvey.sc.egov.usda.gov/) by the United States Dept. of Agriculture (USDA), Natural Resources Conservation Service (NRCS). There are 2 soil mapping units located within the LOD, see Table 2 below.

Table 2 – Soils Mapping Units within LOD	
Soil Mapping Unit	**Soil Series**
CtA	Conestoga silt loam, 0 to 3 percent slopes
UrgB	Urban land-Conestoga complex, 0 to 8 percent slopes

Detailed descriptions and mapping of soil mapping units are provided in the Attachment 2. Soil use limitations (outlined in Table 3) were reviewed in relation to the Compressor Station 200 and resolutions were identified in Section 4.1.

Table 3 – Limitations of Pennsylvania Soils Pertaining to Earth Disturbance Projects (Erosion and Sediment Control Best Management Practice (BMP) Manual – Technical Guidance Number 363-3134-008/Page 401)

SOIL NAME	SOIL WITH SLOPE CLASS	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
Conestoga	CtA, UrgB	X	C/S						X	X	X		X		X		

4.1 Resolution of Soil Limitations

Transco proposes the following resolutions to compensate for soil limitations, summarized in Table 3 above:

1. To offset the caving of cutbanks, trenching operations will be conducted in accordance with the OSHA Technical Manual for Trenching.
2. Preventative coatings shall be used to prevent corrosion of concrete and/or steel.
3. When bedrock is encountered it will be removed by mechanical methods or blasting. Blasting operations will conform with local, state, and federal regulations.
4. Precautions will be taken to prevent slope failure when working within low strength soils by flattening cut/fill slopes, not overloading, maintaining lateral support, and preventing saturation of soils. Low strength soils will not be used for roadway construction.
5. Excavation in soils prone to flooding, slow percolation, ponding, wetness, location in a seasonal high water table, or are hydric will likely encounter water. Compensation will involve dewatering with appropriate means such as pump water filter bags, sediment traps, etc.
6. Soils that have the potential to swell, shrink, or heave due to frost action may cause damage to roadways or pads. Where foundations are critical, compensation may require removal and replacement of soils with suitable material.
7. In circumstances where soils appear to be a poor source of topsoil, drought, or prone to wetness, soil testing will be performed to determine the appropriate applications of soil amendments to promote growth. Soils onsite that are fair sources of topsoil, will be identified, stripped, and stockpiled for use during restoration.
8. In order to minimize erosion of soils that are easily erodible, compensation may involve providing a protective lining, to apply seed, mulch, erosion control blankets (either in rolls or hydraulically applied), tracking slopes, upstream diversions, waterbars, etc. to minimize soil erosion.

4.2 Geologic Formations

Transco retained Civil & Environmental Consultants, Inc. (CEC) of Pittsburgh, PA to perform a geohazard assessment, the following is provided from their 2020 report. Transco utilized United States Geological Survey (USGS), Geologic Map of Pennsylvania - Map 1, dated 1980 (online), to evaluate geologic hazards on the Project. The desktop analysis completed for the Project by CEC revealed that the Compressor Station 200 does not cross known, mapped, or inferred faults. No mines were identified in the site vicinity. Karst features were identified in the vicinity of the site. The analysis outlined that Compressor Station 200 lies within a zone of moderate to low landslide incidence and susceptibility.

Due to the moderate to low landslide incidence and susceptibility, a Geological Hazard Assessment and Mitigation Plan was completed by CEC and is submitted with this application (Attachment B). The Geological Hazard Assessment and Mitigation Plan identifies appropriate best management practices to avoid and mitigate for conditions encountered during construction.

Risk posed karst features are addressed in the Geological Hazard Assessment and Mitigation Plan was completed by CEC and is submitted with this application (Attachment B). The Geological Hazard Assessment and Mitigation Plan identifies appropriate best management practices to avoid and mitigate for conditions encountered during construction, and offers the following conclusions and recommendations:

- Soils consist of Urban land-Conestoga Complex developed on Cambrian-aged Ledger Formation bedrock (a crystalline dolomite).
- No risk of subsidence due to commercially mined coal seams, surface or deep mining.
- CEC concluded that carbonate rock is at the ground surface and that karst features do occur in this area.
- The risk of encountering arsenic bearings soils/rock during construction was deemed to be low.
- Radioactive soils/bedrock were not anticipated, and the Site is at a low potential risk for radon in indoor air but recommended that construction safety protocols consider radon accumulations in confined excavations and below grade structures.
- Issues related to arsenic bearing soils/rock were deemed to be unlikely.
- Little to no risk existed to construction from slope instability.
- Limited geohazard mitigation measures were recommended.
- Due to a limited risk of karst feature development CEC recommended:
  - If soluble limestone or other carbonate rocks be encountered, surface water best management practices should be implemented according to the erosion and sedimentation control plans to provide positive surface water drainage away from building areas, excavations, and exposed rock at all times before, during, and after construction.
  - Stormwater management plans should also incorporate use of watertight joints in piping and consideration of potential adverse impacts of infiltration, if used.

