Environmental Assessment:

Midwater BESS Project

Human and Environmental Impacts of Constructing and Operating the

150 MW Midwater BESS Project

February 2026

MINNESOTA
PUBLIC UTILITIES COMMISSION

PUC Docket Nos. IP-7138/ ESS-24-294; TL-24-295

CAH Docket No. 71-2500-40799

Project Contacts

Responsible Government Unit

Public Utilities Commission
121 Seventh Place East, Suite 350
Saint Paul, MN 55101-2147

Commission Representative

Jacques Harvieux
(651) 201-2233
jacques.harvieux@state.mn.us

Preparer

Public Utilities Commission
121 Seventh Place East, Suite 350
Saint Paul, MN 55101-2147

Commission Representative

James E. Sullivan
(651) 539-1059
jim.sullivan@state.mn.us

Project Proposer

Midwater BESS, LLC
7480 Flying Cloud Drive, Suite 425
Eden Prairie, MN 55344

Midwater BESS Representative

Mary Matze
(786) 321-9379
mmatze@spearmintenergy.com

Midwater BESS, LLC (Midwater), a wholly owned subsidiary of Spearmint Energy, proposes to construct and operate a battery energy storage system (BESS) with a nominal power rating of up to 150 MW alternating current (AC) with approximately 600 megawatt-hours (MWh) of energy capacity. Additionally, the project will include an approximately 2,668-foot long 161 kilovolt (kV) high voltage transmission line (HVTL) and associated facilities to interconnect the BESS to the grid. The BESS and HVTL will be developed on a site totaling approximately 104.4 acres in Shell Rock Township (Township), Freeborn County, Minnesota. Midwater must obtain a site and route permit from the Minnesota Public Utilities Commission before it can construct the proposed Midwater BESS project.

Sources

Much of the information used to prepare this environmental assessment comes from the site permit application. Additional sources include information from relevant federal and state environmental review documents for similar projects, spatial data, a Citizen Advisory Task Force, and site visits.

Project Mailing List

To place your name on the project mailing list contact docketing.puc@state.mn.us or (651) 201-2204 and provide the docket number (ESS-24-294; TL-24-295), your name, email address, and mailing address. Please indicate whether you would like to receive notices by email or U.S. mail.

Alternative Formats

This document can be made available in alternative formats, that is, large print or audio, by calling (651) 296-0406 (voice)

Contents

1 Introduction 1
1.1 How is this document organized? 1
1.2 What does the applicant propose to construct? 2
1.3 What is the state of Minnesota's role? 3
1.4 What is the public's role? 4
1.5 What is an Environmental Assessment? 4
1.6 Where do I get more information? 5
1.7 What permits are needed? 5
1.8 How are impacts analyzed in this EA? 5
1.9 What factors guide the Commission's decision? 6
1.10 What are the potential impacts of the project? 7
1.11 What's next? 8
2 Proposed Project 10
2.1 BESS Facility 10
2.1.1 How do BESS facilities work? 10
2.1.2 Where is the Project located? 10
2.1.3 How is the facility designed? 10
2.1.4 How would the BESS facility be constructed? 13
2.1.5 How would the facility be operated and maintained? 16
2.1.6 What happens at the end of the facility's useful life? 18
2.1.7 Project Costs 18
2.1.8 Project Schedule 19
3 Regulatory Framework 20
3.1 What Commission approvals are required? 20
3.2 What is environmental review? 20
3.3 What does the review and permitting process look like? 20
3.3.1 Application Filing and Acceptance 21
3.3.2 Scoping Process 21
3.3.3. Scoping Meetings 22
3.3.4 Citizen Advisory Task Force 24
3.3.5 Scoping Decision 25
3.4 Are other permits or approvals required? 25
3.4.1 Federal 25

3.4.2 State 27
3.4.3 Local 28
3.5 Do electrical codes apply? 28
3.6 Are any issues outside the scope of this EA? 29
4 Project Impacts and Mitigation 30
4.1 What are potential impacts and how are they measured? 30
4.1.1 Potential Impacts and Mitigation 30
4.1.2 BESS Operating Scenarios 31
4.1.3 Regions of Influence 32
4.2 Environmental Setting 34
4.2.2 Constructed Environment 37
4.2.3 Social and Cultural Environment 42
4.3 Human Settlement 43
4.3.1 Aesthetics 43
4.3.2 Noise 46
4.3.3 Cultural Values 50
4.3.4 Land Use and Zoning 51
4.3.5 Property Values 54
4.3.6 Transportation and Public Services 56
4.3.7 Socioeconomics 59
4.3.8 Environmental Justice 61
4.4 Public Health and Safety 63
4.4.1 Public Safety and Emergency Services 64
4.5 Land-based Economies 69
4.5.1 Agriculture 69
4.5.2 Tourism and Recreation 71
4.6 Archeological, Cultural, and Historic Resources 73
4.7 Natural Resources 76
4.7.1 Air Quality 77
4.7.2 Soils 80
4.7.3 Surface Water and Floodplains 82
4.7.4 Geology and Groundwater 86
4.7.5 Wetlands 92
4.7.6 Vegetation 95

4.7.7 Wildlife and Habitat 96
4.7.8 Rare and Unique Resources 99
4.7.9 Climate Change 102
4.8 Unavoidable Impacts 105
4.9 Irretrievable or Irreversible Impacts 105
4.10.1 Displacement 106
4.10.2 Communications 106
4.10.3 Implantable Medical Devices 106
4.10.4 Forestry 107
4.10.5 Mining 107
4.11 Cumulative Analysis 107
4.11.1 Analysis Background 107
5 Sources 108

Appendices

Appendix A: Scoping Decision
Appendix B: Maps
Appendix C: Draft Site and Route Permits
Appendix D: Response to Information Requests
Appendix E: Citizen Advisory Task Force Report
Appendix F: Fire Plume Simulation

Figures

Figure 1. Proposed Midwater BESS Project 3
Figure 2. Representative BESS Enclosures 12
Figure 3. Underground Cabling 13
Figure 4. Stormwater Management Site Plan (Appendix B). 15
Figure 5. Simplified Process Summary 21
Figure 6. Environmental Setting of the Project (Appendix B). 34
Figure 7. Proximity of Locations to the Project (Appendix B) 44
Figure 8. Common Noise Levels 47
Figure 9. Modeled Noise Impacts 49

Figure 10. Census Tracts in Project Area 62
Figure 11. Air Pollution Sources 77
Figure 12. Project Area Soils (Appendix B). 80
Figure 13. Project Area Flood Maps (Appendix B). 83
Figure 14. MDH Well Index within One Mile of the Project Area (Appendix B). 88
Figure 15. Delineated Wetlands in the Project Area (Appendix B). 93
Figure 16. Rare and Unique Resources in the Project Area (Appendix B) 101

Tables

Table 1. Application of the Siting Factors 6
Table 2. Operations and Maintenance Tasks and Frequency 17
Table 3. Estimated Project Costs 19
Table 4. Anticipated Project Schedule 19
Table 5. Potential Downstream Permits 26
Table 6. Regions of Influence for Human and Environmental Resources 33
Table 7. MPCA Impaired Waters 36
Table 8. Proximity of Locations to the Project 45
Table 9. Noise Area Classifications (dBA) 48
Table 10. Modeled Noise Impact by Receptor 49
Table 11. Population Characteristics 60
Table 12. Low-Income and Minority Population Characteristics 63
Table 13. Project Area Soils 81
Table 14. MDH Well Index within One Mile of Project Area 88
Table 15. Delineated Wetland Summary Table 94

Acronyms and Abbreviations

Acronym/Abbreviation	Description
AC	alternating current
AIMP	Agricultural Impact Mitigation Plan
ALJ	administrative law judge
Applicant	Midwater BESS, LLC
BESS	battery energy storage system
BMP	best management practice
BWSR	Board of Water and Soil Resources
Commerce	Department of Commerce
Commission	Public Utilities Commission
CSW Permit	Construction Stormwater Permit
dBA	A-weighted sound level recorded in units of decibels
DC	direct current
DNR	Department of Natural Resources
DSP	draft site permit
EA	environmental assessment
EMF	electromagnetic fields
EPA	United States Environmental Protection Agency
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
kV	kilovolt
MBS	Minnesota Biological Survey
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MW	megawatt
MWh	megawatt hour
mG	milligauss
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MWI	Minnesota Well Index
NAC	noise area classification
NHIS	Natural Heritage Information System
NLEB	Northern Long Eared Bat
NWI	National Wetland Inventory
ROI	region of influence
ROW	right-of-way
SCADA	supervisory control and data acquisition
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SWPPP	Stormwater Pollution Prevention Plan
TCLP	Toxicity Characteristic Leaching Procedure
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VMP	Vegetation Management Plan
WCA	Wetland Conservation Act
WHPA	Wellhead Protection Area
WMA	Wildlife Management Area

DEFINITIONS

Several terms used in this document have specific meaning in Minnesota law or regulation. Other terms are defined for clarity.

associated facilities means buildings, equipment, and other physical structures that are necessary to the operation of a large electric power generating plant or high voltage transmission line (Minnesota Rule 7850.1000, subpart 3).

construction means any clearing of land, excavation, or other action that would adversely affect the natural environment of the site or route but does not include changes needed for temporary use of sites or routes for nonutility purposes, or uses in securing survey or geological data, including necessary borings to ascertain foundation conditions (Minnesota Statute § 216E.01, subdivision 3).

distribution line means power lines that operate below 69 kilovolts.

easement is a grant of one or more property rights by the property owner to and /or for the use by the public, a corporation, or another person or entity.

effect refers to the description and explanation of changes to the natural, cultural, or built environment that result from the construction and operation of a project and help determine the project's potential environmental impacts. Effects may be characterized as direct, indirect, or cumulative.

high voltage transmission line means a conductor of electric energy and associated facilities designed for and capable of operation at a nominal voltage of 100 kilovolts or more and is greater than 1,500 feet in length (Minnesota Statute § 216E.01, subdivision 4).

impact means the change, whether beneficial or adverse, identified through an effects analysis in the physical environmental conditions or in the natural or cultural resources of the state that results from a proposed project or governmental action. Impacts may be direct, indirect, cumulative, or reasonably foreseeable. Impact analysis results are reported as negligible, minimal, moderate, or significant. Mitigative activities may be included in the analysis to offset project impacts.

land control area means the 104.4-acre area for which Midwater is assumed to have site control through ownership, a lease agreement, or an easement. The site permit application refers to this as the "Project Area." For this document, it applies to both the area for the BESS facility and the final ROW for the transmission line connection to the Glenworth Substation. The term is used to bound a review area and should not be understood to imply the applicant has secured, or will definitely secure, the necessary land rights.

large electric power generating plant means electric power generating equipment and associated facilities designed for or capable of operation at a capacity of 50,000 kilowatts or more (Minnesota Statute § 216E.01, subd. 5).

local vicinity means 1,600 feet from the land control area and collection line corridor.

mitigation means to avoid, minimize, correct, or compensate for a potential impact.

power line means a distribution, transmission, or high voltage transmission line.

project area means one mile from the land control area and collection line corridor.

tolling agreement for a battery energy storage system) is a contract where one party (the asset owner/operator) provides the physical battery storage system and its operational capabilities, while another party (the offtaker or tolling customer) provides the energy to be stored and controls how the battery is charged and discharged, typically in exchange for a “tolling fee.” In a BESS tolling agreement, the tolling customer effectively "rents" the use of the battery system to store and dispatch their own energy, without owning or operating the physical asset.

transmission line means power lines that operate at 69 kilovolts (kV) and above.

1 Introduction

Midwater BESS, LLC (Midwater or applicant), a wholly owned subsidiary of Spearmint Energy, proposes to construct and operate a battery energy storage system (BESS) with a nominal power rating of up to 150 MW alternating current (AC) and approximately 600 megawatt-hours (MWh) of energy capacity on a site of approximately 104.4 acres in Shell Rock Township, Freeborn County, Minnesota. As proposed, the facility will be connected to the electric grid through a tap line of approximately 2,668 feet between the project substation and the adjacent Glenworth Substation, which is owned and operated by ITC Midwest. Midwater anticipates that project construction will begin in mid-2027 and that operation will commence in the second quarter of 2028.

Midwater must obtain a site and route permit from the Minnesota Public Utilities Commission (Commission) before it can construct the proposed Midwater BESS project (facility or project). The applicant filed a site permit application (application) on November 19, 2024, and the Commission determined that it was substantially complete on January 24, 2025.

Minnesota Public Utilities Commission Energy Infrastructure Permitting (EIP) staff have prepared this environmental assessment (EA) for the proposed project. The EA presents the project, highlights resources affected by the project, and discusses potential human and environmental impacts.[1] It also discusses ways to mitigate potential impacts. These mitigation strategies can become enforceable conditions of the Commission's permits.

An EA is not a decision-making document, but rather, a document used to inform the Commission and other state agency decisions, particularly with respect to the goals of the Minnesota Power Plant Siting Act to "minimize adverse human and environmental impacts while insuring continuing electric power system reliability and integrity and ensuring that electric energy needs are met and fulfilled in an orderly and timely fashion".[1]

1.1 How is this document organized?

The EA addresses the matters identified in the Commission's December 3, 2025, scoping decision. This EA is based on the applicant's site permit application, public scoping comments, and the Citizen Advisory Task Force (ATF) report. It addresses the matters identified in the Commission's December 3, 2025, scoping decision (Appendix A).

- **Chapter 1** briefly describes the state of Minnesota's role; discusses the organization of the EA; and provides a summary of potential impacts and mitigation.
- **Chapter 2** describes project design, construction, operation, and decommissioning.
- **Chapter 3** summarizes the regulatory framework, including the site and route permit processes, the environmental review process, other approvals that might be required for the project, and the criteria the Commission uses to make its decisions.
- **Chapter 4** describes the environmental setting; details potential human and environmental impacts from the project; and identifies measures to mitigate adverse impacts. It summarizes the related cumulative project impacts within the context of the existing

[1] Minn. Stat. § 216E.02, subd. 1.

environmental setting, as well as listing unavoidable impacts and irreversible and irretrievable commitments of resources.

- **Chapter 5** identifies the sources used to prepare the document.

1.2 What does the applicant propose to construct?

Midwater proposes to construct and operate a battery energy storage system (BESS) with a nominal power rating of up to 150 MW alternating current (AC) with approximately 600 megawatt-hours (MWh) of energy capacity on a site of approximately 104.4 acres in Shell Rock Township, Freeborn County, Minnesota. In addition to battery energy storage enclosures, the facility will also include inverters and transformers, electrical feeder lines, a project substation, stormwater drainage basins, storage and parking areas, and fencing surrounding the facility perimeter. Midwater will also construct an operations and maintenance facility at the site to house operations and maintenance materials. The facility will connect to the electric grid via a tap line approximately 2,668 feet long, running from the project substation to the adjacent ITC Midwest Glenworth Substation.

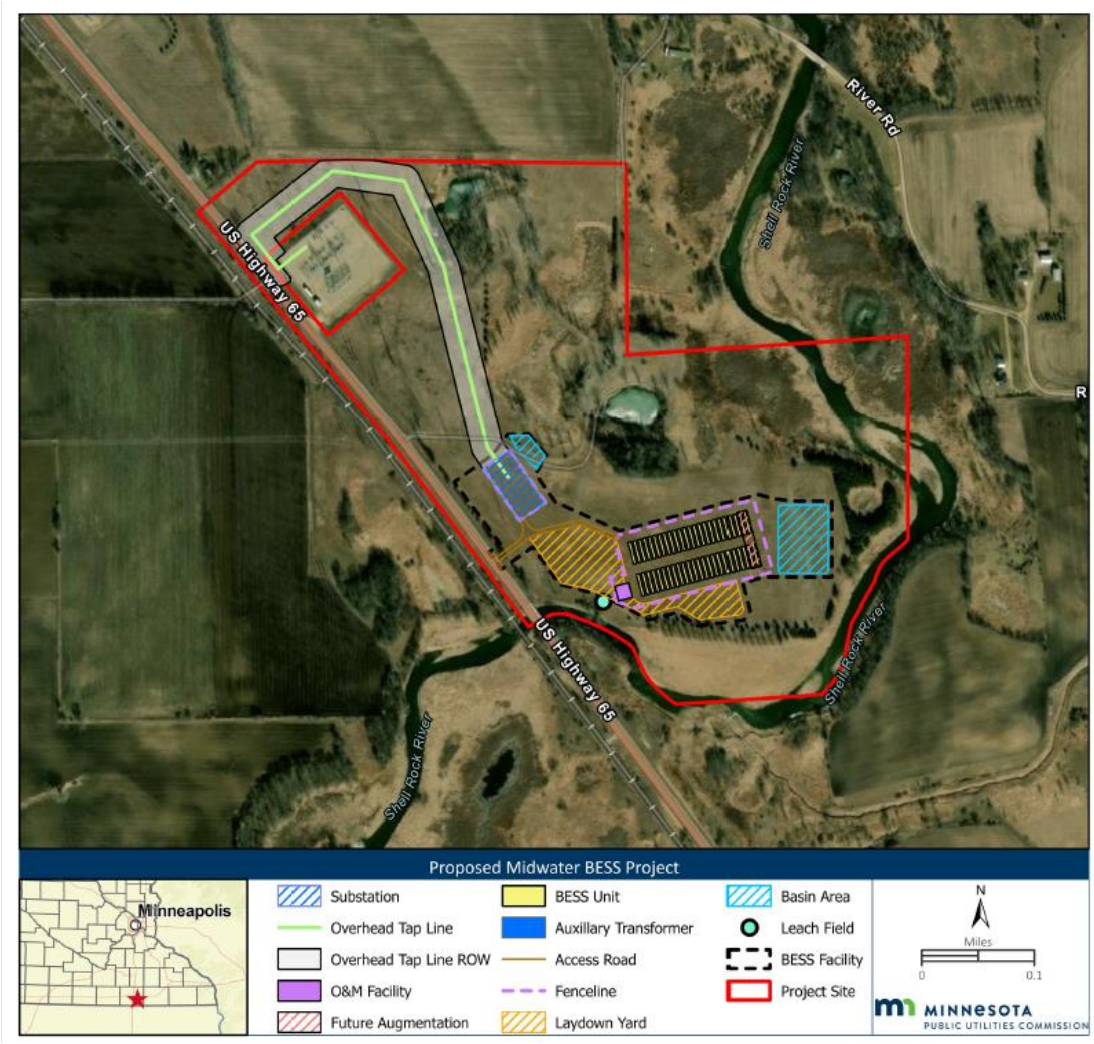
Midwater indicates that the project will help meet the growing demand for renewable energy and will assist Minnesota in reaching its Renewable Energy Objectives by allowing wind and solar resources to continue producing energy at times when they would otherwise be curtailed due to low demand.

Midwater anticipates entering into a tolling agreement with an affiliated merchant energy business or other third part market participant, rather than a long-term power purchase agreement more typical of renewable projects. Alternatively, Midwater may sell the project to a utility or operate under a different revenue structure.[2]

Midwater filed a generator interconnection agreement (GIA) application for the project with the Midcontinent Independent System Operator (MISO) in 2022 and anticipates signing a GIA in the third quarter of 2026.[3] Midwater anticipates that construction on the project will begin in early 2027 and be completed in time to begin operating in the 2nd quarter of 2028.[4] Total project cost is expected to be approximately $458 million, and annual operating costs are anticipated to be approximately $246 million.[5]

[2] Midwater Application, 18 -19.
[3] Midwater Application, 27. See also Appendix D, Information Request 1.
[4] Midwater Application, 19. Information Request 2.
[5] Midwater Application, Table 2.3-1, 29.

Figure 1. Proposed Midwater BESS Project



1.3 What is the state of Minnesota's role?

The state of Minnesota has a regulatory and permitting process for this project administered by the Commission. The applicant needs a site permit and a route permit from the Commission in order to construct the project. Commission staff have prepared this EA for the project. An administrative law judge will conduct public hearings for the project. Comments on the EA can be provided during the public hearings.

As noted above, the applicant needs both a site and route permit from the Commission; however, other government agencies may also be involved. The project may also require additional approval from other federal and state agencies and local governments, for example, a driveway permit from Freeborn County or a Construction Stormwater Permit from the Minnesota Pollution Control Agency (MPCA). A site permit supersedes local zoning, building, and land use rules.[6] The Commission's site

[6] Minn. Stat. § 216E.10, subd. 1.

and route permit decision must be guided with consideration of local zoning and land use impacts in accordance with the legislative goal to "minimize human settlement and other land use conflicts".[7]

Midwater applied to the Commission for a site and route permit for the project on October 7, 2024.[8] The Commission must consider whether the record supports issuing a site and route permit, and what conditions should be placed in each permit.[9]

To ensure a fair and thorough airing of the issues, the Minnesota Legislature set out a process for the Commission to follow when considering site and route permit applications.[10] In this instance, an EA was prepared, and a public hearing will be held. The goal of the EA is to describe potential human and environmental impacts of the project (*the facts*), whereas the intent of the public hearing is to allow people interested in the opportunity to advocate, question, and debate what the Commission should decide about the project (*what the facts mean*). The record developed during this process includes all public input (written and oral) which will be considered by the Commission when it makes its decisions on the Applicant's application.

1.4 What is the public's role?

The public plays a vital role in this process; the State of Minnesota depends on public input to make well-informed decisions. For example, during the EA scoping period, the Commission heard directly from community members about their project-related concerns. This input helped shape the focus of the environmental analysis and ensured the right information was gathered.

The next step in the process is the project public hearing. This is another opportunity for the public to share their perspectives – this time on what the facts presented in the EA mean to them and whether they are accurately reflected in the EA. Your input will help the Commission identify relevant facts, interpret their significance, and make informed decisions about the project and its permitting.

1.5 What is an Environmental Assessment?

This document is an Environmental Assessment (EA). The Commission will use the information in this document, and the record developed from this work, to inform their site and route permitting decisions for the project.

This EA contains an overview of affected resources and discusses potential human and environmental impacts and mitigation measures. EIP staff prepared this document as part of the environmental review process. Scoping is the first step in the process. It provides the public opportunities to offer comments on the content of this environmental assessment, suggest alternatives, and potential impact mitigation measures.

---

[7] Minn. Stat. § 216E.03, subd. 7.

[8] Midwater BESS, LLC, *Midwater Energy Storage Project: Application to the Minnesota Public Utilities Commission for a Site Permit*, October, 7, 2024, eDocket ID: 202410-210785-01, 202410-210785-02, 202410-210785-03, 202410-210785-04, 202410-210785-05, 202410-210785-06, 202410-210785-07, 202410-210785-08, 202410-210785-09, 202410-210785-10, 202410-210788-01, 202410-210788-02, 202410-210788-03, 202410-210788-04

[9] If the Commission grants a site or route permit, it chooses which of the studied locations is most appropriate. In this matter only one site location was studied.

[10] *See generally* Minn. Stat. § 216E.

1.6 Where do I get more information?

For additional information don't hesitate to contact Commission EIP staff:

- James E. Sullivan (jim.sullivan@state.mn.us), (651) 539-1064
- Jacques Harvieux (jacques.harvieux@state.mn.us), (651) 201-2233

Project Information, including the combined site and route permit application, notices, and public comments, can be found on eDockets: https://www.edockets.state.mn.us/documents by entering "24-294"in the Docket number field and selecting the search button. Information is also available on Commission's project webpage: https://puc.eip.mn.gov/web/project/15971.

1.7 What permits are needed?

Both a site and route permit from the Commission are required for the project, along with federal, state, and local permits, as necessary, to construct.

The project requires a site permit from the Commission because it meets the statutory definition of an *energy storage system*, which is equipment and associated facilities designed with a nameplate capacity of 10 MW or more and capable of storing generated electricity for a period of time and delivering the electricity for use after storage.[11] Additionally, the project's high-voltage transmission line requires a route permit from the Commission.[12]

Various federal, state, and local approvals will be required for activities related to the construction and operation of the project. These permits are referred to as "downstream permits" and must be obtained by the applicant prior to constructing the Project.

1.8 How are impacts analyzed in this EA?

The project will impact human and environmental resources. Impacts will occur during both construction and operation. Impacts are discussed in this EA for typical, atypical, and accident operating conditions. These scenarios and associated impacts are described in greater detail in Chapter Four.

A potential impact is the anticipated change to an existing condition and is caused directly or indirectly by the project. Potential impacts can be positive or negative, short- or long-term, and can accumulate incrementally. Impacts vary in duration and size, by resource, and across locations. Impacts from construction and operation can be mitigated by avoiding, minimizing, or compensating for the adverse effects and environmental impacts from the project.

Impact is determined through an effects analysis that considers its context, anticipated on-the-ground effects, and applicable mitigation measures. Project impacts can range from beneficial to harmful.

Select resource topics received abbreviated study because they were deemed to be of minor importance to the Commission's site permit decision. Potential impacts are anticipated to be

[11] Minn. Stat. § 216E.01, subd. 3a
[12] Minn. Stat. § 216E.03 (2023).

negligible for displacement, electronic communications, implantable medical devices, forestry, and mining.

1.9 What factors guide the Commission's decision?

Minnesota statute and rule identify the factors the Commission must consider when determining whether to issue permits.

After reviewing the project record, including public comments, the Commission will decide whether to issue a site and route permit. If permits are granted, the Commission will also determine the need for any appropriate permit conditions.

Minnesota Statutes § 216E.03 lists considerations that guide the study, evaluation, and designation of site and route permits. Minnesota Rule 7850.4100 lists the factors the Commission must consider when making a site and route permit decisions (Table 1):

Table 1. Siting and Routing Factors

Factor	Description
A	Effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services.
B	Effects on public health and safety.
C	Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining.
D	Effects on archaeological and historic resources.
E	Effects on the natural environment, including effects on air and water quality resources and flora and fauna.
F	Effects on rare and unique natural resources.
G	Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity.
H	Use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries.
I	Use of existing large electric power generating plant sites.
J	Use of existing transportation, pipeline, and electrical transmission systems or rights-of-way.
K	Electrical system reliability.
L	Costs of constructing, operating, and maintaining the facility are dependent on design and route.
M	Adverse human and natural environmental effects which cannot be avoided.
N	Irreversible and irretrievable commitments of resources.

The Commission is also guided by the "state's goals to conserve resources, minimize environmental impacts, minimize human settlement and other land use conflicts, and ensure the state's electric

energy security through efficient, cost-effective power supply and electric transmission infrastructure."[13]

1.10 What are the potential impacts of the project?

This summary applies the Commission's siting and routing factors to the project. Some factors are described in just a few words. Other factors are more descriptive and include a list of elements that, when grouped, make up the factor. Finally, certain factors are relatively succinct, but the scoping process identified elements to be analyzed in this EA. For example, the public health and safety factor includes an EMF element.

Several factor-based analyses are based on the three project scenarios evaluated in this EA (Chapter 4.1.2), which form an integral part of the siting factor analysis and its interpretation. Construction phase impacts will be noticeable and likely moderate for the duration of earthmoving and construction activities; however, this form of impact will not occur after construction is completed.

Typical and atypical scenarios reflect daily operations and represent the long-term project impacts. Accident scenario impacts are anticipated to be short-term, largely for the duration of the accident event, and likely moderate to significant. Accident scenario impacts are largely reversible and managed through engineered cabinet design and emergency service planning and coordination activities. The BESS accident scenario was considered through each of the relevant factors, with greatest potential impact on the following:

- Public Safety and Emergency Services (Chapter 4.4.1): The project presents typical construction and operational safety risks, including falls, equipment uses, electrical accidents, and potential public exposure from unauthorized entry. A hazard unique to a BESS is battery failure leading to thermal runaway and fire, which requires a specialized emergency response. Construction and operational impacts are expected to be minimal, while impacts from an accident scenario may be moderate to significant but manageable. To offset this possibility, the facility will use more stable LFP battery technology, automated monitoring, fire detection, and isolation systems. Coordination with local emergency services, regulatory compliance, training, fencing, and emergency response planning are intended to minimize risks and environmental impacts.
- Tourism and Recreation (Chapter 4.5.2): Project impacts on recreation and tourism are expected to be minimal within the local vicinity and the project area. Short-term construction effects include localized noise, dust, traffic, and visual disturbances. Long-term operational impacts are primarily aesthetic and unlikely to affect recreational use. The project will not restrict access to the Shell Rock River State Water Trail or nearby snowmobile trails, and safety setbacks, signage, and fencing will be provided. Tourism in Freeborn County is largely recreation-based and is not expected to be measurably affected. Accident scenarios, such as a BESS fire, could cause brief, localized disruptions, but long-term recreation and tourism impacts are not anticipated.
- Air Quality (Chapter 4.7.1): Air quality impacts are evaluated for construction, operation, and accident scenarios within the regional airshed. Construction impacts would be minimal, short-term, and localized, primarily from fugitive dust and equipment exhaust, and can be

[13] Minn. Stat. § 216E.03, subd. 7(a).

mitigated through standard practices. During operation, the project would not emit criteria or hazardous air pollutants including carbon dioxide, with only negligible air emissions from maintenance activities. Accident scenarios, such as a BESS thermal runaway, could cause temporary air quality impacts; however, modeling shows air pollutant emissions would remain localized and below harmful thresholds at the site boundary. Overall air quality impacts are minimal, manageable, and mitigable through design, monitoring, and emergency response planning.

- Surface Water and Floodplains (Chapter 4.7.3): Surface water impacts are evaluated within the land control area and are expected to be minimal during construction and normal operations (typical and atypical scenarios), with no adverse direct impacts on waterbodies or floodplains. Facilities are sited outside mapped waters, impaired streams, and FEMA flood zones. Short-term, localized indirect impacts may occur from erosion, sedimentation, or stormwater runoff but can be mitigated through best management practices. Stormwater detention basins, monitoring, and permitting will manage runoff quantity and quality. In an unlikely accident scenario, temporary and reversible impacts to surface waters could occur from contaminated runoff or air pollutant deposition, with mitigation provided through emergency response and monitoring plans.
- Groundwater (Chapter 4.7.4): The project is located in the South-Central Minnesota Groundwater Province, with regionally important but confined bedrock aquifers and shallow groundwater. No sole source aquifers, wellhead protection areas, or wells occur within the project area, and project infrastructure is sited outside the Glenville drinking water management area. Under typical operations, groundwater impacts are not expected due to LFP battery chemistry, sealed enclosures, impermeable foundations, and secondary containment. Accident scenarios, such as thermal runaway, are unlikely to result in groundwater contamination because releases would be limited and short-term. Monitoring, spill response and leaks will further minimize groundwater risk.
- Wildlife and Habitat (Chapter 4.7.7): Wildlife impacts were evaluated within the land control area for non-avian species and the local vicinity for birds. The project area supports common, agriculture-adapted wildlife and provides limited habitat value. Overall impact is expected to be minimal. Short-term negative effects to individual animals may occur during construction and operation, while long-term effects are negligible or slightly beneficial due to establishment of perennial vegetation and stormwater features. The project avoids high-quality habitats, wetlands, and Important Bird Areas, involves minimal tree removal, and is unlikely to affect priority or protected bird species.

Mitigation and related preventative measures were developed for each of the potential impacts described in the chapters above. A draft site permit (BESS) and a draft route (transmission line) for the project, which include these special permit provisions, are included in Appendix C.

1.11 What's next?

A public hearing will be held in community where the project will be located, providing an opportunity for the public to ask questions and submit written or oral comments (or both) regarding the project and this EA. The hearing will be conducted by an Administrative Law Judge (ALJ) from the Minnesota Court of Administrative Hearings.

Following the hearing and close of the public comment period, the ALJ will submit a written report to the Commission summarizing the hearing record and all comments received. The report will include findings of fact, conclusions of law, and recommendations. The Commission will then review the full record and determine whether to issue the site and route permits for the project.

The Commission reviews all the information in the project record in determining whether to issue permits for the project. Site and route permits define the location of the project and include conditions specifying mitigation measures. The Commission is expected to make their permitting decisions in the second quarter of 2026.

2 Proposed Project

Midwater proposes to develop and operate a Battery Energy Storage System (BESS) with a nominal output of up to 150 megawatts (MW) alternating current (AC) and an energy capacity of approximately 600 megawatt-hours (MWh). The project would be sited on approximately 104.4 acres in Shell Rock Township (Sections 7, 8, and 17), Freeborn County, Minnesota. The facility will connect to the electrical grid via a new 161 kilovolt (kV) tap line, approximately 2,668 feet in length, linking the project substation to the adjacent Glenworth substation. This chapter provides an overview of the proposed project and outlines its construction, operation, and eventual decommissioning.

2.1 BESS Facility

2.1.1 How do BESS facilities work?

A BESS connects to the electric grid and transfers electric energy from the grid to store in batteries when demand is low and then transfers this energy back to the grid during outages or when demand is high.

A BESS consists of a series of electrochemical devices (batteries) that are charged by collecting energy from a source (the electric grid or a power plant) and discharges the energy at a later time when needed. Battery storage can enhance the flexibility of a power system and can help integrate renewable generation technologies like wind and solar into the grid by storing energy when demand is low and discharging the energy when demand is high.[14]

2.1.2 Where is the Project located?

The project is in Shell Rock Township in Freeborn County, Minnesota (Figure 1).

The facility is located on a site of approximately 104.4 acres in sections 7, 8, and 17 of Shell Rock Township (Township 107N, Range 15W) in Freeborn County. The facility site is south of the city of Glenville and is bounded by Highway 65 to the west, and the Shell Rock River along the east and south.

Midwater selected the site based on the available capacity, low interconnection costs at the ITC Glenworth Substation, and landowner interest.[15] Midwater indicated that they have an option to purchase on the southern-most parcel of land and has entered into a voluntary lease agreement for the other two parcels with a 30-year lease term.[16]

2.1.3 How is the facility designed?

In addition to battery energy storage enclosures, the facility will also include inverters and transformers, electrical feeder lines, a project substation, stormwater drainage basins, access roads, storage and parking areas, and fencing surrounding the perimeter of the facility. Midwater will construct an operations and maintenance facility at the site to house operations and maintenance

[14] National Renewable Energy Laboratories, *Grid-Scale Battery Storage: Frequently Asked Questions*. (September 2019), https://www.nrel.gov/docs/fy19osti/74426.pdf (accessed September 8, 2025).
[15] Midwater Application, Section 2.2.2, 26.
[16] Midwater Application, Section 2.2.2, 25, and Section 6.2.10.2, 98.

materials. The facility will be connected to the electric grid through a tap line of approximately 2,668 feet between the project substation and the adjacent Glenworth Substation. Midwater indicated that the specific equipment and final design will depend upon market conditions and equipment availability at the time of construction (anticipated in 2027).[17]

Batteries and BESS Enclosures

The BESS industry currently uses two main types of lithium-ion batteries:

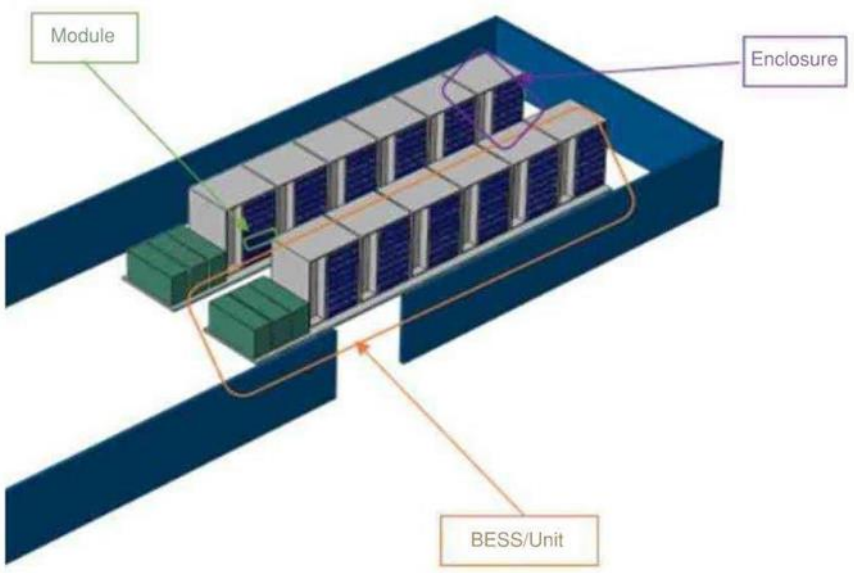
- **Nickel Manganese Cobalt (NMC)**: Nickel is the primary source of energy in NMC batteries, but manganese and cobalt are required to stabilize and provide the desired power output. Because cobalt is expensive, these batteries typically use eight parts nickel to one part each of manganese and cobalt (8:1:1). NMC have a high energy density, which means that they can store energy in a smaller package, making them suitable for electric vehicles and consumer electronics such as smartphones and laptops.
- **Lithium Ion Phosphate (LFP)**: LFP batteries are comprised of roughly equal parts of iron and phosphate. Relative to NMC technology, LFP batteries are more chemically stable and less prone to thermal runaway events and combustion, and the components of LFP batteries are cheaper and generally considered to be less toxic. LFP batteries are commonly used in energy storage facilities.

Battery storage technology is developing rapidly, and Midwater has indicated that it anticipates using some type of LFP battery technology but will defer selection of the technology until closer to the 2027 construction start. Midwater has developed a preliminary design modeled on the Tesla Megapack 2 XL battery.

The batteries are housed in enclosures (Figure 2). Under the preliminary design, BESS enclosures will occupy approximately 5.6 acres of the approximately 16.6 acre fenced area of the site. Each BESS enclosure will connect to pad-mounted switchgear, transformer(s) to step up and step down voltage, and an electric distribution system via 34.5 kV underground cables. Midwater anticipates that the BESS enclosure dimensions are approximately 10 feet tall, eight feet wide, and 20 feet long.[18]

[17] Midwater Application, Section 5.1.1.1, 36.
[18] Appendix D, Information Request 2.

Figure 2. Representative BESS Enclosures



Project Tap Line and Substation

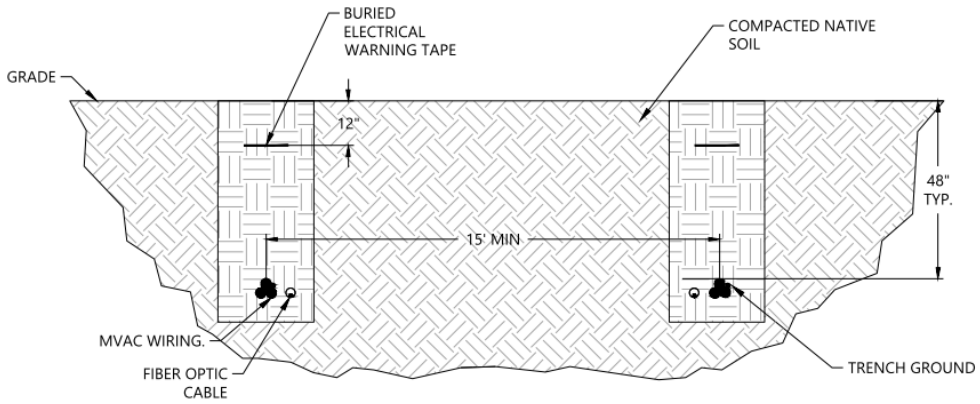
Electricity will flow from the Glenworth substation to the project substation via a 161 kV tap line of approximately 2,668 feet. At the project substation, transformers will step the voltage down from 161 kV to 34.5 kV and then back from 34.5 kV to 161 kV depending upon the flow of electricity.[19] Pending final design, Midwater anticipates that the tap line will be comprised of two dead-end structures (one each at the Glenworth and project substations) and one to two tangent structures to support the line between dead-end structures.[20]

Power Conversion System

Electrical energy will flow between the project substation and the BESS enclosures through underground 34.5 kV AC feeder lines (Figure 3). The power will pass through medium voltage transformers and inverters to the battery modules. The inverters convert AC to DC for storage in the battery modules and from DC to AC for delivery back to the grid. Depending upon the final technology, transformers and inverters may either be located within BESS enclosures or may be located on pads near the BESS enclosures. Cabling will be trenched or plowed into place to a dept of at least four feet, deeper if necessary to avoid other utilities or infrastructure.[21]

[19] Midwater Application, Section 5.1.1.2, 39.
[20] Midwater Application, Section 2.2.2, 26.
[21] Midwater Application, Section 5.2, 45.

Figure 3. Underground Cabling



Fencing

Midwater will install security fencing around the facility. Fencing will be secured to posts that will be directly embedded in the soil or set in concrete foundations as required for structural integrity. At the time of application, Midwater anticipated using six-foot-tall chain link fencing topped by one to two feet of barbed wire.[22] Opacity strips will be added to the chain link fabric to further obscure view and reduce the likelihood that deer will jump the fence and enter the facility.

Access Roads and Drive Area

Midwater anticipates that the site will be accessed through a point on the western project area boundary from U.S Highway 65. During construction the entry road apron will be approximately 100 feet wide to allow safe turning radii for trucks entering and leaving the site. Within the site the surfaces between BESS enclosures and the fence will be covered by gravel, allowing for access to the enclosures and substation. Midwater anticipates that the internal spacing/drive lanes will be approximately 24 feet wide.[23]

Operations and Maintenance Building

Midwater indicates that it will construct an operations and maintenance (O&M) building within the fenced site to provide a workspace for maintenance activities and to store parts, supplies, and equipment. If constructed, preliminary plans anticipate locating the O&M building and associated parking area on approximately 0.1 acres along the eastern portion of the site. Alternatively, Midwater may rent an existing warehouse or commercial space nearby to serve as an operations base and storage facility.[24]

2.1.4 How would the BESS facility be constructed?

Midwater anticipates that construction will begin in mid-2027 to meet an in-service date likely the second quarter of 2028. The actual construction schedule is dependent upon permitting, final design, delivery of equipment, and workforce availability.

[22] Appendix D, Information Request 2.
[23] Midwater Application, Section 5.1.1.8, 42.
[24] Midwater Application, Section 5.1.1.5, 40.

Work force mobilization and initial site preparation will begin after all necessary permits and approvals have been received. Initial site preparation includes vegetation removal, grading, tree removal, site access improvements, and preparation of staging and laydown areas and job site trailers. Preliminary engineering analysis indicated that approximately 16.6 acres of the proposed facility development area will require grading.[25] This acreage includes a temporary 3.42-acre laydown yard.[26] The applicant anticipates grading in selected areas only to provide a level workspace and maintain soil stability in areas with a slope of greater than dive percent to accommodate the panels, inverters, and access roads.

Typical construction equipment will be used for project construction, including scrapers, bulldozers, dump trucks, vibratory compactors, pile drivers, watering trucks, pickup trucks, and backhoes. Additional specialty equipment could include a skid steer loader, concrete truck and boom truck, a high reach bucket truck, crane, forklift, and a truck-mounted auger or drill rig.

The applicant estimates that the project will create approximately 75 temporary construction jobs, and one to two full-time jobs to operate and maintain the facility.[27]

Access Road and Drive Areas

Construction of the permanent site entrances, access roads, and turnouts will begin with stripping and segregating topsoil from the proposed road corridors. Topsoil removed from permanent access roads will be stockpiled in suitable on-site locations for use in final reclamation during decommissioning. The entry road is located along the western project area boundary from U.S. Highway 65 with an apron that will be approximately 100 feet wide during both construction and operation to provide adequate turning radii for trucks. Beyond the apron, the road will narrow to 24 feet as it enters the BESS facility.[28] During construction, portions of the access road may be temporarily widened to accommodate equipment and materials, but the final road width will be reduced to its permanent design once construction is complete.

Substation and Interconnection

Site preparation for the substation, including grading and compacting, will occur concurrently with the grading for the BESS. Following site preparation, contractors will install a grounding grid and underground conduit within the substation footprint along with foundations for the transformer, control house(s), and high voltage structures. Substation equipment will be delivered to the site and installed on the prepared foundations. Contractors will construct secondary containment areas for the transformer according to design requirements in the Spill Prevention, Control, and Countermeasure (SPCC) plan, and final grading will occur around the project substation. Dead end structures will be installed at both the Glenworth substation and the project substation and conductors will be strung along the tap line. Depending upon final design, one tangent structure between the dead-end structures may be required. Final perimeter fencing will be installed and crushed rock will be lain within the fenced area extending approximately five feet outside the fence line.

---

[25] Midwater Application, Section 5.2.1.1, 47.
[26] Midwater Application, Table 5.1-3, 41.
[27] *Ibid*, 47.
[28] Midwater Application, Section 5.1.1.8, 41.

Power Conversion System

The electrical collection system will be installed below-ground. Cable for the AC electrical collection system will be placed 42 inches underground. A trench will be excavated for the cabling, topsoil and subsoil will be segregated and stockpiled. Once cabling is installed in the trench, the trench will be backfilled with subsoil followed by topsoil.

Depending upon final equipment selected, inverters may be inside the BESS enclosures or may be mounted on a pad adjacent to the enclosures. Preliminary design anticipates that inverter and transformer skids will be placed on concrete foundations reinforced with rebar. Concrete foundations may be poured on-site or pre-cast and then assembled.

BESS Enclosures

Once the BESS area has been prepared and underground cables and conduits are installed, workers will install pile foundations (driven piles or helical piles) for the BESS containers. BESS containers (approximately eight feet by 20 feet) will be placed on foundations by crane and will be bolted or welded to pile caps. Installation of the BESS enclosures will require the use of trenching machines, pile drivers, forklifts, concrete trucks, boom trucks, and cranes.[29]

Stormwater Drainage

The project design includes installation of two stormwater ponds consistent with MPCA regulations to collect and treat runoff during facility operation (Figure 4. Stormwater Management Site Plan, Appendix B).[30] Project contractors would remove topsoil to be temporarily stored at a suitable location. Subsoil would be excavated in accordance with design depths and slopes to accommodate inlets and outlets. Excavated subsoil would be distributed throughout the site as fill material in areas where grading is required. Topsoil would be replaced, and the basis will be seeded with a seed mixture that is tolerant of wet conditions.

Fencing

Midwater will install permanent security fencing along the BESS and project substation perimeter (Figure 1) to comply with applicable electrical codes, including the National Electrical Code in NFPA 70. Fencing will consist of a ten-foot-tall chain link fence, with one to two feet of barbed wire on the fence top. High voltage warning signs and lockable gates will also be installed on the fencing.

Restoration

As the project nears completion, temporary areas like the 3.42-acre laydown yard will be restored by grading to natural contours and respreading stockpiled topsoil. Disturbed areas, both inside and outside the proposed BESS development area, will be de-compacted, reseeded with specific seed mixes, and stabilized using erosion control methods (e.g., silt fences, hydro-mulch, sediment logs). A temporary cover crop will help prevent erosion while perennial vegetation establishes, expected to be fully developed by Year 5 (sixth growing season).

Restoration and site cleanup will take about 2 to 4 months. The preliminary Vegetation Management Plan (VMP) outlines best management practices (BMPs) for seeding, erosion control,

[29] Midwater Application, Section 5.2.1.1, 46.
[30] Midwater Application, Section 6.5.4.1, 119.

and managing invasive species. The VMP is found in Appendix C of the Permit Application. Vegetation will be monitored during the growing season (May–November) using an adaptive management approach. The VMP provides a guide to site preparation, installation of prescribed seed mixes, management of invasive species and noxious weeds, and control of erosion/sedimentation. Land not used for the project will remain in its current condition, or, if disturbed during project construction, will be re-seeded with a beneficial habitat seed mix as prescribed by the VMP.[31] The required restoration management is designed to continue for five years. Midwater BESS will use an adaptive management approach for vegetation management.[32]

Maintenance methods may include mowing, selective herbicide use, and manual weed removal. Mechanical removal and selective use of herbicides may be used to treat unwanted woody species and noxious and perennial weeds. Areas outside the BESS will be maintained according to local land use, possibly continuing under Conservation Reserve Program (CRP) guidelines.

2.1.5 How would the facility be operated and maintained?

Midwater estimates the service life of the project to be 30 years.[33] Following restoration and construction closeout, control of the facility will transfer from the construction team to the operations staff. One or two full time maintenance staff will perform regularly scheduled inspections of electrical equipment, maintain or repair equipment as needed, maintain vegetation at the site, and remove snow as needed (Table 2).

The applicant indicated that project maintenance will include inspection of electrical equipment, vegetation management, and snow removal (as needed). The project electrical performance will be monitored in real-time by a supervisory control and data acquisition (SCADA) system. The SCADA system allows for early notification of abnormal operations, which facilitates prompt maintenance and repair. Per the applicant, “The Project will be professionally maintained and operated by Midwater BESS, an affiliate, and/or a qualified contractor.”[34]

[31] Midwater Application, Section 2.1, 24.
[32] Midwater Application, Section 5.2.1.3, 48.
[33] Midwater Application, Section 5.2.1.4, 49.
[34] Midwater Application, Section 5.2.1.4, 49.

Table 2. Operations and Maintenance Tasks and Frequency

Device	Task	Preliminary Frequency
BESS	System visual check	Once Yearly
	Filter Inspection	Once Yearly
	Battery condition check	Continuous - remote
	Breaker check	Once Yearly
	Cooling system check	Once Yearly
Electric Boards	Case visual check	Once Yearly
	Fuses check	Once Yearly
	Surge arresters check	Once Yearly
	Torque check	Once Yearly
	DC voltage and current check	Once Yearly
	Grounding check	Once Yearly
Inverter	Case visual inspection	Once Yearly
	Air intake and filters inspections	Once Yearly
	DC voltage and current check	Once yearly
	Conversion efficiency inspection	Once yearly
	Datalogger memory download	Once yearly
	Fuses check	Once yearly
	Grounding check	Once yearly
	Torque check	Once yearly
Support Structures	Visual check	Once yearly
MV Transformers	Visual Check	Once yearly

Battery Augmentation

The batteries used in the facility will lose the ability to store and deliver energy, through a process sometimes referred to as “derating” or “degradation,” which results in diminished capacity and efficiency, shorter operational life, and a decline in performance over time. Battery degradation is caused by chemical wear and tear that occurs over multiple charging and discharging cycles, aging (regardless of how the battery is used), and environmental factors such as temperature fluctuation, humidity, and dust in the operating environment. The normal degradation process can also be impacted by temperature extremes.[35]

To maintain the facility’s capacity and accreditation, BESS facilities anticipate replacing degraded batteries with new batteries periodically over the course of the facility’s operating life. This periodic replacement is referred to as “augmentation.” Battery augmentation may involve either the addition of battery modules within the existing enclosures (Scenario 1) or the installation of new enclosures and new batteries (Scenario 2). Midwater indicates the type and frequency of

[35] GridX. “What is Battery Degradation and How to Prevent It”, accessed December 5, 2025, https://www.gridx.ai/knowledge/what-is-battery-degradation-and-how-to-prevent-it

augmentation will depend upon final design.[36] The final design of the project has accommodated the use of future augmentation units and so the initial build of BESS enclosures will not match that of the project design (Figure 1). Midwater indicates the project site will be designed and constructed to accommodate future BESS augmentations.[37]

2.1.6 What happens at the end of the facility's useful life?

As the project progresses through its service life, the applicant may seek to repower the project. The applicant's decision on whether to pursue repowering will consider the equipment performance, maintenance costs, extending the useful life of the project, or a desire to increase storage capacity, with newer or more efficient batteries and other equipment. Any site permit issued by the Commission will specify the maximum capacity, so if Midwater wishes to increase the capacity increase, it must seek an amendment to the site permit. At the end of the project life cycle, Midwater will either continue operations through re-permitting and retrofitting the facility or carry out its decommissioning plan.

Commission-issued site permits require that the permittee be responsible for removing all project components and restore the site to pre-construction conditions at the end of a project's useful life and that the permittee is responsible for all costs associated with decommissioning the project. Midwater provided a draft decommissioning plan as Appendix D of its site permit application.

If the project is not repowered, Midwater will follow their decommission plan and remove the related facilities. Decommissioning would include removal of the BESS enclosures (cabinets, batteries, racking, and other auxiliary equipment), foundations, transformers and pad-mounted inverters, fencing, project substation, project tap line structures and conductors, gravel and crushed rock, and the access road. Below-ground electric and communications cabling would be removed to a depth of four feet. Midwater anticipates the decommissioning of the facility will take approximately 12 weeks to complete.

Under the Commission permit, Midwater will be responsible for all decommissioning costs. Midwater anticipates the total estimated cost to decommission the project is approximately $1.34 million and estimated salvage/scrap value is approximately $664,354 for a net decommissioning cost of approximately $678,473. Midwater anticipates establishing either an escrow account, surety bond, or reserve fund for decommissioning purposes.[38]

2.1.7 Project Costs

Midwater estimates the total installed capital cost to construct the project to be approximately $459 million (Table 3). Actual costs will depend on final material and labor costs.[39]

[36] Midwater Application, Section 5.1.1.1, 38.
[37] *Ibid.*
[38] Midwater Application, Section 5.1.3.2, 58.
[39] Appendix D, Information Request #1, December 12, 2025.

Table 3. Estimated Project Costs

Project Component	BESS Estimated Cost	HVTL Estimated Cost
Planning and state permitting	$1,200,000	N/A
Acquisition and "downstream" permitting	$7,000,000	N/A
Design	$1,300,000	$125,000
Procurement	$130,000,000	$250,000
Construction	$71,000,000	$250,000
Operation	$246,000,000	$60,000
Decommission	$1,215,643	$127,000
Totals	$457,715,643	$812,184
Total Project Cost	$458,527,827	

Midwater estimate operations and maintenance costs of approximately $246 million over the life of the project.[40] Maintenance costs include labor, materials, and lease payments. State and local taxes will be paid by Midwater BESS.[41]

2.1.8 Project Schedule

Midwater anticipates the project will begin commercial operation by the end of 2028. Table 4 shows Midwater's estimated development and construction milestones.[42]

Table 4. Anticipated Project Schedule

Activity	Anticipated Timeframe
Land Acquisition	Complete
Site Permit	Q3 2026
Downstream Permits	Q1-Q2, 2027
Construction	Q2 2027 – Q1 2028
Testing and Commissioning	Q1 2028
Commercial Operation Date	Q2 2028

[40] Midwater Application, Section 2.3, 28.
[41] Midwater Application, Section 6.2.10.2, 97.
[42] Appendix D, Information Request #1, December 12, 2025.

3 Regulatory Framework

Chapter 3 presents the site permitting process administered by the Commission. It discusses the environmental review required and lists the factors the Commission considers when making its decision. This chapter also presents the required approvals from federal, state, and local permitting authorities for actions related to the project. Lastly, topics outside the scope of this EA are also listed.

3.1 What Commission approvals are required?

Construction of the project requires a site permit for the BESS and a route permit for the HVTL from the Commission.[43] A certificate of need (CN) is not required for an energy storage system (ESS) or HVTL that directly interconnects an ESS to the transmission system.[44] Therefore, a CN is not required for the proposed project.

3.2 What is environmental review?

Environmental review informs interested persons about the potential impacts of a project and possible mitigation measures. Additionally, environmental review informs Commission decisions.

Minnesota law requires that potential human and environmental impacts be analyzed before the Commission decides whether to grant a site or route permit. This analysis is called environmental review. Minnesota law provides the Commission with two processes to review permit applications. The alternative process, which applies to ESS and relatively smaller transmission lines, such as the project, requires that an EA be prepared and that a public hearing be held.[45]

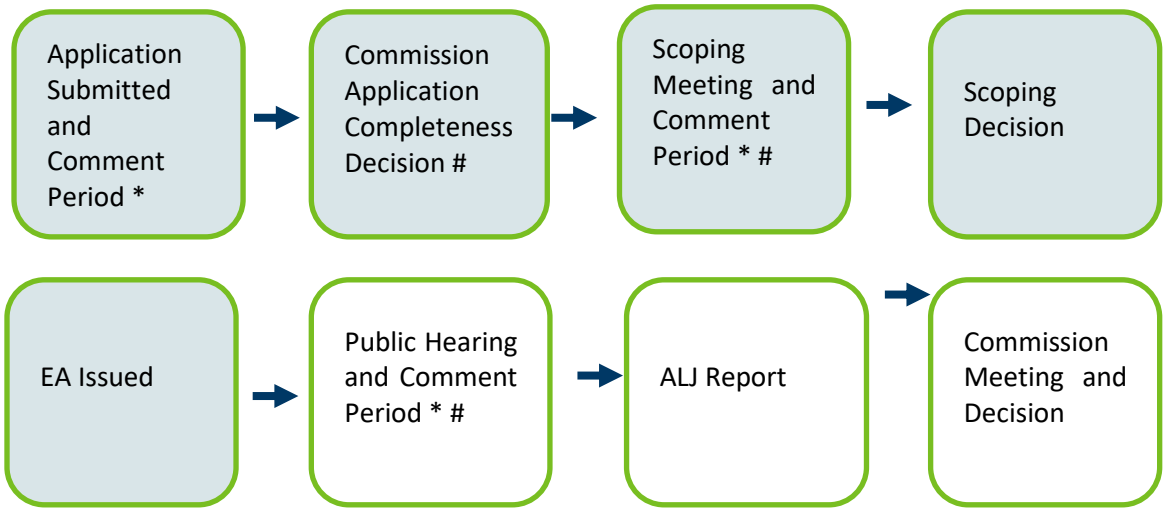
3.3 What does the review and permitting process look like?

On January 21, 2025, the Commission accepted the join site and route permit application as substantially complete. Two in-person and one virtual public information and scoping meetings were held for the project. The first in-person meeting took place on February 19, 2025, in Albert Lea, Minnesota, followed by the virtual meeting on February 20, 2025. The second in-person meeting was held on April 7, 2025, in Glenville, Minnesota.

The environmental review and permitting process for the project is illustrated in Figure 5. Simplified Permitting Process Summary

[43] Minn. Stat. § 216E.01, subd. 5. Note that the applicable definition after July 1, 2025, is Minn. Stat. § 216I.02, subd 7.
[44] Minn. Stat. §216B.243, subd. 8(9) & (10).
[45] Minn. Stat. § 216E.04, subd. 1 and 5; Minn. R. 7850.3700, subp. 1. Applicants are free to elect the alternative process if their project qualifies for it. Pursuant to Minn. Stat. §216E.04, subd. 2(3) and (9), Midwater BESS seeks approval of its application under the alternative review procedures of Minn. Stat. §216E.04 and Minn. R. 7850.2800 to 7850.3900.

Figure 5. Simplified Permitting Process Summary



3.3.1 Application Filing and Acceptance

Midwater provided the required written notice of its intent to file its application under the alternative permitting process on September 23, 2024.[46] Midwater filed a joint site and route permit application on November 19, 2024.[47] The Commission accepted the application as substantially complete in its order dated January 21, 2025.[48] The order also referred the matter to the Court of Administrative Hearings for appointment of an administrative law judge (ALJ) to conduct a public hearing for the project. Commission staff provided a *Sample Site Permit for an Energy Storage System* and a *Sample Route Permit* on February 25, 2025.[49]

3.3.2 Scoping Process

Scoping is the first step in the environmental review process. It helps focus the EA on the most relevant information needed by the Commission to make informed decisions. Scoping includes a public meeting (or meetings) and comment period that provides opportunities for people interested in helping develop the scope (or contents) of the EA.[50] The purpose of the public information and scoping meetings is to provide information and answer questions about a proposed project and the permitting process. The public meetings and associated comment period also provide an opportunity to gather input regarding potential impacts and mitigative measures that should be studied in the EA. Additionally, for this project, the Commission authorized a Citizen Advisory Task Force (ATF) charged with evaluating potential impacts of the

[46] Midwater BESS, LLC, *Notice of Intent by Midwater BESS, LLC to Submit a Site Permit Application Under the Alternative Permitting Process*., August 19, 2024, eDocket No. 20248-209598-01
[47] Midwater BESS, LLC, *Midwater Energy Storage Project: Application to the Minnesota Public Utilities Commission for a Site Permit*, October 7, 2024, eDocket Nos. 202411-212161-01; 202411-212161-02; 202411-212161-03; 202411-212161-04; 202411-212161-05; 202411-212161-06; 202411-212161-07; 202411-212161-08; 202411-212161-09; 202411-212161-10; 202411-212161-11; 202411-212161-12; 202411-212161-13
[48] Commission, *Order*, November 19, 2024, eDocket No. 202411-212121-01
[49] Commission, Sample Energy Storage System Site Permit, February 25, 2025, eDocket No. 20252-215749-01; Commission, Sample Route Permit, February 25, 2025, eDocket No. 20252-215748-01
[50] Minn. R. 7850.3700, subp. 2.

project and possible alternative sites. A summary of the public meetings, comments, and the Citizen Advisory Task Force are provided below.

3.3.3. Scoping Meetings

On February 7, 2025, the Commission issued a joint *Notice of Public Information and Environmental Assessment Scoping Meetings* and associated public comment period.[51] Commission and Commerce staff held a public information and scoping meeting, on February 19, 2025, in Albert Lea, Minnesota, and an online meeting on February 20, 2025. The public comment period was extended to April 21, 2025, with an additional scoping meeting on April 7, 2025, in Glenville, Minnesota.[52]

Approximately 20 community members attended the February 19, 2025, Albert Lea meeting and questioned the choice of meeting location, saying it limited transparency.[53] Many questioned the need for the project, citing infrequent power outages and adequate existing grid reliability. Participants raised environmental and public-health concerns related to the site's proximity to the Shell Rock River, wetlands, wildlife habitat, homes, and a nearby school. They referenced local cancer rates and stressed risks associated with potential battery fires, including toxic smoke and the capacity of the local fire department to respond. Long-term concerns included impacts on land use, future housing, and possible disturbance of Native American cultural resources.

Residents also worried that construction jobs would not benefit the local workforce. Some urged that project hiring support the Glenville economy. A representative from the International Union of Operating Engineers highlighted the value of such infrastructure projects for regional union workers and requested that the EA address labor considerations and local union hiring impacts.

The Commission held an online meeting on February 20, 2025.[54] About ten community members voiced concerns about the project's location, particularly its proximity to Glenville-Emmons High School and the Shell Rock River. A school board representative highlighted potential environmental and safety risks related to the area's sandy soil and the river's significance, while another participant questioned whether downstream communities were notified. Additional concerns included the site's closeness to an anhydrous ammonia storage facility and possible effects on school enrollment if families perceive safety risks. Fire safety, especially emergency planning for thermal runaway, was also raised. Participants requested that future meetings be held in Glenville to improve local access and involvement.

About 80 community members attended the April 7, 2025, Glenville public meeting.[55] Many questioned the transparency of the site-selection process and urged reconsideration of alternative locations, including other substations. Residents raised concerns about thermal runaway, coolant leaks, and potential contamination of groundwater and the Shell Rock River, as well as stormwater management, flooding, and cumulative environmental impacts from nearby industrial and agricultural activities. Participants also sought clarity on BESS operations, including system reliability during outages or cooling failures, battery lifespan, recycling, decommissioning, emergency

[51] Commission *Notice of Public Information and Environmental Review Scoping Meeting*, February 7, 2025, eDocket No: 20252-215067-01
[52] Commission *Notice of Public Information and Environmental Review Scoping Meeting*, March 24, 2025, eDocket No: 20253-216704-01
[53] Midwater BESS Albert Lea Scoping Meeting, February 19, 2025, transcripts, eDocket no. 20253-216765-01
[54] Midwater BESS Virtual Scoping Meeting, February 20, 2025, transcript, eDocket no. 20253-216766-01
[55] Midwater BESS Albert Lea Scoping Meeting, February 19, 2025, transcripts, eDocket no. 20254-218333-01

monitoring, local response capability, and potential noise impacts. Economic concerns centered on tax revenues, site tax status, liability and ownership, and the use of public subsidies. Many emphasized the importance of local job creation, strong union involvement, and clarity on energy market impacts and pending power purchase agreements.

Written Comments

The Commission received 335 comments from the public.[56] Most commenters objected to the project's location due to its proximity to the Shell Rock River, schools, daycares, and residential neighborhoods. Many raised concerns about thermal runaway fire risks, toxic smoke, evacuation needs, and the limited capacity of the local volunteer fire department. Commenters frequently emphasized the Shell Rock River's ecological and economic importance, noting flood vulnerability, high water tables, and permeable soils that could intensify contamination from a fire or chemical leak. Many feared long-term harm to restoration work, wildlife, agriculture, and drinking water. Additional concerns included air and water pollution, farmland loss, declining property values, and minimal local economic benefit. Some requested a $25 million bond for damages and a larger share of tax revenue for Glenville. Commenters also criticized limited transparency and community engagement.

Agency Comments: The Commission received three comments from state agencies. The Minnesota Department of Transportation (MnDOT) recommended avoiding new highway access points, using or upgrading existing access, and coordinating permits and construction activity.[57] They requested accurate mapping of project boundaries and noted future alignment shifts near highway ROW would require coordination. The Minnesota Department of Natural Resources (DNR) recommended wildlife- and water-protective measures, including higher fencing, wildlife-safe lighting, restrictions on chloride-based dust suppressants, wildlife-friendly erosion control, native seed mixes, wetland features in water basins, and avian flight diverters. They also noted dewatering may require a water appropriation permit.[58] The Minnesota Pollution Control Agency (MPCA) reviewed project documents and had no comments.[59]

Local Government Comments: The Commission received four comments from local units of government. Butler County (Iowa) expressed concern about a potential fire at the facility and the downstream contamination of the Shell Rock River, which supports recreation and tourism.[60] The Shell Rock River Watershed District requested strict adherence to stormwater treatment standards and recommended use of skimmers and the more protective 5.66 cfs discharge criterion.[61] Freeborn County Board of Commissioners formally opposed the project, citing risks to health, safety, welfare,

---

[56] Written comments from the public received on the Scope of the Environmental Assessment, eDockets Nos. 20253-216746-01 (Batch 1); 20253-216747-01 (Batch 2); 20254-218151-01 (Batch 3); 20254-218408-01 (Batch 4).
[57] Stacy Kotch Egstad, Minnesota Department of Transportation, to James Sullivan, Minnesota Public Utilities Commission, March 10, 2025, eDocket no. 20253-216207-01
[58] Martin Donovan, Minnesota Department of Natural Resources, to James Sullivan, Minnesota Public Utilities Commission, March 10, 2025, eDocket no. 20253-216145-01
[59] Chris Green, Minnesota Pollution Control Agency, to James Sullivan, Minnesota Public Utilities Commission, April 15, 2025, eDocket no. 20254-217720-01
[60] Wayne Dralle, Rusty Eddy, and Greg Barnett, Butler County Board of Supervisors, Iowa, to James Sullivan, Minnesota Public Utilities Commission, April 15, 2025, eDocket no. 20254-217701-01
[61] Andy Heschel, Shell Rock River Watershed District, to James Sullivan, Minnesota Public Utilities Commission, April 18, 2025, eDocket no. 20254-218094-01

wildlife, and the environment, including toxic emissions in the event of a fire, fire hazards, noise, runoff, and land-use incompatibility.[62] Shell Rock Township also passed a resolution (Resolution # 2025-04-08-1) opposing the project due to potential chemical leaks, wildlife disruption, water and soil contamination, and noise impacts.[63]

Labor Unions: Operating Engineers Local 49 and the Carpenters Council supported the project, emphasizing grid reliability benefits, job creation, and the need for a reasonable regulatory process that does not hinder future energy projects.[64]

Applicant Comments: Midwater BESS, LLC urged stakeholders to wait for the environmental assessment, emphasizing that project impacts should be evaluated using facts and data.[65] The applicant stated it has engaged local stakeholders, agencies, and landowners throughout the permitting process.

3.3.4 Citizen Advisory Task Force

The Commission established a Citizen Advisory Task Force (ATF) on June 2, 2025, in response to community concerns about the project.[66] Commission staff recruited ATF members and facilitated three meetings. Although consensus was not required, the ATF emphasized environmental protection, fire safety, community involvement, and financial safeguards as essential conditions for any project approval.[67] The task force identified several priority issues for the Commission to address:

- **Water Protection:** Strong stormwater management, pollution controls, and water-quality monitoring due to the project's proximity to the Shell Rock River.
- **Wildlife Impacts:** Concern over habitat loss near a DNR Wildlife Management Area, which would make the site ineligible for conservation programs.
- **Fire Safety:** Support for lithium-iron technology but a need for firefighter training and equipment upgrades.
- **Local Involvement:** Insufficient local notice and input, strong community opposition, and concerns about lack of local control.
- **Cleanup & Decommissioning:** Clear requirements ensuring that Midwater covers all cleanup and end-of-life costs rather than the taxpayer.

---

[62] Freeborn County Board of Commissioners Resolution 25-139, submitted to James Sullivan, Minnesota Public Utilities Commission, eDocket no. 20254-217825-01

[63] Shell Rock Lake Township, Freeborn County, Resolution # 2025-04-0801, submitted to James Sullivan, Minnesota Public Utilities Commission, eDocket no. 20254-217456-01

[64] Nathan Runke and Richard Kolodziejski, IUOE Local 49 and NCSRC of Carpenters, submitted to Will Seuffert, Minnesota Public Utilities Commission, April 21, 2025, eDocket no. 20254-217919-01

[65] Jeremy P. Duehr, Frederickson & Byron, on behalf of Midwater BESS, Inc., eDocket no. 20254-217951-01

[66] Minnesota Public Utilities Commission Advisory Task Force Order, service date, June 2, 2025, eDocket no. 20256-219493-01 and Minnesota Department of Commerce, Advisory Task Force Establishment, Charge, and Order, June 18, 2025, eDocket no. 20256-220015-01

[67] Midwater Energy Storage Project Advisory Task Force, *Midwater Energy Storage Project Advisory Task Force Report,* Minnesota Public Utilities Commission, Docket Nos. ESS-24-294 and TL-24-295 (Saint Paul, MN, November 2025). eDocket no. 202511-224951-01

- **Ongoing Collaboration:** Continued coordination between local officials and operators on emergency response, contamination risks, and decommissioning.

The ATF also reviewed two potential alternative sites but could not determine whether they were viable sites. A copy of the ATF report which includes additional details is provided in Appendix E. Recommendations from the report are considered throughout the analysis in Chapter Four.

3.3.5 Scoping Decision

The scoping decision identifies the issues studied in this EA. After considering public comments and recommendations by staff, the Commission issued a scoping decision on December 3, 2025 (Appendix A). The scoping decision identifies issues and topics to be evaluated in this EA.

3.4 Are other permits or approvals required?

The site and route permits are the only Commission permits required for the project. However, various federal, state, and local approvals will be required for activities related to project construction and operation. These subsequent permits are referred to as "downstream" permits and must be obtained by the permittee prior to construction.[68] Table 5 lists potential downstream permits that might be required, several of which are discussed here.

3.4.1 Federal

The U.S. Environmental Protection Agency requires certain facilities to develop, maintain, and implement a Spill Prevention, Control and Countermeasures Plan (SPCCP) to prevent oil spills and control any spills that do occur. An SPCCP may be required for power transformers within the project substation.

A permit is required from the United States Fish and Wildlife Service (USFWS) for the incidental taking of any threatened or endangered species.[69] The project is not expected to impact federally listed threatened or endangered species, and no permit from the USFWS is anticipated to be necessary.

[68] Midwater Permit Application, Table 6.5-8, 126.

[69] 16 U.S. § 1532(19) (defining "take" to mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct).

Table 5. Potential Downstream Permits

Unit of Government	Type of Application	Purpose	Anticipated for Project
Federal			
U.S. Environmental Protection Agency	Spill Prevention, Control and Countermeasures Plan	Prevent oil spills and minimize impacts from any spills that do occur.	Yes
U.S. Army Corps of Engineers (USACE)	Section 404 Permit	A Section 404 Permit will be required for any dredging or filling in jurisdictional waters of the United States.	Possible
State			
Department of Natural Resources	License to Cross Public Lands and Waters	Prevent impacts associated with crossing public lands and waters	No
	State Threatened and Endangered Species Consultation	Consultation to mitigate impacts on state-listed species	Yes
	Water Appropriation Permit	Balances competing management objectives may be required for construction dewatering	Possible
Minnesota Pollution Control Agency	Construction Stormwater Permit	Minimizes temporary and permanent impacts from stormwater	Yes
	Section 401 Clean Water Act – Water Quality Certification	Ensures project will comply with state water quality standards	No
State Historic Preservation Office	National Historic Preservation Act Section 106 Consultation	Ensures adequate consideration of impacts to significant cultural resources	Yes
Department of Agriculture	Agricultural Impact Mitigation Plan	Establish measures for protection of agricultural resources	Yes
Department of Labor and Industry	Electrical Inspection	Necessary to comply with electric code.	Yes
Department of Transportation	Utility Accommodation on Trunk Highway ROW Permit	Controls utilities being placed along or across highway rights-of-way (ROW)	Possible
	Oversize/Overweight Permit	Controls use of roads for oversize or overweight vehicles	No
Board of Water and Soil Resources	Wetland Conservation Act	Ensures conservation of wetlands	No
Local			
Freeborn County	Right-of-Way/Utility Permit	Needed to construct or maintain electrical lines along or across county highway ROW	Possible
	Access Permit	Needed to move, widen, or create a new driveway access to county roads	Possible
	Wetland Conservation Act Permit	Ensures conservation of wetlands	No
	Moving Permit/ Oversize/Overweight Vehicle Permit	Needed to transport oversized and overweight loads on county roads	Yes

3.4.2 State

Potential impacts to state lands and waters, as well as fish and wildlife resources, are regulated by the DNR. Licenses are required to cross state lands or waters.[70] Projects affecting the course, current, or cross-section of lakes, wetlands, and streams that are public waters may require a *Public Waters Work Permit*.[71] Not unlike the USFWS, DNR encourages project proposers to consult with the agency to determine if a project has the potential to impact state-listed threatened or endangered species. Additionally, consultation can lead to the identification of measures to mitigate potential impacts associated with the project.

Construction projects that disturb one or more acres of land require a general *National Pollutant Discharge Elimination System/State Disposal System Construction Stormwater Permit* (CSW Permit) from the MPCA. This permit is issued to "construction site owners and their operators to prevent stormwater pollution during and after construction."[72] The CSW Permit requires use of best management practices; development of a Stormwater Pollution Prevention Plan; and adequate stormwater treatment capacity once the project is complete. Projects must be designed so that stormwater discharged after construction does not violate state water quality standards. Specifically, projects with net increases of one acre or more to impervious surface must be designed to treat water volumes of one-inch times the net increase in impervious surface.[73]

A Clean Water Act Section 401 *Water Quality Certification* from MPCA might also be required. "Section 401 of the Clean Water Act requires any applicant for a federal license or permit to conduct an activity that may result in a discharge of a pollutant into waters of the United States to obtain a certification from the State in which the discharge originates that the discharge complies the applicable water quality standards."[74] The certification becomes a condition of the federal permit.

Additionally, MPCA regulates generation, handling, and storage of hazardous waste.

A permit from MnDOT is required for construction, placement, or maintenance of utility lines adjacent or across trunk highway rights-of-way.[75] Coordination would be required to construct access roads or driveways from trunk highways.[76] These permits are required to ensure that use of the right-of-way does not interfere with free and safe flow of traffic, among other reasons.[77]

---

[70] Minn. Stat. § 84.415.

[71] Minnesota Department of Natural Resources (DNR). 2025. "Requirements for Projects Involving Public Waters Work Permits." Accessed December 8, 2025. http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/requirements.html.

[72] Minnesota Pollution Control Agency (MPCA). 2025. "*Construction Stormwater*." Accessed December 8, 2025. https://www.pca.state.mn.us/business-with-us/construction-stormwater

[73] Minnesota Pollution Control Agency (MPCA). 2025. "*Minnesota Stormwater Manual*." Accessed December 8, 2025. https://www.pca.state.mn.us/water/minnesotas-stormwater-manual.

[74] Minnesota Pollution Control Agency. 2025. "Clean Water Act Section 401 Water Quality Certifications." Accessed December 9, 2025. https://www.pca.state.mn.us/business-with-us/clean-water-act-section-401-water-quality-certifications

[75] Minn. R. 8810.3300, subp. 1.

[76] Minnesota Department of Transportation (MnDOT). 2025. "Permit Information and Forms – Utility Agreements and Permits." Accessed December 9, 2025. https://www.dot.state.mn.us/utility/forms.html

[77] Minnesota Department of Transportation. 2025. "Utility Accommodation on Trunk Highway Right-of-Way: Policy OP002." Accessed December 9, 2025. https://www.dot.state.mn.us/policy/operations/oe002.html

The State Historic Preservation Office (SHPO) is charged with preserving and protecting the state's historic resources. SHPO consults with project proposers and state agencies to identify historic resources to avoid and minimize impacts to these resources.

The Minnesota Department of Agriculture (MDA) ensures the integrity of Minnesota's food supply while protecting the health of its environment and the resources required for food production. MDA assists in the development of agricultural impact mitigation plans that outline necessary steps to avoid and mitigate impacts on agricultural lands.

The Board of Water and Soil Resources (BWSR) oversees implementation of Minnesota's *Wetland Conservation Act* (WCA). The WCA is implemented by local units of government.

3.4.3 Local

Freeborn County oversees local implementation of the Minnesota Wetland Conservation Act (WCA) in the project area. The WCA requires that any person "proposing to impact a wetland to first, attempt to avoid the impact; second, attempt to minimize the impact; and finally, replace any impacted area with another wetland of at least equal function and value."[78]

Commission site permits preempt local zoning, building, and land use rules, regulations, or ordinances promulgated by regional, county, local, and special purpose government; however, coordination with local governments may be required for the issues listed below.

- Access/Driveway Coordination may be required to construct access roads or driveways from county or township roads.
- Overwidth Load Coordination may be required to move over-width or heavy loads on county or township roads.
- Road Crossing and Right-of-Way Coordination may be required to cross or occupy county or township road rights-of-way.

3.5 Do electrical codes apply?

Yes, if constructed the project must meet electrical safety code requirements. The project must meet the National Electrical Safety Code requirements.[79] These standards are designed to safeguard human health "from hazards arising from the installation, operation, or maintenance of conductors and equipment in electric supply stations and overhead and underground electric supply lines."[80] They also ensure that facilities and all associated structures are built from materials that will withstand the operational stresses placed upon them over the expected lifespan of the equipment, provided operational maintenance is performed.

Application of these codes requires multiple layers of third-party review to ensure regulatory compliance and minimize risk.[81] The project Engineer of Record (EOR) is legally obligated to design the project in accordance with all applicable codes and permit requirements and typically includes

---

[78] Minn. R. 8420.0100, subp. 2.
[79] *See* Minn. Stat. § 326B.35; Minn. R. 7826.0300, subp. 1 (requiring utilities to comply with the most recent edition of the National Electric Safety Code when constructing new facilities or reinvesting capital in existing facilities)
[80] IEEE Standards Association (n.d.) *2017 – National Electrical Safety Code Brochure*, retrieved from: https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/nesc_2017_brochure.pdf.
[81] Appendix D, Information Request 6.

peer review as part of standard practice. The project owner also hires an Owner's Engineer to independently review the EOR's design for compliance with codes, standards, and utility practices.

In addition, lenders and insurers conduct their own reviews. Independent engineers, engaged on behalf of lenders, review all plans and monitor construction to ensure the project is built according to specifications and national safety standards. Insurers also perform engineering reviews to confirm compliance with current safety standards. Together, these multiple oversight layers help ensure compliance and reduce project risk.

3.6 Are any issues outside the scope of this EA?

Yes, the scoping decision identified several issues that will not be studied. This EA does not address the following:

- The need for the project, including questions of size, type, timing, and alternative system configurations.
- Any site or route for the project other than the site and route proposed by Midwater in its combined application.
- Any impacts related to the manufacture of the elements of the project including batteries, battery storage units, concrete, fuel used for construction vehicles, etc.
- The manner in which landowners are compensated for the project.

4 Project Impacts and Mitigation

Chapter 4 describes the environmental setting, affected resources, and potential impacts from the project. It also discusses mitigation of potential impacts.

4.1 What are potential impacts and how are they measured?

Potential impacts are measured on a qualitative scale based on an expected impact level; the level of impact takes mitigation into account.

A potential impact is the anticipated change to an existing condition caused either directly or indirectly by the construction and operation of a proposed project. Potential impacts can be positive or negative, short- or long-term, and, in certain circumstances, can accumulate incrementally. Impacts vary in duration and size, by resource, and across locations.

Direct impacts are caused by the proposed action and occur at the same time and place. An indirect impact is caused by the proposed action but is further removed in distance or occurs later in time. This EA considers direct and indirect impacts that are reasonably foreseeable, which means a reasonable person would anticipate or predict the impact. Cumulative potential effects are the result of the incremental impacts of the proposed action in addition to other projects in the environmentally relevant area.

4.1.1 Potential Impacts and Mitigation

The following terms and concepts are used to describe and analyze potential impacts:

- ***Duration: Impacts vary in length.*** Short-term impacts are generally associated with construction. Long-term impacts are associated with the operation and usually end with decommissioning and reclamation. Permanent impacts extend beyond the decommissioning stage.
- ***Size: Impacts vary in size.*** To the extent possible, potential impacts are described quantitatively, for example, the number of impacted acres or the percentage of affected individuals in a population.
- ***Uniqueness: Resources are different.*** Common resources occur frequently, while uncommon resources are not ordinarily encountered.
- ***Location: Impacts are location dependent***. For example, common resources in one location might be uncommon in another.

The context of an impact, in combination with its anticipated on-the-ground effect, is used to determine an impact level, which can range from beneficial to harmful. Impact levels are described using a qualitative scale, which is explained below. These terms are not intended as value judgments, but rather a means to ensure common understanding among readers and to compare potential impacts between alternatives.

- ***Negligible*** impacts do not alter an existing resource condition or function and are generally not noticeable to an average observer. These short-term impacts affect common resources.
- ***Minimal*** impacts do not considerably alter an existing resource condition or function. Minimal impacts might, for some resources and at some locations, be noticeable to an

average observer. These impacts generally affect common resources over the short- or long-term.

- ***Moderate*** impacts alter an existing resource condition or function and are generally noticeable to the average observer. Impacts might spread out over a large area making them difficult to observe but can be estimated by modeling. Moderate impacts might be long-term or permanent to common resources, but generally short- to long-term to uncommon resources.
- ***Significant*** impacts alter an existing resource condition or function to the extent that the resource is impaired or cannot function. Significant impacts are likely noticeable or predictable to the average observer. Impacts might spread out over a large area making them difficult to observe but can be estimated by modeling. Significant impacts can be of any duration and affect common or uncommon resources.

Also discussed are opportunities to avoid, minimize, or compensate for potential impacts. Collectively, these actions are referred to as mitigation.

- To ***avoid*** an impact means to eliminate it altogether, for example, by not undertaking parts or all of a project, or relocating the project.
- To ***minimize*** an impact means to limit its intensity, for example, by reducing project size or moving a portion of the project.
- To ***correct*** an impact means to repair, rehabilitate, or restore the affected resource.
- To ***compensate*** for an impact means replacing it or providing a substitute resource elsewhere, or by fixing it by repairing, rehabilitating, or restoring the affected resource. Compensating an impact can be used when an impact cannot be avoided or further minimized.

Some impacts can be avoided or minimized; some might be unavoidable but can be minimized; others might be unavoidable and unable to be minimized, but compensation can be applied. The level at which an impact can be mitigated might change the impact level.

4.1.2 BESS Operating Scenarios

Potential BESS impacts are affected by the operational status of the BESS. For analysis in this EA, three BESS operating scenarios are used to evaluate project impacts. These scenarios are discussed for several resources and impacts. The three scenarios include: Typical, Atypical, and Accident.

The typical operating scenario (typical) describes the normal, intended system behavior during routine charging, discharging, and standby modes. Under these conditions, the BESS operates within manufacturer-specified limits for voltage, temperature, and state of charge, with all monitoring, control, and safety systems functioning as designed. Routine or expected regulatory reporting requirements and maintenance activities are part of the typical Midwater operating scenario.

The atypical operating scenario (atypical) involves abnormal but foreseeable conditions that deviate from normal operation, such as component malfunctions, loss of communication, environmental extremes, or single-point equipment failures. These events are generally addressed through automated protective functions, alarms, and controlled shutdowns in accordance with applicable codes and standards (e.g., UL, NFPA, IEEE) and site operating procedures. Regulatory reporting, if

required, is typically limited to incident documentation, corrective actions, and notifications to the applicable regulatory authority (Freeborn County, MDH, MPCA, Watershed District), without the need for off-site emergency response. Most of the analysis provided in the EA reflects either a typical or atypical operating scenario.

An accident operating scenario (accident) is expected to involve very rare, low-probability events characterized by severe failures such as thermal runaway, fire, explosion, or structural compromise. These scenarios may exceed normal engineering controls and trigger formal emergency response actions, including system isolation, activation of fire suppression systems, and coordination with local fire departments and Freeborn County Emergency Management Services. Regulatory involvement may include immediate notification of applicable state and local regulatory authorities, as well as implementation of an emergency action plan, post-incident investigation, and compliance reporting to applicable state and federal agencies in accordance with permitting conditions and emergency response regulations. Environmental effects and related impacts may be greater under the accident scenario, and are included, where relevant, throughout the EA.

4.1.3 Regions of Influence

Potential impacts to human and environmental resources are analyzed within specific geographic areas called regions of influence ("ROI"). The ROI represents the geographic area where most of the project's direct, indirect, and cumulative effects are likely to occur. ROI delineation is an important environmental review concept as it both determines and has implications for:[82]

1. the collection of background data and information to support the analysis;
2. bounding the affected environment description that provides the context for understanding a project's potential environmental effects;
3. defining the range of affected populations and interested parties to be solicited in the scoping process; and,
4. capturing direct, indirect, and potential cumulative effects.

The following factors must be considered in defining the ROI:[83]

- Magnitude and direction of expected direct and indirect environmental effects;
- Dispersion or migration relationships for affected environmental media, such as groundwater flow and wind direction;
- Ecosystem boundaries and wildlife migration patterns;
- Political or regulatory jurisdictions (air basin boundaries, counties, city limits, flood control districts, watershed districts, etc.) which present resource management or impact mitigation requirements

This EA uses the following ROIs based on the approach provided above:

- Land control area (land control of the BESS and gen-tie line)

[82] U.S. Army, *Guide to Environmental Impact Analysis: A Supplement to the US Army NEPA Manual Series* (2012), 15.
[83] *Ibid*, 18.

- Local vicinity (1,600 feet from the boundary of the BESS land control area)
- Project area (one-mile from the boundary of the facility)
- Region (Freeborn County)

Impacts on resources may extend beyond these distances but are expected to diminish quickly. ROIs vary between resources. Table 6 summarizes the ROIs used in this EA.

Table 6. Regions of Influence for Human and Environmental Resources

Resource Type	Resource Element	Region of Influence
Human Settlement	Displacement, Electrical Interference, Land Use and Zoning	Land control area
	Noise, Property Values	Local vicinity
	Aesthetics, Cultural Values, Recreation	Project area
	Socioeconomics	Region
Public Services	Airports, Roads, Emergency Services, Public Utilities	Project area
Public Health and Safety	Electric and Magnetic Fields, Implantable Medical Devices, Stray Voltage, Worker and Public Safety	Land control area
Land-based Economies	Agriculture, Forestry, Mining	Site control area
	Tourism	Project area
Archaeological and Historic Resources	—	Project area
Natural Environment	Geology and Groundwater, Soils, Vegetation, Water Resources, Wetlands, Wildlife (except birds), Wildlife Habitat	Land control area
	Wildlife (birds), Rare and Unique Resources	Local vicinity
	Air Quality	Region

4.2 Environmental Setting

The environmental setting refers to the description of the natural, physical, social, and cultural context where the project takes place. It accounts for the existing environmental conditions that could be affected or influenced by a proposed action and becomes the analytical framework for each siting and routing factor.

