LAMBERTVILLE EAST EXPANSION PROJECT

RESOURCE REPORT 7
Soils

FERC Docket No. CP18-___-000

December 2017

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Filing Requirement	**Location in Environmental Report**
☒ List, by milepost, the soil associations that would be crossed and describe the erosion potential, fertility, and drainage characteristics of each association.	Section 7.2, Figure 7.2-1, and Table 7.4-1
☒ If an aboveground facility site is greater than 5 acres: – List the soil series within the property and the percentage of the property comprised of each series; – List the percentage of each series which would be permanently disturbed; – Describe the characteristics of each soil series; and – Indicate which are classified as prime or unique farmland by the U.S. Department of Agriculture, Natural Resources Conservation Service.	Section 7.2, Figure 7.2-1, and Table 7.4-1
☒ Identify, by milepost, potential impact from: Soil erosion due to water, wind, or loss of vegetation; soil compaction and damage to soil structure resulting from movement of construction vehicles; wet soils and soils with poor drainage that are especially prone to structural damage; damage to drainage tile systems due to movement of construction vehicles and trenching activities; and interference with the operation of agricultural equipment due to the probability of large stones or blasted rock occurring on or near the surface as a result of construction.	Section 7.4 and Table 7.4-1
☐ Identify, by milepost, cropland and residential areas where loss of soil fertility due to trenching and backfilling could occur.	Not Applicable
☒ Describe proposed mitigation measures to reduce the potential for adverse impact to soils or agricultural productivity. Compare proposed mitigation measures with the staff's current "*Upland Erosion Control, Revegetation and Maintenance Plan,*" which is available from the Commission Internet home page or from the Commission staff, and explain how proposed mitigation measures provide equivalent or greater protections to the environment.	Section 7.4

ACRONYMS AND ABBREVIATIONS

E&SCP	Erosion and Sediment Control Plan
Elizabethtown Gas	Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas
FERC	Federal Energy Regulatory Commission
NRCS	Natural Resource Conservation Service
Project	Lambertville East Expansion Project
PSEG	PSEG Power LLC
SPCC Plan	Spill Prevention, Control and Countermeasure Plan
SSURGO	Soil Survey Geographic Database
Texas Eastern	Texas Eastern Transmission, LP
USDA	United States Department of Agriculture

7.0 RESOURCE REPORT 7 – SOILS

7.1 Introduction

Texas Eastern Transmission, LP ("Texas Eastern") is seeking a certificate of public convenience and necessity from the Federal Energy Regulatory Commission ("FERC") pursuant to Sections 7(b) and 7(c) of the Natural Gas Act to construct, install, own, operate, and maintain the proposed Lambertville East Expansion Project ("Project").

The Project's purpose is to expand the compression facilities at the Lambertville Compressor Station located in West Amwell Township, Hunterdon County, New Jersey to provide incremental pipeline transportation service to existing city-gates in New Jersey on behalf of two local utility customers, PSEG Power LLC ("PSEG") and Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas ("Elizabethtown Gas"), as well as to comply with new air emissions regulations under the New Jersey Reasonably Achievable Control Technology program. This new firm transportation capacity will enable PSEG and Elizabethtown Gas to serve their growing residential and commercial demand in their respective service territories. To accomplish this, Texas Eastern will install two new Solar Taurus 70 natural gas-fired turbine compressor units to replace two existing higher emitting Clark DC-990 natural gas-fired turbine compressor units at the station. The replacement of the two existing units will also require removal of a building, coolers and auxiliary equipment associated with the compressor units to be removed and installation of replacement buildings, coolers and auxiliary equipment for the compressor units to be installed.

In addition, Texas Eastern will perform system maintenance activities for certain facilities at Texas Eastern's existing Lambertville Compressor Station including the removal of four retired reciprocating compressor units and associated building, coolers and auxiliary equipment, and the removal of a warehouse and one other building. Texas Eastern will also perform yard piping modifications as part of this scope.

This Resource Report 7 (Soils) describes the soil types to be affected by the Project and identifies potential impacts to soils associated with construction and operation of the Project. This Resource Report also discusses the ways in which Texas Eastern will help ensure that any such impacts are minimized. A checklist showing the status of the FERC filing requirements for Resource Report 7 is included following the table of contents.