- If bedrock is encountered, excavation other than blasting should be implemented.
- Excavations should be closed as soon as possible after exposure.
- Any proposed water utility trenches should be lined to prevent infiltration and/or underground piping should be leak proof and utilized gasketed joints.
- Should sinkholes or other subsidence conditions occur, a geotechnical engineer should be notified to investigate in further detail and provide remedial recommendations.
- CEC recommended having geotechnical personnel on-site during construction in areas where geohazard mitigation measures are recommended.
- CEC also recommended periodic monitoring of field conditions in areas where drainage causes water to pool.

Based on a letter provided by Civil & Environmental Consultants, Inc. (CEC) dated February 22, 2022, it is unlikely that the proposed BMP will contribute to sinkhole development, and it is CEC's opinion that the site is suitable for the proposed method of infiltration. The CEC letter is included in Attachment 7.

5. Characterizations of Earth Disturbance Activities, Including Past, Present, and Proposed Land Uses

The existing Compressor Station 200 component of the Project is located in East Whiteland Township, Chester County. The Project at Compressor Station 200 involves the installation of a gravel pad, proposed BMPs, and other compressor station modifications in order to connect the existing Transco Mainline A into suction to support south flow. Transco will use and implement the practices, measures, and details to control soil erosion and off-site sedimentation during construction. Using data taken from Google Earth and Multi-Resolution Land Characteristics (MRLC) Consortium website (https://www.mrlc.gov/viewer/), it is documented that the land has been utilized as a compressor station site for a long period of time. Transco confirmed with local operations managers that the site has been an active compressor station since 1950. The site will continue to operate as a compressor station once the Project is completed.

6. Erosion and Sediment Control Best Management Practices

Various erosion and sediment control measures will be used during the construction of Compressor Station 200. E&S BMPs proposed to be used at the site to control soil erosion and sediment pollution are listed below. Details of BMPs proposed to be used at the Project location are included in the Erosion and Sedimentation Control Plan sheets. BMP's listed will be used at the Project location at the discretion of the environmental inspector, when found necessary to comply with 25 PA Code Chapter 102 and to adequately address potential erosion and sediment control issues.

Rock Construction Entrances / Street Sweeping

Rock construction entrances shall be installed whenever sediment tracking onto road surfaces is a potential or if required by the county conservation district or other agency. Soil erosion control measures shall be installed if required and as needed. In special protection watersheds, either a 100' long rock construction entrance or a standard 50' rock construction entrance with a wash rack will be used at the construction entrance to wash construction vehicle wheels before they enter the public roadway. The wash rack will discharge to a 24" (min.) compost filter sock. Thickness of the rock construction entrance shall be constantly maintained to the specified dimensions by adding rock. Sediment deposited on roadways shall be removed and returned to the construction site immediately.

If a standard rock construction entrance is unfeasible, public street sweeping with a vacuum sweeper and rolling of dirt and gravel roads will occur at the end of each workday (or more frequently as needed) and/or manual cleaning of tires prior to site egress may also be implemented. Vacuum sweepers can remove accumulated sediment from streets before it is washed into surface waters. Tires can be cleaned off manually with a broom prior to exiting. Rolling of dirt roads can stabilize areas affected by tracked mud.

Compost Filter Sock

Compost filter socks shall be placed downslope of disturbed areas to serve as a sediment barrier and filter. Filter socks shall be placed at existing level grade, parallel to contours, with both ends of the sock extended up slope at a 45-degree angle. In areas where it is not feasible to install compost filter sock parallel to contours, compost filter sock j-hooks will be utilized. Compost filter sock j-hooks will be installed in accordance with DEP's list of approved alternative E&S and PCSM BMPs. Socks can be used on both steep and rocky slopes. Socks can range in size from 12" to 32" diameter depending on the site conditions, although only 12" and 18" diameter are proposed. The maximum permissible slope lengths above compost filter socks will be used to determine the sizes of compost filter.

Safety Fence

Safety fence shall be installed to protect sensitive environmental features as depicted on the plan drawings. The fencing shall remain in place during all phases of construction.

Inlet Filter Bags

Inlet filter bags are used as protection at the entrance of catch basins for trapping particles unable to pass through a No. 40 sieve. Berms shall be required for installation of inlet filter bags.

Erosion Control Blankets

A suitable erosion control blanket or soil stabilizer shall be used wherever earth disturbance occurs within 50' of surface waters or 100' of special protection water, especially if site conditions make use of conventional erosion and sedimentation (E&S) BMPs difficult. Erosion control blankets should be used on finished slopes greater than 3:1.

Pumped Water Filter Bag

Filter bags shall be placed in well-vegetated, grassy areas and discharge onto stable, erosion resistant areas and staked if the slope is greater than 5 percent. In the event that this is not possible, a geotextile path will be provided. A compost filter sock shall be placed below the filter bag when placed within 50' of streams or wetlands located within a HQ/EV watershed.

Tarps

Small stockpiles of soil material may be tarped to avoid contact with stormwater.

Typical Topsoil Stockpile

The maximum topsoil stockpile height shall not exceed 35'. Stockpile slopes shall be no steeper than 2H:1V. Stockpiles shall be stabilized in accordance with temporary seeding specifications and mulch is to be maintained until the stockpile is stabilized. Stockpile location shown on the plans are illustrative and may vary in location as construction proceeds.