The environmental setting is defined as the area within an approximate 2-mile radius of the proposed BESS. The project is located on land previously used for agricultural production and aggregate mining, in a rural area south of Glenville, Minnesota. It lies immediately southeast of the ITC Midwest Glenworth Substation and includes two 69 kV and two 161 kV overhead transmission lines (See Figure 6. Environmental Setting of the Project, Appendix B).

No other BESS facilities are located within the immediate project vicinity. The nearest permitted facility is the Lake Wilson Solar Energy Center near Lake Wilson, approximately 137 miles west of the project area. Although the Minnesota Public Utilities Commission (MPUC) has permitted the Lake Wilson Solar Energy Center and its associated BESS, construction has not yet begun. (See Figure 6, Appendix B).

4.2.1 Natural Environment

The natural environment encompasses the overall landscape, including soils, vegetation, and wildlife, along with water and air quality. Describing these resources helps provide a clear understanding of the potential environmental effects of the project.

Geographic Setting

According to the U.S. Geological Survey (USGS) land use classification system, the surrounding area is predominantly agricultural, consisting mainly of row-crop fields planted with corn, soybeans, and pasture, interspersed with scattered rural residences. Within the 104.39 acres of the project area (combined project parcels), approximately 20.23 acres are classified as wetlands and 4.9 acres as open water/watercourse.[84]

According to the Natural Resources Conservation Service (NRCS) Land Resource Region and Major Land Resource Area classifications, the project lies within the northern portion of the Central Feed Grains and Livestock Region, specifically within the Central Iowa and Minnesota Till Prairies area. This landscape is characterized by level agricultural land interspersed with wooded areas, including forests, savannas, prairies, and river floodplains.

The Minnesota Department of Natural Resources (DNR) and the U.S. Forest Service identify the project area under the Ecological Classification System (ECS) as part of the Eastern Broadleaf Forest Province (222), Minnesota and Northeast Iowa Morainal Section (222M), and the Oak Savanna Subsection (222Me). The Oak Savanna Subsection consists of rolling plains and loess-mantled ridges underlain by sandstone, carbonate bedrock, and till. Depth to bedrock generally ranges from less than 100 feet to about 200 feet. Soils in this area are primarily Mollisols and Alfisols, which are fertile, organic-rich soils conducive to agriculture.[85]

---

[84] Midwater Application, Table 6.5-9, 127.

[85] Alfisols and Mollisols are two of the twelve major soil orders under the USDA Soil Taxonomy: Mollisols are soils characterized by a thick, dark, organic-rich surface horizon called a mollic epipedon, which typically forms under grassland

Average annual precipitation in the Albert Lea/Glenville, Minnesota area is variable, ranging from 24 to 50.7 inches, during the 1991-2020 period.[86] These values include rain and snowfall. The growing season lasts approximately 146 to 156 days. Historically, fire was the dominant natural disturbance, shaping the region's upland prairie and oak savanna ecosystems. More recent disturbances include tornadoes, high wind events, and periodic flooding. Pre-settlement vegetation consisted mainly of tallgrass prairie, maple-basswood forest, and bur oak savanna. Today, the predominant land use within this subsection remains agricultural.

Shell Rock River Watershed*:* The Shell Rock River begins at Albert Lea Lake in Freeborn County in south-central Minnesota, just a few miles north of the Iowa border.[87] From there, it flows 113 miles into Iowa before joining the Cedar River. Within Minnesota, the Shell Rock drains a 246-square-mile (160,000-acre) watershed, all of it located in Freeborn County.

The Shell Rock is a headwaters river, meaning its condition affects thousands of people downstream who rely on the Shell Rock, Cedar, Iowa, and Mississippi rivers for recreation and drinking water. The Shell Rock River is designated as a State Water Trail by the Minnesota Department of Natural Resources.[88] Several lakes lie within the Shell Rock River Watershed, among them Pickerel, White, Fountain, and Albert Lea Lakes, are popular destinations for fishing, swimming, and boating. Albert Lea Lake, a shallow 2,600-acre basin, attracts migrating waterfowl each spring and fall, and eagles nest along its shores year-round.[89] Once dominated by prairie and wetlands, the watershed, including the project area, is now largely cropland, extensively drained with field tile and ditch systems. Crop-based agriculture in the area is primarily corn and soybean production.

Wildlife within the watershed includes beaver, mink, muskrat, otter, raccoon, and white-tailed deer, along with leopard frogs and painted turtles. Avian wildlife documented in the watershed includes bald eagles, Cooper's hawks, red-tailed hawks, great horned owls, yellowthroats, and migratory birds including belted kingfishers, great blue herons, mallard ducks, eastern kingbirds, and the spotted sandpiper.[90]

According to the Minnesota Pollution Control Agency (MPCA), the Shell Rock River is impaired by mercury and elevated nutrient (phosphorus) levels from both regulated and non-regulated sources (Table 7).[91] Nearby Salem Creek was also listed as impaired; however, this water body is located approximately four miles from the project area and is not considered further in this

---

vegetation (prairies, steppes, and plains). Alfisols are moderately leached soils that form primarily under deciduous forest or mixed forest vegetation. They are characterized, in part, by a subsurface clay accumulation horizon (argillic or kandic horizon). Both soils are fertile; however, the Mollisol is generally considered to be more fertile than Alfisols. See the USDA Soil Classification website: https://www.nrcs.usda.gov/resources/guides-and-instructions/soil-classification (Accessed on October 28, 2025).

[86] GLISA, "Albert Lea, MN | GLISA," Great Lakes Integrated Sciences and Assessments (GLISA), accessed January 28, 2026, https://glisa.umich.edu/station/albert-lea-3-se/

[87] Minnesota Pollution Control Agency, "*Shell Rock River*," accessed December 1, 2025, https://www.pca.state.mn.us/watershed-information/shell-rock-river

[88] Minnesota Department of Natural Resources, "*Shell Rock River Water Trail*," accessed December 23, 2025, https://www.dnr.state.mn.us/watertrails/shellrockriver/index.html

[89] *Ibid.*

[90] *Ibid.*

[91] Minnesota Pollution Control Agency, "*Shell Rock River*," accessed December 1, 2025, https://www.pca.state.mn.us/watershed-information/shell-rock-river

analysis. Excess phosphorus fuels algae blooms that degrade water quality, harm fish and aquatic insects, and diminish recreational opportunities. The river also experiences other eutrophication-related issues, including low dissolved oxygen, elevated pH, and, at times, high bacteria levels.

Table 7. MPCA Impaired Waters

Water Body Name	AUID	Affected Designated Use	Pollutant or Stressor
Shell Rock River	07080202-501	Aquatic Consumption	Mercury in fish tissue
		Aquatic Life	Nutrients, Dissolved oxygen, Benthic macroinvertebrates bioassessments, Fish bioassessments, Turbidity
Salem Creek	07040004-503	Aquatic Recreation	Fecal coliform
		Aquatic Life	Benthic macroinvertebrates bioassessments, Fish bioassessments

Air Quality Conditions: Air quality conditions are characterized, in part, through the National Ambient Air Quality Standards (NAAQS) and the statewide Air Quality Index (AQI). The NAAQS are federal limits set by the U.S. Environmental Protection Agency to protect public health and the environment from major pollutants like ozone, particulate matter, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead. States must monitor their air and take action to ensure these standards are met.

In Minnesota, the Minnesota Pollution Control Agency (MPCA) operates the statewide air-monitoring network and reports ambient air quality pollutant data to the EPA. If the monitored ambient air quality in a region meets federal ambient air quality standards, the area is considered in attainment with the NAAQS and must continue pollution-prevention practices, typically administered through a facility air quality permit, to maintain clean air. If levels exceed the NAAQS, the area is designated nonattainment, and the MPCA must develop a State Implementation Plan outlining how it will reduce pollution and achieve the required air-quality levels.[92]

According to the MPCA, Minnesota has only one air-quality "nonattainment" area under federal the federal ambient standards, located in Dakota County for lead. All other counties in the state, including Freeborn County, are classified as "attainment/unclassifiable" in the statewide air-quality plan. As a result, Glenville, situated within Freeborn County, is designated as "attainment/unclassifiable" for all six federal criteria pollutants regulated under the National Ambient Air Quality Standards (NAAQS): ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. This classification indicates that the area meets, or is not currently known to violate, federal air-quality requirements and is not a significant contributor to air-quality problems elsewhere. Near-term air-quality readings further support this designation, with daily monitoring showing generally good conditions for pollutants such as $PM_{2.5}$ and ozone.

[92] Under the Clean Air Act (CAA) the terms *attainment* and *compliance* describe different things: attainment refers to whether the air in a region meets federal standards, while compliance refers to whether individual facilities are following the emission limits and requirements in their permits. An area's air can be in attainment even if a facility violates its permit, and a facility can be "in compliance" even if the surrounding area is still in nonattainment. Attainment is formally defined in Section 107(d) as the status of a geographic area relative to the NAAQS. Compliance is referenced throughout the Act, particularly in Sections 113 and 502 (Title V permits), as adherence of sources to emissions limits and regulatory requirements.

The Minnesota Air Quality Index (AQI) program is the state's system for tracking and reporting daily air pollution levels. Using data from monitoring stations around Minnesota, the MPCA translates measurements of pollutants, such as fine particles and ozone, into a simple, color-coded index that shows how clean or unhealthy the air is throughout the state. The MPCA updates this information throughout the day and issues alerts when conditions may harm sensitive groups such as children, older adults, or people with heart and lung conditions. The program helps residents make informed choices about outdoor activity while guiding the state's efforts to protect public health and improve air quality.[93]

Data collected by the MPCA for their Air Quality Index program indicates that air quality in the area is generally good to moderate; however, wildfire smoke days has affected the AQI statewide, including Glenville.[94]

4.2.2 Constructed Environment

The constructed environment refers to all human-made or human-modified surroundings that provide the setting for human activity. It includes the proposed project, along with other physical structures, infrastructure, and spaces developed, altered, or maintained by people. This can include: buildings and facilities; roads, bridges, and transportation systems; utilities such as water, sewer, and energy infrastructure; urban and suburban developments; and, landscaped or engineered outdoor spaces (parks, plazas, drainage systems).

In environmental review or planning contexts, the constructed environment is typically contrasted with the natural environment, highlighting the difference between human-built features and natural ecological systems. Midwater reviewed the MPCA "What's in my neighborhood" database and found 21 mapped records within one mile of the project area which included the following:[95]

- 5 Construction stormwater sites
- 5 Feedlot sites
- 3 Petroleum remediation, leak sites
- 3 Underground storage tank sites
- 2 Site assessment sites
- 1 Aboveground storage tank site
- 1 Hazardous waste site
- 1 Aboveground storage tank site
- 1 Wastewater, municipal NPDES/ State Disposal System (SDS) permit.

The sites identified above, along with utility and related elements of the constructed environment are reviewed in this chapter

[93] Minnesota Pollution Control Agency, "Understanding the Air Quality Index (AQI)," accessed December 1, 2025, https://www.pca.state.mn.us/air-water-land-climate/understanding-the-air-quality-index-aqi
[94] Minnesota Pollution Control Agency, "Minnesota Air Quality Index," accessed December 1, 2025, https://data.pca.state.mn.us/views/Minnesotaairqualityindex/AQIExternal?%3Aembed=y&%3AisGuestRedirectFromVizportal=y
[95] Midwater Application, Section 6.2.5.1, 74.

Utility-related Infrastructure

Several existing transmission lines connect to the Glenworth substation:

- Glenworth to Hayward 161 kV line (north–south)
- Glenworth to Worth County 161 kV line (north–south)
- Glenworth to Tap 162862 69 kV line (east–west)
- Glenworth to Tap 170811 69 kV line (east–west)
- Freeborn Wind Farm to Glenworth HVTL (southeast direction)

All of these transmission lines terminate through their connection at the ITC Midwest Glenworth Substation. The proximity of the substation allows for a short overhead HVTL (approximately 2,668 feet) connecting the proposed project substation to the Glenworth substation (see Figure 6).

The Glenworth substation, the proposed project interconnection, was constructed in early 2010 and entered service in 2011. The 161 kV portion of the station was built to a minimum 2000-A standard, although individual equipment ratings vary. The 161/69-kV transformer is rated at 158 MVA (summer normal) and 180 MVA (summer emergency). The 69 kV section of the station is owned by Dairyland Power Cooperative.

Industry

The built environmental setting is dominated by agricultural support-related activities and agricultural processing. Nearly all industrial operations hold several environmental permits and are subject to ongoing, routine inspections by local and state regulators.

- POET Bioprocessing – Glenville: The POET Bioprocessing – Glenville facility (POET) is located at 15300 780th Ave, Albert Lea, (near Glenville, MN) and produces 48 million gallons of bioethanol annually. POET creates bioethanol from locally-grown corn and additionally produces high-protein Distillers Dried Grains with Solubles (DDGS), and Carbon Dioxide (CO_2), relying primarily on truck and rail (Union Pacific) for raw material transport and finished product distribution. Air, water, storage tanks, and hazardous waste are managed through POET's environmental permits.[96] POET is a large quantity groundwater consumer and holds a Minnesota Department of Natural Resources groundwater appropriation permit for three high-yield wells.[97]
- Chevron Renewable Energy Group – Biodiesel: The Albert Lea biodiesel production facility is located in southeastern Minnesota. The multi-feedstock refinery produces approximately 30 million gallons of high-quality biodiesel per year. The facility began operations in 2005 and received multi-feedstock technology upgrades in 2013. It has a nameplate capacity of 30 million gallons per year (mmgy) and relies on a combination of low and high free fatty acid

[96] The following environmental permits, issued by the Minnesota Pollution Control Agency, are held by the facility: Tanks (TS0055837-001 and TS0055837); Air permit (04700055); Water quality discharge permit (SIU000254 and MN0065692); Hazardous Waste (MNR000111336 - Very small quantity generator); Pollution Prevention (56007GRRSR1MILE); and, Industrial Stormwater (A00002701).

[97] As of June 26, 2018, the facility holds a Minnesota Department of Natural Resources Water Appropriation Permit (1998-5102) for three wells with a withdrawal limit of up to 242 million gallons of water per year.

feedstocks. The facility uses both truck and rail (Union Pacific) for load transport. The facility holds several environmental permits.[98]

- Former Peavey Company – Glenville Elevators A & B: The former Peavey Company – Glenville Elevators A & B were used to receive, store, dry, clean, and ship grain. Currently, Agra Resources owns the former Peavey elevators.

Municipal Details and Infrastructure

- City of Glenville: The City of Glenville was initially platted as Shell Rock in 1856, once rail service was developed, the city name was changed to Glenville per the railroad executives.[99] The city has a total area of 1.18 square miles (1.12 square miles is land, with 0.06 square miles are water).[100] According to the United States Census Bureau, Glenville currently maintains a population of 568.[101] The city is served by a municipal wells, electrical service through the Freeborn-Mower Coop, and MN Energy Resources as the natural gas provider. Municipal solid waste is managed by private haulers. Municipal wastewater is managed through the Glenville Wastewater Treatment Facility. The City of Glenville, Minnesota, sources its drinking water from groundwater wells that draw from the Cedar Valley Group aquifer (Well #1 - Unique Well ID: 241980; Well #2 – Unique Well ID: 217116).[102] Well #1 was drilled in 1953 to a depth of 265 feet, while Well #2 was drilled to a depth of 370 feet.[103] According to the Minnesota Department of Health, both wells are classified as "Not vulnerable."[104]

  The water supply is managed by the City of Glenville and is subject to monitoring and testing to ensure it meets state and federal standards. A 2016 Source Water Protection Plan inventory has identified a buried sewer line and an operating well as potential contaminant sources within 200 feet of the well, which are managed to protect the water source.[105] Private wells serve domestic use throughout the project area.[106]

---

[98] The facility currently holds the following Minnesota Pollution Control Agency permits: Air quality permit (04700061), a water quality discharge permit (SIU000257), and stormwater permits (Industrial: MNRNE38LG; Construction: C00058213). Hazardous Waste (MNS000115485 - Small quantity generator); Pollution Prevention (56007SYMRX15278); and, Tanks (TS0125473, 123782, TS0123782).

[99] Warren Upham, *Minnesota Geographic Names: Their Origin and Historic Significance.* (St. Paul, Minnesota Historical Society, 1920). 201; see also "*History of Freeborn County Communities*," *Genealogy Trails*, accessed October 30, 2025, https://genealogytrails.com/minn/freeborn/history_communities.html

[100] U.S. Census Bureau, "Gazetteer Files: Places - National," archived January 12, 2012, accessed November 4, 2025, https://web.archive.org/web/20120112090031/http://www.census.gov/geo/www/gazetteer/files/Gaz_places_national.txt

[101] U.S. Census Bureau, "Decennial Census," accessed November 4, 2025, https://www.census.gov/programs-surveys/decennial-census.html

[102] Minnesota Department of Health (MDH), Glenville – Source Water Assessment, accessed November 4, 2025, https://swareport.web.health.state.mn.us/SWA_Factsheet.html?pwsid=1240010

[103] *Ibid.*

[104] *Ibid.*

[105] *Ibid.*

[106] Midwater noted that "There are 18 domestic wells, one sealed environmental bore hole, one test well within one mile of the Project Area. The wells were drilled to depths ranging from about 15 to 160 feet. The DNR depth to water table map indicates most of the Project Area has a depth to water table of 0–10 feet with isolated areas of 10–20 feet." Midwater Application, Section 6.5.3.2, 115.

- Glenville Municipal Wastewater Treatment Facility: The Glenville Wastewater Treatment Facility (WWTF), is located at 221 Main Street West, Glenville, Minnesota, approximately one mile west of the project area (See Figure 6). The WWTF primarily processes wastewater from sewage and was built in the early 1990's. It includes a lift station, about 5,000 feet of 8-inch forcemain, and a three-cell stabilization pond system discharging to Freeborn County Ditch No. 16. Facilities that discharge directly to surface water require a National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) permit, whereas those that do not may require an SDS permit. The WWTF holds an NPDES/SDS permit (MN0021245).

  The system is designed for an average wet weather flow of 130,000 gallons per day with a five-day Biological Oxygen Demand (BOD_5) of 184 mg/L, in addition to limits for nitrogen compounds, phosphorus, and Total Suspended Solids (TSS). The primary ponds have surface areas of 5.06 and 5.21 acres, and the secondary pond is 4.08 acres; there are no known bypass points.

  Any WWTF modifications that increase pollutant loading or degrade surface waters are subject to Minnesota's antidegradation rules.[107] The permit also complies with anti-backsliding requirements,[108] meaning existing, stricter effluent limits must be maintained unless federal law allows less stringent limits.[109]

- Former Glenville Dump: The Glenville Dump (SA0007546) was a four-acre waste disposal operation located in the northeast quarter of the northeast quarter of Section 7, Shell Rock Township. The facility began operation in 1950 and ceased operation in 1974.[110] An early inspection report revealed that the site was situated within a marsh, tideland, or floodplain area, with the Shell Rock River located nearby. The dump operated as an unlined facility utilizing typical "burn and cover" waste management practices. It accepted an estimated 5,000 cubic yards of waste annually, including household, industrial, institutional, commercial, and agricultural materials, though no other details were available. The site operated daily, without access restrictions or disposal fees, and was located approximately one-quarter mile from the nearest residence. Upon closure in 1974, the facility was covered with approximately two feet of compacted fill material.[111]

  The Minnesota Pollution Control Agency (MPCA) conducted a statewide assessment of closed dump sites to evaluate potential risks to human health and the environment. This evaluation included review of available documentation, regulatory filings, and onsite assessments for locations identified as potentially concerning. The Glenville Dump was not classified as a high-risk site under the MPCA assessment.

[107] Minn. R. 7050.0250–7050.0335

[108] Minn. R. 7053.0275

[109] Clean Water Act §402(o)

[110] U.S. Department of Health, Education, and Welfare – Public Health Service, *Community Solid Waste Practices: Land Disposal Site Investigation Report for the Glenville Dump, Glenville, Minnesota*. Completed by Don Perwein, P.E., Minnesota Pollution Control Agency, August 30, 1968.

[111] Minnesota Pollution Control Agency, Division of Solid Waste, Disposal Site Closure Record, August 7, 1974.

Based on available information, including findings from the 2001 MPCA report, the Glenville Dump was not carried forward for additional investigation as it did not appear to be a source of groundwater contamination.[112]

- Commercial and Wholesale Petroleum Facilities: Eleven facilities currently operate with registered petroleum storage tanks, based on current MPCA records. Six facilities operate with registered above ground petroleum storage tanks (Freeborn County Garage/shop; Glenville Emmons High School; Knutson Oil Co Glenville Bulk Plant; Land O Lakes Ag Center; Magellan Pipeline Co LP - Albert Lea; and, US West/Quest), and five facilities with active, registered underground storage tanks (Former Big Jims Service; Freeborn County Garage/shop; Glenville Emmons High School; Glenville Shortstop; and Grove Properties).

  Petroleum related releases are typically a result of leaks due to the end of the tank service life, common to both above and underground tank systems.[113] In situations where a leak or release is expected, the MPCA will require a site assessment and, if needed, petroleum remediation. Seventeen sites in the project area have undergone site investigation and assessment because of petroleum releases, with eleven sites requiring petroleum remediation.

Livestock Production Operations

Seven livestock operations. registered with the Minnesota Pollution Control Agency (MPCA), are located in the southwest portion of the project area.[114] The livestock operations are primarily beef and dairy cattle; however, bison, horse, and sheep are also present within the project area, for a total of approximately 660 animals. Livestock waste is managed through land application on fields used for agricultural production primarily within the Shell Rock River Watershed, specifically, within the County Ditch 16 subwatershed.

Transportation

The area is served by several state and local highways and roads, including US Highway 65, which runs parallel to the City of Glenville, and the proposed project, which has an annual average daily traffic[115] (AADT) of 2,953 two-way trips (Monitor ID 1635). Based on the USDOT analysis, the US

---

[112] Minnesota Pollution Control Agency, "*Dump Assessment Study: A report to the Minnesota Legislature on the screening and assessment of Minnesota's 1,800 old dumps."* (Saint Paul, MN: Minnesota Pollution Control Agency, 2001).

[113] For a typical underground petroleum tanks in Minnesota, users can expect around 20–30 years of service under normal conditions. Older or poorly maintained tanks may fail in 15 to 20 years; modern, well-maintained systems might last 30 to 40 years. However, tank longevity is far from guaranteed, and risk increases significantly with age, soil conditions, and maintenance history. For a typical above-ground petroleum fuel tanks properly installed and maintained in Minnesota, it's reasonable to expect 20 to 30 years of reliable service. With careful material selection, corrosion prevention, and compliance with inspection/maintenance regulations, many tanks might safely operate for 30 to 40 years (or slightly more in some cases).

[114] The MPCA regulates livestock operations greater than 10 animal units (AU). See Minn. R. 7020.

[115] Annual Average Daily Traffic (AADT) is a standard traffic engineering metric used to quantify how busy a road is throughout the year. AADT is measured for a specific portion of road, typically between intersections or other defined points. It represents the total number of vehicles traveling on a specific road segment over the course of a year, divided by 365 days. AADT is an average, which smooths out daily and seasonal fluctuations, meaning some days are busier (e.g., weekdays, harvest season) and some slower (e.g., weekends or holidays). It includes all vehicle types (cars, trucks, motorcycles, and others) traveling on that particular segment. U.S. Highway 65 data was accessed from https://mndot.public.ms2soft.com/TDMS.UI_Core/trafficviewer (November 17, 2025).

Highway 65 AADT is considered low for a rural highway or US Route. Rail service is a substantial presence on the landscape, with the Union Pacific rail running paralleling US Highway 65 (west side) as it passes through the Glenville area, including the project area. This segment of the Union Pacific rail services 15 to 20 trains a day; however, this number may vary due to seasonal demands and market fluctuations.[116]

4.2.3 Social and Cultural Environment

The social and cultural environment refers to the human-related conditions, communities, and cultural resources that may be affected by a proposed project. The social and cultural environment is evaluated as part of the environmental review process to:

- Determine whether a project could affect community well-being, heritage, or identity
- Identify project effects and determine impacts on historically significant properties under laws like the National Historic Preservation Act
- Ensure that minority or disadvantaged populations are not disproportionately affected
- Support decision-making that balances infrastructure needs with social and cultural preservation

The project area, including the City of Glenville, features a variety of social and cultural activities with notable gathering places, including the Glenville-Emmons High School, the Glenville Senior Citizens, Inc., building, and the Glenville Legion. Two faith communities, the First Lutheran Church (founded 1910) and the Glenville United Methodist Church (founded 1875) serve Glenville residents and have been active for in the area for a century. Aside from typical holidays, the city also holds an annual celebration, typically in August, known as Glenville Days, organized by the Glenville Community Boosters.

The estimated 2024-2025 population of the City of Glenville is between 539 to 558 people, with a median age of 44.2 years, and a median income of $53,750.[117] The population features an annual rate of change reported as -0.2%.[118] According to the State Demographer, “The largest Glenville racial/ethnic groups are White (87.4%) followed by Hispanic (5.9%) and Other (4.9%).”[119]

Hunting and fishing opportunities surround Glenville, with many residents and visitors taking advantage of the abundant resources. The importance of these activities is often framed in terms of land use and recreation; however, the Minnesota Constitution explicitly identifies them as integral to the state’s heritage and culture.[120] The social component is recognized through community participation and group activities involved with hunting and fishing.

---

[116] Personal Communication, Kelly O’Brien, Union Pacific Railroad, December 3, 2025.
[117] Glenville Demographics, “Minnesota Demographics,” accessed December 12, 2025, https://www.minnesota-demographics.com/glenville-demographics
[118] *Ibid.*
[119] *Ibid.*
[120] Minnesota Constitution, Article XIII, Sec. 12. [Adopted, November 3, 1998]

4.3 Human Settlement

Large energy projects can significantly influence the features and character of human settlements. The EA evaluates these effects, which include, but are not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services.[121] *Displacement* refers to whether individuals or communities would need to relocate or otherwise be removed. *Noise* impacts are assessed based on state noise standards and reflect how sound affects existing communities. *Aesthetic* and *visual* effects, such as changes to views, scenic quality, and neighborhood character, are also evaluated under the human settlement factor, along with *socioeconomic* effects on property values, community services, and local economies. This factor further considers *public service* effects, including potential demands on or changes to infrastructure (e.g., roads, utilities, schools, emergency services), as well as *public health and safety* impacts on nearby residents' well-being. The assessment also examines how the project may alter *cultural* and *recreational* uses of the affected land.

4.3.1 Aesthetics

The ROI for aesthetics is the project area. The project will introduce new manmade structures into the existing landscape. Portions of the project will be visible from US Highway 65, and by those that use the Shell Rock River for recreational purposes. For most people who pass through the project area on US Highway 65 or the Shell Rock River, the project effect on aesthetics under typical or atypical operating scenarios is expected to be *negligible* to *minimal*. For individuals with greater view exposure, such as people who live in the project area, the effect is anticipated to be minimal. Project effects will be short-term (construction) and long-term (operation), though all effects will be localized. Potential project effects are unavoidable but can be mitigated in part.

Aesthetics refers to the visual quality of an area as perceived by the viewer, shaping their impressions and perspectives, often influenced by personal values, past experiences, and any existing connection to the area. The extent to which aesthetic changes are noticed or felt depends on an individual's sensitivity to landscape changes, their connection to the viewshed, and their exposure to the viewshed asset. As a result, the experience of landscape changes can differ significantly from one person to another.

A viewshed includes the natural landscape and built features visible from a specific location. Natural landscapes can include wetlands, surface waters, distinctive landforms, and vegetation patterns. Buildings, roads, bridges, and power lines are examples of built features.

Viewer exposure refers to variables associated with observing a viewshed, and can include the number of viewers, frequency and duration of views, and view location. For example, a high exposure viewshed would be observed frequently by large numbers of people. These variables, as well as other factors such as viewing angle or time of day, can affect the aesthetic impact.

The existing project area landscape is shaped by the Shell Rock River, dominated by rural and agricultural land uses, with generally flat terrain outside the Shell Rock River channel. Agriculture is generally row crop fields of corn, soybeans, and related crops (i.e., hay, small grains).

---

[121] The EA Human Settlement analysis is guided by Minn. R. 7850.4100(A) (2025). This portion of the rule considers "effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services"

The built environment near the project area is described in Chapter 4.2 and includes the city of Glenville and related infrastructure, roads and rail service, industrial operations, and transmission and distribution lines. There are seven residences or farmsteads within the project area (Table 8).

There are no residences or businesses within the area of site control; however, there are two residents within 1,000 feet of the area of land control. The closest resident is located approximately 980 feet to the north of the Midwater facility development area, while the second is located approximately 365 feet north of the proposed HVTL facility.[122] In addition to nearby homes, Shell Rock State Wildlife Management Area is located approximately 412 feet southwest of the southern BESS fence line.[123]

Potential Impacts

The visible elements of the facility will consist of approximately 150 to 200 new BESS enclosures, a fenced area of approximately 16.6 acres, a project substation, up to four new transmission structures, new stormwater ponds, and potentially a new O&M building.[124] Most components of the BESS will be finished in non-descript, neutral colors, with the majority standing at less than ten feet in height.[125] The new 10-foot chain link fence will include neutral-colored, non-reflective opacity strips, and will be topped by barbed wire.[126] The fence will surround the facility. The project substation is anticipated to be less than 50 feet tall and will be located adjacent to the existing ITC Midwest Glenworth Substation.[127] BESS enclosures will be approximately ten feet in height and will have limited visibility from surrounding locations due to existing vegetative screening.[128]

The project will convert approximately 17 acres from agricultural use into a BESS facility. Although the change will be noticeable, it is similar in appearance to existing electric substations in the project area. Thirteen locations within a quarter mile of the project area may experience visual impacts, including seven residences, two roads, one railroad, one water trail, and two public lands. (See Table 8 and Figure 7. Proximity of Locations to the Project, Appendix B). The seven residential locations would experience long-term exposure to the change in viewshed, while the remaining locations reflect short-term exposure opportunities.

---

[122] Midwater Application, Section 6.2.1, 64.
[123] Midwater Application, Table 6.2-1, 64-65.
[124] Appendix D, Information Request 5.
[125] Midwater Application, Section 6.2.1.1, 65.
[126] Appendix D, Information Request 2.
[127] *Ibid.*
[128] *Ibid.*

Table 8. Proximity of Locations to the Project

Location	General Location	Distance to Proposed BESS Facility Development Area (Feet)	Distance to BESS Facility (Feet)	Distance to HVTL Facility (Feet)
1	**Residence**: Located to the east along River Road. This residence is surrounded by vegetation and has several outbuildings screening the view of the project.	1,441.0	1,840.3	2,919.5
2	**Residence:** Located to the east along River Road. This residence has vegetation on its west side screening the view of the project	982.0	1,347.7	2,348.2
3	**Residence:** Located to the east along River Road. This residence has vegetation on its west side screening the view of the project.	1,364.2	1,678.7	2,555.7
4	**Residence:** Located to the north along U.S. Highway 65. This residence has vegetation on its south side screening the view of the project.	1,865.6	2,631.2	364.8
5	**Residence:** Located to the north along River Road. This residence has substantial vegetation on its south side screening the view of the project.	2,384.9	2,618.2	1,742.0
6	**Residence:** Located to the north along River Road. This residence has substantial vegetation on its south side screening the view of the project.	2,080.9	2,379.4	1,447.2
7	**Residence:** Located to the northeast along River Road. This residence has substantial vegetation on its south side screening the view of the project.	1,510.6	1,623.9	1,921.4
8	**Road:** Located along the southwestern border of the Project Area. This road is partially screened from the BESS Facility by vegetation.	323.8	459.4	877.3
9	**Railroad:** Located along the southwestern border of the Project Area. This railroad is partially screened from the BESS Facility by vegetation.	397.1	560.8	913.6
10	**Road:** Located northeast of the Project Area. This road is substantially screened from viewing the Project by existing vegetation.	1,138.1	1,406.3	2,227.0
11	**Water Trail:** Located to the south and east of the Project Area. The Shell Rock River is screened partially or substantially from viewing the Project by vegetation.	149.3	228.7	898.2
12	**Protected Areas Database of the United States (PADUS)/Public Land**: Located to the southwest of the Project Area. The Shell Rock State Wildlife Management Area is substantially screened from viewing the Project by vegetation.	411.6	580.1	922.3
13	**PAD-US/Public Land:** Located to the south of the Project Area. This Marginal Cropland – Limited is substantially screened from viewing the Project by vegetation.	627.3	784.7	1,913.9

The existing topography of the project area and surrounding landscape is generally flat, allowing for long viewsheds that are primarily interrupted by existing vegetation. Rows of trees and shrubs provide substantial visual screening from U.S. Highway 65 to the southwest of the project area. Views of the project area from the Shell Rock River to the south and east are also partially to substantially screened by existing vegetation.

For residents outside the project vicinity and for others with low viewer exposure, such as travelers along U.S. Highway 65, project effects on aesthetics are anticipated to be minimal.

Exterior security lighting will be installed at the project substation. Switch activated lights will be located at each BESS enclosure to allow for maintenance and repair. As cameras installed at the gates and along the fence line will be used, Midwater does not plan to install lighting at gates or along the fence line. Impacts to light-sensitive land uses are not anticipated given the rural project location and the minimal required lighting for operations.

Mitigation

Minimizing the aesthetic impact from energy storage facilities is primarily accomplished by locating the facilities so that they are not immediately adjacent to homes, ensuring that damage to natural landscapes during construction is minimized, and shielding the facilities from view by terrain or vegetation. In addition to the existing vegetation, Midwater will also develop a three-tiered vegetative buffer around the BESS site.[129] Impacts from facility lighting can be minimized by using shielded and downward facing light fixtures and using lights that minimize blue hue.

The Draft Site Permit (DSP) (Appendix C) includes the following conditions to address project impacts to aesthetics:

- Section 4.3.8 requires the permittee to consider landowner input with respect to visual impacts and to use care to preserve the natural landscape.
- Section 5.1 is a special condition requiring the permittee to minimize lighting impacts by using shielded and downward facing light fixtures and using lights that minimize blue hue.
- Section 5.2 is a special condition based on the ATF Report that requires the permittee to install three distinct rows of planting buffers surrounding the security fence. Plants would be chosen from compatible, local species and approved by the Freeborn County Office of Environmental Services for environmental impact and adhere to ITC Midwest's standards for power line clearance. Additionally, the chain-link fence will include opacity strips.

Aesthetic impacts can also be mitigated through individual agreements with neighboring landowners (sometimes referred to as good neighbor agreements). Such agreements are not within the scope of this EA.

4.3.2 Noise

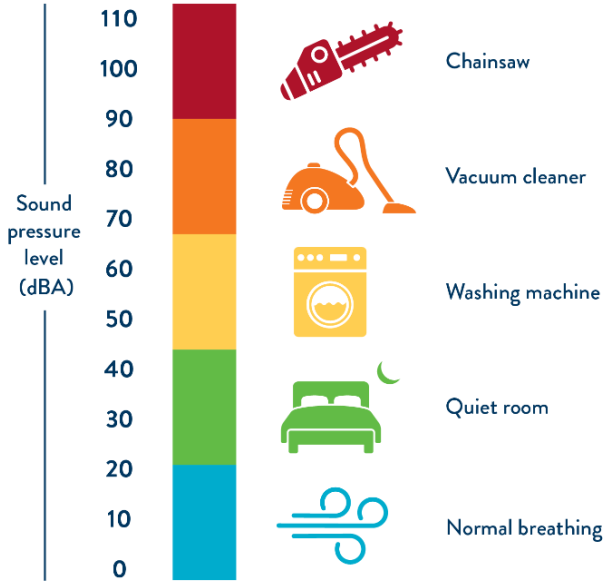
The ROI for noise is the project vicinity and includes potential human health impacts as well as wildlife. Distinct noises are associated with the different phases of project construction. The impact level during construction will range from *negligible* to *significant* depending on the activity and facility operating scenario. Potential impacts are anticipated to be intermittent and short-

[129] Appendix D, Information Request 2.

term. These localized impacts may affect nearby residences and might exceed state noise standards. Impacts are unavoidable but can be minimized. Operational impacts are anticipated to be *negligible*.

Noise can be defined as any undesired sound. It is measured in units of decibels on a logarithmic scale. The A-weighted scale ("dBA") is used to duplicate the sensitivity of the human ear.[130] A three dBA change in sound is barely detectable to average human hearing, whereas a five dBA change is clearly noticeable. A 10 dBA change is perceived as a sound doubling in loudness. Noise perception is dependent on a number of factors, including wind speed, wind direction, humidity, and natural and built features between the noise source and the receptor. Figure 8 provides decibel levels for common indoor and outdoor activities.[131]

Figure 8. Common Noise Levels



In Minnesota, noise standards are based on *noise area classifications* ("NAC") corresponding to the location of the listener, referred to as a receptor. NACs are assigned to areas based on the type of land use activity occurring at that location. Household units, designated camping and picnicking areas, resorts and group camps are assigned to NAC 1; recreational activities (except designated camping and picnicking areas) and parks are assigned to NAC 2; agricultural and related activities are assigned to NAC 3. A complete list is available at Minn. R. 7030.0050.

Noise standards are expressed as a range of permissible dBA over a one-hour period. L_{10} may be exceeded 10 percent of the time, or six minutes per hour, while L_{50} may be exceeded 50 percent of the time, or 30 minutes per hour. Standards vary between daytime and nighttime hours. There is no limit to the maximum loudness of a noise. Table 9 provides current Minnesota noise standards.

[130] Minnesota Pollution Control Agency (MPCA), "A Guide to Noise Control in Minnesota" (St. Paul, MN: MPCA, 2015), accessed October 31, 2025, https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf

[131] Federal Aviation Administration, "Fundamentals of Noise and Sound," February 9, 2018, accessed October 31, 2025, https://www.faa.gov/regulations_policies/policy_guidance/noise/basics/.

Table 9. Noise Area Classifications (dBA)

Noise Area Classification	Daytime (7:00 a.m. to 10:00 p.m.)		Nighttime (10:00 p.m. to 7:00 a.m.)	
	L_{10}	L_{50}	L_{10}	L_{50}
1	65	60	55	50
2	70	65	70	65
3	80	75	80	75

The MPCA noise standards are public health standards. That is, they protect people from noise generated by all sources at a specific time and place. The total sum of noise at a specific time and location cannot exceed the standards. The MPCA evaluates whether a specific noise source is in violation by determining if the source "causes or significantly contributes" to a violation of the standards.

Potential Impacts

A predictive noise model evaluated project and total noise at sensitive receptors within 3,200 feet of the project boundary, comparing results to Minnesota nighttime noise limits because BESS facilities may operate continuously. The primary noise receptors are the local residences, which are designated using the letter "R" on the noise modeling receptor map.[132] Though not explicitly designated in the modeling, noise receptors could also include individuals working outside in the project vicinity. The proposed project is in a rural, agriculturally dominated area and is near a railroad and US Highway 65. Potential noise impacts from the project are associated with construction noise and operational noise. Based on the modeling assumptions, Midwater modeled compliance with the Minnesota night time noise limits.[133]

Construction Phase Impacts

The project will create intermittent noise during construction (e.g., heavy equipment operations, backing alarms, etc.), and the resulting noise impacts will be temporary. Additionally, project construction noise will likely be similar to noise emitted from existing farm operations in the area and vary from day to day. Midwater will mitigate noise impacts by limiting construction to daytime hours to the extent practicable and ensuring that equipment/vehicles are operated with properly functioning mufflers and noise-control devices.[134] The noise from construction activities would dissipate with distance and be audible at varying decibels, depending on the locations of the equipment and receptor. Under an accident scenario, noise would be similar to those experienced during construction.

[132] Midwater Application, Appendix E (Appendix C, Figure 1).
[133] Midwater Application, Section 6.2.6.2, 84.
[134] Midwater Application, Section 6.2.6, 85.

Typical and Atypical Operating Scenario Impacts

Noise levels during operation of the project are anticipated to be negligible. Modeled results are found in Appendix B, Table 10. Modeled Noise Impact by Receptor and Figure 9. Modeled Noise Impacts

The BESS as designed and modeled using integrated BESS containers with an emitting sound power level of 87 dBA at the source, is predicted to comply with the 50 dBA nighttime noise limit for NAC-1 receptors without mitigation. If final equipment exceeds 87 dBA as a noise source, noise mitigation, such as noise walls, silencers, barriers, or operational limits, may be required, and an additional noise study would be conducted. Midwater will be required to comply with Minnesota noise regulations at all times. The HVTL is expected to produce negligible noise impacts. Under normal conditions it should be inaudible, and during rainy or foggy periods, ambient noise is expected to exceed any corona-related noise. Nearby residences are not expected to experience noticeable noise impacts.[135] As a result, no mitigation measures are proposed for the HVTL.

Wildlife Impacts

Facility noise impacts on wildlife and ecosystems were discussed at the April 7, 2025, Glenville public meeting and also reviewed by the ATF.[136] Noise is recognized as a stressor that may disrupt breeding, foraging, or migration; cause avoidance of habitat; and affect sensitive or rare species. It can also interfere with nesting, mating, or denning, potentially displacing wildlife from critical habitats.[137]

In Minnesota, however, noise impacts on wildlife are typically assessed qualitatively through environmental review and conservation statutes, rather than being regulated by specific noise limits. Mitigation is tailored to species sensitivity, habitat type, and timing, rather than compliance with a fixed decibel standard. Minnesota Rule 7030.0050 noise regulation applies to protect human receptors, not wildlife or habitat. For example, areas such as the Shell Rock River Wildlife Management Area (WMA) could be evaluated further to explore potential noise impacts; however, such an evaluation would have to include the existing noise conditions, especially the Union Pacific railroad, a transportation route that is more than a century old, and currently features between 15 and 20 trips a day (See Chapter 4.2). If needed, based on the findings of a wildlife noise impact study, mitigation measures may include seasonal construction limits, setbacks, and habitat buffers.

Mitigation

If the selected BESS units have a maximum sound power level of 87 dBA or less, the project is expected to comply with Minn. R. 7030 nighttime limits without additional mitigation. Compliance depends on selecting integrated BESS units rated at or below this level. If equipment exceeds 87 dBA, additional noise mitigation, such as silencers, layout changes, noise barriers, or operational

[135] Midwater Application, Section 6.2.6.3, 84-86.

[136] April 7, 2025, Glenville, Minnesota, Midwater Scoping Meeting, eDocket 20254-218333-01; Midwater Citizen Advisory Task Force Report eDocket 202511-224951-01.

[137] See Cameron Albert Duquette, Scott R. Loss, and Torre J. Hovick, "A Meta-Analysis of the Influence of Anthropogenic Noise on Terrestrial Wildlife Communication Strategies," *Journal of Applied Ecology* 58, no. 5 (2021): 1112–1121., and, Masato Senzaki, Taku Kadoya, and Clinton D. Francis, "Direct and Indirect Effects of Noise Pollution Alter Biological Communities in and Near Noise-Exposed Environments," *Proceedings of the Royal Society* B 287 (2020): 20200176.

limits, will be required. The type and extent of mitigation will depend on final equipment selection, and further analysis with an updated noise study would be necessary after final design.

The Draft Site Permit (DSP) includes the following noise-related conditions (Appendix C):

- Section 4.3.7 is a standard condition that requires the permittee to comply with noise standards established under Minnesota noise standards as defined under Minn. R. 7030.010 to 7030.0080, and to limit construction and maintenance activities to daytime hours to the extent practicable.
- Section 5.3 is a special condition that requires the permittee to file a pre-construction noise modeling and impact assessment summarizing results from noise propagation modeling using the selected equipment and final layout prior to construction of the facility. This condition also requires the permittee to file an updated noise impact assessment prior to modifying the permitted facility.
- Section 5.4 establishes a special condition requiring the Permittee to conduct post-construction baseline noise testing after consulting with the Minnesota Department of Natural Resources (DNR) regarding the potential effects of site-generated noise on nearby wildlife, based on input from local DNR staff. This section also clarifies that the project must operate in continuous compliance with Minnesota Pollution Control Agency (MPCA) noise standards and that the Permittee may be required to modify the design or operation of the facility as necessary to achieve and maintain compliance with those standards or reduce noise impacts to wildlife based on DNR consultation.

4.3.3 Cultural Values

The ROI for cultural values is the project area. Development of the project will change the character of the area, potentially changing residents' sense of place. There are tradeoffs for rural communities between renewable energy projects and retaining the rural character of an area. Construction and operation of the project is not anticipated to impact or alter the work and leisure pursuits of residents in the project area in such a way as to impact the underlying culture of the area.

Cultural values can be defined as shared community beliefs or attitudes that define what is collectively important to the group. These values provide a framework for individuals and community thought and action. Infrastructure projects believed inconsistent with these values can deteriorate community character. Those found consistent with these values can strengthen it. Projects often invoke varying reactions and can, at times, weaken community unity.

Individual and community-based renewable energy is becoming more valued across the nation. Utility scale renewable projects, generally located far from load centers in rural areas, are also valued, but, at times, opposed by residents. The highly visible, industrial look and feel of these projects can erode the rural feeling that is part of a residents' sense of place.

Cultural values can be informed by ethnic heritage. Residents in the project area derive primarily from European ancestry. Cultural values are also informed by work and leisure pursuits, for example, farming and snowmobiling, as well as land use, such as agricultural cropland. Community events in the project area are usually tied to geographic features, seasonal/municipal events, and national holidays. A description of the City of Glenville is provided in Chapter 4.2.

The Freeborn County General Land Use Plan strives to balance the growth in the area with preservation of natural and scenic resources by concentrating urban and suburban development, maximizing efficiency of resource use, preserving the natural and cultural resources that provide a sense of place of the county, ensuring that growth. The comprehensive plan seeks to locate utilities to minimize potential aesthetic, public health or welfare impacts, including those to property.[138]

Potential Impacts

Construction and operation of the project is not anticipated to impact or alter the work life and leisure pursuits of residents or visitors in the project area or affect land use in such a way as to impact the underlying culture or community unity of the area.

At the same time, the development of the project may change the character of the immediate area, at least where it is visible. In addition, the project represents a shift in energy infrastructure by introducing storage facilities to the landscape. The value residents put on the character of the landscape within which they live is subjective, meaning its relative value depends upon the perception and psychological responses unique to individuals. Because of this, for some residents, project construction may change their perception of the immediate area's character thus potentially eroding their sense of place. This tension between infrastructure projects and rural character creates real tradeoffs.

Because of the relatively small size of the project and distance from homes, businesses and recreational resource, project impacts to cultural resources and activities are anticipated to be negligible to minimal.

Mitigation

There are no conditions included in the DSP that directly address mitigation for impacts to cultural values. No mitigation is proposed.

4.3.4 Land Use and Zoning

The ROI for land use and zoning impact analysis is the land control area. Though zoning and land use rules are superseded by a Commission permit decision must be guided, in part, by consideration of impacts to local zoning and land use in accordance with the legislative goal to "minimize human settlement and other land use conflicts." Land use impacts are anticipated to be long-term and localized. Although energy storage systems were not specifically addressed in local planning documents or zoning codes at the time of the Midwater application, the proposed facility was generally consistent with local land use ordinances and the Freeborn County's Comprehensive Plan.

Land Use

Land use is the characterization of land based on what can be built on it and how the land is used. Zoning is a regulatory tool used by local governments (cities, counties, and some townships) to guide specific land uses within specific geographic areas. Land cover documents how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types, including wetlands. Construction of the BESS will alter current and future land use and land cover in the land control area. Constructing the project will change land use at the site from

[138] Freeborn County, "Freeborn County General Land Use Plan" (2022), accessed December 4, 2025, https://www.Freeborncounty.gov/sites/default/files/2020-10/Freeborn%20County%20Land%20Use%20Plan.pdf

agricultural to energy storage production for the expected 30-year life of the project. After the project's useful life, the land control area could be restored to agricultural or other planned land uses by implementing appropriate restoration measures. Impacts can be minimized.

The National Land Cover Database provides "spatial reference and descriptive data for characteristics of the land surface" nationwide. The predominant land uses within the project area, as classified by the U.S. Geological Survey, are hay/pasture (41.3%), herbaceous (19.2%), and emergent herbaceous wetlands (19.4%). Smaller portions of the area consist of developed land, open water, crops, and wooded areas. The proposed BESS facility development area is primarily hay/pasture (89.5%). Together, the hay/pasture and herbaceous coverages dominate both the project area and the proposed BESS development area, resulting in largely open spaces interspersed with trees and wooded groves. Emergent herbaceous wetlands in the land control area are present near the Shell Rock River.

Zoning

Zoning is a regulatory tool used by local governments (cities, counties, and some townships) to guide specific land uses within specific geographic areas. During project design preparation, Midwater reviewed the Freeborn County Comprehensive Plan, which serves as a guide for land use decisions within the county. The Comprehensive Plan is closely tied to zoning and subdivision regulations and provides descriptions and intended purposes for various land use types. The project area is situated within the Agricultural District, which is designated to preserve and conserve land for agricultural purposes. As feasible, Midwater has designed the project to align with the goals and policies outlined in the Freeborn County Comprehensive Plan.

Freeborn County has also adopted the 2016–2021 Comprehensive Water Plan. The Comprehensive Water Plan establishes priorities and actions related to water quality, water quantity, and land use conditions that affect land and water resources. Key resources and concerns addressed include aquifers, surface waters (lakes, shorelands, aquatic invasive species, and wetlands), soil and erosion, waste disposal and management (subsurface sewage treatment systems, feedlots, and solid waste), drainage, and municipal wastewater and stormwater. The plan places particular emphasis on agricultural land uses, as approximately 81 percent of productive land in Freeborn County is farmed or used for rotational animal pastures.

Freeborn County is currently undertaking the development and enactment of an ordinance to regulate siting and operation of Energy Storage Systems. Section 26-82 of the draft ordinance provides standards for siting, construction and operation. A copy of the draft ordinance is found in Appendix E with the ATF report. Freeborn County proposes to regulate the installation and operation of commercial energy storage systems with a rated capacity of 40 kilowatts or greater, up to the threshold requiring Public Utilities Commission (PUC) permitting, outside municipal limits. The ordinance aligns with Minn. Stat. § 216B.2422 and Minn. R. 1325.1100. The proposed Freeborn County standards are summarized as follows:

- *Setback Distances* - Under the proposed Freeborn County ordinance, energy storage systems must adhere to specific setback requirements, including 1,320 feet from dwellings (except for owners or municipalities with a waiver), 150 feet from road rights-of-way (with fencing at least 100 feet from roads), 100 feet from wetlands and 103E public drainage systems, and 30 feet from side and rear property lines. Systems cannot be installed within

200 feet of a dwelling. Height restrictions limit battery units and support structures to a maximum of 12 feet, with stacking prohibited unless specifically approved.

- *Site Security* - Fencing and security measures require secure perimeter fencing with gates, warning signs, and 24-hour emergency contact information. Barbed or razor wire is generally prohibited, and fencing plans should minimize impacts on wildlife where feasible.
- *Stormwater Management* - Stormwater and erosion control must comply with MPCA Construction Stormwater Permit requirements, and applicants must obtain recommendations from the affected watershed district.
- *Aesthetics* - Aesthetics and landscaping standards require structures to be white, gray, or otherwise non-obtrusive with matte finishes, and a vegetative buffer consisting of at least three rows of plantings must surround the perimeter fence. The buffer must reach the height of the tallest system component within two years, be maintained by the owner and operator, and include pollinator-friendly ground cover.
- *Signage* - All signage must comply with Freeborn County Code of Ordinances, Chapter 30. Power lines associated with the system, up to 34.5 kV, must be buried, with variances required for aboveground lines. Waste disposal must follow applicable local, state, and federal regulations for solid and hazardous materials.
- *Emergency Services and Fire Prevention* - Energy storage systems must comply with applicable Minnesota and National Electrical Codes and notify the PUC Energy Facilities Permitting Program. Fire safety measures include an automatic fire suppression system maintained and tested twice yearly, a 20-foot non-combustible buffer between batteries and combustible materials, and early detection systems for thermal runaway. Project developers must coordinate with local emergency services and submit project summaries, site plans, and emergency response plans to the Zoning Administrator.
- *PFAS Prohibition* - The use of PFAS chemicals is prohibited, with certification required for all components and replacements.
- *Decommissioning* - In terms of abandonment and decommissioning, a system is considered discontinued if it is inactive for one year unless a reactivation plan is approved, and all unused or defunct equipment must be removed within 30 days.
- *Construction Codes* - All installations must also meet applicable local, state, and federal standards, including the Minnesota Building Code and the National Electric Code.

In addition to the proposed Freeborn County ordinance, Shell Rock Township passed a resolution on April 8, 2025, that expressed its opposition to the establishment of a BESS system in Shell Rock Township. The township premised their resolution on concerns related to chemical leaks and hazardous waste spills, disruption of local wildlife habitats and biodiversity, river, soil, and aquifer contamination, and noise pollution affecting the quality of life.

Potential Impacts

Under Minnesota's permitting framework, the Commission's permitting authority over the Midwater BESS project is not governed or constrained by local land-use plans or ordinances, including the proposed Freeborn County ESS ordinance. However, the Commission may consider

such local plans and regulations as part of its siting analysis and permitting decisions without being legally bound to apply or enforce the proposed Freeborn County Ordinance. The project, as proposed, would not conform with proposed setback distances from water bodies; however, the proposed ordinance also provides for a waiver process.[139] As noted above, the Commission's permitting decisions must be guided, in part, by consideration of local zoning and land use impacts.

The Shell Rock Township resolution, opposing the Midwater project based on public health, safety, and environmental concerns, is not an ordinance. Rather, it expresses the collective opinion, intent, and policy position of the township board's opposition to the project and is not a regulation.

Mitigation

The project would convert approximately 28 acres of cultivated cropland to a BESS. As presented above, the project, as proposed, presents potentially nonconforming actions with the proposed Freeborn County Ordinance. The DSP (Appendix C) has several special permit conditions related to the preservation and restoration of agricultural land, guided by the ATF and the proposed Freeborn County ordinance:

- Section 4.3.22 requires the permittee to avoid damage to drain tile and to repair or replace drain tile if damaged over the project's life.
- Section 5.5 is a special condition that requires the permittee to prepare an AIMP that details methods to minimize soil compaction, preserve topsoil, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use.
- Section 5.6 is a special condition that requires the applicant to prepare a VMP to prevent soil erosion and invests in soil health by establishing a plan to protect soil resources by ensuring perennial cover. Additionally, this section requires a three-tiered vegetative buffer, as part of the applicant's VMP. The applicant's draft VMP is found in Appendix C of the site permit application.
- Section 9.2 requires removal of all project-related infrastructure and restoration and reclamation of the site to pre-project conditions to the extent feasible. The applicant's draft decommissioning plan is found in Appendix D of the site permit application.

These permit conditions mitigate impacts to local zoning by ensuring the project is consistent, to the greatest extent practicable, with Freeborn County's draft energy storage system ordinance.

4.3.5 Property Values

The ROI for property values is the local vicinity. Project effects on property values within the local vicinity could occur. Property value impacts can be measured in three ways: *sale price* (tells you what value the market ultimately assigns), *sales volume* (tells you how active the market is at those values), and *marketing time* (tells you how easily that value is realized). These measures are influenced by a complex interaction of other factors that together help distinguish between

[139] See Proposed Freeborn County Ordinance, Sec. 26-82 (2). (January, 2026).

nominal price changes and true market value shifts, by factoring in liquidity and demand pressures, rather than relying on headline numbers.

Many of these factors are parcel specific, and can include condition, size, acreage, improvements, and neighborhood characteristics; the proximity to schools, parks, and other amenities; and the presence of existing infrastructure, for example, highways or transmission lines. In addition to property-specific factors, local and national market trends, as well as interest rates, can affect all three measures. The presence of a BESS becomes one of many interacting factors that could affect a specific property's value.

The findings from property value studies are generalizable to the Midwater project; however, each landowner has a unique relationship and sense of value associated with their property a landowner's assessment of potential impacts to their property's value is often a deeply personal comparison of the property "before" and "after" a proposed project is constructed. The landowner's judgments, however, do not necessarily influence the market value of a property. Professional property appraisers assess a property's value by looking at the property "after" a project is constructed. Moreover, potential market participants are likely to see the property independent of the changes brought about by a project; therefore, they do not take the "before" and "after" into account the same way a current landowner might. Staff acknowledge this chapter does not and cannot consider or address the fear and anxiety felt by landowners when facing the potential for negative impacts to their property's value.[140]

Potential Impacts

Electrical generating facilities can impact property values. Often, negative effects result from impacts that extend beyond the project location. Examples include emissions, noise, and visual impacts. Unlike fossil-fueled electric generating facilities, the project would not generate emissions. Potential impacts from operational noise are possible but can be mitigated. Aesthetic impacts will occur, but because the project is relatively low in height, especially when compared to a wind turbine or a smokestack, impacts are anticipated to be minimal. The low facility profile, especially with the vegetative barrier surrounding the site, would further localize impacts.

Commission staff relied on a study, *The Impact of Utility-scale Battery Energy Storage System Projects on Property Values in California, Massachusetts, and New York*, for the Midwater project review that assessed property value impacts as a result of a BESS sited in a residential area that included the price metrics described above.[141] Prior to this study, no research systematically evaluated how operational BESS facilities impact surrounding property prices.

The study evaluated whether large battery energy storage systems (BESS) affect the value of nearby homes in California, Massachusetts, and New York during the shift toward clean energy. It is

---

[140] This paragraph is based, in part, on the following: James Chalmers, *High Voltage Transmission Lines and Residential Property Values in New England*, PowerPoint presentation, October 30, 2019, accessed September 18, 2025, https://www.nhmunicipal.org/sites/default/files/uploads/Annual_Conference/2019/Sessions/Wednesday/market_effects_of_utility_rows_presentation-1045am.pdf ; Department of Commerce, *Rights-of-Way and Easements for Energy Facility Construction and Operation*, August 5, 2014, accessed September 18, 2025, https://mn.gov/Commerce/energyfacilities/.

[141] Yixin Gwee, "The Impact of Utility-scale Battery Energy Storage System Projects on Property Values in California, Massachusetts, and New York" (master's thesis, University of Pennsylvania, 2023), accessed December 21, 2025, University of Pennsylvania ScholarlyCommons. https://repository.upenn.edu/bitstreams/f1ac4248-d424-4fe4-9d9c-563108cec75f/download

generally understood that large battery projects help support renewable energy and keep the power grid stable. However, some people worry about possible downsides, such as fire risks, which could influence how buyers view nearby homes.

To measure the "true impact," the author used a statistical method called a hedonic difference-in-differences model.[142] This approach was used to examine 178 utility-scale BESS projects and compared changes in home values over time between houses located close to a BESS and similar houses farther away. By making this comparison, the model separated the effect of the BESS from overall trends in the housing market.

The main result of the study is that being close to an operating utility-scale BESS does not have a statistically meaningful effect on nearby home prices. This finding remains consistent after several additional tests, including examining individual projects, looking at how prices change over different time periods after a BESS becomes operational, and comparing neighborhoods with different income and demographic characteristics. The study approach and findings have relevance to the Midwater project review.

Impacts on the value of specific properties within the project vicinity could occur. Considerations such as setbacks, benefits to the community, economic impact, noise, and screening could have an unpredictable range of influence over property value. The project is screened to some extent from nearby residences by the topography, existing windbreaks around the property, and the three-tiered vegetative barrier.

To the extent that negative impacts do occur they are expected to decrease with distance from the project. Aesthetic and noise impacts that might affect property values would be limited to residences and parcels in the project vicinity where the facility may be visible and where noise impacts from operation may occur.

Mitigation

Impacts on property values can be mitigated by reducing aesthetic impacts and encumbrances to future land use. Section 5.1 of the DSP (Appendix C) is a special condition requiring the permittee to develop a site-specific Visual Screening Plan. Impacts can also be mitigated through individual agreements with neighboring landowners. Such agreements are not within the scope of this EA.

4.3.6 Transportation and Public Services

The ROI for transportation and public services is the project area. Potential project effects to the electrical grid, roads and railroads, and other utilities are anticipated to be short-term, intermittent, and localized during construction. Project effects to water (wells and septic systems) are not expected to occur. Overall, construction-related effects are expected to be minimal, and are associated with possible traffic delays. During operation, negligible traffic increases would occur for maintenance. Impacts are unavoidable but can be minimized.

Public services are services provided by a governmental entity or by a regulated private entity to provide for public health, safety, and welfare.

Water and Wastewater: The project site is not serviced by city water supply or sanitary sewer. Many nearby residents in the project area have private wells for domestic water needs and private septic

[142] *Ibid.*

systems of drain fields for domestic wastewater. Residents within the City of Glenville rely on municipal drinking water wells and a municipal waste water treatment facility (See Chapter 4.2).

Electric Utilities: The primary electric provider in the project area is the Freeborn Mower Electrical Cooperative. As shown in Figure 6, and introduced in Chapter 4.2, there are several high voltage transmission lines (greater than 100 kV) in the project area, which connect to the ITC Midwest Glenworth Substation. No additional overhead transmission lines are mapped within one mile of the project.[143] In addition to the high voltage transmission lines, there are lower voltage electric distribution lines throughout the project area.

Pipelines: Minnesota Energy Resources provides natural gas service in the project area. There are no mapped pipelines within the project land control area.[144]

Roads: The major roadway accessing the project area is U.S. Highway 65, described in Chapter 4.2, and runs parallel to the project area along the western boundary.

Railroads: The Glenville portion of the Union Pacific (UP) Railroad route parallels the west side of US Highway 65 near the project area. This portion of the railroad is separated from the project area by U.S. Highway 65 and does not cross any portion of the site.

Airports: The airport closest to the project area is the Albert Lea Municipal Airport, a public-use or general aviation facility, located approximately nine miles from Glenville, Minnesota.

Potential Impacts

Large energy projects can adversely affect public services, such as buried utilities or roads. These effects are usually temporary, for example, road congestion associated with material deliveries. Project effects can be long-term if they change the area in a way that precludes or limits public services.

Water and Wastewater: Midwater will not install any wells or septic systems for drinking water or sanitary services; however, monitoring wells will be installed to monitor and respond to any potential groundwater contamination from coolant leaks at the facility site. See DSP permit special condition 5.12.

Roads: During construction, workers and trucks delivering construction material and equipment will use U.S. Highway 65 to access the project site. Truck traffic during construction is estimated at approximately five truck trips per day during site preparation, 15 truck trips per day during BESS installation, and three truck trips per day during the mechanical, electrical, and commissioning phase. Semi-truck deliveries will vary daily depending on the construction schedule and equipment delivery timelines. Overweight or oversized loads are not anticipated; however, if such loads are required, Midwater will obtain all necessary approvals from state and local agencies prior to construction.[145]

For comparison, the functional capacity of a two-lane paved rural highway exceeds 5,000 average annual daily traffic (AADT). While the increase in traffic may be noticeable to nearby residents, the modest increase in volume is not expected to adversely affect traffic operations. Slow-moving construction vehicles may cause temporary delays on smaller roads, similar to those experienced

[143] Midwater Application, Section 6.2.7.4, 88.
[144] Midwater Application, Section 6.2.7.4, 87.
[145] Midwater Application, Section 6.2.7.8, 89.

during agricultural planting or harvest periods; however, such delays are expected to be minimal and limited to the relatively short construction delivery period.[146]

Construction is expected to involve an average workforce of 30 to 50 personnel, with a peak of up to 75 workers for limited periods. This workforce is anticipated to generate approximately 20 to 40 daily pickup or passenger vehicle trips, assuming limited ridesharing or carpooling.[147]

No impacts on roads are anticipated during the operation; negligible traffic increases would occur for maintenance.

Railroads: The project will not affect the UP railroad during construction or operation.

Electric Utilities: Midwater will coordinate with Gopher State One Call before and during construction to identify existing infrastructure, address safety considerations, and avoid potential conflicts. An American Land Title Association (ALTA) survey will also be conducted to confirm the locations of underground utilities. Final project design will seek to minimize or avoid impacts to underground utilities. Where conflicts cannot be avoided, Midwater will coordinate with the affected utility provider to develop appropriate protection or relocation measures. All underground utilities will be clearly marked prior to the start of construction.[148]

The project is not expected to affect existing utilities such as transmission lines or substations; therefore, no mitigation measures are proposed for these facilities. Construction activities will not involve groundwater withdrawal or disturbance of the regional aquifer, and no impacts to regional water wells are anticipated. If an on-site well is installed, its use will be monitoring purposes, which are not known to cause adverse regional groundwater effects.

Mitigation

Water and Wastewater: A well construction permit from the Minnesota Department of Health (MDH) would be required if a well is installed at an O&M facility.

Utilities: Section 4.3.5 of the DSP (Appendix C) is a standard permit condition that requires the permittee to minimize disruptions to public utilities. Impacts to electrical infrastructure that cross the project can be mitigated by appropriate coordination with the owners of the existing infrastructure and following industry best practices. The location of underground utilities can be identified using the Gopher State One Call system during engineering surveys and marking the underground utility locations prior to construction. If a utility is identified, the project component or the utility itself might need to be relocated if it cannot be successfully crossed. Relocation, as well as any necessary crossing, would need to be coordinated with the affected utility.

Roads: Changes or additions to driveways from county roads will require permits from the county. MnDOT noted that access to the project area from low-traffic township or county roads is not possible and encourages Midwater to investigate utilizing or upgrading the existing access northwest of the proposed, new project access from US Highway 65. Additionally, MnDOT noted that when Midwater requests access to the project area from US Highway 65, the District 6

[146] Midwater Application, Section 6.2.7.8, 89.
[147] Midwater Application, Section 6.2.7.8, 89.
[148] Midwater Application, Section 6.2.7.8, 90.

Development Review Committee may require Midwater to install temporary or permanent turn lanes to mitigate increased safety risks.[149]

Section 4.3.19 of the DSP requires permittees to inform road authorities of roads that will be used during construction and acquire necessary permits and approvals for oversize and overweight loads. Permitted fencing and vegetative screening cannot interfere with road maintenance activities, and the least number of access roads shall be constructed.

In addition to permit requirements for driveway access and the conditions of the draft site permit, the following practices can mitigate potential impacts:

- Pilot vehicles can accompany movement of heavy equipment.
- Deliveries can be timed to avoid traffic congestion and dangerous situations on the roadway.
- Traffic control barriers and warning devices can be used as necessary.
- Photographs can be taken prior to construction to identify pre-existing conditions. Permittees would be required to repair any damaged roads to pre-construction conditions.

Railroads: As no impacts to existing railroads are anticipated, no mitigation is proposed.

4.3.7 Socioeconomics

The ROI for socioeconomics is the region. The project effect on socioeconomics is anticipated to be minimal to significant and positive. Effects associated with construction will, overall, be short-term and minimal. Significant positive effects may occur for individuals. Impacts from operation will be long-term and significant. Adverse impacts are not anticipated.

Freeborn County is the 37th largest of the state's 87 counties. Its population declined during the first half of the decade, ranking 72nd in population growth statewide between 2020 and 2024. The county has an older median age than the state overall and a higher share of residents aged 65 and older. This trend reflects an aging population, driven in large part by the Baby Boom generation progressing through the population pyramid. See Table 11.

In 2023-2024 the sectors with the largest employment in Freeborn County were Manufacturing (21.7), Retail Trade (16.0), Health Care & Social Assistance (13.5), and Accommodation & Food Services (9.2).[150] Freeborn County is part of the Minnesota Department of Employment and Economic Development Region 10, which is the Southeast Economic Development Region. Unemployment rates fluctuate with the economy, but the unemployment rate for Region 10 has been consistently similar to the state, typically slightly lower, but within 0.3%, of Minnesota's unemployment rate.[151] In 2024, Freeborn County had a slightly lower unemployment rate (3.8%)

[149] MnDOT Comment, March 10, 2025, eDocket no. 20253-216207-01

[150] Minnesota Department of Employment and Economic Development, "County Profiles for Freeborn County" (2024), accessed December 16, 2025. https://mn.gov/deed/assets/052725_freeborn_tcm1045-407637.pdf

[151] Minnesota Department of Employment and Economic Development (DEED), "Economic Development Region 10: Southeast, 2025 Regional Profile" (2025), accessed December 16, 2025, https://mn.gov/deed/assets/2025_Southeast_tcm1045-133258.pdf

than the state average (3.9 %). The county also had a slightly lower labor force participation rate (62.1%) than Minnesota as a whole (68.5%).[152]

Table 11. Population Characteristics

Area	Total Population				Population Characteristics***		
	2000 Census*	2020 Census*	% Change 2000 - 2020	2024 Estimate **	% Minority‡	Median Household Income ($)	% Below Poverty Level
Minnesota	4,919,479	5,706,494	15.9	5,842,388	22.3	87,117	9.8
Freeborn County	32, 584	30,895	-5.2	30,314	15.1	69,012	9.3
Glenville	720	641	-11.0	558	7.4	53,750	8.1
Shell Rock Township	430	389	-9.53	254	3.6	60,000	3.1

* U.S. Census Bureau, https://data.census.gov/

** 2022, Minnesota State Demographic Center, Population Data, Our Estimates, https://mn.gov/admin/demography/data-by-topic/population-data/our-estimates/

*** 2022 American Community Survey 5-year estimates

‡ Minority population includes all persons who do not self-identify as white alone.

Potential Impacts

Project impacts are anticipated to be positive. Potential impacts associated with construction will be positive, but minimal and short-term. Significant positive effects might occur for individuals. Impacts from operation will be long-term, positive, and moderate. The project will not disrupt local communities or businesses and does not disproportionately impact low-income or minority populations (see discussion of environmental justice in Chapter 4.3.9). Adverse impacts are not anticipated.

Project construction is likely to result in increased expenditures for lodging, food and fuel, transportation, and general supplies at local businesses during construction. The applicant indicates that procurement of construction resources will give preference to women, veteran, and minority owned business contractors. The applicant expects that the "Project will create approximately 75 jobs during the peak construction and installation phases (anticipated between the first and third quarters of 2027), and one to two full-time jobs during the expected 30-year operations phase."[153] Midwater anticipates a payroll during this period of approximately $3 million in wages. The applicant expects general skilled labor to be available in Freeborn County or Minnesota to serve the

[152] Minnesota Department of Employment and Economic Development, "County Profiles for Freeborn County" (2024), accessed December 16, 2025. https://mn.gov/deed/assets/052725_freeborn_tcm1045-407637.pdf

[153] Midwater Application, Section 5.2.1.1, 47.

basic infrastructure and site development needs, with specialized labor being required for certain aspects of the project.[154]

The project is expected to generate approximately $19,700 in annual property tax revenue for Freeborn County over the 30-year lease term, totaling about $788,000.[155] In addition, Shell Rock Township is projected to receive approximately $2,400 annually over the same 30-year period, for a total of about $95,000.[156] In addition, lease and purchase payments paid to the landowners will offset potential financial losses associated with removing a portion of their land from agricultural production.[157]

The applicant anticipates the project will support approximately 75 jobs during the construction phase, and one to two long-term personnel during the operations phase. Indirect economic benefits will occur from additional local spending on lodging, goods and services and local sales tax.[158]

The proposed project will affect approximately 17 acres of agricultural land currently enrolled in the Conservation Reserve Program (CRP) within the proposed development area during its operational life.[159] This impact is not expected to be significant for land-based economies in the surrounding area, as the proposed BESS development area represents less than 0.1 percent of Freeborn County's total cropland base (332,702 acres).[160] Based on USDA Farm Service Agency records, there were approximately 11,266 acres of land enrolled in the Conservation Reserve Program (CRP) in Freeborn County, Minnesota as of the most recent CRP county summary.[161]

Mitigation

The project is anticipated to result in positive short-term socioeconomic impacts, primarily associated with construction-related employment and spending. Long-term socioeconomic impacts from project operation are expected to be minimal and not significant. Section 8.5 of the Development Services Plan (DSP) requires the permittee to submit quarterly reports documenting efforts to hire Minnesota workers, consistent with Minn. Stat. § 216E.03, subd. 10(c). In addition, Section 8.6 of the DSP requires the permittee and all construction contractors and subcontractors to pay no less than the prevailing wage rate. These measures are expected to adequately address potential socioeconomic impacts; therefore, no additional mitigation is proposed.

4.3.8 Environmental Justice

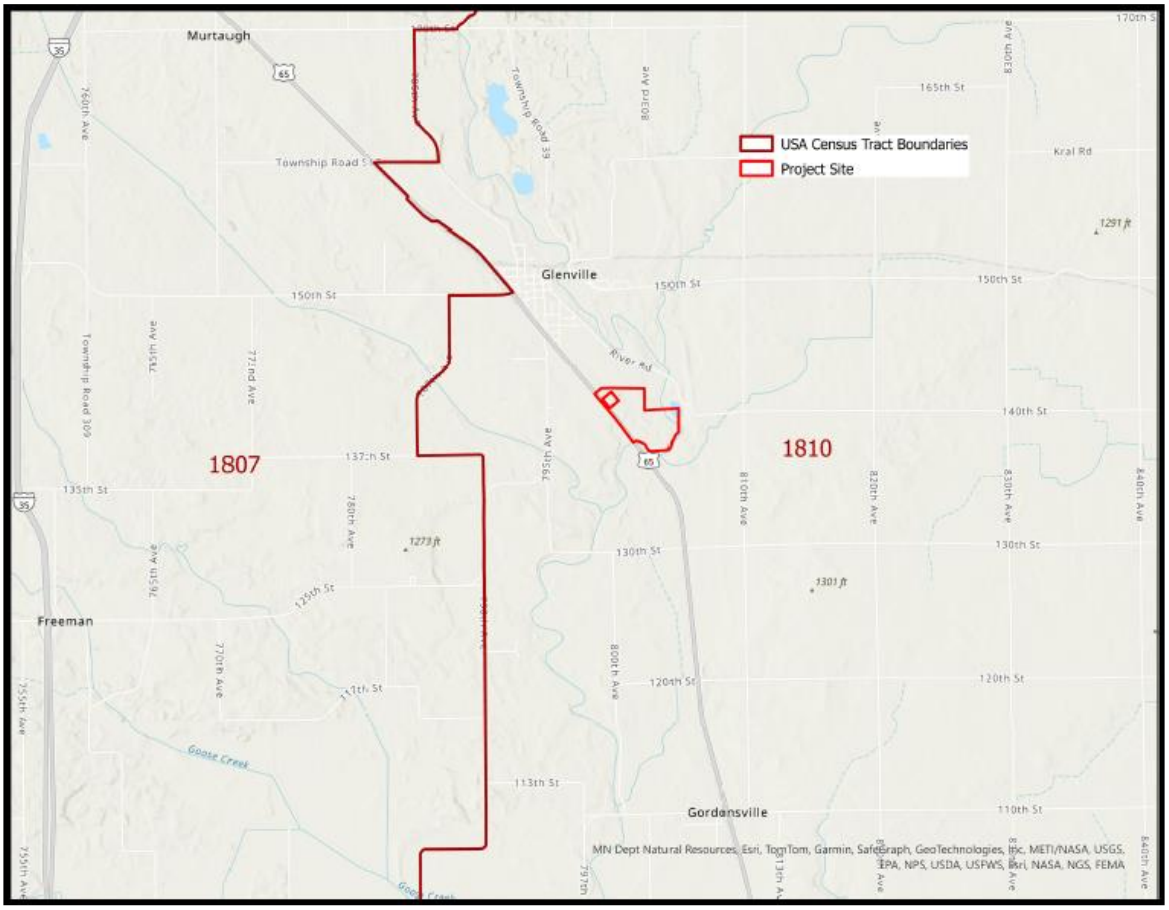
The ROI for economic justice analysis is the region. The project will not have disproportionately high and adverse human health or environmental effects on low-income, minority, or tribal populations.

---

[154] Midwater Application, Section 6.2.10.2, 97.
[155] Midwater Application, Section 6.2.10.2, 98.
[156] *Ibid.*
[157] *Ibid.*
[158] Midwater Application, Section 5.2.1.1, 47.
[159] Midwater Application, Section 6.3.1.1, 99. The total number of acres enrolled in the CRP program in the project area is 40 acres through the U.S. Department of Agriculture – Commodity Credit Corporation under Contract number 11749A from October 1, 2021, through September 30, 2031.
[160] *Ibid.*
[161] Environmental Working Group, "Conservation Reserve Program: Freeborn County, Minnesota," accessed December 16, 2025, https://conservation.ewg.org/crp.php?fips=27047&utm_source

Environmental justice is “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.”[162] The goal of this "fair treatment" is not to shift risks among populations, but to identify potential disproportionately high and adverse effects and identify alternatives that may mitigate these impacts.[163]

Figure 10. Census Tracts in Project Area



Potential Impacts

Utility infrastructure can adversely impact low-income, minority or tribal populations. To identify potential environmental justice concerns in the project area, the MPCA Environmental Justice tool was used to consider the composition of the affected area to determine whether low-income, minority or tribal populations are present and whether there may be disproportionately high and adverse human health or environmental effects on these populations.[164] Low-income and minority

[162] Minn. Stat. § 116.065

[163] Minnesota Pollution Control Agency, “Environmental Justice Framework” (St. Paul: Minnesota Pollution Control Agency, May 2022), accessed December 15, 2025, https://efiling.web.commerce.state.mn.us/documents/%7B60CD839A-0000-CD1D-B9CA-05F047CE8DED%7D/download?contentSequence=0&rowIndex=4

[164] Minnesota Pollution Control Agency, “Environmental Justice Areas, ArcGIS Experience,” accessed December 15, 2025, *https://experience.arcgis.com/experience/bff19459422443d0816b632be0c25228/page/Page/?views=EJ-areas*

populations are determined to be present in an area when the low-income percentage or minority group percentage exceeds 50 percent or is "meaningfully greater" than in the general population. In this analysis, a difference of 10 percentage points or more was used as the threshold to distinguish whether a "meaningfully greater" low-income or minority population resides in the ROI.

Staff conducted a demographic assessment of the affected community to identify low-income and minority populations using U.S. Census data. See Table 12. Low-Income and Minority Population Characteristics

provides low-income and minority population data and shows the census tracts and the City of Glenville used to compare the project area with Freeborn County. [165]

Table 12. Low-Income and Minority Population Characteristics

Area	% Below Poverty Level	Median Household Income ($)	% Minority Population‡
Region of Comparison			
Minnesota	9.3	$87,556	23.5
Freeborn County	9.8	$69,012	18.7
Project Census Tracts			
Glenville	8.1	$53,750	12.6
Census Tract 1807	5.6	$41,109	9.8
Census Tract 1810	7.5	$37,956	4.6

Mitigation

The project will not create disproportionate or adverse impacts to low income or minority populations because the low-income or minority residents of the project area not a meaningfully greater segment than the area of comparison. Mitigation is not proposed.

4.4 Public Health and Safety

A BESS can provide major grid benefits, such as stabilizing power supply, supporting renewable integration, and improving reliability; however, its operation may also result in public health and safety impacts. This chapter discusses potential effects from a BESS *fire or thermal runaway*, *electrical and explosion hazards*, including exposure to potentially toxic chemicals, *public safety and emergency services*, and *construction*-related factors that affect public safety. The ROI for public health and safety is the land control area.

[165] Data for this table was collected from the following sources, accessed on December 16, 2025: Minnesota and Freeborn County Data (2023): https://mn.gov/deed/assets/052725_freeborn_tcm1045-407637.pdf ; Glenville demographics (2020): https://datausa.io/profile/geo/glenville-mn ; Census Tract 1807, Freeborn County (2020): https://data.redding.com/census/race-ethnicity/total-population-change/census-tract-1807-freeborn-county-minnesota/140-27047180700/ ; Census Tract 1810, Freeborn County (2020): https://data.redding.com/census/race-ethnicity/total-population-change/census-tract-1810-freeborn-county-minnesota/140-27047181000/

The primary operational safety hazard associated with a BESS is battery failure that could lead to thermal runaway and fire. Thermal runaway events may require specialized emergency response due to the potential for high heat, smoke, and hazardous gases. While such events are infrequent, their consequences could be more severe than typical or atypical electrical facility incidents. As a result, operational impacts to public health and safety are anticipated to range from moderate to potentially significant, depending on the nature and severity of an incident. These impacts could be short- or long-term but can be minimized through facility design, operational protocols, emergency planning, and coordination with local responders.

4.4.1 Public Safety and Emergency Services

The ROI for public and work safety is the land control area. Like any construction project, there are risks for injuries from falls, equipment and vehicle use, electrical accidents, etc. Public risks involve electrocution. Electrocution risks could also result from unauthorized entry into the fenced area. The main safety hazard of a BESS is battery failure leading to thermal runaway and fire. Emergency response to fires or thermal runaway events at BESS facilities require specialized response. Potential impacts from construction are anticipated to be minimal. Potential impacts during operation are anticipated to be moderate to significant. Impacts would be short- and long-term and can be minimized.

Like any construction project, there are risks. These include potential injury from falls, equipment and vehicle use, electrical accidents, etc. Construction might disturb existing environmental hazards on-site, for example, contaminated soils. In addition to the typical operational risks associated with an electric facility (falls, electrical accidents, etc..) battery storage facilities include a heightened risk of thermal runaway events and fires. During operation there are occupational risks similar to those associated with construction. Public risks would result from unauthorized entry into the facility.

Construction crews must comply with local, state, and federal regulations when installing the project. This includes standard construction-related health and safety practices. This generally includes safety orientation and training, as well as daily/weekly safety meetings.

Emergency services in the project area are provided by local law enforcement and emergency response agencies located in nearby communities. Law enforcement in the project area is provided by the Freeborn County Sheriff, and the police departments of Albert Lea. Fire service is provided by the Albert Lea Fire Department and the Glenville Volunteer Fire Department. Ambulance response is provided by regional and local ambulance services. The primary ambulance service for the project area is the Mayo Clinic Ambulance in Albert Lea. Hospitals near the project area include the Mayo Clinic Hospital Albert Lea, which is located within ten miles of the project. Coordination with these agencies would help ensure appropriate emergency preparedness and response capabilities throughout construction and operation.

Construction Phase Impacts

The inflow of temporary construction personnel could increase demand for emergency and public health services. On the job injuries of construction workers requiring assistance due to slips, trips or falls, equipment use, or electrocution can create a demand for emergency, public health, or safety services that would not exist if the project were not to be built. Although no road closures are

anticipated during construction, any temporary closures could impede police, fire, and other rescue vehicles access to the site of an emergency.[166]

Typical and Atypical Scenario Impacts

The Midwater BESS is designed to operate in compliance with applicable safety standards and to minimize potential impacts to public health, safety, and the environment during emergency conditions or equipment failures. Midwater has incorporated automated monitoring, control, and protection systems intended to detect abnormal operating conditions and to initiate appropriate response measures.

Once operational, the BESS will be monitored continuously by an integrated Battery Management System (BMS), Energy Response Plan (ERP), and related systems.[167] These systems monitor electrical performance, battery state of charge, temperature, and other operating parameters. If abnormal conditions are detected (e.g., electrical faults, over-voltage or under-voltage conditions, excessive temperatures, loss of grid connection, or internal system malfunctions) the system will automatically initiate protective actions.

Protective measures may include the immediate cessation of charging and discharging operations and the electrical isolation of affected battery modules, containers, or the entire facility through automated disconnects and circuit breakers. These actions are intended to prevent fault propagation, eliminate the potential for unintended power export to the electrical grid, and reduce the risk of equipment damage or safety hazards. Under such conditions, the system is designed to default to a safe, non-operating state.

Thermal management systems are provided to regulate battery temperatures during normal operation and under abnormal conditions. If elevated temperatures are detected, cooling systems may be adjusted, or a controlled system shutdown may be initiated. In the unlikely event of a fire or thermal runaway event, the facility will rely on fire detection, suppression, and ventilation systems designed in accordance with applicable building and fire codes. These systems are intended to contain the event, limit the spread of heat or fire, and reduce the potential for off-site impacts. Affected system components would remain offline until inspected and determined to be safe for return to service.

The facility will include manual emergency shutdown controls that allow authorized personnel or emergency responders to de-energize the system if necessary. Use of these controls results in electrical isolation of the BESS while maintaining the operation of safety systems such as alarms and fire detection.

Following any emergency shutdown or system failure, the BESS will remain in a “locked-out” condition pending review of system diagnostics, inspection, and any required corrective actions. Facility restart will occur only after confirmation that safe operating conditions have been restored.

Overall, the design and operation of the BESS emergency and system failure contingencies are intended to avoid or minimize potential adverse environmental impact, including risks to public safety, air quality, and surrounding land uses, and to ensure consistency with applicable local, state, and federal requirements. These systems are developed and with input and coordination with

[166] Midwater Application, Section 6.3.4.1, 101.
[167] Midwater Application, Section 6.2.5.2, 80.

applicable emergency services. Under these operating scenarios, adverse environmental impacts are not anticipated.

Accident Scenario Impacts

As with other industrial facilities, there is the potential for falls, fire or other industrial accidents once operational. The main safety hazard of a BESS is battery failure leading to thermal runaway which has the potential to spread to nearby batteries and containers, quickly presenting an emergency. The movement of electrons and lithium ions within the battery cell produces electricity as well as heat. Lithium-ion batteries are designed to allow heat to dissipate from the cell to maintain a controlled reaction. Thermal runaway is a phenomenon when a battery cell generates heat at a greater rate than the heat can dissipate from the cell, resulting in a cascading chemical reaction which produces additional heat. Thermal runaway events can result in extremely high temperatures, smoke, fire, and potentially ejection of gas, shrapnel, and particulates.[168] While BESS are a relatively new technology, ongoing research is shaping industry standards that continue to reduce incident risk and address safety concerns. This is particularly present in the battery-type selected for the BESS.

As discussed in Chapter 2.1.3, there are two major types of lithium-ion battery technology used in BESS facilities. The chemistry of NMC batteries allows them to charge and discharge at higher rates (referred to as “energy density”) than LFP batteries. The ability to charge and discharge at high rates made them a popular choice in early BESS projects. However, compared to LFP batteries, the NMC batteries have a lower thermal runaway temperature, creating increased risks and requiring enhanced monitoring. In comparison, LFP batteries have a higher thermal runaway temperature, making them more stable and less prone to fire. As a result of the relative thermal stability compared to NMC technology as well as decreased costs as the LFP technology matured, the energy storage industry has more recently pivoted to LFP technology. The Midwater BESS will use LFP technology.

Emergency response to fires or thermal runaway events at BESS facilities are characterized as accident scenarios and require specialized response and pose potentially significant environmental impacts. BESS fires present unique challenges to firefighters; unlike other utilities or industrial sites, they do not have a single point of disconnect. Although separate parts of the system can be disconnected, the batteries will remain energized.[169] During a thermal runaway event or fire, gases can build up inside battery containers, making it unsafe for first responders to approach or enter them. Because these fires may be difficult to put out, some batteries may continue to hold energy, and toxic gases may be present.

