

Neuse River Basin Flood Risk Management Integrated Feasibility Study and Environmental Assessment

Appendix E. Geotechnical Engineering



**US Army Corps
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Appendix E: Geotechnical Engineering

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APPENDIX E. APPENDIX E: GEOTECHNICAL REPORT

E.1 INTRODUCTION

The Neuse River Basin is within the Piedmont and Coastal Plain physiographic provinces. The Neuse River starts in the Piedmont region of North Carolina, but much of the river runs through the Coastal Plain before it empties into the Pamlico Sound. The non-structural measures for the Neuse River Basin Feasibility consists of floodproofing and elevating 768 houses throughout the Neuse River Basin. A detailed description of the Tentatively Selected Plan (TSP) can be found in the draft Neuse River Basin Feasibility Report and Environmental Assessment. The non-structural measures were grouped together based on geographic location.

E.1.1 Purpose

The purpose of this Appendix is to provide a geological description in the general vicinity of the proposed non-structural measures and buyouts. Design phase considerations and general construction recommendations are also provided.

E.2. REGIONAL GEOLOGY

The regional geological description for the proposed non-structural measures and buyouts is based on the 1985 Geological Map of North Carolina. Figure E-1 below shows the regional geology in the vicinity of the proposed non-structural measures and buyouts. The approximate location of the proposed non-structural measures and buyouts are shown with red polygons and are labeled in accordance with Chapter 3 of the Main Report. The geological formations near and within the proposed non-structural measures are shaded and labeled. The proposed non-structural measures are within the Raleigh Belt, the Eastern Slate Belt, and the Coastal Plain. The Raleigh Belt and the Eastern Slate Belt are within the Piedmont physiographic province and contain the CZg, CZve, CZam, CZig, and PPmg geological units. The Coastal Plain is represented in Figure E-1 by the Km, Kb, Kp, Kc, Tpy, and Tec geological units. Soils within the Piedmont region typically consist of residual soils overlying the Metamorphic and Igneous bedrock. Soils within the Coastal Plain typically consists of alluvial sands and clays with intermittent layers of sedimentary rock (1985 Geological Map of NC).

