

APPENDIX F

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Potential Flooding Impacts Attributable to Construction of Proposed Route Transmission Lines

Xcel Energy - Rebuild of Transmission Lines 0844 and 0861

Construction and placement of new structures within the Minnesota River floodplain displaces volume, thereby increasing flooding potential by decreasing the volume available for water at any given flood stage. If the displacement of volume from construction in the floodplain is significant, there may be a need to conduct modeling to evaluate the impact of the structures on flooding within the valley.

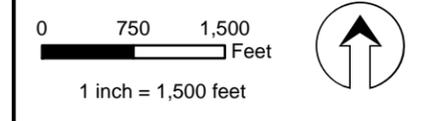
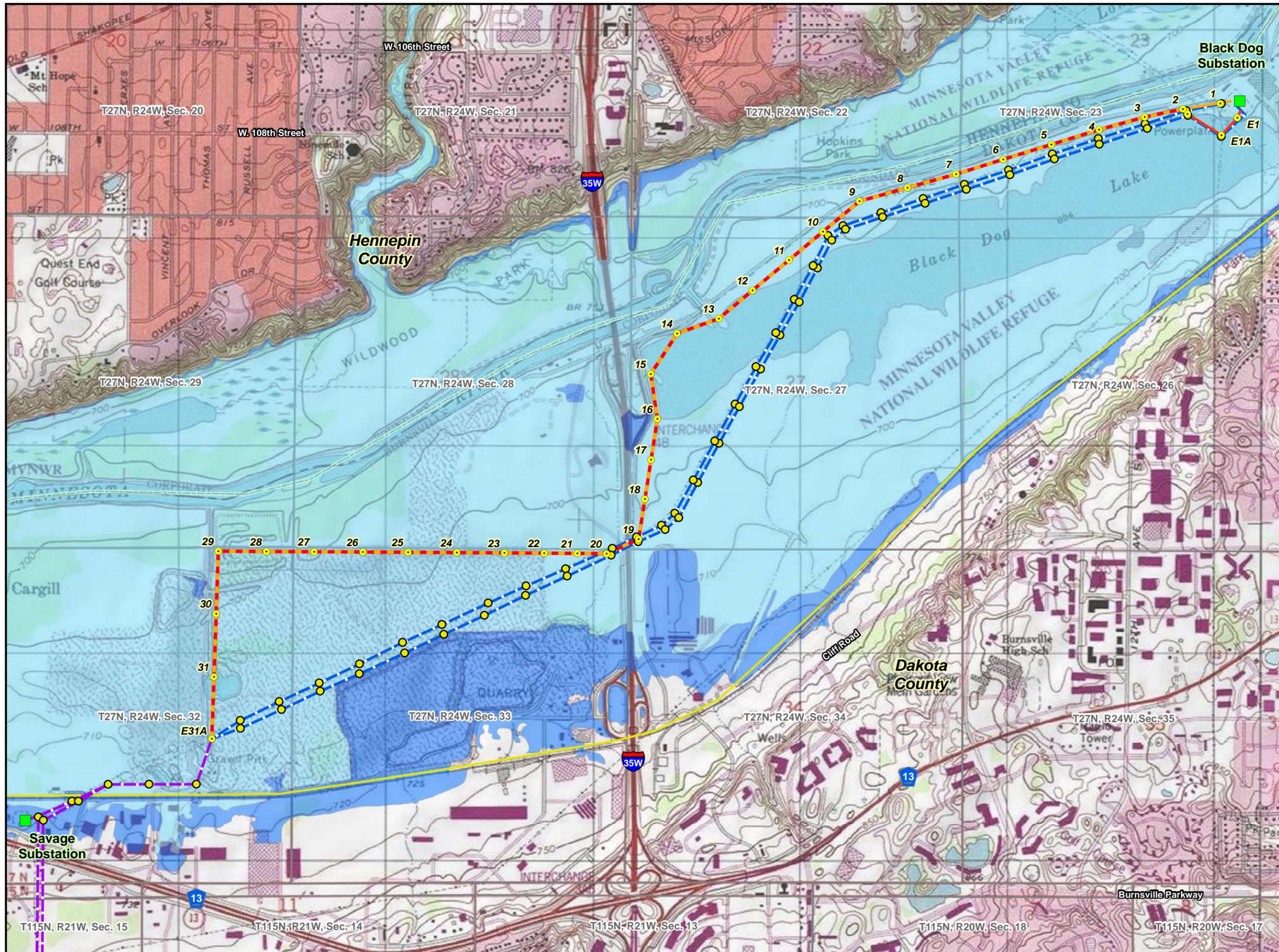
To evaluate whether further floodplain analysis would be required, simple analytical calculations were performed, conservatively, based on worst-case assumptions. The attached figure shows the 100- and 500-year floodplain boundaries for the stretch of the Minnesota River valley that would contain the proposed route. The analysis provides a simple calculation of the total volume of water that would be displaced by the concrete foundations of each support structure for the proposed transmission line, and the resulting water level increase within the area of floodplain for the project route. Since a longer stretch of the river valley floodplain would have a greater area, the displaced volume from the structures would be “spread out” over a greater area, resulting in less impact. Therefore, using the floodplain limited to only the stretch that contains the proposed project provides the most conservative approach.

