Appendix B – Water Body Crossing Procedures, and Pipeline Testing, Reliability, and Safety Information

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Erosion and Sediment Control Plan (E&SCP) Excerpt- ETNG Water Body & Wetland Crossing Procedures

5.2.5 Various Types of Crossings

Construction at waterbodies will be conducted using two principal crossing methods, a "dry" crossing and a "wet" crossing. The "dry" crossing procedure is further divided into a flumed crossing and a dam and pump crossing. These methods are designed to maintain downstream flow at all times and to isolate the construction zone from the stream flow by channeling the water flow through a flume pipe or by damming the flow and pumping the water around the construction area. The overall objective is to minimize siltation of the waterbody and to facilitate trench excavation of saturated spoil. Unless approved otherwise by the appropriate state agency, pipeline construction and installation must occur using one of the two "dry" crossing methods for waterbodies state-designated as either coldwater or significant coolwater or warmwater fisheries. The flumed and dam and pump crossing methods are applicable to waterbodies up to 30 feet wide at the water's edge at the time of construction. The two "dry" crossings are further described below in Sections 5.2.5.2 and 5.2.5.3.

The "wet" crossing procedure involves open cutting the waterbody without isolating the construction zone from the stream flow. The objective of this method is to complete the waterbody crossing as quickly as practical in order to minimize the duration of impacts to aquatic resources. All streams, their classifications, timing windows, and crossing procedures will be identified in the Clearance Package/Permit Book and on the construction drawings. Table 6-1 outlines the general procedures to be followed at all waterbody crossings.

5.2.5.1 General Crossing Procedures

1. Dewater trench in accordance with the procedures described in Section 3.5.6.

2. For minor waterbodies:

   a. Place all spoil from the waterbody within the construction ROW at least 10 feet from the water's edge or in the extra work areas shown on the construction drawings. Use sediment barriers to prevent flow of spoil or heavily silt-laden water into the waterbody.

3. For intermediate waterbodies:

   a. Less than 30 feet in width, place all spoil from the waterbody within the construction ROW at least 10 feet from the water's edge or in the extra work areas shown on the construction drawings. Use sediment barriers to prevent flow of spoil or heavily silt-laden water into the waterbody.

b. Greater than 30 feet in width, spoil may be temporarily sidecast into the waterbody provided that site specific approval is received from the appropriate permitting agency.

4. For major waterbodies:

   a. Place all upland bank spoil from the waterbody within the construction ROW at least 10 feet from the water's edge or in the extra work areas shown on the construction drawings. Use sediment barriers to prevent flow of spoil or heavily silt laden water into the waterbody.

5. Restore and stabilize the banks and channel in accordance with Section 5.2.6.

5.2.5.2 Flumed Crossing

The flumed crossing method utilizes a flume pipe(s) to transport stream flow across the disturbed area and allows trenching to be done in drier conditions (Figure 30). The flume pipe(s) installed across the trench will be sized to accommodate anticipated stream flows. This method is utilized for perennial waterbodies (minor and intermediate) up to 30 feet wide that are state designated fisheries including coldwater fisheries and warmwater fisheries considered significant by the state. Flumes are generally not recommended for use on a watercourse with a broad unconfined channel, unstable banks, a permeable substrate, excessive stream flow, or where the installation and construction of the flume crossing will adversely affect the bed or banks of the stream.

1. Cross all minor waterbodies that are state-designated fisheries, as identified in the Clearance Package/ Permit Book, using a dry crossing technique (Figures 30, 31).

2. All construction equipment must cross state-designated fisheries on an equipment bridge as specified in Section 5.2.2.

4. The flumed crossing shall be installed as follows:

   a. Install flume pipe(s) after blasting and other rock breaking measures (if required), but before trenching;

   b. Properly align flume pipe(s) to prevent bank erosion and streambed scour;

   c. Use sand bags or equivalent dam diversion structure to provide a seal at either end of the flume to channel water flow (some modifications to the stream bottom may be required to achieve an effective seal);

   d. **Do not remove flume pipe** during trenching, pipe laying (thread pipe underneath the flume pipe(s)), or backfilling activities, or initial streambed restoration efforts unless authorized by agency permits; and

   e. Remove all flume pipes and dams that are not also part of the equipment bridge as soon as final cleanup of the stream bed and bank is complete.

5.2.5.3 Dam and Pump Crossing

The dam and pump method is presented as an alternative dry crossing procedure to the flumed crossing. The dam and pump crossing is accomplished by utilizing pumps to transport stream flow across the disturbed area (Figure 31). This method involves placing sandbags across the existing stream channel upstream from the proposed crossing to stop water flow and downstream from the crossing to isolate the work area. Pumps are used to pump the water across the disturbed area and back into the stream further downstream. This method is intended for use at perennial waterbodies (minor and intermediate) up to 30 feet wide and state designated fisheries including coldwater fisheries and warmwater fisheries considered significant by the state. The dam and pump procedure allows for more space and flexibility during trenching and pipe installation, which shortens the duration of time spent at the waterbody.