7.2 Soils in the Project Area

The Project will be located at Texas Eastern's existing Lambertville Compressor Station and an adjacent farm field in West Amwell Township, Hunterdon County, New Jersey. Soils at the proposed Project site were mapped utilizing the United States Department of Agriculture ("USDA"), Natural Resource Conservation Service ("NRCS") gridded Soil Survey Geographic Database ("SSURGO"), which includes geospatially referenced Geographic Information System soil map unit polygons at a 1:24,000 scale (USDA NRCS 2016). The SSURGO contains the most detailed level of soil mapping performed by the NRCS, and corresponds with (or sometimes supersedes) the original county soil survey mapping. The SSURGO data maps are linked in the database to information about the component soils and their properties for each map unit. Each map unit may contain one to three major components (i.e., differing properties) and some minor components.

According to the USDA-NRCS SSURGO, the construction workspace for the Project will cross four soil map units including Penn channery silt loam (2 to 6 percent slopes), Penn channery silt loam (6 to 12 percent slopes), Klinesville channery loam (12 to 18 percent slopes), and Rough broken land (shale). Figure

7.2-1 depicts the extent of soil types described in this Resource Report. General descriptions of these soil map units are provided below.

Penn channery silt loam soils, 2 to 6 percent slopes (Mapping Unit PeoB), and 6 to 12 percent slopes (Mapping Unit PeoC2) – The Penn soil series can be found on nearly level to steep uplands. They are well drained soils that are composed of fine loamy residuum weathered from acid reddish shale, siltstone, and fine-grained sandstone. The soils in this series are classified as prime farmland soils. Various buildings and facilities associated with Texas Eastern's existing Lambertville Compressor Station are currently located on these two soil map units. A majority of the temporary workspace (92 percent) will be located on these soils.

Klinesville channery loam soils, 12 to 18 percent slopes (Mapping Unit KkoD) – This soil map unit consists of moderately sloping and somewhat excessively drained soil. The soils are derived from fine loamy residuum weathered from shale. Texas Eastern's existing Lambertville Compressor Station is currently located on this soil map unit. A small portion of the developed area associated with the station will be utilized as temporary workspace during construction of the Project.

Rough broken land, shale (Mapping Unit ROPF) – The rough broken land soil map unit is typically located in areas with many rock outcrops (USDA 1974). Rough broken land soils are located near the developed portion of the site. The soils are currently vegetated with upland grasses and the area is regularly mowed as it is within the fence limits of the Lambertville Compressor Station. During construction, the rough broken land soils at the site will be crossed by temporary workspace.

7.3 Soil Characteristics

This section identifies soil characteristics that could affect or be affected by the Project, including erosion potential, presence of prime farmland, compaction potential, presence of shallow bedrock/bedrock fragments, and revegetation limitations. For a summary of soils to be affected by the Project and their potential soil characteristics, refer to Section 7.4 and Table 7.4-1. Brief discussions of each of the primary soil characteristics evaluated as part of this report are provided below.

7.3.1 Erosion Potential

Soil erosion potential is dependent on-site conditions such as slope, climate, vegetative cover, or surface roughness. Other factors include soil texture, organic matter, calcium carbonate content, rock content, and aggregate stability. For this evaluation, Texas Eastern identified the soils having high potential for erosion by water through examination of factors including anticipated slope angle, K-factor, and the Highly Erodible Lands classification for the map unit as indicated in the SSURGO database. Soils having high potential for wind erosion were identified based on the Wind Erodibility Group as indicated in the SSURGO database.

