12

Geology, Soils, and Farmlands

Contents

Figures

Tables

Acronyms/Abbreviations

AASHTO ..... American Association of State Highway and Transportation Officials
FPPA ..... Farmland Protection Policy Act
GBNRTC ..... Greater Buffalo Niagara Region Transportation Council
NRCS ..... Natural Resources Conservation Service
NYSDOT ..... New York State Department of Transportation
TIP ..... Transportation Improvement Program
USGS ..... U.S. Geological Survey

12 Geology, Soils, and Farmlands

This chapter describes existing geology and soils in the study area, farmland prevalence within the study area, and potential environmental effects of the Proposed Action on these resources. Geology considers both bedrock (e.g., sandstone, shale, gneiss, etc.) and unconsolidated surficial deposits (e.g., sand, gravel, clay, etc.). The section on soils considers the uppermost layer of the ground, which has been exposed to climatic and erosive forces. Impacts to geology and soils are primarily associated with construction activities, which are discussed in more detail in Chapter 19, "Construction Effects." As detailed in the following analyses, the Proposed Action would not result in any adverse impacts to these resources.

12.1 REGULATORY CONTEXT

The regulatory implications of geology are generally established through building codes or other engineering criteria that dictate design requirements for project elements. Examples include design codes for earthquake resistance and bearing capacity of foundations. For example, the American Association of State Highway and Transportation Officials (AASHTO) and the New York State Department of Transportation (NYSDOT) in its Bridge Safety Assurance and Blue Pages manual prescribe seismic design requirements for roadway and bridge structures. Such codes and criteria are typically accounted for during detailed design of project-related structures.

The Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture protects and regulates prime farmland soils under the Farmland Protection Policy Act (7 CFR Part 658) (FPPA), which was passed in 1981 as a measure to minimize the effects of federal programs on the unnecessary and irreversible conversion of farmland to nonagricultural use. The FPPA does not apply to projects already in or committed to urban development or those that could otherwise not convert farmland to nonagricultural uses. The U.S. Census Bureau-designated "Urbanized Area" completely contains the Proposed Action, making the Proposed Action exempt from FPPA requirements.

12.2 METHODOLOGY

The study area for this chapter is defined as 1/4 mile on either side of the Proposed Action alignment and 1/2 mile radius around each proposed station. Geologic data are provided by the NRCS, the U.S. Geological Survey (USGS), and the New York State Geological Survey. Bedrock and surficial geologic conditions are based on published maps for the western New York region. Soils data are provided by soil surveys from the NRCS (formerly the Soil Conservation Service).

In addition, the Town of Amherst Foundation Study,[1] which included a literature review, home inspections, soil sampling, field inspections, and phone surveys, was referenced.

12.3 EXISTING CONDITIONS

This section characterizes existing geologic and soils conditions in the study area. Existing conditions are largely based on available mapping and surveys of the study area, as well as the Town of Amherst Foundation Study. More extensive geotechnical investigations would occur during final design of the Proposed Action.

12.3.1 Geology

12.3.1.1 Bedrock Geology

The majority of the study area is underlain by shale, limestone, and dolomite. The portion of the study area in Tonawanda and Amherst is underlain by the Camillus, Syracuse, and Vernon formation. Data from the USGS indicates that the formation is composed mostly of shale, dolostone, salt, and gypsum. This formation begins at Kenmore Avenue and continues north through the remainder of the study area. Akron Dolostone and Onondoga and Bois Blanc Limestone, which are made up mostly of shale and dolostone, underlie the portion of the study area south of Kenmore Avenue. Dissolution of rock, due to the limestone ladened base rock, has been known to cause sinking foundations in the northeast section of the study area, north of Maple Road .

12.3.1.2 Surficial Geology

Unconsolidated deposits of mostly glacial or glacial lacustrine in origin define the surficial geology in the study area. The glacial deposits consist of till, lake deposits, sand, and gravel deposits. These deposits are composed mostly of clay, silt, sand, and stones. The typical thickness of the deposits are 40 feet but range from 1 foot to 70 feet.