1. The dam and pump method may be used for crossings of waterbodies where pumps can adequately transfer stream flow volumes around the work area, and where there are no concerns about sensitive species passage.

2. Implementation of the dam and pump crossing method will meet the following performance criteria:

   a. Use sufficient pumps, including onsite backup pumps, to maintain downstream flows;

   b. Construct dams with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner);

   c. Screen pump intakes

   d. Prevent streambed scour at pump discharge; and

   e. Monitor the dam and pumps to ensure proper operation throughout the waterbody crossing.

3. The dam and pump crossing shall be installed as follows:

   a. Install and properly seal sandbags at the upstream and downstream location of the crossing;

   b. Create an in-stream sump using sandbags if a natural sump is unavailable for the intake hose;

   c. Initiate pumping of the stream around the work area prior to excavating the trench;

   d. Screen all intake hoses to prevent the entrainment of fish and other aquatic life;

   e. Direct all discharges from the pumps through energy dissipaters to minimize scour and siltation;

   f. Monitor pumps at all times until construction of the crossing is completed; and

   g. Following construction, remove the equipment crossing and sandbag dams.

5.2.5.4 Wet Crossing

This construction technique is typically used to cross waterbodies that are non state-designated as well as intermediate and major waterbodies with substantial flows that cannot be effectively culverted or pumped around the construction zone using the dry crossing techniques (Figure 32). Non-state designated waterbodies include perennial warmwater streams not considered significant by the state, intermittent drainage ditches, and intermittent streams.

The wet-ditch crossing shall be installed as follows:

1. For minor waterbodies:
    a. Equipment bridges are not required at non state-designated fisheries (e.g. agricultural or intermittent drainage ditches). However, if an equipment bridge is used, it must be constructed in accordance with Section 5.2.2;
    b. Limit use of equipment operating in the waterbody to that needed to construct the crossing;
    c. Complete trenching and backfilling in the waterbody (not including blasting and other rock breaking measures) within 24 continuous hours; and
    d. If a flume is installed within the waterbody during mainline activities, it can be removed just prior to lowering in the pipeline. The 24-hour timeframe starts as soon as the flume is removed.
2. For intermediate waterbodies:
    a. Limit use of equipment operating in the waterbody to that needed to construct the crossing. All other construction equipment must cross on an equipment bridge as specified in Section 5.2.2; and
    b. Attempt to complete trenching and backfill work within the waterbody (not including blasting and other rock breaking measures) within 48 continuous hours, unless site-specific conditions make completion within 48 hours infeasible.
3. For major waterbodies:
    a. Company will develop site-specific crossing plans to be submitted for approval by the FERC and the appropriate permitting agency; and
    b. Construct the crossing in accordance with the measures contained in this Plan to the maximum extent practical.

5.2.6 Restoration

1. Return all waterbody banks to preconstruction contours or to stable angle of repose as approved by the EI.

2. Use clean gravel or native cobbles for the upper 12 inches of trench backfill in all waterbodies identified in the Clearance Package/Permit Book as coldwater fisheries.

3. For wet crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing the crossing. For dry crossings, complete bank stabilization before returning flow to the waterbody channel.

4. Limit the placement of riprap to the slopes along the disturbed waterbody crossing.

5. Install erosion control fabric along waterbodies with low flow conditions (Figure 33).

6. Revegetate disturbed riparian areas with conservation grasses and legumes in accordance with the recommended Upland Seed Mix in Appendix B. In the event that final cleanup is deferred more than 20 days after the trench is backfilled, all slopes within 100 feet of waterbodies shall be mulched with 3 tons/acre of straw.

7. Remove all temporary sediment barriers when replaced by permanent erosion controls or when restoration of adjacent upland areas is successful as specified in Section 8.1.

8. Install a permanent interceptor dike and a trench plug at the base of slopes near each waterbody crossed. Locate the trench plug immediately upslope of the interceptor dike. Permanent interceptor dikes may not be installed in agricultural areas.

6. WETLAND CROSSINGS

6.1 Definition

The term "**Wetland**" as used in this Plan includes any area that satisfies the requirements of the current Federal methodology for identifying and delineating wetlands. Wetland areas have been delineated prior to construction and are identified on the construction drawings.

The wetland crossing procedures described in this Plan comply with the Section 404 Nationwide permit program terms and conditions (33 CFR Part 330). The requirements outlined below do not apply to wetlands in actively cultivated or rotated cropland. Standard upland protective measures including workspace and topsoiling requirements, will apply to these agricultural wetlands.