7. Recycling and Disposal of Materials

The restoration of the facility will require the removal of the temporary materials. The temporary materials include, but may not be limited to, stone surfaces and associated geotextiles. The contractors are required to discard of these materials at suitable disposal or recycling sites and in compliance with local, state, and federal regulations.

Contractors are required to inventory and manage their construction site materials. The goal is to be aware of the materials on-site, ensure they are properly maintained, used, and disposed of, and to make sure the materials are not exposed to stormwater. The following materials or substances are expected to be present on-site during construction (Note: this list is not an all-inclusive list and the materials management plan can be modified to address additional materials used on-site):

- Acids
- Detergents
- Fertilizers (nitrogen/phosphorus)
- Hydroseeding mixtures
- Petroleum based products
- Sanitary wastes
- Soil stabilization additives
- Solder
- Solvents

These materials must be stored as appropriate and shall not contact storm or non-stormwater discharges. Contractor shall provide a weatherproof container to store chemicals or erodible substances that must be kept on the site. Contractor is responsible for reading, maintaining, and making employees and subcontractors aware of Safety Data Sheets (SDSs).

8. Thermal Impacts

Due to the overall nature of the Project, thermal impacts to surface waters are not anticipated. The primary means to address thermal impacts on this Project is to limit the size and duration of exposed earth.

Stormwater runoff associated with the installation of the gravel pad will be routed through the stormwater BMP designed to retain and infiltrate the first surge of water from the site. The first surge of water will be the warmest water for the duration of the storm event and will quickly cool as the storm event progresses. The BMP is designed to capture and infiltrate this warmest surge of stormwater. Based on routing calculations, stormwater is not discharged from the BMP for the first 11.50 hours during a 100-year/24-hour storm event. The retention period is longer for less intense storms. Therefore, as a result of these measures, no significant thermal impact to the receiving waters is anticipated.

9. Antidegradation Requirements

Earth disturbance will be minimized to the extent practical and will be phased or sequenced to only disturbed portions that are necessary for the specific scope of work. Where possible, the LOD was decreased to avoid additional disturbance to the extent practical.

Anti-Degradation Best Available Combination of Technologies (ABACT) standards have been proposed for Compressor Station 200 because there are no viable non-discharge alternatives. The Erosion and Sediment Control Plan prepared for the Project outlines a more stringent design and E&S BMPs that meet ABACT standards.

The Compressor Station 200 is located in an EV watershed and construction activities in these areas will result in increased discharge of stormwater to surface waters which will be mitigated by the implementation of post construction stormwater management (PCSM) BMPs. Proposed PCSM BMPs are designed with stormwater volume reduction and water quality treatment maximized to the extent practicable within the site constraints to maintain and protect existing water quality and existing and designated uses.

10. Riparian Buffers

Compressor Station 200 is not located within a riparian buffer.

11. Project Site Runoff

The construction of Compressor Station 200 will increase the volume of stormwater runoff due to the increase in the type and size of the impervious area. The contractor will construct stormwater BMPs to mitigate the increase in volume and peak rates associated with construction. Refer to the Post-Construction Stormwater Management (PCSM) Plan for additional information (Section 3 of this ESCP Application). Changes in stormwater runoff between pre- and post-development conditions for 2-year rainfall event and changes in peak discharge rates for 1-, 2-, 10-, 25-, 50- and 100-yr storms are given in the tables below.

Pre- and Post-Construction Stormwater Volume for 2-yr Rainfall event

Pre-construction (cf)	Post-construction before BMPs (cf)	Post-construction after BMPs (cf)	Net (cf)
12,821	14,372	11,227	-1,594

Pre-Construction Peak Discharge Rates (cfs)

1-year	2-year	10-year	25-year	50-year	100-year
2.19	3.81	8.95	12.90	14.88	19.07

Post-Construction Peak Discharge Rates (cfs)

1-year	2-year	10-year	25-year	50-year	100-year
2.62	4.35	9.71	13.76	15.78	20.04

Post-Construction w/ BMPs Peak Discharge Rates (cfs)

1-year	2-year	10-year	25-year	50-year	100-year
1.33	2.49	6.29	10.44	11.98	16.02

Difference between Pre-Construction and Post-Construction w/ BMPs

	1-year	2-year	10-year	25-year	50-year	100-year
NET Difference	-0.86	-1.32	-2.66	-2.46	-2.90	-3.05

12. Offsite Discharge Analysis

The stormwater BMPs constructed at Compressor Station 200 are in areas that will discharge stormwater to offsite, non-surface water. These areas have been analyzed to reduce the likelihood that these discharges will be erosive to adjacent property owners. The analysis has been performed in accordance with PADEP Document 3150-FS-DEP4124, "Off-Site Discharges of Stormwaters to Areas That Are Not Surface Waters". The full analysis is presented in Attachment 4 – Offsite Discharge Report. A summary of the findings for Compressor Station 200 is presented below.