12.3.2 Soils

The NRCS identifies major classifications of soils into series that have similar characteristics (such as texture and drainage). Within each series, soils differ in slope and other characteristics that affect their use. On the basis of these differences, soil series are further divided into phases (soil map units). Different soil phases exhibit variable water storage, erosion potential, and other characteristics that are important from a development perspective. Clay and silt clay loam with bands of silt loam and sandy loam define the soil texture in the study area. These soils are made up of "fine particles" that affect the region's drainage, permeability, infiltration, rooting depth, and moisture holding capacity.

A variety of soil types exist within the study area (Figure 12-1). From University Station to Maple Road, Ud (Urban Land) and Ut (Urban land-Odessa complex) dominate the soil type but Uh (Urban land-Churchville complex) and Uu (Urban land-Schoharie complex) are also common. Throughout University at Buffalo (UB) North Campus, the soil types are a mix of Od (Odessa silt loam), CoA

[1] U.S. Army Corps of Engineers and the Town of Amherst. (2005). Town of Amherst Soils and Residential Foundation Study. Accessed at *http://www.amherst.ny.us/pdf/building/soilsstudy/TOA_Soils_Foundation_Study.pdf*

(Churchville silt loam), and CgB (Cazanovia Silt Loam). North of UB North Campus, the soil type is primarily Cv (Cosad loamy fine sand).

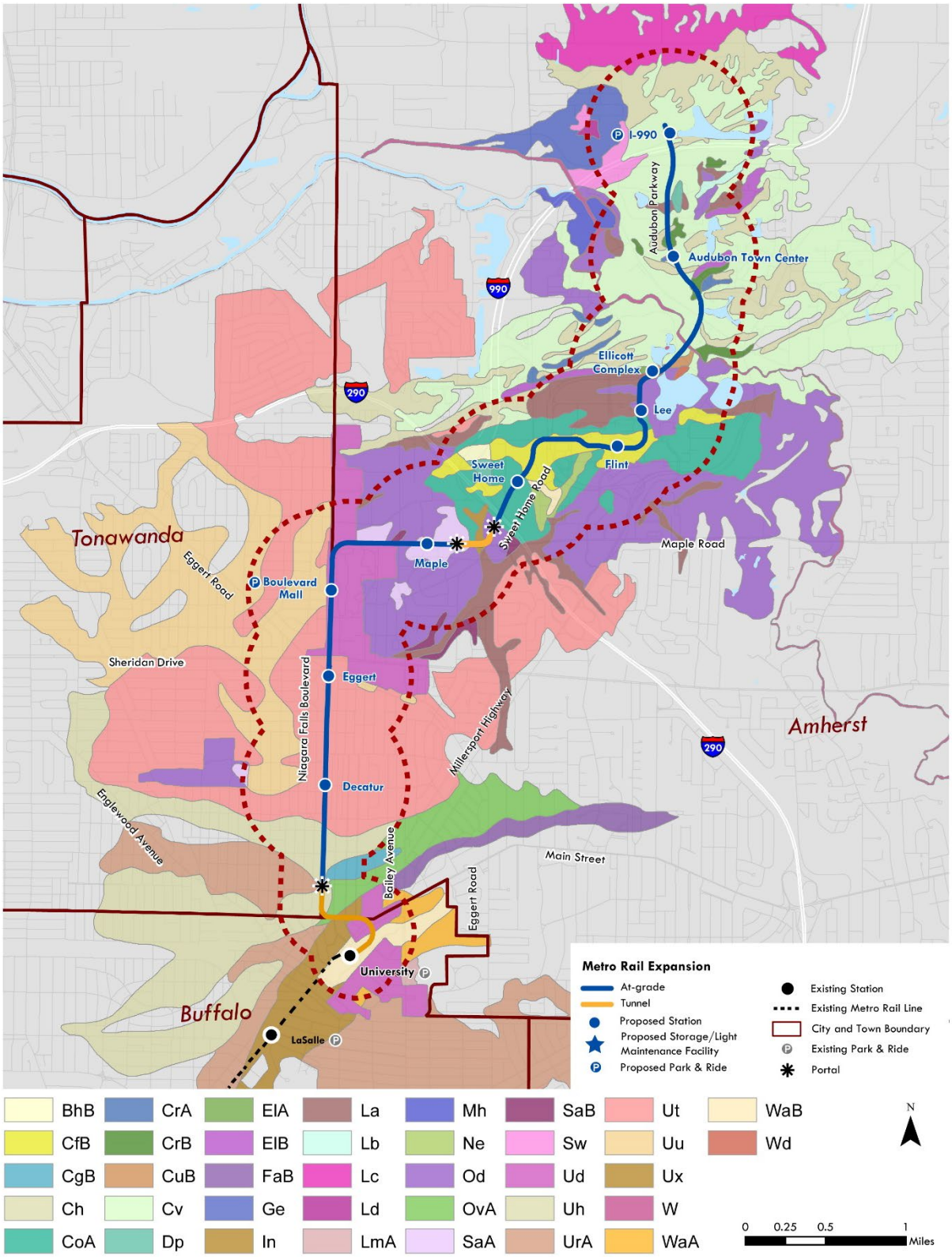
As defined by the NRCS, hydric soils are formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic (i.e., without oxygen) conditions in the upper part. Hydric soils in the study area occur primarily along streams and creeks (see Chapter 11, "Water Resources"). Table 12-1 details the hydric soils within the study area.