6.2 General Procedures

6.2.1 Clearing and Grading

1. Limit construction activity and ground disturbance in wetland areas to a construction ROW width of 75 feet or as shown on the construction drawings. With written approval from the FERC for site-specific conditions, construction ROW width within the boundaries of federally delineated wetlands may be expanded beyond 75 feet.

2. Wetland boundaries and buffers must be clearly marked in the field with signs and /or highly visible flagging until construction-related ground disturbing activities are complete.

3. Restrict extra work areas (such as staging areas and additional spoil storage areas) to those shown only on the construction drawings. All extra work areas must be located at least 50 feet away from wetland boundaries, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. If site-specific conditions do not permit a 50-foot setback, the Company can receive written approval from the FERC to locate these extra work areas closer than 50 feet from the wetland.

4. Aboveground facilities shall not be located in any wetland, except as permitted or where the location of such facilities outside of wetlands would prohibit compliance with DOT regulations.

5. If standing water or saturated soils are present, or if construction equipment causes ruts or mixing of the topsoil and subsoil in wetlands, use low-ground-weight construction equipment or operate normal equipment on timber riprap, prefabricated equipment mats or terra mats on the working side of the ROW during clearing operations. Do not use more than two layers of timber riprap to stabilize the ROW.

6. Cut vegetation just above ground level and grind stumps to ground level, leaving existing root systems in place. Immediately remove all cut trees and branches from the wetland and stockpile in an upland area on ROW for disposal.

7. Limit pulling of tree stumps and grading activities to directly over the trenchline. Do not grade or remove stumps or root systems from the rest of the ROW in wetlands unless the Chief Inspector and EI determine that safety-related construction constraints require removal of tree stumps from under the working side of the ROW.

8. Do not cut trees outside of the construction ROW to obtain timber for riprap or equipment mats.

9. Cleared materials (slash, logs, brush, wood chips) shall not be permanently placed within wetland areas.

6.2.2 Temporary Erosion and Sediment Control

1. Install sediment barriers immediately after initial ground disturbance at the following locations:
   a. Within the ROW at the edge of the boundary between wetland and upland;
   b. Across the entire ROW immediately upslope of the wetland boundary to prevent sediment flow into the wetland;
   c. Along the edge of the ROW, where the ROW slopes toward the wetland, to protect adjacent, off ROW wetland; and
   d. Along the edge of the ROW as necessary to contain spoil and sediment within the ROW through wetlands.

2. Maintain all sediment barriers throughout construction and reinstall as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete in accordance with Section 8.1.

6.2.3 Crossing Procedure

1. Minimize the length of time that topsoil is segregated and the trench is open.

2. Do not use rock, soil imported from outside the wetland, tree stumps, or brush riprap to stabilize the ROW.

3. Perform topsoil segregation in accordance with Section 3.5.3.1 and trench dewatering in accordance with Section 3.5.6.

4. Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.

5. Use "push pull" or "float" techniques to place the pipe in the trench where water and other site conditions allow.

6. Install trench plugs and/or seal the trench bottom as necessary to maintain the original wetland hydrology at locations where the pipeline trench may drain a wetland.

7. Install a permanent interceptor dike and a trench plug at the base of slopes near the boundary between the wetland and adjacent upland areas. In addition, install sediment barriers as outlined in Section 3.5.2. Permanent interceptor dikes shall not be installed in agricultural areas.

8. Restore segregated topsoil to its original position after backfilling is complete. When required, additional fill material imported from off the ROW must be approved by the EI. The original wetland contours and flow regimes will be restored to the extent practical.

6.2.4 Cleanup and Restoration

1. Revegetate the ROW with annual ryegrass at 40 lbs/acre PLS or with the recommended Wetland Seed Mix in Appendix B, unless standing water is present.

2. **Do not use lime or fertilizer in wetland areas.**

3. Mulch the disturbed ROW only when required by the appropriate land management or state agency, as identified in the Clearance Package/Permit Book.

4. In the event that final cleanup is deferred more than 20 days after the trench is backfilled, all slopes adjacent to wetlands shall be mulched with 3 tons/acre of straw for a minimum of 100 feet on each side of the crossing.

5. Remove all timber riprap and prefabricated equipment mats upon completion of construction.

6. Develop specific procedures in coordination with the appropriate land management or state agency, where necessary, to prevent the invasion or spread of undesirable exotic vegetation (such as purple loose strife and phragmites).

7. Ensure that all disturbed areas permanently revegetate in accordance with Section 8.1.

8. Remove temporary sediment barriers located at the boundary between wetland and adjacent upland areas after upland revegetation and stabilization of adjacent upland areas are successful as specified in Section 8.1.