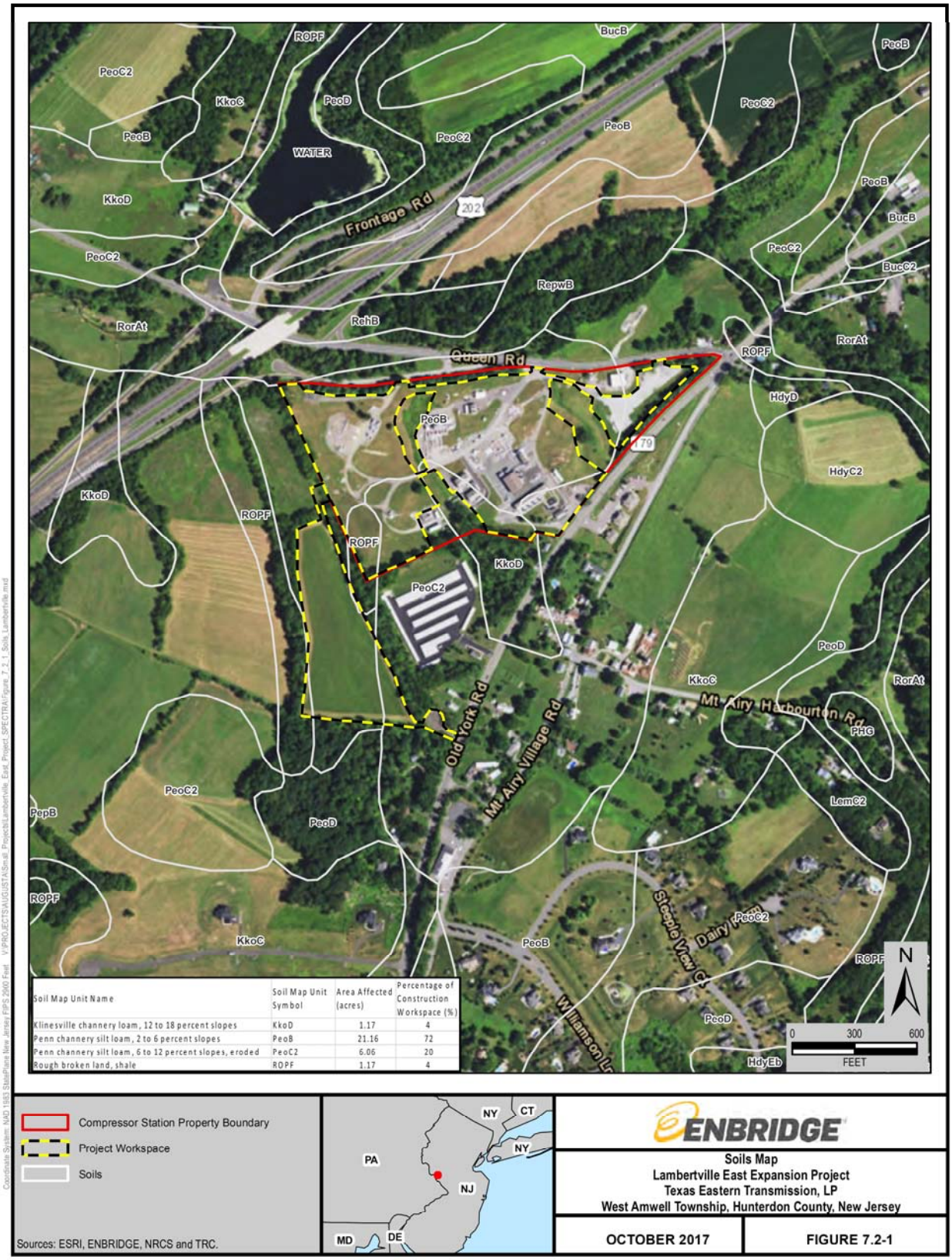

Figure 7.2-1 Soils Map

TABLE 7.4-1

Soil Types and Potential Limitations at the Proposed Aboveground Facilities

Map Unit ID	Soil Name	Drainage Class	High Erosion Potential		Shallow Bedrock[3]	Compaction Potential[4]	Prime Farmland or Farmland of Statewide Importance[5]	Soil with Poor Revegetation Potential[6]	Area Affected (acres)
			Water[1]	Wind[2]					
Hunterdon County, New Jersey									
KkoD	Klinesville channery loam, 12 to 18 percent slopes	Somewhat excessively drained	Yes	No	Yes	Low	No	No	1.17
PeoB	Penn channery silt loam, 2 to 6 percent slopes	Well drained	No	No	Yes	Low	Prime farmland	No	21.16
PeoC2	Penn channery silt loam, 6 to 12 percent slopes	Well drained	Yes	No	Yes	Low	Farmland of statewide importance	No	6.06
ROPF	Rough broken land, shale	Well drained	No	No	Yes	Moderate	No	Yes	1.17

1/ Includes soils designated as highly erodible by NRCS, or soils designated as potentially highly erodible by NRCS with average slope greater than or equal to 9 percent and K factor greater than 0.25.
2/ Includes soils in wind erodibility groups 1 and 2.
3/ Includes soils that have lithic bedrock within 60 inches of the soil surface.
4/ Compaction potential was determined by drainage class. High compaction potential includes very poorly drained and poorly drained soils, moderate compaction potential includes somewhat poorly drained to moderately well drained soils, and low compaction potential includes well drained soils. Urban, rock-outcrop and human-influenced soils (e.g., udorthents, urban land) are often not provided drainage classes. For the purposes of this assessment, unless NRCS provided information for drainage class, these types of soils were considered to have a moderate compaction potential.
5/ Prime farmland and farmland of statewide importance soils are designated by the NRCS.
6/ Includes soils with average slopes greater than 15% (Strongly Sloping), a K-factor of 0.40 or greater, a drainage class of excessively drained, or if they are classified with components of udorthents or rock-outcrops.