Potential air quality impacts from a thermal runaway situation may present a community hazard; however, pre-construction air quality impact modeling as well as real-time situational air quality modeling support actions on the ground including, if needed, evacuation.[170]

---

[168] UL Research Institutes, “What Is Thermal Runaway,” 2021, accessed December 5, 2025, https://tinyurl.com/bdfdymmp

[169] American Clean Power, Energy Storage Emergency Response Plan Template, accessed December 3, 2025, https://cleanpower.org/wp-content/uploads/gateway/2022/11/ACP_Energy_Storage_Emergency_Response_Plan_Template.pdf , 14–17.

[170] See Chapter 4.7.1

Chapter 4.7.1 of the EA provides a detailed review of the air quality modeling completed to evaluate a thermal runaway at the project site. Air pollutants of interest included Carbon Monoxide, Carbon Dioxide, and Hydrogen Fluoride. The modeling results indicated that greatest air quality impacts are localized to the project site and are minimized to concentrations that are not harmful to human health or the environment. Although emergency response professionals are generally equipped with safety gear and equipment to safely manage a thermal runaway, planning and training for a response are necessary to mitigate potential impacts.

Currently, industry guidance recommends that responders keep a safe distance, monitor the situation, and allow the fire to burn out naturally as the batteries release their stored energy. While each situation is unique, active thermal runaway scenarios can last hours to days.[171] Under this scenario, environmental impacts are potentially significant in the short-term, but largely confined to the project site, and reversible through emergency service response and related remediation activities, as needed.

Mitigation

The project will be designed and constructed in compliance with applicable electric codes. Electrical inspections will ensure proper installation of all components, and the project will undergo routine inspection. Electrical work will be completed by trained technicians.

Construction is bound by federal and state Occupational Safety and Health Administration (OSHA) requirements for worker safety, and must comply with local, state, and federal regulations regarding installation of the facilities and qualifications of workers. Established industry safety procedures will be followed during and after construction of the project. Crews will be trained and briefed on safety issues, reducing the risk of injury. The project will be fenced to prevent unauthorized access.

Construction crews must comply with local, state, and federal regulations when installing the BESS components and associated facilities. This includes standard construction-related health and safety practices. This generally includes safety orientation and training, as well as daily/weekly safety meetings.

In addition to the use of the more stable LFP technology, Midwater's facility design uses modular containers that are tested by the manufacturer to ensure fire resistance. Modern BESS containers include explosion prevention systems to remove flammable gases during a thermal runaway event and relieve pressure to limit gas levels within the containers from reaching levels that can be flammable or explosive. The containers are spaced to minimize the potential for fire to spread to other containers. The BESS equipment is monitored remotely, tracking cell voltage and temperature to identify and isolate potential issues before they occur. The facility will also install fire detection systems at the containers to recognize incidents and disconnect and isolate failed equipment.

[171] AEGIS Loss Control. "White Paper: Lithium-Ion Battery Energy Storage System (Li-ion BESS)." AEGIS Loss Control, 2023, accessed on February 5, 2026, https://www.aegislink.com/content/dam/aegislink/resources/publications/public/LossControl/Lithium-Ion_Battery_Energy_Storage_Systems_%28Li-ion_BESS%29_112023.pdf

The National Fire Protection Association issued updated NFPA 855 Standard for the Installation of Stationary Energy Storage Systems in 2023. The standard includes fire detection and suppression, explosion control, exhaust ventilation, gas detection, and thermal runaway requirements.[172]

NFPA standards require BESS facilities to prepare a hazard mitigation analysis (HMA) detailing the results of the equipment testing and the risks associated with the technology prior to installation of the BESS. Midwater indicates that HMAs are typically prepared during the financing phase of a project, while other sources indicate that HMAs are typically provided to jurisdictional units for approval of a BESS project. Midwater indicates that it will provide the HMA to the Commission when it is available.[173]

Public safety is addressed in several sections of the DSP (Appendix C):

- Section 4.3.27 requires the permittee to take several public safety measures, including landowner educational materials, appropriate signs and gates, etc.
- Section 8.11 of the DSP is a standard condition that requires permittees file an Emergency Response Plan with the Commission and local first responders prior to operation.[174] As discussed above, the fire hazards associated with BESS facilities require additional training for first responders. Emergency response plans for BESS facilities require project-specific details on emergency response to incidents at the BESS. This includes BESS-specific emergency response training. The American Clean Power Association has developed an Emergency Response Plan template for BESS Facilities.[175]
- Section 8.12 requires disclosure of extraordinary events, such as fires, etc.
- Section 9.1 requires a decommissioning plan prior to construction and updated every five years. Periodic updates of the plan will address the developing information on end-of-life issues related to batteries.

The DSP also includes special conditions developed in part through the ATF which include:

- Section 5.5 requires the permittee to file a Hazard Mitigation Analysis detailing the testing results for the selected equipment and the risks associated with the technology at least 30 days prior to the pre-construction meeting.
- Section 5.6 requires regular training on lithium-iron batteries and associated facility technology for local firefighting crews.
- Section 5.7 requires a calculation of appropriate waterflow in gallons per minute (gpm) needed to cool a BESS unit and mitigate runoff. In addition, it requires Midwater to purchase specialized hose nozzles for local fire response authorities to control gpm if necessary.

---

[172] National Fire Protection Association, NFPA 855: Standard for the Installation of Stationary Energy Storage Systems, accessed December 5, 2025, https://tinyurl.com/2n7c5r6d The standard is available for purchase, the website highlights details of the updated edition.

[173] Appendix D, Response to Information Request 3

[174] Midwater Application, Section 6.2.7.8, 90.

[175] American Clean Power Association, Energy Storage Emergency Response Plan Template, accessed January 5, 2026, https://tinyurl.com/56cu4r33

- Section 5.8 requires Midwater to install on-site, continuous recording cameras that can be monitored remotely by both the facility management team and a third party, along with onsite meteorological monitoring equipment, capable of use in the event of an emergency.
- Section 5.9 requires Midwater to conduct a feasibility assessment to evaluate the use of dry hydrants and drafting water from the Shell Rock River for fire response.

4.5 Land-based Economies

A BESS can affect land-based economies (e.g., agriculture, forestry, tourism, mining, etc.) by precluding or limiting land use for other purposes. Potential project effects on agriculture and tourism, which includes hunting and fishing, are discussed here.[176]

4.5.1 Agriculture

The ROI for agriculture is the site. Potential impacts on agricultural producers are anticipated to be minimal. A loss of approximately 17 acres farmland in Freeborn County would occur for the life of the project. Potential impacts are localized and unavoidable but can be minimized.

Agricultural use dominates the area of land control, with approximately 90 percent of the BESS facility development area used for hay or pasture, with the remaining land use coverage characterized as "herbaceous."[177] The site is not irrigated.

From the U.S. Department of Agriculture's 2022 Census of Agriculture, there are approximately 351,174 acres of farmland in Freeborn County, including 332,702 acres of cropland (94.7 percent). By acreage, the largest crops are corn and soybeans. Swine production, turkeys, and cattle, are the top three livestock production sectors in the county.[178]

Prime farmland is defined by Federal regulation at 7 C.F.R.657.5(a)(1) "is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses." The site contains approximately 33.4 acres of soils classified as prime farmland when drained.[179]

Potential Impacts

The impact intensity level is expected to be minimal and very localized. Conversion of farmland to energy uses can be viewed as a conversion from one type of industrial use to another. Conversely, the conversion of farmland to energy uses can be viewed as a negative impact to agricultural production.

The project will result in up to 17 acres of farmland, currently enrolled in CRP, being removed from agricultural production for the life of the project.[180] Although this change in land use would take potentially productive farmland out of production, the removal of 17 acres relative to 332,702 acres

[176] Minn. R. 7859.4100(C). (2025).
[177] Midwater Application, Table 6.5-9, 127.
[178] Midwater Application, Section 6.3.1, 98.
[179] *Ibid.*
[180] Appendix D, Information Request 4.

of farmland in the county is insignificant. The applicant indicates that the land could be returned to pre-construction use after the project is decommissioned and the site is restored.[181]

Construction of the project has the potential to damage agricultural soils through compaction or erosion if BMPs are not implemented to minimize damage.

Mitigation

Several sections of the DSP (Appendix C) address agricultural mitigation and soil-related impacts:

- Section 4.3.9 requires protection and segregation of topsoil.
- Section 4.3.10 requires measures to minimize soil compaction.
- Section 4.3.11 requires the permittee to "implement erosion prevention and sediment control practices recommended by the [MPCA]" and to "obtain a [CSW Permit]." A CSW Permit requires both temporary and permanent stormwater controls to ensure that stormwater does not become a problem on or off-site.
- Section 4.3.15 requires the permittee to develop a vegetation management plan (VMP) that defines how the land control area will be revegetated and monitored over the life of the project. Appropriate seeding rates and timing of revegetation will stabilize soils and improve overall soil health. Midwater has included a draft VMP as Appendix C of its site permit application.
- Section 4.3.18 requires the permittee to take reasonable precautions against the spread of noxious weeds.
- Section 4.3.23 requires that "site restoration and management" practices enhance "soil water retention and reduces storm water runoff and erosion".
- Section 4.3.26 requires the permittee to fairly restore or compensate landowners for damages to crops, fences, drain tiles, etc. during construction.
- Section 5.2 is a special condition that requires the permittee to revise their current draft VMP to include a vegetative landscape buffer that includes three distinct rows of county-approved plantings.
- Section 5.10 is a special condition that requires the permittee to develop an agricultural impact mitigation plan (AIMP) with MDA. The plan would detail methods to minimize soil compaction, preserve topsoil, control noxious weeds and invasive species, maintain the existing drainage conditions through appropriate maintenance and repair of existing drain tile, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use.

Reduced or lost farming or CRP revenues may be offset by lease agreements, which are outside the scope of this document.

[181] Midwater Application, Section 5.3.1.4, 60.

4.5.2 Tourism and Recreation

The ROI for recreation is the local vicinity and the ROI for tourism is the project area. Potential project effects to recreational opportunities and tourism are anticipated to be minimal. During construction, unavoidable short-term impacts will occur as construction equipment and vehicle traffic will create noise, dust, and visual impacts. These effects will be intermittent and localized. Operational effects of the project will be long-term and are primarily associated with changes to the view scape caused by new built features introduced to the landscape. Because direct long-term effects are primarily aesthetic in nature, indirect long-term impacts to recreation are expected to be generally negligible, albeit unique to the individual. Potential impacts can be minimized through vegetative buffers and opacity strips within the chain-link fence.

In the 2023 Minnesota Visitor Economy Impact report, Freeborn County accounted for about $128.3 million in spending, with 10.6 million dollars in state and local taxes, and 931 private sector jobs.[182] Tourism in the project area is largely related to recreational activities including fishing, hunting, and boating. Activities in the project area are typically associated with the Shell Rock River State Water Trail and the Shell Rock wildlife management area (WMAs).

The Freeborn County Trails snowmobile trail is present within the northwest corner of the project area. Project infrastructure near the snowmobile trail is the existing substation and new transmission power line poles (Figure 6). Figure 6 depicts recreational opportunities near the project area. The parks nearest the project area are Glenville-Emmons Secondary School Grounds, located 0.4-mile northwest of the project, while Glenville-Emmons Elementary School Grounds, located 0.9-mile northwest of the project, and the St. Nicholas Park, located 4.4 miles northwest of the project are outside the ROI for this analysis.[183]

Impacts to recreation can be direct or indirect. Direct impacts are impacts that directly impede the use of a recreational resource, for example, closing of a trail to facilitate project construction. Indirect impacts reduce the enjoyment of recreational resources but do not prevent use, for example, aesthetic impacts visible from a scenic overlook.

Although the Shell Rock River Water Trail is located within the proposed BESS project area, no project infrastructure will obstruct or restrict public access to the water trail. Users traveling along the small segment of the trail near the project area may experience a slight increase in noise during BESS construction and operation. These effects will be temporary and limited to the immediate vicinity of the facility.[184]

To prevent unauthorized access from river users (such as individuals tubing), appropriate signage and fencing will be installed as needed to inform and protect the public from entering project grounds. During the construction phase, there may be temporary visual, auditory, and aesthetic impacts experienced by some visitors and nearby residents. Once construction is complete, normal operation of the BESS is not expected to disrupt recreational activities or reduce public use of the water trail.[185]

---

[182] Explore Minnesota, "Minnesota Visitor Economy Impact Report" (2023), accessed December 23, 2025, https://mn.gov/tourism-industry/assets/25-county-data_8.5x11-final-digital-012125_tcm1135-666622.pdf

[183] Midwater Application, Section 6.2.9, 94-95.

[184] Midwater Application, Section 6.2.9.1, 95.

[185] *Ibid.*

Snowmobilers may notice a change in visual character along the portion of the snowmobile trail located near the HVTL project area.[186] The existing trail alignment passes through the northwest corner of the project area beneath the HVTL facility. Snowmobile trails typically function as part of a broader network connecting communities. While portions of the Freeborn County trail system traverse rural landscapes, other segments pass through municipalities and developed areas.

The presence of the HVTL is not expected to affect snowmobile trail use. Poles and associated support structures for the HVTL connecting the BESS to the ITC Midwest Glenworth Substation will be set back from the trail in accordance with state guidelines to ensure public safety. In addition, trail markers and warning signage will be installed to help riders remain on the designated trail and to alert users to potential electrical hazards associated with unauthorized access to the HVTL or the ITC Midwest Glenworth Substation.

Accident Scenario Impacts

A BESS fire or thermal runaway event would most likely result in short-term, localized impacts to recreation and tourism within the defined regions of influence (ROI). These impacts would differ from routine construction or operational effects in that they would be acute, episodic, and safety-driven, rather than continuous or aesthetic.

Impacts on recreation would be local. In the event of a thermal runaway, emergency response actions, such as temporary access restrictions, evacuations, or road closures, could briefly limit access to nearby recreational resources. Smoke, odors, or visible emergency activity could deter use of nearby facilities such as trails, wildlife management areas, or river access points during the incident and immediate recovery period. Depending on wind direction and duration, smoke could temporarily reduce air quality or visibility, discouraging activities such as fishing, hunting, boating, or snowmobiling. These effects would be temporary and localized, and normal recreational use would be expected to resume once the incident is resolved and the site deemed safe.

Tourism-related impacts would likely be minimal and short-lived. While a highly visible or widely reported BESS fire could cause brief concern among visitors, tourism in the project area is primarily tied to outdoor recreation rather than destination-based attractions. As such, any reduction in tourism activity would likely be limited to the immediate timeframe of the event and would not be expected to measurably affect overall visitor spending or employment in Freeborn County. Given the county's broader tourism base and the episodic nature of such events, long-term tourism impacts are not anticipated.

Mitigation

No public or private recreational lands or opportunities are located within or adjacent to the HVTL or BESS. Therefore, the proposed project is not anticipated to result in impacts on recreational resources, and no mitigation measures are proposed. Additionally, modern BESS facilities are designed with fire detection, suppression systems, and emergency response coordination to reduce both the likelihood and severity of thermal runaway events. Existing and proposed visual screening measures (e.g., vegetative buffers and opacity strips) would not directly mitigate fire-related effects but can help reduce long-term perception-related concerns that sometimes influence recreational or tourism use.

---

[186] *Ibid.*

4.6 Archeological, Cultural, and Historic Resources

A BESS can affect archaeological, cultural, or historic resources in several ways, both directly through physical disturbance and indirectly through changes to the surrounding environment or landscape. This chapter considers the project's potential environmental effects during *construction activities*, the change in *visual and setting*, and *indigenous and tribal cultural resources*.[187]

Archeological resources are locations where objects or other evidence of archaeological interest exist, and can include aboriginal mounds and earthworks, ancient burial grounds, prehistoric ruins, or historical remains.[188] Historic resources are sites, buildings, structures, or other antiquities of state or national significance.[189]

Construction and operation of project pose the potential to impact resources that have importance to American Indian Tribes with ties to the region. Siting of large energy facilities in a manner that respects historic and cultural ties to the land requires coordination with tribes.

Construction Phase Impacts

Construction-related impacts to archaeological, cultural, and historic resources are a product of the effects that ground-disturbing or structural activities can have on places, objects, or landscapes that have historical or cultural importance.[190] Over time, secondary and cumulative impacts from repeated development can result in the gradual and irreversible loss of archaeological, cultural, and historic resources, which are nonrenewable and cannot be replaced once destroyed.

Archaeological resources are the physical remains of past human activity, including artifacts, foundations, and burial sites, many of which are preserved beneath the ground surface. Construction activities pose a risk to these resources through ground-disturbing actions such as excavation, grading, trenching, and drilling, can damage or destroy archaeological materials before they are identified or documented.[191] In addition, vibrations generated by heavy equipment or blasting may further compromise fragile remains or cause subsurface features to collapse. Even when archaeological materials are recovered, removing them from their original location can result in a loss of contextual information, essential to understanding their scientific and cultural significance. Construction also carries the risk of inadvertently disturbing human remains, including Indigenous burials, which can have serious cultural, ethical, and legal consequences. Increased access to construction sites may additionally expose archaeological resources to looting, theft, or vandalism.

---

[187] Minn. R. 7850.4100 (D). (2025).

[188] Minnesota Statutes, Section. 138.31, subd. 14.

[189] Minnesota. Statutes, Section 138.51.

[190] Sharon Sullivan and Richard Mackay, eds., *Archaeological Sites: Conservation and Management* (Los Angeles: Getty Conservation Institute, 2013), accessed January 6, 2026, Getty Publications Virtual Library, https://www.getty.edu/conservation/publications_resources/books/arch_sites_conserv_mgmnt.html

[191] Jim Williams and Mike Corfield, "*Construction Impacts on in Situ Preservation of Archaeological Sites and Artefacts*," in *Proceedings of the 5th European Commission Conference on Cultural Heritage Research: A Pan -European Challenge*, Cracow, Poland, 2002, accessed January 6, 2026, Historic England Research Reports, https://historicengland.org.uk/research/results/reports/5797/PlanningMitigationandArchaeologicalConservationResourceAssessment

Cultural resources include sites, landscapes, and practices that are central to the identity and heritage of living communities, particularly Indigenous and traditional groups. Construction activities may adversely affect these resources by altering or destroying culturally significant sites (i.e., sacred areas, traditional use locations, or cultural landscapes), resulting in a permanent loss of cultural meaning. Construction may also restrict access to areas used for ceremonies, gathering, or cultural education, limiting the community ability to sustain important traditions. Visual and auditory intrusions, including noise, dust, lighting, and changes to viewsheds, can further diminish the cultural and spiritual value of these places, while land use changes may disrupt traditional practices and cultural continuity.

Historic resources, which include buildings, structures, districts, or objects typically at least 50 years old, may also be affected by construction. Similar to archaeological resources, impacts to historic resources can include demolition or alteration, physical damage from vibration or excavation, and the introduction of incompatible new development that diminishes historic character.

In Minnesota, several statutes provide a legal framework for the protection of archaeological, cultural, and historic resources. The Minnesota Field Archaeology Act (Minn. Stat. §§ 138.31–138.42) governs identification, preservation, and management of archaeological sites, requiring state agencies to review development activities that may affect these resources. The Minnesota Historic Sites Act (Minn. Stat. §§ 138.661–138.669) establishes state responsibilities for historic preservation, including maintaining registers of significant historic properties and ensuring that projects consider potential impacts to these resources. The Minnesota Private Cemeteries Act (Minn. Stat. § 307.08) protects burial sites by regulating disturbances and requiring consultation with appropriate authorities when human remains are present. At the local level, Minnesota Statute § 471.193 authorizes cities, counties, and towns to establish heritage preservation commissions, empowering communities to safeguard historic and cultural resources within their jurisdictions. Together, these statutes provide a coordinated framework to balance development with the preservation of the state's archaeological, cultural, and historic heritage.

Potential Impacts

No historic or architectural resources have been previously inventoried within the project area.[192] Two historic resources were identified adjacent to the project boundary: Bridge 24004 (FE-SHE-0008) and Trunk Highway 65 (XX-ROD-00178). Neither of these resources will be affected by the project. An additional nine historic resources were identified within a one-mile buffer of the project area; however, none of these resources have been evaluated for listing in the National Register of Historic Places (NRHP).[193]

The project area lies within Minnesota Archaeological Region 2e (Prairie Lake [East]). Archaeological village sites from earlier prehistoric periods are most commonly situated on islands, lake peninsulas, and along major river systems. Woodland period sites exhibit a similar distribution pattern but are generally associated with temporary camps or specialized activity areas. Material culture from these periods is typically represented by ceramic, lithic, and ground stone technologies. Euro-American settlement initially concentrated along river

[192] Midwater Application, Section 6.4.1, 103.
[193] Midwater Application, Table 6.4-2, 103.

corridors and later expanded according to surveyed township and range divisions. Freeborn County represents the southeasternmost extent of this archaeological region.

Archaeological and cultural resources in Freeborn County were inventoried in 2022.[194] The inventory aimed to expand knowledge of precontact and contact-period archaeological sites in Freeborn County, through a survey of 2,603 acres. This inventory documented 37 previously unrecorded sites and revisiting one known site, while assigning designations to four reported localities. Additional findings noted that a geomorphology-based search revealed previously overlooked potential areas, as well as the role of water sources and stream valley sites for identification of historic habitation. None of the sites revealed in this inventory are located within the Midwater project area.

The project area has been impacted by agricultural practices for over a century and aggregate mining for decades. Midwater conducted a Phase I Archaeological Reconnaissance Survey that included a site review with surficial excavation at the site (i.e., shovel survey) to determine if archaeological resources were present within the project area.[195] Midwater noted that there is a single previously recorded archaeological site recorded, located approximately ½ mile to the east of the project.[196] This site was not developed by Midwater. The Phase I Archaeological Reconnaissance Survey report was submitted to the SHPO for review on August 28, 2024. SHPO provided a letter dated October 22, 2024, indicating that based on the results of the survey, they agree that there are no properties listed in the National or State Registers of Historic Places, or within the Historic Sites Network, that will be affected by this project.[197] They also agree that there are no known or suspected archaeological resources that will be affected by the project.[198]

The potential for project construction-related impacts to archeological, cultural, and historic resources is negligible.

Mitigation

While the likelihood of a construction-related impact to archeological, cultural, and historic resources at the project area is not likely, Midwater will prepare an Unanticipated Discoveries Plan (UDP) that outlines the steps they will take if previously unrecorded cultural resources or human remains are encountered during construction.[199]

Potential Visual and Landform (Setting) Impacts

Potential visual and landform impacts describe how a project may affect the appearance, visibility, or physical setting of archaeological, cultural, or historic sites. Visual impacts occur when construction or other changes alter how a site is seen or experienced, while landform impacts involve changes to terrain or topography that may disturb the site's natural context. Because these

---

[194] Austin A. Buhta, Rolfe D. Mandel, Aaron J. Mayer, Alexander T. Anton, and William P. Nanavati, *Freeborn County, Minnesota: An Archeological and Geomorphological Resources Inventory and Appraisal: Public Summary Report*, Archeological Contract Series 333 (June 2022), accessed September 18, 2025, https://mn.gov/admin/assets/Freeborn%20County%20Final%20Report%20Public%20Version_tcm36-539896.pdf

[195] Midwater Application, Appendix F.

[196] Midwater Application, Table 6.4-1, 102-103.

[197] Midwater Application, Section 6.4.2, 104. Appendix B-2.

[198] *Ibid.*

[199] Midwater Application, Section 6.4.2.1, 104.

resources are valued for landscape context as well as their physical features, such changes can reduce cultural and aesthetic appreciation, limit educational or interpretive opportunities, and compromise research potential.

Potential visual and landform impacts were evaluated through the Freeborn County archeological and geomorphological resources inventory and appraisal, along with Midwater's visual analysis and noise modeling. Impacts are evaluated as sensory (visual and aural) as well as potential access restrictions.

Archeological and cultural resources have been identified around the project area, with the greatest concentration of documented sites centered around the Albert Lea Lake and Myre-Big Island State Park.[200] The closest archaeological site is located to the east of the project area approximately one-half mile. As previously discussed, two features of historical and architectural interest were also noted based on Midwater's investigation.

Midwater maintains that the visual impact of the BESS would not be out of character with the existing ITC Midwest Glenworth Substation and related infrastructure, explaining that the enclosures are neutral in color, relatively low in height (approximately ten feet, including foundations), and approximately 22.9 feet long.[201] In addition, the constructed portion of the project area will feature a three-tier vegetative buffer, providing additional visual screening. Given the distance between the project area and archaeological, cultural, and historical resources, visual impacts are considered negligible. Project construction and operation-related impacts to the local landscape are not anticipated to affect or interfere with the visual character of identified resources.

Ambient noise can adversely affect the individual and public experience with archaeological, cultural, or historic resource of interest these resources. To evaluate these impacts, Midwater provided a noise modeling investigation that assessed potential facility noise impacts through a comparison of the State of Minnesota noise standards.[202] The facility, when considered with existing background noises sources, is expected to comply with the nighttime Minnesota noise standards at distances beyond 1,000 feet from the geographic center of the BESS operation (See Figure 9). Identified archaeological, cultural, or historic resources of interest are outside the 1,000-foot noise impact area and are not expected to be affected by project-related noise during typical or atypical operating conditions.

Mitigation

Potential visual and landform impacts from the project are not likely to affect the appearance, visibility, or physical setting of archaeological, cultural, or historic sites. No mitigation is expected.

4.7 Natural Resources

BESS facilities affect the natural environment. The environmental effects are dependent upon many factors, such as how the project is designed, constructed, maintained, and decommissioned. Other factors, for example, include the project's environmental setting, which influence potential effects.

---

[200] *Freeborn County, MN: An Archeological and Geomorphological Resources Inventory and Appraisal*, Figure 16, 90.
[201] Midwater Application, Section 5.1.1.1, 38. See also Section 6.2.1.1, 65.
[202] Midwater Application, Appendix E.

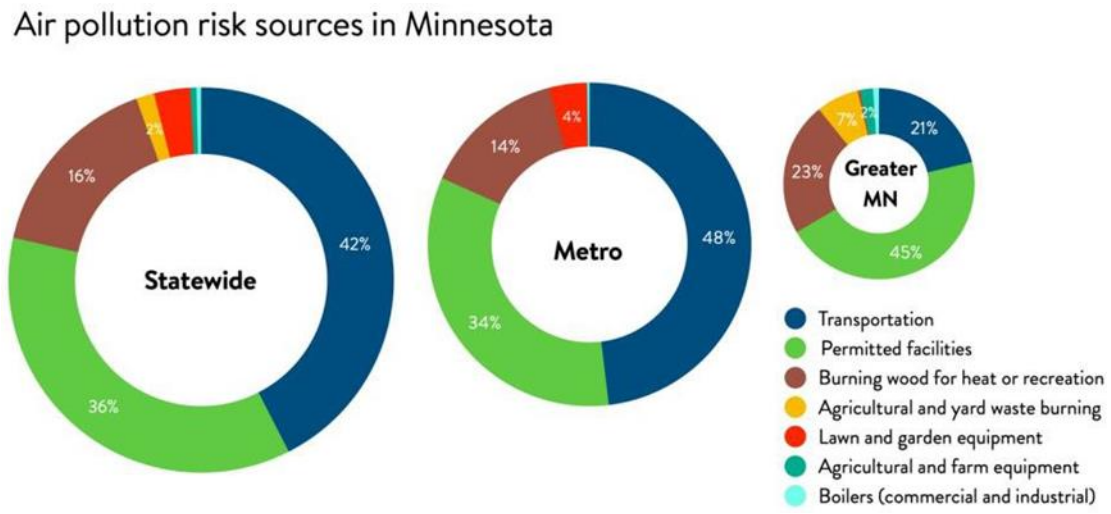
A project's environmental effects and their related resulting impacts can and do vary significantly both within, and across, projects. This EA evaluates the project's environmental effects on air and water quality, as well as flora and fauna.

4.7.1 Air Quality

The ROI for air quality is the regional airshed. Potential impacts on air quality are evaluated through three scenarios as described in Chapter 4.1.2: construction, typical/atypical operations, and an accident scenario. During construction, air quality impacts would be intermittent, localized, short-term, and minimal. Impacts are associated with fugitive dust and exhaust. Impacts can be mitigated. Once operational, the project will not generate criteria pollutants or carbon dioxide. Negligible fugitive dust and exhaust emissions would occur as part of routine maintenance activities. Impacts are unavoidable and do not affect a unique resource. Impacts can be minimized. Air quality impacts are possible under the accident scenario. These impacts could be significant, though temporary, and mitigated through local fire and emergency government response.

Air quality is a measure of how pollution-free the ambient air is and how healthy it is for humans, other animals, and plants. Emissions of air pollutants will occur during construction and operation of new infrastructure for the project. Overall air quality in Minnesota has improved over the last 20 years, but current levels of air pollution still contribute to health impacts. As illustrated in Figure 11, today, most of our air pollution that can lead to health effects are transportation, permitted facilities, and wood burning for heat or recreation. Transportation has a much greater contribution to air pollution in the metro area than in greater Minnesota

Figure 11. Air Pollution Sources[203]



The nearest air quality monitor to the project is in Rochester, Minnesota, approximately 50 miles northeast of the facility. Glenville air quality conditions are presented in Chapter 4.2, with air quality conditions in this area generally good.

[203] Minnesota Pollution Control Agency, The Air We Breathe: The State of Minnesota's Air Quality, January 2025 Report to the Legislature (2025), 12–13, accessed February 12, 2026, https://www.pca.state.mn.us/sites/default/files/lraq-1sy25.pdf

Construction Phase Impacts

Minimal intermittent air emissions are expected during construction of the project. Air emissions associated with construction are highly dependent upon weather conditions and the specific activity occurring. For example, traveling to a construction site on a dry gravel road will result in more fugitive dust than traveling the same road when wet. Once operational, neither the BESS nor the transmission line will generate criteria pollutants or carbon dioxide.

Motorized equipment will emit exhaust. This includes construction equipment and vehicles travelling to and from the project. Exhaust emissions, primarily from diesel equipment, would vary according to the phase of construction.

All projects that involve movement of soil, or exposure of erodible surfaces, generate some type of fugitive dust emissions. The project will generate fugitive dust from travel on unpaved roads, grading, and excavation.

Typical and Atypical Operating Scenario Impacts

Emissions associated with maintenance are dependent upon weather conditions and the specific activity occurring. Vehicle exhaust will be emitted during maintenance visits to the generating facility. The applicant indicates that, over the life of the project, fugitive dust emissions will be reduced by the elimination of farming-related emissions and establishment of permanent vegetative cover.

Accident Scenario Impacts

Midwater evaluated the potential dispersion and off-site impacts of air pollutants that could be emitted during a thermal runaway event within a lithium-ion BESS. The analysis focused on the proposed Midwater BESS in Freeborn County and was conducted to support fire safety evaluation, regulatory review, and hazard mitigation planning for an outdoor, utility-scale energy storage installation. An important assumption included in this modeling is that a fire is contained to a single battery cabinet, as the distance between cabinets is designed to avoid or eliminate fire propagation (i.e., fire jumping from cabinet to cabinet) under this scenario.

The primary modeling objective was to assess the potential downwind extent of gases and soot-related visibility reduction associated with a BESS cabinet fire. A conservative worst-case fire scenario was developed using established electrical-to-combustion energy conversion methods, published industry data, and alignment between modeled thermal impacts and observed enclosure damage.

The calculated heat release rate, combustion product yields, and associated parameters were then used as inputs for the plume dispersion modeling performed using the Fire Dynamics Simulator (FDS), a computational fluid dynamics model developed and maintained by the National Institute of Standards and Technology (NIST). FDS is a widely accepted and extensively validated fire modeling tool used by regulatory agencies, researchers, and fire protection professionals, and is supported by a substantial body of peer-reviewed literature. Modeling scenarios evaluated a range of wind speeds, wind directions, and BESS cabinet configurations representative of outdoor, utility-scale installations, with conservative assumptions applied to reflect credible worst-case conditions. A copy of the modeling report is included in Appendix F.

Modeling results indicate that concentrations of carbon monoxide, hydrogen fluoride, and carbon dioxide generated during the modeled fire scenario decrease rapidly with distance from

the source:

- Carbon monoxide concentrations at the site boundary remained below the Immediately Dangerous to Life or Health (IDLH) threshold of 1,200 parts per million established by the National Institute for Occupational Safety and Health (NIOSH).
- Hydrogen fluoride concentrations, estimated using a conservative carbon monoxide–to–hydrogen fluoride ratio, exhibited only brief exceedances of the 30 parts per million IDLH value within the near-field plume and did not extend to the site boundary.
- Carbon dioxide concentrations remained well below the 40,000 parts per million IDLH threshold and were confined to the immediate vicinity of the initiating cabinet.
- Reduced visibility due to soot was limited to the immediate plume region near the source and did not extend to the site boundary.

Overall, the plume analysis demonstrates that potential impacts from toxic gases and smoke associated with a worst-case BESS fire scenario would be localized and would not result in off-site impacts or acute inhalation risks. The modeled results are consistent with available large-scale fire test observations and established FDS modeling principles. Although the analysis conservatively evaluated the BESS cabinet closest to the facility property boundary, the conclusions are applicable regardless of the location of a hypothetical initiating fire within the facility. In the event of a complete and sudden thermal runaway, the emergency response would follow the established procedures discussed in Chapter 4.4, with the addition of state resources deployed to assess on-site conditions and determine the most effective actions to mitigate the hazard.[204]

Mitigation

During the construction phase, exhaust emissions can be minimized by keeping vehicles and equipment in good working order and not running equipment unless necessary. In addition, watering exposed surfaces, covering disturbed areas, and reducing speed limits on-site are all standard construction practices. Several sections of the draft site permit indirectly mitigate impacts to air quality, including sections related to soils, vegetation removal, restoration, and pollution and hazardous wastes.

Under the typical and atypical scenario, the facility is not likely to emit regulated air pollutants in amounts that require regulatory action; however, if emissions exceed regulatory levels, reporting practices are established through their operations and maintenance plans.

While an accident scenario is not likely, it is not impossible. Mitigation occurs at both the level of the facility as well as informing and shaping the community emergency management response. Under the current application, Midwater is required by industry standards to design and install fire protection and hazard prevention practices. This includes conducting a rigorous hazard analysis, along with thorough mitigation planning that reduces the probability and consequence of a thermal runaway.[205] In addition, system-level safety is established through

[204] The Minnesota State Fire Marshall uses real-time tools to support emergency response situations in support of local emergency services.

[205] Midwater Application, Section 6.2.5.4, 79, notes “The BESS equipment will also be either certified or compliant with relevant safety standards in place at the time of final design, including National

integrated protective responses under failure conditions, as well as thermal runaway propagation testing that quantifies risk and feeds the cabinet spacing and related mitigation decisions. This work is further supported by the fire plume modeling demonstration.

Mitigation suggested by the ATF included distributing the project's hazard mitigation analysis information with local emergency responders.

- Section 5.5 is a special condition that requires the permittee to distribute their Hazard Mitigation Analysis with emergency responders prior to the project's pre-construction meeting.

4.7.2 Soils

The ROI for soil resources is the land control area. Impacts on soil resources will occur during construction and decommissioning of the project. The level of impact is expected to be minimal. Potential negative impacts will occur over both the short- and long-term. Isolated moderate to significant negative impacts associated with high rainfall events could occur.

The Soil Survey of Freeborn County indicates that soils in the county are predominantly deep, well-drained soils formed from loamy alluvium and sandy outwash.[206] These soils are characterized by loamy surface sediments underlain by sandy and gravelly outwash. Within the project area, soils are primarily sandy loams, with smaller extents of clay loam soils. When adequately drained, these soils are well suited to the existing agricultural uses.

The project area exhibits gently rolling topography, with elevations ranging from approximately 1,204 to 1,230 feet above mean sea level, consistent with its historical row-crop agricultural use. Small, localized areas of hydric soils are present throughout the project area.207 The project area soil types are charactered in Table 13 and Figure 12. Project Area Soils (Appendix B).

Fire Protection Association (NFPA) 68, NFPA 69, and NFPA 855."

[206] Soil Survey Staff, USDA Natural Resources Conservation Service, *Web Soil Survey: Freeborn County, Minnesota* (Washington, DC: U.S. Department of Agriculture, 2019), accessed January 12, 2026, https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

[207] Natural Resources Research Institute, *Minnesota Natural Resources Atlas: Water Table—Depth* (Duluth, MN: University of Minnesota–Duluth, 2024), accessed January 12, 2026, https://mnatlas.org/gis-tool/?id-k_0279 See also Appendix D, Information Request 3, regarding hydric soils and the project Vegetative Management Plan, especially during decommissioning.

Table 13. Project Area Soils[208]

Map Unit Symbol	Map Unit Name	Hydric Classification	Acres
1030	Pits, sand and gravel	Non-hydric	24.61
W	Water	Non-hydric	10.14
41B	Estherville sandy loam, 2 to 6 percent slopes	Predominantly non-hydric	7.80
27	Dickinson fine sandy loam, 0 to 2 percent slopes	Predominantly non-hydric	6.26
156	Fairhaven loam, 0 to 2 percent slopes	Predominantly non-hydric	0.57
41C	Estherville sandy loam, 6 to 12 percent slopes	Predominantly non-hydric	14.38
5B	Dakota loam, 2 to 6 percent slopes	Predominantly non-hydric	3.49
5C	Dakota loam, 6 to 14 percent slopes	Predominantly non-hydric	4.39
41	Estherville sandy loam, 0 to 2 percent slopes	Predominantly non-hydric	0.43
5	Dakota loam, 0 to 2 percent slopes	Predominantly non-hydric	19.09
465	Kalmarville loam, frequently flooded	Predominantly non-hydric	6.72
1055	Aquents and Histosols, ponded	All hydric	0.84
392	Biscay clay loam, 0 to 2 percent slopes	All hydric	2.50
517	Shandep loam	All hydric	1.40
525	Muskego soils, 0 to 1 percent slopes	All hydric	1.75
Total Acres			104.39

Potential Impacts

Soil impacts would occur primarily during project construction and, to a lesser extent, during operation. Construction-related impacts would result mainly from grading and excavation for the substation, BESS, operations and maintenance facility, laydown yard, stormwater basins, and access roads. Given the rolling topography and existing agricultural land use, limited grading would be required. Temporary soil compaction could occur in undeveloped portions of the project area due to equipment use and installation of BESS module foundations. These impacts would be mitigated through the use of low-impact construction equipment and methods, regrading, and post-construction tilling where appropriate.

Hydric soils are primarily located within jurisdictional wetlands and outside of the proposed BESS and HVTL project development disturbance areas.[209] Two hydric map units (Unit 517, *Shandep loam*; and Unit 392, *Biscay clay loam, 0-2 percent slopes*) will be disturbed by construction activities. Most of the *Shandep loam* located in the BESS project area will be disturbed and covered with gravel to accommodate a stabilized equipment pad and therefore will not require management until project decommissioning. The *Biscay clay loam* is located in the northern portion of the project area where transmission line structures will be placed, resulting in minimal soil disturbance. The *Shandep* soils will be stockpiled separately and used to restore and reclaim the site to existing pre-construction conditions.[210] Excavated topsoil management will follow BMP's illustrated in the Midwater application.[211]

[208] Adapted from Midwater Application, Table 6.5-4: Project Area Soils

[209] Midwater BESS, LLC, Response to Energy Infrastructure Permitting Information Request #3, December 18, 2025.

[210] Midwater Application, Appendix D, Decommissioning Plan.

[211] Midwater Application, Section 6.5.4.1, 119.

During project operation, minor soil compaction could occur along access roads from routine maintenance vehicle use. These impacts are expected to be negligible and confined to the roadbeds. Overall, the project is expected to reduce long-term erosion potential by establishing permanent vegetative cover. Additional erosion control measures would include gravel surfacing the access roads and installation of culverts to manage and redirect surface water runoff.

Because construction would disturb more than one acre of land, the project would require coverage under the MPCA Construction Stormwater General Permit. A Stormwater Pollution Prevention Plan (SWPPP) would be prepared and submitted by Midwater along with the Notice of Intent, as required due to the project's proximity to impaired water.[212] The SWPPP would identify best management practices (BMPs), including erosion and sediment controls, revegetation measures, soil stabilization, and dust control practices, to minimize soil erosion and protect adjacent resources during construction and operation. Stormwater ponds would be installed in accordance with MPCA and Shell Rock River Watershed District requirements to collect and treat runoff during project operation.

Mitigation

Several sections of the DSP (Appendix C) address soil-related impacts:

- Section 4.3.9 requires protection and segregation of topsoil.
- Section 4.3.11 requires the permittee to obtain a MPCA CSW Permit and implement the BMPs within for erosion prevention and sediment control.
- Section 5.10 is a special condition that requires the permittee to develop an AIMP with MDA. The plan will detail methods to minimize soil compaction, preserve topsoil, control noxious weeds and invasive species, maintain the existing drainage conditions through appropriate maintenance and repair of existing drain tile, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use.
- Section 5.11 requires the permittee to develop a VMP that defines how the land control area will be revegetated and monitored over the life of the project. Appropriate seeding rates and timing of revegetation will stabilize soils and improve overall soil health. Midwater has included a draft VMP as Appendix C of its site permit application.

4.7.3 Surface Water and Floodplains

The ROI for surface water resources is the land control area. The level of impact is anticipated to be minimal under typical or atypical operation scenarios; however, in an accident scenario, impacts may be significant, affecting air, water, and land resources, though reversible and likely short-term. Direct impacts to surface waters are not expected. Indirect impacts to surface waters might occur. These impacts will be short-term, of a small size, and localized. Impacts can be mitigated.

---

[212] See Minn. R. 7090 Sec. 3.3, as well as Minnesota Pollution Control Agency (MPCA), "Impaired Waters: 2024 Viewer" (St. Paul, MN: Minnesota Pollution Control Agency, 2024), accessed January 12, 2026, https://mpca.maps.arcgis.com/apps/webappviewer/index.html?id=fcfc5a12d2fd4b16bc95bb535d09ae82

Large electric power facilities have the potential to impact surface water resources and floodplains. These projects could directly impact water resources and floodplains if these features cannot be avoided through project design. These projects may also indirectly impact surface waters and floodplains though construction activities which move, remove, or otherwise handle vegetative cover and soils. Changes in vegetative cover and soils can change runoff and water flow patterns.

The project is located in the Shell Rock River Watershed, a major watershed in the Mississippi River Basin.[213] Two National Hydrography Dataset (NHD) watercourses and three NHD waterbodies are mapped within the project area; however, none occur within the proposed BESS development area or the proposed HVTL development area. The proposed BESS and HVTL will not impact any NHD flowlines. In addition, one Minnesota Department of Natural Resources (DNR) Public Waters Inventory (PWI) feature is present within the project area but will not be affected by the proposed BESS or HVTL.[214]

Floodplains are flat, or nearly flat, land adjacent to a river or stream that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which includes areas covered by the flood, but which do not experience a strong current. Floodplains prevent flood damage by detaining debris, sediment, water, and ice. The Federal Emergency Management Agency (FEMA) delineates floodplains and determines flood risks in areas susceptible to flooding. The base flood that FEMA uses, known as the 100-year flood, has a one percent chance of occurring during each year.

At the state level, the DNR oversees the administration of the state floodplain management program by promoting and ensuring sound land use development in floodplain areas in order to promote the health and safety of the public, minimize loss of life, and reduce economic losses caused by flood damages. The DNR also oversees the national flood insurance program for the state of Minnesota. Floodplains are also regulated at the local level.

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) were reviewed to evaluate existing floodplains and flood risk within the project area. The applicable FEMA map for Freeborn County at the project location (FIRM Panel 27047C0395C; effective November 19, 2014) indicates the presence of 100- and 500-year floodplains (Flood Hazard Zone AE) and a mapped floodway within the project area.[215] These floodplain features are associated with the Shell Rock River along the southeastern perimeter of the project area.[216] Field verification confirmed mapping that 100- and 500-year floodplains are present within the project area (See Figure 13. Project Area Flood Maps, Appendix B).

Under Section 303(d) of the Clean Water Act, states are required to assess all waters of the state to determine if they meet water quality standards, list waters that do not meet standards and update the list biannually and conduct total maximum daily load studies to set pollutant-reduction goals needed to restore waters to the extent that they meet water quality standards for designated uses.

---

[213] Minnesota Department of Natural Resources, "Minnesota's Watershed Basins," *Minnesota Department of Natural Resources*, accessed January 13, 2026, https://www.dnr.state.mn.us/watersheds/map.html

[214] Midwater Application, Section 6.5.5.1, 120, 121.

[215] Midwater Application, Section 6.5.5.3, 123-124.

[216] Federal Emergency Management Agency (FEMA), National Flood Hazard Layer (NFHL) Viewer (2017), accessed January 13, 2026, https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd

The list, known as the 303(d) list, is based on violations of water quality standards. The MPCA has jurisdiction over determining 303(d) waters in the State of Minnesota.

There are two waters listed by the MPCA as impaired waters within the project area. The Shell Rock River, and Salem Creek, discussed in Chapter 4.2. The impairments include mercury, nutrient, dissolved oxygen, and turbidity (Shell Rock River) and fecal coliform (Salem Creek). The Shell Rock River is the receiving water for facility stormwater runoff. Potential nonpoint sources of pollution reflect livestock and crop production, with potential point source contributions from the Glenville WWTF and Glenville-POET (See Chapter 4.2).

Construction Phase Impacts

The project has been designed to avoid direct impacts to surface waters by siting facilities away from waterbodies. However, construction activities could result in potential indirect impacts if sediment or fugitive dust from excavation, grading, vegetation removal, or construction traffic were to enter nearby surface waters. All pole structures and BESS facility components have been located outside of the Shell Rock River watercourse to prevent permanent water quality impacts to the river. Nonetheless, there is a potential for construction-related erosion and sedimentation, as an impaired segment of the Shell Rock River is approximately 26 feet from the proposed BESS facility development area. Temporary stormwater infrastructure will be used during construction, sediment basins, silt fences, and other temporary controls must be maintained to prevent uncontrolled discharge, consistent with their MPCA construction stormwater permit.

Typical and Atypical Operating Scenario Impacts

When in operation, Midwater will function under their NPDES, SPCC plan, and their SWPPP, as well as the Commission site permit. Both typical and atypical operations involve stormwater quality monitoring to manage the stormwater basin pollutant load.

Under the typical scenario, two stormwater management issues have surface water impact potential. The first is stormwater volume. Impervious surfaces such as access roads, concrete pads that support the battery cabinets, and associated infrastructure, can increase runoff volume. Under high rainfall or rapid snowmelt conditions, localized flooding or channel erosion, if not managed with infiltration or detention measures, may be an issue. The Midwater BESS will include two stormwater detention basins, sized to accommodate anticipated stormwater volumes, through the Shell Rock River Watershed District basin sizing criteria, which will be included in the facility NPDES permit and SWPPP.

The second issue is specific to stormwater quality concerns. Sediment is the primary pollutant of concern, but construction and BESS-related maintenance and battery chemicals (fuels, lubricants, coolant, concrete wash water) could enter the stormwater detention basins. Additionally, Lithium-ion or other battery chemistries may contain electrolytes that, if released from damaged units, could contaminate stormwater. Along with ongoing surveillance of the BESS operations to determine the presence of leaks or related failures, Midwater will conduct water quality testing of the detention basin water to determine if treatment is needed prior to discharging stormwater to the Shell Rock River.[217]

[217] See Chapter 4.7.4

The proposed BESS and HVTL facilities are designed to avoid impacts to flood zones with all project infrastructure sited completely outside of mapped FEMA flood zones. Additionally, floodwaters would not be impacted by the BESS. As a result, the project will not impact FEMA-mapped floodplains.[218]

Accident Scenario Impacts

The accident scenario reflects the significant, though unlikely event of a thermal runaway situation. Environmental impacts include pollutant-related stormwater runoff, that may include fire suppressant chemistry or chemistry related to electrolytes and coolant. In addition, BESS-related debris may also be entrained within the runoff and could make its way to the Shell Rock River. The second surface water quality impact is the possibility of contamination from the deposition of particulate matter and gases related to the thermal runaway condition.[219] Typically, thermal runaway events are relatively short in duration so the likelihood that short or long-term deposition-related impacts occur as a result of a thermal runaway are not likely; however, if they do occur, they could affect surface waters.

Mitigation

Standard construction management practices, including, but not limited to containment of excavated soils, protection of exposed soils, stabilization of restored soils, and controlling fugitive dust, would minimize the potential for eroded soils to reach surface waters.

Best management practices to minimize the impact on surface waters will be utilized as a part of the SWPPP, including but not limited to sediment control, revegetation plans, and management of exposed soils to prevent sediment from entering waterbodies.[220] Preliminary design for the project also anticipates two stormwater basins to control runoff from the project.[221]

The DSP (Appendix C) has two standard conditions and a special condition that addresses potential impacts on surface waters:

- Section 4.3.11 requires the permittee to "implement erosion prevention and sediment control practices recommended by the [MPCA]" and to "obtain a [CSW Permit]." A CSW Permit requires both temporary and permanent stormwater controls. This section also requires implementation of erosion and sediment control measures, contours graded to provide for proper drainage, and all disturbed areas be returned to pre-construction conditions. Midwater will also develop a Stormwater Pollution Prevention Plan (SWPPP) that complies with MPCA rules and guidelines. The SWPPP describes construction activity, temporary and permanent erosion and sediment controls, BMPs, permanent stormwater management that will be implemented during construction and through the life of the project. Implementation of the protocols outlined in the SWPPP will minimize the potential for soil erosion during construction.

[218] Midwater Application, Section 6.5.5.3.1, 124.
[219] L. P. Wright, L. Zhang, I. Cheng, J. Aherne, and G. R. Wentworth, "Impacts and Effect Indicators of Atmospheric Deposition of Major Pollutants to Various Ecosystems—A Review," Aerosol and Air Quality Research 18 (2018): 1953–1992, https://doi.org/10.4209/aaqr.2018.03.0107 (accessed February 4, 2026).
[220] Midwater Application, Section 6.5.4, 119.
[221] Midwater Application, Section 6.5.5.4.1, 125.

- Section 4.3.23 requires that "site restoration and management" practices enhance "soil water retention and reduces storm water runoff and erosion".

In addition to the general conditions, a special condition is also included in the DSP to address surface water impacts:[222]

- Section 5.12 requires the permittee to prepare and file a Surface and Groundwater Monitoring Plan (SGMP). The SGMP must be designed to detect, evaluate, and respond to any potential impacts to surface water or groundwater resulting from construction, operation, or emergency events at the facility. The SGMP must be prepared in coordination with the Minnesota Pollution Control Agency (groundwater) and the Shell Rock River Watershed District (surface water).

The SGMP would require water quality sampling of the stormwater basin contents, as well as pollutant-based action limits prior to stormwater basin discharge. Other permit conditions would be enacted in the event an accident scenario occurs, including sections 8.11 and 8.12 discussed in Chapters 4.4 and 4.7.4 respectively.

4.7.4 Geology and Groundwater

The ROI for geology and groundwater is the land control area. Impacts on domestic water supplies are not expected. Impacts on geology are not anticipated. Localized impacts to groundwater resources, should they occur, would be intermittent, but have the potential to occur over the long-term. Indirect impacts from surface waters might occur during construction. Impacts can be mitigated through use of BMPs for stormwater management.

Geology

The *County Geologic Atlas of Freeborn County, Minnesota* indicates that the county's surficial geology reflects deposition by glacial ice and meltwater.[223] Surficial materials within the project area primarily consist of glacial drift composed of glacial till, characterized by a matrix of sand, silt, and clay with scattered pebbles, cobbles, and occasional boulders. The thickness of glacial drift overlying bedrock in Freeborn County generally ranges from less than 50 feet to more than 200 feet.

Bedrock underlying the project area consists of Upper Cretaceous, Middle Devonian, Upper Ordovician, and Middle Ordovician formations.[224] Much of the project area is located in the northern portion of Freeborn County, which is primarily underlain by the Maquoketa and Galena Group bedrock. The Maquoketa Group consists of carbonate rock, fine-grained limestone, shaly limestone, and shale with a gradational basal contact. The Galena Group is composed of carbonate rock, including fine-grained white to yellow-gray limestone, dolomitic limestone, and interbedded sandy, shaly, and silty units. Northern portions of the project area are underlain by the Dubuque, Windrow,

[222] This condition reflects the work of the Midwater Citizen Advisory Task Force. The Shell Rock River Watershed District (SRRWD) will manage SGMP approval, as well as data management and incident reporting. The SRRWD-approved SGMP will be included in the MPCA Construction Stormwater Permit.
[223] Mankato State University, Geologic Atlas of Freeborn County, Minnesota (1991), accessed January 14, 2026, https://mrbdc.mnsu.edu/sites/mrbdc.mnsu.edu/files/public/gis/minnesota_geologic_atlas/freeborn_county_geologic_atlas.pdf
[224] Lusardi, Barbara A., Angela S. Gowan, Jennifer M. McDonald, Katherine J. Marshall, Gary N. Meyer, and Kaleb G. Wagner, "Minnesota Geological Survey" (2019), accessed January 14, 2026, https://conservancy.umn.edu/handle/11299/208552

Spillville, Glenwood, and Platteville formations, which consist of fossiliferous limestone, shale, and clay-rich units.

County Well Index (CWI) well log data indicate that depth to bedrock within the project area ranges from approximately 120 to 240 feet, with bedrock depths generally increasing toward the eastern and southeastern portions of the project area.[225]

A desktop geotechnical evaluation was completed for the Project Area in January 2024. This evaluation included a review of U.S. Geological Survey (USGS) information on karst hazard potential, as well as University of Minnesota and Minnesota Department of Natural Resources (DNR) Ecological and Water Resources Division karst mapping.[226] Mapping of susceptible geologic features indicates that sinkholes, shallow limestone formations, unconfined or shallow aquifers, and other karst conditions are not present within or near the project area. The mapping tool identifies the nearest mapped karst feature approximately 13 miles southeast of the project area, near the intersection of Highway 105 and the Iowa border. Based on these data sources, the potential for karst-related features within the project area is considered low.

Groundwater

The project area is located within the South-Central Minnesota Groundwater Province, which is characterized by thick glacial sediments composed primarily of loam and clay loam overlying regionally extensive Paleozoic sandstone and carbonate bedrock aquifers.[227] Aquifers present in the vicinity include the Upper Carbonate aquifer, Cambrian-Ordovician aquifer system, St. Peter–Prairie du Chien–Jordan aquifer, and Mount Simon aquifer.[228] These bedrock aquifers are regionally important water resources due to their high water-bearing potential; however, they are generally confined beneath clay-rich glacial deposits with limited shallow sand aquifers.

A review of U.S. EPA Sole Source Aquifer (SSA) designations, the Minnesota Well Index (MWI), and University of Minnesota Natural Resources Research Institute wellhead protection mapping indicated that no EPA-designated SSAs occur within the project area. The project area is not located within a delineated Minnesota Department of Health (MDH) Wellhead Protection Area (WHPA); however, a portion of the Glenville Drinking Water Supply Management Area (DWSMA) occurs in the northern portion of the project area. The BESS infrastructure is located outside of the DWSMA, though a segment of the HVTL is located within the DWSMA. No public water-supply wells or WHPAs are present within the project area. The nearest WHPA is located north of the project area.

Land use in the project area is primarily rural, and residences and farms typically rely on private wells and septic systems. According to the MDH Minnesota Well Index, no wells are located within

[225] Minnesota Department of Health (MDH), "Minnesota Well Index, version 2.1.2" (2024), accessed January 14, 2026, https://mnwellindex.web.health.state.mn.us/

[226] Minnesota Department of Natural Resources (DNR), "Karst Feature Inventory: Karst Features in Minnesota" (2022); updated April 14, 2024), accessed January 14, 2026, https://arcgis.dnr.state.mn.us/portal/apps/webappviewer/index.html?id=9df792d8f86546f2aafc98b3e31adb62

[227] Minnesota Department of Natural Resources (DNR), "Minnesota Groundwater Provinces" (2021), accessed January 14, 2026, https://files.dnr.state.mn.us/waters/groundwater_section/mapping/provinces/2021-provinces.pdf

[228] U.S. Geological Survey (USGS), "Ground Water Atlas of the United States, Hydrologic Atlas 730" (2000), accessed January 14, 2026, https://doi.org/10.3133/ha730

the project area. Within one mile of the project area, 18 wells have been identified, including 16 active domestic wells, one active test well, and one sealed environmental borehole (See Table 14, Figure 14. MDH Well Index within One Mile of the Project Area, Appendix B). These wells were drilled to depths ranging from approximately 15 to 160 feet, with an average depth to bedrock of approximately 84 feet below ground surface. DNR depth-to-water-table mapping indicates shallow groundwater conditions across much of the project area, with depths generally ranging from 0 to 10 feet and localized areas of 10 to 20 feet.

Table 14. MDH Well Index within One Mile of Project Area

Unique Well ID	Well Name	Well Elevation (ft)	Well Depth (ft)	Depth to Bedrock (ft)	Well Installation Date	Casing Depth (ft)	Well Use/Status
152793	Kral, Charles	1,240	156	106	08/17/1978	126	Domestic/Active
152795	Lenz, Theo	1,235	111	76	04/17/1979	91	Domestic/Active
226721	Pensinger, Lynn	1,227	138	110	03/18/1969	121	Domestic/Active
132514	Nelson, Harland	1,236	125	70	05/18/1976	95	Domestic/Active
103524	Waalkens, John	1,220	100	70	03/20/1976	78	Domestic/Active
226437	Hauge, Duane	1,230	144	Unknown*	01/1968	Unknown[Ŧ]	Domestic/Active
191940	Soil Exploration	1,235	32	Unknown*	04/18/1985	19	Test Well/Active
781805	Flatness, Donald	1,221	160	101	05/07/2012	107	Domestic/Active
103531	Nelson, Harland	1,236.3	125	70	05/08/1976	95	Domestic/Active
342328	Rayman Enterprises	1,230	15	Unknown*	05/24/17	15	Environmental Bore Hole (Sealed)
523121	ITT Financial Services	Unknown	125	80	01/26/1993	84	Domestic/Active
653883	Knutson, Ben	1,248	118	Unknown*	07/14/2001	111	Domestic/Active
685011	Flatness, Tom	1,228	90	80	05/15/2003	80	Domestic/Active
720967	Knack, Mrs. Richard	1,222	155	123	12/14/2005	130	Domestic/Active
793555	Madsen, Ryan	1,221	136	82	01/04/2013	86	Domestic/Active
806984	Kluender, Todd	1,219	110	70	10/20/2015	86	Domestic/Active
806955	Mayers, Rayan	1,221	150	83	04/07/2016	89	Domestic/Active
838311	Fredrickson, Dennis	1,229	110	83	12/26/2018	87	Domestic/Active

*Well did not encounter bedrock based on MDH Well Log Information

[Ŧ] No well casing details provided in MDH Well Log.

MDH vulnerability assessments for public water-supply areas consider geologic sensitivity, well construction, maintenance, and use. Based on these criteria, the Glenville DWSMA is classified as having moderate to high vulnerability. However, given the absence of wells within the project area and the siting of project infrastructure outside of WHPAs, no direct impacts to public or private groundwater supplies are anticipated.

Typical and Atypical Scenario Impact

For a groundwater impact to occur, a release from the BESS would need to (1) escape primary and secondary containment, (2) infiltrate underlying compacted gravel pad and soils, and (3) migrate downward to the water table. The surficial water table at the project site is anticipated to be approximately 10 to 20 feet.[229] The BESS design includes multiple engineered barriers that interrupt

[229] See Chapter 4.7.4

this pathway, including sealed enclosures, impermeable foundations, and controlled drainage. As a result, a complete exposure pathway to groundwater is not present under normal or reasonably foreseeable conditions. Under an accident scenario, an additional potential groundwater pollution source is the use of any fire suppression chemistry or debris from the BESS.

Construction materials reduce the likelihood of groundwater impacts. Midwater will use a lithium iron phosphate (LFP) battery type that will be housed in factory-built, weather-resistant enclosures. Potential groundwater impacts were evaluated with consideration to the materials used in the BESS, the likelihood of release, and the design features intended to prevent migration of contaminants to soil and groundwater.

Each LFP battery cell using this design contains a small quantity of organic electrolytes sealed within a metal cell casing. The electrolyte is not stored in bulk and is contained within multiple layers of engineered barriers, including individual cells, battery modules, racks, and the exterior enclosure. Under typical operating conditions, electrolytes are not released.

The likelihood of electrolyte leakage from an LFP BESS is very low. LFP chemistry is characterized by high thermal and chemical stability, with a significantly reduced risk of thermal runaway compared to other lithium-ion chemistries. In the event of cell failure, LFP cells are more likely to vent gases than release liquid electrolyte. Liquid electrolyte release would generally only be expected under extreme conditions, such as severe mechanical damage or a major fire event.

Even in the unlikely event of electrolyte release, the volume would be limited to small quantities at the individual cell level. Any such release would be contained within the BESS enclosure and secondary containment features, preventing contact with soil or infiltration of groundwater. As a result, electrolyte-related groundwater impacts are not anticipated.

Additionally, Midwater will use a closed-loop liquid cooling system to maintain optimal operating temperatures. Cooling fluids are typically water-based with glycol additives for freeze protection, appropriate for Minnesota climatic conditions. These fluids are non-flammable and commonly used in industrial and commercial HVAC applications.

Coolant leaks are considered low-probability events and are generally associated with long-term wear, seal degradation, or maintenance-related issues rather than sudden failure. The cooling system is fully contained within the BESS enclosure, and the total volume of coolant released would be limited.

The BESS enclosures are installed on engineered concrete pads with impermeable surfaces and are designed to prevent the release of fluids to underlying soils. The foundation depth will be installed at an estimated range of one to three feet below ground surface (depending on soil conditions) and would, therefore, not impact aquifer resources.[230] In addition, secondary containment, drip pans, or sloped floors are incorporated to capture any incidental leaks. Routine inspection and monitoring allow for early detection and repair, further reducing the potential for environmental release. Given these design and operational controls, any coolant release would be expected to be contained and managed before migration to soil, or groundwater could occur. The BESS will be designed, installed, and operated in accordance with applicable standards, including UL 9540, UL 9540A, and NFPA 855, which address safety, containment, and failure scenarios. These standards, along with

[230] Midwater Application, Section 6.5.3.2.1, 117.

MPCA best management practices (groundwater), minimize the potential for environmental releases.

Spill prevention and response procedures will be implemented as part of facility operations. Any detected release would be promptly addressed in accordance with state and federal spill reporting and cleanup requirements.

Based on the inherent stability of LFP battery chemistry, the sealed nature of battery electrolyte, the low likelihood of coolant leaks, and the multiple layers of engineered containment, the proposed BESS is not expected to result in adverse impacts to groundwater. Potential releases are unlikely, limited in volume if they occur, and effectively mitigated by design and operational controls. Therefore, the project is anticipated to pose a negligible risk to groundwater quality.

Accident Scenario Impacts

A thermal runaway event is a low-probability but high-consequence failure scenario in which one or more battery cells experience uncontrolled temperature and pressure increase, potentially leading to fire, gas venting, and damage to battery components. This event could reasonably result in impacts to groundwater; however, for a thermal runaway event to create groundwater impacts, several conditions would need to occur sequentially:

1. Release of contaminants (electrolyte, degraded battery materials, or fire residues);
2. Failure of primary containment (battery cell, module, enclosure);
3. Failure of secondary containment or site controls;
4. Infiltration of contaminants into soil;
5. Migration to the water table.

Modern BESS facilities, including Midwater, are designed to interrupt these pathways through multiple engineered controls, described in the typical and atypical scenarios, above. It is important to note that thermal runaway events are acute and short-term occurrences rather than chronic sources of contamination. As a result, even in a worst-case scenario, the duration of potential exposure is limited. Groundwater impacts generally require sustained or repeated releases over time, which is not characteristic of thermal runaway events.

In terms of the materials released from a thermal runaway, lithium-ion batteries primarily release heat and gases, including carbon monoxide, carbon dioxide, hydrogen, and trace volatile organic compounds. In LFP-based systems, thermal runaway is less likely to propagate, and oxygen release is significantly reduced compared to other lithium-ion chemistries. As a result, events are typically less energetic and shorter in duration.

Liquid releases during thermal runaway are limited and uncommon. As noted above, battery electrolyte is sealed within individual cells and is not stored in bulk. Even during cell failure, the predominant release mechanism is gas venting rather than liquid discharge. Any liquid electrolyte that may be released would occur in small, localized quantities and would generally remain within the battery module or enclosure.

Firefighting activities associated with a thermal runaway event may involve using water to cool adjacent equipment and prevent fire spread. This water could come into contact with battery components, soot, or combustion byproducts, potentially generating contaminated runoff. Midwater has developed a stormwater management plan with detention basins and a water

monitoring plan to address potentially contaminated runoff that may occur under an accident scenario.

In the unlikely event of a liquid electrolyte release during thermal runaway, the volume would be limited to individual cells or modules. Electrolytes are organic liquids with relatively low environmental persistence and would be subject to volatilization, degradation, and removal during emergency response and cleanup. Given the small quantities involved and the presence of engineered barriers, infiltration of groundwater is unlikely.

Solid battery materials (e.g., cathode and anode components) are not readily mobilized by water and would remain within the enclosure or on the impermeable surface. These materials would be collected and disposed of in accordance with applicable MPCA hazardous waste regulations following the incident.

Fire suppression water represents a more credible liquid release scenario than electrolyte itself. Water used during an emergency response could entrain combustion byproducts, particulate matter, or trace metals. Site design features, including two stormwater detention basins, are intended to manage runoff and prevent uncontrolled discharge to soil.

Emergency response procedures typically include isolation, containment, and proper disposal of firefighting runoff where practicable. In Minnesota, any significant release would be managed in coordination with local fire departments and in compliance with MPCA spill reporting and remediation requirements.

Groundwater sensitivity and pollutant exposure duration pose additional factors in this review. Regional hydrogeologic data suggest that portions of the county with coarser textured soils (such as sands and gravels in glacial outwash or alluvial terraces) may have relatively higher intrinsic sensitivity to pollution, whereas areas underlain by finer tills and loams would have lower sensitivity.[231] University of Minnesota surficial geology maps indicate that the subsurface project area geology is dominated by a sandy outwash, developed during the last glaciation.[232] The groundwater sensitivity to pollutant impact is likely moderate to high in this location.

Regulatory controls and mitigation measures are also impact-related considerations for the project. Midwater is designed, installed, and operated in accordance with UL 9540, UL 9540A, and NFPA 855, which address thermal runaway behavior, fire propagation, and containment. These standards inform enclosure design, spacing, fire detection, and emergency response planning.

Spill prevention and emergency response plans will also be implemented to address both routine operations and rare emergency events. Any release with the potential to impact soil or groundwater would be promptly reported and remediated in accordance with MPCA and Minnesota Department of Health requirements.

While a thermal runaway event represents a credible worst-case safety scenario, it is unlikely to result in adverse groundwater impacts. Liquid releases associated with thermal runaway are limited in volume, infrequent, and secondary to gas release and heat generation. Multiple

[231] Minnesota Department of Natural Resources, “Groundwater Pollution Sensitivity, Minnesota DNR,” accessed January 16, 2026, https://www.dnr.state.mn.us/waters/groundwater_section/mapping/sensitivity.html
[232] University of Minnesota, D-01 Surficial Geology, ArcGIS Hub, accessed January 16, 2026, https://hub.arcgis.com/maps/UMN::d-01-surficial-geology/explore?location=43.571863%2C-93.253949%2C13&path=

engineered barriers, impermeable foundations, and emergency response measures substantially reduce the potential for contaminants to reach groundwater. Therefore, even under thermal runaway conditions, the risk to groundwater quality is expected to be low and localized, with no long-term impacts anticipated.

Mitigation

Midwater has integrated engineering and operational features that minimize the impact risk to groundwater resources whether they occur through typical, atypical, or accident scenarios. In addition to these features, Midwater will include a water quality monitoring plan that includes a groundwater component that relies on groundwater sampling from groundwater sampling wells that will be located on the site. This plan is part of DSP special condition 5.12:

- Section 5.12 requires the permittee to prepare and file a Surface and Groundwater Monitoring Plan (SGMP). The SGMP must be designed to detect, evaluate, and respond to any potential impacts to surface water or groundwater resulting from construction, operation, or emergency events at the facility. The SGMP must be prepared in coordination with the Minnesota Pollution Control Agency (groundwater) and the Shell Rock River Watershed District (surface water).

The SGMP would identify groundwater monitoring locations, stormwater basin sampling points, sampling parameters, methods, and frequencies needed to detect potential impacts. Pollutant concentration action levels would be established in coordination with the SRRWD.

4.7.5 Wetlands

The ROI for wetlands is the land control area. The level of impact is anticipated to be minimal. Although there is a potential for wetlands to be indirectly affected, direct impacts are not expected. These impacts will be short-term, of a small size, and localized. Any potential impact can be mitigated.

Wetlands are areas with hydric (wetland) soils, hydrophilic (water-loving) vegetation, and wetland hydrology (inundated or saturated during much of the growing season). Wetland types include marshes, swamps, bogs, and fens. Wetlands vary widely due to differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors.[233]

Wetlands are important to the health of waterways and communities that are downstream. Wetlands can be one source of hydrology in downstream watercourses and water bodies, detain floodwaters, recharge groundwater supplies, remove pollution, and provide fish and wildlife habitat. Wetland health also has economic impacts because of their key role in fishing, hunting, agriculture, and recreation. These large infrastructure projects could temporarily or permanently impact wetlands if these features cannot be avoided through project design. During construction, temporary disturbance of soils and vegetative cover could cause sediment to reach wetlands which could in turn affect wetland functionality.

Midwater conducted a desktop review of historical aerial photography to identify wetlands and watercourses within the project area in accordance with Minnesota Board of Water and Soil Resources (BWSR) and U.S. Army Corps of Engineers (USACE), following guidance for off-site

[233] U.S. Environmental Protection Agency (USEPA), "What Is a Wetland," *U.S. Environmental Protection Agency* (2022), accessed January 13, 2026, https://www.epa.gov/wetlands/what-wetland.

wetland determinations.[234] The potential for wetlands within the project area was further evaluated using additional desktop resources, including recent aerial imagery, hydric soil map units, LiDAR data, and digital elevation models.

Desktop mapping identified 26 wetlands within the project area based on National Wetlands Inventory (NWI) data. National Hydrography Dataset (NHD) mapping identified two watercourses and three waterbodies within the project area. Minnesota Department of Natural Resources (DNR) Public Waters Inventory (PWI) mapping identified one watercourse, the Shell Rock River, and no PWI water basins within the project area.

Wetland delineation field investigations were conducted within the project area on April 29 and 30, 2024.[235] Field delineations identified seven wetlands and one pond totaling approximately 28.48 acres. Most of the delineated features were classified as freshwater emergent or riverine wetlands. Summaries of the delineated wetlands and pond are provided in Table 15 and Figure 15. Delineated Wetlands in the project area (Appendix B).

Three potential wetland areas identified during the desktop review were determined in the field to lack one or more of the three required wetland parameters and therefore were not classified as wetlands. Field delineation results also confirmed the presence and extent of NWI-mapped wetlands identified during the initial desktop assessment within the project area.[236]

[234] Minnesota Board of Water and Soil Resources and U.S. Army Corps of Engineers, "Guidance for Offsite Hydrology/Wetland Determinations," July 1, 2016, accessed January 16, 2026, https://bwsr.state.mn.us/sites/default/files/2018-12/WETLANDS_Delin_Guidance_for_Offsite_Hydrology_and_Wetland_Determinations.pdf

[235] Midwater Application, Appendix I (Westwood Wetland Delineation Report, dated May 29, 2024).

[236] Midwater Application, Figure 10, Table 6.5-5, and Appendix I.

Table 15. Delineated Wetland Summary Table[237]

Wetland Name	Area (acres)	Mapped on NWI	Cowardin Wetland Type	Circular 39 Type	Eggers & Reed Type
WB-01	2.48	PUBFx, PFO1Cx	PEM1E, PFO1C, PUBFx	Type 2/5/7	Fresh Wet Meadow, Floodplain Forest, Shallow Open Water
WB-03	3.35	PEM1A, PEM1C, PEM1Fx, PUBFx	PEM1A, PEM1E, PUBF	Type 2/3/5	Fresh Wet Meadow, Shallow Marsh, Shallow Open Water
WB-04	4.80	PEM1A, PEM1C, PUBFx	PEM1A, PEM1E, PUBF	Type 2/3/5	Fresh Wet Meadow, Shallow Marsh, Shallow Open Water
WB-05	0.26	No	PEM1A	Type 1	Seasonally Flooded Basin
WB-06	0.56	No	PEM1A	Type 1	Seasonally Flooded Basin
WB-07	0.02	PEM1A	PEM1C	Type 2	Fresh Wet Meadow
WB-08	15.85	PEM1A, PEM1C, PEM1F, PEM1Fx, PUBF	PEM1A, PEM1C, PEM1F, PFO1C, PUBF	Type 2/3/5/7	Fresh Wet Meadow, Shallow Marsh, Floodplain Forest, Shallow Open Water
PO-01	1.16	PUBFx	PUBFx	Type 5	Shallow Open Water

Total Acres – 28.48

Potential Impacts

Several NWI and field-delineated wetlands are present within the proposed BESS development area; however, BESS construction is not expected to result in direct or unavoidable wetland impacts. No wetland impacts subject to DNR, USFWS, USACE, or local permitting are anticipated, and no loss of WCA regulated wetlands is expected. The BESS has been designed to avoid alterations to wetland boundaries, hydrology, or functions.

The HVTL has been designed to avoid and minimize impacts to water resources to the extent practicable. All pole structures are located outside of delineated wetlands, although a portion of the overhead line will cross the edge of one wetland. Temporary, minor, and reversible wetland impacts may occur during construction and installation. These impacts will be minimized using best management practices, including erosion and sediment control measures, and all temporarily disturbed wetland areas will be restored. Any permanent wetland impacts exceeding *de minimis* thresholds would be mitigated in accordance with applicable state and federal regulations.

Project wetland impacts that result from typical, atypical, or accidental scenarios are similar to those experienced by surface waters and are discussed in Chapter 4.7.3. No additional actions beyond those discussed in Chapter 4.7.3 are required to address project wetland impacts.

Mitigation

The project has been sited to avoid delineated wetlands. BMPs identified in the SWWP will minimize potential for sediment to reach offsite wetlands during construction.

[237] Adapted from Midwater Application, Table 6.5-5: Delineated Wetland Summary Table, 122.

Section 4.3.13 of the DSP (Appendix C) generally prohibits placement of the BESS or associated facilities in public waters and public waters wetlands. The permit condition does allow for electric collector or feeder lines to cross or be placed in public waters or public waters wetlands subject to permits and approvals by the DNR and the United States Army Corps of Engineers, and local units of government as implementers of the WCA.

4.7.6 Vegetation

The ROI for vegetation is the project site. The facility will convert farmland to a mixture of impermeable surface and perennial vegetation for the life of the project. Potential facility impacts can be mitigated through development of a VMP.

The project is located within the Oak Savanna Subsection, which has historically consisted of hardwood forest, tallgrass prairie, bur oak savanna, and scattered lakes, characterized by a series of end moraines along its western boundary with the eastern boundary being dominated by hardwood forest.[238] Present-day land use in the subsection is dominated by agriculture, with increasing urban development in the northern portion. Agricultural lands include cultivated cropland and hay/pasture, with corn, soybeans, and harvested vegetables representing the primary crops in Freeborn County.[239]

Field surveys did not reveal native prairie within either the proposed BESS development area or the proposed HVTL development area.[240] A review of land cover data from the National Land Cover Database indicated that the project area is predominantly hay/pasture, herbaceous cover, and emergent herbaceous wetlands, with smaller areas of developed land, open water, cropland, and wooded areas.[241] The proposed BESS development area is composed largely of CRP-enrolled hay/pasture land.

Potential Impacts

Facility construction will eliminate vegetative cover and create impermeable surfaces with the access road and the developed area of the facility. Midwater estimates that approximately 17.7 acres (including both facility components and a re-vegetated area outside the fence line) will be converted from CRP land for the life of the facility. Removal of vegetative cover exposes soils and could result in soil erosion. Temporary or permanent removal of vegetation also has the potential to affect wildlife habitat.

Following construction, Midwater plans to establish native vegetation over the remainder of the site outside the fenced area using native prairie seed mixes that include both native grasses and wildflowers will be used at the facility. Once established, vegetation would be maintained using best practice guidance for establishing and maintaining the re-vegetated areas.[242]

---

[238] Midwater Application, Section 6.1, 62.
[239] See Chapter 4.2.1
[240] Midwater Application, Section 6.5.6, 127.
[241] J. Dewitz, "National Land Cover Database (NLCD) 2019 Products" (ver. 3.0, February 2024) (U.S. Geological Survey, 2021), accessed January 20, 2026, https://doi.org/10.5066/P9KZCM54
[242] Midwater Application, Section 6.5.8.1, 136.

Construction activities could introduce or spread invasive species and noxious weeds and the early phases of site restoration and seeding of native species can result in populations of non-native and invasive species on site.

Mitigation

Several sections of the DSP (Appendix C) address impacts to vegetation:

- Section 4.3.8 requires the permittee to minimize the number of trees removed.
- Section 4.3.17 requires the permittee to employ BMPs to avoid potential introduction and spread of invasive species and to file an Invasive Species Management Plan prior to construction.
- Section 4.3.18 requires the permittee to take all reasonable precautions to prevent the spread of noxious weeds during construction.
- Section 5.10 is a special condition that requires the permittee to prepare an AIMP that details methods to minimize soil compaction, preserve topsoil, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use.
- Section 5.11 is a special condition that requires the permittee to develop a VMP that defines how the land control area will be revegetated and monitored over the life of the project. Appropriate seeding rates and timing of revegetation will stabilize soils and improve overall soil health. Midwater has included a draft VMP as Appendix C of its site permit application.
- Section 5.13 is a special condition that requires the permittee, in coordination with the Minnesota Department of Natural Resources and Freeborn County, to develop a tree replacement plan to replace any trees that are removed for the construction of the project and file the plan with the Commission at least 14 days before the preconstruction meeting. Replacement trees may be planted on public lands with the permission of the public entity/owner.

4.7.7 Wildlife and Habitat

The ROI for non-avian wildlife and their habitats is the land control area, the ROI for birds is the local vicinity. Long-term, minimal positive impacts to small mammals, insects, snakes, etc. would occur. Impacts to large wildlife species, for example, deer, will be negligible. Significant negative impacts could occur to individuals during construction and operation of the project. While most of the site will be covered by crushed rock, a portion of the land control area will provide native habitat for the life of the project. The project does not contribute to significant habitat loss or degradation or create new habitat edge effects. Potential impacts can be mitigated in part through design and BMPs. The impact intensity level is expected to be minimal.

Wildlife species likely to occur within the project area consist primarily of common species adapted to agricultural landscapes dominated by hay and pasture lands. Currently, smooth brome and Kentucky bluegrass are the predominant vegetation types within the project area.[243] These grasses

[243] Midwater Application, Section 6.5.7.1, 128.

represent temporary or managed cover types that provide limited seasonal habitat value and support a relatively small assemblage of generalist wildlife species.

Mammals expected to utilize the project area include common, wide-ranging species such as raccoon, coyote, red fox, gray fox, striped skunk, thirteen-lined ground squirrel, and white-tailed deer.[244] Avian species associated with agricultural settings may also be present, including American crow, eastern bluebird, mourning dove, ring-necked pheasant, wild turkey, various small passerine species, and common raptors such as red-tailed hawks. Following crop harvest, agricultural fields may provide short-term foraging opportunities for common waterfowl, including Canada goose and mallard.[245]

The conversion of Conservation Reserve Program (CRP) grassland within the proposed BESS development area to a recommended perennial vegetation mix would help maintain habitat and foraging opportunities and may encourage use by grassland-dependent and ground-nesting bird species. In addition, the creation of surface water features associated with stormwater management ponds would provide an additional water source for wildlife in the immediate vicinity. Reptiles and amphibians adapted to agricultural environments, including American toad, common garter snake, and northern leopard frog, which may also occur within the project area.[246]

Higher-quality and more diverse wildlife habitats are present outside the project area. While agricultural lands and aquatic resources associated with the Shell Rock River dominate the surrounding landscape, extensive forested and wetland habitats within nearby Myre-Big Island State Park and surrounding Wildlife Management Areas provide greater habitat diversity and support a broader range of wildlife species, including migratory birds.[247]

Potential Impacts

The impact intensity level is expected to be minimal. Impacts could be positive or negative and depend on species type. Potential impacts will be short- and long-term and can be mitigated.

Avian Wildlife: The project is located within the Mississippi Flyway, one of four major migratory bird flyways in North America that supports the seasonal movement of millions of birds representing hundreds of species. Birds utilizing the Mississippi Flyway generally migrate north from Central and South America along the Gulf of Mexico and follow major river systems, including the Mississippi River. Rivers and lakes along this route provide important habitat for waterfowl, shorebirds, and other waterbirds.

The project area is also located within the Eastern Tallgrass Prairie Bird Conservation Region (BCR 22), an area identified by the U.S. Fish and Wildlife Service (USFWS) as supporting numerous priority bird species. Within BCR 22, the USFWS has identified Birds of Conservation Concern (BCC), which represents the agency's highest avian conservation priorities.

Migratory birds within the project area are protected under the Migratory Bird Treaty Act (MBTA), which regulates the take, possession, transport, and disturbance of migratory birds, their nests, and eggs. In addition, the Bald and Golden Eagle Protection Act (BGEPA) provides specific protections for

---

[244] *Ibid.*

[245] *Ibid*., 129.

[246] Minnesota Department of Natural Resources (DNR), 2026. "Animals: Reptiles and Amphibians," accessed January 20, 2026, https://www.dnr.state.mn.us/animals/index.html

[247] Midwater Application, Section 6.5.7.1, 129.

bald and golden eagles, including prohibitions on disturbance that could result in biologically significant impacts such as nest abandonment or interference with breeding, feeding, or sheltering.

A site reconnaissance conducted by Midwater in spring of 2024 evaluated available habitat within the project area and vicinity for threatened and endangered species identified in the IPaC and Minnesota DNR Conservation Explorer tools. The reconnaissance identified minimally suitable nesting habitat for the listed avian species within the project area. Project area land cover consists primarily of Conservation Reserve Program (CRP) grassland (approximately 89 percent), with limited deciduous shrubland confined to shelterbelts and field edges. Forested habitats are minimal, reducing suitability for tree-dependent migratory birds such as bald eagle and red-headed woodpecker.

The project will involve minimal or no tree clearing, and existing nesting habitat within shelterbelts and field edges will remain intact. Although some open water and wetland features are present within the project area, wetlands will not be utilized for the BESS or high-voltage transmission line facilities. As a result, wetland- or water-dependent bird species are unlikely to be impacted. Overall, the project area provides limited suitable habitat for migratory birds, and few, if any, Birds of Conservation Concern are expected to regularly use the area for nesting, foraging, or roosting. No waterfowl feeding and resting areas, as defined by the DNR, are located within one mile of the project area.[248]

Audubon Important Bird Areas (IBAs) are voluntary, non-regulatory sites that are part of an international conservation program. The program works with private landowners, public land managers, and community members to identify key habitats for birds, monitor these areas for changes in bird populations and habitat quality, and promote long-term conservation.[249] The nearest IBA to the project area is the Elk Creek Marsh Important Bird Area, which is located in northern Iowa, more than ten miles from the project area, and therefore outside of the project's immediate vicinity.[250]

Mitigation

Midwater has designed the project's infrastructure to avoid areas with potential for high-quality wildlife habitat. Best Management Practices (BMPs), as described in Chapter 4.7.2, will be implemented during construction, post-construction, and operational phases to stabilize soils, protect habitat, and mitigate potential impacts within the project area. The establishment of perennial plant species throughout the project's life is expected to reduce soil erosion and runoff, improve nutrient cycling, and provide beneficial habitat for insects and ground-nesting species.

The project layout specifically avoids portions of the project area that could provide quality habitat for avian species. The continued presence of perennial grasses on steeper slopes within the proposed BESS and HVTL areas will help maintain existing habitat conditions, resulting in minimal

[248] Minnesota Department of Natural Resources (DNR), "Migratory Waterfowl Feeding and Resting Areas" (2016; updated 2023), accessed January 20, 2026, https://gisdata.mn.gov/dataset/env-migratory-waterfowl-areas
[249] Minnesota Department of Natural Resources (DNR), "Migratory Waterfowl Feeding and Resting Areas" (2016; updated 2023), accessed January 20, 2026, https://gisdata.mn.gov/dataset/env-migratory-waterfowl-areas
[250] *Audubon, Minnesota Important Bird Areas Interactive Map*, 2020, accessed January 20, 2026, https://www.arcgis.com/home/webmap/viewer.html?webmap=3b3d225539f8449daf84be6aa89eab50

impacts on nesting or foraging birds. Enhanced vegetative diversity is anticipated to provide additional benefits for ground-nesting species while maintaining soil and water quality.

No waterfowl feeding or resting areas occur within, adjacent to, or within one mile of the project area, and no Important Bird Areas are located nearby. As a result, no impacts to these resources are anticipated, and no additional mitigation measures are proposed.

Several sections of the DSP (Appendix C) specify measures that will minimize impacts on wildlife:

- Section 4.3.23 requires use of "site restoration and management practices that provide for native perennial vegetation and foraging habitat beneficial to gamebirds, songbirds, and pollinators."
- Section 8.13 requires permittees to report "any wildlife injuries and fatalities" to the Commission on a quarterly basis.
- Section 5.14 is a special condition that requires use of wildlife-friendly erosion control.

Other potential mitigation measures include:

- Checking open trenches and removing any wildlife caught in trenches before backfilling mitigates impacts.
- Once permanent vegetation is established, restricting mowing from April 15 to August 15 will improve the potential for ground nesting habitat.

4.7.8 Rare and Unique Resources

The ROI for rare and unique resources is the local vicinity. The level of impact is anticipated to be minimal, as the project avoids identified areas of species occurrence and preferred habitat. No additional mitigation measures are proposed.

The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) portal was reviewed to identify federally listed threatened and endangered species, candidate species, and designated critical habitat that may occur within or near the project area. The IPaC review identified one federally endangered species, the northern long-eared bat (*Myotis septentrionalis*), and one federally proposed endangered species, the tricolored bat (*Perimyotis subflavus*), as having potential to occur in the project vicinity. Suitable habitat for both bat species generally consists of forested areas in proximity to water sources. [251]

According to the Minnesota Department of Natural Resources (DNR) and the USFWS, no known northern long-eared bat or tricolored bat maternity roost trees or hibernacula are documented in Freeborn County; however, these species may still occur within or near the project area. The IPaC report also identified the monarch butterfly (*Danaus plexippus*) as a candidate species for federal listing, although it is not currently afforded protection under the Endangered Species Act.[252]

---

[251] Minnesota Department of Natural Resources (DNR), "Rare Species Guide: Myotis septentrionalis," 2018, accessed January 20, 2026, https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMACC01150

[252] Minnesota Department of Natural Resources (DNR) and U.S. Fish and Wildlife Service (USFWS), Townships Containing Documented Northern Long-eared Bat (NLEB) Maternity Roost Trees and/or Hibernacula Entrances in Minnesota, 2016, accessed January 20, 2026, https://efotg.sc.egov.usda.gov/references/public/MN/MN_NLEB_Township_List_and_Map_4-1-16.pdf

Although not identified in the IPaC review, the bald eagle (*Haliaeetus leucocephalus*) was evaluated due to its federal protection under the Bald and Golden Eagle Protection Act (BGEPA). USFWS National Bald Eagle Management Guidelines were considered to avoid disturbance to eagles and their nests.