Gas Pipeline Testing, Reliability, and Safety

Hydrostatic testing is the last step in pipeline construction. This consists of running water, at pressures higher than will be needed for natural gas transportation, through the entire length of the pipe. This serves as a test to ensure that the pipeline is strong enough, and absent of any leaks of fissures, before natural gas is pumped through the pipeline. Prior to conducting the testing, a Hydrostatic Testing Discharge permit would be obtained from the Tennessee Department of Environment and Conservation as required by state regulations.

The hydrostatic tests would last as long as needed to minimize potential impacts to receiving stream and bank surfaces. Testing needs to allow sufficient time for withdrawal to not significantly impact the wetted surface of the stream, a 24-hour testing period, and sufficient amount of time to empty the pipe without causing significant impacts to the receiving stream. The test water would contain no chemical additives. At the time of this test, the pipe would be new and uncontaminated, minimizing possible impacts to the receiving water.

Depending in part on which route is selected, potential sources for hydrostatic test water may be groundwater. In the event hydrostatic test water is needed at a remote location, it could be withdrawn from nearby streams and trucked to the hydrostatic test site. The feasibility of using water from small creeks along the route would be determined by evaluating the amount of flow at the time of construction. Withdrawal of water from small streams, especially during low-flow periods, would be done at a rate which would minimize the impact to the capability of these streams to meet their designated uses.

At the conclusion of each test, the water would be discharged at the permitted discharge point at a rate designed to minimize impacts to the adjoining land and receiving streams. Test water would be discharged through a discharge structure to prevent erosion of the stream banks. In extreme cases where the local drainage could not support the discharge volume, the water would be trucked back to another point as allowed by the permit and released there in a controlled manner. Any installed discharge structures would be removed when all testing was complete.

In order to ensure the efficient and safe operation of the extensive network of natural gas pipelines, pipeline companies routinely inspect their pipelines for corrosion and defects. This is done through the use of sophisticated pieces of equipment known as pigs. Pigs are robotic devices that are propelled down pipelines to evaluate the interior of the pipe. Pigs can test pipe thickness, and roundness, check for signs of corrosion, detect minute leaks, and any other defect along the interior of the pipeline that may either impede the flow of gas, or pose a potential safety risk for the operation of the pipeline.

In addition to inspection with pigs, there are a number of safety precautions and procedures in place to minimize the risk of accidents. In fact, the transportation of natural gas is one of the safest ways of transporting energy, mostly due to the fact that the infrastructure is fixed, and buried underground.

The natural gas pipeline would be designed, constructed, operated, and maintained in accordance with DOT *Minimum Federal Safety Standards* as outlined in 49 CFR Part 192. The proposed pipeline would be inspected annually to investigate for signs of failed pipe integrity. Any unusual situation or condition would be inspected immediately by TVA. Leak surveys are instrumental in early detection of leaks and can reduce the likelihood for pipeline failure.

The proposed pipeline would include features designed to increase overall safety and protect the public from potential failure. Such features may include but are not limited to having shut-off valves at each end of the pipeline that close in the event of an abnormal event.

There are potential hazards associated with natural gas, the primary component of which is methane, an odorless, colorless, and tasteless material. Natural gas is lighter than air and would therefore not settle to ground level as does propane.

Before placing the pipeline in service, TVA would prepare a procedures manual for operation, maintenance, and emergencies, as required under 49 CFR Part 192. The standards specified in 49 CFR Part 192 include a requirement to establish an Emergency Plan with written procedures to minimize the hazards from a natural gas pipeline emergency. Key elements of the plan would include procedures for:

- Identifying and classifying emergency events, such as gas leaks, fires, explosions, and natural disasters,
- Establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response,
- Making personnel, equipment, tools, and materials available at the scene of an emergency,
- Protecting people first and property second, and making them safe from actual or potential hazards, and
- Implementing emergency shutdown of system and safely restoring service.

Cathodic protection systems would be installed along the pipeline to prevent pipeline corrosion. On unprotected pipelines, corrosion can be a major source of pipeline failure. The cathodic protection system imparts a current to the pipeline to offset natural soil and moisture corrosion potential. Cathodic protection systems would be inspected to ensure proper operating conditions for corrosion mitigation.

In summary, design criteria for safety would include but not be limited to the following:

- Pipeline would be inspected annually,
- To meet cover requirements, pipe would be covered with no less than three feet of backfill,
- Natural gas would disperse into the atmosphere when exposed,
- Surface markers would be placed to designate the buried line,
- Emergency procedure would be developed in the event of failure, and
- Pipeline would have an emergency shutdown system.

With these measures and adherence to applicable federal safety standards, potential hazards associated with the operation of the proposed pipeline would be minimal.