7.3.2 Prime Farmland Soils

The USDA defines Prime Farmland as "land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion."[1] This designation includes cultivated land, pasture, woodland, or other lands that are either used for food or fiber crops or are available for these uses. However, the fact that a particular soil is considered Prime Farmland does not mean that it is currently in agricultural use. Some Prime Farmland soils may be located in forested, open, or residential areas. Urbanized land and open water are excluded from Prime Farmland. Prime Farmland soil typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods, and is not subject to frequent, prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered Prime Farmland if the limiting factor is mitigated (e.g., through artificial drainage). In some areas, land that does not meet the criteria for Prime Farmland is considered to be Farmland of Statewide Importance as determined by the appropriate State agencies. Farmland of Statewide Importance is land that might economically produce high yields of crops when treated and managed according to acceptable farming methods.

7.3.3 Compaction Potential

Soil compaction occurs when soil particles are compressed. This modifies soil structure and can result in a reduction in the porosity and moisture-holding capability of the soil, thus restricting rooting depth. Compaction also decreases infiltration and thus increases runoff and the potential for water erosion. The potential for soil compaction is derived from multiple characteristics such as soil drainage, hydrology, texture, permeability, seasonal flooding, and high-water table parameters as expressed in the soil survey. The risk for compaction is greatest when soils are wet. Therefore, fine-grained soils having poor drainage characteristics have the greatest propensity for compaction. Construction equipment traveling over wet or saturated soils could disrupt soil structure, reduce pore space, increase runoff potential, and cause rutting/topsoil-subsoil soil mixing.

7.3.4 Shallow to Bedrock

The depth of bedrock can be used to estimate locations where blasting may be required and where rock fragments may become a potential issue (e.g., to future land-use, especially agricultural use) following completion of construction work. According to the NRCS, shallow bedrock soils have bedrock contact in the upper 60 inches of the soil profile.

7.3.5 Revegetation Potential

The ability of soils within the Project area to support successful revegetation was determined by data derived from the NRCS official series descriptions and county soil surveys. Soils were considered to have poor revegetation potential if they contained any combination of the following characteristics: average slopes greater than 15 percent ("Strongly Sloping"); a K factor greater than 0.40; a drainage class of excessively well-drained; or classified with components of Udorthents or rock-outcrops.

7.4 Soil Impacts and Mitigation

Construction of the Project will result in minor, short-term impacts on soils. The Project facilities will be located within the fence limits of Texas Eastern's existing Lambertville Compressor Station; however, some temporary workspace will be required outside of the facility. Utilizing an existing compressor station

[1] 7 U.S.C. § 4201(c)(1)(A); 7 C.F.R. § 658.2(a).

site will limit new soil disturbance by working within previously developed or disturbed soils and minimizing land use change.

Texas Eastern will further minimize impacts to soil by implementing Best Management Practices as provided in the Erosion and Sediment Control Plan ("E&SCP") located in Appendix 1B of Resource Report 1. The E&SCP is consistent with the FERC's Upland Erosion Control, Revegetation, and Maintenance Plan, May 2013 Version and Wetland and Waterbody Construction and Mitigation Procedures, May 2013 Version.

Additionally, Texas Eastern has prepared a Spill Prevention, Control and Countermeasure Plan ("SPCC Plan") to minimize potential contamination of soil resources from accidental spills of hazardous materials (*see* Appendix 1B, Resource Report 1).

7.4.1 Highly Erodible Soils

Short-term increases in erosion can occur as a result of the removal of vegetation during clearing and grading activities and the subsequent exposure of topsoil to wind action and precipitation. Further, increased erosion can occur in areas with vegetation that is slow to become re-established. Increased erosion of soils is of special concern at waterbodies where it can result in increased sedimentation in waterways. A large percentage (72 percent) of the soils located at the site do not have a high erosion potential (*see* Table 7.4-1).

To mitigate for soil erosion, Texas Eastern will use erosion control devices at locations, as identified in the E&SCP and as deemed necessary during construction. Temporary erosion controls, including interceptor diversions and sediment filter devices (e.g., hay bales, silt fences, sand bags) will be installed as necessary immediately following initial ground disturbance. Erosion control devices will be maintained over the course of the proposed Project and will be reinstalled, as necessary. Temporary erosion control devices will be inspected on a regular basis and after each rain event of 0.5 inches or greater to ensure proper functioning.