Land cover within the project area is dominated by hay/pasture, herbaceous vegetation, and emergent herbaceous wetlands, with limited forested habitat. As a result, habitat suitability for tree-dependent species, including bald eagle, is minimal, and few migratory bird species that rely on forested areas are expected to occur within the project area; however, a bald eagle has been observed within the project area.

Midwater submitted a formal request to the DNR Natural Heritage Information System (NHIS) to evaluate the project area for the presence of rare species and other sensitive biological resources. The DNR Natural Heritage Review Team identified two state-listed species within portions of T101N, R20W, Sections 7, 8, and 17: the edible valerian (*Valeriana edulis var. ciliata*), a state-listed threatened plant species, and the suckermouth minnow (*Phenacobius mirabilis*), a state-listed species of special concern.[253] Species habitat and life history information was reviewed using the DNR Rare Species Guide.

Edible valerian typically occurs in moist, sunny, calcareous habitats such as calcareous fens, wet meadows, moist prairies, and along highway or railroad rights-of-way. Minnesota's Endangered Species Statute and associated rules prohibit taking listed plant species without a permit. Project activities are limited to previously tilled lands and do not include wetlands, wet meadows, or railroad rights-of-way. As a result, impacts to edible valerian are not anticipated. One area of new construction is proposed within a highway right-of-way for site access; this area can be evaluated for the presence of edible valerian prior to construction, if necessary.

The suckermouth minnow has been documented in the Shell Rock River near the project area. Although its reproductive biology is not well understood, spawning is believed to occur multiple times between late May and August. No project work is proposed within the Shell Rock River, and erosion and sediment control measures outlined in the SWPPP will be implemented to prevent indirect impacts.[254] Therefore, no adverse effects to this species are anticipated.

Midwater evaluated the presence of high-value ecological resources during project development. These resources include rare species and native plant communities, MBS sites of biodiversity significance, habitats identified in the Minnesota Wildlife Action Plan, aquatic resources, large block habitats, public conservation lands, and properties enrolled in conservation programs.

The DNR has identified a Site of *Moderate* Biodiversity Significance along the U.S. Highway 65 right-of-way in the vicinity of the project area.[255] Sites ranked as *Moderate* include areas with documented rare species, moderately disturbed native plant communities, and landscapes that retain substantial potential for ecological recovery.[256] This site contains a Southern Mesic Prairie

[253] Midwater Application, Section 6.5.8.3, 132.
[254] Midwater Application, Section 6.5.8.3, 133.
[255] Midwater Application, Section 6.5.8.4, 134.
[256] Minnesota Department of Natural Resources (DNR), "Guidelines for Assigning Statewide Biodiversity Significance Ranks to Minnesota County Biological Survey Sites," 2009, accessed January 20, 2026, https://files.dnr.state.mn.us/eco/mcbs/biodiversity_significance_ranking.pdf

native plant community, which is considered imperiled within Minnesota. Moderate-ranked MBS sites contain rare species and/or native plant communities that may be disturbed but retain restoration potential. DNR guidance recommends avoiding or minimizing impacts to such areas through measures such as operating within previously disturbed lands, maintaining buffers, preventing herbicide drift, implementing erosion control measures, and promptly revegetating disturbed soils with appropriate native species. The project has been designed to avoid direct impacts on this MBS site.

The Shell Rock 17 MBS area was determined to be below the minimum threshold for statewide significance (See Figure 16.) Rare and Unique Resources in the Project Area, Appendix B). This means that the area may retain conservation value at the local level, including as habitat for native plants and wildlife, a movement corridor for animals, a buffer to adjacent higher-quality natural areas, or an area with high potential for native habitat restoration. Accordingly, project design and implementation will consider potential indirect impacts, such as surface runoff or the introduction and spread of invasive species.

No native plant communities have been identified within the project area itself, with the nearest native plant community located approximately 0.45 miles south of the project area along U.S. Highway 65. A native prairie assessment was conducted to determine whether native prairie occurs within the project area. Although four areas were initially identified as potential native prairies, all were determined to have been previously enrolled in the USDA Conservation Reserve Program (CRP) and are dominated by non-native smooth brome and Kentucky bluegrass. As a result, no native prairie occurs within the project area that would restrict development.

The Minnesota Wildlife Action Plan and associated Wildlife Action Network were also reviewed. The closest mapped Wildlife Action Network area is located approximately 1.8 miles southeast of the project area. Aquatic resources within the project area are limited and do not overlap with the Proposed BESS for HVTL development areas. No large block habitats occur within or adjacent to the project area, which is surrounded primarily by agricultural lands and small woodlots.

A review of public conservation and recreation lands found none within the project area or within a quarter-mile buffer. The project area includes approximately 104.4 acres of privately owned land, with approximately 53.4 acres currently or formerly enrolled in the CRP. One county conservation easement and the Shell Rock State Wildlife Management Area are located within a quarter-mile of the project area, but no direct impacts are anticipated.

Overall, review of NHIS data, MBS mapping, native prairie assessments, and other ecological resources indicate that the project has been sited and designed to avoid high-value biological resources. With implementation of recommended avoidance measures and best management practices, no significant impacts to rare species, native plant communities, or other sensitive ecological resources are anticipated.

Potential Impacts

The DNR has indicated that there are two bald eagles nesting within or near the project area, with many public comments noting their presence in the area.[257] No impacts to federally listed species are anticipated during construction or operation of the project. The northern long-eared bat (NLEB) Rangewide Determination Key was completed through the USFWS Information for Planning and Consultation (IPaC) system. Provided no changes are made to the project, no additional consultation or coordination with the USFWS is required for NLEB. During the construction phase, ground operations may disturb bald eagle presence in the area; however, this is likely short-term and temporary. The USFWS adopted the National Bald Eagle Management Guidelines to protect eagle nests and avoid "disturbance" in compliance with the BGEPA and has developed additional guidance to determine when an incidental take permit is required if disturbance cannot be avoided.[258]

No impacts to Minnesota state-listed endangered, threatened, or special concern species are anticipated during construction or operation of the proposed BESS or HVTL. The project area consists primarily of hay and pasture land and does not contain native prairie. The DNR's formal response to the Natural Heritage Information System (NHIS) request did not identify edible valerian or suckermouth minnow in the vicinity of the project area. Due to the absence of suitable habitat, no impacts or mitigation measures are anticipated for these species.

Two National Hydrography Dataset (NHD) watercourses, three NHD waterbodies, and one DNR Public Waters Inventory (PWI) feature occur within the project area but will be avoided by project infrastructure. Best management practices along with implementation of the SWPPP, will be used to prevent or minimize indirect impacts to surrounding natural resources during construction and operation.

Other high-value ecological resources in the vicinity of the project area will not be affected as the project will use setbacks, erosion control measures, and other protective practices. Minnesota Biological Survey (MBS) Sites of Biodiversity Significance and DNR Regionally Significant Ecological Areas (RSEAs) located southwest of the project area will remain unaffected due to project siting, separation by the Shell Rock River, and the implementation of BMPs. Because no native prairie occurs within the project area, no impacts are anticipated, and no mitigation measures are proposed.

Mitigation

No additional mitigation practices or strategies are expected beyond those previously identified in other chapters of this EA.

4.7.9 Climate Change

The project will help to shift energy production in Minnesota and the upper Midwest toward carbon-free sources. Construction emissions will have a short- term negligible increase in greenhouse gases that contribute to climate change. The project's design incorporates design

[257] Haley Byron, Regional Environmental Assessment Ecologist, South Region, Minnesota Department of Natural Resources, email message to Jim Sullivan, Minnesota Public Utilities Commission, January 22, 2026. An eagle nest is located to the west of the project site and there is evidence for an additional nest to the northeast of the project site.
[258] Midwater Application, Section 6.5.8.1, 132.

elements that minimize impacts from the increase in extreme weather events such as increase flooding, storms, and heat wave events that are expected to accompany a warming climate.

Climate change refers to any significant change in climate measures lasting for an extended period. Greenhouse gases (GHG) are gaseous emissions that trap heat in the atmosphere and contribute to climate change. These emissions occur from natural processes and human activities. The most common GHGs emitted from human activities include carbon dioxide, methane, and nitrous oxide. In Minnesota, the majority of GHG emissions are associated with fossil fuel combustion, particularly from electricity generation and transportation.

Potential Impacts

Project construction will result in short-term GHG emissions from the use of diesel- and gasoline-powered construction equipment and vehicles. Midwater prepared estimates of construction- and operations-related emissions based on comparable projects in Minnesota and experience developing BESS projects nationwide.[259] Operational emissions will be limited and primarily associated with on-site vehicle use and employee commuting.

Climate data for Freeborn County were reviewed using the Minnesota DNR Climate Explorer tool, including historical trends from 1895 through 2024 and projected future conditions. Historical data indicate that average annual temperatures and precipitation have increased over time, and climate models project continued warming and increases in precipitation through mid-century.[260] These projections are relevant given the project's anticipated 30-year operational life.

The project has been designed to account for both current and anticipated future climate conditions. BESS enclosures will include temperature moderation systems to ensure reliable operation within expected temperature ranges. Structural and foundation components will be designed to withstand projected environmental conditions, including extreme heat, cold, wind, snow, and precipitation. The HVTL will be designed in accordance with current NESC standards, which account for conductor sag, wind, ice loading, and temperature increases.

Flood risk was evaluated using third-party flood modeling tools and preliminary hydraulic modeling conducted as part of the project's engineering design.[261] These analyses indicate a low risk of flooding within the project area. Stormwater management features, including appropriately sized collection basins, grading, swales, and diversion berms, will be implemented to manage runoff and meet applicable state and county requirements. Facility BMPs and SWPPP implementation will further reduce potential impacts.

The BESS is expected to enhance grid resilience during extreme weather events by providing stored energy when generation or transmission systems are disrupted. BESS facilities have demonstrated this capability during recent extreme weather events in other regions of the United States. Minnesota has established statewide goals and policies to address climate change, including Executive Order 19-37[262] and the Next Generation Energy Act,[263] which set statutory targets for

[259] Midwater Application, Section 6.5.2.1, 107.
[260] Midwater Application, Table 6.5-2.
[261] Midwater Application, Section 6.5.2.2, 110.
[262] Minnesota. *Executive Order 19-37: Establishing the Climate Change Subcabinet and the Governor's Advisory Council on Climate Change to Promote Coordinated Climate Change Mitigation and Resilience Strategies in the State of Minnesota.* Issued by Governor Tim Walz, December 2, 2019. PDF published by the Office of the Minnesota Governor.
[263] Minn. Stat. § 216B.2401

reducing GHG emissions while expanding renewable energy and energy efficiency. Emissions from Minnesota's electricity generation sector have declined substantially since 2005, largely due to increased reliance on renewable energy sources.[264]

Battery energy storage is a critical component of renewable energy infrastructure. Energy storage reduces curtailment of wind and solar generation by storing excess energy during periods of low demand and discharging energy during periods of peak demand. By increasing the efficiency and reliability of renewable energy utilization, the project supports Minnesota's climate goals, reduces reliance on higher-emission generation resources, and minimizes the need for additional transmission infrastructure. Overall, the project is consistent with state climate mitigation and resilience objectives and is not anticipated to result in significant adverse impacts related to greenhouse gas emissions or climate change.

Mitigation

Emission related mitigations, discussed in Chapter 4.7.1 (Air Quality), will reduce emissions during construction. Strategies to reduce emissions include keeping vehicles in good working order, which will reduce the amount GHG emissions from diesel or gasoline.

Project developers can employ location, design, and construction strategies to mitigate impacts resulting from a warmer, wetter, and more energetic climate by:

- Avoiding sites with high probability for extreme weather events to the extent possible.
- Designing facility components to withstand snow loads as well as stronger storms and winds.
- Designing the project's stormwater system to prevent flooding during heavy rainfall events.
- Designing the project's electrical collection system to be resistant to flooding damage.

Midwater indicates that it will select enclosures and design foundations to withstand the current and anticipated temperature fluctuations and will install a temperature modulation system such as liquid and/or air cooling or natural convection in the enclosures to regulate heat and optimize battery performance. The BESS enclosures selected for the project are designed to withstand wind, flood, blizzard, and hail events. Final design will include a safety factor for snow and wind loads for components and equipment pads. Unlike wind turbines or solar panels mounted on tracking systems, BESS enclosures are stationary and do not need to be stowed during high winds or hail.

The preliminary site plan includes two stormwater drainage basins to reduce stormwater runoff from the site. Final site design will ensure the site will meet state and county requirements for reducing runoff and treating stormwater. Final site design may employ swales and berms to prevent flooding and route water to stormwater basins.

[264] Minnesota Department of Commerce (DOC) and Minnesota Pollution Control Agency (MPCA), "Greenhouse Gas Emissions in Minnesota 2005–2020: Report to the Legislature, January 2023," accessed January 25, 2026, https://www.pca.state.mn.us/sites/default/files/lraq-2sy23.pdf

4.8 Unavoidable Impacts

Natural resource effects are unavoidable when and if they cannot be avoided even with mitigation strategies.

Potential environmental effects and possible mitigation measures are discussed in this chapter. However, even with mitigation strategies, certain environmental effects can only partially be mitigated, or, in some cases, not at all. In these situations, the resulting impacts cannot be avoided. This EA presents this issue to better describe and explain these situations.[265] Most adverse unavoidable impacts are associated with construction; therefore, they would be temporary.

Unavoidable adverse effects associated with construction of the project (in some instances a specific phase of construction) would last through construction and include:

- Fugitive dust.
- Noise disturbance to nearby residents and recreationalists.
- Visual disturbance to nearby residents and recreationalists.
- Soil compaction and erosion.
- Vegetative clearing.
- Disturbance and temporary displacement of wildlife, as well as direct impacts to wildlife inadvertently struck or crushed.
- Minor amounts of marginal habitat loss.
- Possible traffic delays.

Unavoidable adverse impacts associated with the operation would last as long as the life of the project, and include:

- Visual impacts of the project.
- Loss of land for agricultural purposes.
- Injury or death of birds and mammals from fencing.

4.9 Irretrievable or Irreversible Impacts

Resource commitments are irreversible when it is impossible or very difficult to redirect that resource to a different future use. An irretrievable commitment of resources means the resource is not recoverable for later use by future generations.

This EA discusses the Irreversible and irretrievable resource commitments, which are primarily related to project construction, including the use of water, aggregate, hydrocarbons, steel, concrete, wood, and other consumable resources. Some, like fossil fuel use, are irretrievable. Some resource commitments, such as water use, are irreversible. Others may be partially recyclable, for example, the raw materials used to construct batteries and enclosures would be an irretrievable commitment of resources, excluding those materials that may be recycled at the end

[265] Minn. R. 7850.4100 (M).

of useful life. The commitment of labor and fiscal resources to develop, construct, and operate the project is considered irretrievable.

4.10 Potential Impacts of Limited Import

Many environmental resources and associated impacts from a project are analyzed during the environmental review process. However, if impacts are negligible and will not impact the permit decision, those resource impacts receive less study and analysis. The following resource topics meet this threshold, which is based on information provided by the applicant, field visits, scoping comments, environmental analysis, and staff experience with similar projects.

4.10.1 Displacement

Displacement can occur when residences or other buildings are located within a proposed site or right-of-way. If the buildings would potentially interfere with the safe operation of a project, they are typically removed from the site or ROW and relocated. Displacements from large energy facilities are rare and are more likely to occur in heavily populated areas where avoiding all residences and businesses is not always feasible than in rural areas where there is more room to adjust site boundaries or ROWs to accommodate the proposed energy facility.

There are no residences, businesses, or structures such as barns or sheds located within the area of site control, and none will be displaced by the project. No mitigation is proposed.

4.10.2 Communications

Electronic interference from the proposed project is not anticipated. The project area is served by several AM and FM radio stations and digital television channels. There are no radio, microwave, or television towers located within the site. Landline telephone service to the project area is provided by AT&T, Frontier Communications, and CenturyLink. Mobile service cellular phone service in the service area is provided by national carriers.

Because the BESS facilities are relatively low (less than 20 feet), they are well below the line of site used in many communication system signals. Electronic interference associated with communications infrastructure and devices including agricultural navigation systems is related to a phenomenon known as corona. Impacts are not expected, because anticipated electric fields are below levels expected to produce significant levels of corona.

Section 4.3.21 of the DSP (Appendix C) requires the permittee to take whatever action is feasible to restore or provide equivalent reception should interference occur to “radio or television, satellite, wireless internet, GPS-based agriculture navigation systems or other communication devices” as a result of the project. Additional mitigation is not proposed.

4.10.3 Implantable Medical Devices

Electromagnetic fields (EMF) might interfere with implantable electromechanical medical devices, such as pacemakers, defibrillators, neurostimulators, and insulin pumps. Impacts on people using implantable medical devices are not expected to occur, but, if they did occur, moving away from the project would return the pacemaker to normal operation. Additional mitigation is not proposed.

4.10.4 Forestry

Active forestry operations, including commercial timber harvest, woodlots, or other forestry resources do not occur within the land control area. Impacts on forestry operations will not occur.

4.10.5 Mining

There are no active gravel pits within the area of land control. Project construction will require the use of sand and aggregate for backfill and access roads. The project demand for sand and gravel will be temporary and is not expected to require new or expanded sand or aggregate operations. Impacts on mining will not occur and no mitigation is proposed.

4.11 Cumulative Analysis

A cumulative analysis accounts for the incremental effects of a project on the environment in addition to other projects in the environmentally relevant area.

Cumulative potential effects are those effects on the environment "that result from the incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects ... regardless of what person undertakes the other projects or what jurisdictions have authority over the project."

The "environmentally relevant area" includes locations where the potential effects of the project coincide with the potential effects of other projects to impact the elements studied in this EA.

A cumulative analysis is intended to aid decision-makers so that they do not make decisions about a specific project without relevant context. This is because effects that may be minimal in the context of a single project may accumulate and become significant when all projects are considered.

4.11.1 Analysis Background

The ROI for cumulative potential effects varies across elements and is consistent with the ROIs used throughout this document. Where cumulative potential effects overlap, they may amplify or diminish the magnitude and extent of impacts to the resources and environmental elements evaluated. This may or may not change the level of impact assigned to the resource or element.

Commission staff contacted local governments, MnDOT, the Environmental Quality Board's interactive project database, and Freeborn County to identify foreseeable projects. Though there are reasonably foreseeable projects in Freeborn County and Southern Minnesota generally, there are none within the environmental relevant area. That is, there are no impacts anticipated that would overlap with those of the Midwater project. Accordingly, no cumulative potential effects are anticipated.

Cumulative potential effects are discussed here for existing environmental conditions and projects that are reasonably foreseeable in the next five years in the project area. It is assumed that the construction-related impacts of these projects are short-term, for example, construction impacts will cause local disturbances, such as increased noise levels, and traffic delays/and reroutes. Thus, the discussion here is focused on the potential long-term impacts of these projects.

5 Sources

FEDERAL AGENCIES

- U.S. Army. *Guide to Environmental Impact Analysis: A Supplement to the US Army NEPA Manual Series* (2012).
- U.S. Census Bureau. *Gazetteer Files: Places – National*.
- U.S. Census Bureau. *Decennial Census*.
- U.S. Department of Health, Education, and Welfare – Public Health Service. *Community Solid Waste Practices: Land Disposal Site Investigation Report for the Glenville Dump* (1968).
- Federal Aviation Administration (FAA). *Fundamentals of Noise and Sound* (2018).
- Federal Emergency Management Agency (FEMA). *National Flood Hazard Layer Viewer*.
- U.S. Environmental Protection Agency (USEPA). *What Is a Wetland* (2022).
- U.S. Geological Survey (USGS). *Ground Water Atlas of the United States*.
- J. Dewitz (USGS). *National Land Cover Database (NLCD) 2019 Products*.
- Soil Survey Staff, USDA Natural Resources Conservation Service. *Web Soil Survey: Freeborn County*.

STATE AGENCIES – MINNESOTA

Minnesota Public Utilities Commission

- Midwater BESS, LLC. *Application for a Site Permit* (2024).
- Midwater Energy Storage Project Advisory Task Force Report (2025).

Minnesota Pollution Control Agency (MPCA)

- Construction Stormwater
- Minnesota Stormwater Manual
- Clean Water Act Section 401 Water Quality Certifications
- Understanding the Air Quality Index
- Minnesota Air Quality Index
- Shell Rock River
- Dump Assessment Study (2001)
- Disposal Site Closure Record (1974)
- A Guide to Noise Control in Minnesota (2015)
- Environmental Justice Framework (2022)
- Environmental Justice Areas (ArcGIS)
- Impaired Waters: 2024 Viewer
- Greenhouse Gas Emissions in Minnesota 2005–2020 (with DOC)

Minnesota Department of Natural Resources (DNR)

- Public Waters Work Permit Requirements
- Shell Rock River Water Trail

- Myre-Big Island State Park
- Watershed Basins
- Karst Feature Inventory
- Minnesota Groundwater Provinces
- Groundwater Pollution Sensitivity
- Animals: Reptiles and Amphibians
- Migratory Waterfowl Feeding and Resting Areas
- Rare Species Guide
- Biodiversity Significance Ranking Guidelines

Minnesota Department of Transportation (MnDOT)

- Utility Agreements and Permits
- Utility Accommodation Policy OP002

Minnesota Department of Health (MDH)

- Glenville Source Water Assessment
- Minnesota Well Index

Minnesota Department of Employment and Economic Development (DEED)

- County Profiles for Freeborn County (2024)
- Economic Development Region 10 Profile (2025)

Minnesota Department of Commerce (DOC)

- Rights-of-Way and Easements for Energy Facility Construction and Operation
- Greenhouse Gas Emissions Report (with MPCA)

Minnesota Board of Water and Soil Resources (BWSR)

- Guidance for Offsite Hydrology/Wetland Determinations (with USACE)

Minnesota Executive Branch

- Executive Order 19-37 (Governor Walz)

Minnesota Constitution

- Article XIII, Sec. 12 (1998 Amendment)

LOCAL GOVERNMENT

- Freeborn County. *Freeborn County General Land Use Plan* (2022).

PROFESSIONAL ORGANIZATIONS & INDUSTRY STANDARDS

- IEEE Standards Association. *National Electrical Safety Code Brochure*.
- National Fire Protection Association (NFPA 855).
- UL Research Institutes. *What Is Thermal Runaway*.
- American Clean Power / American Clean Power Association. *Energy Storage Emergency Response Plan Template*.
- AEGIS Loss Control. *White Paper: Lithium-Ion BESS*.
- James Chalmers. *High Voltage Transmission Lines and Residential Property Values* (presentation).

ACADEMIC INSTITUTIONS & SCHOLARLY PUBLICATIONS

Universities / Research Institutes

- Natural Resources Research Institute (University of Minnesota Duluth). *Minnesota Natural Resources Atlas*.
- University of Minnesota – Minnesota Geological Survey (Lusardi et al.).
- University of Minnesota. D-01 Surficial Geology (ArcGIS Hub).
- Mankato State University. *Geologic Atlas of Freeborn County*.
- Yixin Gwee. *Impact of Utility-Scale BESS on Property Values* (Master's thesis, UPenn).
- Duquette et al. *A Meta-Analysis of the Influence of Anthropogenic Noise on Terrestrial Wildlife Communication Strategies*, *Journal of Applied Ecology* (2021).
- Senzaki et al. *Proceedings of the Royal Society B* (2020).
- Buhta et al. *Freeborn County Archeological and Geomorphological Resources Inventory*.
- Williams & Corfield. *Construction Impacts on Archaeological Sites*.
- Sullivan & Mackay, eds. *Archaeological Sites: Conservation and Management* (Getty).
- Warren Upham. *Minnesota Geographic Names* (1920).
- Wright et al. *Impacts and Effect Indicators of Atmospheric Deposition of Major Pollutants to Various Ecosystems—A Review, Aerosol and Air Quality Research*.

Federally Funded Research Laboratory

- National Renewable Energy Laboratory (NREL). *Grid-Scale Battery Storage FAQ* (2019).
- NONPROFIT ORGANIZATIONS
- GLISA (Great Lakes Integrated Sciences and Assessments – University of Michigan partnership).
- Environmental Working Group (EWG).
- Audubon. Minnesota Important Bird Areas Map.
- Explore Minnesota/Minnesota Tourism Industry (state-affiliated nonprofit tourism promotion entity).
- Genealogy Trails. *History of Freeborn County Communities*.

PRIVATE & CORPORATE SOURCES

- GridX. *What Is Battery Degradation and How to Prevent It*.
- Midwater BESS, LLC (project applicant filing).
- Minnesota Demographics (commercial demographic website).

APPENDICES

MIDWATER BESS, LLC

APPENDIX A

MIDWATER BESS, LLC

SCOPING DECISION

MINNESOTA
PUBLIC UTILITIES COMMISSION

Sasha Bergman, Executive Secretary

Notice of Environmental Assessment
Scoping Decision

In the Matter of the Joint Application of Midwater BESS, LLC for a Site Permit and Route Permit for the up to 150 MW Midwater Energy Storage Project and Associated 161 kV Transmission Line in Freeborn County, Minnesota

Docket Nos. IP-7138/ESS-24-294; IP-7138/TL-24-295

Issued: December 4, 2025

PLEASE TAKE NOTICE that the Minnesota Public Utilities Commission (Commission) has issued the scoping decision for the environmental assessment (EA) that will be prepared for the proposed Midwater Battery Energy Storage System (BESS) project in Freeborn County, Minnesota.

The EA will be prepared by the Commission's Energy Infrastructure Permitting (EIP) environmental review staff and will address the potential human and environmental impacts of the project. The scoping decision identifies those issues that will be studied, as well as those that will not be addressed.

The scoping decision and other relevant documents are available:

- On the Commission's website: https://puc.eip.mn.gov/web/project/15971 and
- On the State of Minnesota's eDockets system: https://www.edockets.state.mn.us/documents (enter either of the docket numbers "24-294" or "24-295").

The EA is scheduled to be completed in the first quarter of 2026. A public hearing will be held in the project area after the EA is complete and available for review.

If you would like more information or if you have questions, please contact Commission staff: Jim Sullivan (jim.sullivan@state.mn.us) (651) 539-1064 or Jacques Harvieux (jacques.harvieux@state.mn.us) (651) 201-2233.

To place your name on the project mailing list, email docketing.puc@state.mn.us or call Leesa Norton at (651) 201-2246 with the docket numbers (24-294; 24-295), your name, email address, and mailing address. Please indicate how you would like to receive notices, delivered either by email or U.S. mail. Placing your name on the project mailing list ensures that you receive the most up-to-date information about the project.

This notice and the scoping decision can be made available in alternative formats, i.e., large print or audio, by calling (651) 296-0406 (voice).

MINNESOTA
PUBLIC UTILITIES COMMISSION

In the Matter of the Joint Application of Midwater BESS, LLC for a Site Permit and Route Permit for the up to 150 MW Midwater Energy Storage Project and Associated 161 kV Transmission Line in Freeborn County, Minnesota

ENVIRONMENTAL ASSESSMENT SCOPING DECISION

DOCKET NOS. IP-7138/ESS-24-294
IP-7138/TL-24-295

The above matter has come before the Executive Secretary of the Minnesota Public Utilities Commission (Commission) for a decision on the scope of the environmental assessment (EA) to be prepared for the Midwater battery energy storage system (BESS) project (project) in Freeborn County, Minnesota. The Commission is reviewing this application under Minnesota Statute 216E (2023) and Minnesota Rule Chapter 7850.

Project Description

Midwater BESS, LLC (Midwater), a wholly owned subsidiary of Spearmint Energy, proposes to construct and operate a BESS with a nominal power rating of up to 150 MW alternating current (AC) with approximately 600 megawatt-hours (MWh) of energy capacity on a site of approximately 17 acres in Shell Rock Township, Freeborn County, Minnesota.[1]

In addition to battery energy storage enclosures, the facility will also include inverters and transformers, electrical feeder lines, a project substation, stormwater drainage basins, storage and parking areas, and fencing surrounding the perimeter of the facility. Midwater will construct an operations and maintenance facility at the site to house operations and maintenance materials. The facility will connect to the electric grid through a 161 kV tap line of approximately 2,668 feet in length between the project substation and the adjacent Glenworth Substation owned and operated by ITC Midwest.[2] Midwater anticipates that project construction will begin in early 2027 and that operation will commence in late 2027.

Midwater indicates that the project will help meet the growing demand for renewable energy and will assist Minnesota in reaching its renewable energy objectives by allowing wind and solar resources to continue producing energy at times when they would otherwise be curtailed due to low demand.[3] Midwater anticipates entering into a tolling agreement with an affiliated merchant energy business or other third part market participant, rather than a long-term power purchase agreement more typical of renewable projects.[4] Alternatively, Midwater may sell the project to a utility or operate under a different revenue structure.[5]

[1] Midwater Application, Section 2.1, 24.
[2] *Ibid*, 24.
[3] Midwater Application, Section 1.1, 15.
[4] *Ibid*, 16.
[5] Midwater Application, Section 1.1.3, 18.

Project Purpose

The project will provide up to 150 MW of grid-connected battery energy storage for up to four hours, supporting around 100,000 households during peak demand.[6] Battery energy storage systems play a role in enabling a low-cost, reliable, and carbon-free electric grid by storing excess electricity during low demand and discharging it during high demand. This project will help integrate more renewable energy, particularly wind and solar, by reducing the need to curtail production during off-peak times (e.g., windy nights) and instead storing that energy for daytime use. This shift also decreases reliance on fossil fuel generation and increases production tax benefits for renewable facilities.[7]

Beyond energy shifting, the project will provide voltage and frequency regulation to maintain grid stability. Currently, such services are mainly provided by natural gas plants.[8] A BESS can deliver stored energy more efficiently and at a lower cost, reducing the need for fossil fuel use. The project enhances grid resilience, supports storm recovery, and reduces energy waste. It also provides indirect benefits to ratepayers by stabilizing the grid without requiring costly new transmission infrastructure.

Regulatory Background

In Minnesota, no person may construct an energy storage system (ESS), defined as a facility capable of operating at a capacity of 10 MW or more, without a site permit from the Commission. Midwater's proposed project will have a nominal power rating of up to 150 MW AC and therefore requires a site permit from the Commission. As an ESS facility, the site permit application qualifies for Commission review under the alternative permitting process described in Minnesota Statute 216E.04. The Midwater 161 kV tap line will require a route permit based on its length and voltage. The project does not require a certificate of need from the Commission because the Project is exempt under Minn. Stat. 216B.243, subd. 8(9).

Midwater filed a combined application for a site and route permit on October 7, 2024. The Commission accepted the combined application as substantially complete in its order dated November 19, 2024. Commission Energy Infrastructure Permitting (EIP) staff are responsible for conducting environmental review for the site and route permit application. An EA will be prepared to meet the applicable environmental review requirements for the application.

Scoping Process

Scoping is the first step in the development of the EA for the project. The scoping process has two primary purposes: (1) to gather public input as to the impacts and mitigation measures to study in the EA, and (2) to focus the EA on those impacts and mitigation measures that will aid in the Commission's decisions on the site and route permit. The EA scoping comment period was open from February 7, 2025, through April 21, 2025. During the comment period and three public meetings, EIP staff received written and oral comments from the public, state and local units of government, a professional union, and the applicant.[9]

---

[6] Midwater Application, Section 1.1, 15-16.
[7] *Ibid*.
[8] *Ibid*.
[9] Written comments from the public received on the Scope of the Environmental Assessment, eDockets Nos. 20253-216746-01 (Batch 1); 20253-216747-01 (Batch 2); 20254-218151-01 (Batch 3); 20254-218408-01 (Batch 4). Oral comments received on the Scope of the Environmental Assessment, eDockets Nos. 20253-216765-01 (Albert Lea Meeting); 20253-216766-01 (Virtual Meeting); 20254-218333-01 (Glenville Meeting); 20255-218578-01 (Batch 5 - Written comments and materials submitted by the public at the Glenville Meeting). Written comments from state and local units of government included: Minnesota

Public Meeting Comments

Three public meetings for the project were held beginning with an in-person event in Albert Lea, Minnesota, on February 18, 2025, followed by a virtual meeting held on February 19, 2025, and an additional in-person meeting in Glenville, Minnesota, on April 7, 2025.

February 19, 2025, Albert Lea, Minnesota

Approximately twenty community members participated in the Albert Lea meeting.[10] Meeting participants commented that the public meeting should have been held at Glenville High School and maintained that the Albert Lea site reflected poor coordination and limited transparency. Additionally, many questioned the project need, claiming that area power outages are rare. They also expressed skepticism about the local necessity for additional energy storage, given current grid reliability and usage patterns.

Meeting participants also presented comments on potential project-related environmental and public health risks, highlighting the site's proximity to the Shell Rock River, raising concerns about groundwater pollution, stormwater runoff, and cross-state watershed impacts. Attendees also questioned the site's suitability due to its proximity to wetlands, wildlife habitat, a nearby school, and residential areas. The region's historical cancer rates were cited, along with concerns about facility fire risk, particularly the release of toxic smoke and whether the local fire department could adequately respond to a battery fire. Many commenters emphasized long-term risks to land use, future homebuilding, and the potential disturbance of Native American cultural resources.

Several residents expressed concerns that construction labor would likely come from outside the area, limiting local economic benefit. They called for project-related job opportunities to support the Glenville economy. A representative from the International Union of Operating Engineers (IUOE) emphasized the value of infrastructure projects like BESS for their members in Minnesota and the Dakotas. The IUOE requested that the EA include labor considerations and local union hiring impacts.

February 20, 2025, Virtual Meeting

Approximately ten community members raised concerns pertaining to project location, particularly its proximity to Glenville-Emmons High School, and the nearby Shell Rock River.[11] A representative of the Glenville-Emmons School Board expressed concern about potential environmental and safety impacts, especially given the area's sandy soil and the river's importance. One commenter also questioned whether downstream communities had been informed. Additional concerns included the site's proximity to an anhydrous ammonia storage facility and potential impacts on school enrollment if families feel unsafe. Fire safety was also raised during the virtual meeting, specifically, emergency planning in the event of thermal runaway. Meeting participants requested that future meetings be held in Glenville to ensure greater local access and involvement.

Department of Transportation (20253-216207-01); Minnesota Department of Natural Resources (20253-216145-01 and 20253-216145-02); Minnesota Pollution Control Agency (20254-217720-01); Freeborn County, Minnesota (20254-217825-01); Butler County, Iowa (20254-217701-01); Shell Rock Lake Township (20254-217456-01); and the Shell Rock River Watershed District (20254-218094-01). Written comments were also provided by the IUOE Local 49 and NCSRC of Carpenters (20254-217919-01) and the Applicant (20254-217951-01).

[10] Midwater BESS Albert Lea Scoping Meeting, February 19, 2025, transcripts, eDocket no. 20253-216765-01

[11] Midwater BESS Virtual Scoping Meeting, February 20, 2025, transcript, eDocket no. 20253-216766-01

April 7, 2025, Glenville, Minnesota

Approximately 80 community members participated in the Glenville, Minnesota meeting.[12] Many commenters focused on the transparency of the site selection process, questioning why the Glenville site was chosen and urged a more thorough review of alternative locations, including other substations. Residents also raised concerns about thermal runaway risks, coolant leaks, and potential contamination of groundwater and the Shell Rock River, especially in the event of fire or system failure. Additionally, commenters expressed concern over stormwater management, flood risk, and the project's cumulative environmental impact, particularly given existing exposures from the nearby ethanol plant, agricultural chemicals, highways, and railroads.

Operational and technical concerns were presented by the public that included the BESS system's functionality, resilience during power outages or cooling system failures, battery lifespan, recycling plans, and decommissioning and waste removal. Comments were also received that sought clarity on emergency monitoring, local response capabilities, and ongoing noise pollution.

Community members commented on tax revenue, levies, the site's tax status, and potential liability and ownership issues, emphasizing the need for local job creation and expressed a strong preference for union labor and local workforce involvement. The use of public subsidies, energy market implications, and the absence of finalized power purchase agreements were also points of concern.

Written Public Comments

The Commission received 335 written comments from citizens during the public comment period.[13] A common theme among nearly all the written comments focused on inappropriate project siting due to its proximity to sensitive areas, including the Shell Rock River, a public school, daycares, and residential neighborhoods. Many questioned why an industrial energy project is proposed so close to vulnerable populations and critical natural resources.

Several commenters mentioned the risk of thermal runaway fires, which commenters maintained is substantial for lithium-ion batteries. Residents fear such an event could release toxic smoke, require evacuations, and overwhelm the local volunteer fire department. Several commenters asked the developer to fund emergency preparedness, equipment, and training for such a situation.

The Shell Rock River and its watershed were repeatedly identified as vital ecological, recreational, and economic resources, with many comments emphasizing the area's vulnerability to flooding, high water table, and permeable soils. Commenters also speculated that these conditions could worsen contamination impacts in the event of a fire or chemical leak. Many feared a single project failure could undo decades of restoration work and jeopardize wildlife, agriculture, and drinking water downstream.

Commenters also expressed concern over air and water pollution, loss of farmland, and reduced property values. Many argued that the project provides no local economic benefit, with risks far outweighing potential rewards. Requests were made for a $25 million bond to cover damages and for Glenville to receive a majority share of any tax revenue.

[12] Midwater BESS Albert Lea Scoping Meeting, February 19, 2025, transcripts, eDocket no. 20254-218333-01
[13] Written comments from the public received on the Scope of the Environmental Assessment, eDockets Nos. 20253-216746-01 (Batch 1); 20253-216747-01 (Batch 2); 20254-218151-01 (Batch 3); 20254-218408-01 (Batch 4).

Additionally, commenters criticized the lack of transparency and community engagement. Many said they only recently learned of the project and felt excluded from decisions.

Agency Comments

The Commission received three written comments from state agencies:

Minnesota Department of Transportation

The Minnesota Department of Transportation (MnDOT) reviewed the project and provided comments focused on safety and permitting, emphasizing the importance of minimizing new access points onto the state highways to reduce crash risks.[14] They recommended the applicant use or upgrade existing access northwest of the proposed site rather than creating new direct access from US 65. MnDOT may require turn lanes to improve safety if access from the highway is necessary.

Although the applicant indicated the transmission line would not encroach on MnDOT's highway right-of-way (ROW), MnDOT noted that any future shifts in alignment toward the ROW would require permits and additional consultation.

MnDOT also requested that project boundary maps clearly exclude highway ROW areas where the applicant does not have land rights, showing accurate lease and ownership details. If the project permit is approved, MnDOT expects ongoing coordination regarding permits, traffic control, and construction, with MnDOT staff involved in pre-construction meetings affecting state property.

Minnesota Department of Natural Resources

The Minnesota Department of Natural Resources (DNR) reviewed the combined site and route permit application for the project.[15] The DNR provided several recommendations to minimize environmental and wildlife impacts in the environmental assessment (EA).

The DNR advised increasing the security fence height to at least 10 feet to prevent deer and large wildlife from entering and recommended avoiding barbed wire due to injury risks. Lighting should be shielded and downward-facing, with low blue light emissions to reduce harm to wildlife. The EA should identify any construction dewatering activities, noting that a water appropriation permit is required for withdrawals exceeding 10,000 gallons per day or one million gallons annually.

The DNR also cautioned against using chloride-based dust suppression agents due to toxicity risks and encouraged the EA to detail dust control plans. For erosion control, wildlife-friendly materials like bio-netting are preferred, avoiding plastic mesh products that can harm small animals or pollute nearby waterways. Coordination with vegetation management groups is encouraged to develop native, pollinator-friendly seed mixes for site restoration, avoiding invasive non-native species. The vegetation plan should include wetland features in water storage basins to reduce erosion and support habitat.

Given the project's location in a riparian corridor important for migratory and breeding waterfowl, avian flight diverters must be installed on transmission lines to reduce bird collisions and electrocution

[14] Stacy Kotch Egstad, Minnesota Department of Transportation, to James Sullivan, Minnesota Public Utilities Commission, March 10, 2025, eDocket no. 20253-216207-01
[15] Martine Donovan, Minnesota Department of Natural Resources, to James Sullivan, Minnesota Public Utilities Commission, March 10, 2025, eDocket no. 20253-216145-01

risks. The DNR requested that the EA should address avian interactions and incorporate relevant design standards to protect local bird populations.

Minnesota Pollution Control Agency

Minnesota Pollution Control Agency (MPCA) staff had no comments on the project.[16]

Local Government Comments

The Commission received four written comments from local units of government:

Butler County Board of Supervisors (Iowa)

The Butler County Board of Supervisors provided written comment in its role as part of the Shell Rock River Watershed Management Coalition, where the county collaborates with neighboring counties and cities to protect and improve water quality for recreation and environmental health.[17] Butler County illustrated their reliance on the Shell Rock River for tourism and recreational use, noting that it is home to four county-run campgrounds and relies heavily on the river's boating and fishing opportunities. While not opposed to development, Butler County is deeply concerned about projects near the river that could undermine these water quality efforts. Their primary worry is the risk of heavy metal contamination from a potential fire at the proposed facility. Firefighting efforts could wash hazardous chemicals into the river, posing a serious threat to the ecosystem and recreational uses downstream.

Shell Rock River Watershed District

The Shell Rock River Watershed District (District), a local government entity guided by state-approved water management plans, emphasized its commitment to improving water quality and preventing degradation.[18] In reference to the proposed project, the District cites its rules dated February 13, 2007, which require water quality treatment for sites subject to NPDES Phase II regulations. Key requirements include proper maintenance of stormwater facilities to ensure they meet original design performance standards, with settled materials removed as needed and a maintenance plan specifying responsible parties and intervals. The District also mandates that water quality pond designs follow the guidelines outlined in the MPCA's manual *Protecting Water Quality in Urban Areas* (2000 or revised). Treatment must demonstrate removal of total suspended solids and limit discharge to 5.66 cubic feet per second per acre for a 1.25-inch storm event or meet the Nationwide Urban Runoff Program (NURP) treatment volume. Given the BESS site's proximity to the Shell Rock River, the District requests adherence to the more stringent 5.66 cubic feet per second (cfs) design criterion and recommends the installation of skimmers to enhance water treatment before discharge.

Freeborn County Board of Commissioners

The Freeborn County Board of Commissioners provided their Resolution 25-139 as a written comment to formally oppose the proposed project.[19] While recognizing Minnesota's energy goals and the importance of grid reliability, the Board expressed serious concerns about the project's potential

[16] Chris Green, Minnesota Pollution Control Agency, to James Sullivan, Minnesota Public Utilities Commission, April 15, 2025, eDocket no. 20254-217720-01

[17] Wayne Dralle, Rusty Eddy, and Greg Barnett, Butler County Board of Supervisors, Iowa, to James Sullivan, Minnesota Public Utilities Commission, April 15, 2025, eDocket no. 20254-217701-01

[18] Andy Heschel, Shell Rock River Watershed District, to James Sullivan, Minnesota Public Utilities Commission, April 18, 2025, eDocket no. 20254-218094-01

[19] Freeborn County Board of Commissioners Resolution 25-139, submitted to James Sullivan, Minnesota Public Utilities Commission, eDocket no. 20254-217825-01

adverse impacts on public health, safety, welfare, the local community, wildlife, and the environment. Specific risks cited include toxic emissions, fire hazards such as thermal runaway, explosions, and challenges to emergency response capabilities due to the facility's scale and proximity to residences, the Shell Rock River, and sensitive environmental areas. The Board also raised concerns about continuous noise emissions affecting residents and wildlife, and the site's vulnerability to severe weather events that could increase hazardous runoff into the Shell Rock River Watershed. Given these issues, the Board found that the project is inconsistent with the County's goals for public safety and compatible land use.

Shell Rock Township

During the public comment period, the Shell Rock Township Board (Shell Rock) passed a resolution (Resolution # 2025-04-08-1) that formally opposes the proposed project.[20] The resolution was provided to the Commission as a formal comment. Shell Rock cites serious concerns over potential environmental and public health risks, including chemical leaks, hazardous material spills, disruption to wildlife habitats, contamination of soil, river, and aquifers, and noise pollution. Emphasizing the importance of protecting the township's environmental integrity and quality of life, Shell Rock calls on relevant authorities and stakeholders to seek alternative solutions that do not endanger the health, safety, or well-being of the community.

Labor Unions

Operating Engineers Local 49 and North Central States Regional Council of Carpenters, representing construction workers, support the proposed project, recognizing its importance in backing up the electric grid when renewable sources aren't producing.[21] They advocate for a balanced, reasonable environmental review process that doesn't overly burden the applicant or regulators, emphasizing the project's potential to create high-quality, local jobs and contribute to the state's energy goals without discouraging future similar developments.

Applicant

Midwater BESS, LLC submitted a response to comments made by the Shell Rock Township Board and Freeborn County Board of Commissioners, who passed resolutions opposing the project.[22] Midwater emphasized that the purpose of the environmental review process is to study impacts based on facts and data and urged stakeholders to wait for the EA before forming conclusions regarding the project. The applicant noted it had actively engaged with local stakeholders, including government officials, agencies, and landowners, since submitting its permit application.

Citizen Advisory Task Force

In response to concerns voiced about the project, the Commission authorized a Citizen Advisory Task Force (ATF) on June 2, 2025, to identify project issues and impacts of local concern and to identify ways

[20] Shell Rock Lake Township, Freeborn County, Resolution # 2025-04-0801, submitted to James Sullivan, Minnesota Public Utilities Commission, eDocket no. 20254-217456-01

[21] Nathan Runke and Richard Kolodziejski, IUOE Local 49 and NCSRC of Carpenters, submitted to Will Seuffert, Minnesota Public Utilities Commission, April 21, 2025, eDocket no. 20254-217919-01 and Jeremy P. Duehr, Frederickson & Byron, on behalf of Midwater BESS, Inc., April 21, 2025, eDocket no. 20254-217951-01.

[22] Midwater BESS, Inc., eDocket no. 20254-217951-01

to avoid, minimize, or mitigate those impacts.[23] In accordance with the Commission's order, Commission EIP staff solicited task force members and facilitated three ATF meetings.[24]

While task force consensus was not required, the ATF recommendations emphasized environmental protection, fire safety, community involvement, and long-term financial safeguards as essential conditions for the project's approval. Through their deliberations, the task force identified areas of importance for the Commission to consider as they address community concerns in their project permitting decision:[25]

1. *Water Protection*: The Shell Rock River, its watershed, and state water trail are high-priority concerns. The ATF noted that strong project stormwater management and pollution prevention measures are essential permit conditions and suggested stormwater practices, including stormwater retention basin design modifications and water quality monitoring, to address these concerns.
2. *Wildlife Impacts*: The proximity of the project to a DNR Wildlife Management Area raises wildlife habitat concerns, as the project site would be ineligible for conservation programs.
3. *Fire Safety and Thermal Events*: ATF members supported the use of lithium-iron battery technology but emphasized the need for local firefighter training and firefighting equipment upgrades as permit conditions.
4. *Local Involvement*: ATF members were critical of the limited local notice and input during the application and scoping process and cited community opposition, particularly due to the site's environmental sensitivity. They also expressed concern about the lack of local control.
5. *Cleanup and Decommissioning*: The task force called for clear, enforceable permit requirements to ensure the developer, rather than the local taxpayers, bears any cleanup or decommissioning costs.
6. *Ongoing Collaboration*: Members want continued communication between local officials and site operators on emergency response, contamination, and decommissioning plans.

Two potential alternative sites were considered; however, the ATF was unable to conclude that these sites were viable alternatives for the project.[26]

HAVING REVIEWED THE MATTER, consulted with EIP staff, and in accordance with Minnesota Rule 7850.3700, I hereby make the following scoping decision:

[23] Minnesota Public Utilities Commission Advisory Task Force Order, service date, June 2, 2025, eDocket no. 20256-219493-01 and Minnesota Department of Commerce, Advisory Task Force Establishment, Charge, and Order, June 18, 2025, eDocket no. 20256-220015-01

[24] Midwater Energy Storage Project, Minnesota Public Utilities Commission, November, 2025, eDocket no. Task Force Report 202511-224951-01

[25] *Ibid.* eDocket no. 202511-224951-01

[26] *Ibid.* eDocket no. 202511-224951-01

MATTERS TO BE ADDRESSED

The EA for the proposed project will include a description and analysis of the human and environmental impacts of the project required by Minnesota Rule 7850. It will provide information on the potential impacts of the project as they relate to the topics outlined in this scoping decision and possible mitigation measures. It will identify impacts that cannot be avoided and irretrievable commitments of resources, as well as permits from other government entities that may be required for the project. The EA will discuss the relative merits of the proposed project site with respect to the siting factors in Minnesota Rule 7850.4100.

GENERAL DESCRIPTION OF THE PROJECT

A. Project Description

B. Project Purpose

C. Project Schedule

D. Project Costs

REGULATORY FRAMEWORK

A. Site Permit

B. Route Permit

C. Environmental Review

D. Public Hearing

E. Permit Decisions

F. Other Permits and Approvals

PROJECT DESIGN, CONSTRUCTION, & OPERATION

A. Project description (batteries, enclosures, inverters, transformers, substation and transmission intertie, roads, fencing)

B. Construction

C. Restoration

D. Operation and maintenance

E. Decommissioning

AFFECTED ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATIVE MEASURES

The EA will analyze the human and environmental impacts and potential mitigation measures associated with the proposed project. Potential project impacts, both positive and negative, will be described. Based on the identified impacts, the EA will outline reasonable mitigation measures to reduce or eliminate those impacts. The EA will describe any unavoidable impacts resulting from implementation of the proposed project.

Data and analyses will be commensurate with the level of impact for a given resource and the relevance of the information to consider mitigation measures. EIP staff will evaluate the cost of data and analyses in relation to the relevance and importance of the information to determine the appropriate level of detail for the EA. Less important material may be summarized, consolidated, or simply referenced.

If relevant information cannot be obtained within timelines prescribed by statute and rule, the costs of obtaining such information is excessive, or the means to obtain it is unknown, EIP staff will include a statement in the EA that such information is incomplete or unavailable and the relevance of the information in evaluating potential impacts or alternatives.

A. Impacts to Human Settlements (typical and atypical operating conditions)

    1. Noise
    2. Aesthetics (lighting, appearance of project components, fencing)
    3. Displacement
    4. Socioeconomic impacts (local revenues, taxes, employment)
    5. Cultural values
    6. Zoning and land use compatibility
    7. Property values
    8. Public services
    9. Communication and electronic interference
    10. Public health and safety (worker and public safety)
    11. Environmental justice

B. Impacts to Land Based Economies (typical and atypical operating conditions)

    1. Agriculture
    2. Forestry
    3. Mining
    4. Recreation and tourism

C. Impacts to Archaeological and Historic Resources (typical and atypical operating conditions)

D. Impacts to the Natural Environment (typical and atypical operating conditions)

    1. Air quality
    2. Vegetation
    3. Wildlife

4. Geology and soils
5. Water resources (surface water, groundwater, wetlands)
6. Rare and unique natural resources

E. Greenhouse Gas Emissions

F. Climate Change and Design for Resilience

G. Electric System Reliability

H. Adverse Impacts that Cannot be Avoided

I. Irreversible and Irretrievable Commitments of Resources

J. Cumulative Potential Effects

ISSUES OUTSIDE THE SCOPE OF THE EA

The EA will not address the following topics:

A. The need for the project, including questions of size, type, timing, and alternative system configurations.

B. Any site or route for the project other than the site and route proposed by Midwater in its combined application.

C. Any impacts related to the manufacture of the elements of the project including batteries, concrete, fuel used for construction vehicles, etc.

D. The manner in which landowners are compensated for the project.

SCHEDULE

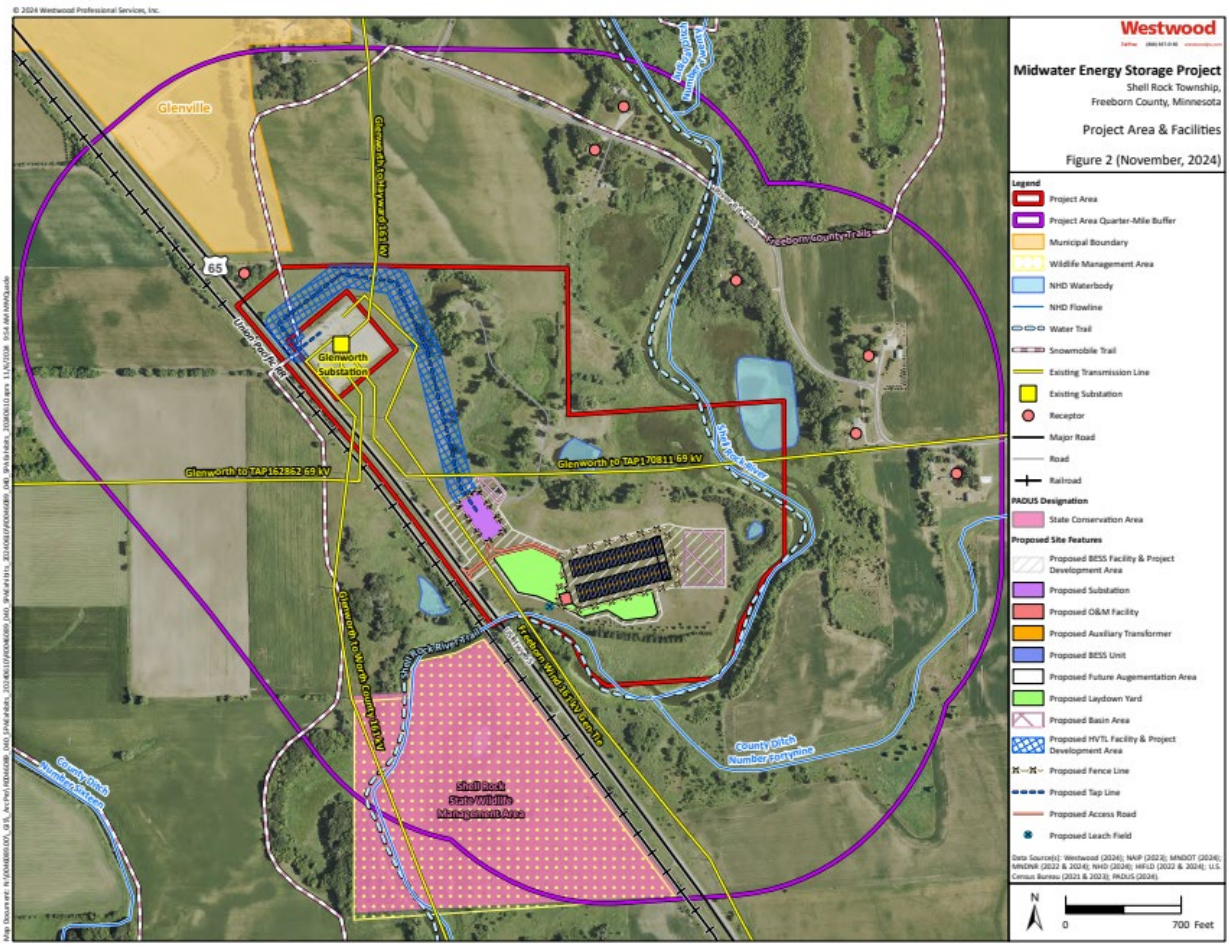
The EA is anticipated to be completed and issued in the first quarter of 2026. Upon completion, it will be noticed and made available for review. A public hearing will be held after the EA has been issued. Comments on the EA may be submitted into the hearing record.

Signed this 3rd day of DEC 2025

STATE OF MINNESOTA
PUBLIC UTILITIES COMMISSION

Sasha Bergman, Executive Secretary

PROJECT SITE



APPENDIX B

MIDWATER BESS, LLC

MAPS AND FIGURES



Proposed Midwater BESS Project



- Substation
- Overhead Tap Line
- Overhead Tap Line ROW
- O&M Facility
- Future Augmentation
- BESS Unit
- Auxillary Transformer
- Access Road
- Fenceline
- Laydown Yard
- Basin Area
- Leach Field
- BESS Facility
- Project Site

N

Miles

0 0.1

MINNESOTA PUBLIC UTILITIES COMMISSION

LANDSCAPE REQUIREMENTS & PROVISIONS

SEC. 26-82. – ENERGY STORAGE SYSTEMS GENERAL STANDARDS

(1) STANDARDS FOR ENERGY STORAGE SYSTEMS (EQUAL TO OR GREATER THAN 40 KILOWATTS UP TO MEETING THE THRESHOLD FOR PUC PERMITTING)

g. VEGETATIVE LANDSCAPE BUFFER AND SCREENING. A VEGETATIVE LANDSCAPE BUFFER MUST BE IMPLEMENTED AND MAINTAINED AROUND THE ENTIRE EXTERIOR PERIMETER OF THE SECURITY FENCE OF AN ENERGY STORAGE SYSTEM. THE VEGETATIVE BUFFER SHALL BE SET BACK CONSISTENT WITH THE REQUIREMENTS FOR A FIRE SAFETY BUFFER REQUIRED BY THIS ORDINANCE. THIS MEASURE IS AIMED AT ENHANCING THE VISUAL APPEAL AND ENVIRONMENTAL INTEGRATION OF THE PROJECT. THE FOLLOWING STANDARDS MUST BE ADHERED TO:

1. REQUIREMENTS
   - i. THE LANDSCAPE BUFFER SHALL CONSIST OF A MINIMUM OF THREE DISTINCT ROWS OF PLANTINGS.
   - ii. THE BUFFER MUST PROVIDE VISUAL SCREENING AND GLARE MINIMIZATION OF THE ENERGY STORAGE SYSTEM THROUGHOUT ALL SEASONS TO THE GREATEST EXTENT REASONABLY POSSIBLE.
   - iii. THE VEGETATIVE LANDSCAPE BUFFER MUST HAVE A MINIMUM HEIGHT EQUAL TO THAT OF THE TOP OF THE HIGHEST COMPONENT WITHIN THE ENERGY STORAGE SYSTEM (EXCEPTING INCIDENTAL EQUIPMENT USED FOR COMMUNICATIONS EQUIPMENT OR OTHER ACCESSORY USES) WITHIN TWO (2) YEARS OF THE ORIGINAL PLANTING.
   - iv. A CONTINUOUS, MAINTAINED GRASS COVER MUST BE ESTABLISHED AND PRESERVED THROUGHOUT THE BUFFER, INCLUDING BENEATH AND IN-BETWEEN THE TREES AND SHRUBS, TO ENHANCE SOIL STABILITY, WATER FILTRATION, AND OVERALL AESTHETICS.
2. SPECIES SELECTION AND DESIGN.
   - i. THE SPECIES, SPACING AND DESIGN OF THE VEGETATIVE BUFFER WILL BE DETERMINED BY THE FREEBORN COUNTY SOIL AND WATER CONSERVATION DISTRICT (SWCD) STAFF, WITH JOINT APPROVAL AUTHORITY.
   - ii. TREE AND SHRUB SELECTIONS WILL BE BASED ON THE SOILS WINDBREAK SUITABILITY GROUP FROM THE SWCD FIELD OFFICE TECHNICAL GUIDE.
   - iii. SPECIES SHOULD ALSO BE REFERENCED FROM TABLE 7 OF THE NATIVE TREES AND SHRUBS BENEFICIAL TO UPLAND WILDLIFE CHART.
3. MAINTENANCE RESPONSIBILITY. THE PROPERTY OWNER AND ENERGY STORAGE SYSTEMS OPERATOR SHARE THE OBLIGATION TO MAINTAIN THE VEGETATIVE BUFFER, ENSURING THAT ALL VEGETATION WITHIN IT ARE KEPT ALIVE AND HEALTHY. THEY MUST ALSO ACTIVELY MANAGE THE BUFFER TO KEEP IT FREE FROM NOXIOUS WEEDS AND INVASIVE PLANTS.
4. ENFORCEMENT AND PENALTIES. FAILURE TO MAINTAIN THE VEGETATIVE SCREENING AS SPECIFIED WILL RESULT IN ENFORCEMENT ACTIONS BY THE COUNTY. THE COSTS INCURRED FOR RECTIFYING ANY MAINTENANCE DEFICIENCIES WILL BE ASSESSED AGAINST THE PROPERTY.

LANDSCAPE SCHEDULE

QTY	COMMON / BOTANICAL NAME	SIZE	SPACING	MATURE SIZE	NATIVE TO STATE
7	**DECIDUOUS TREES**				
	NORTHWOOD RED MAPLE / ACER RUBRUM 'NORTHWOOD'	2" CAL. B&B	AS SHOWN	H 40'-60' W 40'	NATIVE CULTIVAR
	COMMON HACKBERRY / CELTIS OCCIDENTALIS	2" CAL. B&B	AS SHOWN	H 40'-60' W 40'	NATIVE
	NORTHERN RED OAK / QUERCUS RUBRA	2" CAL. B&B	AS SHOWN	H 50'-70' W 50'-70'	NATIVE
	ACCOLADE™ ELM / ULMUS X 'MORTON'	2" CAL. B&B	AS SHOWN	H 50'-70' W 40'-50'	NATIVE CULTIVAR
38	**EVERGREEN TREES**				
	WHITE FIR / ABIES CONCOLOR	6' HT. B&B	AS SHOWN	H 30'-50' W 25'-30'	NATIVE
	BLACK HILLS SPRUCE / PICEA GLAUCA DENSATA	6' HT. B&B	AS SHOWN	H 30'-40' W 20'-30'	NATIVE CULTIVAR
	COLUMNAR WHITE PINE / PINUS STROBUS `FASTIGIATA`	6' HT. B&B	AS SHOWN	H 25'-40' W 10'-15'	NATIVE CULTIVAR
	TECHNY ARBORVITAE / THUJA OCCIDENTALIS 'TECHNY'	6' HT. B&B	AS SHOWN	H 10-15' W 6-10'	NATIVE CULTIVAR
11	**ORNAMENTAL TREES**				
	AUTUMN BRILLIANCE SERVICEBERRY / AMELANCHIER X GRANDIFLORA 'AUTUMN BRILLIANCE'	1.5" EQUIVALENT CAL. CLUMP / 6' HT. B&B	AS SHOWN	H 30'-40' W 15'-20'	NATIVE CULTIVAR
	THORNLESS COCKSPUR HAWTHORN / CRATAEGUS CRUS-GALLI INERMIS	1.5" EQUIVALENT CAL. CLUMP / 6' HT. B&B	AS SHOWN	H 15-20' W 15-20'	NATIVE CULTIVAR

QTY	COMMON / BOTANICAL NAME	SIZE	SPACING OC	MATURE SIZE	FIELD5
89	**SHRUBS**				
	VIKING BLACK CHOKEBERRY / ARONIA MELANOCARPA 'VIKING'	#5 CONT.	60" o.c.	H 5'-7' W4'-5'	NATIVE CULTIVAR
	PRAIRIE FIRE DOGWOOD / CORNUS ALBA 'PRAIRIE FIRE'	#5 CONT.	84" o.c.	H 5'-7' W 5'-7'	NATIVE CULTIVAR
	JEWELL BUSH HONEYSUCKLE / DIERVILLA LONICERA `JEWEL`	#5 CONT.	60" o.c.	H 3-5' W 3-5'	NATIVE CULTIVAR
	SUMMER WINE® NINEBARK / PHYSOCARPUS OPULIFOLIUS 'SEWARD'	#5 CONT.	60" o.c.	H 5'-6' W 5'-6'	NATIVE CULTIVAR
	BAILEY'S COMPACT CRANBERRYBUSH / VIBURNUM TRILOBUM 'BAILEY COMPACT'	#5 CONT.	60" o.c.	H 5'-6' W 5'-6'	NATIVE CULTIVAR

NOTES: **1.** QUANTITIES ON PLAN SUPERSEDE LIST QUANTITIES IN THE EVENT OF A DISCREPANCY.
2. B.B. SPECIFIES ROOT TYPE AS BALLED AND BURLAP.
3. H.T. SPECIFIES MINIMUM SPECIMEN HEIGHT UPON INSTALLATION.
4. #5 CONT. TO MEET MINIMUM SIZE REQ. OF 24"H OR 30"W FOR DECIDUOUS SHRUBS UPON INSTALLATION. IF PLANT SIZE UNAVAILABLE AT #5 CONT. UPSIZE CONTAINER UNTIL MINIMUM PLANT SIZE REQ. IS MET.
5. PLANT SPECIES SUBJECT TO CHANGE BASED UPON AVAILABILITY AT TIME OF PLANTING & SITE COMPATIBILITY. SUBSTITUTIONS MUST BE OF LIKE SPECIES AND SIMILAR MATURE SIZE.

LEGEND:

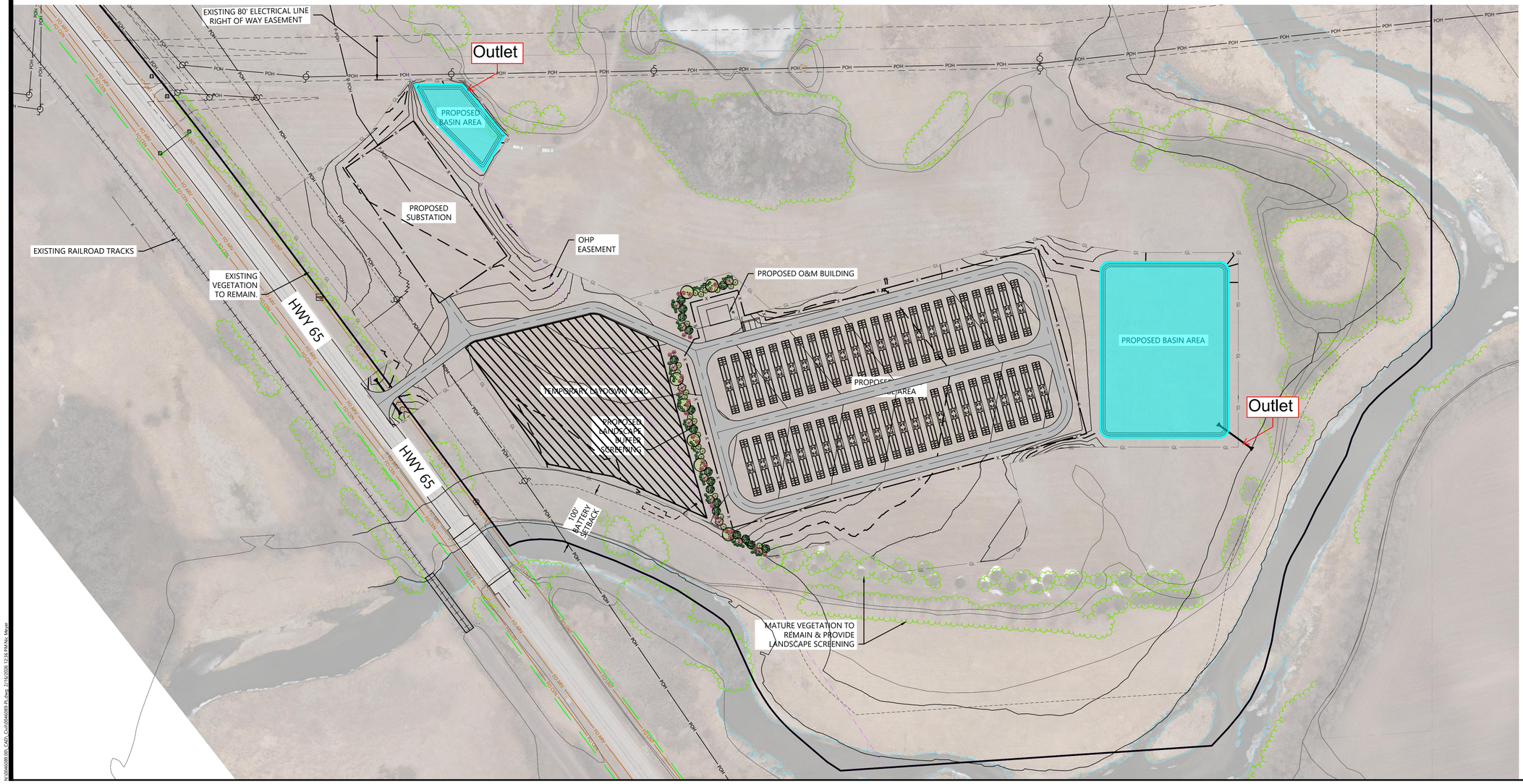
- PROJECT BOUNDARY
- PARCEL LINES
- SETBACK LINES
- EX. WATERCOURSE
- EX. OVERHEAD POWER
- EX. WETLAND AREA
- EX. INDEX CONTOUR (5')
- EX. INTERVAL CONTOUR (1')
- EX. TREE LINE
- EX. OVERHEAD ELECTRIC
- EX. EASEMENTS
- PROPOSED OVERHEAD ELECTRIC
- PROPOSED SECURITY FENCE
- PROPOSED ACCESS ROAD
- PROPOSED CULVERT
- TEMPORARY LAYDOWN YARD
- PROPOSED BATTERY STORAGE EQUIPMENT
- PROPOSED BASIN
- PROPOSED SWALE

NOTES:

1. TREE LOCATIONS AND SPACING ARE SUBJECT TO CHANGE BASED ON CONSTRUCTED UTILITY LOCATIONS.
2. NO PLANTING WILL BE INSTALLED UNTIL ALL GRADING AND CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA.
3. DECIDUOUS TREES SHOULD BE LOCATED A MINIMUM OF 5' OFF ANY UTILITY PIPE AND CONIFEROUS TREES TREES SHOULD BE LOCATED A MINIMUM OF 15' OFF ANY UTILITY PIPE.
4. ALL LANDSCAPED AREAS SHALL BE IRRIGATED WITH A DRIP LINE OR SPRAY SYSTEM AS APPROPRIATE FOR THE PROPOSED PLANTINGS IN THE SPECIFIC AREA.
5. MECHANICALS TO BE SCREENED WITH ADEQUATE VEGETATION.

LANDSCAPE LEGEND:

- DECIDUOUS TREES
- EVERGREEN TREES
- ORNAMENTAL DECIDUOUS TREES
- SHRUBS



Westwood

Phone (720) 531-8350
Toll Free (888) 937-5150
10170 Church Ranch Way, Suite #201
Westminster, CO 80021
westwoodps.com

Westwood Professional Services, Inc.

Figure 4

PREPARED FOR:

spearmint

2916 N Miami Ave, Suite 910
Miami, FL 33127

REVISIONS:

#	DATE	COMMENT	BY	CHK	APR
A	2024-07-25	ISSUED FOR REVIEW	EAC	NTM	NTM
B	2026-01-16	ISSUED FOR REVIEW	EAC	NTM	NTM
C	2026-01-23	ISSUED FOR REVIEW	EAC	NTM	NTM
D	2026-01-30	ISSUED FOR REVIEW	EAC	NTM	NTM

Midwater BESS Project

Freeborn County, Minnesota

Overall Preliminary Landscape Screening Plan

NOT FOR CONSTRUCTION

DATE: 2026-01-30

SHEET: C.200 REV: D

N:\0046089.00_CAD_Civil\0046089-B.dwg, 2/16/2026 12:56 PM, Nic Meyer



Westwood

Phone (720) 531-8350
Toll Free (888) 937-5150
10170 Church Ranch Way, Suite #201
Westminster, CO 80021
westwoodps.com

Westwood Professional Services, Inc.

PREPARED FOR:

spearmint

2916 N Miami Ave, Suite 910
Miami, FL 33127

REVISIONS:

#	DATE	COMMENT	BY	CHK	APR
A	2024-07-25	ISSUED FOR REVIEW	EAC	NTM	NTM
B	2026-01-16	ISSUED FOR REVIEW	EAC	NTM	NTM
C	2026-01-23	ISSUED FOR REVIEW	EAC	NTM	NTM
D	2026-01-30	ISSUED FOR REVIEW	EAC	NTM	NTM

Midwater BESS Project

Freeborn County, Minnesota

Preliminary Landscape Screening Plan

NOT FOR CONSTRUCTION

DATE: 2026-01-30

SHEET: C.201

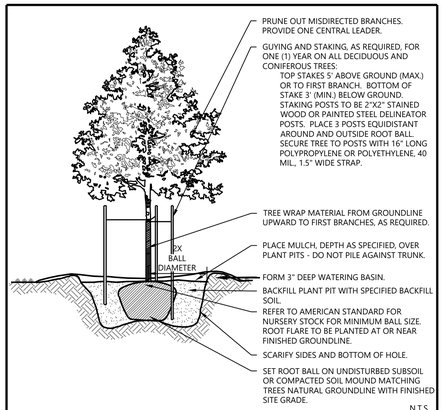
REV: D

N:\0004\009.00_CAD_Civil\004009.R.dwg 2/16/2026 12:26 PM Nic Meyer

PLANTING NOTES

1. CONTRACTOR SHALL CONTACT COMMON GROUND ALLIANCE AT 811 OR CALL811.COM TO VERIFY LOCATIONS OF ALL UNDERGROUND UTILITIES PRIOR TO INSTALLATION OF ANY PLANTS OR LANDSCAPE MATERIAL.
2. ACTUAL LOCATION OF PLANT MATERIAL IS SUBJECT TO FIELD AND SITE CONDITIONS.
3. NO PLANTING WILL BE INSTALLED UNTIL ALL GRADING AND CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA.
4. ALL SUBSTITUTIONS MUST BE APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO SUBMISSION OF ANY BID AND/OR QUOTE BY THE LANDSCAPE CONTRACTOR.
5. CONTRACTOR SHALL PROVIDE TWO YEAR GUARANTEE OF ALL PLANT MATERIALS. THE GUARANTEE BEGINS ON THE DATE OF THE LANDSCAPE ARCHITECT'S OR OWNER'S WRITTEN ACCEPTANCE OF THE INITIAL PLANTING. REPLACEMENT PLANT MATERIAL SHALL HAVE A ONE YEAR GUARANTEE COMMENCING UPON PLANTING.
6. ALL PLANTS TO BE SPECIMEN GRADE, MINNESOTA-GROWN AND/OR HARDY. SPECIMEN GRADE SHALL ADHERE TO, BUT IS NOT LIMITED BY, THE FOLLOWING STANDARDS:
   ALL PLANTS SHALL BE FREE FROM DISEASE, PESTS, WOUNDS, SCARS, ETC.
   ALL PLANTS SHALL BE FREE FROM NOTICEABLE GAPS, HOLES, OR DEFORMITIES.
   ALL PLANTS SHALL BE FREE FROM BROKEN OR DEAD BRANCHES.
   ALL PLANTS SHALL HAVE HEAVY, HEALTHY BRANCHING AND LEAFING.
   CONIFEROUS TREES SHALL HAVE AN ESTABLISHED MAIN LEADER AND A HEIGHT TO WIDTH RATIO OF NO LESS THAN 5:3.
7. PLANTS TO MEET AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1-2014 OR MOST CURRENT VERSION) REQUIREMENTS FOR SIZE AND TYPE SPECIFIED.
8. PLANTS TO BE INSTALLED AS PER MNLA & ANSI STANDARD PLANTING PRACTICES.
9. PLANTS SHALL BE IMMEDIATELY PLANTED UPON ARRIVAL AT SITE. PROPERLY HEEL-IN MATERIALS IF NECESSARY; TEMPORARY ONLY.
10. PRIOR TO PLANTING, FIELD VERIFY THAT THE ROOT COLLAR/ROOT FLAIR IS LOCATED AT THE TOP OF THE BALLED & BURLAP TREE. IF THIS IS NOT THE CASE, SOIL SHALL BE REMOVED DOWN TO THE ROOT COLLAR/ROOT FLAIR. WHEN THE BALLED & BURLAP TREE IS PLANTED, THE ROOT COLLAR/ROOT FLAIR SHALL BE EVEN OR SLIGHTLY ABOVE FINISHED GRADE.
11. OPEN TOP OF BURLAP ON BB MATERIALS; REMOVE POT ON POTTED PLANTS; SPLIT AND BREAK APART PEAT POTS.
12. PRUNE PLANTS AS NECESSARY - PER STANDARD NURSERY PRACTICE AND TO CORRECT POOR BRANCHING OF EXISTING AND PROPOSED TREES.
13. WRAP ALL SMOOTH-BARKED TREES - FASTEN TOP AND BOTTOM. REMOVE BY APRIL 1ST.
14. STAKING OF TREES AS REQUIRED; REPOSITION, PLUMB AND STAKE IF NOT PLUMB AFTER ONE YEAR.
15. THE NEED FOR SOIL AMENDMENTS SHALL BE DETERMINED UPON SITE SOIL CONDITIONS PRIOR TO PLANTING. LANDSCAPE CONTRACTOR SHALL NOTIFY LANDSCAPE ARCHITECT FOR THE NEED OF ANY SOIL AMENDMENTS.
16. BACKFILL SOIL AND TOPSOIL TO ADHERE TO MN/DOT STANDARD SPECIFICATION 3877 (SELECT TOPSOIL BORROW) AND TO BE EXISTING TOP SOIL FROM SITE FREE OF ROOTS, ROCKS LARGER THAN ONE INCH, SUBSOIL DEBRIS, AND LARGE WEEDS UNLESS SPECIFIED OTHERWISE. MINIMUM 4" DEPTH TOPSOIL FOR ALL LAWN GRASS AREAS AND 12" DEPTH TOPSOIL FOR TREE, SHRUBS, AND PERENNIALS.
17. MULCH TO BE AT ALL TREE, SHRUB, PERENNIAL, AND MAINTENANCE AREAS. TREE AND SHRUB PLANTING BEDS SHALL HAVE 4" DEPTH OF SHREDDED HARDWOOD MULCH. SHREDDED HARDWOOD MULCH TO BE USED AROUND ALL PLANTS WITHIN TURF AREAS. PERENNIAL AND ORNAMENTAL GRASS BEDS SHALL HAVE 2" DEPTH SHREDDED HARDWOOD MULCH. MULCH TO BE FREE OF DELETERIOUS MATERIAL AND COLORED RED, OR APPROVED EQUAL. ROCK MULCH TO BE BUFF LIMESTONE, 1 1/2" TO 3" DIAMETER, AT MINIMUM 3" DEPTH, OR APPROVED EQUAL. ROCK MULCH TO BE ON COMMERCIAL GRADE FILTER FABRIC, BY TYPAR, OR APPROVED EQUAL WITH NO EXPOSURE. MULCH AND FABRIC TO BE APPROVED BY OWNER PRIOR TO INSTALLATION. MULCH TO MATCH EXISTING CONDITIONS (WHERE APPLICABLE).
18. EDGING TO BE COMMERCIAL GRADE VALLEY-VIEW BLACK DIAMOND (OR EQUAL) POLY EDGING OR SPADED EDGE, AS INDICATED. POLY EDGING SHALL BE PLACED WITH SMOOTH CURVES AND STAKED WITH METAL SPIKES NO GREATER THAN 4 FOOT ON CENTER WITH BASE OF TOP BEAD AT GRADE, FOR MOWERS TO CUT ABOVE WITHOUT DAMAGE. UTILIZE CURBS AND SIDEWALKS FOR EDGING WHERE POSSIBLE. SPADED EDGE TO PROVIDE V-SHAPED DEPTH AND WIDTH TO CREATE SEPARATION BETWEEN MULCH AND GRASS. INDIVIDUAL TREE, SHRUB, OR RAIN-GARDEN BEDS TO BE SPADED EDGE, UNLESS NOTED OTHERWISE. EDGING TO MATCH EXISTING CONDITIONS (WHERE APPLICABLE).
19. ALL DISTURBED AREAS TO BE SODDED OR SEEDED, UNLESS OTHERWISE NOTED. PARKING LOT ISLANDS TO BE SODDED WITH SHREDDED HARDWOOD MULCH AROUND ALL TREES AND SHRUBS. SOD TO BE STANDARD MINNESOTA GROWN AND HARDY BLUEGRASS MIX, FREE OF LAWN WEEDS. ALL TOPSOIL AREAS TO BE RAKED TO REMOVE DEBRIS AND ENSURE DRAINAGE. SLOPES OF 3:1 OR GREATER SHALL BE STAKED. SEED AS SPECIFIED AND PER MN/DOT SPECIFICATIONS. IF NOT INDICATED ON LANDSCAPE PLAN, SEE EROSION CONTROL PLAN.
20. PROVIDE IRRIGATION TO ALL PLANTED AREAS ON SITE. IRRIGATION SYSTEM TO BE DESIGN/BUILD BY LANDSCAPE CONTRACTOR. LANDSCAPE CONTRACTOR TO PROVIDE SHOP DRAWINGS TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO INSTALLATION OF IRRIGATION SYSTEM. CONTRACTOR TO PROVIDE OPERATION MANUALS, AS-BUILT PLANS, AND NORMAL PROGRAMMING. SYSTEM SHALL BE WINTERIZED AND HAVE SPRING STARTUP DURING FIRST YEAR OF OPERATION. SYSTEM SHALL HAVE ONE-YEAR WARRANTY ON ALL PARTS AND LABOR. ALL INFORMATION ABOUT INSTALLATION AND SCHEDULING CAN BE OBTAINED FROM THE GENERAL CONTRACTOR.
21. CONTRACTOR SHALL PROVIDE NECESSARY WATERING OF PLANT MATERIALS UNTIL THE PLANT IS FULLY ESTABLISHED OR IRRIGATION SYSTEM IS OPERATIONAL. OWNER WILL NOT PROVIDE WATER FOR CONTRACTOR.
22. REPAIR, REPLACE, OR PROVIDE SOD/SEED AS REQUIRED FOR ANY ROADWAY BOULEVARD AREAS ADJACENT TO THE SITE DISTURBED DURING CONSTRUCTION.
23. REPAIR ALL DAMAGE TO PROPERTY FROM PLANTING OPERATIONS AT NO COST TO OWNER.
24. RAIN GARDEN NOTE: PROVIDE AND INSTALL EROSION CONTROL BLANKET AT RAIN GARDEN AREA SIDE SLOPES AFTER ALL PLANTING HAVE BEEN INSTALLED. BLANKET TO BE ONE SEASON GEOJUTE, MN/DOT CATEGORY 2 (STRAW 1S, WOOD FIBER 1S), OR APPROVED EQUAL. BLANKET TO BE OVERLAPPED BY 4" AND ANCHORED BY SOD STAPLES. PLACE BLANKET PERPENDICULAR TO THE SLOPE. TRENCH IN EDGES OF BLANKET AREA TO PREVENT UNDER MINING. PROVIDE SILT FENCE AT TOP OF SLOPE AS NEEDED. SHREDDED HARDWOOD MULCH TO MATCH OTHER PROJECT PLANTING MULCH. PLACE 4" DEPTH OF MULCH AT ALL PLANTING AND EROSION CONTROL BLANKET AREA (NO FILTER FABRIC). SEE RAIN GARDEN DETAIL FOR FURTHER INFORMATION. RAIN GARDEN TO PROVIDE PROPER INFILTRATION AND DRAINAGE REQUIREMENTS PER ENGINEERS APPROVAL.

PLANTING DETAILS



PRUNE OUT MISDIRECTED BRANCHES. PROVIDE ONE CENTRAL LEADER.

GUYING AND STAKING, AS REQUIRED, FOR ONE (1) YEAR ON ALL DECIDUOUS AND CONIFEROUS TREES:
TOP STAKES 5' ABOVE GROUND (MAX.) OR TO FIRST BRANCH. BOTTOM OF STAKE 3' (MIN.) BELOW GROUND. STAKING POSTS TO BE 2"X2" STAINED WOOD OR PAINTED STEEL DELINEATOR POSTS. PLACE 3 POSTS EQUIDISTANT AROUND AND OUTSIDE ROOT BALL. SECURE TREE TO POSTS WITH 16" LONG POLYPROPYLENE OR POLYETHYLENE, 40 MIL., 1.5" WIDE STRAP.

TREE WRAP MATERIAL FROM GROUNDLINE UPWARD TO FIRST BRANCHES, AS REQUIRED.

PLACE MULCH, DEPTH AS SPECIFIED, OVER PLANT PITS - DO NOT PILE AGAINST TRUNK.

FORM 3" DEEP WATERING BASIN.

BACKFILL PLANT PIT WITH SPECIFIED BACKFILL SOIL.

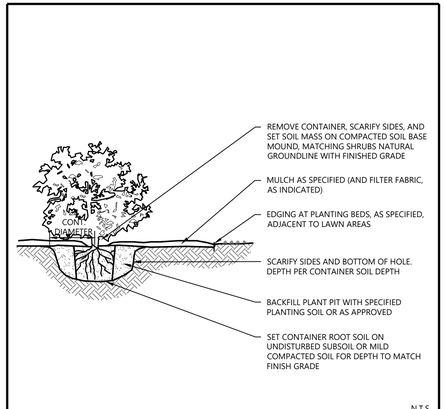
REFER TO AMERICAN STANDARD FOR NURSERY STOCK FOR MINIMUM BALL SIZE. ROOT FLARE TO BE PLANTED AT OR NEAR FINISHED GROUNDLINE.

SCARIFY SIDES AND BOTTOM OF HOLE.

SET ROOT BALL ON UNDISTURBED SUBSOIL OR COMPACTED SOIL MOUND MATCHING TREES NATURAL GROUNDLINE WITH FINISHED SITE GRADE.

N.T.S.

Westwood	DECIDUOUS TREE PLANTING	LAST REVISED: 10/19/18
		LA28



REMOVE CONTAINER, SCARIFY SIDES, AND SET SOIL MASS ON COMPACTED SOIL BASE MOUND, MATCHING SHRUBS NATURAL GROUNDLINE WITH FINISHED GRADE

MULCH AS SPECIFIED (AND FILTER FABRIC, AS INDICATED)

EDGING AT PLANTING BEDS, AS SPECIFIED, ADJACENT TO LAWN AREAS

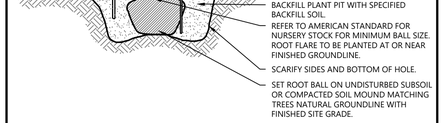
SCARIFY SIDES AND BOTTOM OF HOLE. DEPTH PER CONTAINER SOIL DEPTH

BACKFILL PLANT PIT WITH SPECIFIED PLANTING SOIL OR AS APPROVED

SET CONTAINER ROOT SOIL ON UNDISTURBED SUBSOIL OR MILD COMPACTED SOIL FOR DEPTH TO MATCH FINISH GRADE

N.T.S.

Westwood	SHRUB & PERENNIAL CONTAINER PLANTING	LAST REVISED: 10/23/18
		LA27-C



PRUNE OUT MISDIRECTED BRANCHES. PROVIDE ONE CENTRAL LEADER.

GUYING AND STAKING, AS REQUIRED, FOR ONE (1) YEAR ON ALL DECIDUOUS AND CONIFEROUS TREES:
TOP STAKES 5' ABOVE GROUND (MAX.) OR TO FIRST BRANCH. BOTTOM OF STAKE 3' (MIN.) BELOW GROUND. STAKING POSTS TO BE 2"X2" STAINED WOOD OR PAINTED STEEL DELINEATOR POSTS. PLACE 3 POSTS EQUIDISTANT AROUND AND OUTSIDE ROOT BALL. SECURE TREE TO POSTS WITH 16" LONG POLYPROPYLENE OR POLYETHYLENE, 40 MIL., 1.5" WIDE STRAP.

