

Location Restrictions

Unit 3 Landfill – Cell 4 Lateral Expansion

Sherburne County Generating Plant

Introduction

This report presents documentation and certification for the location standards for the Cell 4 lateral expansion (Cell 4) of the Unit 3 Landfill (U3LF) at the Sherburne County Generating Plant (Sherco) in Becker, Minnesota. Cell 4 qualifies as a “new coal combustion residual (CCR) landfill” according to 40 CFR Section §257.53 since it is a lateral expansion of an existing CCR landfill. This document addresses the requirements of 40 CFR Sections §257.60 through §257.64 (Rules), i.e., location standard requirements, for new CCR landfills and lateral expansions and demonstrates Cell 4’s compliance with said requirements.

Location Restrictions

The sections below provide substantiation of compliance for each of the location restrictions.

Compliance with §257.60, Placement above the uppermost aquifer

To comply with §257.60, the owner or operator must demonstrate that:

- (a) *New CCR Landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer...*

Hydrogeologic conditions beneath Cell 4 have been documented in the *Sherco Unit 3 AQCS Solids Landfill Hydrogeologic Evaluation Phase II – Field Investigation* (Xcel Energy, 2008). The uppermost aquifer beneath Cell 4 is an unconfined, sand and gravel aquifer comprised of Quaternary-age alluvial sediments, and the potentiometric surface (i.e., water table) within this aquifer constitutes the upper limit of the uppermost aquifer. Based on review of historical groundwater elevation measurements reported in Annual Groundwater Monitoring Reports for the U3LF, the historic high groundwater elevation occurred in 2012. The lowest point of the Cell 4 base liner is the sump, at elevation 950.5 feet. The elevation of the historic high groundwater table below the sump is approximately 943 feet. This equates to a vertical separation between the Cell 4 base liner and the upper limit of the uppermost aquifer of 7.5 feet, exceeding the minimum separation distance of 5 feet.

Figure 1 shows the groundwater contours generated from the 2012 historic high groundwater measurements and the location of the Cell 4 sump.

Compliance with §257.61, Wetlands

To comply with §257.61, the owner or operator must demonstrate that:

- (a) New CCR Landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in §232.2 of this chapter...*

Figure 2 shows the U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) database map. There are no wetlands mapped within the footprint for Cell 4, according to the NWI map and on-site observations do not indicate the presence of wetlands within the Cell 4 footprint. Two emergent vegetation wetlands, as shown by the NWI map west of Cell 1 in the lined ditches of the U3LF haul road. Two unconsolidated bottom wetlands are also shown south of Cell 1, which constitute the leachate Retention Basin. The wetlands in the lined ditches and Retention Basin are manmade and are therefore incidental. Incidental wetlands may be impacted by construction and operational activities of the landfill. The nearest jurisdictional wetland is the Mississippi River, located approximately 3,300 feet to the south. The separation distance from the Mississippi River is great enough that construction and operation of Cell 4 will not cause or contribute to a violation of local, state, or federal wetland regulations.

Compliance with §257.62, Fault Areas

To comply with §257.62, the owner or operator must demonstrate that:

- (a) New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time...*

Based on a review of the United States Geologic Survey (USGS) Faults and Folds Database map, Cell 4 is not located within 200 feet of a fault zone which has had displacement in Holocene time. Hydrogeologic investigations conducted within the Cell 4 area confirm the absence of fault activity in recent geologic history.

Figure 3 shows the site location on a USGS Quaternary Faults and Folds Database map.

Compliance with §257.63, Seismic Impact Zones

To comply with §257.63, the owner or operator must demonstrate that:

- (a) New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in seismic impact zones...*

§257.53 defines a seismic impact zone as meaning "an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g) will exceed 0.10 g in 50 years."

