2.5.5 Stability of Slopes

There are no natural or man-made slopes that could adversely affect Fermi 3 Seismic Category I structures. This section provides an overview of the site topography and planned site development to confirm the absence of slopes that require stability evaluation. The plant design for Fermi 3 does not require a safety-related cooling pond or ultimate heat sink related embankments. No safety-related retaining walls, bulkheads, or jetties are required for the site. No manmade earth or rock dams are present on the site that could adversely affect the safety of the nuclear plant facilities.

As described in Subsection 2.4.4, there are no off-site dams whose failure could adversely affect the safety of the nuclear facility.

2.5.5.1 Slope Characteristics

2.5.5.1.1 General Discussion

The finished grade for Fermi 3 will be relatively flat with no cut slopes, fills, or undisturbed slopes that could impact safety-related systems, structures and components. As discussed in Subsection 2.5.5.2, an 8 percent slope angle away from the structures will be provided. Figure 2.4-215 presents ground surface contours for the final site grade, which shows the site is relatively level. Prior to construction, the highest point in the site area is elevation 177.7 m (582.9 ft) NAVD 88, while the lowest point at the site is elevation 176.8 m (580.1 ft) NAVD 88. There is no evidence of past instability or potentially unstable conditions in the Fermi 3 area.

The water channels located west of Fermi 3 will be backfilled as part of site development; therefore, there are no natural or manmade slopes in the proximity of Fermi 3. Additionally, there are no dams, embankments, or channels on or in the proximity of Fermi 3.

The grade at the power block area where the Category I structures are located is established by placing approximately 2.3 m (7.5 ft) of fill to raise the grade to approximately elevation 179.6 m (589.3 ft) NAVD 88. The extent of the raised grade for the power block is limited, as shown on Figure 2.4-215. At the periphery of the power block fill area the grade slopes down from approximately elevation 179.5 m (588.8 ft) NAVD 88 to approximately elevation 177.3 m (581.8 ft) NAVD 88 using a slope of 12.5 horizontal to 1 vertical (12.5:1), an 8 percent slope.

The foundations for all Category I structures are founded on the bedrock, or fill concrete that extends to the bedrock. Therefore, slope stability in the fill will not impact Category I structures (Subsection 2.5.4.3).

Subsection 2.5.4.2 presents properties of subsurface materials, and the site stratigraphy. These properties were determined as part of the extensive site investigation and subsurface geotechnical characterization performed at the Fermi 3 site.

A detailed discussion of groundwater conditions including water levels is provided in Subsection 2.4.12.

2.5.5.1.2 Exploration Program

An extensive site investigation and subsurface geotechnical characterization was performed at the Fermi 3 site as discussed in Subsection 2.5.4.2 and Subsection 2.5.4.4.

2.5.5.1.3 Slope Materials and Properties

Subsurface material properties are addressed in Subsection 2.5.4.2 and Subsection 2.5.4.5.4.2.

2.5.5.1.4 Groundwater and Seepage

Groundwater is located within the fill overlying the glacial till and the Bass Islands Group dolomite. The groundwater within the fill is unconfined, while the groundwater within the Bass Islands Group dolomite is confined. The glacial till acts as the confining unit and hydraulically separates the groundwater within the fill and Bass Islands Group dolomite.

The high groundwater level is assumed equal to the flood level associated with the design basis Probable Maximum Flood (PMF), which is estimated to be 178.4 m (585.4 ft) NAVD 88. This water level is used, because the hydraulic conductivity of the fill is estimated to range from 8.85 x 10^{-4} m/s (251ft/day) to 6.27 x 10^{-3} (1,776 ft/day) (Subsection 2.4.12.2.4), which allows surface water to infiltrate rapidly and possibly raise the groundwater level in the fill to match the design basis PMF.

2.5.5.2 Design Criteria and Analyses

The maximum slope angle of any permanent slope for Fermi 3 in the power block area or elsewhere is 8 percent (4.6 degrees). The slope angle is 6.5 times less than the minimum required effective angle of internal friction of the engineered backfill or existing fill; therefore, 8 percent slopes are considered stable. Therefore, the finished site grade has no impact on Fermi 3 safety related systems, structures, or components.

2.5.5.3 Boring Logs

A discussion of the exploration program and the drilling and sampling procedures is in Subsection 2.5.4.2. Soil and Rock Boring Logs in the vicinity of the excavations are contained in Appendix 2.5DD.

2.5.5.4 Compacted Fill

The source of fill material adjacent to the Category I structures can be generated from materials excavation for construction or imported from local quarries. Placement and compaction will be in accordance with back filling quality control requirements.