Compressor Station 200 utilizes an infiltration berm and vegetated filter strip to release collected runoff through a spillway and three discharge pipes. The stormwater that flows over the spillway travels directly into a level spreader. Stormwater that flows through the discharge pipes discharges across a riprap apron. The level spreader and riprap apron both discharge towards the existing vegetated swale located southeast of the Limits of Disturbance. The stormwater is discharged as sheet flow and travels along a vegetative flow path until it reaches an existing onsite drainage swale, which discharges to an existing culvert along N. Bacton Hill Road. The flow then continues along the swale on the west side of N. Bacton Hill Road, where it enters a culvert, travels under N. Bacton Hill Road, and into an existing ephemeral stream on the east side of the road. The area downgradient of the proposed infiltration berm is over 90% vegetated. Calculations indicated that the discharge velocity of the proposed level spreader is 0.53 feet per second (fps) and into the proposed riprap apron is 2.56 fps, for the 10-yr 24-hr storm. Duringconstruction the flow velocity in the existing swale increased from 3.40 feet per second to 3.47 feet per second for the 10 year, 24 hour storm event. This increase will likely be mitigated by the use of compost filter socks, which will retain/slow the flow before entering the swale. Since the outlet velocities are below 3.5 fps, downstream erosion will be minimal, if not negligible.

13. Site Restoration Plan

13.1 Previous Land Use

Using data taken from Google Earth and Multi-Resolution Land Characteristics (MRLC) Consortium website (https://www.mrlc.gov/viewer/), it is documented that the land has been utilized as a compressor station site for a long period of time. Transco confirmed with local operations managers that the site has been an active compressor station since 1950.

13.2 Disturbance Activities, Changes to Permanent Topographic Land Cover

The Compressor Station 200 portion of the Project will involve the installation of a gravel pad, infiltration berm, and other compressor station modifications. Transco will use and implement the practices, measures, and details to control soil erosion and off-site sedimentation during construction.

13.3 Restoration Measures

Stormwater controls which will be installed during construction have been designed to avoid impacts to natural drainage features. These controls will only have temporary impacts while installed and will be removed once the site is stabilized with vegetation.

Construction debris will be removed from construction work areas unless the landowner or land managing agency approves leaving materials onsite for beneficial reuse, stabilization, or habitat restoration. The disturbed area will be vegetated and rocks will be removed. Temporary sediment barriers will be removed and replaced by permanent erosion control measures or when revegetation is successful.

Soil Compaction Measures

PCSM BMPs will not be over-compacted. Should they become over-compacted, the soil will be de-compacted. Also, any areas that do not successfully revegetate because of compaction will also be de-compacted and then reseeded.

Revegetation Plan and Procedures

The construction site should be stabilized as soon as possible after completion. Establishment of final cover must be initiated no later than seven days after reaching final grade. Temporary erosion and sedimentation control BMPs can be removed when the site meets final stabilization. Final stabilization means that all soil-disturbing activities are completed and that either a permanent vegetative cover with a density of 70% or greater has been established or that the surface has been stabilized by hard cover such as pavement or buildings. It should be noted that the 70% requirement refers to the total area vegetated and not just a percent of the site.

13.4 Maintenance and Evaluation for Effectiveness

Follow-up inspections of disturbed areas will be conducted as necessary, to determine the success of revegetation. At a minimum, conduct inspections after the first and second growing seasons. Revegetation in non-agricultural areas shall be considered successful if upon visual survey the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. Revegetation efforts will continue until revegetation is successful.

The PCSM BMP for Compressor Station 200 is an infiltration berm with an overflow spillway to a level spreader. These structures should be properly maintained to ensure their effectiveness. Sheet flow conditions and infiltration must be sustained throughout the life of the BMP. BMPs will be inspected for clogging from sediment of debris, damage by foot or vehicular traffic, and flow channelization. Inspections will be made on a quarterly basis for the first two years following installation, and then twice per year thereafter. Inspections will also be made after every storm event greater than 1” during the establishment period.

Vegetated areas will be inspected weekly and after runoff events until permanent vegetation is achieved. Once the vegetation is established, inspections of health, diversity, and density will be performed at least twice per year, during both the growing and non-growing season. Vegetative cover will be sustained at 85% and reestablished if damage greater than 50% is observed. Damaged BMPs will be repaired as soon as possible upon discovery. Repairs will be made to restore damaged BMPs to their original design condition.

Transco will limit routine vegetation mowing or clearing within wetlands and adjacent to waterbodies. Transco will not use herbicides or pesticides in or within 100’ of a waterbody except as allowed by the appropriate land management or state agency.

Contractor shall provide a weatherproof container to store chemicals or erodible substances that must be kept on the site. Contractor is responsible for reading, maintaining, and making employees and subcontractors aware of Safety Data Sheets (SDSs).

14. The Erosion and Sediment Control Plan Shall be Prepared by a Person Trained and Experienced in Erosion Control Methods and Techniques

These plans and narrative were prepared by Patrick Wozinski, P.E. (BAI Group) of State College, PA in accordance with the Pennsylvania Department of Environmental Protection Erosion and Sediment Pollution Control Program Manual, March 2012. Plan preparer’s resume is provided in Attachment C of the ESCP permit package.