During construction, the effectiveness of temporary erosion control devices will be monitored by a Texas Eastern Environmental Inspector. Texas Eastern will implement post-construction monitoring to ensure revegetation, and erosion control devices will be maintained until the Project site is revegetated successfully. Following successful revegetation of construction areas, temporary erosion control devices will be removed.

7.4.2 Prime Farmland Soils

Soils designated as Prime Farmland were identified within the fence limits of the existing Lambertville Compressor Station within the temporary workspace proposed for the Project (*see* Table 7.4-1). These lands are not being used for agriculture. No permanent impacts will occur in these areas, but the soils will be temporarily disturbed during construction of the Project. Following construction, all lands affected by the Project will be restored and revegetated in accordance with the E&SCP.

7.4.3 Potentially Compact Prone Soils

Rutting and compaction of soils due to the travel of heavy equipment may occur at the proposed Project site. The degree of compaction depends upon the ground weight of the equipment or vehicle, soil texture, and soil moisture content at the time of the activity. Compaction would be most severe where heavy weight-bearing equipment or vehicles operate on moist to wet soils containing high clay content. Compaction damages soil structure and reduces pore space impeding the movement of air and water to plant roots.

Compaction can result in reduced vegetative growth rates and crop yields. Soils identified at the proposed Project site have a low to moderate potential for compaction (*see* Table 7.4-1).

Since many of the soils vulnerable to compaction occur in wetlands, and the Project workspace will be limited to upland areas, the Project is expected to have little to no effect on these soils. No agricultural or residential areas will be disturbed by the Project.

7.4.4 Shallow to Bedrock Soils

USDA data was used to identify soil map units where depth to bedrock is generally anticipated to be less than five feet (60 inches) from the soil surface (60 inches is the typical maximum depth of excavation for non-drilled pipeline installation). For urban and other manmade or influenced soils for which a depth to bedrock was not provided (e.g., urban land soils), a depth to bedrock of greater than 60 inches was assigned. Greater than 60 inches was assigned because the "shallow-to-bedrock" analysis is typically used to determine the potential for rock introduction to topsoil; urban and human-disturbed soils typically already have rocks in the soil and/or often do not support topsoil that would necessitate such an analysis or resulting mitigation measures.

Based on soil survey data, shallow to bedrock soils occur at the proposed Project site (*see* Table 7.4-1), however, no blasting is anticipated to be required at the Project.

7.4.5 Soils with Poor Revegetation Potential

Construction of the Project will result in the temporary loss of vegetation and will require that the disturbed areas be re-seeded to restore vegetative growth. Following completion of facility installation and testing, Texas Eastern will remove all construction debris from the Project work areas, restore original contours and drainages, prepare a seedbed (where necessary), and revegetate the Project site.

Implementation of proper topsoil segregation will help ensure post-construction revegetation success, thereby minimizing the potential for long-term erosion due to lack of vegetative cover. Project restoration and revegetation will be accomplished in accordance with FERC's Upland Erosion Control, Revegetation, and Maintenance Plan, May 2013 Version, and the E&SCP. Texas Eastern will conduct post-construction monitoring to ensure that revegetation is successful. Revegetation will be considered successful when plant density and cover within the proposed Project area is similar to adjacent undisturbed areas.

7.4.6 Contaminated Soil

If contaminated media is discovered during construction, Texas Eastern will adhere to all applicable federal, state, and local regulations consistent with the conditions of the FERC certificate. During construction, contamination from accidental spills or leaks of fuels, lubricants, and coolant from construction equipment could adversely affect soils. Texas Eastern has developed a SPCC Plan that specifies cleanup procedures in the event of soil contamination from spills or leaks of fuel, lubricants, coolants, or solvents (*see* Appendix 1B, Resource Report 1). Texas Eastern and its contractors will implement its SPCC Plan to prevent accidental spills of any material that may contaminate soils. If necessary, additional measure will be implemented to ensure that inadvertent spills of fuels, lubricants, or coolants are contained, cleaned up, and disposed of in an appropriate manner.

7.5 References

USDA. 1974. Soil Survey of Hunterdon County, New Jersey.

https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/new_jersey/hunterdonNJ1974/hunterdonNJ1974.pdf

USDA NRCS. 2016. SSURGO Gridded Soil Survey Geographic Database State-tile Package. Available Online at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053628