Based on the USGS 2018 two-percent probability of exceedance in 50 years map, Cell 4 is located in an area of peak acceleration ranging from 0.02 g to 0.04 g, which is less than the 0.10 g threshold constituting a seismic impact zone. Figure 4 shows the site location on a USGS map of peak acceleration zones.

Compliance with §257.64, Unstable Areas

To comply with §257.64, the owner or operator must demonstrate that:

- (a) *An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area...*
- (b) *The owner or operator must consider all of the following factors, at minimum, when determining whether an area is unstable:*
 - (1) *On-site or local soil conditions that may result in significant differential settling;*
 - (2) *On-site or local geologic or geomorphologic features; and*
 - (3) *On-site or local human-made features or events (both surface and subsurface).*

The *Sherco Unit 3 AQCS Solids Landfill Hydrogeologic Evaluation Phase II – Field Investigation* (Xcel Energy, March 2008) referenced above describes the soils and geology beneath Cell 4. The U3LF is located on the Anoka Sand Plain, a physiographic region which occupies large portions of Sherburne, Anoka, and Isanti counties and is characterized by widespread sand and gravel deposits underlain by glacial till. Unconsolidated sediments beneath Cell 4 consist primarily of fine to coarse-grained sand with gravel along with a layer of silty to sandy, dense glacial till. These soils are stable and are well-suited to support the landfill. No soft soils, areas susceptible to mass movements, or karst terrains were reported in the investigation area.

The undeveloped land surrounding Cell 4 is flat to very gently rolling and slopes gradually (one to three percent slope) south and west to the Mississippi River approximately 3,300 feet south of the landfill.

The arrangement of soils and topography provide a stable base, which is not prone to differential settling nor mass movements. Additionally, landfill construction practices such as removal of all topsoil and vegetation, soil compaction, and geotechnical testing of the base and embankments ensure the underlying soils are capable of supporting the pond's structural components (embankments, future final cover, run-on/run-off systems).

Cell 4 is located adjacent to other plant infrastructure with aboveground and underground utilities comprising the Unit 3 Landfill. There are no utilities that would cause unstable conditions beneath Cell 4.

Conclusion

Cell 4 of the U3LF meets all of the location restrictions listed under 40 CFR §257.60 to §257.64. There is adequate separation from the uppermost aquifer. The unit is not located in wetlands nor seismic impact zones. There are no apparent conditions that would cause underlying soils to move or impact the structure of the unit and cause risk to human health or the environment through structural failures.

Certification

I hereby certify under penalty of law that this report was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the state of Minnesota.