ATTACHMENT 1
PROJECT LOCATION MAP

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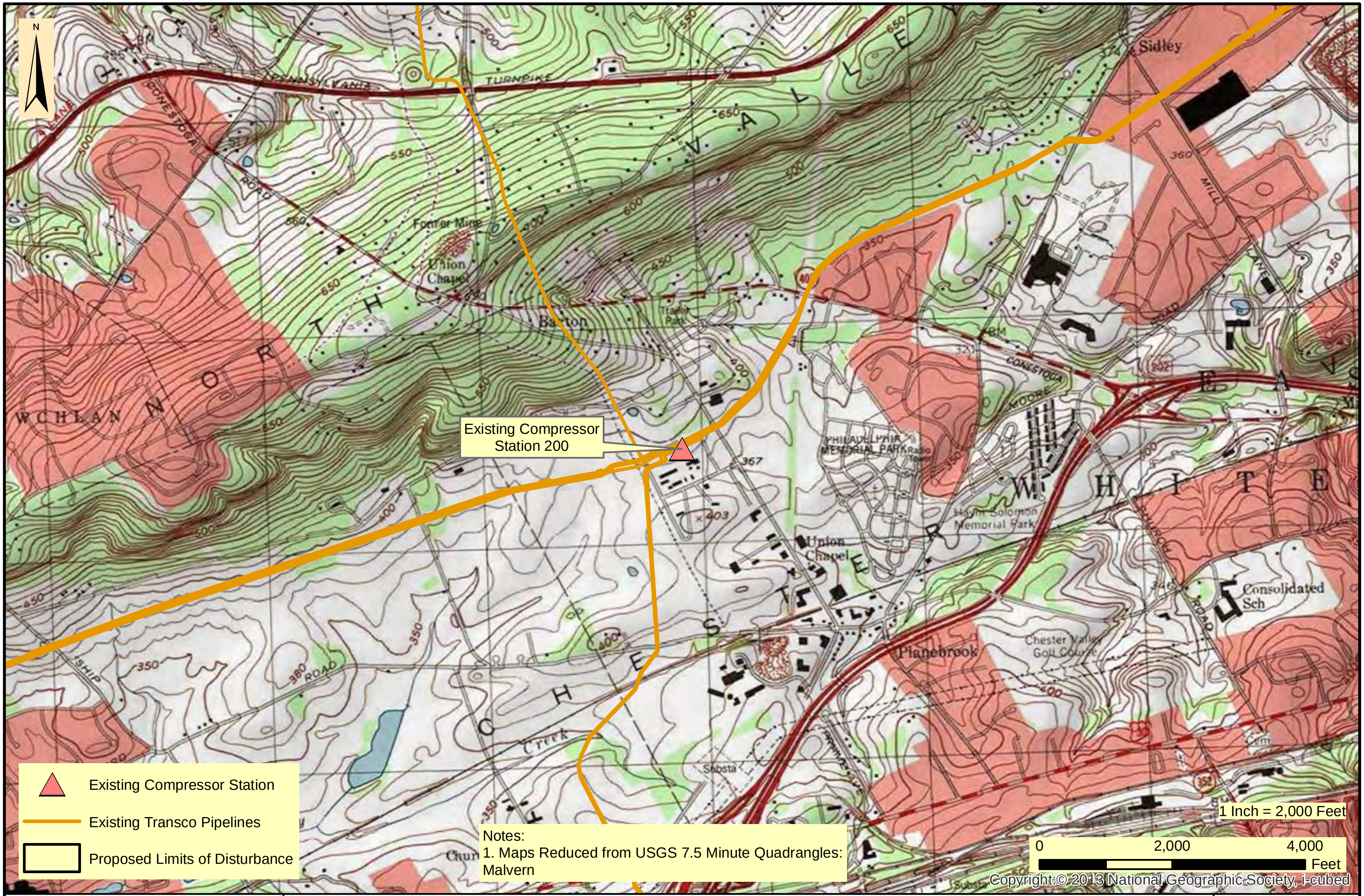

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
REGIONAL ENERGY ACCESS EXPANSION PROJECT
EXISTING COMPRESSOR STATION 200
PROJECT LOCATION MAP

Williams®

EAST WHITELAND TOWNSHIP	CHESTER COUNTY	PENNSYLVANIA

Date: 2/10/2022

Drawn By: FTN

Figure Number: CS200-1

ATTACHMENT 2
SOILS MAP AND REPORT

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Chester County, Pennsylvania

January 27, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:1,950 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chester County, Pennsylvania
Survey Area Data: Version 13, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 25, 2014—Aug 11, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ClB	Clarksburg silt loam, 3 to 8 percent slopes	0.3	3.7%
CtA	Conestoga silt loam, 0 to 3 percent slopes	1.4	15.0%
Th	Thorndale silt loam	0.0	0.0%
UrgB	Urban land-Conestoga complex, 0 to 8 percent slopes	7.5	81.3%
Totals for Area of Interest		**9.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Chester County, Pennsylvania

ClB—Clarksburg silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: w6t9
Elevation: 200 to 1,500 feet
Mean annual precipitation: 32 to 48 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 120 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Clarksburg and similar soils: 90 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clarksburg

Setting

Landform: Valley flats
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Parent material: Residuum weathered from limestone