PLACE MULCH, DEPTH AS SPECIFIED, OVER PLANT PITS - DO NOT PILE AGAINST TRUNK.

FORM 3" DEEP WATERING BASIN.

BACKFILL PLANT PIT WITH SPECIFIED BACKFILL SOIL.

REFER TO AMERICAN STANDARD FOR NURSERY STOCK FOR MINIMUM BALL SIZE. ROOT FLARE TO BE PLANTED AT OR NEAR FINISHED GROUNDLINE.

SCARIFY SIDES AND BOTTOM OF HOLE.

SET ROOT BALL ON UNDISTURBED SUBSOIL OR COMPACTED SOIL MOUND MATCHING TREES NATURAL GROUNDLINE WITH FINISHED SITE GRADE.

N.T.S.

Westwood	EVERGREEN TREE PLANTING	LAST REVISED: 10/19/18
		LA29

Westwood

Phone (720) 531-8350
Toll Free (888) 937-5150
10170 Church Ranch Way, Suite #201
Westminster, CO 80021
westwoodps.com

Westwood Professional Services, Inc.

PREPARED FOR:

spearmint

2916 N Miami Ave, Suite 910
Miami, FL 33127

REVISIONS:

#	DATE	COMMENT	BY	CHK	APR
A	2024-07-25	ISSUED FOR REVIEW	EAC	NTM	NTM
B	2026-01-16	ISSUED FOR REVIEW	EAC	NTM	NTM
C	2026-01-23	ISSUED FOR REVIEW	EAC	NTM	NTM
D	2026-01-30	ISSUED FOR REVIEW	EAC	NTM	NTM

Midwater BESS Project

Freeborn County, Minnesota

Preliminary Landscape Screening Notes & Details

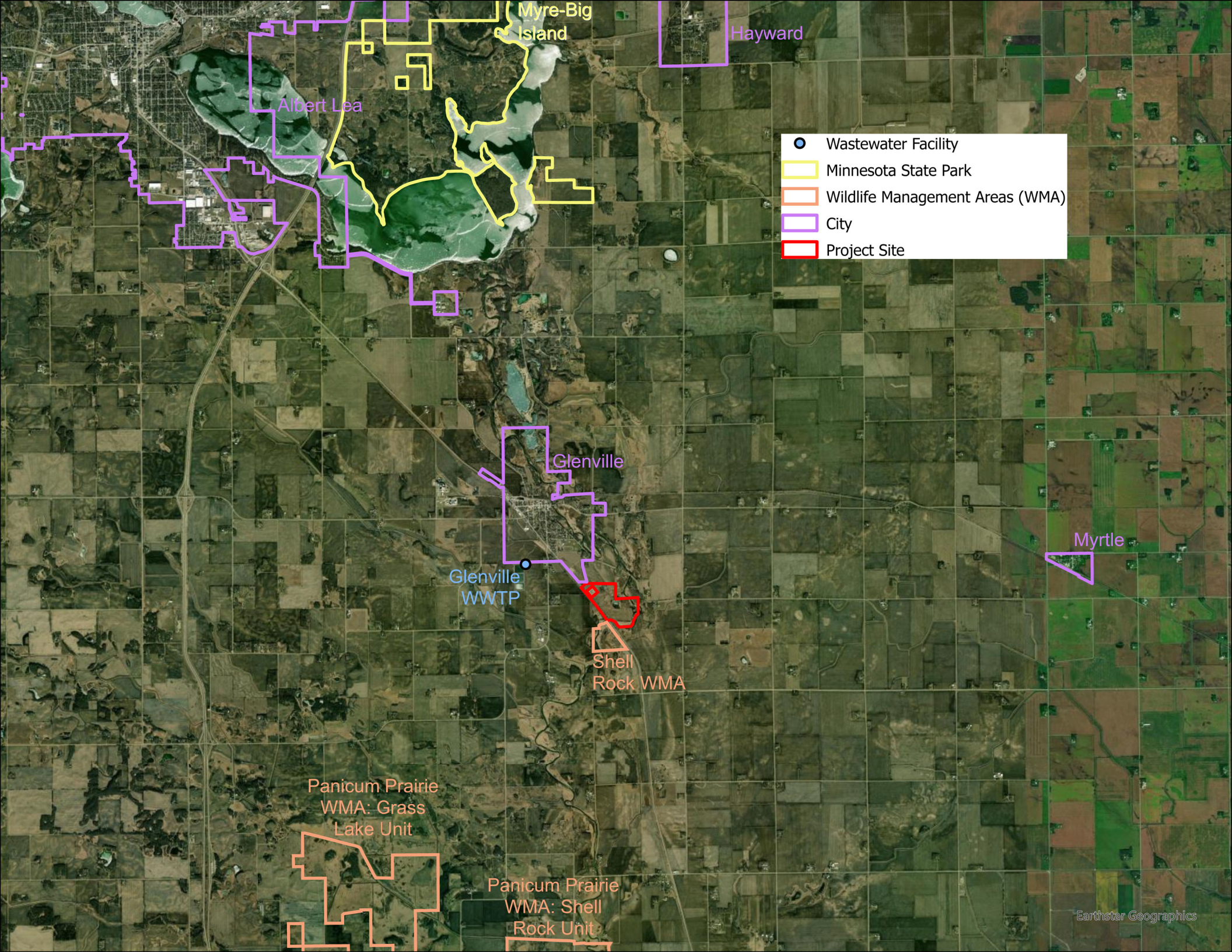
NOT FOR CONSTRUCTION

DATE: 2026-01-30

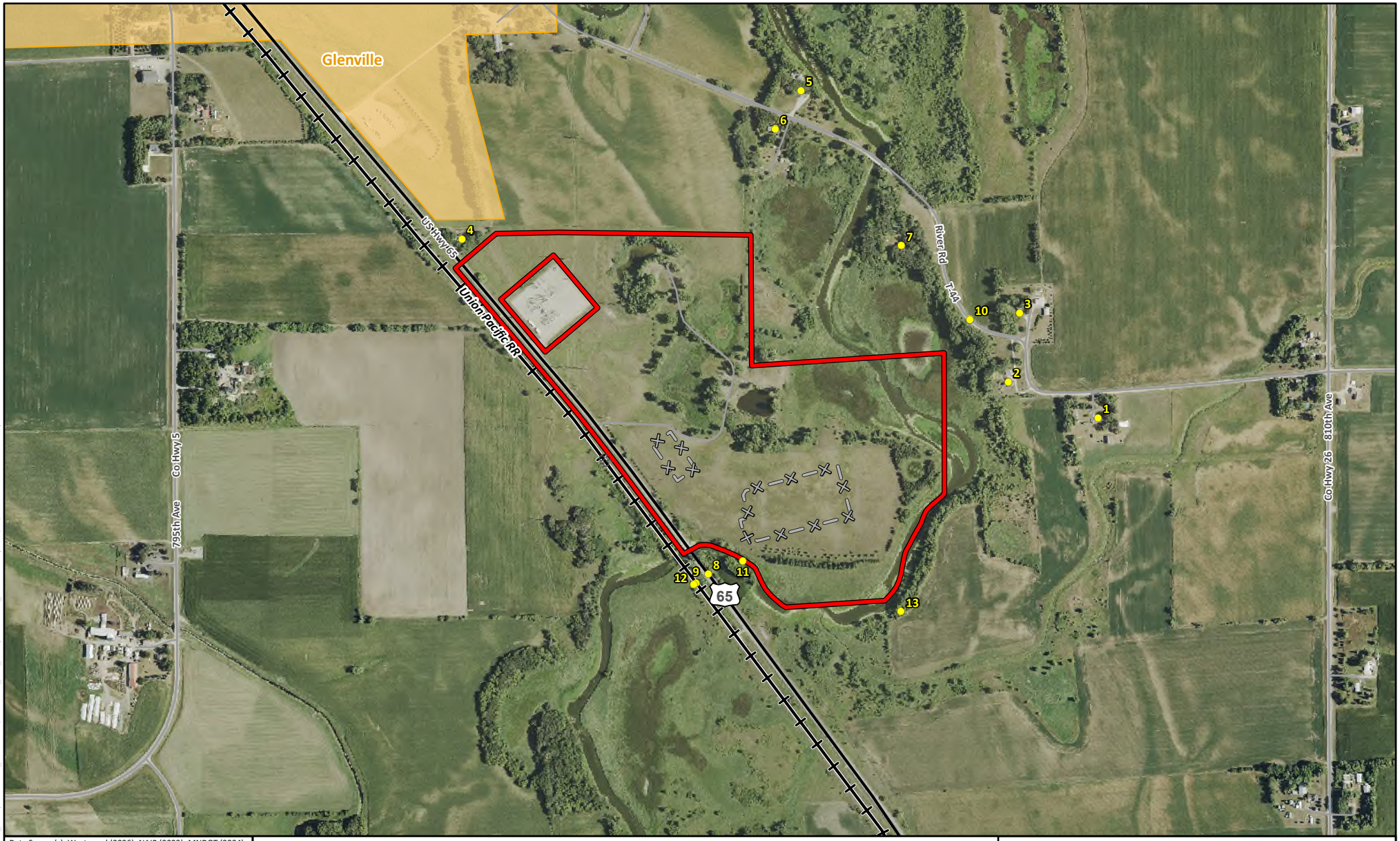
SHEET: C.202

REV: D

N:\0004698.00_CAD_Civil\0004698-R.dwg, 2/2/2026 8:34 PM, Ellie.Crack


Myre-Big Island
Hayward
Albert Lea
Wastewater Facility
Minnesota State Park
Wildlife Management Areas (WMA)
City
Project Site
Glenville
Myrtle
Glenville WWTP
Shell Rock WMA
Panicum Prairie WMA: Grass Lake Unit
Panicum Prairie WMA: Shell Rock Unit
Earthstar Geographics

© 2026 Westwood Professional Services, Inc.



Data Source(s): Westwood (2026); NAIP (2023); MNDOT (2024); U.S. Census Bureau (2021 & 2023).

N

0 900 Feet

Westwood

Toll Free (888) 937-5150 westwoodps.com

Midwater Energy Storage Project

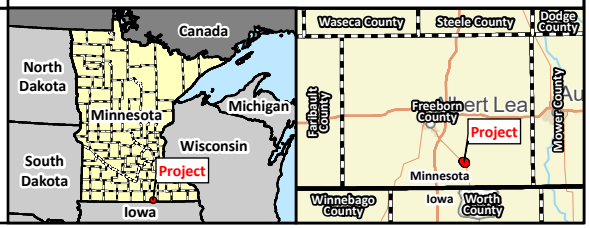
Shell Rock Township, Freeborn County, Minnesota

Proximity of Locations to the Project - Table 6.2-1

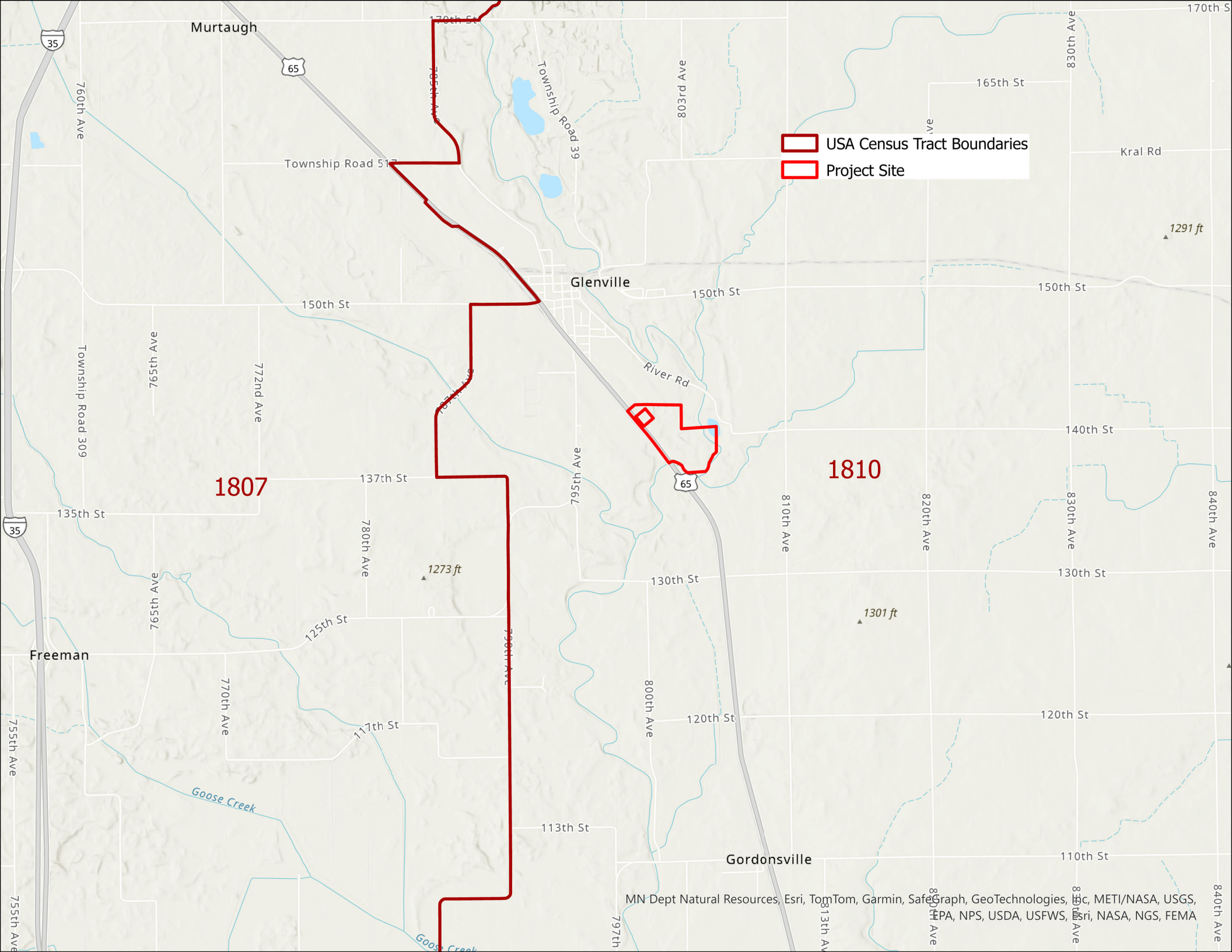
Figure 7

Legend

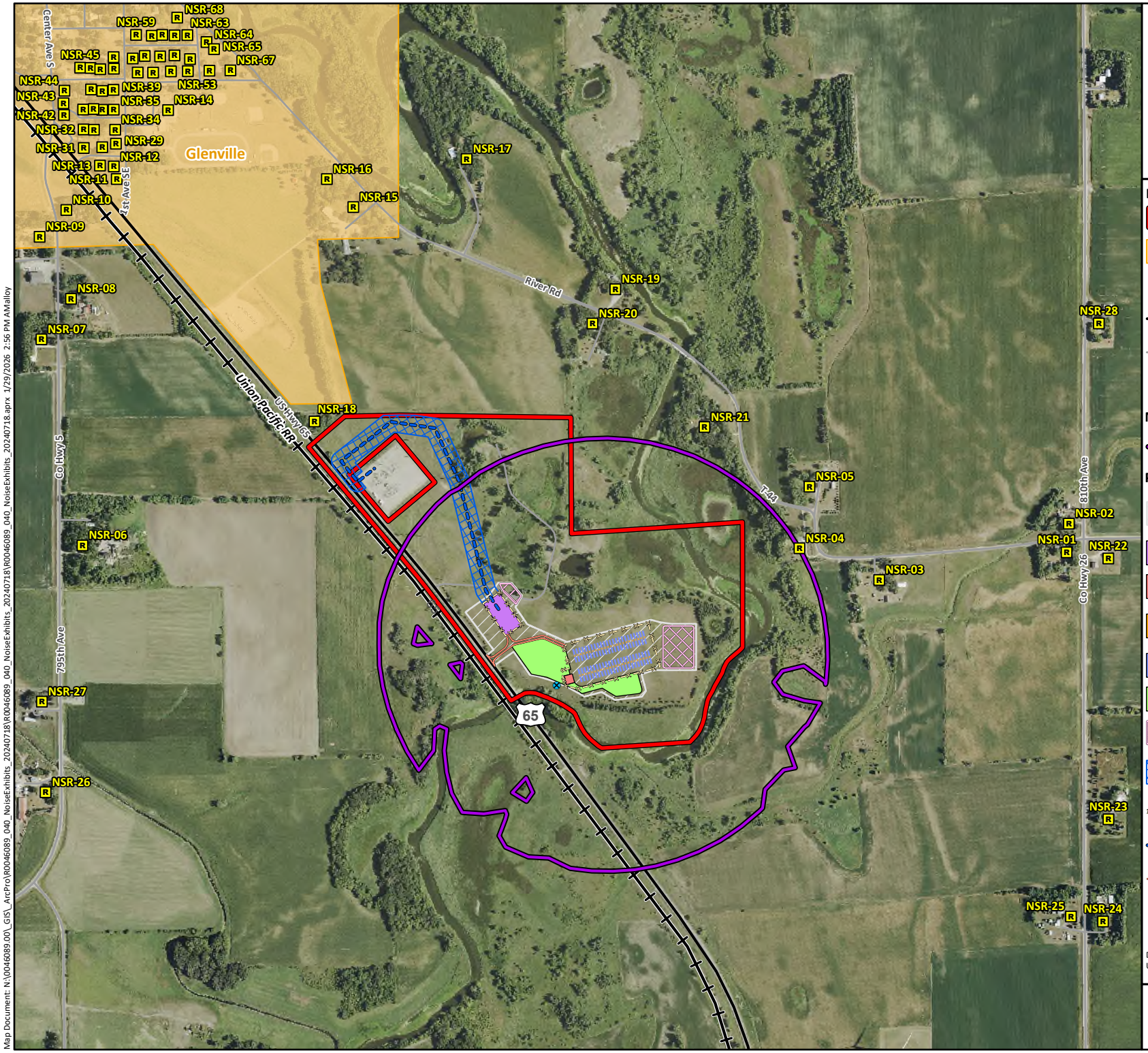
- BESS Facility Fence
- Project Area
- Municipal Boundary
- Major Road
- Road
- Railroad
- Location



Map Document: N:\0046089.00_GIS_ArcPro\R0046089_040_ReceptorExhibit_20250516\R0046089_040_ReceptorExhibit_20250516.aprx 2/19/2026 11:31 AM AMalloy


USA Census Tract Boundaries
Project Site
1807
1810
Murtaugh
Glenville
Freeman
Gordonsville
Township Road 517
150th St
137th St
135th St
125th St
117th St
113th St
130th St
120th St
110th St
140th St
165th St
River Rd
Kral Rd
Township Road 309
Township Road 39
760th Ave
765th Ave
772nd Ave
780th Ave
795th Ave
797th Ave
798th Ave
800th Ave
803rd Ave
810th Ave
820th Ave
830th Ave
840th Ave
755th Ave
770th Ave
Goose Creek
1273 ft
1291 ft
1301 ft
MN Dept Natural Resources, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS, Esri, NASA, NGS, FEMA

© 2026 Westwood Professional Services, Inc.



Westwood
Toll Free (888) 937-5150 westwoodps.com

Midwater Energy Storage Project

Shell Rock Township,
Freeborn County, Minnesota

50 dBA Total Noise Level Contour
(Assumed 45 dBA Ambient + Project Generated Noise)

Figure 10 (January, 2026)

Legend

- Project Area
- Municipal Boundary
- Receptor
- Major Road
- Road
- Railroad

Noise Contours [dB(A)]

- 50

Proposed Site Features

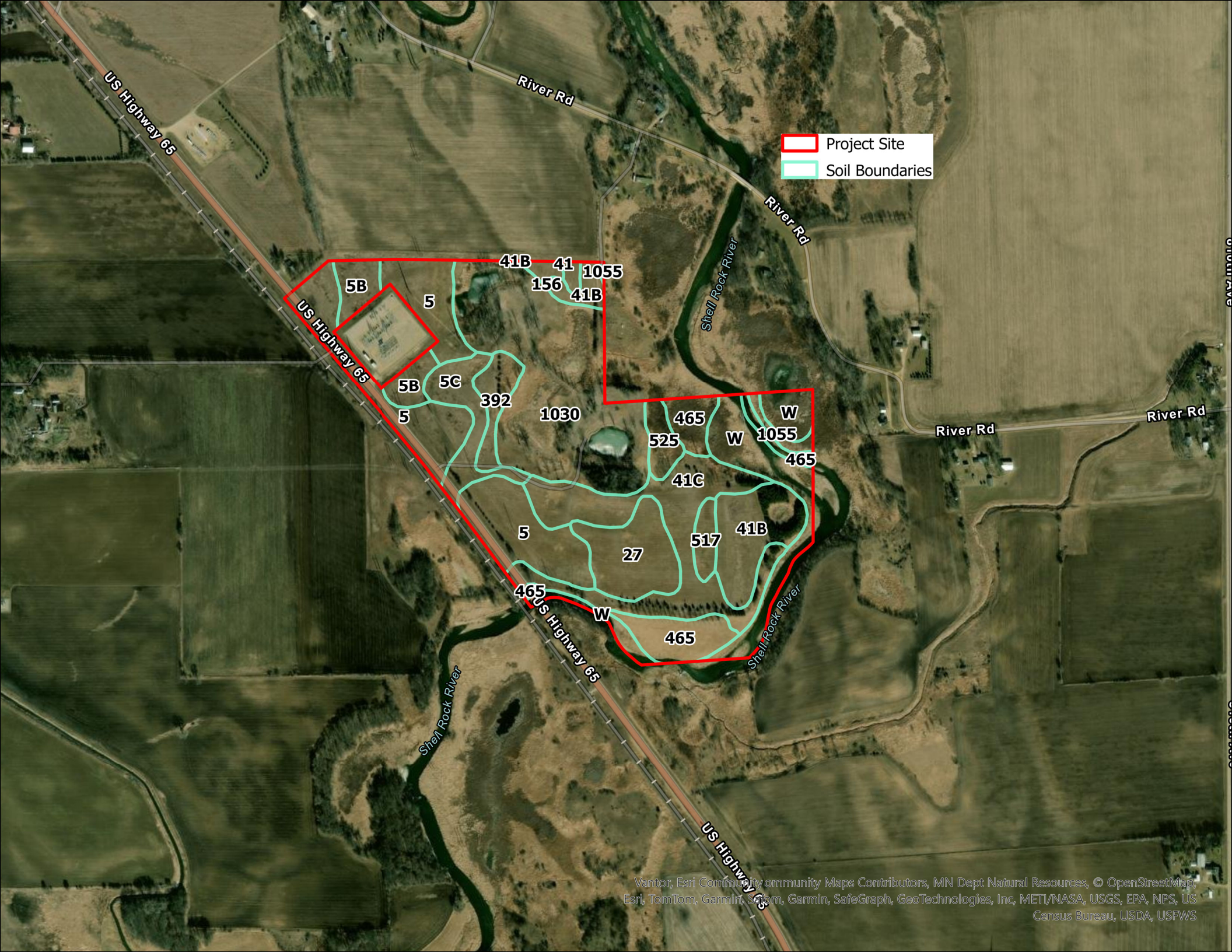
- Proposed BESS Facility & Project Development Area
- Proposed Substation
- Proposed O&M Facility
- Proposed Auxiliary Transformer
- Proposed BESS Unit
- Proposed Laydown Yard
- Proposed Basin Area
- Proposed HVTL Facility & Project Development Area
- Proposed Fence Line
- Proposed Tap Line
- Proposed Access Road
- Proposed Leach Field

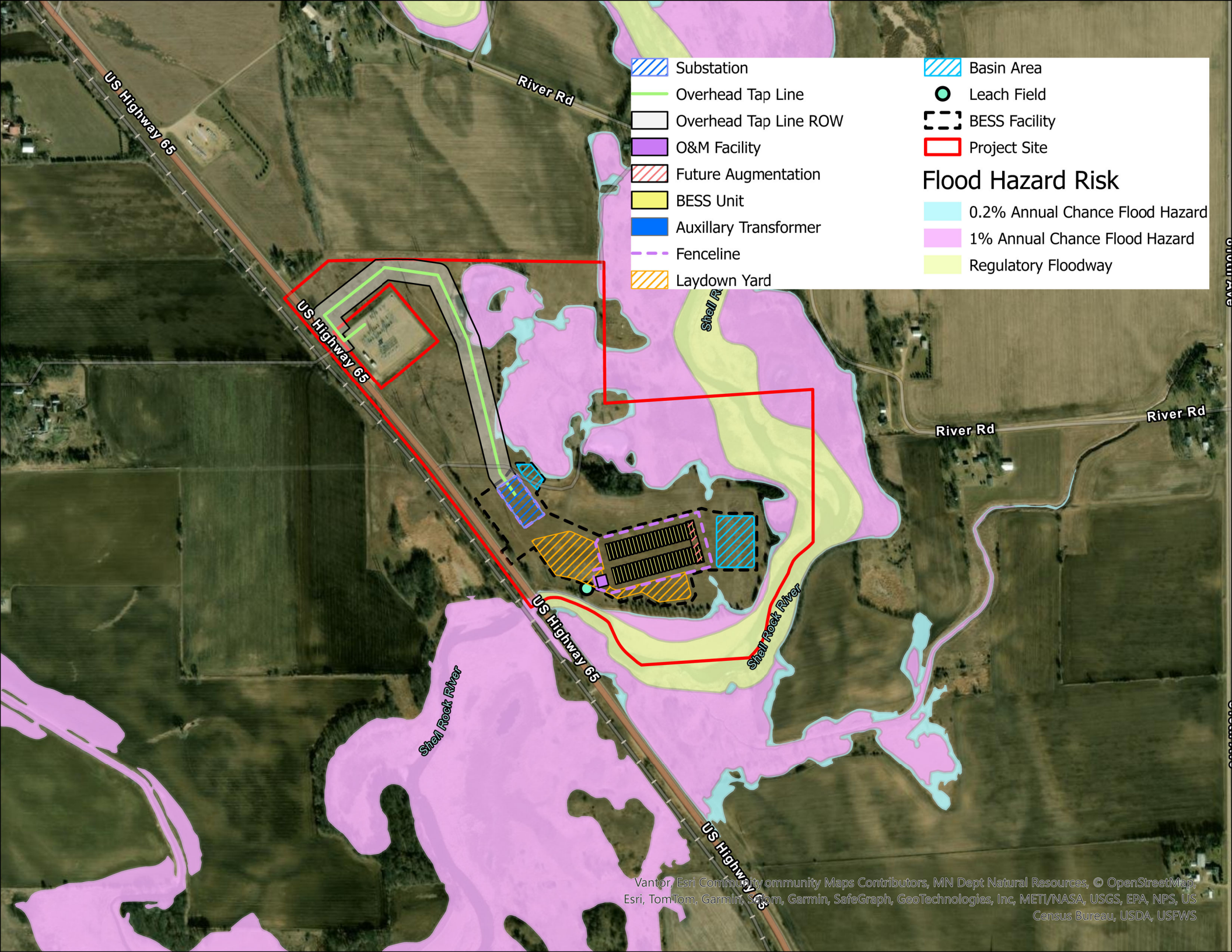
Data Source(s): Westwood (2026); NAIP (2023); MNDOT (2024); U.S. Census Bureau (2021 & 2023).

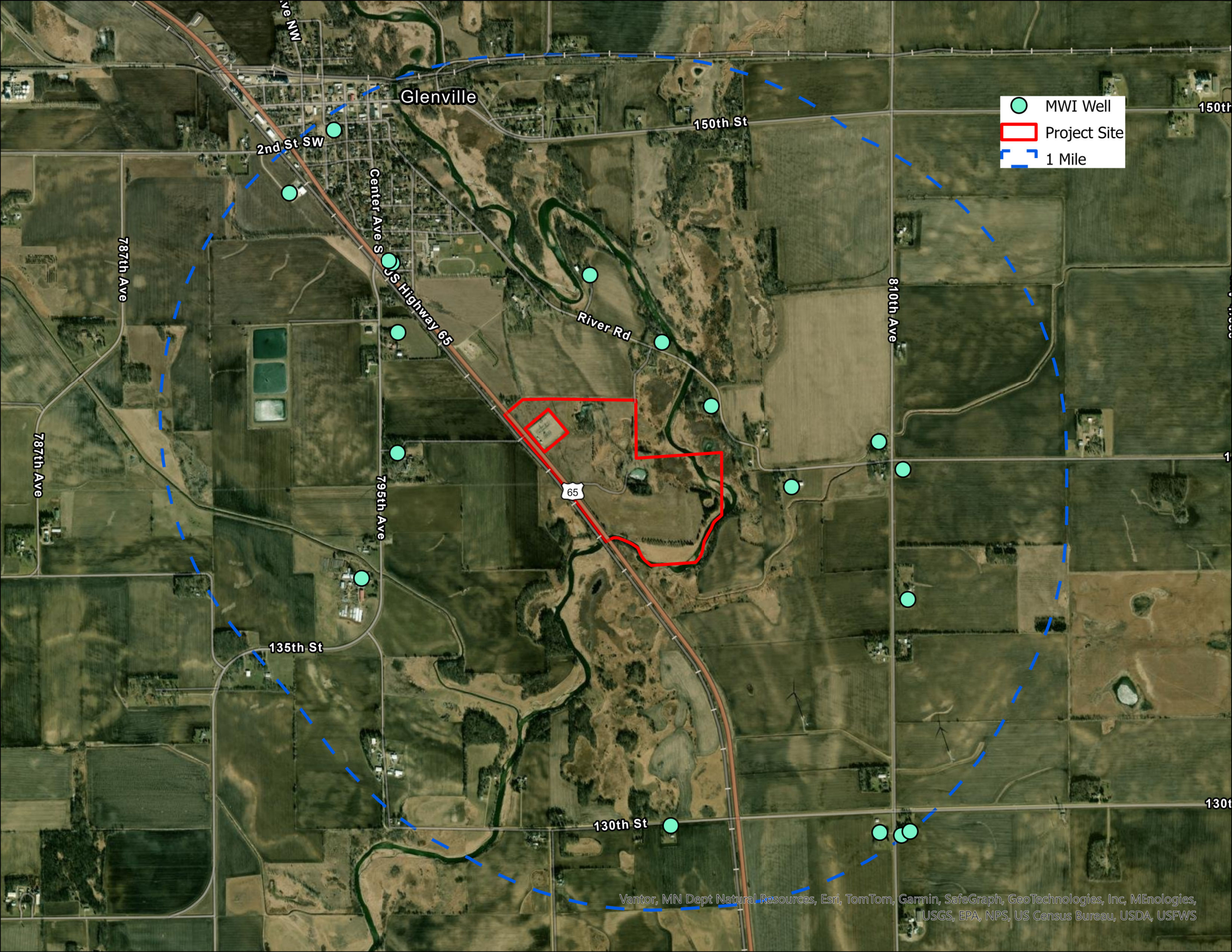
N

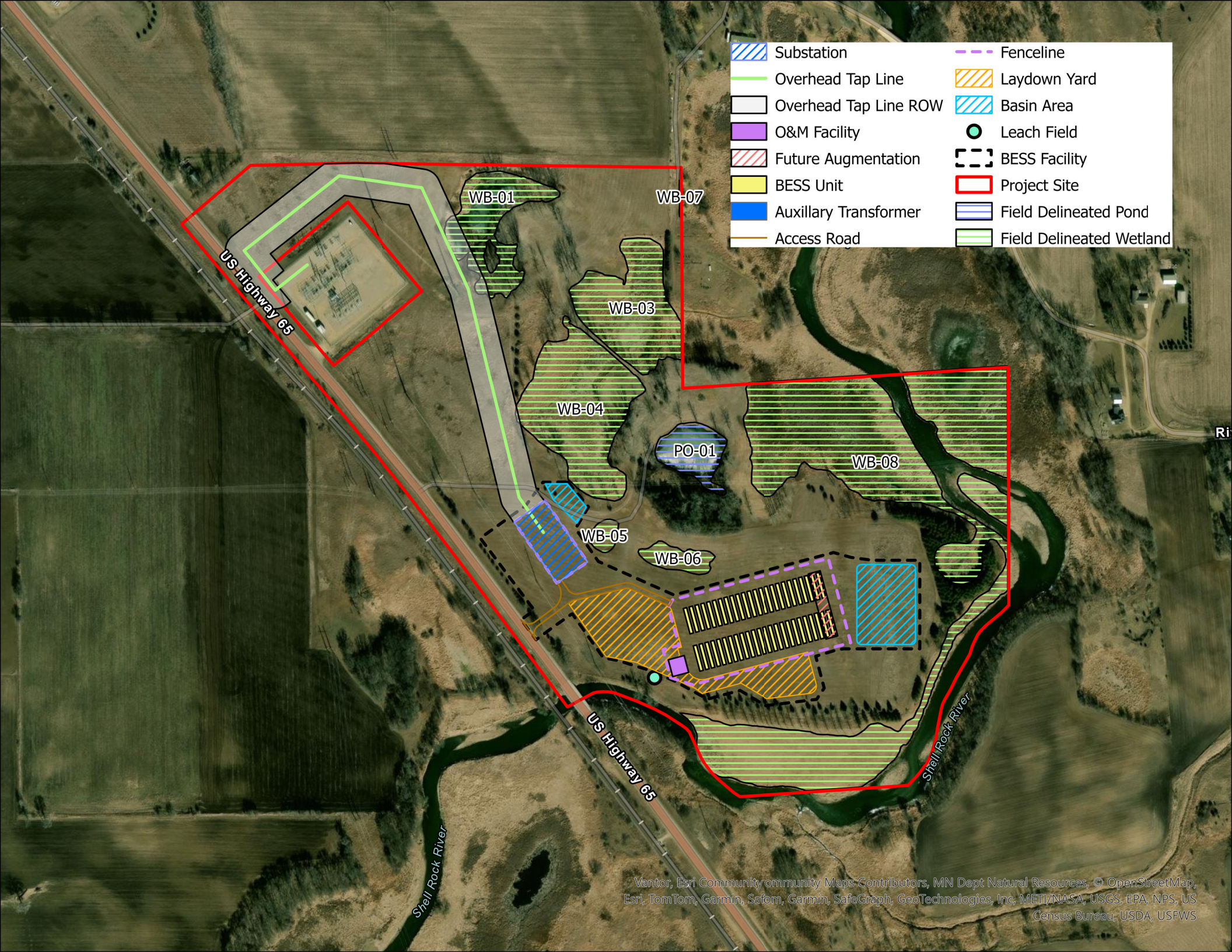
0 1,000 Feet

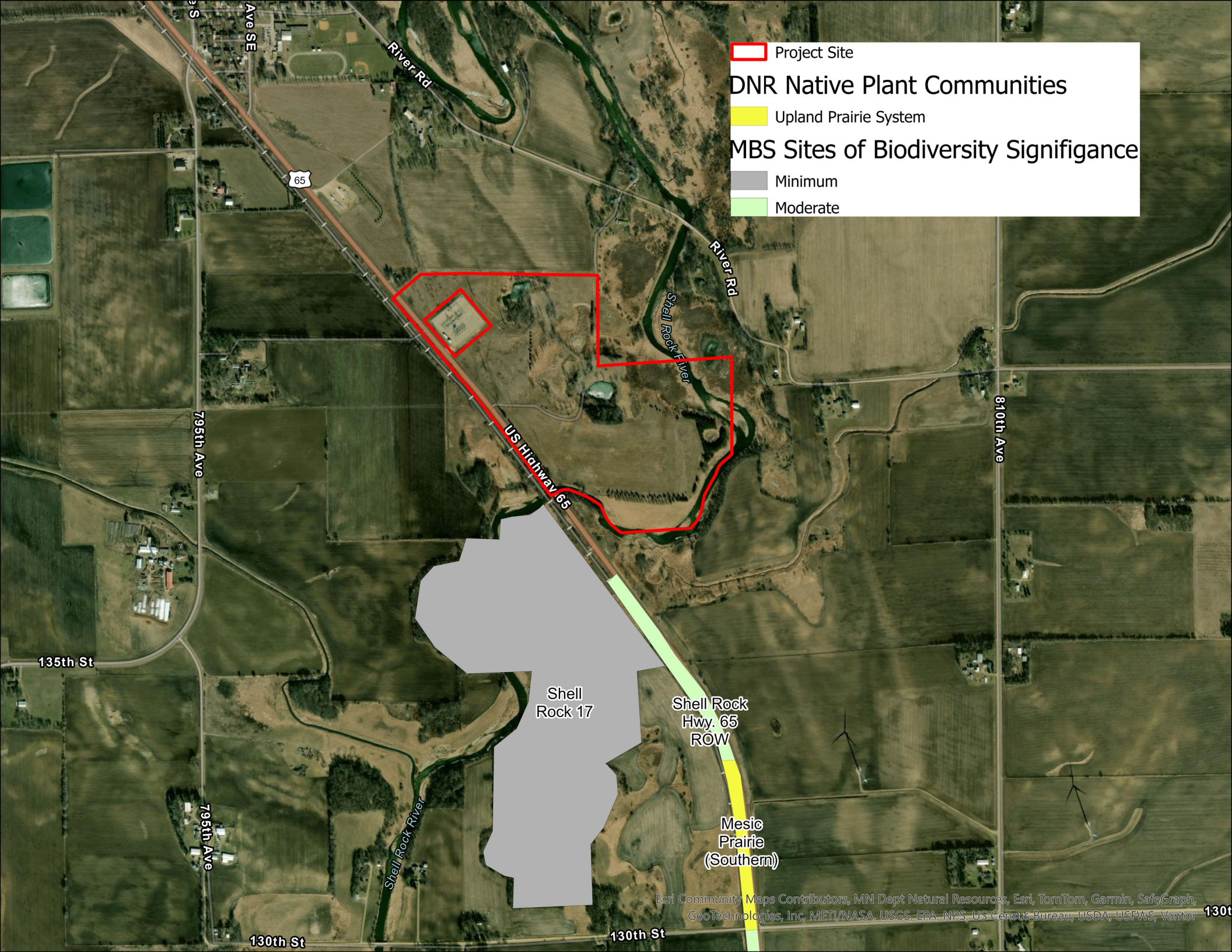
Map Document: N:\0046089.00_GIS_ArcPro\R0046089_040_NoiseExhibits_20240718\R0046089_040_NoiseExhibits_20240718\R0046089_040_NoiseExhibits_20240718.aprx 1/29/2026 2:56 PM AMalloy


Project Site
Soil Boundaries
US Highway 65
River Rd
Shell Rock River
41B
41
1055
156
5B
5
5C
392
1030
465
W
525
41C
517
27
Vantor, Esri Community ommunity Maps Contributors, MN Dept Natural Resources, © OpenStreetMap, Esri, TomTom, Garmin, Stom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS


Substation
Overhead Tap Line
Overhead Tap Line ROW
O&M Facility
Future Augmentation
BESS Unit
Auxillary Transformer
Fenceline
Laydown Yard
Basin Area
Leach Field
BESS Facility
Project Site
Flood Hazard Risk
0.2% Annual Chance Flood Hazard
1% Annual Chance Flood Hazard
Regulatory Floodway
US Highway 65
River Rd
Shell Rock River
Vantor, Esri Community Maps Contributors, MN Dept Natural Resources, © OpenStreetMap, Esri, TomTom, Garmin, Foursquare, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS


MWI Well
Project Site
1 Mile
Glenville
150th St
2nd St SW
Center Ave S
US Highway 65
River Rd
787th Ave
795th Ave
810th Ave
135th St
130th St
65
Vantor, MN Dept Natural Resources, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, MEnologies, USGS, EPA, NPS, US Census Bureau, USDA, USFWS


Substation
Overhead Tap Line
Overhead Tap Line ROW
O&M Facility
Future Augmentation
BESS Unit
Auxillary Transformer
Access Road
Fenceline
Laydown Yard
Basin Area
Leach Field
BESS Facility
Project Site
Field Delineated Pond
Field Delineated Wetland
WB-01
WB-03
WB-04
WB-05
WB-06
WB-07
WB-08
PO-01
US Highway 65
US Highway 65
Shell Rock River
Shell Rock River
Vantor, Esri Community Maps Contributors, MN Dept Natural Resources, © OpenStreetMap, Esri, TomTom, Garmin, Safom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS


Project Site
DNR Native Plant Communities
Upland Prairie System
MBS Sites of Biodiversity Signifigance
Minimum
Moderate
River Rd
Ave SE
65
River Rd
Shell Rock River
US Highway 65
795th Ave
810th Ave
135th St
Shell
Rock 17
Shell Rock
Hwy. 65
ROW
Mesic
Prairie
(Southern)
795th Ave
Shell Rock River
130th St
130th St
Esri Community Maps Contributors, MN Dept Natural Resources, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, Vantor

APPENDIX C

MIDWATER BESS, LLC

DRAFT ROUTE AND SITE PERMITS

STATE OF MINNESOTA PUBLIC UTILITIES COMMISSION

SITE PERMIT FOR
~~[PROJECT NAME]~~ MIDWATER ENERGY STORAGE PROJECT

AN ENERGY STORAGE SYSTEM IN
~~[COUNTY]~~ FREEBORN COUNTY

ISSUED TO
MIDWATER BESS, LLC

PUC DOCKET NO. ~~[Docket Number]~~ ESS-24-294

In accordance with the requirements of Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850 this site permit is hereby issued to:

~~[Permittee]~~ Midwater BESS, LLC

~~[Permittee]~~ Midwater BESS, LLC is authorized by this site permit to construct and operate ~~[Provide a description of the project authorized by the Minnesota Public Utilities Commission]~~ the Midwater Energy Storage Project, a battery energy storage system (BESS) with a nominal power rating of up to 150 MW alternating current (AC) with approximately 600 megawatt-hours (MWh) of energy capacity on a site of approximately 17 acres in Shell Lake Township, Freeborn County

The energy storage system shall be constructed and operated within the site identified in this site permit and in compliance with the conditions specified in this site permit.

This site permit shall expire 30 years from the date of this approval.

Approved and adopted this ____ day of [Month, Year]

BY ORDER OF THE COMMISSION

_____

Sasha Bergman,
Executive Secretary

To request this document in another format such as large print or audio, call 651-296-0406 or 800-657-3782 (voice). Persons with a hearing or speech impairment may call using their preferred Telecommunications Relay Service or email consumer.puc@state.mn.us for assistance.

Contents

1 SITE PERMIT 1

1.1 Pre-emption 1

2 PROJECT DESCRIPTION 1

2.1 Project Ownership 1

3 DESIGNATED SITE 2

4 GENERAL CONDITIONS 2

4.1 Site Permit Distribution 2

4.2 Access to Property 3

4.3 Construction and Operation Practices 3

4.3.1 Field Representative 3

4.3.2 Site Manager 3

4.3.3 Employee Training - Site Permit Terms and Conditions 4

4.3.4 Independent Third-Party Monitoring 4

4.3.5 Public Services, Public Utilities, and Existing Easements 4

4.3.6 Temporary Workspace 5

4.3.7 Noise 5

4.3.8 Aesthetics 5

4.3.9 Topsoil Protection 5

4.3.10 Soil Compaction 5

4.3.11 Soil Erosion and Sediment Control 6

4.3.12 Public Lands 6

4.3.13 Wetlands and Water Resources 6

4.3.14 Native Prairie 7

4.3.15 Vegetation Management 7

4.3.16 Application of Pesticides 8

4.3.17 Invasive Species 8

4.3.18 Noxious Weeds 8

4.3.19 Roads 8

4.3.20 Archaeological and Historic Resources 9

4.3.21 Interference 9

4.3.22 Drainage Tiles 10

4.3.23 Restoration 10

4.3.24 Cleanup 10

4.3.25 Pollution and Hazardous Wastes 10

4.3.26 Damages 10

4.3.27 Public Safety 10
4.3.28 Site Identification 11
4.4 Collector and Feeder Lines 11
4.5 Other Requirements 11
4.5.1 Safety Codes and Design Requirements 11
4.5.2 Other Permits and Regulations 12
5 SPECIAL CONDITIONS 12
5.1 Lighting 12
5.2 Tiered Vegetative Buffer 12
5.3 Pre-Construction Noise Modeling and Impact Assessment 13
5.4 Noise Studies and Noise Mitigation 13
5.5 Hazard Mitigation Analysis 13
5.6 Local Firefighter Training 13
5.7 Emergency Planning and Preparedness 14
5.8 Site Monitoring 14
5.9 Dry Hydrant Use 14
5.10 Agricultural Impact Mitigation Plan 14
5.11 Vegetative Management Plan 14
5.12 Surface and Groundwater Monitoring 15
5.13 Tree Replacement Plan 16
5.14 Bio-Netting or Natural Netting 16
5.15 Unanticipated Discoveries Plan 16
5.16 Security Fencing 16
5.17 Dust Control 17
5.18 Battery Augmentation 17
5.19 Offtake Agreement 17
5.20 Annual Report 17
6 DELAY IN CONSTRUCTION 18
7 COMPLAINT PROCEDURES 18
8 COMPLIANCE REQUIREMENTS 19
8.1 Pre-Construction Meeting 19
8.2 Pre-Operation Meeting 19
8.3 Site Plan 19
8.4 Status Reports 20
8.5 Labor Statistic Reporting 20
8.6 Prevailing Wage 21

8.7 In-Service Date 21
8.8 As-Builts 21
8.9 GPS Data 21
8.10 Right of Entry 21
8.11 Emergency Response 22
8.12 Extraordinary Events 22
8.13 Wildlife Injuries and Fatalities 22
9 DECOMMISSIONING AND RESTORATION 22
9.1 Decommissioning Plan 22
9.2 Site Final Restoration 23
10 COMMISSION AUTHORITY AFTER SITE PERMIT ISSUANCE 23
10.1 Expansion of Designated Site Boundaries 23
10.2 Periodic Review 24
10.3 Modification of Conditions 24
10.4 More Stringent Rules 24
11 SITE PERMIT AMENDMENT 24
12 TRANSFER OF SITE PERMIT 24
13 REVOCATION OR SUSPENSION OF SITE PERMIT 25
14 EXPIRATION DATE 25

ATTACHMENTS

Attachment 1 – Complaint Handling Procedures for Permitted Energy Facilities
Attachment 2 – Compliance Filing Procedures for Permitted Energy Facilities
Attachment 3 – Site Permit Maps

~~SAMPLE~~ DRAFT **PERMIT** ~~[Project Name and PUC Docket No.]~~ Midwater Energy Storage Project, Docket No. ESS-24-294

1 SITE PERMIT

The Minnesota Public Utilities Commission (Commission) hereby issues this site permit to ~~[Permittee Name]~~ Midwater BESS, Inc. (Permittee) pursuant to Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850. This site permit authorizes the Permittee to construct and operate ~~[Provide a description of the project as authorized by the Commission]~~ a 150-megawatt battery energy storage system (BESS) in Shell Rock Township, Freeborn County, Minnesota. (~~[Project Name, if applicable,~~ Midwater Energy Storage Project, henceforth known as Project). The energy storage system shall be constructed and operated within the site identified in this site permit and in compliance with the conditions specified in this site permit.

1.1 Pre-emption

Pursuant to Minn. Stat. § 216E.10, this site permit shall be the sole site approval required for the location, construction, and operation of the energy storage system and this site permit shall supersede and preempt all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local and special purpose governments.

2 PROJECT DESCRIPTION

The Project is a 150-megawatt battery energy storage system (BESS) in Shell Rock Township, Freeborn County, Minnesota. In addition to batteries, racking, and enclosures, the facility will also include inverters and transformers, electrical feeder lines, a project substation, stormwater drainage basins, storage and parking areas, and fencing surrounding the perimeter of the facility. Midwater BESS may construct an operations and maintenance facility at the site or may lease existing space nearby to house operations and maintenance materials. The facility will be connected to the electric grid through a tap line of approximately 2,668 feet between the project substation and the adjacent Glenworth Substation.

The Project is located in the following:

County	Township Name	Township	Range	Section
Freeborn	Shell Rock Township	101N	20W	7, 8, and 17

2.1 Project Ownership

At least 14 days prior to the pre-construction meeting, the Permittee shall file a description of its ownership structure, identifying, as applicable:

(a) the owner(s) of the financial and governance interests of the Permittee;
(b) the owner(s) of the majority financial and governance interests of the Permittee's owners; and

(c) the Permittee's ultimate parent entity (meaning the entity which is not controlled by any other entity).

The Permittee shall notify the Commission of:

(a) a change in the owner(s) of the majority* financial or governance interests in the Permittee; or
(b) a change in the owner(s) of the majority* financial or governance interests of the Permittee's owners; or
(c) a sale which changes the ultimate parent entity of the Permittee

*When there are only co-equal 50/50 percent interests, any change shall be considered a change in majority interest.

In the event of an ownership change, the new Permittee must provide the Commission with a certification that it has read, understands, and is able to comply with the conditions of this permit.

3 DESIGNATED SITE

The site designated by the Commission for the Project is depicted on the site maps attached to this site permit (Designated Site). The site maps show the approximate location of the energy storage system and associated facilities within the Designated Site and identify a layout that seeks to minimize the overall potential human and environmental impacts of the Project, as they were evaluated in the permitting process.

The Designated Site serves to provide the Permittee with the flexibility to make minor adjustments to the layout to accommodate requests by landowners, local government units, federal and state agency requirements, and unforeseen conditions encountered during the detailed engineering and design process. Any modification to the location of a photovoltaic tracker row or associated facility shall be done in such a manner as to have human and environmental impacts that are comparable to those associated with the layouts on the maps attached to this site permit. The Permittee shall identify any modifications in the Site Plan pursuant to Section 8.3.

4 GENERAL CONDITIONS

The Permittee shall comply with the following conditions during construction and operation of the energy storage system over the life of this site permit.

4.1 Site Permit Distribution

Within 30 days of issuance of this site permit, the Permittee shall provide all affected

landowners with a copy of this site permit and the complaint procedures. An affected landowner is any landowner or designee that is within or adjacent to the permitted site. In no case shall a landowner receive this site permit and complaint procedures less than five days prior to the start of construction on their property. The Permittee shall also provide a copy of this site permit and the complaint procedures to the applicable regional development commissions, county environmental offices, and city and township clerks. The Permittee shall file with the Commission an affidavit of its site permit and complaint procedures distribution within 30 days of issuance of this site permit.

4.2 Access to Property

The Permittee shall notify landowners prior to entering or conducting maintenance within their property, unless otherwise negotiated with the landowner. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Minnesota Department of Commerce (Department of Commerce) staff or~~ Commission staff.

4.3 Construction and Operation Practices

The Permittee shall comply with the construction practices, operation and maintenance practices, and material specifications described in the permitting record for this Project unless this site permit establishes a different requirement in which case this site permit shall prevail.

4.3.1 Field Representative

The Permittee shall designate a field representative responsible for overseeing compliance with the conditions of this site permit during construction of the Project. This person shall be accessible by telephone or other means during normal business hours throughout site preparation, construction, cleanup, and restoration.

The Permittee shall file with the Commission the name, address, email, phone number, and emergency phone number of the field representative at least 14 days prior to the pre-construction meeting. The Permittee shall provide the field representative's contact information to affected landowners, local government units and other interested persons at least 14 days prior to the pre-construction meeting. The Permittee may change the field representative at any time upon notice to the Commission, affected landowners, local government units and other interested persons. The Permittee shall file with the Commission an affidavit of distribution of its field representative's contact information at least 14 days prior to the pre-construction meeting and upon changes to the field representative.

4.3.2 Site Manager

The Permittee shall designate a site manager responsible for overseeing compliance with the

conditions of this site permit during the commercial operation and decommissioning phases of the Project. This person shall be accessible by telephone or other means during normal business hours for the life of this site permit.

The Permittee shall file the name, address, email, phone number, and emergency phone number of the site manager with the Commission within 14 days prior to the pre-operation meeting. The Permittee shall provide the site manager's contact information to landowners within or adjacent to the Project Boundary, local government units and other interested persons at least 14 days prior to the pre-operation meeting. The Permittee may change the site manager at any time upon notice to the Commission, landowners within or adjacent to the Project Boundary, local government units, and other interested persons. The Permittee shall file with the Commission an affidavit of distribution of its site manager's contact information at least 14 days prior to the pre-operation meeting and upon changes to the site manager.

4.3.3 Employee Training - Site Permit Terms and Conditions

The Permittee shall train and educate all employees, contractors, and other persons involved in the construction and ongoing operation of the energy storage system of the terms and conditions of this site permit. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

4.3.4 Independent Third-Party Monitoring

Prior to any construction, the Permittee shall propose a scope of work and identify an independent third-party monitor to conduct Project construction monitoring on behalf of the ~~Department of Commerce~~ Commission. The scope of work shall be developed in consultation with and approved by ~~the Department of Commerce~~ Commission staff. This third-party monitor will report directly to and will be under the control of ~~the Department of Commerce~~ Commission staff with costs borne by the Permittee. ~~Department of Commerce~~ Commission staff shall keep records of compliance with this section and will ensure that status reports detailing the construction monitoring are filed with the Commission in accordance with scope of work approved by ~~the Department of Commerce~~ Commission staff.

4.3.5 Public Services, Public Utilities, and Existing Easements

During Project construction, the Permittee shall minimize any disruption to public services or public utilities. To the extent disruptions to public services or public utilities occur these shall be temporary, and the Permittee shall restore service promptly. Where any impacts to utilities have the potential to occur the Permittee shall work with both landowners and local entities to determine the most appropriate mitigation measures if not already considered as part of this site permit.

The Permittee shall cooperate with county and city road authorities to develop appropriate signage and traffic management during construction. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

4.3.6 Temporary Workspace

The Permittee shall select temporary workspace and equipment staging areas that limit the removal and impacts to vegetation. The Permittee shall not site temporary workspace in wetlands or native prairie as defined in sections 4.3.13 and 4.3.14. The Permittee shall site temporary workspace to comply with standards for development of the shorelands of public waters as defined in Section 4.3.13. The Permittee shall obtain temporary easements outside of the authorized Project Boundary from affected landowners through rental agreements. Temporary easements are not provided for in this site permit.

4.3.7 Noise

The Permittee shall comply with noise standards established under Minn. R. 7030.0010 to 7030.0080, at all times and at all appropriate locations during operation of the Project. The Permittee shall limit construction and maintenance activities to daytime working hours to the extent practicable.

4.3.8 Aesthetics

The Permittee shall consider input pertaining to visual impacts from landowners and the local unit of government having direct zoning authority over the area in which the Project is located. The Permittee shall use care to preserve the natural landscape, minimize tree removal and prevent any unnecessary destruction of the natural surroundings in the vicinity of the Project during construction and operation.

4.3.9 Topsoil Protection

The Permittee shall implement measures to protect and segregate topsoil from subsoil on all lands utilized for Project construction unless otherwise negotiated with affected landowner.

4.3.10 Soil Compaction

The Permittee shall implement measures to minimize soil compaction of all lands during all phases of the Project's life and shall confine compaction to as small an area as feasible. The Permittee shall use soil decompaction measures on all lands utilized for Project construction

and travelled on by heavy equipment (*e.g.*, cranes and heavy trucks), even when soil compaction minimization measures are used.

4.3.11 Soil Erosion and Sediment Control

The Permittee shall implement those erosion prevention and sediment control practices recommended by the Minnesota Pollution Control Agency (MPCA) Construction Stormwater Program. If construction of the Project disturbs more than one acre of land or is sited in an area designated by the MPCA as having potential for impacts to water resources, the Permittee shall obtain a National Pollutant Discharge Elimination System/State Disposal System Construction Stormwater Permit from the MPCA that provides for the development of a Stormwater Pollution Prevention Plan that describes methods to control erosion and runoff.

The Permittee shall implement reasonable measures to minimize erosion and sedimentation during construction and shall employ perimeter sediment controls, protect exposed soil by promptly planting, seeding, using erosion control blankets and turf reinforcement mats, stabilizing slopes, protecting storm drain inlets, protecting soil stockpiles, and controlling vehicle tracking. Contours shall be graded as required so that all surfaces provide for proper drainage, blend with the natural terrain, and are left in a condition that will facilitate re-vegetation and prevent erosion. All areas disturbed during construction of the Project shall be returned to pre-construction conditions.

4.3.12 Public Lands

In no case shall the energy storage system and associated facilities including foundations, access roads, underground cable, and transformers, be located in the public lands identified in Minn. R. 7850.4400, subp. 1, or in federal waterfowl production areas. Photovoltaic tracker rows and associated facilities shall not be located in the public lands identified in Minn. R. 7850.4400, subp. 3, unless there is no feasible and prudent alternative.

4.3.13 Wetlands and Water Resources

The Permittee shall not place the energy storage system or associated facilities in public waters and public waters wetlands, as shown on the public water inventory maps prescribed by Minnesota Statutes Chapter 103G, except that electric collector or feeder lines may cross or be placed in public waters or public waters wetlands subject to permits and approvals by the Minnesota Department of Natural Resources (DNR) and the United States Army Corps of Engineers (USACE), and local units of government as implementers of the Minnesota Wetlands Conservation Act. The Permittee shall locate the energy storage system and associated facilities in compliance with the standards for development of the shorelands of public waters as

identified in Minn. R. 6120.3300, and as adopted, Minn. R. 6120.2800, unless there is no feasible and prudent alternative.

The Permittee shall construct in wetland areas during frozen ground conditions, to the extent feasible, to minimize impacts. When construction during winter is not possible, wooden or composite mats shall be used to protect wetland vegetation. The Permittee shall contain and manage soil excavated from the wetlands and riparian areas in accordance with all applicable wetland permits. The Permittee shall access wetlands and riparian areas using the shortest route possible in order to minimize travel through wetland areas and prevent unnecessary impacts.

The Permittee shall restore wetland and water resource areas disturbed by construction activities to pre-construction conditions in accordance with the requirements of applicable state and federal permits or laws and landowner agreements. The Permittee shall meet the USACE, DNR, Minnesota Board of Water and Soil Resources, and local government wetland and water resource requirements.

4.3.14 Native Prairie

The Permittee shall not place the energy storage system or associated facilities in native prairie, as defined in Minn. Stat. § 84.02, subd. 5, unless addressed in a prairie protection and management plan and not located in areas enrolled in the Native Prairie Bank Program. The Permittee shall not impact native prairie during construction activities, as defined in Minn. Stat. § 216E.01, unless addressed in a prairie protection and management plan.

The Permittee shall prepare a prairie protection and management plan in consultation with the DNR if native prairie, as defined in Minn. Stat. § 84.02, subd. 5, is identified within the Project Boundary. The Permittee shall file the prairie protection and management plan with the Commission at least 30 days prior to submitting the Site Plan required by Section 8.3 of this site permit. The prairie protection and management plan shall address steps that will be taken to avoid impacts to native prairie and mitigation to unavoidable impacts to native prairie by restoration or management of other native prairie areas that are in degraded condition, by conveyance of conservation easements, or by other means agreed to by the Permittee, the DNR, and the Commission.

4.3.15 Vegetation Management

The Permittee shall disturb or clear vegetation within the Designated Site only to the extent necessary to assure the safe construction, operation, and maintenance of the Project. The Permittee shall minimize the number of trees removed within the Designated Site specifically preserving to the maximum extent practicable windbreaks, shelterbelts, and living snow fences.

4.3.16 Application of Pesticides

The Permittee shall restrict pesticide use to those pesticides and methods of application approved by the MDA, DNR, and the U.S. Environmental Protection Agency (EPA). Selective foliage or basal application shall be used when practicable. All pesticides shall be applied in a safe and cautious manner so as not to damage adjacent properties including crops, orchards, tree farms, apiaries, or gardens. The Permittee shall contact the landowner at least 14 days prior to pesticide application on their property. The Permittee may not apply any pesticide if the landowner requests that there be no application of pesticides within the landowner's property. The Permittee shall provide notice of pesticide application to landowners and beekeepers operating known apiaries within three miles of the pesticide application area at least 14 days prior to such application. The Permittee shall keep pesticide communication and application records and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

4.3.17 Invasive Species

The Permittee shall employ best management practices to avoid the potential introduction and spread of invasive species on lands disturbed by Project construction activities. The Permittee shall develop an Invasive Species Prevention Plan and file it with the Commission at least 14 days prior to the pre-construction meeting. The Permittee shall comply with the most recently filed Invasive Species Prevention Plan.

4.3.18 Noxious Weeds

The Permittee shall take all reasonable precautions against the spread of noxious weeds during all phases of construction. When utilizing seed to establish temporary and permanent vegetative cover on exposed soil the Permittee shall select site-appropriate seed certified to be free of noxious weeds. To the extent possible, the Permittee shall use native seed mixes. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

4.3.19 Roads

The Permittee shall advise the appropriate governing bodies having jurisdiction over all state, county, city, or township roads that will be used during the construction phase of the Project. Where practical, existing roadways shall be used for all activities associated with construction of the Project. Oversize or overweight loads associated with the Project shall not be hauled across public roads without required permits and approvals.

The Permittee shall locate all perimeter fencing and vegetative screening in a manner that does not interfere with routine road maintenance activities and allows for continued safe travel on public roads.

The Permittee shall construct the fewest number of site access roads required. Access roads shall not be constructed across streams and drainage ways without the required permits and approvals. Access roads shall be constructed in accordance with all necessary township, county or state road requirements and permits.

The Permittee shall promptly repair private roads or lanes damaged when moving equipment or when accessing construction workspace, unless otherwise negotiated with the affected landowner. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

4.3.20 Archaeological and Historic Resources

The Permittee shall make every effort to avoid impacts to archaeological and historic resources when constructing the Project. In the event that a resource is encountered, the Permittee shall consult with the State Historic Preservation Office (SHPO) and the State Archaeologist. Where feasible, avoidance of the resource is required. Where not feasible, mitigation must include an effort to minimize Project impacts on the resource consistent with SHPO and State Archaeologist requirements.

Prior to construction, the Permittee shall train workers about the need to avoid cultural properties, how to identify cultural properties, and procedures to follow if undocumented cultural properties, including gravesites, are found during construction. If human remains are encountered during construction, the Permittee shall immediately halt construction and promptly notify local law enforcement and the State Archaeologist. The Permittee shall not resume construction at such location until authorized by local law enforcement or the State Archaeologist. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

4.3.21 Interference

If interference with radio or television, satellite, wireless internet, GPS-based agriculture navigation systems or other communication devices is caused by the presence or operation of the Project, the Permittee shall take whatever action is necessary to restore or provide reception equivalent to reception levels in the immediate area just prior to the construction of the Project. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

4.3.22 Drainage Tiles

The Permittee shall avoid, promptly repair, or replace all drainage tiles broken or damaged during all phases of the Project's life unless otherwise negotiated with the affected landowner. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

4.3.23 Restoration

The Permittee shall restore the areas affected by construction of the Project to the condition that existed immediately before construction began to the greatest extent possible. The time period to complete restoration may be no longer than 12 months after the completion of construction. Restoration shall be compatible with the safe operation, maintenance, and inspection of the Project. Within 60 days after completion of all restoration activities, the Permittee shall file with the Commission a Notice of Restoration Completion.

4.3.24 Cleanup

The Permittee shall remove and properly dispose of all construction waste and scrap from the right-of-way and all premises on which construction activities were conducted upon completion of each task. The Permittee shall remove and properly dispose of all personal litter, including bottles, cans, and paper from construction activities daily.

4.3.25 Pollution and Hazardous Wastes

The Permittee shall take all appropriate precautions to protect against pollution of the environment. The Permittee shall be responsible for compliance with all laws applicable to the generation, storage, transportation, clean up and disposal of all waste generated during construction and restoration of the Project.

4.3.26 Damages

The Permittee shall fairly restore or compensate landowners for damage to crops, fences, private roads and lanes, landscaping, drain tile, or other damage sustained during construction. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

4.3.27 Public Safety

The Permittee shall provide educational materials to landowners within and adjacent to the Designated Site and, upon request, to interested persons about the Project and any restrictions

or dangers associated with the Project. The Permittee shall also implement any necessary safety measures such as placing warning signs and gates for traffic control or restricting public access. The Permittee shall file with the Commission an affidavit of its public safety notifications at least 14 days before the pre-construction meeting.

The Permittee shall submit the location of all underground facilities, as defined in Minn. Stat. § 216D.01, subd. 11, to Gopher State One Call following the completion of the construction of the Project.

4.3.28 Site Identification

The Permittee shall mark the energy storage system with a clearly visible identification number and/or street address.

4.4 Collector and Feeder Lines

The Permittee may use overhead or underground collector and feeder lines to carry power from an internal Project interconnection point to the energy storage system. The Permittee shall place overhead and underground collector and feeder lines that parallel public roads within the public right-of-way or on private land immediately adjacent to the road. The Permittee shall obtain approval from the landowner or government unit responsible for the affected right-of-way.

The Permittee shall locate collector and feeder lines in such a manner as to minimize interference with agricultural operations including but not limited to existing drainage patterns, drain tile, future tiling plans, and ditches. The Permittee shall place safety shields on all guy wires associated with overhead collector and feeder lines. The Permittee shall submit the engineering drawings of all collector and feeder lines with the Site Plan pursuant to Section 8.3.

4.5 Other Requirements

4.5.1 Safety Codes and Design Requirements

The Permittee shall design the energy storage system and associated facilities to meet or exceed all relevant local and state codes, the National Electric Safety Code, and North American Electric Reliability Corporation requirements. This includes standards relating to clearances to ground, clearance to crossing utilities, clearance to buildings, strength of materials, clearances over roadways, right-of-way widths, and permit requirements. The Permittee shall keep records of compliance with these standards and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

4.5.2 Other Permits and Regulations

The Permittee shall comply with all applicable state statutes and rules. The Permittee shall obtain all required permits for the Project and comply with the conditions of those permits unless those permits conflict with or are preempted by federal or state permits and regulations.

At least 14 days prior to the pre-construction meeting, the Permittee shall file with the Commission an Other Permits and Regulations Submittal that contains a detailed status of all permits, authorizations, and approvals that have been applied for specific to the Project. The Other Permits and Regulations Submittal shall also include the permitting agency name; the name of the permit, authorization, or approval being sought; contact person and contact information for the permitting agency or authority; brief description of why the permit, authorization, or approval is needed; application submittal date; and the date the permit, authorization, or approval was issued or is anticipated to be issued.

The Permittee shall demonstrate that it has obtained all necessary permits, authorizations, and approvals by filing an affidavit stating as such and an updated Other Permits and Regulations Submittal prior to commencing Project construction. The Permittee shall provide a copy of any such permits, authorizations, and approvals at the request of ~~Department of Commerce staff or~~ Commission staff.

5 SPECIAL CONDITIONS

The special conditions shall take precedence over other conditions of this permit should there be a conflict.

5.1 Lighting

Permittees must use shielded and downward facing lighting and LED lighting that minimizes blue hue at the gate locations, BESS enclosures, and along fence lines. Downward facing lighting must be clearly visible on the plan and profile submitted for the Project.

5.2 Tiered Vegetative Buffer

The Permittee shall include a vegetative landscape buffer surrounding the security fence of the BESS. The vegetative buffer shall consist of three (3) distinct rows of plantings designed to provide year-round screening. The Permittee shall coordinate with the Freeborn County Office of Environmental Services to complete the following:

- Determine that plant species are compatible, native or locally appropriate species;
- Planting layout details; and,

- Vegetative buffer maintenance plan details.

Additionally, the Permittee share ensure that the vegetative buffer is consistent with ITC Midwest standards for transmission line clearances.

5.3 Pre-Construction Noise Modeling and Impact Assessment

The Permittee shall file a noise impact assessment at least 14 days prior to the pre-construction meeting. The noise impact assessment shall summarize the results from noise propagation modeling that incorporates noise inputs from the selected equipment and the facility layout shown in the site plans required in Section 8.3 of this permit. The permittee shall file an updated noise impact assessment including any revisions to selected equipment or facility layout prior to any modifications to the facility over its operating life.

5.4 Noise Studies and Noise Mitigation

The Permittee shall file a proposed methodology for the conduct of a post-construction noise study at least 14 days prior to the pre-construction meeting. The Permittee shall develop the post-construction noise study methodology in consultation with Commission staff. The Permittee must conduct the postconstruction noise study and file with the Commission the completed post-construction noise study within 18 months of commencing commercial operation. The BESS facilities and associated facilities shall be placed and operated such that the Permittee shall, at all times, comply with noise standards established by the MPCA. Operation of the facility shall be modified, or project components shall be removed from service if necessary to comply with these noise standards.

5.5 Hazard Mitigation Analysis

The Permittee shall file a Hazard Mitigation Analysis detailing the results of the equipment testing, and the risks associated with the technology, along with an affidavit of distribution of the Hazard Mitigation analysis to emergency responders with jurisdiction over the project, at least 30 days prior to the pre-construction meeting

5.6 Local Firefighter Training

The Permittee shall provide regular training on battery technology used in the BESS and associated facility technology for local firefighting crews and emergency services personnel. The Permittee shall keep records of compliance with this section and provide them upon the request of Commission staff.

5.7 Emergency Planning and Preparedness

The Permittee shall calculate appropriate waterflow in gallons per minute (gpm) needed to cool a BESS unit and mitigate runoff. In addition, the Permittee shall purchase specialized hose nozzles for local fire response authorities to control gpm if necessary. Waterflow and any specialized equipment shall be part of the firefighter training required by Section 5.6 of this permit.

5.8 Site Monitoring

Within thirty (30) days of commercial operation, the Permittee shall install and place into service a meteorological station and an on-site, continuous recording camera system. The camera system must provide adequate site coverage that can be monitored remotely by both the facility management team and a third party. The Permittee shall consult with the Minnesota Pollution Control Agency (MPCA) to develop the on-site meteorological station. Consultation will support selection of appropriate meteorological equipment suitable for the intended purpose, data parameters, siting, and station placement to ensure data representativeness and adequacy.

5.9 Dry Hydrant Use

The Permittee shall conduct a feasibility assessment to evaluate the use of dry hydrants and drafting water from the Shell Rock River for fire response. The assessment shall be shared with firefighting and emergency service personnel and included as part of the firefighter training required by Section 5.6 of this permit.

5.10 Agricultural Impact Mitigation Plan

At least 14 days prior to the pre-construction meeting, the Permittee shall develop an agricultural impact mitigation plan (AIMP) in coordination with the Minnesota Department of Agriculture The plan shall detail methods to minimize soil compaction, preserve topsoil, control noxious weeds and invasive species, maintain the existing drainage conditions through appropriate maintenance and repair of existing drain tile, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use.

5.11 Vegetative Management Plan

The Permittee shall develop a vegetation management plan (VMP), in coordination with

Commission staff, and the Vegetation Management Working Group, using best management practices established by the DNR and BWSR. The Permittee shall file the VMP and documentation of the coordination efforts between the Permittee and the coordinating agencies with the Commission at least 14 days prior to the pre-construction meeting. Landowner-specific vegetation requests resulting from individual consultation between the Company and a landowner need not be included in the VMP. The Permittee shall provide all landowners within the Designated Site copies of the VMP. The Permittee shall file with the Commission an affidavit of its distribution of the VMP to landowners at least 14 days prior to the pre-construction meeting. The VMP must include the following:

a) management objectives addressing short term (year 0-5, seeding and establishment) and long term (year 5 through the life of the Project) goals;

b) a description of planned restoration and vegetation management activities, including how the site will be prepared, timing of activities, how seeding will occur (e.g., broadcast, drilling, etc.), and the types of seed mixes to be used;

c) a description of how the site will be monitored and evaluated to meet management goals;

d) a description of the management tools used to maintain vegetation (e.g., mowing, spot spraying, hand removal, fire, grazing, etc.), including the timing and frequency of maintenance activities;

e) identification of the third-party (e.g., consultant, contractor, site manager, etc.) contracted for restoration, monitoring, and long-term vegetation management of the site;

f) identification of on-site noxious weeds and invasive species (native and non-native) and the monitoring and management practices to be utilized; and

g) a marked-up copy of the Site Plan showing how the site will be revegetated and that identifies the corresponding seed mixes. Best management practices should be followed concerning seed mixes, seeding rates, and cover crops.

h) the vegetative buffer required by Section 5.2 of this permit.

5.12 Surface and Groundwater Monitoring

At least 14 days prior to the pre-construction meeting, the Permittee shall file a Surface and Groundwater Monitoring Plan (SGMP). The SGMP shall be designed to detect, evaluate, and respond to any potential impacts to surface water or groundwater resulting from construction, operation, or emergency events at the facility. The SGMP must be prepared in coordination with the Minnesota Pollution Control Agency and the Shell Rock River Watershed District.

The SGMP must identify groundwater monitoring locations, stormwater basin sampling points,

sampling parameters, methods, and frequencies needed to detect potential impacts. Pollutant concentration action levels must be established in coordination with the SRRWD. The SGMP must include procedures for baseline, routine, and event-based monitoring, as well as defined response actions if action levels are exceeded. Monitoring results must be reported annually to the SRRWD and the Commission; results must be reported within 24 hours upon an emergency event at the BESS facility. The plan may be modified as needed based on monitoring results, site conditions, or regulatory requirements.

5.13 Tree Replacement Plan

In the event that tree removal is required for construction and operation of the BESS, the permittee, in coordination with the Minnesota Department of Natural Resources and Freeborn County, will develop a tree replacement plan to replace any trees that are removed for the construction of the project and file the plan with the Commission at least 14 days before the preconstruction meeting. Replacement trees may be planted on public lands with the permission of the public entity/owner.

5.14 Bio-Netting or Natural Netting

The Permittee is required to use wildlife-friendly erosion controls. The Permittee shall use only "bio-netting" or "natural netting" types of erosion control materials and mulch products without synthetic (plastic) fiber additives.

5.15 Unanticipated Discoveries Plan

Prior to construction, the Permittee shall survey areas of construction activity within undisturbed land that have not been surveyed. The Permittee shall develop an Unanticipated Discoveries Plan (UDP) to identify guidelines to be used in the event previously unrecorded archeological or historic properties, or human remains, are encountered during construction, or if unanticipated effects to previously identified archaeological or historic properties occur during construction. This is in addition to and not in lieu of any other obligations that may exist under law or regulation relating to these matters. The UDP shall describe how previously unrecorded, non-human burial, archaeological sites found during construction shall be marked and all construction work must stop at the discovery location. The Permittee shall file the UDP with the Commission at least 14 days prior to the preconstruction meeting.

5.16 Security Fencing

The Permittee shall design the security fence surrounding the energy storage system to minimize the visual impact of the Project while maintaining compliance with the National Electric Safety Code. The Permittee shall incorporate opacity strips in the facility's chain-link

security fence to further enhance visual screening. The Permittee shall develop a final fence plan for the specific site in coordination with the DNR. The final fence plan shall be submitted to the Commission as part of the Site Plan pursuant to Section 8.3.

5.17 Dust Control

The Permittee shall minimize and avoid, if possible, the use or chloride-based dust control chemicals (i.e., calcium chloride, magnesium chloride).

5.18 Battery Augmentation

The Permittee shall notify the Commission of scheduled augmentation at least 30 days prior to commencing augmentation activities. In its filing, the Permittee shall describe the number and types of batteries included in the augmentation. The Permittee shall indicate the location of the augmentation on the project Site Plan. In its filing the Permittee shall demonstrate compliance with the noise impact assessment submitted to the Commission as required in Section 5.2 of this permit.

5.19 Offtake Agreement

In the event the Permittee does not have an offtake agreement, or some other enforceable mechanism for the sale of energy, capacity, or ancillary services, and/or other products provided by the Project at the time this site permit is issued, the Permittee shall provide notice to the Commission when it obtains an offtake agreement, or some other enforceable mechanism for the sale of energy, capacity, or ancillary services, and/or other products. This site permit does not authorize construction of the Project until the Permittee has obtained an offtake agreement, or some other enforceable mechanism for the sale of energy, capacity, or ancillary services, and/or other products provided by the Project, including as an example, registration as a market participant with MISO or other Regional Transmission Organization or Independent System Operator. In the event the Permittee does not obtain an offtake agreement or some other enforceable mechanism for the sale of energy, capacity, or ancillary services, and/or other products provided by the Project within four years of the issuance of this site permit, the Permittee must advise the Commission of the reason for not having an offtake agreement, or some other enforceable mechanism. In such event, the Commission may determine whether this site permit should be amended or revoked. No amendment or revocation of this site permit may be undertaken except in accordance with Minn. Stat. § 216I.09 or Minn. Stat. § 216I.14.

5.20 Annual Report

The Permittee shall, by February 1st following each complete or partial year of Project

operation, file a report with the Commission on the monthly availability of the facility including:

a) the installed nameplate capacity of the permitted facility;

b) the monthly and annual availability of the facility;

c) the operational status of the facility and any major outages, major repairs, battery augmentation, or performance improvements occurring in the previous year; and

d) any other information reasonably requested by the Commission.

The Permittee shall file this information in a format recommended by the Commission. This information shall be considered public and must be filed electronically.

6 DELAY IN CONSTRUCTION

If the Permittee has not commenced construction or improvement of the site within four years after the date of issuance of this site permit the Permittee shall file a Failure to Construct Report and the Commission shall consider suspension of this site permit in accordance with Minn. R. 7850.4700.

7 COMPLAINT PROCEDURES

At least 14 days prior to the pre-construction meeting, the Permittee shall file with the Commission the complaint procedures that will be used to receive and respond to complaints. The complaint procedures shall be in accordance with the requirements of Minn. R. 7829.1500

or Minn. R. 7829.1700, and as set forth in the complaint procedures attached to this site permit.

Upon request, the Permittee shall assist ~~Department of Commerce staff or~~ Commission staff with the disposition of unresolved or longstanding complaints. This assistance shall include, but is not limited to, the submittal of complaint correspondence and complaint resolution efforts.

8 COMPLIANCE REQUIREMENTS

Failure to timely and properly make compliance filings required by this site permit is a failure to comply with the conditions of this site permit. Compliance filings must be electronically filed with the Commission.

8.1 Pre-Construction Meeting

Prior to the start of construction, the Permittee shall participate in a pre-construction meeting with ~~Department of Commerce staff and~~ Commission staff to review pre-construction filing requirements, scheduling, and to coordinate monitoring of construction and site restoration activities. Within 14 days following the pre-construction meeting, the Permittee shall file with the Commission a summary of the topics reviewed and discussed and a list of attendees. The Permittee shall indicate in the filing the anticipated construction start date.

8.2 Pre-Operation Meeting

At least 14 days prior to commercial operation of the Project, the Permittee shall participate in a pre-operation meeting with ~~Department of Commerce staff and~~ Commission staff to coordinate field monitoring of operation activities for the Project. Within 14 days following the pre-operation meeting, the Permittee shall file a summary of the topics reviewed and discussed and a list of attendees with the Commission.

8.3 Site Plan

At least 14 days prior to the pre-construction meeting, the Permittee shall file with the Commission, and provide ~~the Department of Commerce, and~~ the counties where the Project will be constructed with a Site Plan that includes specifications and drawings for site preparation and grading; specifications and locations of the energy storage system and associated facilities; and procedures for cleanup and restoration. The documentation shall include maps depicting the Designated Site, energy storage system, and associated facilities layout in relation to that approved by this site permit.

The Permittee may not commence construction until the earlier of (i) 30 days after the pre-construction meeting or (ii) or until the Commission staff has notified the Permittee in writing that it has completed its review of the documents and determined that the planned construction is consistent with this site permit.

If the Commission notifies the Permittee in writing within 30 days after the pre-construction meeting that it has completed its review of the documents and planned construction, and finds that the planned construction is not consistent with this site permit, the Permittee may submit additional and/or revised documentation and may not commence construction until the Commission has notified the Permittee in writing that it has determined that the planned construction is consistent with this site permit.

If the Permittee intends to make any significant changes in its Site Plan or the specifications and drawings after submission to the Commission, the Permittee shall notify the Commission~~, the Department of Commerce,~~ and county staff at least five days before implementing the changes. No changes shall be made that would be in violation of any of the terms of this site permit.

8.4 Status Reports

The Permittee shall file with the Commission monthly Construction Status Reports beginning with the pre-construction meeting and until completion of restoration. Construction Status Reports shall describe construction activities and progress, activities undertaken in compliance with this site permit, and shall include text and photographs.

If the Permittee does not commence construction of the Project within six months of this site permit issuance, the Permittee shall file with the Commission Pre-Construction Status Reports on the anticipated timing of construction every six months beginning with the issuance of this site permit until the pre-construction meeting. The status updates shall include information on the Project's Midcontinent Independent System Operator (MISO) interconnection process, if applicable.

8.5 Labor Statistic Reporting

The Permittee shall file quarterly Labor Statistic Reports with the Commission within 45 days of the end of the quarter regarding construction workers that participated in the construction of the Project. The Labor Statistic Reports shall:

(a) detail the Permittee's efforts and the site contractor's efforts to hire Minnesota workers; and
(b) provide an account of:

i. the gross number of hours worked by or full-time equivalent workers who are Minnesota residents, as defined in Minn. Stat. § 290.01, subd. 7;
ii. the gross number of hours worked by or full-time equivalent workers who are residents of other states, but maintain a permanent residence within 150 miles of the Project; and
iii. the total gross hours worked or total full-time equivalent workers.

The Permittee shall work with its contractor to determine the suitable reporting metric. The report may not include personally identifiable data.

8.6 Prevailing Wage

The Permittee, its contractors, and subcontractors shall pay no less than the prevailing wage rate as defined in Minn. Stat. § 177.42 and shall be subject to the requirements and enforcement provisions under Minn. Stat. §§ 177.27, 177.30, 177.32, 177.41 to 177.435, and 177.45. The Permittee shall keep records of contractor and subcontractor pay and provide them at the request of ~~Department of Commerce staff or~~ Commission staff.

8.7 In-Service Date

At least three days before the Project is to be placed into service, the Permittee shall notify the Commission of the date on which the Project will be placed into service and the date on which construction was completed.

8.8 As-Builts

Within 90 days after completion of construction, the Permittee shall submit to the Commission copies of all final as-built plans and specifications developed during the Project construction.

8.9 GPS Data

Within 90 days after completion of construction, the Permittee shall submit to the Commission, in the format requested by the Commission, geo-spatial information (*e.g.*, ArcGIS compatible map files, GPS coordinates, associated database of characteristics) for all structures associated with the Project.

8.10 Right of Entry

The Permittee shall allow Commission designated representatives to perform the following, upon reasonable notice, upon presentation of credentials and at all times in compliance with the Permittee's site safety standards:

(a) To enter upon the facilities easement of the property for the purpose of obtaining information, examining records, and conducting surveys or investigations.
(b) To bring such equipment upon the facilities easement of the property as is necessary to conduct such surveys and investigations.
(c) To sample and monitor upon the facilities easement of the property.
To examine and copy any documents pertaining to compliance with the conditions of this site permit.

8.11 Emergency Response

The Permittee shall prepare an Emergency Response Plan (ERP) in consultation with the emergency responders having jurisdiction over the Project prior to construction. The Permittee shall file the ERP, along with any comments from emergency responders to the Commission at least 14 days prior to the pre-construction meeting and a revised ERP, if any, at least 14 days prior to the pre-operation meeting. At least 14 days prior to the pre-operation meeting the Permittee shall file with the Commission an affidavit of the distribution of the ERP to emergency responders and Public Safety Answering Points (PSAP) with jurisdiction over the Project. The Permittee shall obtain and register the Project address or other location indicators acceptable to the emergency responders and PSAP having jurisdiction over the Project.

8.12 Extraordinary Events

Within 24 hours of discovery of an occurrence, the Permittee shall notify the Commission of any extraordinary event. Extraordinary events include but shall not be limited to fires, acts of sabotage, collector or feeder line failure, and injured worker or private person. The Permittee shall, within 30 days of the occurrence, file a report with the Commission describing the cause of the occurrence and the steps taken to avoid future occurrences.

8.13 Wildlife Injuries and Fatalities

The Permittee shall report any wildlife injuries and fatalities to the Commission quarterly.

9 DECOMMISSIONING AND RESTORATION

9.1 Decommissioning Plan

The Permittee shall comply with the provisions of the most recently filed and accepted Decommissioning Plan. The initial version of the Decommissioning Plan was submitted for this Project as Appendix D to the Site Permit Application]. The Permittee shall file an updated Decommissioning Plan incorporating comments and

information from the permit application process and any updates associated with the final construction plans with the Commission at least fourteen 14 days prior to the pre-construction meeting. The Permittee shall update and file the Decommissioning Plan with the Commission every five years following the commercial operation date.

The Decommissioning Plan shall provide information identifying all surety and financial securities established for decommissioning and site restoration. The Decommissioning Plan shall provide an itemized breakdown of costs of decommissioning all Project components, which shall include labor and equipment.

The Permittee shall also submit the Decommissioning Plan to the local unit of government having direct zoning authority over the area in which the Project is located. The Permittee shall ensure that it carries out its obligations to provide for the resources necessary to fulfill its requirements to properly decommission the Project at the appropriate time. The Commission may at any time request the Permittee to file a report with the Commission describing how the Permittee is fulfilling this obligation.

9.2 Site Final Restoration

Upon expiration of this site permit or upon termination of operation of the Project, the Permittee shall have the obligation to dismantle and remove from the site all Project components in accordance with the most recently filed and accepted decommissioning plan. To the extent feasible, the Permittee shall restore and reclaim the site to pre-project conditions. Landowners may require the site be returned to agricultural production or may retain restored prairie vegetation, or other land uses as agreed to between the landowner and the Permittee. All access roads shall be removed unless written approval is given by the affected landowner requesting that one or more roads, or portions thereof, be retained. All such agreements between the Permittee and the affected landowner shall be filed with the Commission prior to commencing restoration activities. The Permittee shall restore the site in accordance with the requirements of this condition and file a Notification of Final Restoration Completion to the Commission within 18 months of termination of operation of the Project.

10 COMMISSION AUTHORITY AFTER SITE PERMIT ISSUANCE

10.1 Expansion of Designated Site Boundaries

No expansion of the site boundary described in this site permit shall be authorized without the approval of the Commission. The Permittee may submit to the Commission a request for a change in the boundary of the site for the Project. The Commission will respond to the requested change in accordance with applicable statutes and rules.

10.2 Periodic Review

The Commission shall initiate a review of this site permit and the applicable conditions at least once every five years. The purpose of the periodic review is to allow the Commission, the Permittee, and other interested persons an opportunity to consider modifications in the conditions of this site permit. No modification may be made except in accordance with applicable statutes and rules.

10.3 Modification of Conditions

After notice and opportunity for hearing this site permit may be modified or amended for cause, including but not limited to the following:

(a) violation of any condition in this permit;
(b) endangerment of human health or the environment by operation of the Project; or
(c) existence of other grounds established by rule.

10.4 More Stringent Rules

The issuance of this site permit does not prevent the future adoption by the Commission of rules or orders more stringent than those now in existence and does not prevent the enforcement of these more stringent rules and orders against the Permittee.

11 SITE PERMIT AMENDMENT

This site permit may be amended at any time by the Commission. Any person may request an amendment of the conditions of this site permit by submitting a request to the Commission in writing describing the amendment sought and the reasons for the amendment. The Commission will mail notice of receipt of the request to the Permittee. The Commission may amend the conditions after affording the Permittee and interested persons such process as is required under Minn. R. 7850.4900.