Table 12-1. Hydric Soils

Class	Name	Slope	Depth-To-Water Table	Description
Ch	Cheektowaga fine sandy loam	0% to 3%	Seasonal	Soil is very poorly drained.
CoA	Churchville silt loam	0% to 3%	Seasonal	Nearly level soil is deep and somewhat poorly drained.
CrA	Claverack loamy fine sand	0% to 3%	Seasonal	Soil is moderately well drained.
CrB	Claverack loamy fine sand	3% to 8%	Seasonal	Soil is moderately well drained.
CoB	Churchville silt loam	3% to 8%	Seasonal	Soil is gently sloping, deep, and somewhat poorly drained.
Cv	Cosad loamy fine sand	0% to 3%	Seasonal	Soil is deep and somewhat poorly drained.
Dp	Dumps	NA	NA	Landfills comprise the soil.
Ge	Getzville silt loam	0% to 3%	Seasonal	Soil is deep and very poorly drained.
In	Llion silt loam	Nearly Level	Seasonal	Soil is deep and poorly drained.
La	Lakemont silt loam	0% to 3%	Seasonal	Soil is deep and poorly drained.
Lb	Lakemont mucky silt loam	0% to 2%	Seasonal	Soil is deep and very poorly drained.
Lc	Lamson very fine sandy loam	0% to 3%	Seasonal	Soil is deep and poorly drained.
Ld	Lamson mucky very fine sandy loam	0% to 2%	Seasonal	Soil is deep and very poorly drained.
LmA	Lima loam	0% to 3%	Seasonal	Soil is deep and moderately well drained.
Mh	Minoa very fine sandy loam	0% to 3%	Seasonal	Soil is deep and somewhat poorly drained.
Ne	Newstead loam	0% to 3%	Seasonal	Soil is moderately deep and somewhat poorly drained.
Od	Odessa silt loam	0% to 3%	Seasonal	Soil is deep and somewhat poorly drained.
OvA	Ovid silt loam	0% to 3%	Seasonal	Soil is somewhat poorly drained.
Ud	Urban land	Level or Nearly Level	NA	Soil is covered by asphalt or urban uses.
Uh	Urban land- Churchville complex	0% to 3%	Seasonal	Soil is deep and somewhat poorly drained.
UrA	Urban land-Lima complex	1% to 6%	Seasonal	Soil is moderately well drained.
Ut	Urban land-Odessa complex	0% to 3%	Seasonal	Soil is somewhat poorly drained.
Ux	Urban land-Wassaic complex	0% to 3%	Seasonal	Soil is moderately deep.
Wd	Wayland soils complex	0% to 3%	Seasonal	Soil is deep and very poorly drained.

Source: U.S. Department of Agriculture, 1986

Figure 12-1. Soil Types within the Study Area



Source: Natural Resources Conservation Service Soil Survey Geographic Database, 2018. (See Table 12-1 for soil definitions.)