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 27 inches: silt loam
H3 - 27 to 51 inches: silt loam
H4 - 51 to 84 inches: silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 36 inches to fragipan; 60 to 99 inches to
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Thorndale

Percent of map unit: 5 percent
Landform: Depressions

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

CtA—Conestoga silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: pjhy
Elevation: 300 to 1,600 feet
Mean annual precipitation: 34 to 50 inches
Mean annual air temperature: 46 to 57 degrees F
Frost-free period: 140 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Conestoga and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Conestoga

Setting

Landform: Hillsides
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from schist and/or residuum weathered from limestone

Typical profile

Ap - 0 to 10 inches: silt loam
Bt - 10 to 38 inches: silty clay loam
C - 38 to 75 inches: channery loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 60 to 99 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Clarksburg

Percent of map unit: 5 percent
Landform: Valley flats
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Hollinger

Percent of map unit: 1 percent
Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Duffield

Percent of map unit: 1 percent
Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Letort

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Pequea

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Penlaw

Percent of map unit: 1 percent
Landform: Swales
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave

Across-slope shape: Concave
Hydric soil rating: No

Th—Thorndale silt loam

Map Unit Setting

National map unit symbol: pjkf
Elevation: 200 to 1,000 feet
Mean annual precipitation: 32 to 48 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Thorndale and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Thorndale

Setting

Landform: Drainageways, valleys, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Linear, concave
Across-slope shape: Concave
Parent material: Colluvium derived from calcareous shale and/or colluvium derived from limestone and siltstone

Typical profile

Ap - 0 to 9 inches: silt loam
Btg - 9 to 27 inches: silty clay loam
Bxg - 27 to 36 inches: silt loam
C - 36 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 36 inches to fragipan; 60 to 99 inches to lithic bedrock
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D

Hydric soil rating: Yes

UrgB—Urban land-Conestoga complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: pjn7
Elevation: 300 to 1,600 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 45 to 57 degrees F
Frost-free period: 140 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 50 percent
Conestoga and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Pavement, buildings and other artifically covered areas

Typical profile

C - 0 to 6 inches: variable

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 to 99 inches to lithic bedrock
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Conestoga

Setting

Landform: Hillsides
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from schist and/or residuum weathered from limestone

Typical profile

Ap - 0 to 9 inches: silt loam
Bt - 9 to 40 inches: silty clay loam
C - 40 to 60 inches: loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 60 to 99 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Clarksburg

Percent of map unit: 5 percent
Landform: Valley flats
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Catoctin

Percent of map unit: 5 percent
Landform: Mountainsides
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Upper third of mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Hagerstown

Percent of map unit: 3 percent
Landform: Valley floors
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Penlaw

Percent of map unit: 2 percent
Landform: Swales
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope

Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

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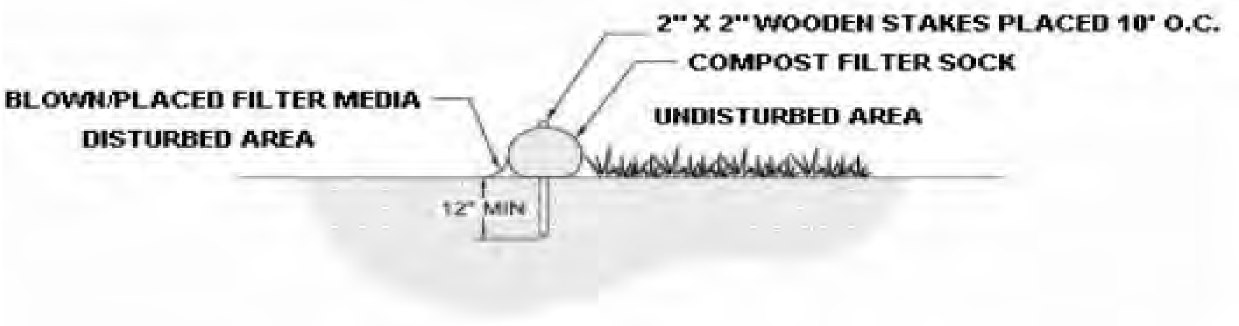
ATTACHMENT 3

E&SC PLAN BMP DESIGN WORKSHEETS AND CALCULATIONS

STANDARD E&S WORKSHEET #1
Compost Filter Socks

PROJECT NAME: Williams REAE - Compressor Station 200
LOCATION: East Whiteland Township, Chester County, PA
PREPARED BY: CD DATE: 03/01/2021
CHECKED BY: KCC DATE: 03/01/2021