To estimate the displacement volume effected by the construction of the structures within the floodplain, maximum volumes were conservatively calculated. The concrete foundations are designed so that their tops are at an elevation higher than the 500-year flood. The above-ground heights of the foundations range from 5 to 15 feet. Volume calculations conservatively used 15 feet for each. Their horizontal dimensions range from 6 to 8 feet in each direction. Conservatively using the maximum of 8 feet by 8 feet and a 15-foot height, the total maximum displacement for each concrete foundation would be 960 cubic feet. A total of 32 concrete foundations fall within the 100-year floodplain as illustrated on the attached figure, indicating that the total maximum displacement would be 30,720 cubic feet during such an event. The area of the 100-year floodplain in the stretch of valley containing the project is 2,515 acres (109,553,400 square feet). Therefore, spreading the displacement attributable to the concrete foundations over this area would cause a maximum incremental rise in water level of 0.0034 inch. Since the 500-year floodplain covers a larger area than the 100-year floodplain, the maximum water level rise would be even less.

Xcel Energy also plans to remove the wooden pole H-frame structures that are currently placed within the 100-year floodplain, including Black Dog Lake, which would result in a decreased volume of displacement during flooding. Therefore, that area of floodplain, which was displaced when the structures were initially installed, will be recovered. Each H-frame is constructed of two primary poles, each of which is reinforced by three supporting poles that surround it at its base. Therefore, each H-frame is constructed of eight poles at its base, each of which is 1 foot in diameter. Based on this, the displacement volume for each pole was first calculated using a cross-sectional area of 0.785 square feet for each pole, and assuming the same 15-foot height used in the analysis above. This resulted in a

volume of 11.78 cubic feet for each pole. Since there are eight poles at the base of each H-frame, the total displacement volume for each H-frame structure is 94.2 cubic feet. A total of 60 H-frame structures will be removed from Black Dog Lake within the 100-year floodplain, as illustrated on the attached figure, indicating that the total regained displacement is approximately 5,652 cubic feet.

On the basis of the conservative worst-case assumptions used in these calculations, construction and emplacement of the concrete foundations for the structures within the Minnesota River floodplain will have a negligible effect on flooding potential. Furthermore, the removal of 60 H-frame structures would reduce the overall floodplain impacts by 5,652 cubic feet bringing the total displacement attributable to the concrete foundations over this area to a maximum incremental rise in water level of 0.0027 inch. Therefore, Xcel Energy believes there is no need to conduct modeling to evaluate the effects on flooding from the installation of the Proposed Route transmission line since the rise in water level is negligible.



- Proposed Structures
- Existing Structures
- Xcel Owned Substation
- Proposed Line 0861 Single Circuit (115kV)
- Proposed Line 0844 Single Circuit (115kV)
- Proposed Line 0844 and 0861 Double Circuit (115kV)
- - - Existing Line Removal (0844 and 0861)
- Existing Lines (0844 and 0861)
- Union-Pacific Railroad
- Floodplain**
- 100-Year Floodplain
- 500-Year Floodplain
- Section Boundary
- County Boundary



FEMA FLOODPLAIN MAP

Rebuild of Transmission Lines 0844 and 0861 Project Xcel Energy Burnsville, Minnesota

Source: Aerial Photography: NAIP 2010
 All Other Data Provided by Xcel Energy, Merjent, ESRI, MNDOT and the MN DNR
 This information is for environmental review purposes only.
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