12.4 FUTURE WITHOUT THE PROPOSED ACTION

The No Action condition would consist of a future scenario with no changes to the Proposed Action corridor, beyond the projects that are already committed and planned by others. A proposed bridge reconstruction effort on the bridge carrying John James Audubon Parkway over Ellicott Creek to the northeast of UB North Campus could affect soils in the study area. The project will replace deteriorated concrete, fascia, bridge joints, curbs, and concrete approach slabs. In addition, the Greater Buffalo Niagara Region Transportation Council (GBNTRC) Transportation Improvement Program (TIP) includes a roadway improvement project within the study area along North Forest Road in Amherst between Route 263 (Millersport Highway) and Dodge Road. The project entails pavement resurfacing for a 1.67 mile stretch of North Forest Road.

In addition, a proposed development for a new residential housing and mixed-use development within the study area would disturb the soils surrounding the proposed I-990 station. This development is proposed on both sides of the Proposed Action alignment and would disrupt forested land and hydric soils. (See Chapter 2, "Land Use, Zoning, and Community Character" for a description of the No Action condition projects.)

12.5 PROPOSED ACTION

Potential impacts related to geology and soils would be primarily associated with construction activities, which are described in Chapter 19, "Construction Effects." Any potential impacts relevant to operation and construction of the Proposed Action are discussed in the following sections.

12.5.1 Geology

The Proposed Action would require excavation of earth material (detailed further in Chapter 19, "Construction Effects"). From University Station, the Proposed Action would extend underground for 1.25 miles, which would require tunnel blasting and cut-and-cover construction. The tunnel would travel below Kenmore Avenue and Niagara Falls Boulevard. This portion of the study area is defined by the transition from the underline Akron Dolostone to the Camillus Shale. An extent of the underground portion of the Proposed Action would tunnel through a vacant parcel on the corner of Kenmore Avenue and Niagara Falls Boulevard (159 Kenmore Avenue). This parcel was once the location of a gas station and is identified as a Phase II field investigation site (described in Chapter18, "Hazardous and Contaminated Materials"). Additional soil testing will occur before constructing the Proposed Action. Cut-and-cover construction would also take place for the portion of the Proposed Action alignment through the intersection of Maple Road and Sweet Home Road, where the light rail would traverse under the intersection. Surface construction of at-grade portions of the Proposed Action would displace surficial unconsolidated deposits up to 5 feet. Surficial disturbances would occur to the following soil types as described following the Proposed Action alignment south to north; Urban land -Churchville Complex, Urban land-Odessa Complex, Urban land, Odessa silt loam, Curchville silt loam, Lilion silt loam, and Cosad loamy fine sand.

12.5.2 Soils

Erosion and suitability for construction are the primary concerns with respect to soils. Erosion would be the primary potential impact during construction, because soils would be exposed to wind, rain, and other erosive forces. (See Chapter 19, "Construction Effects" for further discussion.) Soil types and their limitations for construction would be evaluated in detail during later phases of the Proposed Action. Detailed geotechnical investigations would be conducted to assess soil characteristics along the Proposed Action alignment, so that construction techniques and environmental safeguards can be developed to address any limitations. Any areas of soil exposed during construction would be developed with highway improvements or maintenance facilities, or would be revegetated. As such, erosion would not be a substantial concern during operation of the Proposed Action. Soil stabilization techniques would be used in work areas, both during and after construction, to prevent potential sedimentation of nearby waterways and to minimize other potential soil disturbance effects. Sediment and erosion controls and stormwater maintenance facilities would be implemented in accordance with the 2010 Western New York Stormwater Coalition Stormwater Management Plan[2]Therefore, no adverse impacts to soils would result from the Proposed Action.

12.6 MITIGATION

As the Proposed Action would not result in any adverse effects on geology and soils, no mitigation measures would be required.

[2] Western New York Stormwater Coalition Stormwater Management Plan. 2010. Accessed at http://www2.erie.gov/environment/sites/www2.erie.gov.environment/files/uploads/pdfs/ECS_SWMP_2010.pdf