12 TRANSFER OF SITE PERMIT

The Permittee may request at any time that the Commission transfer this site permit to another person or entity (transferee). In its request, the Permittee must provide the Commission with:

(a) the name and description of the transferee;
(b) the reasons for the transfer;
(c) a description of the facilities affected; and
(d) the proposed effective date of the transfer.

The transferee must provide the Commission with a certification that it has read, understands and is able to comply with the plans and procedures filed for the Project and all conditions of this site permit.

The transferee must provide the Commission with the name and contact information for the site manager, as described in Section 4.3.2, and either a current version with eDocket reference, or a revised version of the following:

(a) complaint procedures, as described in Section 7 and Attachment 1;
(b) ERP, as described in Section 8.12; and
(c) Decommissioning Plan, as described in Section 9.1.

The Commission may authorize transfer of the site permit after affording the Permittee, the transferee, and interested persons such process as is required under Minn. R. 7850.5000.

13 REVOCATION OR SUSPENSION OF SITE PERMIT

The Commission may initiate action to revoke or suspend this site permit at any time. The Commission shall act in accordance with the requirements of Minn. R. 7850.5100, to revoke or suspend this site permit.

14 EXPIRATION DATE

This site permit shall expire 30 years after the date this site permit was approved and adopted.

STATE OF MINNESOTA PUBLIC UTILITIES COMMISSION

ROUTE PERMIT FOR
~~[PROJECT NAME]~~MIDWATER ENERGY STORAGE TRANSMISSION lINE

A HIGH-VOLTAGE TRANSMISSION LINE AND ASSOCIATED FACILITIES

IN
~~[COUNTY]~~FREEBORN COUNTY

ISSUED TO
~~[PERMITTEE]~~MIDWATER BESS, LLC

PUC DOCKET NO. ~~[Docket Number]~~TL-24-295

In accordance with the requirements of Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850 this route permit is hereby issued to:

~~[Permittee]~~MIDWATER BESS, LLC

~~[Permittee]~~ Midwater BESS, LLC, is authorized by this route permit to construct and operate a 161 kV transmission line that is approximately 2,668 feet long and will connect the Midwater Energy Storage Project to the existing ITC Midwest Glenworth Substation in Freeborn County.~~[Provide a description of the project authorized by the Minnesota Public Utilities Commission].~~

The high-voltage transmission line shall be constructed within the route identified in this route permit and in compliance with the conditions specified in this route permit.

Approved and adopted this ____ day of [Month, Year]

BY ORDER OF THE COMMISSION

_____

~~Will Seuffert~~Sasha Bergman,
Executive Secretary

To request this document in another format such as large print or audio, call 651-296-0406 or 800-657-3782 (voice). Persons with a hearing or speech impairment may call using their preferred Telecommunications Relay Service or email consumer.puc@state.mn.us for assistance.

DRAFT PERMIT

CONTENTS

1 ROUTE PERMIT 1
1.1 Pre-emption 1
2 TRANSMISSION FACILITY DESCRIPTION 1
2.1 Structures 1
2.2 Conductors ..... 2~~1~~
2.3 Substations and Associated Facilities 2
3 DESIGNATED ROUTE 2
4 RIGHT-OF-WAY ..... 3~~2~~
5 GENERAL CONDITIONS 3
5.1 Route Permit Distribution 3
5.2 Access to Property ..... 4~~3~~
5.3 Construction and Operation Practices ..... 4~~3~~
5.3.1 Field Representative 4
5.3.2 Employee Training - Route Permit Terms and Conditions 4
5.3.3 Independent Third-Party Monitoring ..... 5~~4~~
5.3.4 Public Services, Public Utilities, and Existing Easements ..... 5~~4~~
5.3.5 Temporary Workspace 5
5.3.6 Noise ..... 6~~5~~
5.3.7 Aesthetics ..... 6~~5~~
5.3.8 Soil Erosion and Sediment Control 6
5.3.9 Wetlands and Water Resources ..... 7~~6~~
5.3.10 Vegetation Management 7
5.3.11 Application of Pesticides 7
5.3.12 Invasive Species ..... 8~~7~~
5.3.13 Noxious Weeds 8
5.3.14 Roads 8
5.3.15 Archaeological and Historic Resources ..... 9~~8~~
5.3.16 Avian Protection 9
5.3.17 Drainage Tiles 9
5.3.18 Restoration ..... 10~~9~~
5.3.19 Cleanup ..... 10~~9~~
5.3.20 Pollution and Hazardous Wastes ..... 10~~9~~
5.3.21 Damages 10
5.4 Electrical Performance Standards 10
5.4.1 Grounding 10

DRAFT PERMIT

5.4.2 Electric Field ..... 11~~10~~
5.4.3 Interference with Communication Devices ..... 11~~10~~
5.5 Other Requirements 11
5.5.1 Safety Codes and Design Requirements 11
5.5.2 Other Permits and Regulations 11
6 SPECIAL CONDITIONS ..... 12~~11~~
7 DELAY IN CONSTRUCTION 12
8 COMPLAINT PROCEDURES 12
9 COMPLIANCE REQUIREMENTS ..... 13~~12~~
9.1 Pre-Construction Meeting ..... 13~~12~~
9.2 Plan and Profile ..... 13~~12~~
9.3 Status Reports ..... 14~~13~~
9.4 In-Service Date ..... 14~~13~~
9.5 As-Builts 14
9.6 GPS Data 14
9.7 Right of Entry 14
10 ROUTE PERMIT AMENDMENT ..... 15~~14~~
11 TRANSFER OF ROUTE PERMIT ..... 15~~14~~
12 REVOCATION OR SUSPENSION OF ROUTE PERMIT 15

ATTACHMENTS

Attachment 1 – Complaint Handling Procedures for Permitted Energy Facilities
Attachment 2 – Compliance Filing Procedures for Permitted Energy Facilities
Attachment 3 – Route Permit Maps

DRAFT PERMIT

~~SAMPLE~~ DRAFT **PERMIT** [~~Project Name and PUC~~ Midwater Energy Storage HVTL, Docket No. TL-24-295]

1 ROUTE PERMIT

The Minnesota Public Utilities Commission (Commission) hereby issues this route permit to ~~[Permittee Name]~~ Midwater BESS, LLC (Permittee) pursuant to Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850. This route permit authorizes the Permittee to construct and operate a 161 kV transmission line approximately 2,668 feet long connecting the Midwater Energy Storage Project to the existing ITC Midwest Glenworth Substation ~~[Provide a description of the project as authorized by the Commission]~~ (Midwater Energy Storage ~~Facility~~Transmission Line ~~[Project Name, if applicable]~~, henceforth known as Transmission Facility). The high-voltage transmission line shall be constructed within the route identified in this route permit and in compliance with the conditions specified in this route permit.

1.1 Pre-emption

Pursuant to Minn. Stat. § 216E.10, this route permit shall be the sole route approval required for construction of the transmission facilities and this route permit shall supersede and preempt all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local and special purpose governments.

2 TRANSMISSION FACILITY DESCRIPTION

~~[Provide a description of the Transmission Facility as authorized by the Commission]~~The Transmission Facility will have a 150-foot-wide right-of-way (75 feet on each side of the anticipated alignment). The route will begin at the Midwater Energy Storage Project Substation and end at the ITC Midwest Glenworth Substation.

The Transmission Facility is located in the following:

County	Township Name	Township	Range	Section
Freeborn	Shell Rock	101N	20W	7, 8, and 17

2.1 Structures

~~[Provide a detailed description of the structures authorized by the Commission]~~The Transmission Facility will consist of four to six steel monopoles with a typical height range from 60 to 90 feet above the ground with spans of approximately 164 to 337 feet. Tangent structures will be used for in-line (straight) segments, and dead-end structures will be used at the substations.

DRAFT PERMIT

2.2 Conductors

~~[Provide a detailed description of the conductors authorized by the Commission]~~

The table below details specifics on the various structure and conductor types as presented in the route permit application.

Line Type	Conductor	Structure		Foundation	Height	Span
		Type	Material			
161 kV		Tangent	Steel	Direct Embed/drilled piers	70 to 130	164-337
161 kV		Deadend	Steel	Direct Embed/drilled piers	70 to 130	164-337

2.3 Substations and Associated Facilities

~~[Provide a detailed description of the associated facilities and substations as authorized by the Commission]~~

3 DESIGNATED ROUTE

The route designated by the Commission is depicted on the route maps attached to this route permit (Designated Route). The Designated Route is generally described as follows:

~~[Provide detailed description of the authorized route including the route widths and any other specifics relevant to each segment. Also include a reference to the relevant route map to be attached to the route permit.]~~
The Transmission Facility route begins at the Midwater Energy Storage Project Substation and proceeds northwesterly for approximately 2,668 feet to the ITC Midwest Glenworth Substation.

The Designed Route includes an anticipated alignment and a right-of-way. The right-of-way is the physical land needed for the safe operation of the transmission line. The Permittee shall locate the alignment and associated right-of-way within the Designated Route unless otherwise authorized by this route permit or the Commission. The Designated Route provides the Permittee with flexibility for minor adjustments of the alignment and right-of-way to accommodate landowner requests and unforeseen conditions.

DRAFT PERMIT

Any modifications to the Designated Route or modifications that would result in right-of-way placement outside the Designated Route shall be specifically reviewed by the Commission in accordance with Minn. R. 7850.4900 and Section 10 of this route permit.

4 RIGHT-OF-WAY

This route permit authorizes the Permittee to obtain a new permanent right-of-way for the transmission line up to ~~[number]~~ 150 feet in width. The permanent right-of-way is typically ~~[number]~~ 75 feet on both sides of the transmission line measured from its centerline or alignment.

The anticipated alignment is intended to minimize potential impacts relative to the criteria identified in Minn. R. 7850.4100. The final alignment must generally conform to the anticipated alignment identified on the route maps unless changes are requested by individual landowners and agreed to by the Permittee or for unforeseen conditions that are encountered or as otherwise provided for by this route permit.

Any right-of-way or alignment modifications within the Designated Route shall be located so as to have comparable overall impacts relative to the factors in Minn. R. 7850.4100, as does the right-of-way and alignment identified in this route permit, and shall be specifically identified and documented in and approved as part of the plan and profile submitted pursuant to Section 9.1 of this route permit.

Where the transmission line parallels existing highway and other road rights-of-way, the transmission line right-of-way shall occupy and utilize the existing right-of-way to the maximum extent possible; consistent with the criteria in Minn. R. 7850.4100, and the other requirements of this route permit; and for highways under the jurisdiction of the Minnesota Department of Transportation (MnDOT), the procedures for accommodating utilities in trunk highway rights-of-way.

5 GENERAL CONDITIONS

The Permittee shall comply with the following conditions during construction and operation of the Transmission Facility over the life of this route permit.

5.1 Route Permit Distribution

Within 30 days of issuance of this route permit, the Permittee shall provide all affected landowners with a copy of this route permit and the complaint procedures. An affected landowner is any landowner or designee that is within or adjacent to the Designated Route. In no case shall a landowner receive this route permit and complaint procedures less than five

DRAFT PERMIT

days prior to the start of construction on their property. The Permittee shall also provide a copy of this route permit and the complaint procedures to the applicable regional development commissions, county environmental offices, and city and township clerks. The Permittee shall file with the Commission an affidavit of its route permit and complaint procedures distribution within 30 days of issuance of this route permit.

5.2 Access to Property

The Permittee shall notify landowners prior to entering or conducting maintenance within their property, unless otherwise negotiated with the landowner. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~the Minnesota Department of Commerce (Department of Commerce) staff or~~ Commission staff.

5.3 Construction and Operation Practices

The Permittee shall comply with the construction practices, operation and maintenance practices, and material specifications described in the permitting record for this Transmission Facility unless this route permit establishes a different requirement in which case this route permit shall prevail.

5.3.1 Field Representative

The Permittee shall designate a field representative responsible for overseeing compliance with the conditions of this route permit during construction of the Transmission Facility. This person shall be accessible by telephone or other means during normal business hours throughout site preparation, construction, cleanup, and restoration.

The Permittee shall file with the Commission the name, address, email, phone number, and emergency phone number of the field representative at least 14 days prior to the pre-construction meeting. The Permittee shall provide the field representative's contact information to affected landowners, local government units and other interested persons at least 14 days prior to the pre-construction meeting. The Permittee may change the field representative at any time upon notice to the Commission, affected landowners, local government units and other interested persons. The Permittee shall file with the Commission an affidavit of distribution of its field representative's contact information at least 14 days prior to the pre-construction meeting and upon changes to the field representative.

5.3.2 Employee Training - Route Permit Terms and Conditions

The Permittee shall train all employees, contractors, and other persons involved in the Transmission Facility construction regarding the terms and conditions of this route permit. The

DRAFT PERMIT

Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

5.3.3 Independent Third-Party Monitoring

Prior to any construction, the Permittee shall propose a scope of work and identify an independent third-party monitor to conduct construction monitoring on behalf of the ~~Department of Commerce~~Commission. The scope of work shall be developed in consultation with and approved by ~~the Department of Commerce~~Commission staff. This third-party monitor will report directly to and will be under the control of ~~the Department of Commerce~~Commission staff with costs borne by the Permittee. ~~Department of Commerce~~Commission staff shall keep records of compliance with this section and will ensure that status reports detailing the construction monitoring are filed with the Commission in accordance with scope of work approved by ~~the Department of Commerce~~Commission staff.

5.3.4 Public Services, Public Utilities, and Existing Easements

During Transmission Facility construction, the Permittee shall minimize any disruption to public services or public utilities. To the extent disruptions to public services or public utilities occur these shall be temporary, and the Permittee shall restore service promptly. Where any impacts to utilities have the potential to occur the Permittee shall work with both landowners and local entities to determine the most appropriate mitigation measures if not already considered as part of this route permit.

The Permittee shall cooperate with county and city road authorities to develop appropriate signage and traffic management during construction. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

5.3.5 Temporary Workspace

The Permittee shall limit temporary easements to special construction access needs and additional staging or lay-down areas required outside of the authorized right-of-way. Temporary space shall be selected to limit the removal and impacts to vegetation. The Permittee shall obtain temporary easements outside of the authorized transmission line right-of-way from affected landowners through rental agreements. Temporary easements are not provided for in this route permit.

The Permittee may construct temporary driveways between the roadway and the structures to minimize impact using the shortest route feasible. The Permittee shall use construction mats to minimize impacts on access paths and construction areas. The Permittee shall submit the

DRAFT PERMIT

location of temporary workspaces and driveways with the plan and profile pursuant to Section 9.1.

5.3.6 Noise

The Permittee shall comply with noise standards established under Minn. R. 7030.0010 to 7030.0080. The Permittee shall limit construction and maintenance activities to daytime working hours to the extent practicable.

5.3.7 Aesthetics

The Permittee shall consider input pertaining to visual impacts from landowners or land management agencies prior to final location of structures, rights-of-way, and other areas with the potential for visual disturbance. The Permittee shall use care to preserve the natural landscape, minimize tree removal and prevent any unnecessary destruction of the natural surroundings in the vicinity of the Transmission Facility during construction and maintenance. The Permittee shall work with landowners to locate the high-voltage transmission line to minimize the loss of agricultural land, forest, and wetlands, and to avoid homes and farmsteads. The Permittee shall place structures at a distance, consistent with sound engineering principles and system reliability criteria, from intersecting roads, highways, or trail crossings.

5.3.8 Soil Erosion and Sediment Control

The Permittee shall implement those erosion prevention and sediment control practices recommended by the Minnesota Pollution Control Agency (MPCA) Construction Stormwater Program. If construction of the Transmission Facility disturbs more than one acre of land or is sited in an area designated by the MPCA as having potential for impacts to water resources, the Permittee shall obtain a National Pollutant Discharge Elimination System/State Disposal System Construction Stormwater Permit from the MPCA that provides for the development of a Stormwater Pollution Prevention Plan that describes methods to control erosion and runoff.

The Permittee shall implement reasonable measures to minimize erosion and sedimentation during construction and shall employ perimeter sediment controls, protect exposed soil by promptly planting, seeding, using erosion control blankets and turf reinforcement mats, stabilizing slopes, protecting storm drain inlets, protecting soil stockpiles, and controlling vehicle tracking. Contours shall be graded as required so that all surfaces provide for proper drainage, blend with the natural terrain, and are left in a condition that will facilitate re-vegetation and prevent erosion. All areas disturbed during construction of the Transmission Facility shall be returned to pre-construction conditions.

DRAFT PERMIT

5.3.9 Wetlands and Water Resources

The Permittee shall develop wetland impact avoidance measures and implement them during construction of the Transmission Facility. Measures shall include spacing and placing the power poles at variable distances to span and avoid wetlands, watercourses, and floodplains. Unavoidable wetland impacts as a result of the placement of poles shall be limited to the immediate area around the poles. To minimize impacts, the Permittee shall construct in wetland areas during frozen ground conditions where practicable and according to permit requirements by the applicable permitting authority. When construction during winter is not possible, the Permittee shall use wooden or composite mats to protect wetland vegetation.

The Permittee shall contain soil excavated from the wetlands and riparian areas and not place it back into the wetland or riparian area. The Permittee shall access wetlands and riparian areas using the shortest route possible in order to minimize travel through wetland areas and prevent unnecessary impacts. The Permittee shall not place staging or stringing set up areas within or adjacent to wetlands or water resources, as practicable. The Permittee shall assemble power pole structures on upland areas before they are brought to the site for installation.

The Permittee shall restore wetland and water resource areas disturbed by construction activities to pre-construction conditions in accordance with the requirements of applicable state and federal permits or laws and landowner agreements. The Permittee shall meet the USACE, Minnesota Department of Natural Resources (DNR), Minnesota Board of Water and Soil Resources, and local units of government wetland and water resource requirements.

5.3.10 Vegetation Management

The Permittee shall minimize the number of trees to be removed in selecting the right-of-way specifically preserving to the maximum extent practicable windbreaks, shelterbelts, living snow fences, and vegetation in areas such as trail and stream crossings where vegetative screening may minimize aesthetic impacts, to the extent that such actions do not violate sound engineering principles or system reliability criteria.

The Permittee shall remove tall growing species located within the transmission line right-of-way that endanger the safe and reliable operation of the transmission line. The Permittee shall leave undisturbed, to the extent possible, existing low growing species in the right-of-way or replant such species in the right-of-way to blend the difference between the right-of-way and adjacent areas, to the extent that the low growing vegetation that will not pose a threat to the transmission line or impede construction.

5.3.11 Application of Pesticides

DRAFT PERMIT

The Permittee shall restrict pesticide use to those pesticides and methods of application approved by the Minnesota Department of Agriculture (MDA), DNR, and the U.S. Environmental Protection Agency (EPA). Selective foliage or basal application shall be used when practicable. All pesticides shall be applied in a safe and cautious manner so as not to damage adjacent properties including crops, orchards, tree farms, apiaries, or gardens. The Permittee shall contact the landowner at least 14 days prior to pesticide application on their property. The Permittee may not apply any pesticide if the landowner requests that there be no application of pesticides within the landowner's property. The Permittee shall provide notice of pesticide application to landowners and beekeepers operating known apiaries within three miles of the pesticide application area at least 14 days prior to such application. The Permittee shall keep pesticide communication and application records and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

5.3.12 Invasive Species

The Permittee shall employ best management practices to avoid the potential introduction and spread of invasive species on lands disturbed by Transmission Facility construction activities. The Permittee shall develop an Invasive Species Prevention Plan and file it with the Commission at least 14 days prior to the pre-construction meeting. The Permittee shall comply with the most recently filed Invasive Species Prevention Plan.

5.3.13 Noxious Weeds

The Permittee shall take all reasonable precautions against the spread of noxious weeds during all phases of construction. When utilizing seed to establish temporary and permanent vegetative cover on exposed soil the Permittee shall select site appropriate seed certified to be free of noxious weeds. To the extent possible, the Permittee shall use native seed mixes. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

5.3.14 Roads

The Permittee shall advise the appropriate governing bodies having jurisdiction over all state, county, city, or township roads that will be used during the construction phase of the Transmission Facility. Where practical, existing roadways shall be used for all activities associated with construction of the Transmission Facility. Oversize or overweight loads associated with the Transmission Facility shall not be hauled across public roads without required permits and approvals.

The Permittee shall construct the fewest number of site access roads required. Access roads shall not be constructed across streams and drainage ways without the required permits and

DRAFT PERMIT

approvals. Access roads shall be constructed in accordance with all necessary township, county or state road requirements and permits.

The Permittee shall promptly repair private roads or lanes damaged when moving equipment or when accessing construction workspace, unless otherwise negotiated with the affected landowner.

5.3.15 Archaeological and Historic Resources

The Permittee shall make every effort to avoid impacts to archaeological and historic resources when constructing the Transmission Facility. In the event that a resource is encountered, the Permittee shall consult with the State Historic Preservation Office and the State Archaeologist. Where feasible, avoidance of the resource is required. Where not feasible, mitigation must include an effort to minimize Transmission Facility impacts on the resource consistent with State Historic Preservation Office and State Archaeologist requirements.

Prior to construction, the Permittee shall train workers about the need to avoid cultural properties, how to identify cultural properties, and procedures to follow if undocumented cultural properties, including gravesites, are found during construction. If human remains are encountered during construction, the Permittee shall immediately halt construction and promptly notify local law enforcement and the State Archaeologist. The Permittee shall not resume construction at such location until authorized by local law enforcement or the State Archaeologist. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

5.3.16 Avian Protection

The Permittee in cooperation with the DNR shall identify areas of the transmission line where bird flight diverters will be incorporated into the transmission line design to prevent large avian collisions attributed to visibility issues. Standard transmission design shall incorporate adequate spacing of conductors and grounding devices in accordance with Avian Power Line Interaction Committee standards to eliminate the risk of electrocution to raptors with larger wingspans that may simultaneously come in contact with a conductor and grounding devices. The Permittee shall submit documentation of its avian protection coordination with the plan and profile pursuant to Section 9.1.

5.3.17 Drainage Tiles

The Permittee shall avoid, promptly repair, or replace all drainage tiles broken or damaged during all phases of the Transmission Facility's life unless otherwise negotiated with the

DRAFT PERMIT

affected landowner. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

5.3.18 Restoration

The Permittee shall restore the right-of-way, temporary workspaces, access roads, abandoned right-of-way, and other public or private lands affected by construction of the Transmission Facility. Restoration within the right-of-way must be compatible with the safe operation, maintenance, and inspection of the transmission line. Within 60 days after completion of all restoration activities, the Permittee shall file with the Commission a Notice of Restoration Completion.

5.3.19 Cleanup

The Permittee shall remove and properly dispose of all construction waste and scrap from the right-of-way and all premises on which construction activities were conducted upon completion of each task. The Permittee shall remove and properly dispose of all personal litter, including bottles, cans, and paper from construction activities daily.

5.3.20 Pollution and Hazardous Wastes

The Permittee shall take all appropriate precautions to protect against pollution of the environment. The Permittee shall be responsible for compliance with all laws applicable to the generation, storage, transportation, clean up and disposal of all waste generated during construction and restoration of the Transmission Facility.

5.3.21 Damages

The Permittee shall fairly restore or compensate landowners for damage to crops, fences, private roads and lanes, landscaping, drain tile, or other damages sustained during construction. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

5.4 Electrical Performance Standards

5.4.1 Grounding

The Permittee shall design, construct, and operate the transmission line in a manner so that the maximum induced steady-state short-circuit current shall be limited to five milliamperes root mean square (rms) alternating current between the ground and any non-stationary object

DRAFT PERMIT

within the right-of-way, including but not limited to large motor vehicles and agricultural equipment. All fixed metallic objects on or off the right-of-way, except electric fences that parallel or cross the right-of-way, shall be grounded to the extent necessary to limit the induced short-circuit current between ground and the object so as not to exceed one milliampere rms under steady state conditions of the transmission line and to comply with the ground fault conditions specified in the National Electric Safety Code. The Permittee shall address and rectify any induced current problems that arise during transmission line operation.

5.4.2 Electric Field

The Permittee shall design, construct, and operate the transmission line in such a manner that the electric field measured one meter above ground level immediately below the transmission line shall not exceed 8.0 kV/m rms.

5.4.3 Interference with Communication Devices

If interference with radio or television, satellite, wireless internet, GPS-based agriculture navigation systems or other communication devices is caused by the presence or operation of the Transmission Facility, the Permittee shall take whatever action is necessary to restore or provide reception equivalent to reception levels in the immediate area just prior to the construction of the Transmission Facility. The Permittee shall keep records of compliance with this section and provide them upon the request of ~~Department of Commerce staff or~~ Commission staff.

5.5 Other Requirements

5.5.1 Safety Codes and Design Requirements

The Permittee shall design the transmission line and associated facilities to meet or exceed all relevant local and state codes, the National Electric Safety Code, and North American Electric Reliability Corporation requirements. This includes standards relating to clearances to ground, clearance to crossing utilities, clearance to buildings, strength of materials, clearances over roadways, right-of-way widths, and permit requirements.

5.5.2 Other Permits and Regulations

The Permittee shall comply with all applicable state statutes and rules. The Permittee shall obtain all required permits for the Transmission Facility and comply with the conditions of those permits unless those permits conflict with or are preempted by federal or state permits and regulations.

DRAFT PERMIT

At least 14 days prior to the pre-construction meeting, the Permittee shall file with the Commission an Other Permits and Regulations Submittal that contains a detailed status of all permits, authorizations, and approvals that have been applied for specific to the Transmission Facility. The Other Permits and Regulations Submittal shall also include the permitting agency name; the name of the permit, authorization, or approval being sought; contact person and contact information for the permitting agency or authority; brief description of why the permit, authorization, or approval is needed; application submittal date; and the date the permit, authorization, or approval was issued or is anticipated to be issued.

The Permittee shall demonstrate that it has obtained all necessary permits, authorizations, and approvals by filing an affidavit stating as such and an updated Other Permits and Regulations Submittal prior to commencing construction. The Permittee shall provide a copy of any such permits, authorizations, and approvals at the request of ~~Department of Commerce staff~~ or Commission staff.

6 SPECIAL CONDITIONS

The special conditions shall take precedence over other conditions of this permit should there be a conflict.

[Add Special Conditions in accordance with the record of the docket]

7 DELAY IN CONSTRUCTION

If the Permittee has not commenced construction or improvement of the route within four years after the date of issuance of this route permit the Permittee shall file a Failure to Construct Report and the Commission shall consider suspension of this route permit in accordance with Minn. R. 7850.4700.

8 COMPLAINT PROCEDURES

At least 14 days prior to the pre-construction meeting, the Permittee shall file with the Commission the complaint procedures that will be used to receive and respond to complaints. The complaint procedures shall be in accordance with the requirements of Minn. R. 7829.1500 or Minn. R. 7829.1700, and as set forth in the complaint procedures attached to this route permit.

Upon request, the Permittee shall assist ~~Department of Commerce staff or~~ Commission staff with the disposition of unresolved or longstanding complaints. This assistance shall include, but is not limited to, the submittal of complaint correspondence and complaint resolution efforts.

DRAFT PERMIT

9 COMPLIANCE REQUIREMENTS

Failure to timely and properly make compliance filings required by this route permit is a failure to comply with the conditions of this route permit. Compliance filings must be electronically filed with the Commission.

9.1 Pre-Construction Meeting

Prior to the start of construction, the Permittee shall participate in a pre-construction meeting with ~~Department of Commerce and~~ Commission staff to review pre-construction filing requirements, scheduling, and to coordinate monitoring of construction and site restoration activities. Within 14 days following the pre-construction meeting, the Permittee shall file with the Commission a summary of the topics reviewed and discussed and a list of attendees. The Permittee shall indicate in the filing the anticipated construction start date.

9.2 Plan and Profile

At least 14 days prior to the pre-construction meeting, the Permittee shall file with the Commission, and provide ~~the Department of Commerce, and~~ the counties where the Transmission Facility, or portion of the Transmission Facility, will be constructed with a plan and profile of the right-of-way and the specifications and drawings for right-of-way preparation, construction, structure specifications and locations, cleanup, and restoration for the Transmission Facility. The documentation shall include maps depicting the plan and profile including the right-of-way, alignment, and structures in relation to the route and alignment approved per this route permit.

The Permittee may not commence construction until the earlier of (i) 30 days after the pre-construction meeting or (ii) until the Commission staff has notified the Permittee in writing that it has completed its review of the documents and determined that the planned construction is consistent with this route permit.

If the Commission notifies the Permittee in writing within 30 days after the pre-construction meeting that it has completed its review of the documents and planned construction, and finds that the planned construction is not consistent with this route permit, the Permittee may submit additional and/or revised documentation and may not commence construction until the Commission has notified the Permittee in writing that it has determined that the planned construction is consistent with this route permit.

If the Permittee intends to make any significant changes in its plan and profile or the specifications and drawings after submission to the Commission, the Permittee shall notify the Commission~~, the Department of Commerce,~~ and county staff at least five days before

DRAFT PERMIT

implementing the changes. No changes shall be made that would be in violation of any of the terms of this route permit.

9.3 Status Reports

The Permittee shall file with the Commission monthly Construction Status Reports beginning with the pre-construction meeting and until completion of restoration. Construction Status Reports shall describe construction activities and progress, activities undertaken in compliance with this route permit, and shall include text and photographs.

If the Permittee does not commence construction of the Transmission Facility within six months of this route permit issuance, the Permittee shall file with the Commission Pre-Construction Status Reports on the anticipated timing of construction every six months beginning with the issuance of this route permit until the pre-construction meeting.

9.4 In-Service Date

At least three days before the Transmission Facility is to be placed into service, the Permittee shall notify the Commission of the date on which the Transmission Facility will be placed into service and the date on which construction was completed.

9.5 As-Builts

Within 90 days after completion of construction, the Permittee shall submit to the Commission copies of all final as-built plans and specifications developed during the Transmission Facility construction.

9.6 GPS Data

Within 90 days after completion of construction, the Permittee shall submit to the Commission, in the format requested by the Commission, geo-spatial information (*e.g.*, ArcGIS compatible map files, GPS coordinates, associated database of characteristics) for all structures associated with the Transmission Facility and each substation connected.

9.7 Right of Entry

The Permittee shall allow Commission designated representatives to perform the following, upon reasonable notice, upon presentation of credentials and at all times in compliance with the Permittee's site safety standards:

DRAFT PERMIT

(a) To enter upon the facilities easement of the property for the purpose of obtaining information, examining records, and conducting surveys or investigations.
(b) To bring such equipment upon the facilities easement of the property as is necessary to conduct such surveys and investigations.
(c) To sample and monitor upon the facilities easement of the property.
To examine and copy any documents pertaining to compliance with the conditions of this route permit.

10 ROUTE PERMIT AMENDMENT

This route permit may be amended at any time by the Commission. Any person may request an amendment of the conditions of this route permit by submitting a request to the Commission in writing describing the amendment sought and the reasons for the amendment. The Commission will mail notice of receipt of the request to the Permittee. The Commission may amend the conditions after affording the Permittee and interested persons such process as is required under Minn. R. 7850.4900.

11 TRANSFER OF ROUTE PERMIT

The Permittee may request at any time that the Commission transfer this route permit to another person or entity (transferee). In its request, the Permittee must provide the Commission with:

(a) the name and description of the transferee;
(b) the reasons for the transfer;
(c) a description of the facilities affected; and
(d) the proposed effective date of the transfer.

The transferee must provide the Commission with a certification that it has read, understands and is able to comply with the plans and procedures filed for the Transmission Facility and all conditions of this route permit. The Commission may authorize transfer of the route permit after affording the Permittee, the transferee, and interested persons such process as is required under Minn. R. 7850.5000.

12 REVOCATION OR SUSPENSION OF ROUTE PERMIT

The Commission may initiate action to revoke or suspend this route permit at any time. The Commission shall act in accordance with the requirements of Minn. R. 7850.5100, to revoke or suspend this route permit.

DRAFT PERMIT

APPENDIX D

MIDWATER BESS, LLC

APPLICANT INFORMATION REQUEST RESPONSE

MINNESOTA
PUBLIC UTILITIES COMMISSION

Energy Infrastructure Permitting

Questions for Development of Environmental Review

In the Matter of the Application of Midwater BESS, LLC for a Site Permit for the up to 150 MW Midwater Energy Storage Project in Freeborn County, Minnesota

PUC Docket No.	IP-7138/ESS-24-294 IP-7138/TL-24-295	Directed To:	Mary Matze
EERA Question No.	1	Please Respond By:	December 12, 2025

Note: Energy Infrastructure Permitting (EIP) staff intends to use information provided in this response to develop an environmental review document. Responses to these questions are considered public information unless otherwise designated by the respondent as nonpublic pursuant to Minnesota Stat. § 13.02.

Question(s)

Estimated Project Costs

1. In the application (p. 29) Midwater provided a breakdown of project cost estimates through Table 2.3-1. The costs were developed in 2024. Please confirm that these cost estimates are still valid and if not, please provide updated project cost estimates as presented in the Table 2.3-1 format.

   Response:

   The proposed budget for the project is largely the same as previously submitted. The Planning and State permitting estimate has been revised to more fully capture ancillary costs related to permitting the project, and due to changes in how project costs are coded.

Task	BESS Facility Cost**	HVTL Facility Cost
Planning and State Permitting	$1,200,000	N/A*
Acquisition and "Downstream" Permits	$7,000,000	N/A*
Design	$1,300,000	$125,000
Procurement	$130,000,000	$250,000
Construction	$71,000,000	$250,000
Operation	$246,000,000	$60,000
Decommissioning	$1,215,643	$127,184
Total	$457,715,643	$812,184

*Included in the cost estimates for the BESS Facility.

**The cost of interconnection fees and network upgrade costs are not included in this budget.

Estimated Project Construction Timeline

2. In the application (p. 13) Midwater noted that "The Applicant is anticipating construction to begin in the first quarter of 2027, with commercial operation by the end of 2027." Please confirm that this statement is still valid and if not, please provide an updated project construction schedule and related milestones described in Section 1.5 of the Application.

   Response:
   The estimated GIA completion date published by the interconnection agency, MISO[1], is September 18, 2026. With this updated date from the interconnection agency and a revised state permitting process, the project schedule has been adjusted as follows:

Land Acquisition	Site Control Complete
Site Permit	Q3 2026
Downstream Permits	Q1-Q2 2027
Construction	Q2 2027-Q1 2028
Testing and Commissioning	Q1 2028
Commercial Operation Date	Q2 2028

Interconnection and Tolling Agreement

3. Midwater noted in their application (p. 27) that "The Applicant expects to sign a GIA [Generator Interconnection Agreement] in the fourth quarter of 2025." Please confirm if this statement is still valid, and, if not, that a new date has been established or anticipated.

   Response:
   The generation interconnection agreement date is driven by the interconnection agency, MISO. Since the original submittal of the application, MISO revised their published GIA completion date to September 18, 2026. MISO study schedules are updated and published monthly.

4. The Applicant noted that they anticipate "entering into a Tolling Agreement with its affiliated merchant energy business or similar third-party market participant." (p. 17). Please confirm if this statement is still valid, and, if not, the new Tolling Agreement arrangement.

   Response:
   At this time, the project does not have a Tolling Agreement with the affiliated merchant energy business or similar third-party market participant or any other enforceable mechanism for the sale of power from the project. The final structure and form of agreement or type of enforceable mechanism, such as

[1] Published as of December 1, 2025. Schedules are updated monthly by MISO.

registration as a MISO participant, governing the commercial terms by which the project will operate will be determined based on market conditions at the time of project financing.

James E. Sullivan *December 3, 2025*

Environmental Review Manager *Date*

MN Public Utilities Commission

MINNESOTA
PUBLIC UTILITIES COMMISSION

Energy Infrastructure Permitting
Questions for Development of Environmental Review

In the Matter of the Application of Midwater BESS, LLC for a Site Permit for the up to 150 MW Midwater Energy Storage Project in Freeborn County, Minnesota

PUC Docket No.	IP-7138/ESS-24-294 IP-7138/TL-24-295	Directed To:	Mary Matze
EERA Question No.	2	Please Respond By:	December 12, 2025

Note: Energy Infrastructure Permitting (EIP) staff intends to use information provided in this response to develop an environmental review document. Responses to these questions are considered public information unless otherwise designated by the respondent as nonpublic pursuant to Minnesota Stat. § 13.02.

Question(s)

Fencing

1. In section 5.1.1.4 of the Midwater application (p. 40) it was noted that "Fencing will consist of a six-foot-tall chain link fence, with one to two feet of barbed wire." During the Midwater Citizen Advisory Task Force, a recommendation was developed on fencing, which provided (Task Force Report, p. A-12): Fencing that is unobtrusive, neutral in color, uses non-reflective materials, does not contain barbed wire, and is at least the height of the individual BESS battery units (approximately 10 feet). The use of opacity strips, woven into the metal fence fabric, was also included in the Citizen Task Force discussions, documented in the Task Force Report. Given the scope and direction of the fencing recommendation, will Midwater revise their proposed fencing plan to align with the Midwater Citizen Task Force recommendation? If so, please provide the modification details.

   Response:

   Midwater BESS can provide fencing to comply with recommendations from the Midwater Citizen Advisory Task Force (CATF) and written request from the Minnesota DNR and would be supportive of the following conditions:

   - Increase height of the fence to 10 feet to comply with MN DNR minimum height recommendations from the agency memo dated March 10, 2025, and recommendation from the CATF.
   - Fencing shall be enhanced to provide neutral-colored, non-reflective opacity fence strips to align with the CATF recommendation.

   As a life-safety measure, we respectfully request to include barbed wire on top of the 10-foot fence.

Vegetative Landscape Buffers

2. The Midwater Citizen's Advisory Task Force presented a recommendation for "The installation of three distinct rows of planting buffers surrounding the security fence. Plants should be chosen from compatible, local species and approved by the Freeborn County Office of Environmental Services for

environmental impact and adhere to ITC Midwest's standards for power line clearance." (Task Force Report, p. A-12). If Midwater intends to abide by this recommendation, please provide a revised Vegetation Management Plan that includes the landscape buffer details.

Response:

While there is existing and established vegetation screening on the perimeter of all four sides of the project site, Midwater BESS is amenable to providing three distinct rows of planning buffers around the security fence on the northwest portion of the project, where the project is most visible from the road. The project site has existing well-established screening by evergreen and deciduous trees on the north, east, and south sides of the project. On the west side of the project facing the road there is a line of established evergreen trees along the road, however, there is more distance between these trees than other parts of the site.

Therefore, we are amenable to enhancing existing screening along the fencing of the northwest portion of the project. The project company will coordinate with the Freeborn County Office of Environmental Services to review the planting plan.

The project, including the proposed landscape buffer will comply with all of ITC Midwest's standards for power line clearance.

The preparation of a landscape buffer plan will take time to prepare. We request that a landscape plan and coordination with Freeborn County Office of Environmental Services occur prior to construction be included as a condition in the site plan permit to allow time for coordination with stakeholders and to refine final project design.

Anticipated BESS Enclosure Dimensions

3. Please confirm that the proposed BESS enclosure dimensions are approximately 10 feet tall, eight feet wide, and 20 feet long.

Response:

We confirm that these dimensions are consistent with current battery technology being considered for the project, though final BESS enclosure dimensions will be provided prior to construction.

James E. Sullivan *December 5, 2025*

Environmental Review Manager *Date*

MN Public Utilities Commission

Response to Energy Infrastructure Permitting

Questions for Development of Environmental Review

In the Matter of the Application of Midwater BESS, LLC for a Site Permit for the up to 150 MW Midwater Energy Storage Project in Freeborn County, Minnesota

PUC Docket No.	IP-7138/ESS-24-294 IP-7138/TL-24-295	Directed To:	Mary Matze
EERA Question No.	3	Please Respond By:	December 18, 2025

Note: Energy Infrastructure Permitting (EIP) staff intends to use information provided in this response to develop an environmental review document. Responses to these questions are considered public information unless otherwise designated by the respondent as nonpublic pursuant to Minnesota Stat. § 13.02.

Question(s)

Vegetation Management Plan

1. In your review of the vegetative management plan, please consider how hydric soils, disturbed by construction, will be managed until project decommissioning.

Response:

Table 6.5-4 of the filed site permit application indicates 13.21 acres of the 104.39-acre Project Area have a hydric soil classification of "Predominantly Hydric" or "All Hydric", constituting 12.65 percent. As shown on Figure 4 of the Vegetation Management Plan (Soils – Hydric Classification), Predominantly Hydric and All Hydric soil classification areas are largely located within jurisdictional wetland and outside of Proposed BESS Facility and HVTL Facility Project Development disturbance areas. Two hydric map units will be disturbed by construction activities as described below.

Map Unit 517 (Shandep loam):

Shandep loam (517) is an "All Hydric" map unit located within the southeastern portion of the Project Area (Figure 4). The portion of the map unit located within the Proposed BESS Facility and Project Development Area will be entirely graded by construction activities. Most of this map unit will be disturbed and covered with gravel to accommodate a stabilized equipment pad and therefore will not require management until project decommissioning.

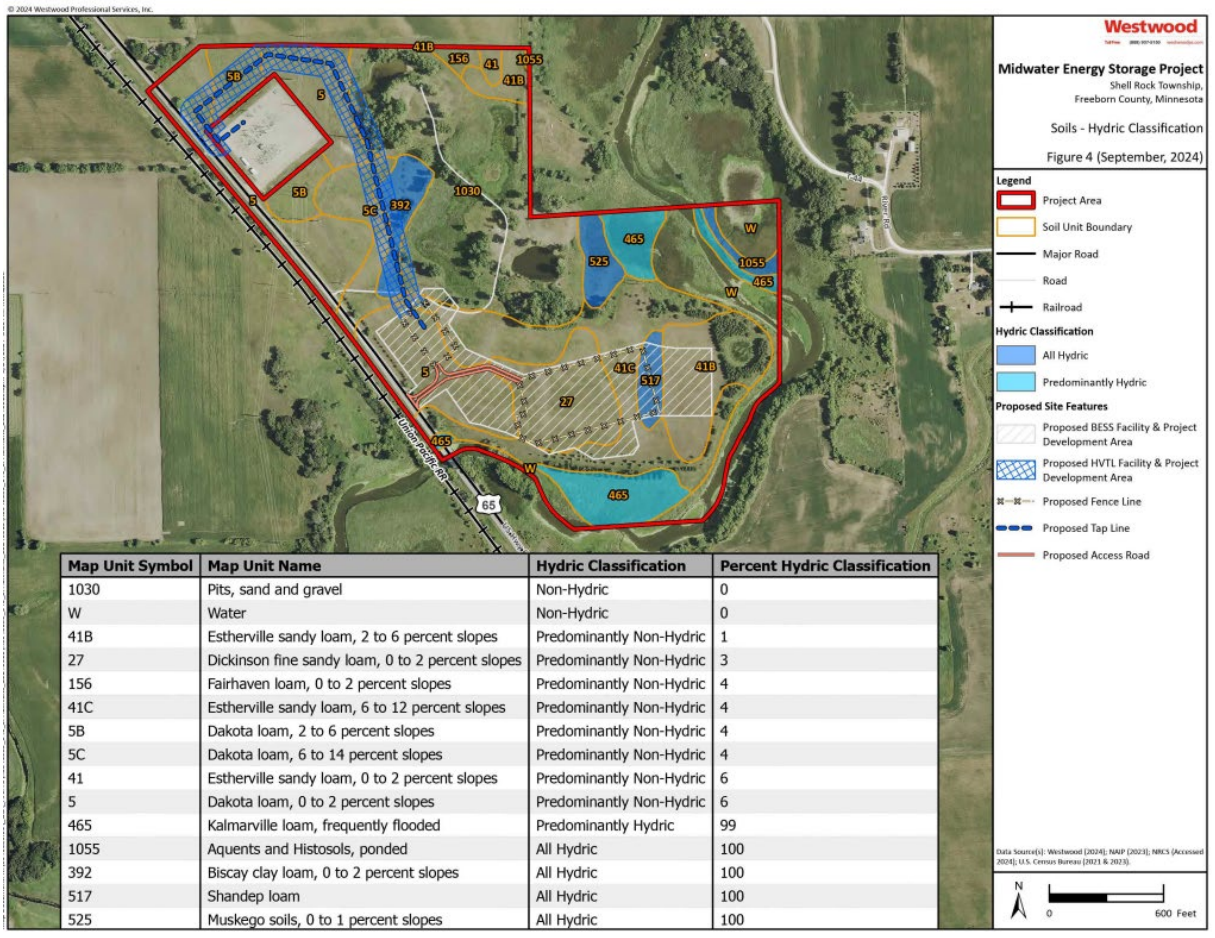
Map Unit 392 (Biscay clay loam, 0-2 percent slopes):

Biscay clay loam (392) is an "All Hydric" map unit located within the northern portion of the Project Area and partially within the Proposed HVTL Facility and Project Development Area (Figure 4), between the existing ITC Midwest Glenworth Substation and the proposed project substation. Transmission line structures are generally designed for installation at existing grades. No significant grading is anticipated for this map unit as the existing topography within the ROW is relatively flat, and disturbance is only

anticipated to accommodate pole structure foundations in this area. Pole structures will be drilled (direct embedded piers) with only minor disturbance to the map unit.

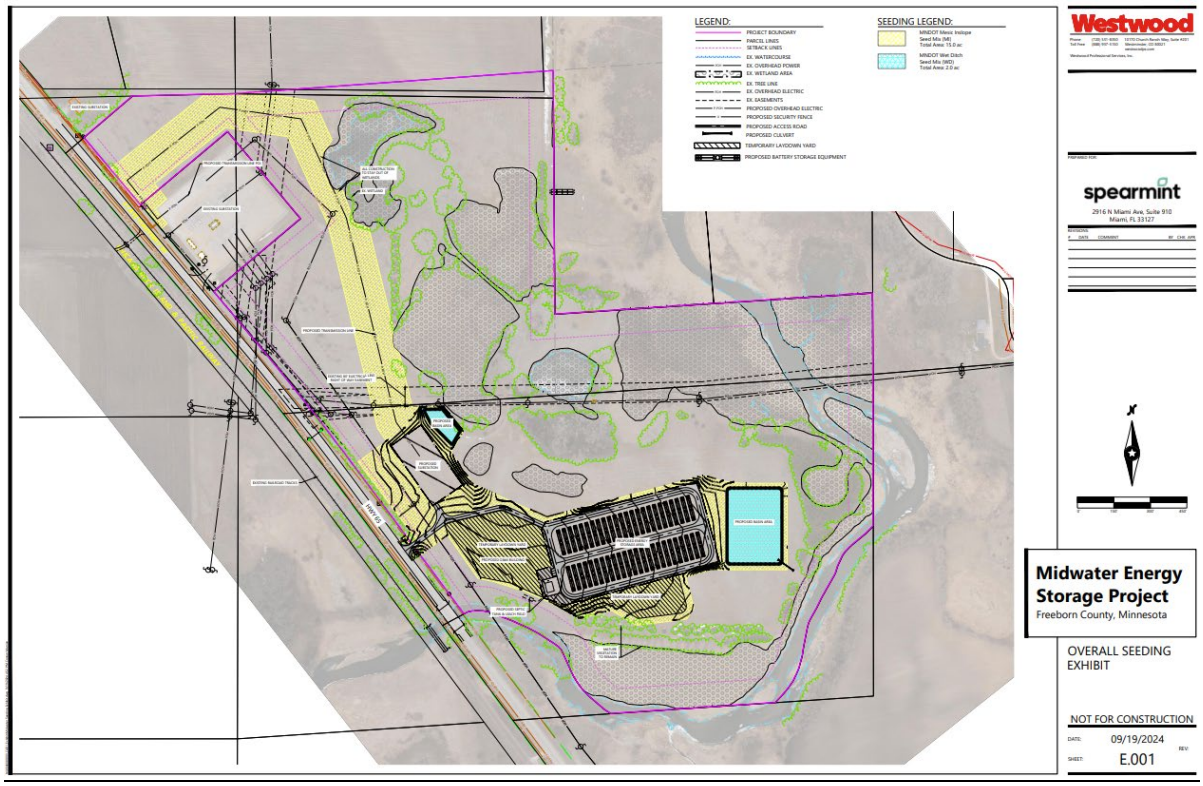
As shown on attached Figure E.001 (Overall Seeding Exhibit) from the Vegetation Management Plan, disturbed portions of map unit 392 within the Proposed HVTL Facility and Project Development Area will be seeded to MNDOT Mesic Inslope Seed Mix (MI) and managed in accordance with the Vegetation Management Plan until the project is decommissioned. Maintenance activities will include mowing and herbicide spot spraying at specified intervals to manage non-native and invasive weed species.

Figure 4: Soils – Hydric Classification



Map Unit Symbol	Map Unit Name	Hydric Classification	Percent Hydric Classification
1030	Pits, sand and gravel	Non-Hydric	0
W	Water	Non-Hydric	0
41B	Estherville sandy loam, 2 to 6 percent slopes	Predominantly Non-Hydric	1
27	Dickinson fine sandy loam, 0 to 2 percent slopes	Predominantly Non-Hydric	3
156	Fairhaven loam, 0 to 2 percent slopes	Predominantly Non-Hydric	4
41C	Estherville sandy loam, 6 to 12 percent slopes	Predominantly Non-Hydric	4
5B	Dakota loam, 2 to 6 percent slopes	Predominantly Non-Hydric	4
5C	Dakota loam, 6 to 14 percent slopes	Predominantly Non-Hydric	4
41	Estherville sandy loam, 0 to 2 percent slopes	Predominantly Non-Hydric	6
5	Dakota loam, 0 to 2 percent slopes	Predominantly Non-Hydric	6
465	Kalmarville loam, frequently flooded	Predominantly Hydric	99
1055	Aquents and Histosols, ponded	All Hydric	100
392	Biscay clay loam, 0 to 2 percent slopes	All Hydric	100
517	Shandep loam	All Hydric	100
525	Muskego soils, 0 to 1 percent slopes	All Hydric	100

Figure E.001: Overall Seeding Exhibit



MINNESOTA
PUBLIC UTILITIES COMMISSION

Energy Infrastructure Permitting

Questions for Development of Environmental Review

In the Matter of the Application of Midwater BESS, LLC for a Site Permit for the up to 150 MW Midwater Energy Storage Project in Freeborn County, Minnesota

PUC Docket No.	IP-7138/ESS-24-294 IP-7138/TL-24-295	Directed To:	Mary Matze
EERA Question No.	4	Please Respond By:	December 22, 2025

Note: Energy Infrastructure Permitting (EIP) staff intends to use information provided in this response to develop an environmental review document. Responses to these questions are considered public information unless otherwise designated by the respondent as nonpublic pursuant to Minnesota Stat. § 13.02.

Question(s)

Conservation Reserve Program

1. Please provide a copy of the Conservation Reserve Program (CRP) documentation for the land parcel affected by the project.

   Response:

   A copy of the USDA's CRP documentation for the land parcel affected by the project is attached. The project notes that CRP is a voluntary program entered into by the current landowners, and that CRP can be terminated at any time upon the request of the landowners or due to a change of land ownership. The current landowner entered the parcel into CRP on October 1, 2021, and it will expire on October 1, 2031.

   Midwater's intention is maintain CRP on the portions of the property that will not be utilized by the project so that existing vegetation will remain intact on the portions of the property not disturbed by the Project.

Labor Payroll Estimate

2. Please provide a payroll estimate with respect to total wages for laborers during the project construction phase.

   Response:

   In the current market, the project estimates laborer's wages at approximately $3 Million during the construction phase of the project.

James E. Sullivan *December 16, 2025*

Environmental Review Manager *Date*

MN Public Utilities Commission

Response to Energy Infrastructure Permitting

Questions for Development of Environmental Review

In the Matter of the Application of Midwater BESS, LLC for a Site Permit for the up to 150 MW Midwater Energy Storage Project in Freeborn County, Minnesota

PUC Docket No.	IP-7138/ESS-24-294 IP-7138/TL-24-295	Directed To:	Mary Matze
EERA Question No.	5	Please Respond By:	January 5, 2026

Note: Energy Infrastructure Permitting (EIP) staff intends to use information provided in this response to develop an environmental review document. Responses to these questions are considered public information unless otherwise designated by the respondent as nonpublic pursuant to Minnesota Stat. § 13.02.

Question(s)

Table 6.2-1: Proximity of Locations to the Project

1. On page 64 and 65 of the Applicant's permit application, a table was generated that was used to convey potential impacts to aesthetics based on changes in viewshed. Does the Applicant have a map that illustrates the general locations identified in Table 6.2-1?

   Response:

   Exhibit 1: Potential Visual Impact Locations – Table 6.2-1 is attached. The exhibit shows the thirteen (13) potential visual impact locations as described within Table 6.2-1 of the Midwater Energy Storage Project Site Permit Application.

BESS Enclosures

2. Please provide the anticipated number of BESS enclosures that will be developed at the site.

   Response:

   The anticipated number of BESS enclosures at the site is expected to be in the range of 150 to 200 full-sized containers, depending on the chosen technology and vendor. These estimates are subject to change based on future technological advancements and vendor selections, but the overall site layout is designed to be flexible, accommodating different sizes and quantities of equipment within the battery energy storage pad area proposed.

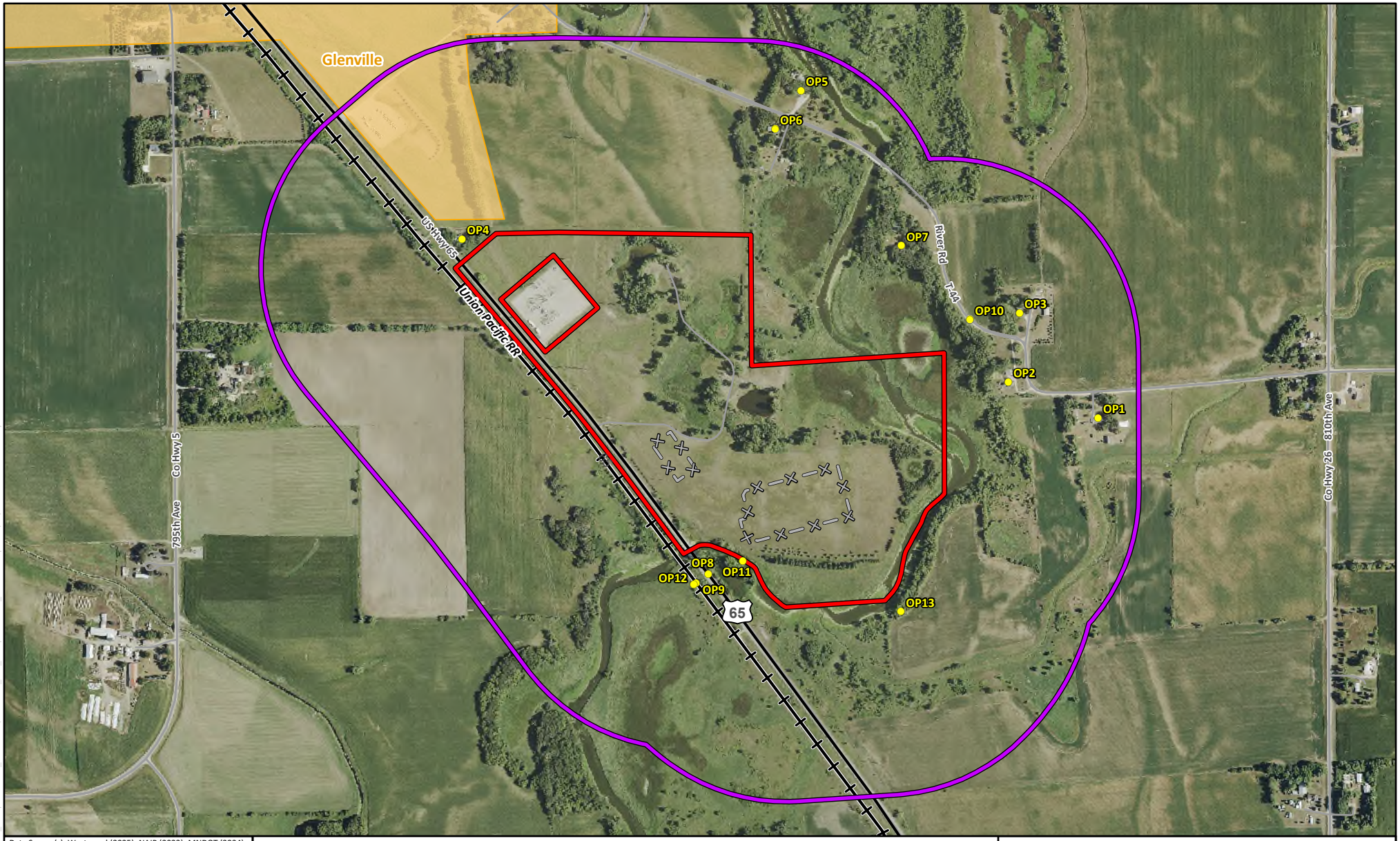
Project Visualization Images

3. Would it be possible to provide updated versions of the project visualization images (Image 5 and 6, pp. 66 through 68) that includes the three-layer vegetative buffer discussed by the Citizen Advisory Task Force?

   Response:

   Midwater BESS, LLC will provide updated project visualization images (Images 5 and 6) that address the three-layer vegetation buffer requested by the Citizen Advisory Task Force. Midwater BESS, LLC anticipates having the revised visualization images available early February 2026 for staff review.

© 2025 Westwood Professional Services, Inc.



Data Source(s): Westwood (2025); NAIP (2023); MNDOT (2024); U.S. Census Bureau (2021 & 2023).

N

0 900 Feet

Westwood

Toll Free (888) 937-5150 westwoodps.com

Midwater Energy Storage Project

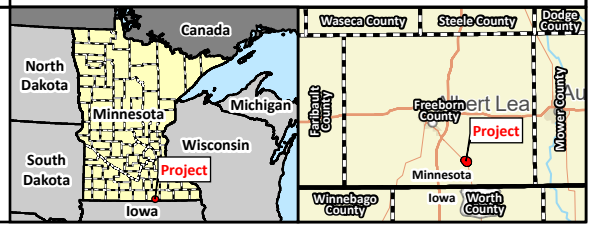
Potential Visual Impact Locations - Table 6.2-1

Shell Rock Township, Freeborn County, Minnesota

Exhibit 1

Legend

- BESS Facility Fence
- Project Area
- Project Area Quarter-Mile Buffer
- Municipal Boundary
- Major Road
- Road
- Railroad
- Potential Visual Impact Location



Map Document: N:\0046089.00_GIS_ArcPro\R0046089_040_ReceptorExhibit_20250516\R0046089_040_ReceptorExhibit_20250516.aprx 12/22/2025 3:38 PM AMalloy

LANDSCAPE REQUIREMENTS & PROVISIONS

SEC. 26-82. – ENERGY STORAGE SYSTEMS GENERAL STANDARDS

(1) STANDARDS FOR ENERGY STORAGE SYSTEMS (EQUAL TO OR GREATER THAN 40 KILOWATTS UP TO MEETING THE THRESHOLD FOR PUC PERMITTING)

g. VEGETATIVE LANDSCAPE BUFFER AND SCREENING. A VEGETATIVE LANDSCAPE BUFFER MUST BE IMPLEMENTED AND MAINTAINED AROUND THE ENTIRE EXTERIOR PERIMETER OF THE SECURITY FENCE OF AN ENERGY STORAGE SYSTEM. THE VEGETATIVE BUFFER SHALL BE SET BACK CONSISTENT WITH THE REQUIREMENTS FOR A FIRE SAFETY BUFFER REQUIRED BY THIS ORDINANCE. THIS MEASURE IS AIMED AT ENHANCING THE VISUAL APPEAL AND ENVIRONMENTAL INTEGRATION OF THE PROJECT. THE FOLLOWING STANDARDS MUST BE ADHERED TO:

1. REQUIREMENTS
   - i. THE LANDSCAPE BUFFER SHALL CONSIST OF A MINIMUM OF THREE DISTINCT ROWS OF PLANTINGS.
   - ii. THE BUFFER MUST PROVIDE VISUAL SCREENING AND GLARE MINIMIZATION OF THE ENERGY STORAGE SYSTEM THROUGHOUT ALL SEASONS TO THE GREATEST EXTENT REASONABLY POSSIBLE.
   - iii. THE VEGETATIVE LANDSCAPE BUFFER MUST HAVE A MINIMUM HEIGHT EQUAL TO THAT OF THE TOP OF THE HIGHEST COMPONENT WITHIN THE ENERGY STORAGE SYSTEM (EXCEPTING INCIDENTAL EQUIPMENT USED FOR COMMUNICATIONS EQUIPMENT OR OTHER ACCESSORY USES) WITHIN TWO (2) YEARS OF THE ORIGINAL PLANTING.
   - iv. A CONTINUOUS, MAINTAINED GRASS COVER MUST BE ESTABLISHED AND PRESERVED THROUGHOUT THE BUFFER, INCLUDING BENEATH AND IN-BETWEEN THE TREES AND SHRUBS, TO ENHANCE SOIL STABILITY, WATER FILTRATION, AND OVERALL AESTHETICS.
2. SPECIES SELECTION AND DESIGN.
   - i. THE SPECIES, SPACING AND DESIGN OF THE VEGETATIVE BUFFER WILL BE DETERMINED BY THE FREEBORN COUNTY SOIL AND WATER CONSERVATION DISTRICT (SWCD) STAFF, WITH JOINT APPROVAL AUTHORITY.
   - ii. TREE AND SHRUB SELECTIONS WILL BE BASED ON THE SOILS WINDBREAK SUITABILITY GROUP FROM THE SWCD FIELD OFFICE TECHNICAL GUIDE.
   - iii. SPECIES SHOULD ALSO BE REFERENCED FROM TABLE 7 OF THE NATIVE TREES AND SHRUBS BENEFICIAL TO UPLAND WILDLIFE CHART.
3. MAINTENANCE RESPONSIBILITY. THE PROPERTY OWNER AND ENERGY STORAGE SYSTEMS OPERATOR SHARE THE OBLIGATION TO MAINTAIN THE VEGETATIVE BUFFER, ENSURING THAT ALL VEGETATION WITHIN IT ARE KEPT ALIVE AND HEALTHY. THEY MUST ALSO ACTIVELY MANAGE THE BUFFER TO KEEP IT FREE FROM NOXIOUS WEEDS AND INVASIVE PLANTS.
4. ENFORCEMENT AND PENALTIES. FAILURE TO MAINTAIN THE VEGETATIVE SCREENING AS SPECIFIED WILL RESULT IN ENFORCEMENT ACTIONS BY THE COUNTY. THE COSTS INCURRED FOR RECTIFYING ANY MAINTENANCE DEFICIENCIES WILL BE ASSESSED AGAINST THE PROPERTY.

LANDSCAPE SCHEDULE

QTY	COMMON / BOTANICAL NAME	SIZE	SPACING	MATURE SIZE	NATIVE TO STATE
7	**DECIDUOUS TREES**				
	NORTHWOOD RED MAPLE / ACER RUBRUM 'NORTHWOOD'	2" CAL. B&B	AS SHOWN	H 40'-60' W 40'	NATIVE CULTIVAR
	COMMON HACKBERRY / CELTIS OCCIDENTALIS	2" CAL. B&B	AS SHOWN	H 40'-60' W 40'	NATIVE
	NORTHERN RED OAK / QUERCUS RUBRA	2" CAL. B&B	AS SHOWN	H 50'-70' W 50'-70'	NATIVE
	ACCOLADE™ ELM / ULMUS X 'MORTON'	2" CAL. B&B	AS SHOWN	H 50'-70' W 40'-50'	NATIVE CULTIVAR
38	**EVERGREEN TREES**				
	WHITE FIR / ABIES CONCOLOR	6' HT. B&B	AS SHOWN	H 30'-50' W 25'-30'	NATIVE
	BLACK HILLS SPRUCE / PICEA GLAUCA DENSATA	6' HT. B&B	AS SHOWN	H 30'-40' W 20'-30'	NATIVE CULTIVAR
	COLUMNAR WHITE PINE / PINUS STROBUS `FASTIGIATA`	6' HT. B&B	AS SHOWN	H 25'-40' W 10'-15'	NATIVE CULTIVAR
	TECHNY ARBORVITAE / THUJA OCCIDENTALIS 'TECHNY'	6' HT. B&B	AS SHOWN	H 10-15' W 6-10'	NATIVE CULTIVAR
11	**ORNAMENTAL TREES**				
	AUTUMN BRILLIANCE SERVICEBERRY / AMELANCHIER X GRANDIFLORA 'AUTUMN BRILLIANCE'	1.5" EQUIVALENT CAL. CLUMP / 6' HT. B&B	AS SHOWN	H 30'-40' W 15'-20'	NATIVE CULTIVAR
	THORNLESS COCKSPUR HAWTHORN / CRATAEGUS CRUS-GALLI INERMIS	1.5" EQUIVALENT CAL. CLUMP / 6' HT. B&B	AS SHOWN	H 15-20' W 15-20'	NATIVE CULTIVAR

QTY	COMMON / BOTANICAL NAME	SIZE	SPACING OC	MATURE SIZE	FIELD5
89	**SHRUBS**				
	VIKING BLACK CHOKEBERRY / ARONIA MELANOCARPA 'VIKING'	#5 CONT.	60" o.c.	H 5'-7' W4'-5'	NATIVE CULTIVAR
	PRAIRIE FIRE DOGWOOD / CORNUS ALBA 'PRAIRIE FIRE'	#5 CONT.	84" o.c.	H 5'-7' W 5'-7'	NATIVE CULTIVAR
	JEWELL BUSH HONEYSUCKLE / DIERVILLA LONICERA `JEWEL`	#5 CONT.	60" o.c.	H 3-5' W 3-5'	NATIVE CULTIVAR
	SUMMER WINE® NINEBARK / PHYSOCARPUS OPULIFOLIUS 'SEWARD'	#5 CONT.	60" o.c.	H 5'-6' W 5'-6'	NATIVE CULTIVAR
	BAILEY'S COMPACT CRANBERRYBUSH / VIBURNUM TRILOBUM 'BAILEY COMPACT'	#5 CONT.	60" o.c.	H 5'-6' W 5'-6'	NATIVE CULTIVAR

NOTES: **1.** QUANTITIES ON PLAN SUPERSEDE LIST QUANTITIES IN THE EVENT OF A DISCREPANCY.
2. B.B. SPECIFIES ROOT TYPE AS BALLED AND BURLAP.
3. H.T. SPECIFIES MINIMUM SPECIMEN HEIGHT UPON INSTALLATION.
4. #5 CONT. TO MEET MINIMUM SIZE REQ. OF 24"H OR 30"W FOR DECIDUOUS SHRUBS UPON INSTALLATION. IF PLANT SIZE UNAVAILABLE AT #5 CONT. UPSIZE CONTAINER UNTIL MINIMUM PLANT SIZE REQ. IS MET.
5. PLANT SPECIES SUBJECT TO CHANGE BASED UPON AVAILABILITY AT TIME OF PLANTING & SITE COMPATIBILITY. SUBSTITUTIONS MUST BE OF LIKE SPECIES AND SIMILAR MATURE SIZE.

LEGEND:

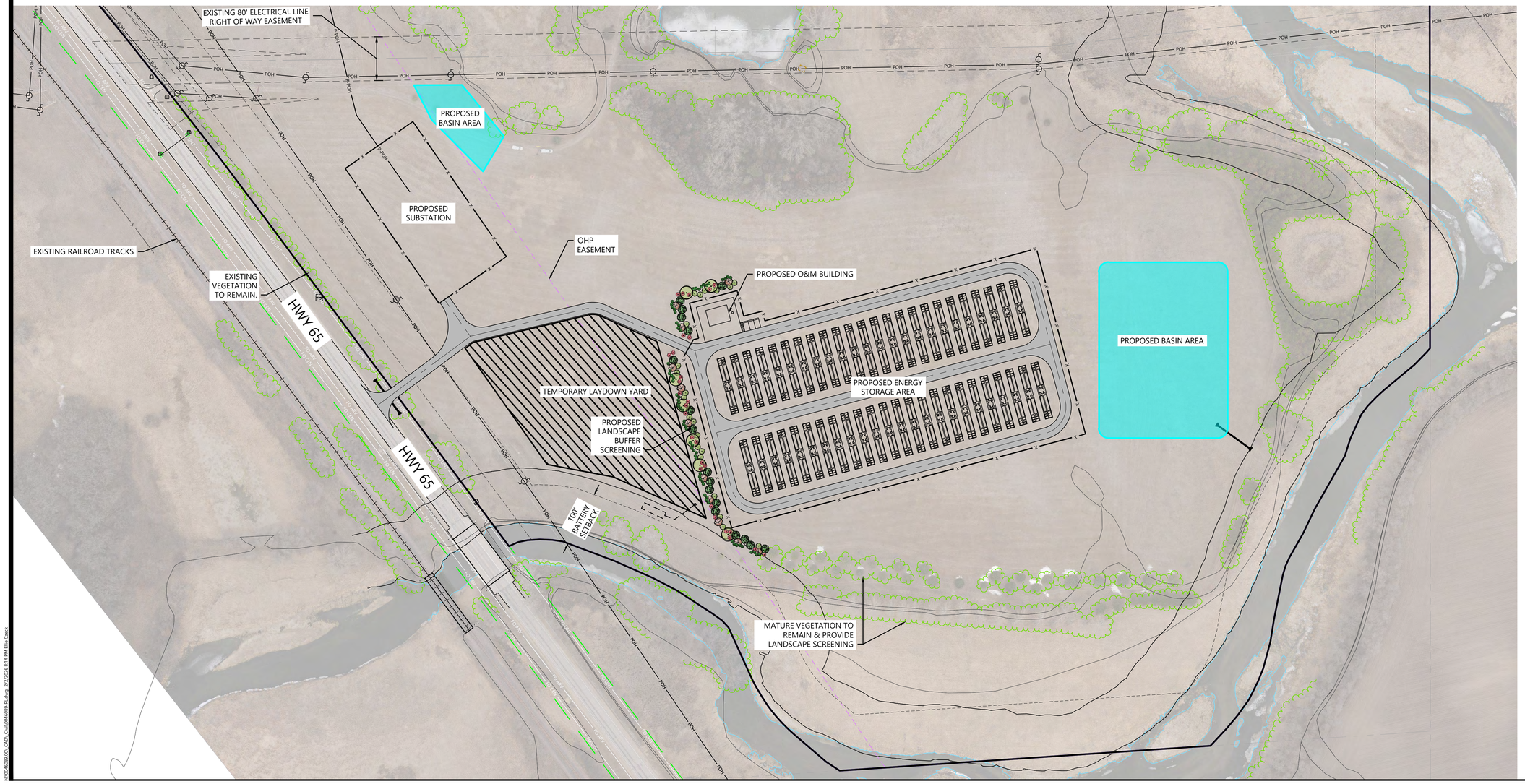
- PROJECT BOUNDARY
- PARCEL LINES
- SETBACK LINES
- EX. WATERCOURSE
- EX. OVERHEAD POWER
- EX. WETLAND AREA
- EX. INDEX CONTOUR (5')
- EX. INTERVAL CONTOUR (1')
- EX. TREE LINE
- EX. OVERHEAD ELECTRIC
- EX. EASEMENTS
- PROPOSED OVERHEAD ELECTRIC
- PROPOSED SECURITY FENCE
- PROPOSED ACCESS ROAD
- PROPOSED CULVERT
- TEMPORARY LAYDOWN YARD
- PROPOSED BATTERY STORAGE EQUIPMENT
- PROPOSED BASIN
- PROPOSED SWALE

NOTES:

1. TREE LOCATIONS AND SPACING ARE SUBJECT TO CHANGE BASED ON CONSTRUCTED UTILITY LOCATIONS.
2. NO PLANTING WILL BE INSTALLED UNTIL ALL GRADING AND CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA.
3. DECIDUOUS TREES SHOULD BE LOCATED A MINIMUM OF 5' OFF ANY UTILITY PIPE AND CONIFEROUS TREES TREES SHOULD BE LOCATED A MINIMUM OF 15' OFF ANY UTILITY PIPE.
4. ALL LANDSCAPED AREAS SHALL BE IRRIGATED WITH A DRIP LINE OR SPRAY SYSTEM AS APPROPRIATE FOR THE PROPOSED PLANTINGS IN THE SPECIFIC AREA.
5. MECHANICALS TO BE SCREENED WITH ADEQUATE VEGETATION.

LANDSCAPE LEGEND:

- DECIDUOUS TREES
- EVERGREEN TREES
- ORNAMENTAL DECIDUOUS TREES
- SHRUBS



Westwood

Phone (720) 531-8350 Toll Free (888) 937-5150
10170 Church Ranch Way, Suite #201
Westminster, CO 80021
westwoodps.com

Westwood Professional Services, Inc.

PREPARED FOR:

spearmint

2916 N Miami Ave, Suite 910
Miami, FL 33127

REVISIONS:

#	DATE	COMMENT	BY	CHK	APR
A	2024-07-25	ISSUED FOR REVIEW	EAC	NTM	NTM
B	2026-01-16	ISSUED FOR REVIEW	EAC	NTM	NTM
C	2026-01-23	ISSUED FOR REVIEW	EAC	NTM	NTM
D	2026-01-30	ISSUED FOR REVIEW	EAC	NTM	NTM

Midwater BESS Project

Freeborn County, Minnesota

Overall Preliminary Landscape Screening Plan

NOT FOR CONSTRUCTION

DATE: 2026-01-30
SHEET: C.200
REV: D

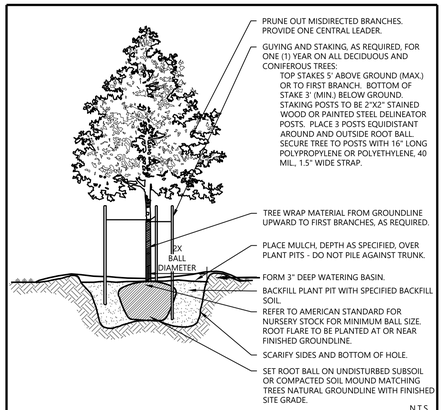
N:\0040699.00_CAD_Civil\0040699-R.dwg 2/2/2026 8:14 PM Ellie.Crack


PROPOSED SUBSTATION
OHP EASEMENT
ACCESS ROAD
ACCESS GATE
PROPOSED O&M BUILDING
TEMPORARY LAYDOWN YARD
PROPOSED LANDSCAPE BUFFER SCREENING
40'
SECURITY FENCE
100' BATTERY SETBACK
HWY 65
FOH
FOIH
FOOH
FOOH
FOIH
FOH
FOH
FO

PLANTING NOTES

1. CONTRACTOR SHALL CONTACT COMMON GROUND ALLIANCE AT 811 OR CALL811.COM TO VERIFY LOCATIONS OF ALL UNDERGROUND UTILITIES PRIOR TO INSTALLATION OF ANY PLANTS OR LANDSCAPE MATERIAL.
2. ACTUAL LOCATION OF PLANT MATERIAL IS SUBJECT TO FIELD AND SITE CONDITIONS.
3. NO PLANTING WILL BE INSTALLED UNTIL ALL GRADING AND CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA.
4. ALL SUBSTITUTIONS MUST BE APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO SUBMISSION OF ANY BID AND/OR QUOTE BY THE LANDSCAPE CONTRACTOR.
5. CONTRACTOR SHALL PROVIDE TWO YEAR GUARANTEE OF ALL PLANT MATERIALS. THE GUARANTEE BEGINS ON THE DATE OF THE LANDSCAPE ARCHITECT'S OR OWNER'S WRITTEN ACCEPTANCE OF THE INITIAL PLANTING. REPLACEMENT PLANT MATERIAL SHALL HAVE A ONE YEAR GUARANTEE COMMENCING UPON PLANTING.
6. ALL PLANTS TO BE SPECIMEN GRADE, MINNESOTA-GROWN AND/OR HARDY. SPECIMEN GRADE SHALL ADHERE TO, BUT IS NOT LIMITED BY, THE FOLLOWING STANDARDS:
   ALL PLANTS SHALL BE FREE FROM DISEASE, PESTS, WOUNDS, SCARS, ETC.
   ALL PLANTS SHALL BE FREE FROM NOTICEABLE GAPS, HOLES, OR DEFORMITIES.
   ALL PLANTS SHALL BE FREE FROM BROKEN OR DEAD BRANCHES.
   ALL PLANTS SHALL HAVE HEAVY, HEALTHY BRANCHING AND LEAFING.
   CONIFEROUS TREES SHALL HAVE AN ESTABLISHED MAIN LEADER AND A HEIGHT TO WIDTH RATIO OF NO LESS THAN 5:3.
7. PLANTS TO MEET AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1-2014 OR MOST CURRENT VERSION) REQUIREMENTS FOR SIZE AND TYPE SPECIFIED.
8. PLANTS TO BE INSTALLED AS PER MNLA & ANSI STANDARD PLANTING PRACTICES.
9. PLANTS SHALL BE IMMEDIATELY PLANTED UPON ARRIVAL AT SITE. PROPERLY HEEL-IN MATERIALS IF NECESSARY; TEMPORARY ONLY.
10. PRIOR TO PLANTING, FIELD VERIFY THAT THE ROOT COLLAR/ROOT FLAIR IS LOCATED AT THE TOP OF THE BALLED & BURLAP TREE. IF THIS IS NOT THE CASE, SOIL SHALL BE REMOVED DOWN TO THE ROOT COLLAR/ROOT FLAIR. WHEN THE BALLED & BURLAP TREE IS PLANTED, THE ROOT COLLAR/ROOT FLAIR SHALL BE EVEN OR SLIGHTLY ABOVE FINISHED GRADE.
11. OPEN TOP OF BURLAP ON BB MATERIALS; REMOVE POT ON POTTED PLANTS; SPLIT AND BREAK APART PEAT POTS.
12. PRUNE PLANTS AS NECESSARY - PER STANDARD NURSERY PRACTICE AND TO CORRECT POOR BRANCHING OF EXISTING AND PROPOSED TREES.
13. WRAP ALL SMOOTH-BARKED TREES - FASTEN TOP AND BOTTOM. REMOVE BY APRIL 1ST.
14. STAKING OF TREES AS REQUIRED; REPOSITION, PLUMB AND STAKE IF NOT PLUMB AFTER ONE YEAR.
15. THE NEED FOR SOIL AMENDMENTS SHALL BE DETERMINED UPON SITE SOIL CONDITIONS PRIOR TO PLANTING. LANDSCAPE CONTRACTOR SHALL NOTIFY LANDSCAPE ARCHITECT FOR THE NEED OF ANY SOIL AMENDMENTS.
16. BACKFILL SOIL AND TOPSOIL TO ADHERE TO MN/DOT STANDARD SPECIFICATION 3877 (SELECT TOPSOIL BORROW) AND TO BE EXISTING TOP SOIL FROM SITE FREE OF ROOTS, ROCKS LARGER THAN ONE INCH, SUBSOIL DEBRIS, AND LARGE WEEDS UNLESS SPECIFIED OTHERWISE. MINIMUM 4" DEPTH TOPSOIL FOR ALL LAWN GRASS AREAS AND 12" DEPTH TOPSOIL FOR TREE, SHRUBS, AND PERENNIALS.
17. MULCH TO BE AT ALL TREE, SHRUB, PERENNIAL, AND MAINTENANCE AREAS. TREE AND SHRUB PLANTING BEDS SHALL HAVE 4" DEPTH OF SHREDDED HARDWOOD MULCH. SHREDDED HARDWOOD MULCH TO BE USED AROUND ALL PLANTS WITHIN TURF AREAS. PERENNIAL AND ORNAMENTAL GRASS BEDS SHALL HAVE 2" DEPTH SHREDDED HARDWOOD MULCH. MULCH TO BE FREE OF DELETERIOUS MATERIAL AND COLORED RED, OR APPROVED EQUAL. ROCK MULCH TO BE BUFF LIMESTONE, 1 1/2" TO 3" DIAMETER, AT MINIMUM 3" DEPTH, OR APPROVED EQUAL. ROCK MULCH TO BE ON COMMERCIAL GRADE FILTER FABRIC, BY TYPAR, OR APPROVED EQUAL WITH NO EXPOSURE. MULCH AND FABRIC TO BE APPROVED BY OWNER PRIOR TO INSTALLATION. MULCH TO MATCH EXISTING CONDITIONS (WHERE APPLICABLE).
18. EDGING TO BE COMMERCIAL GRADE VALLEY-VIEW BLACK DIAMOND (OR EQUAL) POLY EDGING OR SPADED EDGE, AS INDICATED. POLY EDGING SHALL BE PLACED WITH SMOOTH CURVES AND STAKED WITH METAL SPIKES NO GREATER THAN 4 FOOT ON CENTER WITH BASE OF TOP BEAD AT GRADE, FOR MOWERS TO CUT ABOVE WITHOUT DAMAGE. UTILIZE CURBS AND SIDEWALKS FOR EDGING WHERE POSSIBLE. SPADED EDGE TO PROVIDE V-SHAPED DEPTH AND WIDTH TO CREATE SEPARATION BETWEEN MULCH AND GRASS. INDIVIDUAL TREE, SHRUB, OR RAIN-GARDEN BEDS TO BE SPADED EDGE, UNLESS NOTED OTHERWISE. EDGING TO MATCH EXISTING CONDITIONS (WHERE APPLICABLE).
19. ALL DISTURBED AREAS TO BE SODDED OR SEEDED, UNLESS OTHERWISE NOTED. PARKING LOT ISLANDS TO BE SODDED WITH SHREDDED HARDWOOD MULCH AROUND ALL TREES AND SHRUBS. SOD TO BE STANDARD MINNESOTA GROWN AND HARDY BLUEGRASS MIX, FREE OF LAWN WEEDS. ALL TOPSOIL AREAS TO BE RAKED TO REMOVE DEBRIS AND ENSURE DRAINAGE. SLOPES OF 3:1 OR GREATER SHALL BE STAKED. SEED AS SPECIFIED AND PER MN/DOT SPECIFICATIONS. IF NOT INDICATED ON LANDSCAPE PLAN, SEE EROSION CONTROL PLAN.
20. PROVIDE IRRIGATION TO ALL PLANTED AREAS ON SITE. IRRIGATION SYSTEM TO BE DESIGN/BUILD BY LANDSCAPE CONTRACTOR. LANDSCAPE CONTRACTOR TO PROVIDE SHOP DRAWINGS TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO INSTALLATION OF IRRIGATION SYSTEM. CONTRACTOR TO PROVIDE OPERATION MANUALS, AS-BUILT PLANS, AND NORMAL PROGRAMMING. SYSTEM SHALL BE WINTERIZED AND HAVE SPRING STARTUP DURING FIRST YEAR OF OPERATION. SYSTEM SHALL HAVE ONE-YEAR WARRANTY ON ALL PARTS AND LABOR. ALL INFORMATION ABOUT INSTALLATION AND SCHEDULING CAN BE OBTAINED FROM THE GENERAL CONTRACTOR.
21. CONTRACTOR SHALL PROVIDE NECESSARY WATERING OF PLANT MATERIALS UNTIL THE PLANT IS FULLY ESTABLISHED OR IRRIGATION SYSTEM IS OPERATIONAL. OWNER WILL NOT PROVIDE WATER FOR CONTRACTOR.
22. REPAIR, REPLACE, OR PROVIDE SOD/SEED AS REQUIRED FOR ANY ROADWAY BOULEVARD AREAS ADJACENT TO THE SITE DISTURBED DURING CONSTRUCTION.
23. REPAIR ALL DAMAGE TO PROPERTY FROM PLANTING OPERATIONS AT NO COST TO OWNER.
24. RAIN GARDEN NOTE: PROVIDE AND INSTALL EROSION CONTROL BLANKET AT RAIN GARDEN AREA SIDE SLOPES AFTER ALL PLANTING HAVE BEEN INSTALLED. BLANKET TO BE ONE SEASON GEOJUTE, MN/DOT CATEGORY 2 (STRAW 1S, WOOD FIBER 1S), OR APPROVED EQUAL. BLANKET TO BE OVERLAPPED BY 4" AND ANCHORED BY SOD STAPLES. PLACE BLANKET PERPENDICULAR TO THE SLOPE. TRENCH IN EDGES OF BLANKET AREA TO PREVENT UNDER MINING. PROVIDE SILT FENCE AT TOP OF SLOPE AS NEEDED. SHREDDED HARDWOOD MULCH TO MATCH OTHER PROJECT PLANTING MULCH. PLACE 4" DEPTH OF MULCH AT ALL PLANTING AND EROSION CONTROL BLANKET AREA (NO FILTER FABRIC). SEE RAIN GARDEN DETAIL FOR FURTHER INFORMATION. RAIN GARDEN TO PROVIDE PROPER INFILTRATION AND DRAINAGE REQUIREMENTS PER ENGINEERS APPROVAL.

PLANTING DETAILS



PRUNE OUT MISDIRECTED BRANCHES. PROVIDE ONE CENTRAL LEADER.

GUYING AND STAKING, AS REQUIRED, FOR ONE (1) YEAR ON ALL DECIDUOUS AND CONIFEROUS TREES:
TOP STAKES 5' ABOVE GROUND (MAX.) OR TO FIRST BRANCH. BOTTOM OF STAKE 3' (MIN.) BELOW GROUND. STAKING POSTS TO BE 2"X2" STAINED WOOD OR PAINTED STEEL DELINEATOR POSTS. PLACE 3 POSTS EQUIDISTANT AROUND AND OUTSIDE ROOT BALL. SECURE TREE TO POSTS WITH 16" LONG POLYPROPYLENE OR POLYETHYLENE, 40 MIL., 1.5" WIDE STRAP.

TREE WRAP MATERIAL FROM GROUNDLINE UPWARD TO FIRST BRANCHES, AS REQUIRED.

PLACE MULCH, DEPTH AS SPECIFIED, OVER PLANT PITS - DO NOT PILE AGAINST TRUNK.

FORM 3" DEEP WATERING BASIN.

BACKFILL PLANT PIT WITH SPECIFIED BACKFILL SOIL.

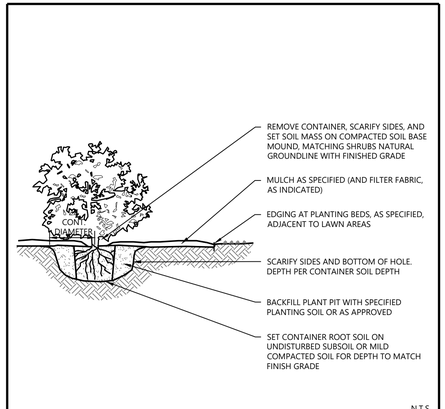
REFER TO AMERICAN STANDARD FOR NURSERY STOCK FOR MINIMUM BALL SIZE. ROOT FLARE TO BE PLANTED AT OR NEAR FINISHED GROUNDLINE.

SCARIFY SIDES AND BOTTOM OF HOLE.

SET ROOT BALL ON UNDISTURBED SUBSOIL OR COMPACTED SOIL MOUND MATCHING TREES NATURAL GROUNDLINE WITH FINISHED SITE GRADE.

N.T.S.