SOCK NO.	Dia. (IN)	LOCATION	SLOPE PERCENT	SLOPE LENGTH ABOVE BARRIER (FT)
CS200-CFS-001	12	Along south-eastern LOD, east site of RCE	4.4%	103.4
CS200-CFS-002	12	Along south-eastern LOD, east site of RCE	2.0%	293.6
CS200-CFS-003	12	Along south-eastern LOD	2.0%	181.3
CS200-CFS-004	12	Along south-eastern LOD	2.0%	102
CS200-CFS-005	12	Along south-eastern LOD	2.7%	112
CS200-CFS-006	12	Along south-eastern LOD	4.1%	147.8
CS200-CFS-007	18	Along south-eastern LOD	3.6%	368.7
CS200-CFS-008	18	Along north-eastern LOD	4.0%	384.7
CS200-CFS-009	12	Along north-eastern LOD	4.9%	267.7
CS200-CFS-010	12	Along north-eastern LOD	4.5%	156.6
CS200-CFS-011	12	Along north-eastern LOD	4.8%	103.8
CS200-CFS-012	12	Along north-eastern LOD	5.0%	100
CS200-CFS-013	12	Along north-eastern LOD	5.0%	80.8
CS200-CFS-014	12	Along south-western LOD	3.1%	260
CS200-CFS-015	12	Along south-western LOD	3.0%	265

ATTACHMENT 4

OFFSITE DISCHARGE REPORT

Transcontinental Gas Pipe Line Company, LLC

Offsite Discharge Report

Regional Energy Access Expansion Project

Compressor Station 200

April 2021

(Revised March 2022)

1.0 Project Description

Transcontinental Gas Pipe Line Company, LLC (Transco), a subsidiary of The Williams Companies, Inc., is proposing the Regional Energy Access Expansion Project (Project). The existing Compressor Station 200 component of the Project is located in East Whiteland Township, Chester County. Proposed are compressor station modifications to connect the existing Transco Mainline A into suction to support south flow. This new facility will require Erosion and Sediment (E&S) Control and Post Construction Stormwater Management (PCSM) Best Management Practices (BMPs) to manage stormwater runoff during and after construction.

Transco has developed an Offsite Discharge Report for the discharges associated with the proposed BMP's. An Offsite Discharge Report is performed to ensure that no offsite erosion will occur downstream of the proposed activities. The analysis conducted for this project followed the sequence outlined in PaDEP's factsheet for offsite discharges (Document #3930-FS-DEP4124).

2.0 Conveyance Best Management Practices

Increases in stormwater runoff during and after construction shall be controlled by sequencing the operations, minimizing the extent and duration of disturbance, and using a selection of E&S Control and PCSM BMPs. During construction, compost filter sock will be used to retain/slow the flow leaving the construction area before entering an existing vegetated swale to the southeast. Post construction, a drainage berm and trench drain will be constructed to direct the majority of runoff from the developed area to the infiltration berm. In addition, a spillway will allow excess water to leave the infiltration berm and be discharged via a level spreader at the base of the spillway. Water will eventually flow into the existing vegetated swale southeast of the Limits of Disturbance. These BMP's will be installed to convey the net increase in volume between the pre and post development 2-year storm events and mitigate the increase (pre-post development) in peak runoff for the 2-, 10-, 50-, and 100-year storm events.

2.1 Infiltration Berm

The infiltration berm releases water through a spillway and three discharge pipes. Stormwater that flows over the spillway travels directly into a level spreader. Stormwater that flows through the discharge pipes and discharges across a riprap apron. The level spreader and riprap apron both discharge towards the vegetated area located southeast of the Limits of Disturbance. The stormwater is discharged as sheet flow and travels along a vegetative flow path until it reaches an onsite drainage swale, which discharges to an existing culvert along N. Bacton Hill Road. The flow then continues along the swale on the west side N. Bacton Hill Road, where it enters a culvert, travels under N. Bacton Hill Road, and into an existing ephemeral stream on the east side of the road. The area downgradient of the proposed infiltration berm is over 90% vegetated. The flow path is depicted on Exhibit 1.0. Soil types and erodibility factors within the flow path are shown on Table 1.

Table 1 – Soils Mapped within Flow Path	
Soil Mapping Unit	**Soil Erodibility Factor, K_f**
UrgB	$K_f = 0.37$
Th	$K_f = 0.37$

The soil erodibility factors are shown in Table 1. K values range from 0.02 to 0.69, a low K value indicates the soil will not easily erode whereas a high K value means the soil will easily erode. Based on a K value of 0.37, both soils are considered moderately susceptible to erosion. Neither soil is listed as easily erodible in Table E.1: Limitations of Pennsylvania Soils Pertaining to Earthmoving Projects in the PaDEP Erosion and Sediment Pollution Control Program Manual, March 2012. Photos were taken along the flow path of the downstream area to show the vegetative cover:

Photo 1: Existing Area at Proposed Level Spreader and Riprap Apron

Photo 2: Area Downgradient of the Proposed Level Spreader and Riprap Apron

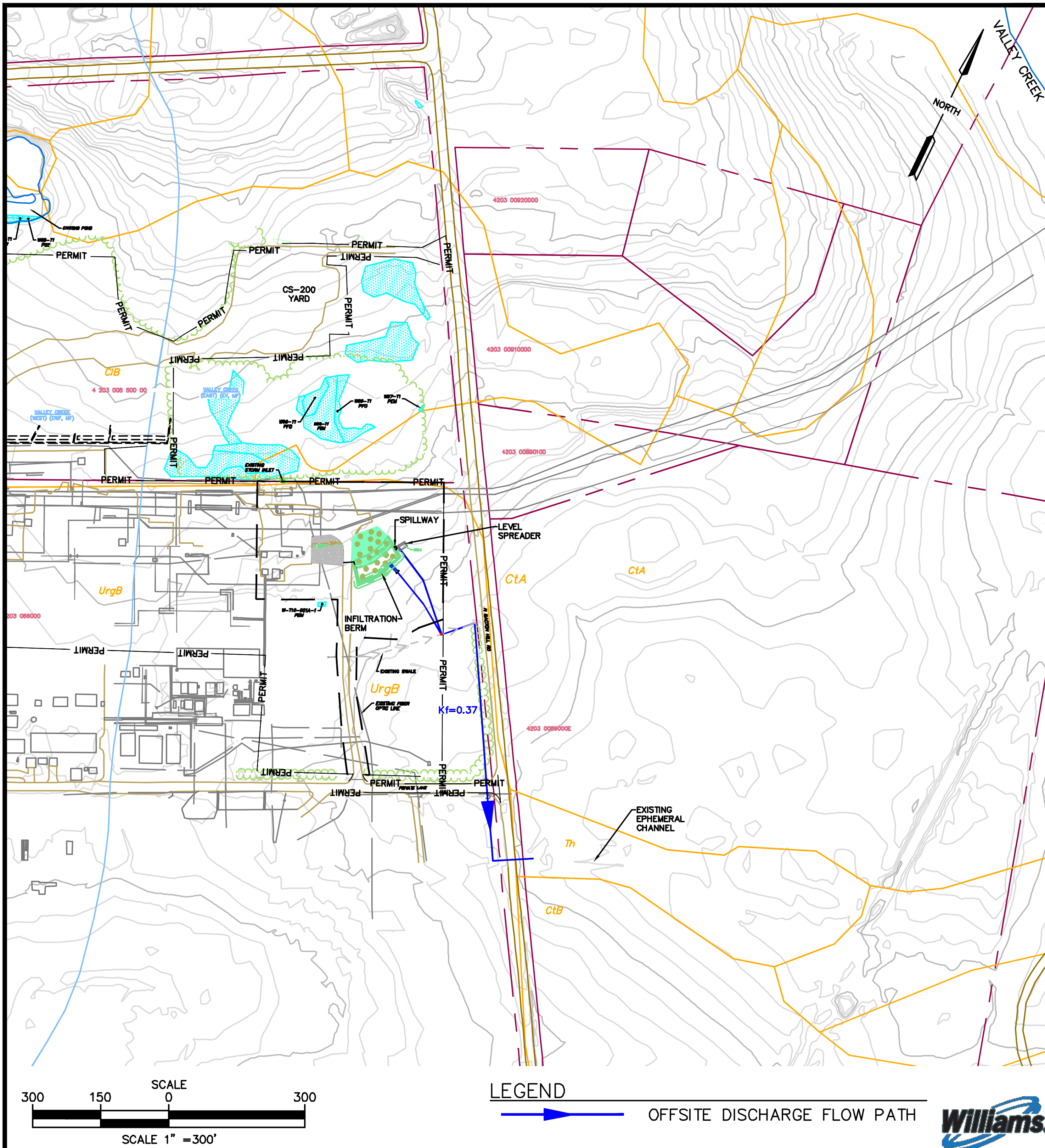
Photo 3: Existing Ephemeral Stream on the east side of N. Bacton Hill Road

Photo 1 shows the existing condition where the level spreader is proposed. The area will be graded to facilitate the installation of the level spreader and revegetated. Photo 2 shows the areas downgradient of the proposed level spreader and riprap apron, which is over 90% vegetated. Photo 3 shows the existing ephemeral stream where the flow from the project eventually discharges.

In the E&S and PCSM Narrative, site calculations are provided that show the Pre-, During-, and Post-Construction runoff flow rates and volumes. The calculations show a minor increase in the during-construction discharge rates. During-construction the flow velocity in the existing swale increased from 3.40 feet per second to 3.47 feet per second for the 10 year, 24 hour storm event. This increase will likely be mitigated by the use of compost filter socks, which will retain/slow the flow before entering the swale. The calculations show a reduction in the post-construction discharge rates and volumes. Post-construction calculations indicated that the discharge velocity at the proposed level spreader is 0.53 feet per second and into the proposed riprap apron is 2.56 feet per second for the for the 10 year, 24-hour storm event. Since all the outlet velocities are below 3.5 feet per second downstream erosion will be minimal if not negligible. If any erosion occurs along the flow path, Transco will repair as necessary.

3.0 Conclusion

Based on the existing vegetative conditions, low discharge velocities from the BMPs, and the reduced flow rates and volumes from the site, downgradient soil erosion is not anticipated as a result of the proposed development of this site.



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TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
REGIONAL ENERGY ACCESS EXPANSION PROJECT
COMPRESSOR STATION 200

EROSION AND SEDIMENTATION CONTROL PLAN

FLOW PATH

EAST WHITELAND TWP CHESTER COUNTY PENNSYLVANIA

DATE:	02/22/22
DRAWN BY:	RWS
CHECKED:	PW
WHM DRAWING NO:	FLOW PATH
	EXHIBIT 1.0

SECTION 2.3.2
DRAWINGS