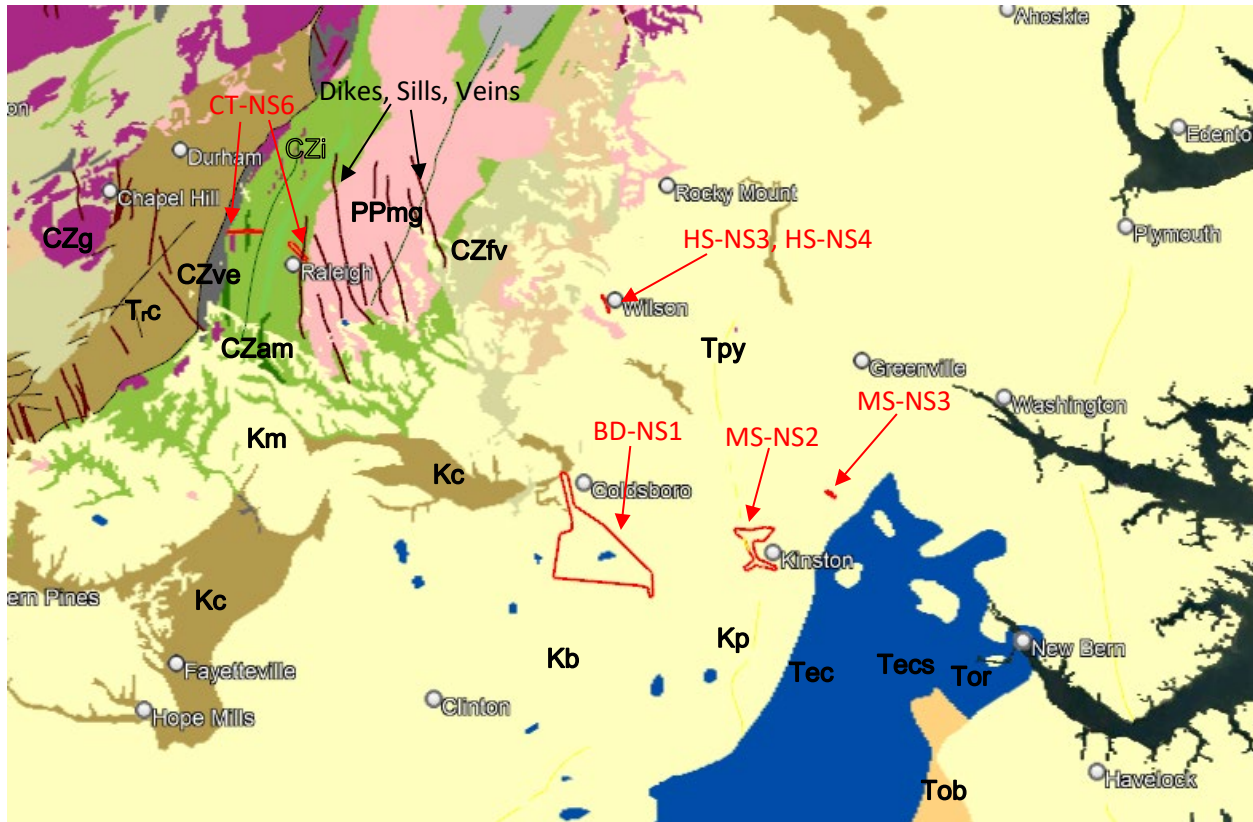


Figure E-1: Regional geology in relation to the proposed non-structural measures and buyouts¹.

E.3. NON-STRUCTURAL DESIGN CONSIDERATIONS

This section of the provides design considerations for the proposed non-structural measures.

E.3.1 Pre-Construction, Engineering, and Design Phase Site Visits

Pre-construction, engineering, and design phase site visits should be conducted to inspect whether the structure is in an acceptable condition to be raised to the proposed elevation. In cases where the structural and geotechnical engineering team determines that addition investigations are needed, in-situ soil testing such as hand auger borings with Dynamic Cone Penetrometers (DCPs), Cone Penetration Tests (CPTs), Standard Penetration Tests (SPTs), and test pits can be performed. The contractor/excavator will be responsible for locating utilities prior to conducted the in-situ soil tests.

Based on some knowledge of the regional geology, difficult excavation due to rock is unlikely. However, previously conducted construction activities have taken place on the

¹ Figure taken from Google Earth using the NC Geological Map of 1985, <https://mrdata.usgs.gov/geology/state/state.php?state=NC>

proposed work site. As a result, debris and other unsuitable material may be encountered during the excavation operations.

E.3.2 Construction Considerations

Existing utilities around and along the foundation should be located prior to construction activities. Excavation trenches along the structure should be graded such that rainwater does not saturate the soils beneath the existing foundation. Temporary unwatering measures, by sump pumps, drainage ditches, or other methods as determined by the contractor, may be needed to control surface water when excavating around the existing foundation. Any voids underneath the existing foundation that were caused by the excavation operations, should be remedied with flowable fill or other methods approved by the Geotechnical Engineer of Record.

E.3.3 Report Limitations

The geological information provided in this report is based on the North Carolina 1985 Geological map. This report does not account for the human placed materials, existing organic materials, and/or surficial deposits that may overlay the geological formation. Site specific groundwater information is not available at the time of this report. Groundwater can vary based on site topography, seasons, rainfall, and other factors. Impermeable to semi-impermeable surfaces, such as concrete, rock, clay, debris, etc., can cause perched groundwater conditions. Site specific investigations can help the engineers and contractors have a better understanding of the subsurface conditions at the proposed work sites.

E.4. REFERENCES

1985 Geological Map of NC, <https://mrdata.usgs.gov/geology/state/state.php?state=NC>