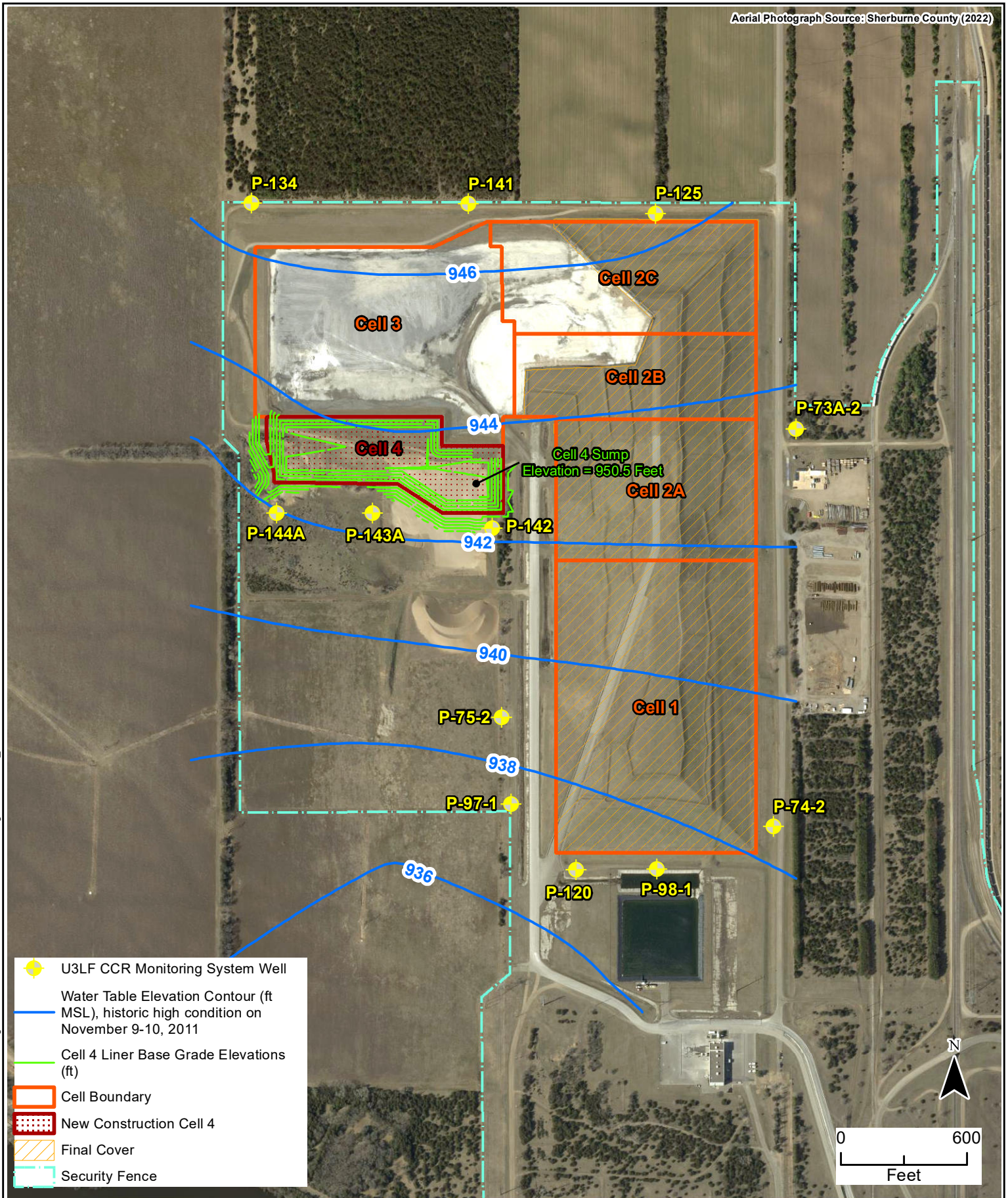
Daniel J. Riggs, PE
License No. 49559

July 7, 2023

Date

References

Xcel Energy, (March 2008). Sherco Unit 3 AQCS Solids Landfill Hydrogeologic Evaluation Phase II – Field Investigation. Becker, Minnesota.