Westwood	DECIDUOUS TREE PLANTING	LAST REVISED: 10/19/18
		LA28



REMOVE CONTAINER, SCARIFY SIDES, AND SET SOIL MASS ON COMPACTED SOIL BASE MOUND, MATCHING SHRUBS NATURAL GROUNDLINE WITH FINISHED GRADE

MULCH AS SPECIFIED (AND FILTER FABRIC, AS INDICATED)

EDGING AT PLANTING BEDS, AS SPECIFIED, ADJACENT TO LAWN AREAS

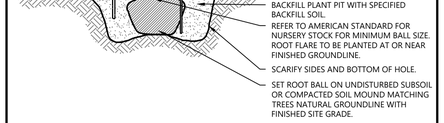
SCARIFY SIDES AND BOTTOM OF HOLE. DEPTH PER CONTAINER SOIL DEPTH

BACKFILL PLANT PIT WITH SPECIFIED PLANTING SOIL OR AS APPROVED

SET CONTAINER ROOT SOIL ON UNDISTURBED SUBSOIL OR MILD COMPACTED SOIL FOR DEPTH TO MATCH FINISH GRADE

N.T.S.

Westwood	SHRUB & PERENNIAL CONTAINER PLANTING	LAST REVISED: 10/23/18
		LA27-C



PRUNE OUT MISDIRECTED BRANCHES. PROVIDE ONE CENTRAL LEADER.

GUYING AND STAKING, AS REQUIRED, FOR ONE (1) YEAR ON ALL DECIDUOUS AND CONIFEROUS TREES:
TOP STAKES 5' ABOVE GROUND (MAX.) OR TO FIRST BRANCH. BOTTOM OF STAKE 3' (MIN.) BELOW GROUND. STAKING POSTS TO BE 2"X2" STAINED WOOD OR PAINTED STEEL DELINEATOR POSTS. PLACE 3 POSTS EQUIDISTANT AROUND AND OUTSIDE ROOT BALL. SECURE TREE TO POSTS WITH 16" LONG POLYPROPYLENE OR POLYETHYLENE, 40 MIL., 1.5" WIDE STRAP.

PLACE MULCH, DEPTH AS SPECIFIED, OVER PLANT PITS - DO NOT PILE AGAINST TRUNK.

FORM 3" DEEP WATERING BASIN.

BACKFILL PLANT PIT WITH SPECIFIED BACKFILL SOIL.

REFER TO AMERICAN STANDARD FOR NURSERY STOCK FOR MINIMUM BALL SIZE. ROOT FLARE TO BE PLANTED AT OR NEAR FINISHED GROUNDLINE.

SCARIFY SIDES AND BOTTOM OF HOLE.

SET ROOT BALL ON UNDISTURBED SUBSOIL OR COMPACTED SOIL MOUND MATCHING TREES NATURAL GROUNDLINE WITH FINISHED SITE GRADE.

N.T.S.

Westwood	EVERGREEN TREE PLANTING	LAST REVISED: 10/19/18
		LA29

Westwood

Phone (720) 531-8350
Toll Free (888) 937-5150
10170 Church Ranch Way, Suite #201
Westminster, CO 80021
westwoodps.com

Westwood Professional Services, Inc.

PREPARED FOR:

spearmint

2916 N Miami Ave, Suite 910
Miami, FL 33127

REVISIONS:

#	DATE	COMMENT	BY	CHK	APR
A	2024-07-25	ISSUED FOR REVIEW	EAC	NTM	NTM
B	2026-01-16	ISSUED FOR REVIEW	EAC	NTM	NTM
C	2026-01-23	ISSUED FOR REVIEW	EAC	NTM	NTM
D	2026-01-30	ISSUED FOR REVIEW	EAC	NTM	NTM

Midwater BESS Project

Freeborn County, Minnesota

Preliminary Landscape Screening Notes & Details

NOT FOR CONSTRUCTION

DATE: 2026-01-30

SHEET: C.202

REV: D

N:\0004698.00_CAD_Civil\0004698-R.dwg, 2/2/2026 8:34 PM, Ellie.Crack

AERIAL PERSPECTIVE: Looking Northeast

Notes:
1. Elevations are an illustrative representation of the proposed project. Actual layout, sizes, and equipment may change from what is currently represented.



Westwood

Phone (952) 937-5150
Fax (952) 937-5822
Toll Free (888) 937-5150

12701 Whitewater Drive
Minnetonka, MN 55343
westwoodps.com

Westwood Professional Services, Inc.

02-02-2026 0046089.00

MIDWATER ENERGY STORAGE PROJECT

FREEBORN COUNTY, MN

spearmint energy

AERIAL PERSPECTIVE: Looking South

Notes:
1. Elevations are an illustrative representation of the proposed project. Actual layout, sizes, and equipment may change from what is currently represented.



Westwood

Phone (952) 937-5150
Fax (952) 937-5822
Toll Free (888) 937-5150

12701 Whitewater Drive
Minnetonka, MN 55343
westwoodps.com

Westwood Professional Services, Inc.

02-02-26 0046089.00

MIDWATER ENERGY STORAGE PROJECT

FREEBORN COUNTY, MN

spearmint energy

GROUND LEVEL PERSPECTIVE: Looking East from Highway 65 Bridge

Proposed Conditions at Approximately 10 Years Growth

Notes:
1. Perspectives are an illustrative representation of the proposed project. Actual layout, sizes, and equipment may change from what is currently represented.
2. Proposed vegetation screening depicted at ~10yrs maturity.



KEY MAP

Westwood

Phone (952) 937-5150
Fax (952) 937-5822
Toll Free (888) 937-5150

12701 Whitewater Drive
Minnetonka, MN 55343
westwoodps.com

Westwood Professional Services, Inc.

02-11-2026 0046089.00

MIDWATER ENERGY STORAGE PROJECT

FREEBORN COUNTY, MN

spearmint energy

GROUND LEVEL PERSPECTIVE: Looking South from Highway 65

Proposed Conditions at Approximately 10 Years Growth

Notes:
1. Perspectives are an illustrative representation of the proposed project. Actual layout, sizes, and equipment may change from what is currently represented.
2. Proposed vegetation screening depicted at ~10yrs maturity.



KEY MAP

Westwood

Phone (952) 937-5150
Fax (952) 937-5822
Toll Free (888) 937-5150

12701 Whitewater Drive
Minnetonka, MN 55343
westwoodps.com

Westwood Professional Services, Inc.

02-11-2026 0046089.00

MIDWATER ENERGY STORAGE PROJECT

FREEBORN COUNTY, MN

spearmint energy

MINNESOTA
PUBLIC UTILITIES COMMISSION

Energy Infrastructure Permitting

Questions for Development of Environmental Review

In the Matter of the Application of Midwater BESS, LLC for a Site Permit for the up to 150 MW Midwater Energy Storage Project in Freeborn County, Minnesota

PUC Docket No.	IP-7138/ESS-24-294 IP-7138/TL-24-295	Directed To:	Mary Matze
EIP Question No.	6	Please Respond By:	February 20, 2026

Note: Energy Infrastructure Permitting (EIP) staff intends to use information provided in this response to develop an environmental review document. Responses to these questions are considered public information unless otherwise designated by the respondent as nonpublic pursuant to Minnesota Stat. § 13.02.

Question(s)

Air Modeling

1) Is it appropriate under the fire plume study to use monthly averaged wind speeds to model plume behavior for a short-duration deflagration event, or would maximum 1-hour (or other short-term) wind data provide a more accurate and conservative representation of potential plume dispersion, especially given the possibility of higher gusts and thermal flux altering ambient flow?

Response:

Wind speed data was gathered using the Midwestern Regional Climate Center, a publicly available resource published in tandem by the National Centers for Environmental Information and Purdue University. Data was pulled from two different stations for the windiest month of the year in the area, April, from 2001 to 2025. The data acquired was hourly data that was averaged over each associated 24-hour period. Wind speeds of 0 mph, 10 mph, 18 mph, and 26 mph were modeled in the analysis. These reflect the minimum possible windspeed (0 mph), the 25th percentile windspeed (10 mph), the maximum average windspeed (26 mph) and an intermediate windspeed (18 mph) for each day in the month of April. The calculations did not consider outliers above 26 mph.

In general, to model outlier values for any parameter would be statistically inaccurate for a risk-based analysis—the goal of these analyses is to assess risk and consequences associated with conditions that can reasonably be expected. As such this approach both considered hourly data in its wind speed calculations and remained consistent with industry best practices for assessing risk.

Additionally, it should be noted that a deflagration event was not modeled in this analysis. Rather, the modeled fire event was a full-scale, five-hour duration burn of the PowerTitan 2.0 (PT2) enclosure. The modeled scenario neglected the growth and decay phases of a potential PT2 fire; thus, the

combustion products are simulated as having a constant release rate consistent with the peak burning duration and mass loss rate. Alteration of the wind speed would not have a significant impact on a deflagration event occurring within the initiating BESS as the internal BESS environment is isolated from wind impacts. Any potential fireball and/or pressure wave produced would emanate from the deflagration panels and last on the order of ~1-3 seconds, a duration of which wind would not play a significant role.

2) Section 6.3.5 indicates the plume remains low to the ground and drives deposition. Within the modeling approach, were building or terrain downwash effects evaluated, and if not, how might downwash influence plume behavior and deposition patterns, particularly given the 0.8-m mesh grid resolution where such effects could be expected at some grid points?

Response:

Downwash effects are captured implicitly in the analysis via CFD modeling of the fluid flow field interaction with adjacent structures at the BESS site (other PT2 enclosures and associated power conversion systems). Additionally, ground surfaces are modeled with a surface roughness parameter applied in the model reflecting the surrounding site area. Larger buildings farther from the site are outside of the modeled zone of influence and would not have an impact on downwash effects for the modeled fire scenario. If further assessment of potential impacts from building downwash is required, FRA can perform a more specific analysis as an additional scope of work using the Environmental Protection Agency's AERMOD software.

Construction Standards and Codes: Evaluation and Compliance

1) The Midwater application noted that the BESS will be constructed to applicable standards and codes, such as the National Fire Protection Association, National Electric Safety Code Rural Utilities Service Bulletin 1724E-200, Design Manual for High Voltage Transmission Lines, National Electrical Safety Code C2-2017, American Society of Civil Engineers, American Concrete Institute, the American Institute of Steel Construction Manual, and the North American Electric Reliability Corporation standards. Please provide a summary of how facility compliance with these construction standards and codes are evaluated and documented by third-parties.

Response:

There are several levels of third-party review that are undertaken on the project, including development of the plans by the Engineer of Record (EOR), working on behalf of the project, and external engineering firms that review the project on behalf of lenders and insurers to ensure the project is complying with regulatory requirements, and minimizing project risk.

The EOR is required by their obligations to their licensure to design a project that complies with all legal code requirements, including those outlined in the permit. Most engineers include a peer review of the design packages as a standard practice. Additionally, the project owner will engage an Owner's Engineer to perform an independent review of the design by the EOR to ensure the design is in compliance with all applicable codes and standards, as well as standard utility practices. All parties involved in the project take multiple steps to confirm compliance with standards.

Additionally, the project's lenders and insurers review all plans to ensure compliance so that the asset risk is minimized to the greatest extent possible. All plans prepared by the EOR are reviewed by third party Independent Engineers that are legally obligated to review the project in the interest of the project's lenders. The lenders' Independent Engineers also monitor the project throughout construction to ensure that projects are built according to specifications in the plan and all applicable national safety standards and codes.

Lastly, the project's insurers also perform an engineering review of all designs to ensure that they comply with the most current safety standards.

James E. Sullivan *January 28, 2026*

Environmental Review Manager *Date*

MN Public Utilities Commission

APPENDIX E

MIDWATER BESS, LLC

CITIZEN ADVISORY TASK FORCE REPORT

NOTE: Does not contain appendices. The complete report with attachments can be found on eDockets at 202511-224951-01

Midwater Energy Storage Project Advisory Task Force Report

Minnesota Public Utilities Commission
Docket Nos. ESS-24-294; TL-24-295
November 2025

Project Team

Jim Sullivan, Minnesota Public Utilities Commission

Dan Pfeiffer, Zan Associates – consultant to the Public Utilities Commission

Tom Kaiser, Zan Associates – consultant to the Public Utilities Commission

Javier Whitaker-Castañeda, Zan Associates – consultant to the Public Utilities Commission

Report Prepared By

Dan Pfeiffer, Zan Associates

Tom Kaiser, Zan Associates

Javier Whitaker-Castañeda, Zan Associates

Contact Information

Minnesota Public Utilities Commission

121 7th Place E, Suite 350

Saint Paul, MN 55101-2147

Phone: 1-800-657-3782

Website: mn.gov/puc

Table of Contents

Table of Contents **3**

Glossary 4

Introduction 5

Methodology 6

Impacts and Issues to Study in the EA 8

Mitigation Measures 10

Identification of Viable Alternative Sites 12

Conclusions 15

Appendices 16

Appendix A	Map of applicant site
Appendix B	Advisory Task Force charge
Appendix C	Advisory Task Force meeting #1 agenda, slides, and meeting minutes
Appendix D	Advisory Task Force meeting #2 agenda, slides, and meeting minutes
Appendix E	Advisory Task Force meeting #3 agenda, slides, and meeting minutes
Appendix F	Map of one-mile radius from Glenworth Substation
Appendix G	Summary and comparison of grid-scale battery technologies for BESS facilities
Appendix H	Documentation regarding water wells in the surrounding area
Appendix I	Draft ESS Ordinance for Freeborn County
Appendix J	Recommendations from the Shell Rock River Watershed District regarding water mitigation measures
Appendix K	Aerial photos and video of site locations
Appendix L	Alternative site suggestions
Appendix M	Freeborn County archeological inventory
Appendix N	Comments on task force for ATF Report

Glossary

Acronym / Term	Definition
ATF	Advisory Task Force
BESS	Battery Energy Storage System
DNR (or MnDNR)	Minnesota Department of Natural Resources
EA	Environmental Assessment
ERP	Emergency Response Plan
ESS Ordinance	Energy Storage System Ordinance
Gpm	gallons per minute
HVTL	High-Voltage Transmission Line
ITC Midwest	International Transmission Company Midwest
kV	Kilovolt
LFP Battery	Lithium-Iron-Phosphate Battery
MISO	Midcontinent Independent System Operator
MW	Megawatt
NMC Battery	Nickel-Manganese-Cobalt Battery
PCA (or MPCA)	Minnesota Pollution Control Agency
PUC (or MPUC or the Commission)	Minnesota Public Utilities Commission
SPCC Plan	Spill Prevention, Control, and Countermeasure Plan
SWPPP	Stormwater Pollution Prevention Plan
WMAs	Wildlife Management Areas

Introduction

On November 19, 2024, Midwater BESS LLC (a subsidiary of Spearmint Renewable Development Company, LLC) submitted an application to the Minnesota Public Utilities Commission (PUC) for a site and route permit for the up to 150 MW Midwater Energy Storage Project and the associated 161 kV high-voltage transmission line (HVTL) in Shell Rock Township, Freeborn County.

The proposed project is located on a 104.4-acre plot of land that is currently under lease with purchase option through agreements with the existing landowners. Approximately 16 acres would be developed and occupied by the Battery Energy Storage System (BESS) facility, its accompanying operational equipment, and fencing. Approximately 8 acres would accommodate the 2,668-foot long HVTL. The project would interconnect with the existing ITC Midwest Glenworth Substation in Freeborn County. (See Appendix A for a map of the proposed site).

In its order of June 2, 2025, the PUC authorized the Minnesota Department of Commerce to establish an Advisory Task Force (ATF) to assist the PUC with the following actions:[1]

1) Identification of additional viable sites or routes in close proximity to the ITC Midwest Glenworth Substation that should be studied;

2) Identify potential appropriate permit conditions to mitigate stormwater runoff at the proposed site and any viable alternatives;

3) Identify potential appropriate permit conditions to mitigate local emergency response to any emergencies at the facility;

4) Identify potential appropriate permit conditions for setbacks from residences, schools, and commercial properties; and

5) Facilitate conversations with the City of Glenville and Freeborn County on any potential advantages for this economic development project being within city municipal services.

(See Appendix B for ATF Charge).

Staff solicited ATF nominations from local units of government and other entities consistent with the PUC's order. Two of the ten anticipated ATF members described in the order were unable to participate.[2]

[1] Pursuant to legislation, Department of Commerce, Energy Environmental Review and Analysis staff transferred from the Department to the PUC's new Energy Infrastructure Permitting unit on July 1, 2025.

[2] An Advisory Task Force invitation email was sent to the Glenville Fire Chief, Matt Webb, on June 16, 2025, and again, on July 9, 2025; however, staff did not receive a response. Additionally, an invitation email was provided to Tabatha Page, Chair of the Glenville-Emmons School Board, on June 14, 2025. The Chair responded on June 17, 2025, explaining that due to the school board schedule and commitments, the board was unable to participate.

Advisory Task Force

Advisory Task Force Member	Government Unit
Melanie Aeschliman, County Administrator	Freeborn County
Nicole Eckstrom, Commissioner	Freeborn County
Jeff Fields, Compliance Officer	IBEW Local 343
Mike Frank, Local Government & Community Affairs Manager	ITC Midwest LLC
Adam Hamberg, Emergency Management Director	Freeborn County Sheriff's Office
Andy Henschel, Administrator	Shell Rock River Watershed District
Tim Kaasa, Town Clerk	Shell Rock Township
Jeff Laskowske, Deputy Fire Chief	Albert Lea Fire Rescue
Mike Lee, Watershed Manager	Shell Rock River Watershed District
Rich Murray, Mayor	City of Albert Lea
Wes Webb, Mayor	City of Glenville

Methodology

The Advisory Task Force met on July 24, August 22, and September 16, 2025 (See Appendix C, Appendix D, and Appendix E for ATF meeting agendas, meetings slides, and meeting notes). In addition to task force members, PUC staff, consulting staff, and representatives of the applicant, Midwater BESS LLC, also attended the meetings. In ATF meeting 2, representatives from the Minnesota Department of Natural Resources (DNR), the Minnesota Pollution Control Agency (MPCA), and the Minnesota State Fire Marshall's office attended and presented topics relevant to the permitting process of the proposed Midwater BESS project. Zan Associates, a PUC consultant, facilitated ATF meetings.

The PUC requested the formation of a task force to identify impacts, issues, mitigation measures, and potential permit conditions that might not have been identified without the insights of local experts. The

goal of the task force was not to reach a unanimous recommendation or decide whether to permit the Midwater BESS project. The purpose of the meeting series was to identify potential impacts and recommend possible mitigation measures that could be studied in the environmental assessment and recommend permit conditions for the PUC to consider during permit decision-making.

Meeting #1 – July 24, 2025

At the first meeting, task force members reviewed the permitting process and the proposed project to date. The task force then used a modified conversation café technique to identify impacts and issues that should be evaluated in the Environmental Assessment (EA). The technique asked task force members to suspend judgment, respect one another, seek to understand rather than persuade, and speak honestly and in depth without repeating the same information. The process involved three rounds. During the first two rounds, task force members identified impacts and issues uninterrupted by other task force members. The third round was a facilitated conversation to dive deeper into the identified impacts and issues and expand upon the first two rounds.

Meeting #2 – August 22, 2025

At the second meeting, presenters from the Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, and the Minnesota State Fire Marshall's Office shared their expertise with the group. Samantha Bump described the DNR's process for evaluating proposed projects, and spoke about the role of the DNR in evaluating ecosystems and wildlife management and the lack of available noise data and related studies to evaluate potential wildlife impacts. Linnea Savereide outlined the MPCA's stormwater design requirements and helped answer questions about stormwater runoff ponds. Mike Volz, on behalf of the State Fire Marshall, compared lithium-ion technology with lithium-iron technology and summarized common fire safety protocols (See Appendix G for a comparison of grid-scale BESS options).

Then, task force members reviewed the impacts and issues identified at the first meeting. Using the conversation café technique, task force members then determined potential mitigation measures to address the previously discussed impacts. These mitigation measures could be studied in the EA in the next phase of the permitting process. The task force members also discussed the potential for viable alternative sites that the PUC could evaluate in the EA (See Appendix L for alternative site suggestions).

Meeting #3 – September 16, 2025

At the third meeting, task force members reviewed the previous two meetings, including reviewing the impacts, potential mitigation measures, and viable alternative locations. Task force members further developed the list of mitigation measures, covering all impact categories previously noted in the earlier two meetings. Noting that unanimous agreement is not a requirement as an advisory task force, the task force shared their opinions about the ATF process overall.

Task force members were welcome to bring their own topics and materials and topics to these meetings, and multiple ATF members took the opportunity to do so. Task force members were made aware that all

materials would be appended to this report (See Appendix M). Upon completion of the third meeting, a draft task force report was provided to task force members for review. Comments and edits from members have been incorporated into this final report (See Appendix N for task force comments).

Impacts and Issues to Study in the EA

Task force members identified impacts and issues by responding to the following question: "What impacts and issues should be studied by the Public Utilities Commission when it prepares the environmental assessment for the project?"

Task force facilitators organized the identified impacts into seven broad categories that are listed in alphabetical order in this report.

Alternative Sites

The task force discussed the possibility of viable alternative sites. The task force did not identify any viable site alternatives for study in the EA. The task force expressed frustration at the alternative site selection limitations, and at the fact that the applicant, Midwater BESS LLC, was not required to provide alternative sites in its PUC permit application. Some task force members were concerned about the proximity of the proposed BESS project to the Shell Rock River, a designated state water trail, and the precedent it could set for future BESS sites, strongly preferring a location removed from potential water impacts. In addition to the Shell Rock River, the task force frequently discussed the DNR wildlife management area—home to deer, waterfowl, and upland game—across from the proposed BESS site (See Appendix K for photos and aerial drone footage of the proposed project site).

Decommissioning and Project End-of-Life

The task force held extensive discussions regarding the end-of-life and decommissioning of the Midwater BESS project site. These conversations centered on concerns stemming from past environmental incidents caused by other companies in the region, as well as a desire to prevent any future burden on taxpayers and liability to Freeborn County and the city of Glenville.

Emergency Response

Some task force members were interested in emergency response discussions as they related to their roles in emergency management. A wide variety of topics were discussed, including responses to various potential emergencies (fires, hazardous material leaks and spills, tornadoes, electric shock injuries on-site, and other catastrophic events).

Conversations centered on establishing the necessary planning measures and acquiring sufficient safety equipment to address any potential emergencies at the site. It was noted that the project is situated near

several major buildings and arteries in the region, including the Shell Rock River, a DNR wildlife management area, Highway 65, nearby Union Pacific railroad tracks, and Glenville-Emmons K-12 School. In the event of an evacuation from the school, buses would not be onsite or readily available because any charter buses would likely travel from Albert Lea to the Glenville-Emmons school.

Fire Hazard and Thermal Events

The task force sought additional information regarding the safety of the proposed battery type, lithium-iron, and the expected emergency response protocols. At the task force meetings, guest speakers compared the attributes of lithium-iron technology with lithium-ion technology and discussed the potential fire risks and thermal risks associated with each technology type. Thermal events can create the release of toxins from the battery housing units and/or other components of the BESS. The applicant will not be using lithium-ion batteries and has selected lithium-iron technology over other options for its chemical stability, low risk of hazardous gas emission and low risk of thermal runaway during a fire event.

There were also several discussions about the appropriate training for firefighters, the necessary firefighting equipment, both on the facility site and at the fire station, and the most effective firefighting tactics.

Tax Revenue and Financial Liability

Discussions focused on removing any potential tax burden on residents of the city of Glenville and Freeborn County. The task force members discussed establishing a bond or escrow requirement to cover any costs related to emergency pollution cleanup, site decommissioning, or company bankruptcy.

The task force noted the financial expenses that the Shell Rock River Watershed District has already incurred for river cleanup and highlighted past projects that have left the county with financial liability. Conversations focused on mitigation measures that would prevent a repeat of those events and protect local governments from liability.

Water Resources

Significant discussion centered around protecting the Shell Rock River and the local watershed. Task force members noted the proximity to the river and soil type as concerns that increase the probability that water runoff and potential pollutants infiltrate the groundwater and the river water. Then the task force identified potential mitigation measures for any pollution in water runoff from storms, fire management, or potential leaks and spills.

Groundwater resources were also discussed, as it was noted that there are many drinking water wells in the area (See Appendix H for documentation regarding water wells in the region). Protecting groundwater quality emerged as a topic of discussion throughout the meeting series.

Visual / Aesthetics / Noise

Conversations focused on what type of fence and buffer to have around the facility. Task force members considered the visual appearance and the impact of noise on the community and wildlife. They also noted the potential for impacts to the project from hunting (e.g., stray bullets) at nearby Wildlife Management Areas (WMAs).

Mitigation Measures

Task force members identified potential mitigation measures that could be analyzed in the EA for each of the seven impact and issue categories. The mitigation measures identified by category include:

Alternative Sites

(See the "Identification of Viable Alternative Sites" section of the report on page 12).

Decommissioning and Project End-of-Life

- Requiring Midwater BESS LLC (applicant) to establish a fund that covers the cost of decommissioning, including complete removal of all structures associated with the BESS, water and soil testing in the area after disassembly, and the cost of any potential environmental clean-up and remediation.
- Decommissioning fund placed with a third-party to ensure it is available when needed.
- Revaluation at regular intervals of the decommissioning fund to ensure the value of the fund has kept pace with inflation and covers any potential increases in expected decommissioning costs.

Emergency Services

- Creation of a detailed emergency response plan for all reasonably plausible emergency scenarios provided by the applicant as a permit condition. Plans should include fire safety protocol, emergency fire response, evacuation plans for nearby residents of Glenville and Freeborn County, hazardous materials protocol, environmental mitigation plans, and instructions for access to the facility for local emergency response teams. Plans should be annually or periodically reviewed and updated.
- A full site plan should be provided to local officials and emergency response teams.
- Cooperation from site operators to establish and update on-site safety protocols in collaboration with local emergency response officials. A clearly identified responsible party that local officials can reliably contact while the site is operational.

- Clear processes and requirements for notifying local officials in the case of any on-site incident. Requirements should include notifying local officials from the City of Glenville, Shell Rock Township, Freeborn County, and, if applicable, neighboring municipalities. Requirements should also include notice occurring within 48 hours of any identified safety, hazard, or environmental pollution concerns.
- High-visibility signage outside the BESS facility with contact information for site management teams and local emergency response teams.
- Onsite weather monitoring equipment by the applicant, capable of use in the event of an emergency.

Fire Hazard and Thermal Events

- Regular training on lithium-iron batteries and associated facility technology for local firefighting crews.
- Calculation of appropriate waterflow in gallons per minute (gpm) needed to cool a BESS unit and mitigate runoff. Purchase specialized hose nozzles for local fire response authorities by the applicant to control gpm if necessary.
- On-site, continuous recording cameras that can be monitored remotely by both the facility management team and a third party.
- Feasibility assessment to evaluate the use of dry hydrants and drafting water from the Shell Rock River for fire response.

Financial Liability

- Requiring the applicant to establish and maintain a bond or fund that would cover environmental clean-up costs in the case of an emergency and prevent the financial burden from falling on local taxpayers.
- Requiring the applicant to establish a bond or fund that covers the cost of decommissioning. (See the Decommissioning and Project End-of-Life section above).

Water Resources

- Design and installation of a stormwater runoff pond that is gated for onsite control during any potential contamination event, lined underneath, and effective for a 1.5-inch rainfall event.[3]

[3] This 1.5-inch value, referred to as the Design Rainfall Depth, reflects the Water Quality Volume (QV) design standard used by the Shell Rock River Watershed District. It is greater than the 1-inch practice currently followed by the Minnesota Pollution Control Agency. This practice is based on the recognition that the first 1.5 inches of runoff typically carries most of the pollutants (sediments, oils, nutrients, etc.) that are washed off an impervious surface during a storm.

- Regular cleaning and maintenance of stormwater ponds and related stormwater infrastructure.
- Installation of biochar filters between the stormwater runoff pond and the Shell Rock River (see Appendix J).
- Baseline testing of river water and groundwater in the area, including measurements for the Shell Rock River and nearby well water, and regular, third-party monitoring of river water, nearby wells, and the stormwater runoff ponds.
- Enhanced monitoring plan in the event of an incident.

Visual / Aesthetics / Noise

- Adherence to Freeborn County's new [in development] ESS ordinance regarding vegetative landscape buffers and screening around BESS developments as a permitting condition. Or, in the case that the ordinance has not yet been approved for public release, a recommendation that the Commission impose a similar condition, based on the language in the draft ordinance, and consistent with requirements for energy generation sites in the County. The draft county ordinance also addresses noise and setbacks, among other key factors. (See Appendix I for the draft ESS ordinance).
- Fencing that is unobtrusive, neutral in color, uses non-reflective materials, does not contain barbed wire, and is at least the height of the individual BESS battery units (approximately 10 feet).
- The installation of three distinct rows of planting buffers surrounding the security fence. Plants should be chosen from compatible, local species and approved by the Freeborn County Office of Environmental Services for environmental impact and adhere to ITC Midwest's standards for power line clearance.
- Conduct baseline testing for noise and request a statement from the DNR regarding potential impact of site noise on nearby wildlife from local DNR staff. Mitigate noise impacts.

Identification of Viable Alternative Sites

Charge 1 asks that the task force "identify additional viable sites or routes in close proximity to the ITC Midwest Glenworth Substation that should be studied." A map was provided by the applicant, along with considerations for proposing viable alternative locations (See Appendix F). Considerations for determining whether an alternative site could be viable included:

1. The site falls within one mile of the Glenworth Substation. Moving beyond a mile increases the cost for the project; each mile of 161 kV HVTL costs approximately $2 million.
2. The site is not located in the city of Glenville or in the Shell Rock River floodplain.

3. The land for the alternative site is available to lease or purchase, and a signed purchase agreement can be obtained.

4. The site can be connected, by a 161 kV HVTL, to the Glenworth Substation, and the land required for the HVTL is available to lease or purchase, and a signed purchase agreement can be obtained.

5. The current interconnect with the Midcontinent Independent System Operator (MISO) for the project can be utilized with no additional connections required.

6. Costs related to permitting, engineering, and constructing at an alternative site. Costs include land purchase or lease, additional permitting, engineering, and an estimated $2 million per mile for 161 kV HVTL installation.

The applicant has no obligation to propose alternative sites for its BESS facility in its permit application to the PUC.[4] The task force was informed that viable alternative sites could be added for study in the EA, but that the PUC would need the task force to identify specific sites.

Concerns about the proposed Midwater BESS location primarily stemmed from the site's proximity to the Shell Rock River, a designated state water trail, and the potential for water contamination from stormwater runoff or runoff from emergency fire management or thermal event response. In addition to the Shell Rock River, the task force frequently discussed the DNR wildlife management area across from the proposed BESS site. Several task force members were not convinced that relocating the site would necessarily mitigate some of the identified impacts, particularly those affecting water resources, since any alternative site close to the Glenworth Substation would be in the same watershed as the proposed site. Task force members also cautioned that permitting the Midwater BESS at the proposed site would set a precedent for the permitting of future BESS facilities near water resources.

Some alternative sites were proposed and discussed at the task force meetings (See Appendix L). Some of the mentioned sites would connect to a different substation, a scenario which is not consistent with the task force's charge. A few alternative sites were within a viable distance from the Glenworth Substation, but the task force was unable to ascertain whether the land for the HVTL was available for purchase. The most discussed alternative site was next to the Glenville water treatment facility; however, a potential site near the industrial park was also discussed.

Task force members expressed frustrations that the applicant chose a site so close to a river, a state water trail, and a DNR wildlife management area, especially given that the applicant was not required to provide viable site alternatives. Of concern to the task force members was that the "viability" term was insufficiently defined in the Task Force Charge. This condition led to confusion in approaching the topic.

Additionally, members expressed concern that it was inappropriate for the task force to be expected to determine the availability of property, which was particularly relevant to viable site alternative deliberations. They noted that they lack this type of BESS-siting expertise and maintained it was improper

[4] See Minn. R. 7850.3100

for government staff and elected officials to solicit landowners. The land brokerage task seemed outside the scope of task force expertise and the role of government and public policy.

Task force members felt that there was a lack of clarity around how project costs related to relocating the site would factor into the discussion of "viability." Midwater BESS LLC initially indicated that, due to costs, eligible alternative sites would need to be within a one-mile radius of the proposed site; later, Midwater BESS LLC indicated that sites could have been identified beyond the one-mile radius.

Ultimately, the task force identified two potential alternative sites, but did not have the time, expertise, or perceived authority to directly solicit landowners and determine whether the sites were viable alternatives. The task force, though helpful in discussing and identifying potential impacts and mitigation measures for the PUC's consideration, was not a forum conducive to identifying viable alternative sites for the project. The task force did not have the structure or authority to broker land transactions that would result in viable alternative sites. Further, the task force was limited to potential sites near the Glenworth Substation and was limited in time. To the task force's understanding, it took Midwater BESS LLC several years to plan and develop the Midwater project. It would likely take a similar amount of time and effort, and similar land brokerage authority, to identify viable alternative sites for the project.

Conclusions

As an advisory task force, the unanimous agreement of all task force members is not a requirement nor was it a task force goal. The conclusions below attempt to highlight areas of importance for decision-maker consideration:

1. Impacts on water resources, including the Shell Rock River, its watershed, and the state water trail, are paramount to the task force. Comprehensive and stringent requirements regarding water protection and prevention of potential pollution in stormwater runoff are essential to this project.

2. The task force expressed concerns about the potential impacts to wildlife habitat due to the nearby DNR wildlife management area. If the BESS is sited at the proposed location, the area cannot be a part of the conservation reserve program.

3. Fire safety and thermal events is a topic of interest to the task force. Many task force members are reassured by the decision to use lithium-iron technology on the site, as opposed to other BESS technologies. The task force agreed that the purchase of additional fire safety equipment and regular training for local firefighters should be permit conditions. Some task force members wanted to prepare for worst-case-scenario fire emergencies.

4. Several task force members expressed concern about the siting and permitting process not starting locally, including the lack of notice during the application process and the lack of local control in the permitting process. Task force members noted unhappiness about the project expressed to them by their constituents and by local officials, citing site location near the Shell Rock River and the DNR wildlife management area as a primary concern.

5. Establishing clear guidelines for clean-up costs for contamination during the lifetime of the BESS and decommissioning is important to the task force. The taskforce wants permit conditions that ensure no future tax burden on local communities.

6. The task force expressed a desire to work collaboratively with the applicant and with future site operators. They requested that local officials be put in regular contact with site operators to discuss topics such as emergency response plans, notification of contamination events or fire events, and decommissioning.

APPENDIX F

MIDWATER BESS, LLC

FIRE SIMULATION REPORT

Plume Analysis for Outside Ground-Mounted Battery Energy Storage Systems: Sungrow PowerTitan2.0 Midwater BESS Site

Final Report | January 2026



Prepared for:

Midwater BESS, LLC

C/O Spearmint Energy
2916 N Miami Ave, Suite 910
Miami, FL 33127

Prepared by:

Fire & Risk Alliance, LLC
7620 Standish Place
Rockville, MD 20855

www.fireriskalliance.com

(301) 658-3060

The distribution of this document to third parties is prohibited without written approval from Fire & Risk Alliance, LLC.

EXECUTIVE SUMMARY

Fire and Risk Alliance, LLC was contracted by Midwater BESS, LLC, a wholly owned indirect subsidiary of Spearmint Renewable Energy Development Company, LLC (Spearmint Energy) to perform a plume analysis evaluating the dispersion and potential impacts of combustion products generated during a propagating thermal runaway event within a Sungrow Power Supply Co., Ltd. (Sungrow) PowerTitan 2.0 (PT2) lithium-ion battery energy storage system. The analysis focused on the proposed Midwater BESS facility located in Freeborn County, Minnesota, and was conducted to support fire safety evaluation, regulatory review, and hazard mitigation planning for outdoor, utility-scale energy storage installations.

The primary objective of this analysis was to determine the potential downwind extents of toxic gases and soot-related visibility reduction resulting from a fully involved BESS cabinet fire. This was achieved through a two-step computational modeling process. First, a large-scale fire test (LSFT) correlation model was developed to establish a representative fire source term, including peak heat release rate (HRR) and combustion product yields. Second, the resulting fire source term was applied in plume dispersion modeling to assess potential off-site impacts.

The LSFT correlation effort relied on review and interpretation of UL 9540A cell-level data and a CSA TS-800:24 large-scale fire testing procedure report. At the time the LSFT was conducted in late 2024 by DNV China Co., Ltd., CSA TS-800:24 was used as guidance for installation-level fire testing and was not yet an explicit code requirement. Its use was consistent with industry practice and AHJ expectations to evaluate worst-case fire behavior, including flame spread to adjacent BESS units, smoke and heat release characteristics, activation of passive safety systems, and potential impacts to nearby equipment or structures. LSFT with intentional ignition became explicitly required with the publication of the 2026 edition of NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*.

Review of the CSA TS-800:24 LSFT data indicated that, while the test was acceptable and compliant with guidance available at the time it was performed, it was not representative of a worst-case outdoor BESS fire scenario as defined under NFPA 855 (2026). The test configuration limited air entrainment due to the enclosure being largely sealed, resulting in oxygen-limited combustion. This condition led to slowed fire development, incomplete combustion (characterized by elevated soot and carbon monoxide relative to carbon dioxide), an extended fire duration with repeated flame extinguishment and re-ignition, and a significant deflagration event that structurally damaged the initiating container and increased heat exposure to adjacent enclosures. These conditions confounded the applicability of the LSFT data for direct worst-case plume modeling.

NFPA 855 (2026), Section G.11.6, specifies that designed deflagration pressure relief areas should be open from the beginning of an LSFT to avoid oxygen-limited conditions, or that doors and openings not used in normal operation should be opened when no compliant pressure relief is provided. In accordance with the CSA TS-800:24 procedure, deflagration panels were closed at the start of the test, which contributed to the oxygen-limited fire behavior observed. As a result, only data from the initial test period prior to the major deflagration event were suitable for qualitative comparison with modeling results.

However, using well-established electrical-to-combustion energy conversion methods, industry reports, and alignment between modeled thermal impacts and observed enclosure damage during the comparable portion of the LSFT, a worst-case fire scenario can be modeled to meet the intent of the 2026 edition of NFPA 855. The model developed for this analysis used an estimated constant peak HRR of 21.1 MW as a conservative representation of a fully involved, Sungrow PT2 BESS fire. This HRR reflects non-oxygen-limited conditions consistent with worst-case outdoor fire exposure and therefore with the 2026 NFPA 855 intent for LSFT.

The calculated HRR, combustion product yields, and associated input parameters were utilized as inputs for the full plume analysis model to predict the dispersion of combustion products under various wind speeds, directions, and cabinet configurations (open or closed doors and deflagration panels). The simulations were performed using the Fire Dynamics Simulator (FDS), a computational fluid dynamics (CFD) tool developed by the National Institute of Standards and Technology (NIST), with PyroSim serving as the model interface and Smokeview used for visualization. FDS is a widely accepted and extensively validated fire modeling tool, supported by decades of development and hundreds of peer-reviewed studies. Each modeled scenario accounted for realistic meteorological conditions and physical configurations consistent with outdoor, utility scale BESS installations, incorporating conservative assumptions to represent credible worst-case events.

The results of the plume analysis indicate that:

- Carbon monoxide concentrations that are Immediately Dangerous to Life or Health (1200 ppm) did not reach the site boundary of 220 ft (67 m) under any wind conditions. Peak concentrations at the boundary were below the Immediately Dangerous to Life or Health value.
- HF concentrations within the combustion plume were estimated from CO using a CO:HF ratio of 7:1 to represent conservative conditions. Brief exceedances of the 30 ppm IDLH value occurred near the plume core but did not persist or extend beyond the site boundary at either ratio, indicating minimal off-site exposure potential.
- Carbon dioxide concentrations were below the 40,000-ppm limit that is Immediately Dangerous to Life or Health and were confined within 16 ft (5 m) of the initiating cabinet.
- Visibility was reduced to less than 33 ft (10 m) within the immediate plume region, indicating short-term tenability hazards near the source; however, visibility remained adequate for egress and response beyond this zone.

Overall, the analysis demonstrates that toxic gas concentrations and soot visibility impairments diminish rapidly with distance from the source, and hazardous exposure limits are not sustained at or beyond the site boundary for any modeled scenario, including that which is considered the worst case. The study concludes that, under the evaluated conditions, no off-site tenability or acute inhalation risks are anticipated, and the results are consistent with observed behaviors from LSFT and established FDS modeling principles. Although this analysis was conducted based on the BESS container closest to the property boundary, these conclusions apply regardless of the location of a hypothetical fire in an initiating BESS container. This report and its supporting plume analysis are intended to assist the Fire Code Official, Authority Having Jurisdiction, and other

project stakeholders in the review of the proposed Midwater BESS design and emergency response planning, ensuring compliance with applicable fire safety codes and standards.

TABLE OF CONTENTS

Executive Summary ..... **iii**

Acronyms and Abbreviations xii

Glossary xiii

1.0 Introduction **1**

1.1 Applicable Codes and Standards 2

2.0 PowerTitan 2.0 BESS Overview **3**

2.1 Cell 3

2.2 Module 5

2.3 Unit 6

2.4 Container 7

2.5 Midwater BESS Site Layout 8

3.0 Analysis Approach and General Assumptions **10**

3.1 Computational Fluid Dynamics Model 10

3.2 BESS Geometry 10

3.3 Assumptions 11

4.0 LSFT Correlation **12**

5.0 Plume Analysis Objectives & Methodology **15**

5.1 General Methodology 15

5.2 Weather Parameters 17

5.3 Model Scenarios 18

6.0 Plume Analysis Results **21**

6.1 Carbon Monoxide (CO) Concentration for Scenarios 1A, 1B, 2A, and 2B 21

6.1.1 Scenario 1A 22

6.1.2 Scenario 1B 25

6.1.3 Scenario 2A 27

6.1.4 Scenario 2B 29

6.1.5 Hydrogen Fluoride 30

6.2 Carbon Dioxide Concentration for Scenarios 1A, 1B, 2A, and 2B 32

6.2.1 Scenario 1A 33

6.2.2 Scenario 1B 35
6.2.3 Scenario 2A 37
6.2.4 Scenario 2B 39
6.3 Soot Visibility for Scenarios 1A, 1B, 2A, and 2B 41
6.3.1 Scenario 1A 42
6.3.2 Scenario 1B 44
6.3.3 Scenario 2A 46
6.3.4 Scenario 2B 48
6.3.5 Atmospheric Deposition 49
7.0 Summary of Findings 50
7.1 LSFT Correlation Model and HRR Development 50
7.2 Plume Analysis 51
7.2.1 Carbon Monoxide (CO): 52
7.2.2 Hydrogen Fluoride (HF): 52
7.2.3 Carbon Dioxide (CO_2): 52
7.2.4 Visibility (Tenability at 33 ft (10 m)): 52
7.2.5 Plume Analysis Summary 52
8.0 Disclaimer 55
8.1 Limitations 55
9.0 Appendix A 56
9.1 Temperature Data Collection 62
9.1.1 BESS A Temperature Data 62
9.1.2 BESS B Temperature Data 68
9.1.3 BESS C Temperature Data 70
9.1.4 BESS D Temperature Data 72
9.2 Heat Flux Data 75

LIST OF FIGURES

Figure 1. CALB battery cell 3
Figure 2. PT2 battery module 6
Figure 3. PT2 unit assembly 7
Figure 4. PowerTitan 2.0 cabinet 7
Figure 5. Midwater BESS site layout with property boundaries 8
Figure 6. Midwater BESS site spacing layout 9
Figure 7. Temperature impact comparison on the roof of initiating and target BESS containers 13
Figure 8. Initiating BESS location 16
Figure 9. FDS site plan side view with grid size and mesh resolution 17
Figure 10. Configurations showing open deflagration panels lying flat along the top edges of the initiating and target containers 19
Figure 11. Depiction of open BESS cabinet doors 19
Figure 12. Plume extent for a CO concentration of 1,200 ppm and 10 mph 22
Figure 13. Plume extent for a CO concentration of 1,200 ppm and 18 mph 23
Figure 14. Plume extent for a CO concentration of 1,200 ppm and 26 mph 23
Figure 15. Maximum plume extent for a CO concentration of 1,200 ppm 24
Figure 16. Plume extent for a CO concentration of 1,200 ppm and 10 mph 25
Figure 17. Plume extent for a CO concentration of 1,200 ppm and 18 mph 25
Figure 18. Plume extent for a CO concentration of 1,200 ppm and 26 mph 25
Figure 19. Maximum plume extents for a CO concentration of 1,200 ppm 26
Figure 20. Plume extent for a CO concentration of 1,200 ppm and 10 mph 27
Figure 21. Plume extent for a CO concentration of 1,200 ppm and 18 mph 27
Figure 22. Plume extent for a CO concentration of 1,200 ppm and 26 mph 27
Figure 23. Maximum plume extents for a CO concentration of 1,200 ppm 28
Figure 24. Plume extent for a CO concentration of 1,200 ppm and 10 mph 29
Figure 25. Plume extent for a CO concentration of 1,200 ppm and 18 mph 29
Figure 26. Plume extent for a CO concentration of 1,200 ppm and 26 mph 29
Figure 27. Maximum plume extents for a CO concentration of 1,200 ppm 30
Figure 28. Plume extent for a CO_2 concentration of 40,000 ppm and 10 mph 33

Figure 29: Plume extent for a CO_2 concentration of 40,000 ppm and 18 mph..... 33
Figure 30. Plume extent for a CO_2 concentration of 40,000 ppm and 26 mph..... 34
Figure 31. Maximum plume extents for a CO_2 concentration of 40,000 ppm..... 34
Figure 32. Plume extent for a CO_2 concentration of 40,000 ppm and 10 mph..... 35
Figure 33. Plume extent for a CO_2 concentration of 40,000 ppm and 18 mph..... 35
Figure 34. Plume extent for a CO_2 concentration of 40,000 ppm and 26 mph..... 35
Figure 35. Maximum plume extents for a CO_2 concentration of 40,000 ppm..... 36
Figure 36. Plume extent for a CO_2 concentration of 40,000 ppm and 10 mph..... 37
Figure 37. Plume extent for a CO_2 concentration of 40,000 ppm and 18 mph..... 37
Figure 38. Plume extent for a CO_2 concentration of 40,000 ppm and 26 mph..... 37
Figure 39. Maximum plume extents for a CO_2 concentration of 40,000 ppm..... 38
Figure 40. Plume extent for a CO_2 concentration of 40,000 ppm and 10 mph..... 39
Figure 41. Plume extent for a CO_2 concentration of 40,000 ppm and 18 mph..... 39
Figure 42. Plume extent for a CO_2 concentration of 40,000 ppm and 26 mph..... 39
Figure 43. Maximum plume for a CO_2 concentration of 40,000 ppm..... 40
Figure 44. Plume extent for soot visibility of 33 ft (10 m) at 10 mph..... 42
Figure 45. Plume extent for soot visibility of 33 ft (10 m) at 18 mph..... 42
Figure 46. Plume extent for soot visibility of 33 ft (10 m) at 26 mph..... 42
Figure 47. Maximum plume extent for soot visibility of 33 ft (10 m)..... 43
Figure 48. Plume extent for soot visibility of 33 ft (10 m) at 10 mph..... 44
Figure 49. Plume extent for soot visibility of 33 ft (10 m) at 18 mph..... 44
Figure 50. Plume extent for soot visibility of 33 ft (10 m) at 26 mph..... 44
Figure 51. Maximum plume extent for soot visibility of 33 ft (10 m)..... 45
Figure 52. Plume extent for soot visibility of 33 ft (10 m) at 10 mph..... 46
Figure 53. Plume extent for soot visibility of 33 ft (10 m) at 18 mph..... 46
Figure 54. Plume extent for soot visibility of 33 ft (10 m) at 26 mph..... 46
Figure 55. Maximum plume extent for soot visibility of 33 ft (10 m)..... 47
Figure 56. Plume extent for soot visibility of 33 ft (10 m) at 10 mph..... 48
Figure 57. Plume extent for soot visibility of 33 ft (10 m) at 18 mph..... 48
Figure 58: Plume extent for soot visibility of 33 ft (10 m) at 26 mph..... 48

Figure 59. Maximum plume extents for soot visibility of 33 ft (10 m) 49
Figure A 1. Test configuration depiction 56
Figure A 2. Aerial photograph of test configuration 57
Figure A 3. FDS model of the LSFT configuration 57
Figure A 4. Deflagration from roof of initiating cabinet 58
Figure A 5. Deflagration in integrated control cabinet of BESS A 59
Figure A 6. BESS A char damage/sooty smoke from smoldering flame at 16 hours, 51 minutes 60
Figure A 7. Smoldering flame from BESS A at 17 hours, three minutes 60
Figure A 8. Oxygen concentration inside BESS A during test initiation 61
Figure A 9. BESS A door temperatures in source term development model 63
Figure A 10. BESS A door temperatures in LSFT 64
Figure A 11. BESS A left wall temperatures in source term development model 64
Figure A 12. BESS A left wall temperatures in LSFT 65
Figure A 13. BESS A roof temperatures in source term development model 65
Figure A 14. BESS A roof temperatures in LSFT 66
Figure A 15. BESS A integrated control cabinet temperatures in source term development model 67
Figure A 16. BESS A integrated control cabinet temperatures in LSFT 67
Figure A 17. BESS B back wall temperatures in source term development model 68
Figure A 18. BESS B back wall temperatures in LSFT 69
Figure A 19. BESS B roof temperatures in source term development model 69
Figure A 20. BESS B roof temperatures in LSFT 70
Figure A 21. BESS C left wall temperatures in source term development model 71
Figure A 22. BESS C left wall temperatures in LSFT 71
Figure A 23. BESS C roof temperatures in source term development model 72
Figure A 24. BESS C roof temperatures in LSFT 72
Figure A 25. BESS D roof temperatures in source term development model 73
Figure A 26. BESS D door temperatures in source term development model 74
Figure A 27. BESS D door temperatures in LSFT 74

LIST OF TABLES

Table 1. Gas Composition Vented During Thermal Runaway of UL 9540A Cell Test 4

Table 2. Cell Test Vent Gas Flammability Properties 5

Table 3. Weather Inputs for Plume Analysis 17

Table 4. Plume Analysis Scenarios 20

Table 5. IDLH and AEG levels of Carbon Monoxide Concentrations 21

Table 6. Extent of CO IDLH and Peak Concentrations at the Nearest Boundary 22

Table 7. Extent of HF Reaching Human Occupancy Height and Peak Concentrations at the Nearest Site Boundary 31

Table 8. Extent of CO2 and Peak Concentrations to the Nearest Boundary 33

Table 9. Scenarios Modeled in FDS 51

Table A 1. Peak Heat Flux Comparison 75

Acronyms and Abbreviations

Carbon Dioxide	CO_2
Carbon Monoxide	CO
Center for Disease Control	CDC
Fire & Risk Alliance, LLC	FRA
Gigajoule	GJ
Hydrogen Fluoride	HF
Kilojoule	kJ
Kilowatt-hour	kWh
Lithium Iron Phosphate	LFP
Megawatt	MW
National Fire Protection Association	NFPA
National Institute of Occupational Safety and Health	NIOSH
National Institute of Standards and Technology	NIST
Parts per Million	PPM
PowerTitan 2.0	PT2

Glossary

Terms denoted with an asterisk (*) are defined by or adapted from the NFPA Glossary of Terms [1].

Term	Abbreviation	Definition
Acute Exposure Guideline Level	AEGL	Three-tiered levels of airborne chemical exposure which may cause health effects. AEGLs are published by the Environmental Protection Agency and are expressed as specific concentrations.
Battery Energy Storage System	BESS	BESS may refer to a singular enclosure containing batteries and their associated sub-systems, or it may refer to an installation of multiple enclosures.
Battery Management System*	BMS	A system that monitors, controls, and optimizes performance of an individual or multiple battery modules.
Combustion Products*	-	Constituents resulting from the combustion of a fuel with the oxygen of the air, including the inert but excluding excess air.
Computational Fluid Dynamics*	CFD	A solution of fundamental equations of fluid flow using computer techniques allowing the engineer to identify velocities, pressures, temperatures.
Fire Dynamics Simulator	FDS	A computational fluid dynamics tool developed by the National Institute of Standards and Technology to simulate fire behavior, plume dynamics, and their effects.
Fire Source Term	-	Refers to the heat release rate and combustion product inputs that are used to calculate the effects of a modelled fire. The user must estimate these inputs and specify them in the model.
Heat Release Rate*	HRR	The rate at which energy is generated by the burning of a fuel and oxygen mixture.
Immediately Dangerous to Life/Health*	IDLH	A concentration of an airborne contaminant that represents the maximum level from which one could escape within 30 minutes without any escape-impairing symptoms or irreversible health effects.
Large Eddy Simulation	LES	A computational fluid dynamics technique that separates fluid flow into two parts: large-scale turbulence, which is computed directly from fluid motion equations, and small-scale turbulence, which is estimated using a sub-grid model.

		This technique is ideal for modeling fire growth, smoke movement, and heat radiation.
Large-Scale Fire Test	LSFT	For these purposes, LSFT refers to an installation-level BESS fire test in which battery vent gases are intentionally ignited to measure the effects of a developed fire on the initiating and target BESS.
Lower Flammability Limit*	LFL	The concentration of a combustible material in air below which ignition will not occur.
PyroSim	-	The graphical user interface software for FDS. PyroSim allows the user to more intuitively view and build the model.
Smokeview	SMV	A visualization program used to display the output of FDS simulations.
Worst-Case Fire Scenario	-	For the purposes of this analysis, the worst-case fire scenario refers to the hypothetical BESS fire event with the highest magnitude of impact in terms of smoke production and concentration of combustion byproducts, as well as the parameters that support the development of this scenario.

1.0 INTRODUCTION

Fire and Risk Alliance, LLC (FRA) was contracted by Midwater BESS, LLC, a wholly owned indirect subsidiary of Spearmint Renewable Energy Development Company, LLC (Spearmint Energy) to perform a plume analysis evaluating the dispersion and behavior of combustion gases generated from a propagating thermal runaway event involving the Sungrow Power Supply Co., Ltd. (Sungrow) PowerTitan 2.0 (PT2) lithium-ion battery energy storage system (BESS). The PT2 system comprises six units, each containing eight modules, with a total energy capacity of approximately 5,015 kilowatt-hours. The BESS assembly includes battery modules, power electronics, control systems, a battery management system, thermal management system, fire detection and notification systems, and explosion control features. It is designed for outdoor, ground-mounted installations serving commercial, industrial, and utility-scale applications.

The primary objective of this analysis was to evaluate the potential downwind extents of combustion products resulting from a fully involved fire originating in a single PT2 cabinet at the proposed Midwater BESS facility in Freeborn County, Minnesota. However, to inform the plume modeling analysis, data from the large-scale fire testing (LSFT) of a Sungrow PT2 BESS enclosure performed by DNV China Co., Ltd. [2] was evaluated to correlate test observations with model predictions and to determine an appropriate heat release rate (HRR) for simulation. Although the LSFT provided valuable insight into BESS fire behavior, the test was influenced by oxygen-limited conditions and multiple reignition events that deviated from expected open-air fire dynamics. While the LSFT complied with standards in place at the time of testing, Section G.11.6 of the 2026 edition of NFPA 855 specifies that designed deflagration relief areas should be open from the beginning of an LSFT to avoid oxygen-limited conditions. Therefore, the initial four hours of test data were used for qualitative validation, and alignment between modeled thermal impacts and observed enclosure damage in this time period was observed.

Based on well-established electrical-to-combustion energy conversion methods in peer-reviewed scientific literature and industry reports, a conservative HRR of 21.1 MW was derived from the total energy content of the system and applied to represent a fully involved fire scenario under realistic conditions.

The assessment was performed using FDS, a computational fluid dynamics (CFD) tool developed by the National Institute of Standards and Technology (NIST), to simulate plume dynamics and estimate concentration profiles of toxic combustion species at the site property boundaries under various wind and enclosure configurations. FDS is a widely accepted and extensively validated fire modeling tool, supported by decades of development and hundreds of peer reviewed studies. Each modeled scenario accounted for realistic meteorological conditions and physical configurations consistent with outdoor, utility scale BESS installations, incorporating conservative assumptions to represent credible worst-case events.

This report summarizes FRA's plume analysis findings and is intended to assist the Fire Code Official, Authority Having Jurisdiction, and other project stakeholders in their review and

evaluation of the Midwater BESS fire safety performance under worst-case thermal runaway conditions.

1.1 Applicable Codes and Standards

The plume analysis and fire source term development were performed following the intent of NFPA 855 (2026 *Standard for the Installation of Stationary Energy Storage Systems*) [3], which governs siting, spacing, and hazard mitigation for stationary BESS installations. Specific guidance was drawn from Annex G.8.3 (Design Failure Scenarios) and Annex G.11 (Fire Test Methods).

Section G.8.3 provides methodologies for defining credible and bounding failure events, emphasizing the use of UL 9540A cell [4] and module test [5] data to develop plausible explosion or deflagration scenarios. It also encourages evaluating multiple credible failure conditions, such as limited propagation events and stoichiometric gas concentrations, to establish conservative system design and analysis parameters.

Section G.11 describes objectives and procedures for LSFT, requiring evaluation of developed fire scenarios that account for flammable vent gas ignition, operation of mitigation devices (e.g., deflagration panels), and pre-test UL 9540A [4] cell characterization.

The approach in this report aligns with these principles: the LSFT correlation model was used to validate a representative HRR, while NFPA 68 [6] and NFPA 69 [7] were referenced for evaluating venting and explosion prevention mechanisms. NFPA 130 [8] tenability limits were used to assess smoke and visibility impacts, and CDC/NIOSH Immediately Dangerous to Life or Health (IDLH) exposure values for CO and HF served as the toxic concentration thresholds for evaluating off-site plume effects [9]. Together, these standards provide a comprehensive framework for the evaluation of thermal runaway propagation, combustion product dispersion, and site safety performance of the proposed Midwater BESS installation.

2.0 POWERTITAN 2.0 BESS OVERVIEW

A brief overview of the Sungrow PT2 BESS is provided below. The PT2 BESS is a fully integrated BESS consisting of battery modules, power electronics, control systems, a battery management system, a thermal management system, fire detection and notification systems, and an explosion control system.

2.1 Cell

The cell is the smallest anatomy of the battery assembly. The PT2 BESS utilizes a lithium iron phosphate prismatic cell, as shown in Figure 1. The cells are CALB model L173F314 and are UL 1973 compliant. Each cell has a rated capacity of 314-amp hours (Ah), a nominal voltage of 3.2 volts (V), and dimensions of 207 ×174.4 ×71.4 mm. CCIC-CSA International Certification Co., Ltd. performed UL 9540A cell-level testing and issued a report [10].

This cell is manufactured for use in the PT2 and is intended to be part of the module assembly to be charged and discharged. Passive safety features include material reliability and manufacturing processes. Known hazards of the cell during normal operation consist of either electrical, thermal, or mechanical failures which could result in gas release, flaming electrical fluid, electrical shorting, thermal heating, and/or thermal runaway.

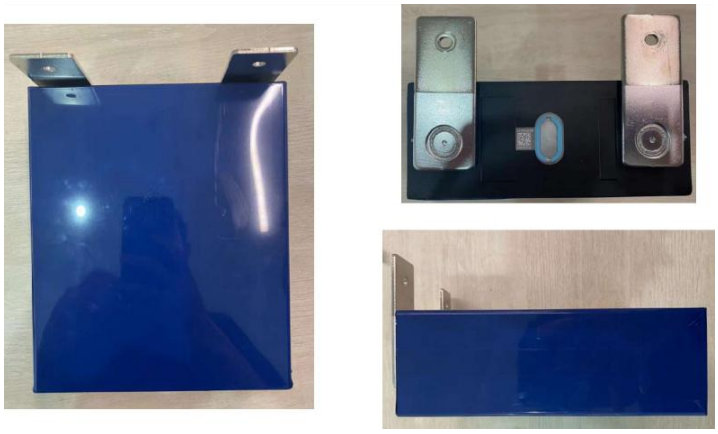


Figure 1. CALB battery cell

The gas volume released during the UL 9540A cell test measured 192 liters in volume. The gas composition produced during the test is shown in Table 1. The cell vent gas flammability properties are shown in Table 2.

Table 1. Gas Composition Vented During Thermal Runaway of UL 9540A Cell Test

Gas Name	Chemical Structure	Volume (%)
Carbon Monoxide	CO	13.924
Carbon Dioxide	CO_2	27.237
Hydrogen	H_2	44.925
Methane	CH_4	6.421
Acetylene	C_2H_2	0.339
Ethylene	C_2H_4	3.827
Ethane	C_2H_6	0.996
Propylene	C_3H_6	1.227
Propane	C_3H_8	0.322
Isobutene	C_4H_8	0.085
N-butene	C_4H_8	0.140
Trans butene	C_4H_8	0.322
Isobutane	C_4H_{10}	0.013
Butane	C_4H_{10}	0.091
2-methyl-1,3 -butadiene	C_5H_8	0.014
Isopentane	C_5H_{12}	0.007
Pentane	C_5H_{12}	0.110
Total	-	100

Table 2. Cell Test Vent Gas Flammability Properties

Flammability Property	Value
Average cell surface temperature at gas venting	140.5°C
Average cell surface temperature at thermal runaway	210.6° C
Cell vent gas volume released	192 L
LFL, % volume in air at the ambient temperature	6.2%
LFL, % volume in air at the venting temperature	5.6%
Burning Velocity (S_u)	63.8 cm/s
Maximum pressure (P_{max})	0.68 MPa

2.2 Module

The battery module is the second smallest level of the BESS anatomy. The PT2 module is model P1044AL-AHA, which is a liquid-cooled module with a casing of metal alloys and a plastic cover, as shown in Figure 2. The module is composed of 104 CALB L173F314 in a 104S configuration and has a rated capacity of 314 Ah and a nominal voltage of 332.8 V. Each module has overall dimensions of 2214 × 790 × 240 mm. TÜV Rheinland Co, Ltd. (TÜV) performed UL 9540A module-level testing and issued a report [5].

This module is manufactured for use in the PT2 and is intended to be part of the unit-level assembly. The module assembly supports safe operation through its material insulation and internal cooling. Passive safety features include material reliability, manufactured assembly process, and internal aerogel insulation. The module itself does not have any active emergency functions for disconnection from the charging source or discharging stored potential energy. Known hazards of the module during normal operation consist of either electrical, thermal, or mechanical failures which could result in gas release, flaming electrical fluid, electrical shorting, thermal heating, and/or thermal runaway.



Figure 2. PT2 battery module

2.3 Unit

The unit (or rack) is the third level of BESS anatomy. Each unit has eight modules and a terminal box/power conversion system (PCS), as shown in Figure 3. The unit for the four-hour duration PT2 is model R0835BL-ACAA, which uses a 4S2P module configuration. It has a rated capacity of 628 Ah, a nominal voltage of 1,331.2 V, and a nominal energy capacity of 835.99 kWh. The unit has overall dimensions of 2214 ×1000 ×790 mm. The unit is manufactured for use in the PT2 and is intended to be part of the container-level assembly. TÜV performed UL 9540A unit level testing and issued a report [11].



Figure 3. PT2 unit assembly

2.4 Container

The container is the final and largest level of the BESS. The PT2 cabinet is a non-walk-in (NWI) style, rigid metal (steel) enclosure designed to house the batteries, associated controllers, and appurtenances. The container supports the safe operation of the BESS through its exterior rigid housing structure, with an IP-55 rating, that helps to protect the batteries from mechanical damage and weather conditions. It has dimensions of 6058 ×2896 ×2438 mm and is intended for outdoor ground-mounted installations. The PT2 is composed of a battery compartment and an integrated control cabin that contains ancillary equipment and is shown in Figure 4. DNV performed the LSFT on the PT2 and issued a report [2].



Figure 4. PowerTitan 2.0 cabinet

2.5 Midwater BESS Site Layout

Figure 5 and Figure 6 represent a proposed potential site plan for the Midwater BESS using dimensions and separation distances for the PT2 provided in the product manual [12]. This site plan was generated using a draft site plan provided by the client, which originally was based on a different energy storage system technology but included an outline of the furthest extents at which the BESS cabinets could be placed. Thus, the site plan below takes the site installation boundaries into account and situates the PT2 cabinets at the same locations to replicate the original distances from the BESS cabinets to the property lines. This site plan is meant to reflect a generic BESS layout while capturing impacts from the closest potential BESS location. It is not final and is not intended to be used for any purpose other than to create a representative plume analysis model for the Midwater BESS. The design of a BESS site plan intended for eventual construction is outside the scope of this work.

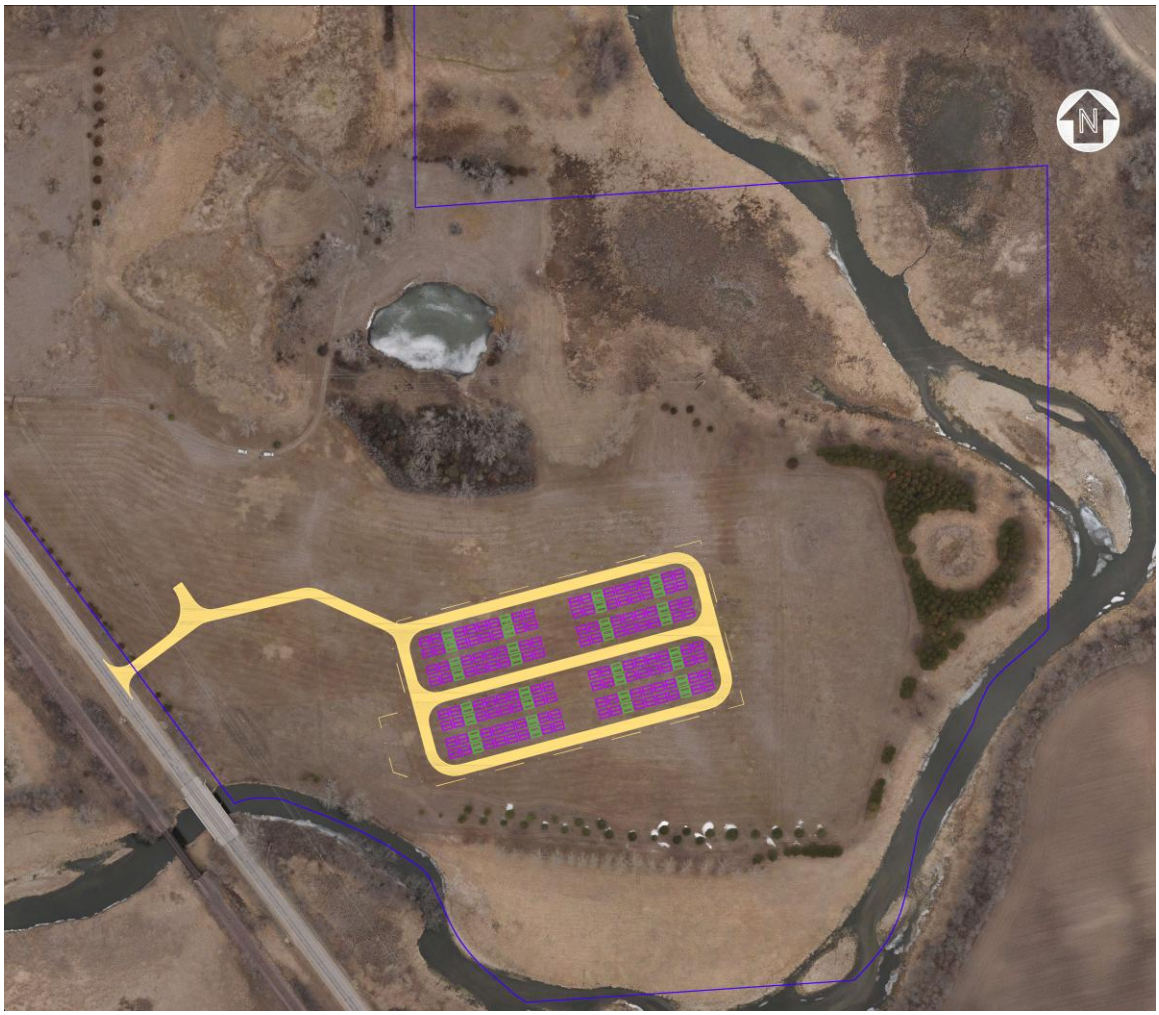


Figure 5. Midwater BESS site layout with property boundaries



Figure 6. Midwater BESS site spacing layout

3.0 ANALYSIS APPROACH AND GENERAL ASSUMPTIONS

The objective of the plume analysis was to evaluate the potential impacts of BESS failure scenarios in which a single cabinet undergoes a fully involved fire resulting from a propagating thermal runaway event, and to assess the dispersion of combustion products toward the downwind property boundaries. The analysis was conducted through a two-step modeling process.

In the first step, data from the LSFT report was used to replicate the LSFT conditions within FDS and correlate modeled outputs with experimental data to ensure fitness of the fire source term calculated HRR. The second step involved applying the calculated fire source term, along with other predefined inputs and boundary conditions, to simulate a worst-case BESS fire scenario and determine the toxic and visibility extents of the resulting plume.

Both the preliminary LSFT correlation model and the subsequent plume analysis model were developed using FDS in conjunction with its graphical user interface, PyroSim, and were based on a consistent set of modeling assumptions. Smokeview software was then employed to visualize, analyze, and present the simulation outputs, including temperature fields, gas concentrations, and soot visibility contours.

3.1 Computational Fluid Dynamics Model

CFD models, such as FDS, utilize a grid-based approach where the model domain is discretized into a mesh of tiny volumetric cells, over which the model solves simplified "low Mach number" fluid and energy flow equations. Developed by NIST [13], FDS uses the Large Eddy Simulation (LES) technique to analyze fluid flow in fires. The LES technique separates fluid flow into two parts: large-scale turbulence, which is computed directly from fluid motion equations, and small-scale turbulence, which is estimated using a sub-grid model. This technique is ideal for modeling fire growth, smoke movement, and heat radiation, which are driven by large-scale structures in fluid flow. With over 500 peer-reviewed publications and over 20 years of continued development, FDS has been extensively validated and proven to be an effective tool for fire simulations.

3.2 BESS Geometry

For this analysis, the PT2 was modeled with nominal external dimensions of 6100 ×2400 ×3000 mm based on the Sungrow PT2 product manual provided by Spearmint Energy. As described in Section 2.4, each cabinet has six racks composed of eight modules each, for a total of 48 modules per cabinet. As a specific site plan was not provided by the client, a potential site plan using the client-provided general outline of the site, as well as separation distances given in the PT2 product manual, were used for this analysis, as shown previously in Section 2.5.

3.3 Assumptions

The following assumptions were made regarding both the LSFT correlation and plume analysis scenarios discussed in the subsequent sections:

- The cooling and heating system integral to the BESS is non-functioning, and there is no air cooling for the battery modules to mitigate a potential fire scenario.
- Upon ignition, the flame front for all initiating modules was modeled as occurring at the front face of the modules, facing the container doors.
- The HRR was calculated based on conversions from electrical to combustion energy, which is discussed further in Appendix A. This HRR was divided by the total surface area of the front faces of the modeled modules to determine the appropriate HRR per unit area for the model. All 48 modules were assumed to be fully involved, contribute to the HRR at the initiation of the simulation, and continue burning for the entire duration of the simulation.
- The fire growth rate applied to the modules assumed initiation at the peak burning rate (that is, the peak HRR was used at a constant rate from time t=0). The development and decay phase of the HRR curve were neglected. The modeled HRR assumed a burn duration of five hours in order to simulate a worst-case fire scenario without oxygen limitation.
- The fire source term in FDS is based on the battery vent gas composition provided in the cell-level UL 9540A test report, with an additional component representing the contribution from the combustible module casing. No other potentially combustible components within the container were included in the fire source term as the mass of such materials is limited and not expected to significantly increase the total HRR or duration of the flaming event.
- The initiating cabinet doors were modeled as fully open rather than in their locked, angled position to represent a worst-case scenario.
- The ambient pressure and temperature conditions in the FDS models was assumed to be 1.01 bar and 20 °C.

4.0 LSFT CORRELATION

In performing a plume analysis, it is important to ensure that the chosen inputs for the model, particularly the HRR and combustion products, provide a conservative representation of a potential worst-case battery fire scenario. In this analysis, the worst-case scenario is defined as the hypothetical fire event with the highest potential magnitude of impact in terms of plume extents from a fully involved non-oxygen limited fire. To ensure the conservative representation of this potential worst-case scenario, a fire source term development model analysis was conducted to iteratively compare predicted target heat flux gauge and thermocouple temperatures with actual measured data from the LSFT. In this iterative comparison, the HRR was estimated, an LSFT correlation model was run, model results were compared with test data, and the HRR was adjusted in a cycle until the model results aligned with test data and the proper HRR was determined. This process hinges upon the LSFT being representative of the worst-case fire scenario to model the predicted extent of the associated smoke plume and toxic post-combustion products.

It should be noted that the LSFT was conducted in accordance with CSA TS-800:24 Large scale fire testing procedure published by CSA Group. At the time the LSFT was conducted in late 2024, installation-level fire testing with intentional ignition was not an explicit code requirement for BESS in all jurisdictions and was instead conducted as an additional measure to validate manufacturer-determined spacing requirements and inform the development of future BESS models. LSFT for BESS installations became explicitly required with the release of the 2026 Edition of NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*. As such, the LSFT report provided was in alignment with test standards at the time it was conducted. However, when evaluated against the criteria established in NFPA 855 (2026), the LSFT was not representative of a worst-case fire scenario due to oxygen limitation. Specifically, Section G.11.6.2.1 of NFPA 855 states that "designed deflagration pressure relief areas in the enclosure should be open from the beginning of the test. Openings that are not designed deflagration pressure relief areas should remain closed if the deflagration pressure relief area(s) are designed in accordance with NFPA 68 requirements". In accordance with the CSA TS-800 LSFT procedure, the deflagration panels were closed at the start of the test.

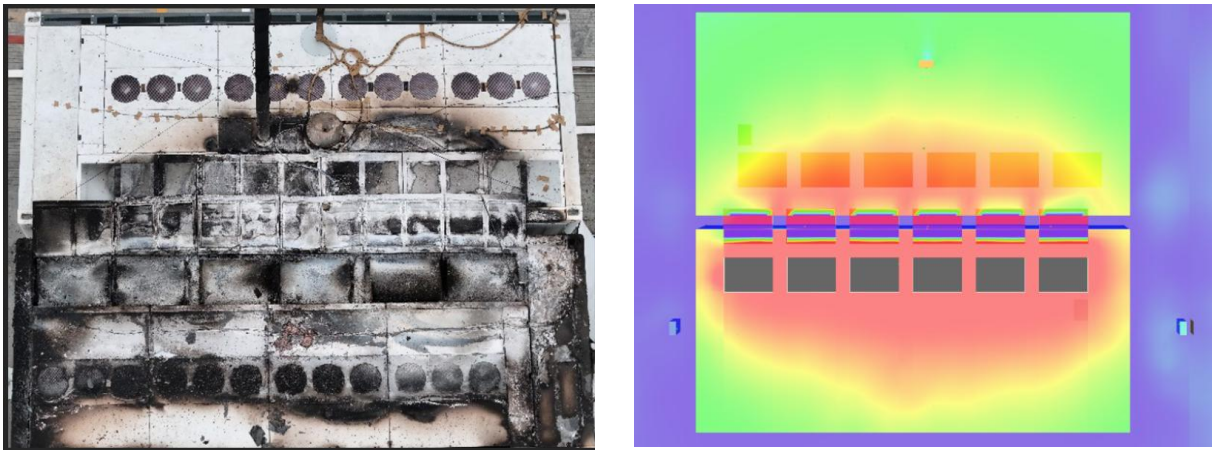
The test configuration restricted air entrainment into the enclosure, preventing sustained combustion and leading to oxygen-limited fire conditions as represented in test results. The oxygen-limited nature of the fire is evident in the oxygen concentration graph from inside the container, the uncharacteristically long duration of the fire (~ 19.5 hours), the occurrence of multiple small deflagrations, and repeated instances of extinguishment and re-ignition throughout the test. Approximately four hours after initial flame development, a large deflagration occurred that blew the integrated control cabinet off the side of the initiating BESS. This event led to a fireball that severely damaged the initiating BESS and impacted the adjacent enclosure, potentially increasing or altering heat exposure to target BESS, therefore confounding the impacts to target BESS captured after the deflagration occurred.

The impacts of oxygen limitation on the LSFT, which confounded interpretation of the test data, are summarized as follows:

- Slowed fire development, limiting fire intensity relative to a fully ventilated fire.
- Incomplete combustion, evidenced by a reduced CO_2-to-CO ratio and elevated soot production.
- A large deflagration event that caused severe damage to the initiating container and increased heat exposure to target containers beyond what would be expected under steady, well-ventilated burning conditions.

The fire source-term development model was performed utilizing data from the first four hours of the test, prior to the large deflagration, to verify that the BESS geometry was modeled correctly, and inform the plume analysis model. A HRR of 21.1 MW was estimated based on conversions from the total electrical energy of the initiating BESS to combustion energy and a five-hour burn duration. A conservative five-hour burn duration was used to represent a faster fire growth rate associated with a fully involved non-oxygen limited fire event. A continuous peak HRR (directly linked to the yield of combustion products) was utilized for all model simulations and was applied to the front faces of each module to simulate a fully involved fire occurring at the module vent location. Weather conditions were set to mirror those recorded in the LSFT report.

The location and severity of the temperature impacts observed on the initiating and target enclosures in the model were comparable with damage to the enclosures shown in the test report, as depicted in Figure 7, and the peak temperatures and heat fluxes observed in the model were within the expected range for a fully involved BESS fire.



LSFT FDS Model

Figure 7. Temperature impact comparison on the roof of initiating and target BESS containers

Additionally, visual comparisons between the modeled temperature impacts to the initiating and adjacent BESS and actual damage depicted in the test report show close alignment. The damage pattern correlates to the extent of impact for predicted temperatures causing structural damage to

steel sheeting (~550-1,200 °F) for the initiating and target BESS to the rear. As such, alignment in observations of damage extent from the LSFT and predicted thermal impacts from the FDS model, as well as the conservative approach taken to estimate the HRR, support the use of the estimated 21.1 MW HRR in the fire source term of the subsequent plume analysis model.

For a full description of the LSFT methodology, refer to Appendix A.

5.0 PLUME ANALYSIS OBJECTIVES & METHODOLOGY

5.1 General Methodology

The aim of the plume analysis was to explore the impact of combustion products from a fully involved fire scenario across the nearest property boundaries in all directions. Soot, carbon monoxide (CO), and carbon dioxide (CO_2) yields were calculated using the gas composition from the cell-level UL 9540A test report, and predicted hazardous gas concentrations and soot visibility were calculated at the property boundaries.

The FDS geometry for the plume analysis used the same cabinet design, BESS spacing, 21.1 MW HRR, and fire source term as for the LSFT correlation model. However, for the plume analysis model the geometry for the full site plan was created, including all BESS cabinets and associated medium voltage transformers, to capture any impacts on dispersion imposed by surrounding structures. The BESS cabinet closest to the nearest property boundary (~220 ft (67 m) offset) was selected as the initiating cabinet.[1] The simulations were run for a duration determined to allow adequate time for the wind field to establish and for steady-state fire conditions and thermal impacts to develop and stabilize.

[1] It should be noted that analysis results detailed in this report apply to other containers regardless of initiating container location and that the sole reason for selecting the container depicted below was its proximity to the property boundary. Conclusions from this analysis apply regardless of the location of a hypothetical fire in an initiating container.

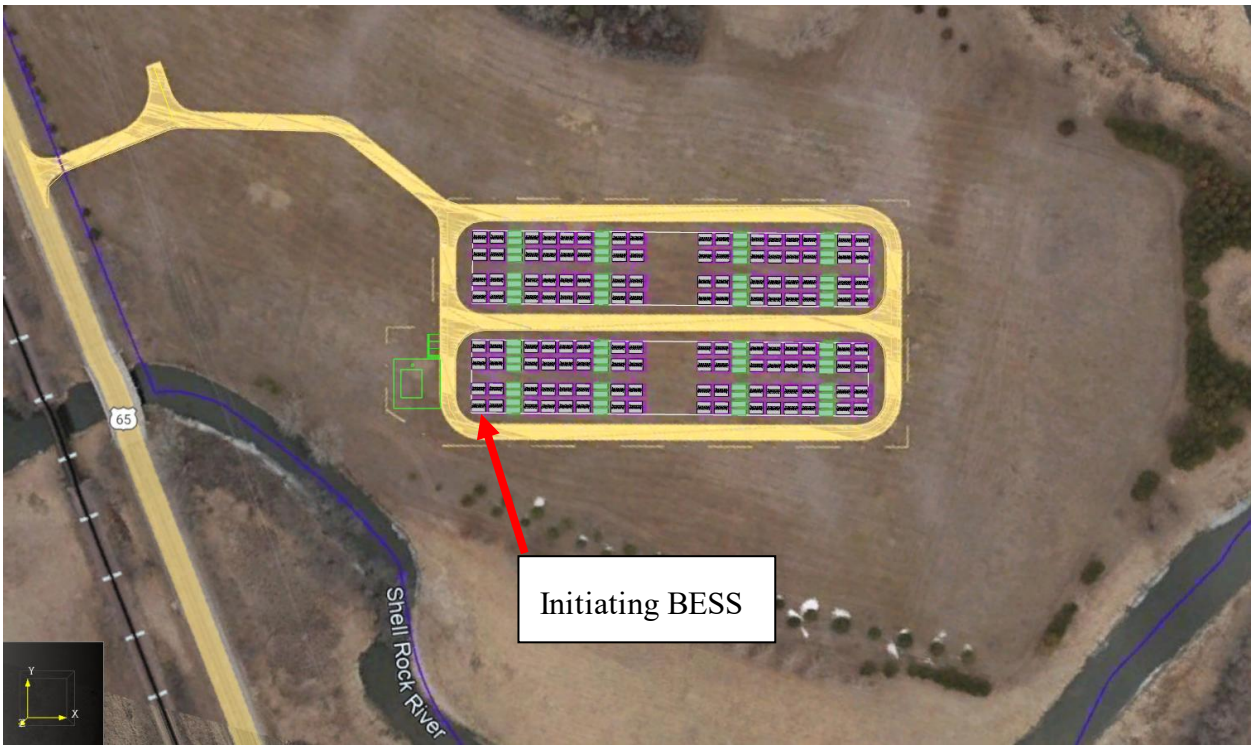


Figure 8. Initiating BESS location

The computational domain for the model was divided into multiple meshes allowing for grid refinement in the main computational domain where the fire occurred and the plume developed. The multiple meshes and associated grid resolution are shown in Figure 9. A computational grid with cubic cells of 0.7 ft (0.2 m) resolution was used for the main computational domain, as well as for all adjacent target containers. The grid resolution immediately above the initiating BESS container and closest targets was 1.3 ft (0.4 m). Beyond this region, a grid resolution of 2.6 ft (0.8 m) was applied. This approach allows for the most refinement in the location of the initiating BESS and sufficient resolution to capture plume extent beyond the initiating container while maintaining an appropriate balance between grid resolution and computational effort.

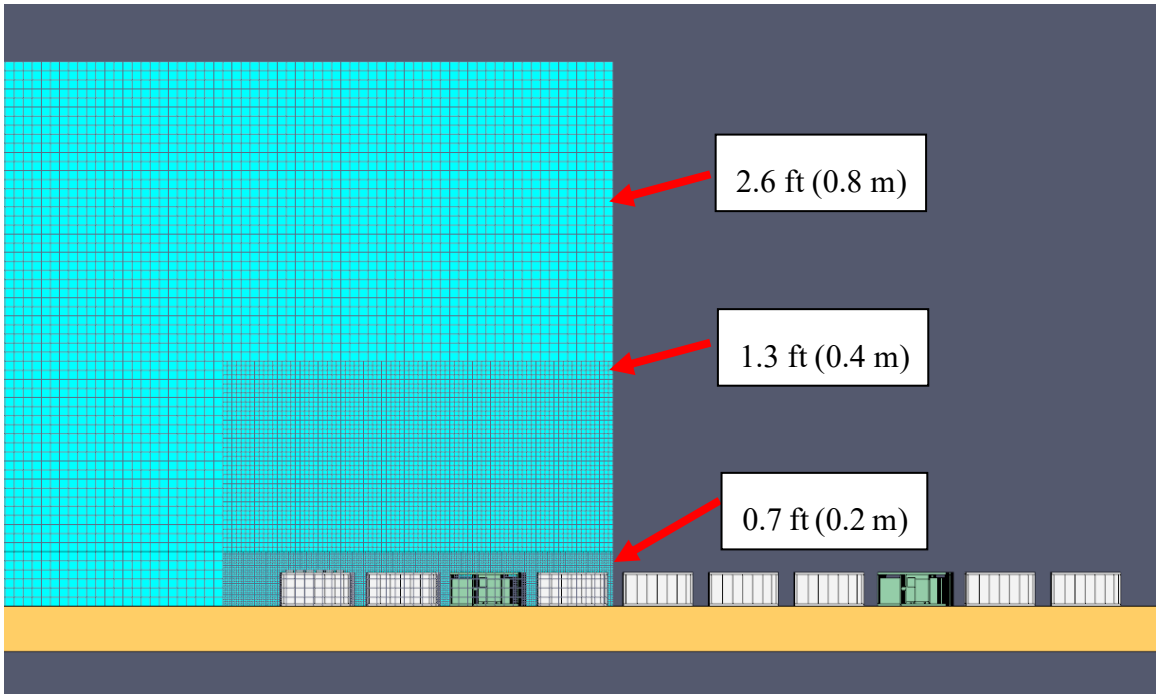


Figure 9. FDS site plan side view with grid size and mesh resolution

5.2 Weather Parameters

Weather data for the Midwater BESS site was obtained for the location's windiest month, April, to ensure prediction of worst-case downwind extents. Wind and temperature [14] data were obtained from the nearest hourly stations, Mason City Municipal Airport and Rochester International Airport. Relative humidity data [15] was obtained using the ASHRAE database for the nearest station, Albert Lea Municipal Airport.

The average high wind speed in April was determined to be 26 mph (11.6 m/s), and as such, this wind speed was used as the maximum for all modeled scenarios. Wind speed was increased over the duration of the simulations to include: 0 mph; 5 mph (2.2 m/s); 10 mph (4.5 m/s); 18 mph (8 m/s); and 26 mph (11.6 m/s) winds.

The zero-wind condition stabilizes the model's initialization phase, isolates buoyancy driven plume behavior, and provides a conservative baseline for local accumulation before evaluating wind driven dispersion effects. Two sub-scenarios of weather parameters, differentiated by wind direction, are given in Table 3.