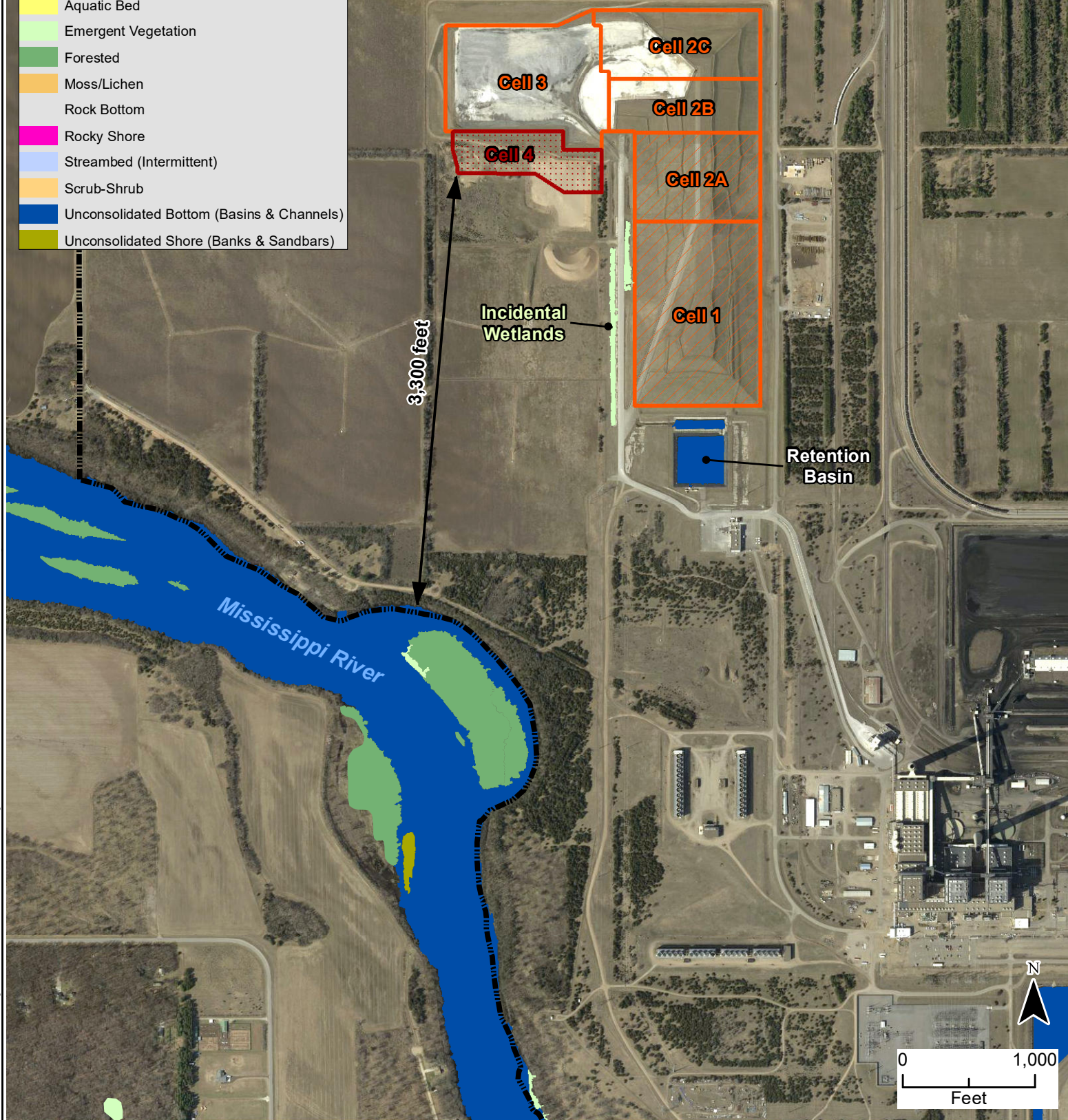


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**FIGURE 1
CFR §257.60 HISTORIC
HIGH WATER LEVEL
CONTOUR MAP**

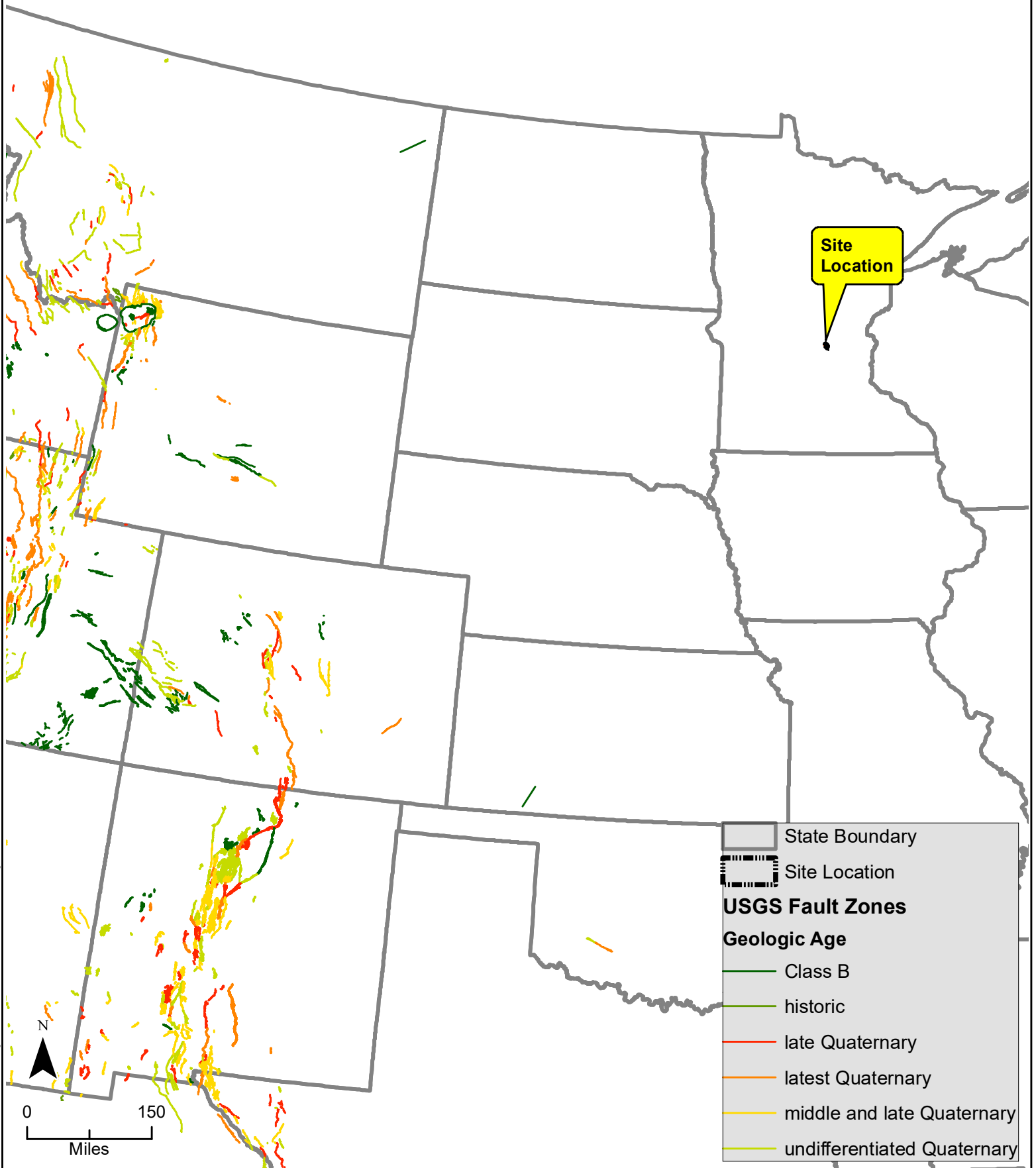
- Active Cell
 - Closed Cell
 - New Construction Cell 4
 - Property Boundary
- NWI Cowardin Class 2009-2014**
- Aquatic Bed
 - Emergent Vegetation
 - Forested
 - Moss/Lichen
 - Rock Bottom
 - Rocky Shore
 - Streambed (Intermittent)
 - Scrub-Shrub
 - Unconsolidated Bottom (Basins & Channels)
 - Unconsolidated Shore (Banks & Sandbars)

Aerial Photograph Source: Sherburne County (2022)
Wetlands Data Source: National Wetland Inventory

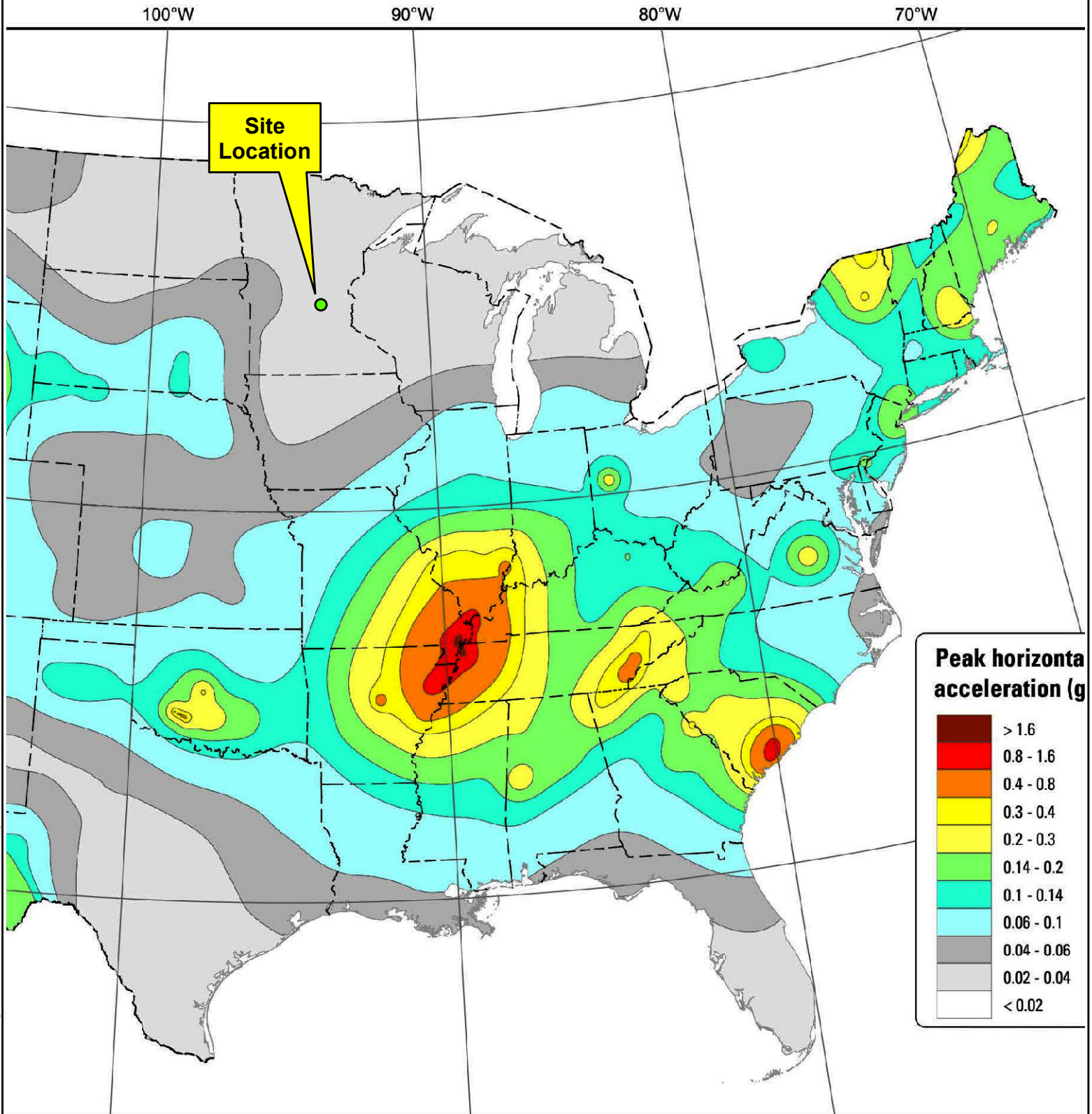


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**FIGURE 2
CFR §257.61
WETLANDS**



Source: USGS - Simplified 2018 National Seismic Hazard Maps for the Conterminous United States, 2018, Two-percent probability of exceedance in 50 years map of peak ground acceleration.



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FIGURE 4
**CFR §257.63 SEISMIC
IMPACT ZONES**