Table 3. Weather Inputs for Plume Analysis

Scenario	Ambient temperature (°F)	Relative humidity (%)	Wind speeds (mph)	Wind direction
A	46	55	0, 10, 18, 26	Northwest
B	46	55	0, 10, 18, 26	South

5.3 Model Scenarios

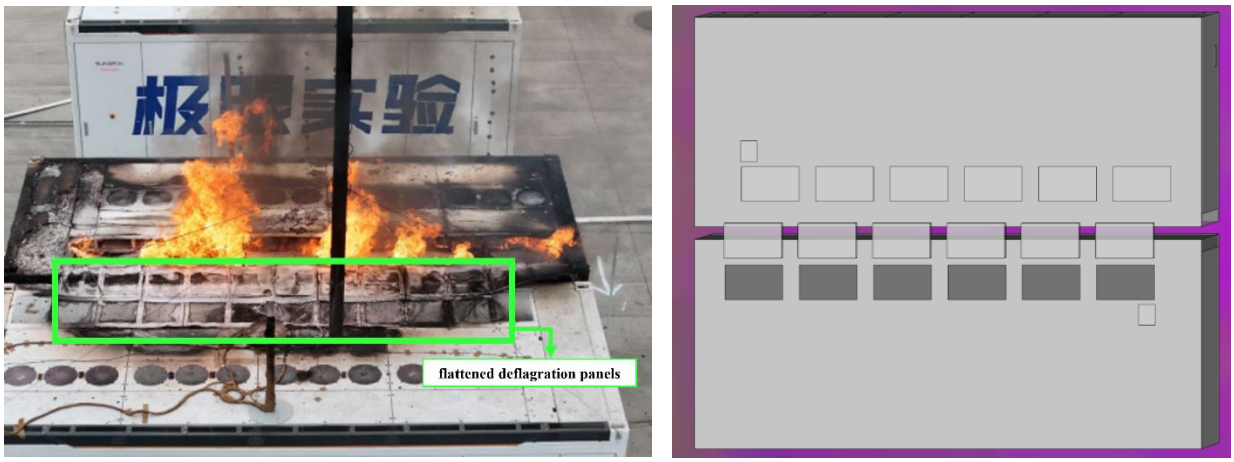
In addition to the wind speeds and directions described in Section 5.2, the plume analysis considered two fire scenarios, intended to represent a post-deflagration fire scenario and a cabinet maintenance failure fire scenario, as follows:

- Scenario 1 - Post-Deflagration: deflagration panels open, cabinet doors closed, full container involvement
- Scenario 2 – Maintenance Failure: cabinet doors open, deflagration panels closed, full container involvement

Scenario 1 represents a plausible fire scenario initiated within a BESS cabinet upon ignition of accumulated vent gases during a thermal runaway event leading to a deflagration. The subsequent pressure rise leads to the opening of the deflagration panels; however, air entrainment remains limited due to the relatively small openings along the cabinet roof, thereby restricting combustion intensity. When the deflagration panels are modeled open, they are assumed to lie flat across the top edges of both the initiating and target containers, consistent with the post deflagration configuration observed in the LSFT report (Figure 10).

Scenario 2 represents a credible worst-case fire scenario in which all initiating cabinet doors are open because of thermal runaway during maintenance operations, due to mechanical failure, or from prior human intervention due to alarm conditions. For the purposes of this analysis, a worst-case fire scenario is defined as the scenario with the highest magnitude of impact in terms of toxic plume extents from a fully involved non-oxygen limited fire. The doors open status allow for unrestricted air flow and efficient combustion, resulting in a fully involved fire with peak heat release, air entrainment, and yields of post-combustion products.

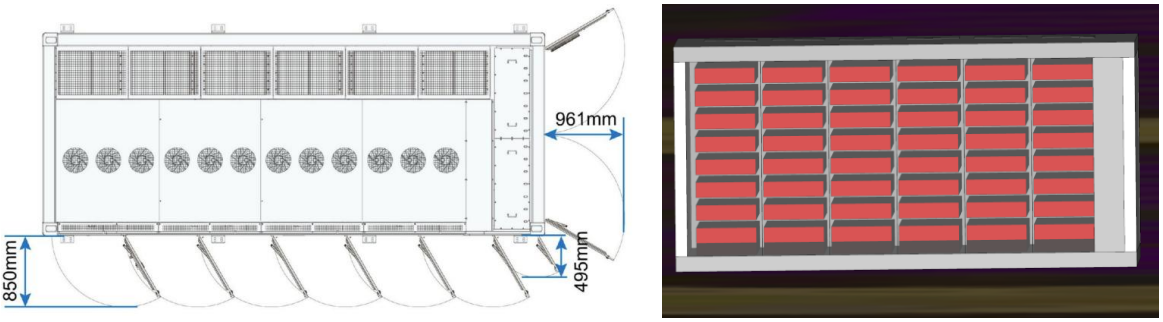
It should be noted that the worst-case scenario only considers involvement of a single BESS container. The likelihood of more than one container becoming involved in a fire is extremely low. The proposed PT 2.0 BESS installation spacing is specified by the manufacturer and is supported by validated heat transfer modeling. In addition, available LSFT test data indicate that thermal runaway did not propagate from the initiating container to adjacent target containers at the manufacturer-specified separation distances. No documented failures in the available BESS fire literature, nor anecdotal case reports, identify a credible mechanism by which thermal runaway would propagate beyond the initiating container under these conditions. Accordingly, a single, fully involved BESS container is considered to represent the credible worst-case fire scenario for this analysis.



LSFT Report FDS Model

Figure 10. Configurations showing open deflagration panels lying flat along the top edges of the initiating and target containers

The angle of the open doors for the initiating container are shown in a locked position of approximately 115° based on the product installation manual, however they were modeled in FDS as open 90° ensure grid alignment and as shown in Figure 11.



Product manual FDS Model

Figure 11. Depiction of open BESS cabinet doors

Table 4 provides a summary of the fire scenarios modeled for the plume analysis.

Table 4. Plume Analysis Scenarios

Scenarios	Status		Wind Profile	
	Deflagration panels	Doors	Direction	Wind speeds (mph)
1A	Open	Closed	Northwest	0, 10, 18, 26
1B	Open	Closed	South	0, 10, 18, 26
2A	Closed	Open	Northwest	0, 10, 18, 26
2B	Closed	Open	South	0, 10, 18, 26

6.0 PLUME ANALYSIS RESULTS

6.1 Carbon Monoxide (CO) Concentration for Scenarios 1A, 1B, 2A, and 2B

The analysis of CO concentrations within the post-combustion plume was conducted with respect to the exposure duration at known IDLH threshold levels [9] or within the acute exposure guideline (AEG) limits [16]. These thresholds provide an understanding of potential health hazards for both emergency responders and the public in proximity to a fully involved BESS fire. IDLH values represent the maximum concentration for a 30-minute duration exposure without experiencing lasting or irreversible health effects, whereas AEGL threshold values correspond to increasing degrees of exposure severity, with AEGL 2 indicating serious but reversible effects and AEGL 3 representing potentially lasting or irreversible health effects.

Table 5 summarizes the CO concentration thresholds for an exposure duration of 30 minutes.

Table 5. IDLH and AEG levels of Carbon Monoxide Concentrations

Threshold	Concentration (ppm)
IDLH	1200
AEGL 2	150
AEGL 3	600

The modeled scenarios investigate the impact of post-combustion gas products from a fully involved BESS fire plume transported downwind toward the nearest site boundary. Figure 12 through 27 illustrate the spatial extent of regions where CO concentrations exceed the IDLH threshold of 1,200 ppm for three (3) wind speeds; 10 mph, 18 mph, and 26 mph. Figures 15, 19, 23, and 27 display the bounding extents of the CO IDLH plume emanating from an initiating BESS cabinet for the wind directions corresponding to Scenarios 1A, 1B, 2A, and 2B, respectively. Each figure was developed by drawing the radii of maximum impact at the corner BESS cabinets and tracing these around the site to represent the potential downwind influence of elevated CO concentrations from a fire occurring within any BESS cabinet on site.

Model results show that wind induced flame tilt promotes the lateral spread of the CO plume close to ground level, reducing vertical dispersion but increasing potential near-surface exposure. Table 6 summarizes both the horizontal extent of CO toward the nearest boundary and the corresponding peak CO concentrations at that respective boundary.

For all simulated scenarios and wind speeds, the horizontal extent of CO transport toward the nearest site boundary at or above the IDLH concentration of 1,200 ppm ranged between 69 ft (21.1 m) and 140 ft (42.6 m), remaining below the nearest boundary distance of 220 ft (67 m). The peak CO concentrations at the boundary ranged from 572 to 773 ppm, indicating that more than 50% of

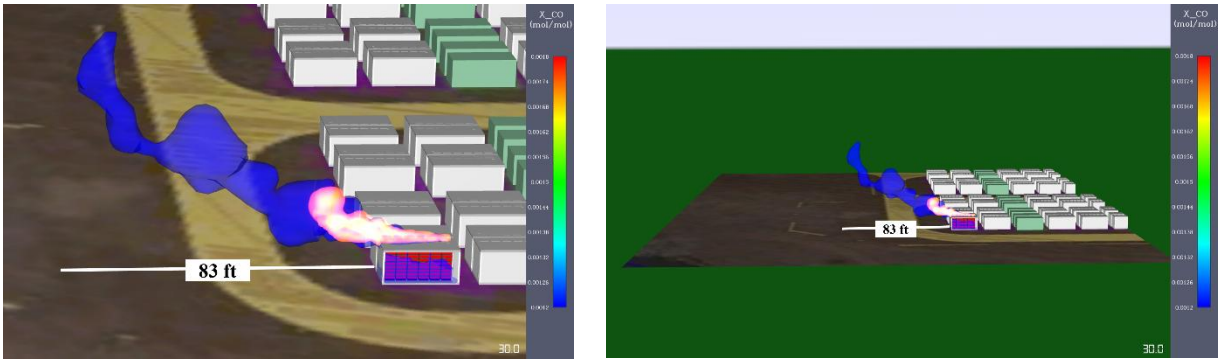
the emitted CO is diluted through entrainment and atmospheric mixing before reaching the boundary. Fluctuations in peak CO concentrations at the nearest property boundary reached AEGL 3 values for transient short-term exposure but were not consistent and would not reach the 30-minute exposure period.

Table 6. Extent of CO IDLH and Peak Concentrations at the Nearest Boundary

Scenarios	Extent of CO downwind towards the site boundary (ft)		
	10 mph	18 mph	26 mph
1A	83 (25.2 m)	96 (29.2 m)	72 (21.9 m)
1B	84 (25.7 m)	71 (21.7 m)	69 (21.1 m)
2A	71 (21.7 m)	120 (36.5 m)	140 (42.6 m)
2B	120 (36.5 m)	108 (33.0 m)	82 (25 m)

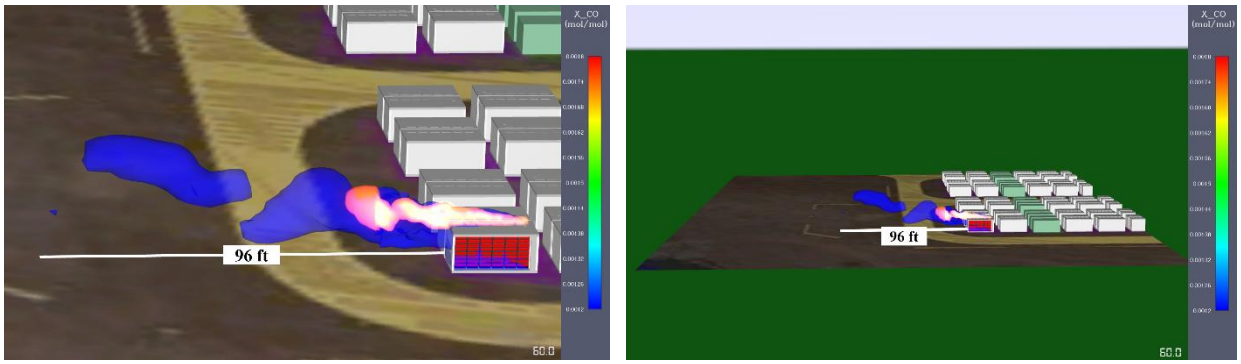
Values in parentheses are the extent of CO downwind towards the site boundary in meters

6.1.1 Scenario 1A



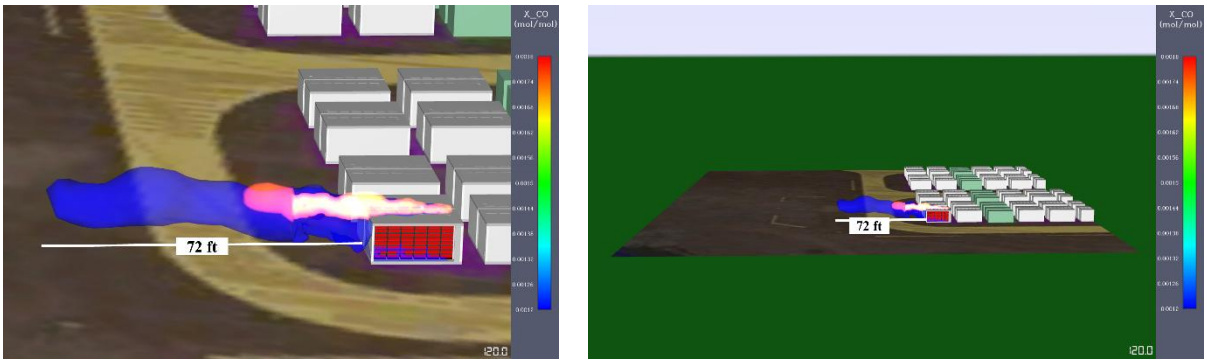
Zoomed in view Side view

Figure 12. Plume extent for a CO concentration of 1,200 ppm and 10 mph



Zoomed in view Side view

Figure 13. Plume extent for a CO concentration of 1,200 ppm and 18 mph



Zoomed in view Side view

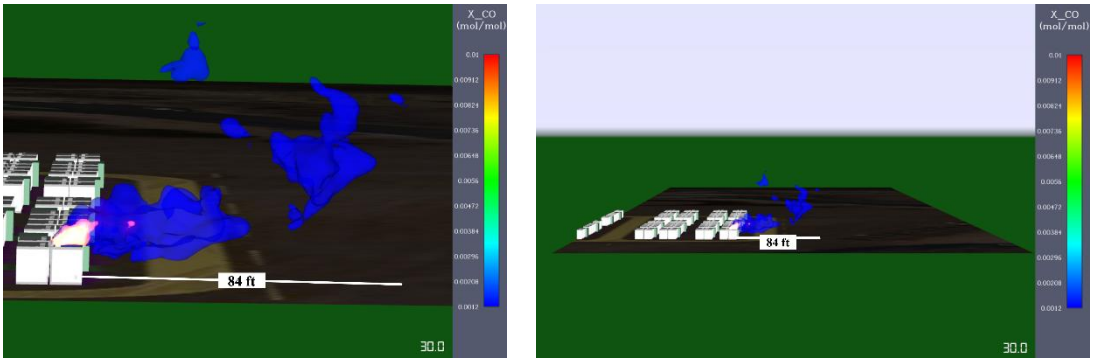
Figure 14. Plume extent for a CO concentration of 1,200 ppm and 26 mph



(cyan = 10 mph; green = 18 mph; red = 26 mph)

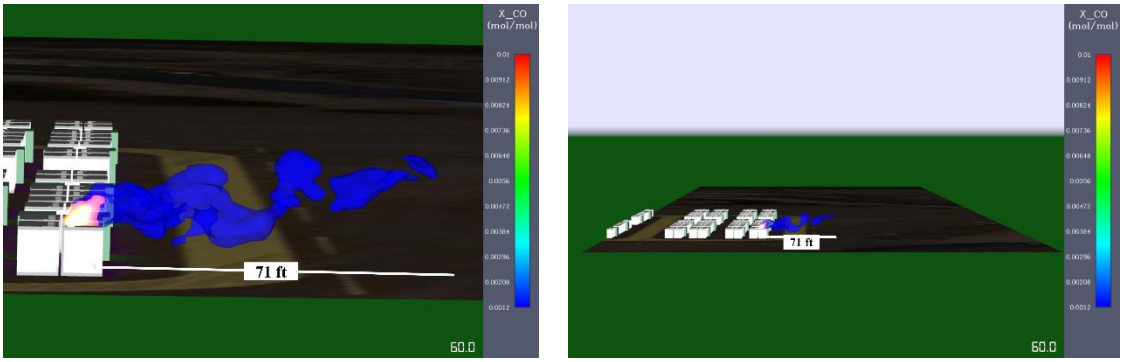
Figure 15. Maximum plume extent for a CO concentration of 1,200 ppm

6.1.2 Scenario 1B



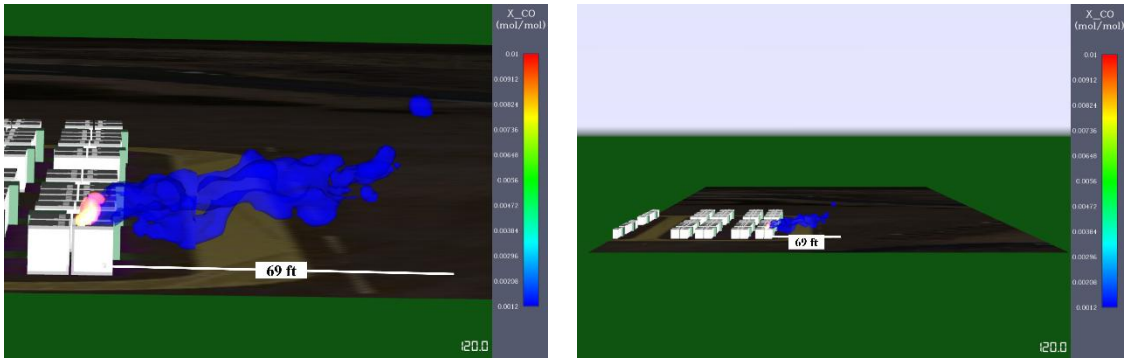
Zoomed in view Side view

Figure 16. Plume extent for a CO concentration of 1,200 ppm and 10 mph



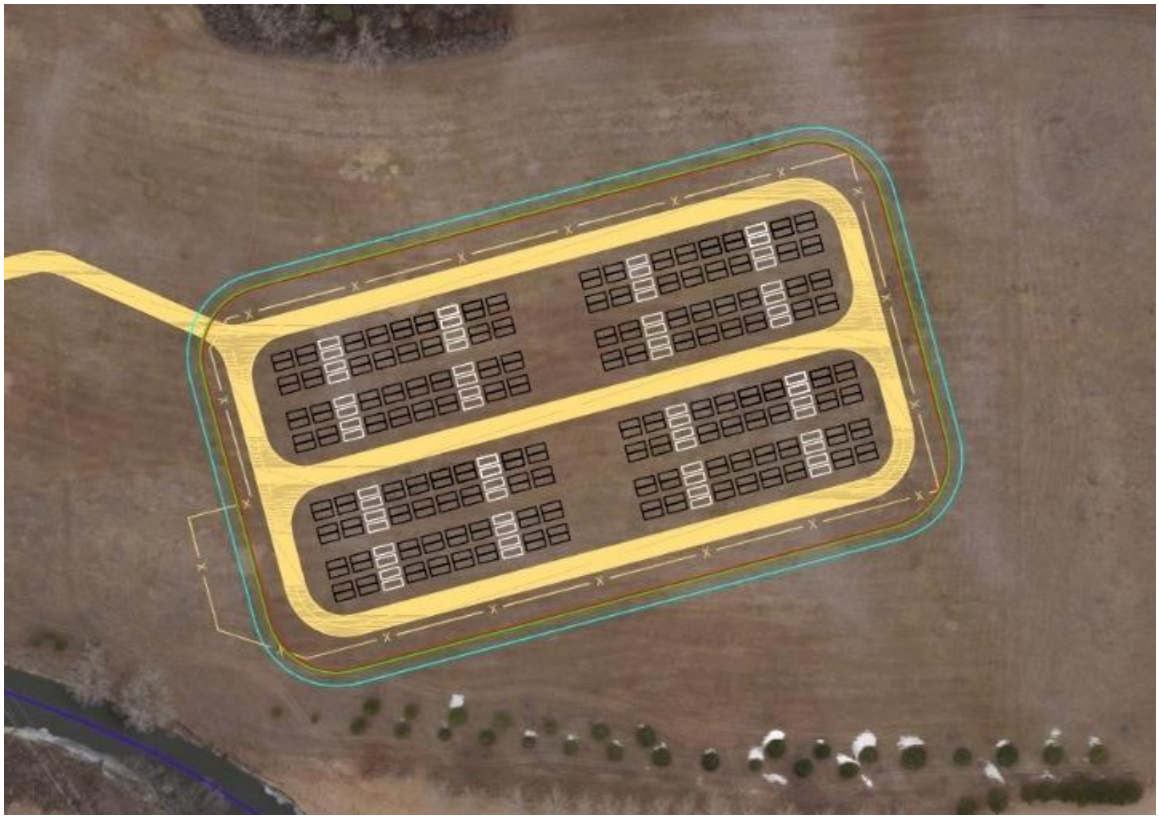
Zoomed in view Side view

Figure 17. Plume extent for a CO concentration of 1,200 ppm and 18 mph



Zoomed in view Side view

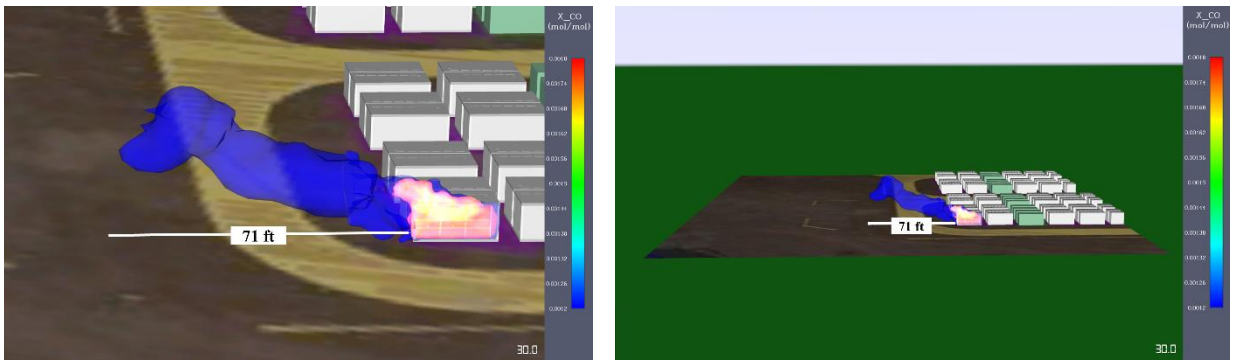
Figure 18. Plume extent for a CO concentration of 1,200 ppm and 26 mph



(**cyan** = 10 mph; **green** = 18 mph; **red** = 26 mph)

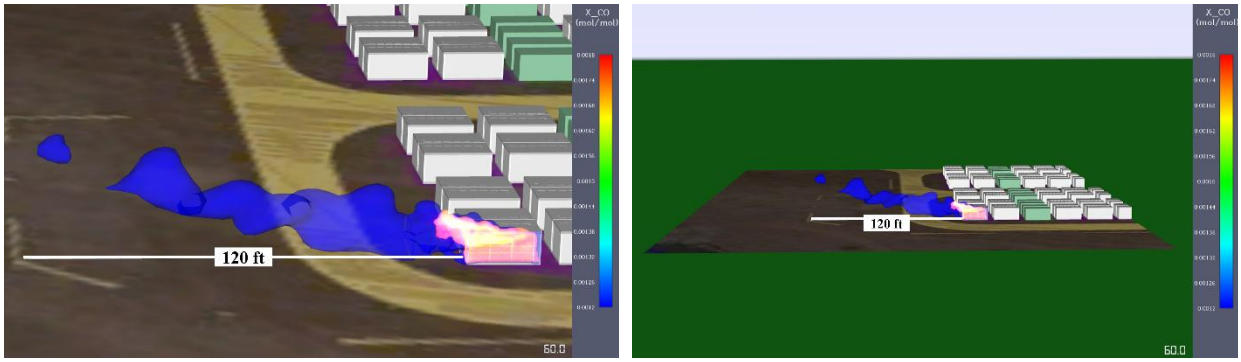
Figure 19. Maximum plume extents for a CO concentration of 1,200 ppm

6.1.3 Scenario 2A



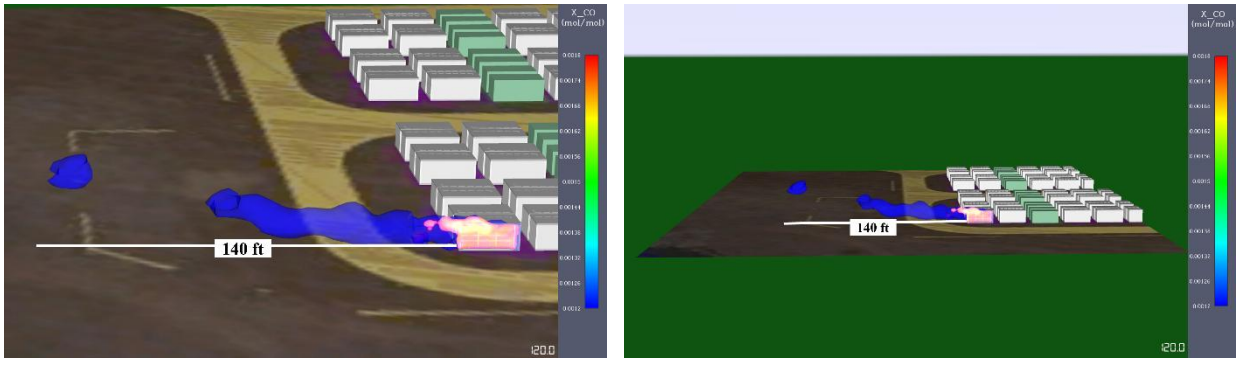
Zoomed in view Side view

Figure 20. Plume extent for a CO concentration of 1,200 ppm and 10 mph



Zoomed in view Side view

Figure 21. Plume extent for a CO concentration of 1,200 ppm and 18 mph



Zoomed in view Side view

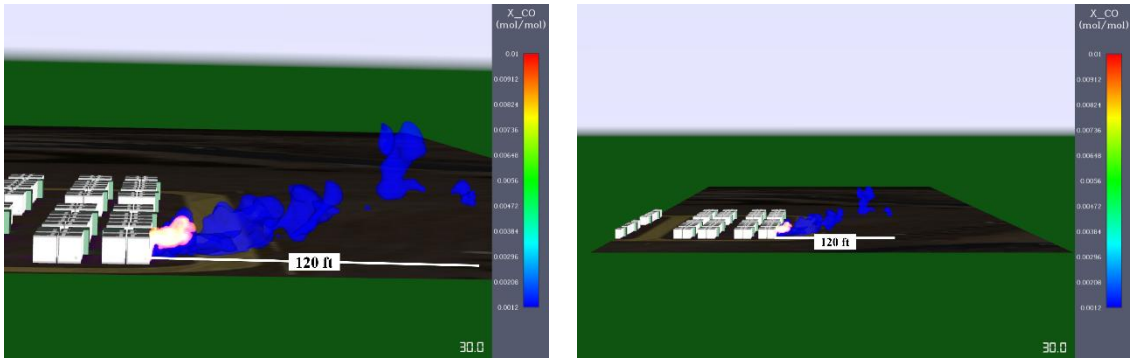
Figure 22. Plume extent for a CO concentration of 1,200 ppm and 26 mph



(cyan = 10 mph; green = 18 mph; red = 26 mph)

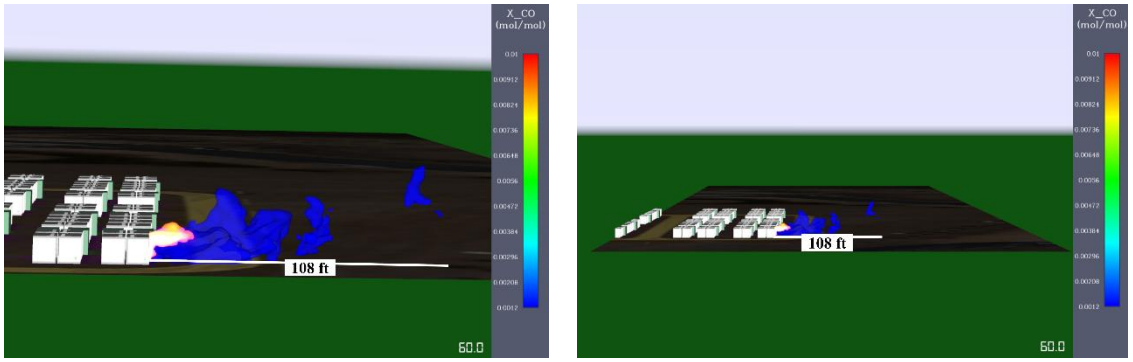
Figure 23. Maximum plume extents for a CO concentration of 1,200 ppm

6.1.4 Scenario 2B



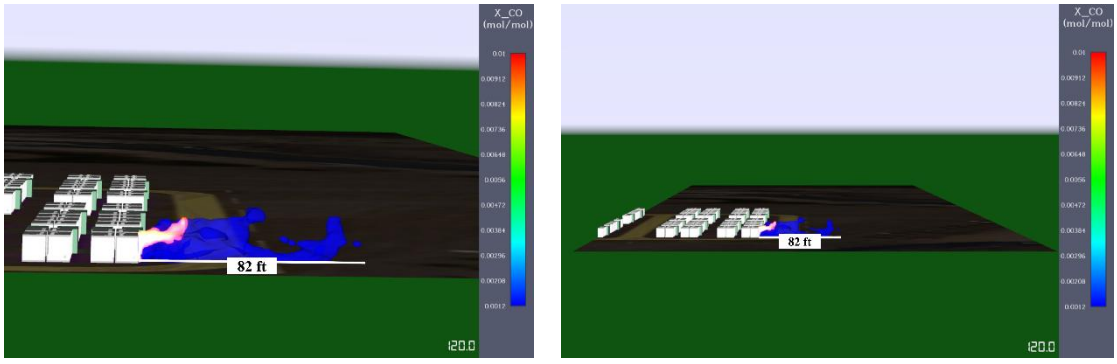
Zoomed in view Side view

Figure 24. Plume extent for a CO concentration of 1,200 ppm and 10 mph



Zoomed in view Side view

Figure 25. Plume extent for a CO concentration of 1,200 ppm and 18 mph



Zoomed in view Side view

Figure 26. Plume extent for a CO concentration of 1,200 ppm and 26 mph



(**cyan** = 10 mph; **green** = 18 mph; **red** = 26 mph)

Figure 27. Maximum plume extents for a CO concentration of 1,200 ppm

6.1.5 Hydrogen Fluoride

Potential hydrogen fluoride (HF) extents were estimated from modeled CO plume concentrations using an empirical CO:HF plume concentration ratio of 7:1. While CO-HF correlations have not been widely studied, FRA's review of available literature and prior BESS testing experience indicates that CO:HF ratios within this range have been observed during battery fire gas characterization for LSFT testing. Published literature has focused on mass loss rates and associated yields of HF via mass produced per *g* mass consumed, which assumes that all fluorides will form HF and does not account for HF dissolution in water vapor, thermal degradation, adhesion to soot particles or formation of other fluoride compounds known to be produced. A comprehensive literature review and comparison of combustion product yields found the ratio of CO:HF yields by mass ranging from approximately 2:1 to 11:1 as established in comparison tables for combustion product yields (McAllister et al. 2025)[2].

[2] McAllister, J., McCarrick, B., & Zhao, Z. (2025). Environmental and Health Impacts of Thermal Runaway Events in Outdoor Lithium-Ion Battery Energy Storage System Installations. SFPE Foundation Report June 2025

Additionally, Sturk et al. (2019)[3] found that traditional HF sample methods using wash bottles to determine fluoride mass overpredicted HF quantities produced by a factor of two due to treating all soluble fluorinated species as HF. Accordingly, applying a CO:HF plume concentration ratio of 7:1 to estimate HF concentrations at the 30 ppm IDLH threshold is expected to yield conservative results, consistent with the overall methodology of this analysis and representing the most reasonable approach available within the scope of the modeling.

The HF concentrations derived from CO correlations briefly exceeded the 30 ppm IDLH threshold within the plume during peak combustion periods but diminished rapidly with downwind distance due to atmospheric dilution and dispersion (Table 7). Peak HF concentrations at the site boundary were estimated based on coincidence CO concentrations and evaluated at the same measurement heights. For both peak CO and HF, the primary plume heights exceeded 6 ft (1.8 m) the representative level for human occupancy at the site boundary, further reducing potential exposure at ground level.

Table 7 also shows horizontal distances of HF concentrations at the IDLH threshold levels reaching the human occupancy height, recognizing that these values are conservative and may vary depending on site topography and local airflow patterns. The maximum predicted extent of HF at the human occupancy height was approximately 123 ft (37.3 m) for the most conservative case (Scenario 2B). This suggests that while transient HF concentrations above the IDLH threshold may occur near the source and within the immediate vicinity of the fire, they are not expected to extend beyond the site property boundary.

Table 7. Extent of HF Reaching Human Occupancy Height and Peak Concentrations at the Nearest Site Boundary

Scenarios	Extent of HF downwind towards the site boundary reaching human occupancy height (ft)	Instantaneous transient peak concentrations at nearest site boundary (ppm)
	7:1 ratio	7:1 ratio
1A	80 (24.2m)	105
1B	65 (19.9m)	82
2A	98 (29.7m)	110
2B	123 (37.3m)	102

Values in parentheses are the extent of HF downwind towards the site boundary in meters and reaching human occupancy height

[3] Sturk, D., Rosell, L., Blomqvist, P., & Ahlberg-Tidblad, A. (2019). Analysis of li-ion battery gases vented in an inert atmosphere thermal test chamber. Batteries, 5(3):61.

6.2 Carbon Dioxide Concentration for Scenarios 1A, 1B, 2A, and 2B

The analysis of CO_2 concentrations was conducted with respect to the IDLH threshold level of 40,000 ppm for an exposure duration of 30 minutes [9]. No AEGL thresholds are defined for CO_2 as it is a naturally occurring, non-flammable gas that poses health hazards primarily through oxygen displacement.

The modeled scenarios examine the behavior of post-combustion CO_2 released during a fully involved BESS fire, with a prevailing downwind direction toward the nearest site boundary. Figure 28 through 43 illustrate the regions where CO_2 concentrations exceed the 40,000 ppm IDLH threshold for the three wind-speeds evaluated; 10 mph, 18 mph, and 26 mph. Figures 31, 35, 39, and 43 display the bounding extents of the CO_2 IDLH plume emanating from an initiating BESS cabinet depicted in the site plan under varying wind directions corresponding to Scenarios 1A, 1B, 2A, and 2B, respectively. Each figure was developed by drawing the radii of maximum impact at the corner BESS cabinets and tracing these around the site to represent the potential downwind influence of elevated CO_2 concentrations.

The spatial distributions indicate that the wind-driven flame tilt enhances near-surface gas accumulation, causing CO_2 to remain close to the ground before dispersing laterally. However, due to its density and rapid dilution, the CO_2 plume dissipates quickly with distance from the source. Table 8 summarizes the horizontal extent of CO_2 spread downwind and the corresponding peak concentrations observed at the nearest site boundary.

Across all scenarios, the extent of CO_2 does not exceed 16 ft (5 m) from the initiating container, suggesting that elevated CO_2 concentrations remain confined to the immediate fire origin. For Scenario 1B, the CO_2 plume is largely retained near the deflagration vent panels on top of the initiating container, with minimal downwind transport at 18 and 26 mph. The peak concentrations measured at the nearest boundary were significantly diluted to approximately 4% of the 40,000 ppm IDLH threshold, corresponding to average values between 1,292 and 1,618 ppm. This concentration range poses negligible short-term toxicity risks at outdoor boundaries.

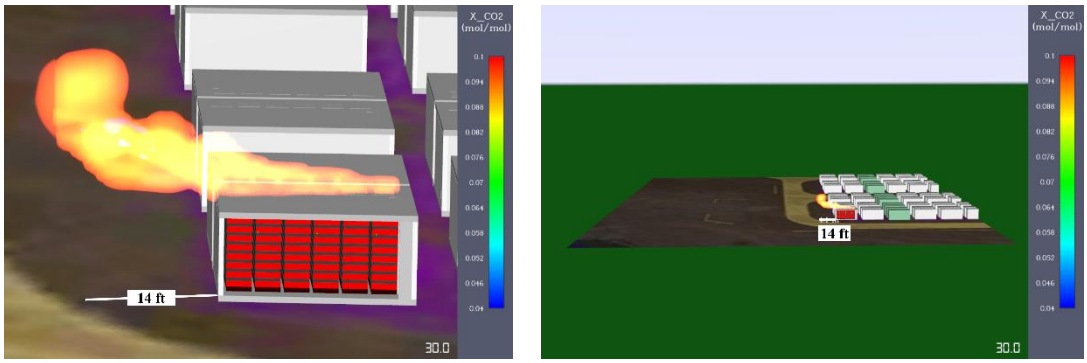
Furthermore, the limited extent of the CO_2 plume highlights that buoyancy effects dominate over wind entrainment for this gas species, leading to vertical rise and localized accumulation above the source rather than long-range transport. These findings are consistent with the expected behavior of CO_2 as a dense combustion byproduct that rapidly disperses through atmospheric mixing.

Table 8. Extent of CO2 and Peak Concentrations to the Nearest Boundary

Scenarios	Extent of CO_2 downwind towards the site boundary (ft)			Peak concentration at the site boundary (ppm)
	10 mph	18 mph	26 mph	
1A	14 (4.1 m)	15 (4.7 m)	16 (4.8 m)	1600
1B	10 (2.9 m)	0 (0.0 m)	0 (0.0 m)	1292
2A	7 (2.2 m)	11 (3.4 m)	10 (2.9 m)	1618
2B	15 (4.6 m)	11 (3.4 m)	16 (4.9 m)	1557

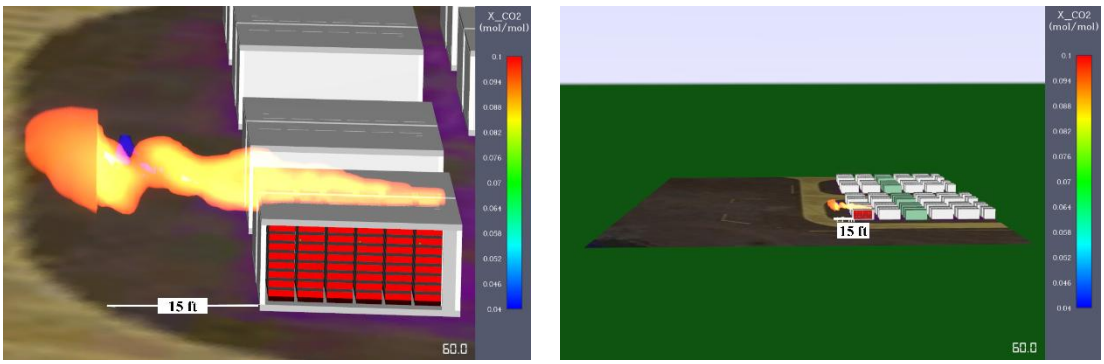
Values in parentheses are the extent of CO_2 downwind towards the site boundary in meters

6.2.1 Scenario 1A



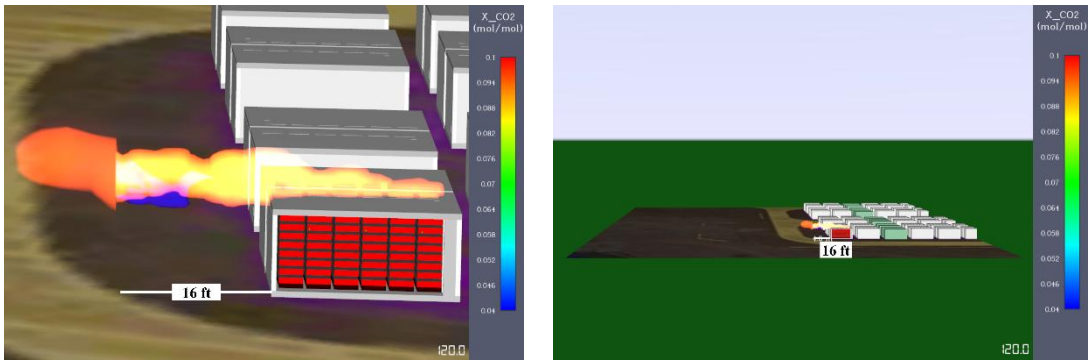
Zoomed in view Side view

Figure 28. Plume extent for a CO_2 concentration of 40,000 ppm and 10 mph



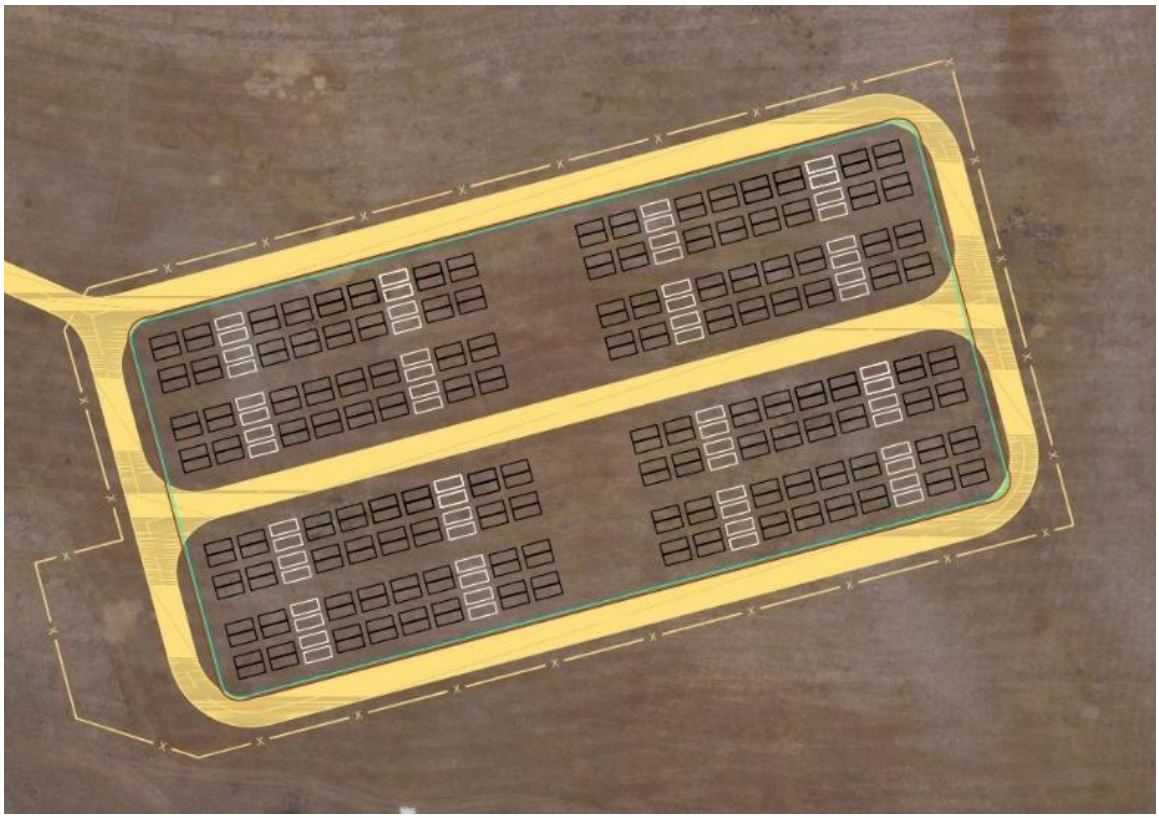
Zoomed in view Side view

Figure 29: Plume extent for a CO_2 concentration of 40,000 ppm and 18 mph



Zoomed in view Side view

Figure 30. Plume extent for a CO_2 concentration of 40,000 ppm and 26 mph

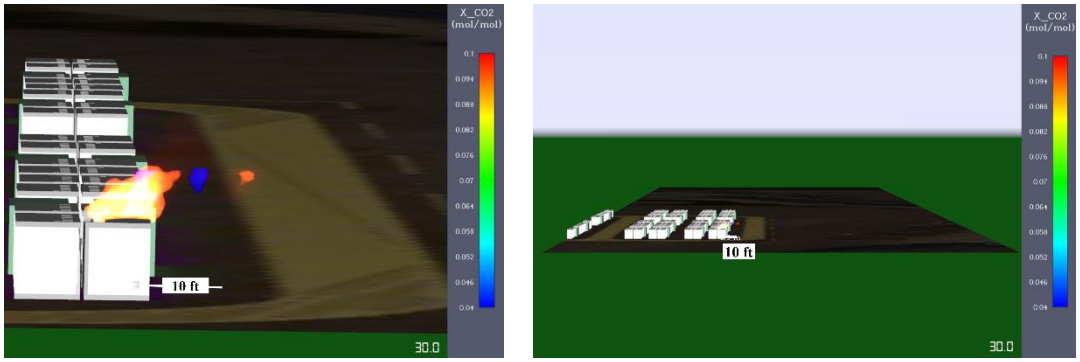


(cyan = 10 mph; green = 18 mph; red = 26 mph)[4]

Figure 31. Maximum plume extents for a CO_2 concentration of 40,000 ppm

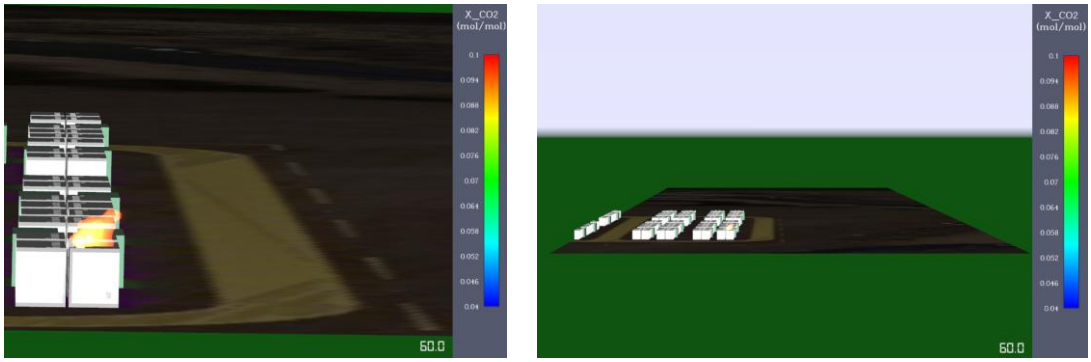
[4] Note that the maximum CO_2 extents for this scenario do not differ greatly by wind speed, hence the close grouping of each line and subsequent appearance of only a single line.

6.2.2 Scenario 1B



Zoomed in view Side view

Figure 32. Plume extent for a CO_2 concentration of 40,000 ppm and 10 mph



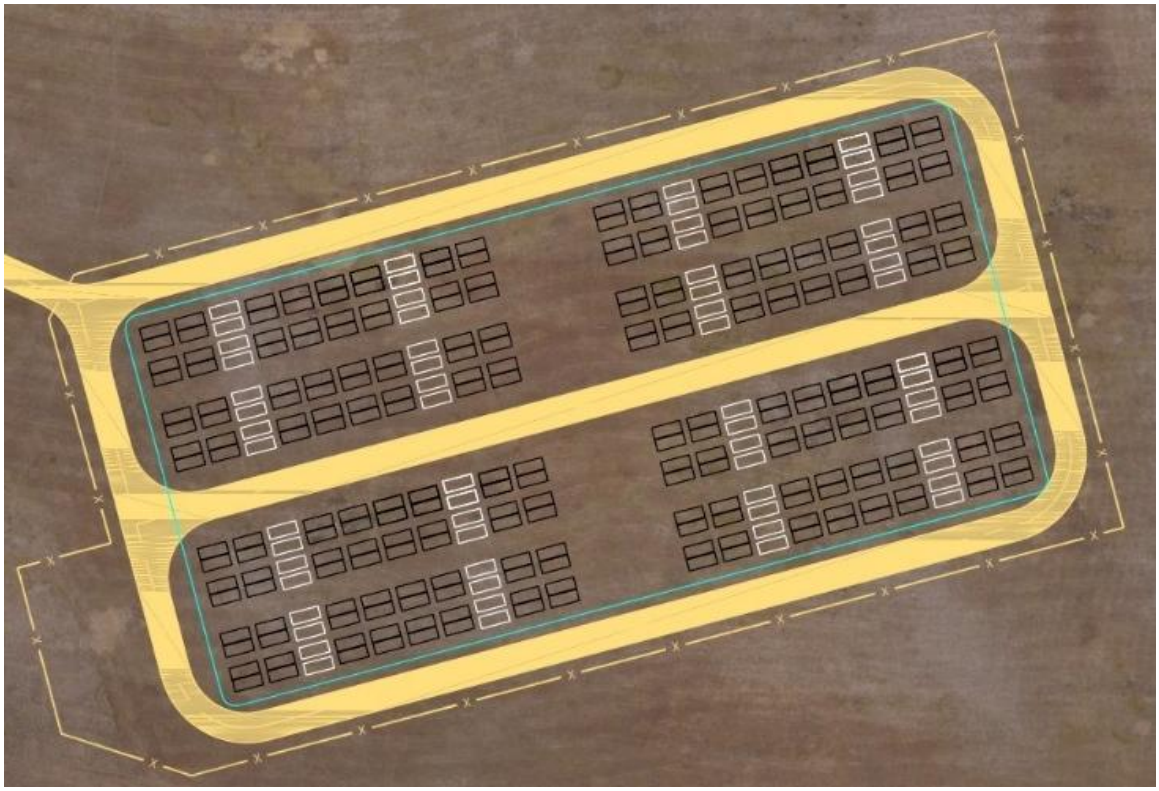
Zoomed in view Side view

Figure 33. Plume extent for a CO_2 concentration of 40,000 ppm and 18 mph



Zoomed in view Side view

Figure 34. Plume extent for a CO_2 concentration of 40,000 ppm and 26 mph

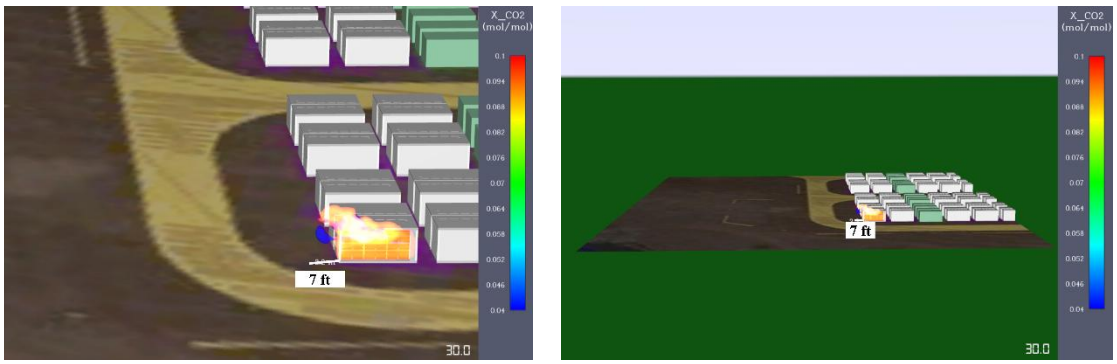


(cyan = 10 mph)[5]

Figure 35. Maximum plume extents for a CO_2 concentration of 40,000 ppm

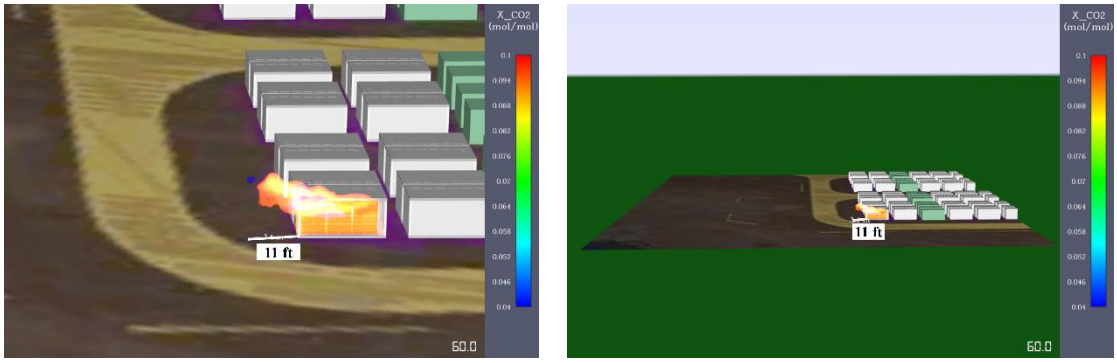
[5] Note that only results for the 10 mph wind speed are shown for this sub-scenario as plumes associated with the 18 mph and 26 mph wind speeds do not extend beyond the initiating BESS.

6.2.3 Scenario 2A



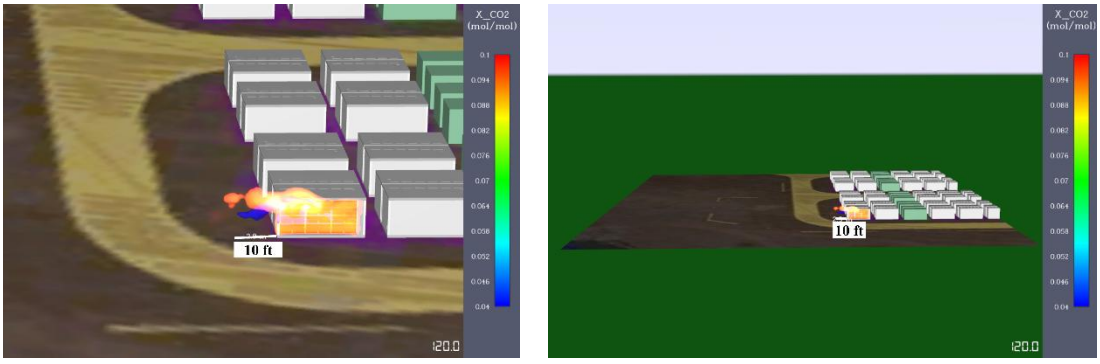
Zoomed in view Side view

Figure 36. Plume extent for a CO_2 concentration of 40,000 ppm and 10 mph



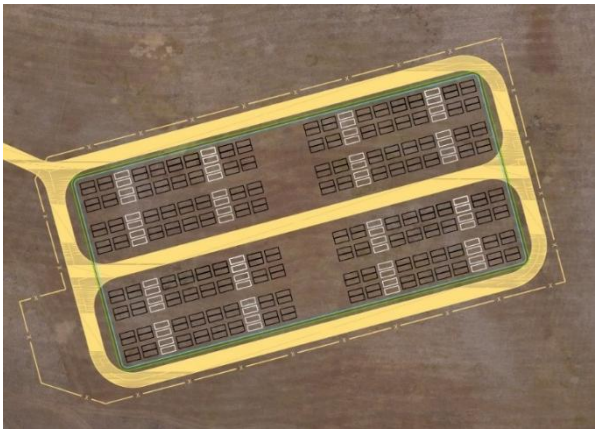
Zoomed in view Side view

Figure 37. Plume extent for a CO_2 concentration of 40,000 ppm and 18 mph

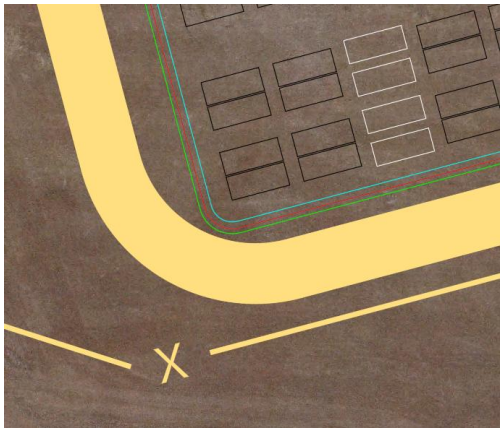


Zoomed in view Side view

Figure 38. Plume extent for a CO_2 concentration of 40,000 ppm and 26 mph



Full site

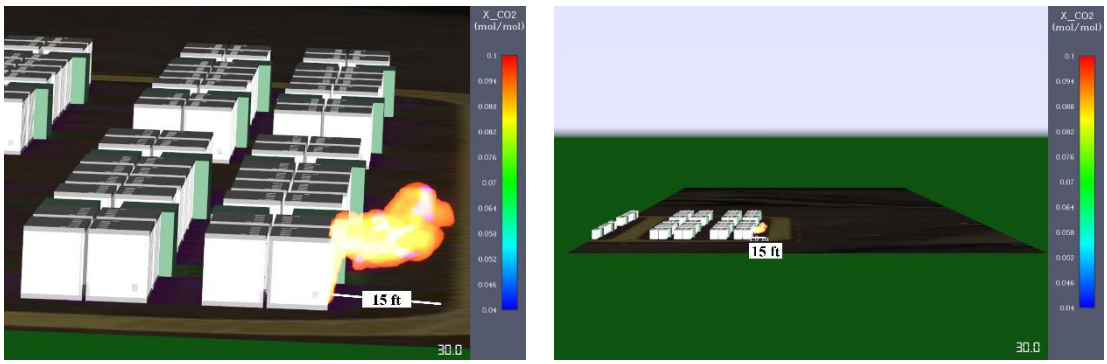


Southwest corner of proposed site

(**cyan** = 10 mph; **green** = 18 mph; **red** = 26 mph)

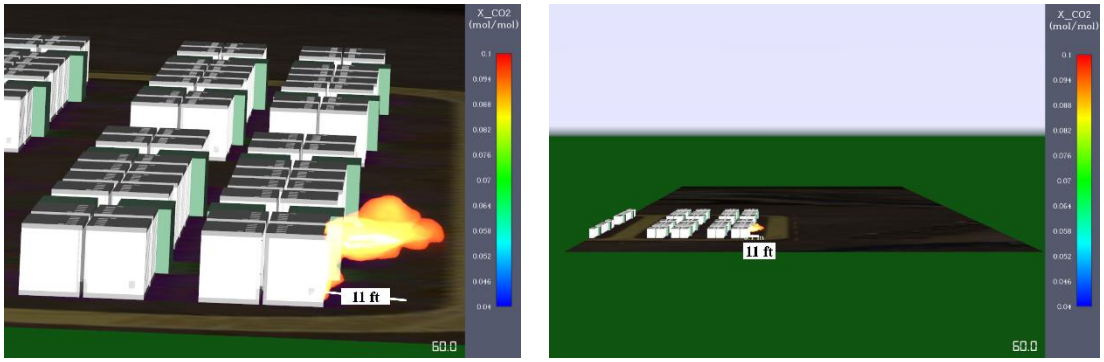
Figure 39. Maximum plume extents for a CO_2 concentration of 40,000 ppm

6.2.4 Scenario 2B



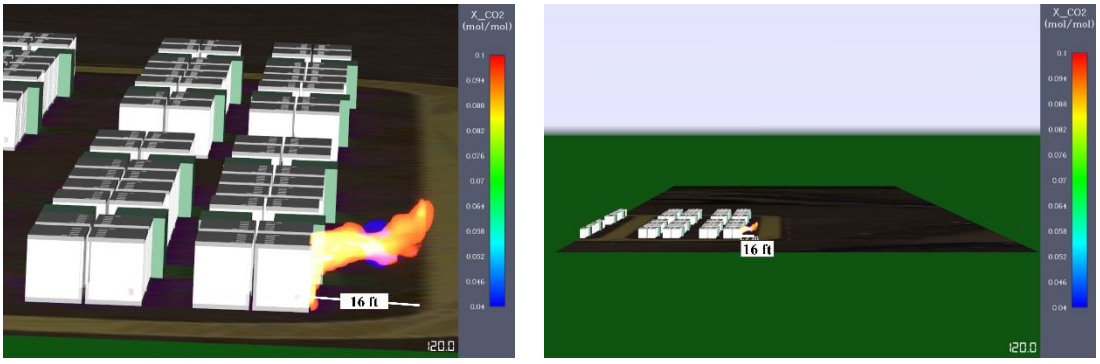
Zoomed in view Side view

Figure 40. Plume extent for a CO_2 concentration of 40,000 ppm and 10 mph



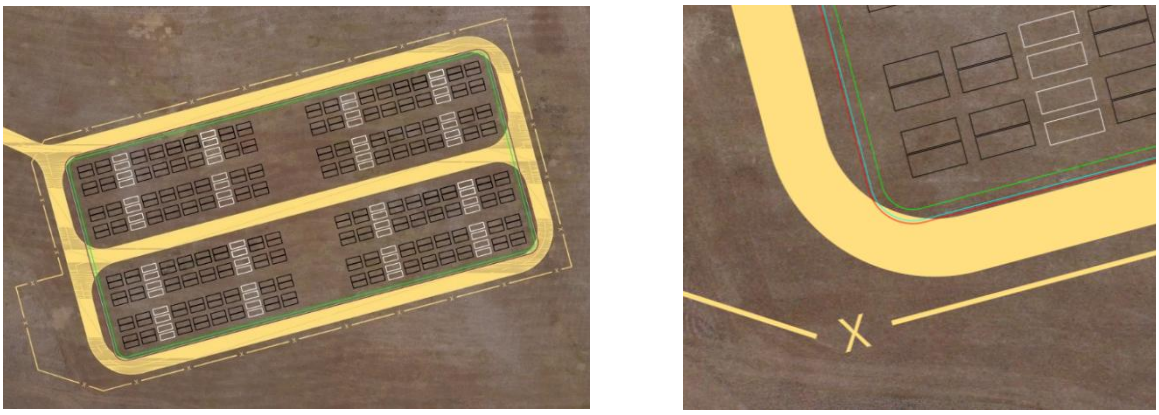
Zoomed in view Side view

Figure 41. Plume extent for a CO_2 concentration of 40,000 ppm and 18 mph



Zoomed in view Side view

Figure 42. Plume extent for a CO_2 concentration of 40,000 ppm and 26 mph



Full site Southwest corner of proposed site

(**cyan** = 10 mph; **green** = 18 mph; **red** = 26 mph)

Figure 43. Maximum plume for a CO_2 concentration of 40,000 ppm

6.3 Soot Visibility for Scenarios 1A, 1B, 2A, and 2B

Visibility refers to the distance at which an observer can clearly distinguish an object against its background. In this analysis, a visibility distance of 33 ft (10 m) was used as the tenability criterion, a widely accepted threshold for maintaining visual recognition of critical features such as exit signs, doors, and wall boundaries during fire events. When visibility falls below 33 ft (10 m), these key features become indiscernible, compromising occupants' ability to orient themselves and locate egress routes, rendering the area untenable for safe evacuation. Additionally, as summarized by Hopke (2014)[6], research has established that the visual range within a smoke plume is directly correlated with the fine particle mass concentrations within the smoke plume, showing a direct correlation between particle mass concentration, light scattering, and visibility.

In practical terms, regions within the 33 ft (10 m) visibility contour are classified as high-hazard zones, where visual obstruction from smoke can delay or prevent effective escape and exposure to particulates is elevated to levels which may cause irritation or temporary effects.

Figure 44 through 59 illustrate the 33 ft (10 m) visibility threshold for Scenarios 1A, 1B, 2A, and 2B for three wind-speeds; 10 mph, 18 mph, and 26 mph. Figures 47, 51, 55, and 59 display the bounding extents of the 33 ft (10 m) visibility threshold for the smoke plume associated with an initiating BESS fire at any cabinet located onsite. Each figure was generated by drawing the radii of maximum impact at the corner BESS cabinets and tracing these around the site to delineate the areas potentially affected by reduced visibility. Collectively, these figures illustrate the potential maximum plume extents for the entire site under different modeled scenarios.

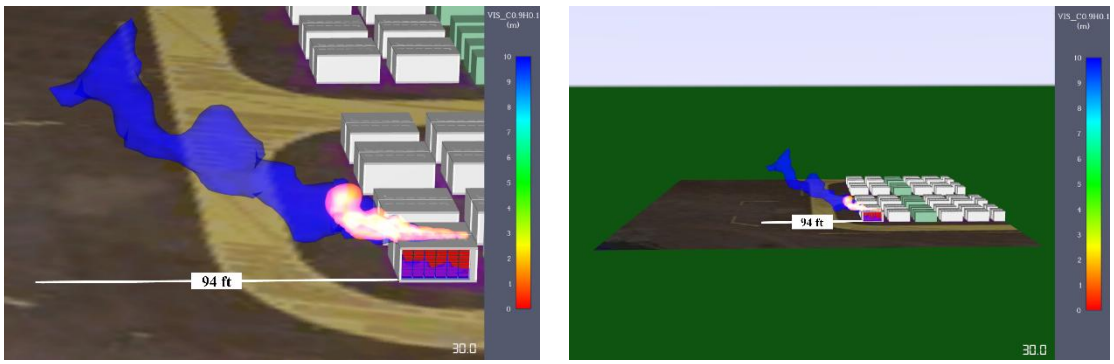
The visualizations display plume inclination due to wind causing reduced visibility zones to extend laterally along the direction of the flame tilt, with more pronounced ground-level obscuration under higher wind speeds. These effects are especially evident for Scenarios 1B and 2B, where the flame and smoke are deflected toward the downwind side of the site.

Regions outside the 33 ft (10 m) isosurface exhibit visibility greater than 33 ft (10 m), indicating potential safety for egress, fire-fighting access, and lower density of fine particulates. The delineation between the < 33 ft (10 m) and > 33 ft (10 m) visibility zones provides a useful spatial reference for assessing plume impact on on-site tenability and identifying safe evacuation zones.

It is considered good practice to compare these modeled visibility fields against building and fire safety design requirements for smoke control and plume spread to ensure compliance with NFPA 130 [8] and related egress tenability guidelines. Such comparisons can inform emergency response planning and placement of muster points or protected escape routes within and around the site.

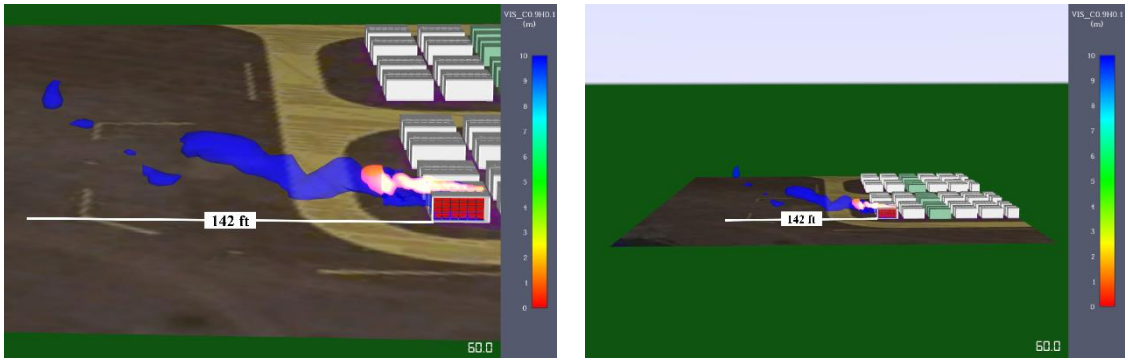
[6]Hopke, P. Visibility and Particulate Air Pollution. Center for Air Resources and Science. Clarkson University 2014

6.3.1 Scenario 1A



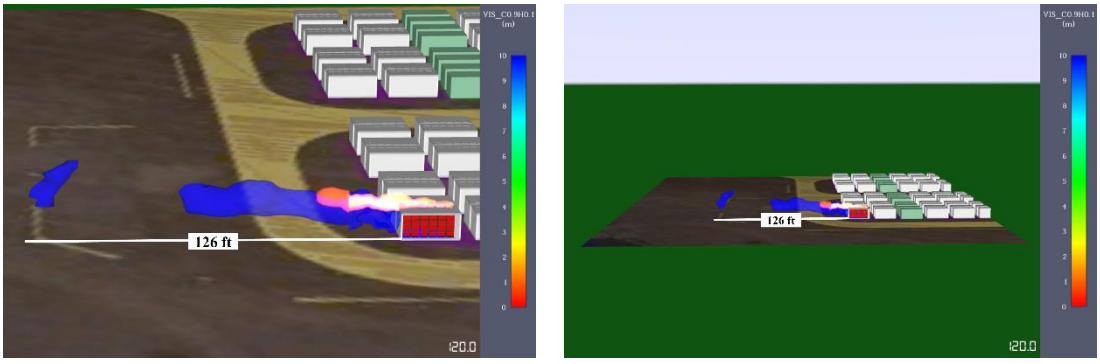
Zoomed in view Side view

Figure 44. Plume extent for soot visibility of 33 ft (10 m) at 10 mph



Zoomed in view Side view

Figure 45. Plume extent for soot visibility of 33 ft (10 m) at 18 mph



Zoomed in view Side view

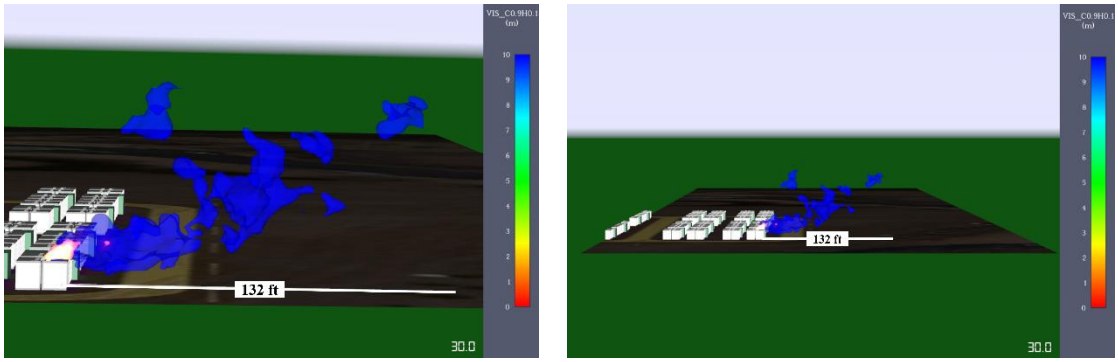
Figure 46. Plume extent for soot visibility of 33 ft (10 m) at 26 mph



(cyan = 10 mph; green = 18 mph; red = 26 mph)

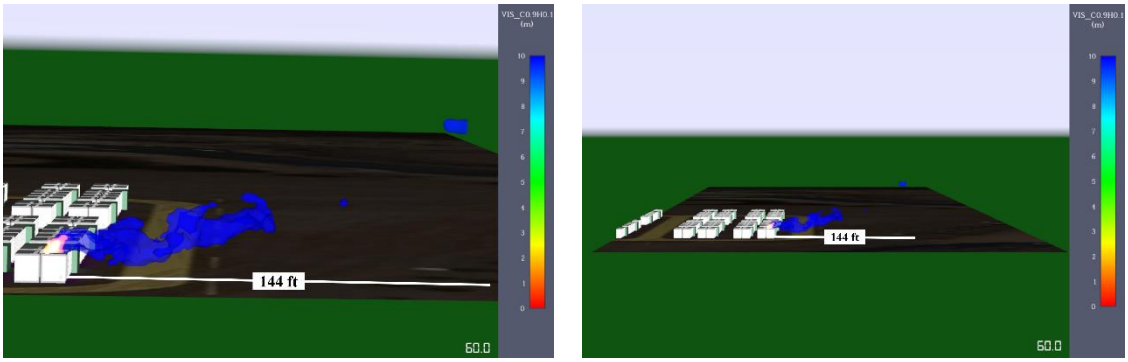
Figure 47. Maximum plume extent for soot visibility of 33 ft (10 m)

6.3.2 Scenario 1B



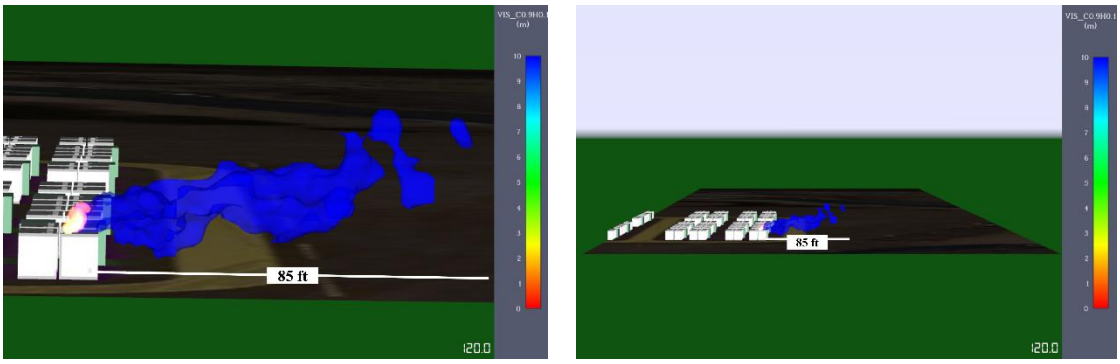
Zoomed in view Side view

Figure 48. Plume extent for soot visibility of 33 ft (10 m) at 10 mph



Zoomed in view Side view

Figure 49. Plume extent for soot visibility of 33 ft (10 m) at 18 mph



Zoomed in view Side view

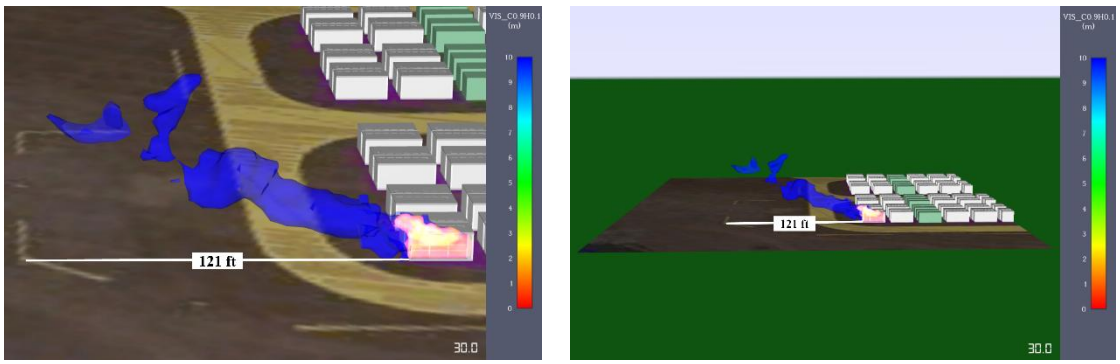
Figure 50. Plume extent for soot visibility of 33 ft (10 m) at 26 mph



(cyan = 10 mph; green = 18 mph; red = 26 mph)

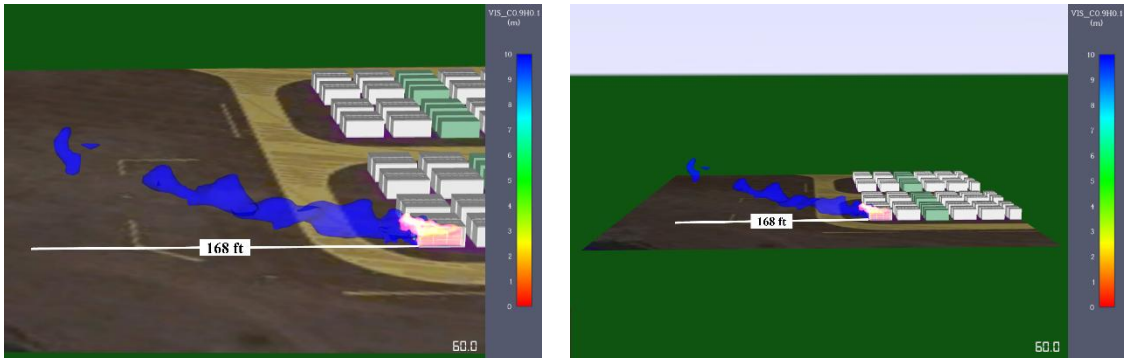
Figure 51. Maximum plume extent for soot visibility of 33 ft (10 m)

6.3.3 Scenario 2A



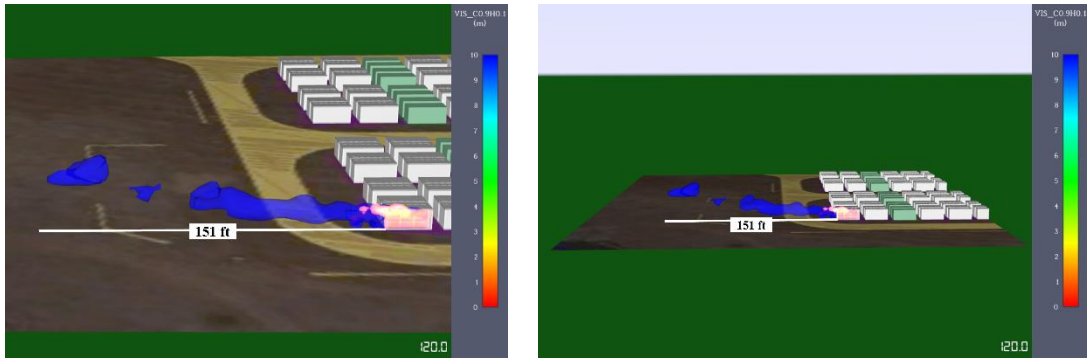
Zoomed in view Side view

Figure 52. Plume extent for soot visibility of 33 ft (10 m) at 10 mph



Zoomed in view Side view

Figure 53. Plume extent for soot visibility of 33 ft (10 m) at 18 mph



Zoomed in view Side view

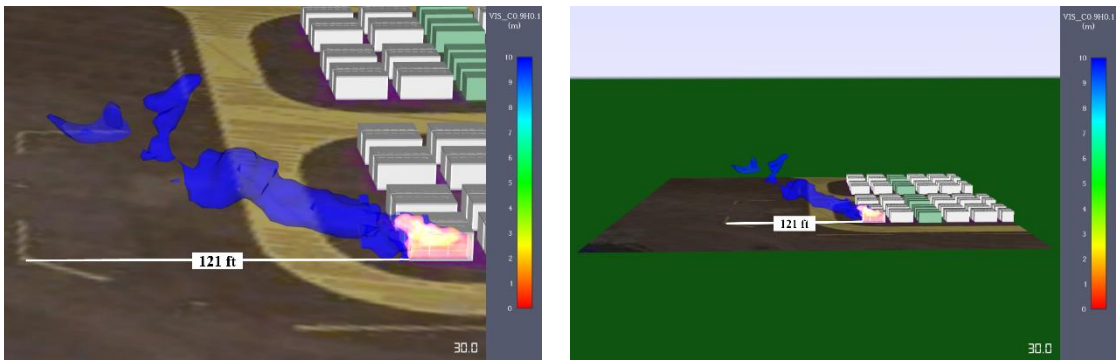
Figure 54. Plume extent for soot visibility of 33 ft (10 m) at 26 mph



(**cyan** = 10 mph; **green** = 18 mph; **red** = 26 mph)

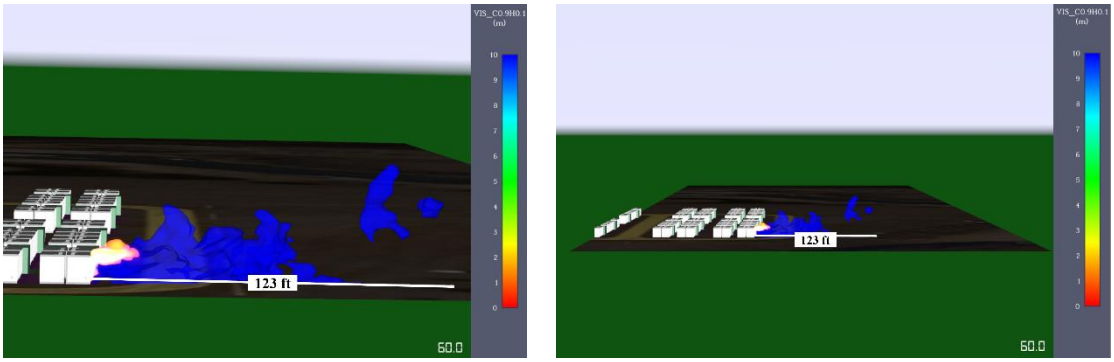
Figure 55. Maximum plume extent for soot visibility of 33 ft (10 m)

6.3.4 Scenario 2B



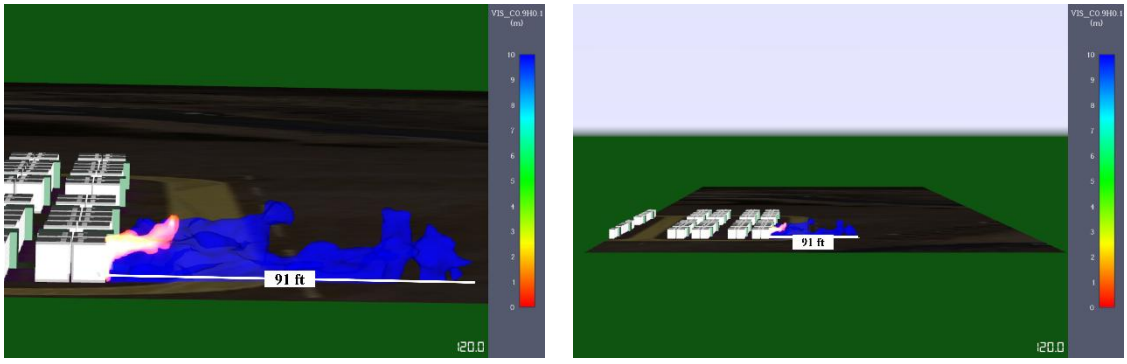
Zoomed in view Side view

Figure 56. Plume extent for soot visibility of 33 ft (10 m) at 10 mph



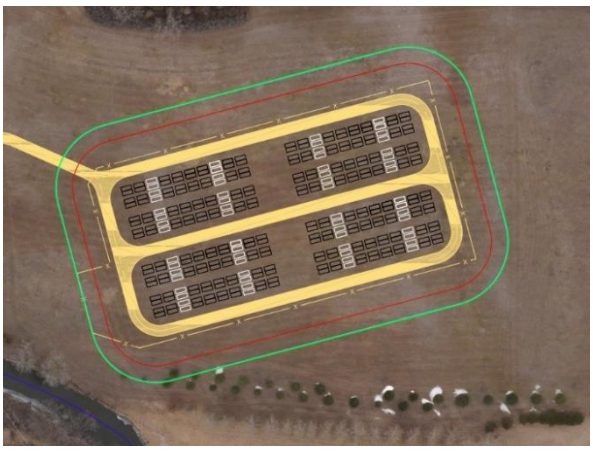
Zoomed in view Side view

Figure 57. Plume extent for soot visibility of 33 ft (10 m) at 18 mph

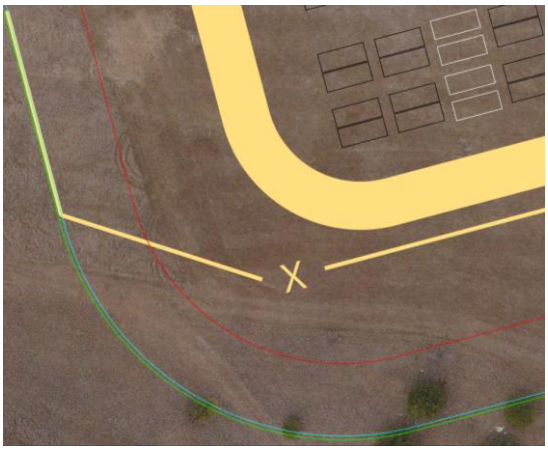


Zoomed in view Side view

Figure 58: Plume extent for soot visibility of 33 ft (10 m) at 26 mph



Full site



Southwest corner of proposed site

(**cyan** = 10 mph; **green** = 18 mph; **red** = 26 mph)

Figure 59. Maximum plume extents for soot visibility of 33 ft (10 m)

6.3.5 Atmospheric Deposition

Atmospheric deposition of soot or other particles was not assessed for this analysis as an evaluation would require the modeling of both dry and wet deposition mechanisms based on atmospheric conditions which falls outside of the capabilities of FDS or other fire models. Dry deposition occurs through gravitational settling and turbulent diffusion, where particles gradually settle out of the plume and accumulate on ground surfaces. Wet deposition involves the interaction of soot particles with atmospheric moisture or precipitation, causing them to be scavenged and removed from the air column. A dispersion framework such as AERMOD or a similar atmospheric transport model is typically required to account for these processes, incorporating the particle size distribution of soot and other particulates emitted during combustion.

Because the modeled soot cloud remained relatively low, localized and short-lived, soot accumulation is expected to be limited primarily to near-field ground contact close to the source, with residual surface soot present only within the immediate impact area. Beyond this region, atmospheric mixing and dispersion are expected to rapidly dilute and dissipate the soot concentration. In this plume analysis, no heavy metals or other toxic particulates were identified; therefore, deposition was assumed to consist primarily of carbon-based soot (ash).

7.0 SUMMARY OF FINDINGS

This fire modeling and plume analysis for Midwater BESS, LLC was conducted to address two primary scopes: (1) large-scale fire testing; and (2) plume analysis modeling. FDS was used to evaluate the potential impacts of a fully involved BESS fire involving the Sungrow PT2 lithium-ion system. The analysis was conducted for the proposed Midwater BESS facility in Freeborn County, Minnesota. The objective was to characterize fire behavior, combustion product dispersion, and potential off-site impacts under varying wind profiles and enclosure configurations representative of realistic failure modes using the Fire Dynamics Simulator, a widely used fire driven fluid flow CFD model.

7.1 LSFT Correlation Model and HRR Development

The LSFT correlation model was performed to establish a representative HRR and fire source term for use in the plume analysis. This process involved iterative comparison of modeled results with data from the LSFT report to ensure that the fire source term would reflect a conservative worst-case BESS fire scenario.

The LSFT was conducted in accordance with CSA TS-800:24, which, at the time of testing, served as an accepted testing standard and guidance document to support Authority Having Jurisdiction (AHJ) review for BESS installations. While the test was compliant with CSA TS-800:24 procedures, evaluation of the test events and recorded data indicated that the LSFT was not representative of a worst-case outdoor BESS fire scenario as defined by the 2026 edition of NFPA 855, primarily due to significant oxygen limitation associated with the enclosed test configuration.

The lack of sufficient air entrainment within the test container resulted in incomplete combustion, an extended fire duration of approximately 19.5 hours, and multiple extinguishment–reignition cycles accompanied by several deflagration events. One such reignition led to a major deflagration approximately four hours into the test, which dislodged the integrated control cabinet wall and damaged the adjacent container, thereby further compromising the validity of the test for worst-case fire characterization.

The impacts of oxygen limitation on the LSFT, which confounded interpretation of the test data, are summarized as follows:

- Slowed fire development, limiting fire intensity relative to a fully ventilated fire.
- Incomplete combustion, evidenced by a reduced CO_2-to-CO ratio and elevated soot production.
- A large deflagration event that caused severe structural damage to the initiating container and increased heat exposure to target containers beyond what would be expected under steady, well-ventilated burning conditions.

NFPA 855 (2026) Section G.11.6 specifies that designed deflagration pressure relief areas should be open from the beginning of the test to avoid oxygen-limited conditions, as such, only LSFT

data from the first four hours prior to the large deflagration event were considered suitable for qualitative comparison with the fire source term development model. Although the available comparison window was limited, modeled thermal impacts to the initiating and target BESS enclosures showed alignment with observed damage patterns documented in the LSFT report.

Based on this evaluation, a peak HRR of 21.1 MW was selected for use in the plume analysis. This value was calculated based on established conversions from the total electrical energy of the PT2 to combustion energy and assumed a five-hour fire duration, representing a conservative estimate for a fully involved, non-oxygen-limited outdoor BESS fire. While data from a fully developed, non-oxygen-limited LSFT would have been preferable, the available test data, combined with conservative assumptions and observed alignment between modeled and test results, support the use of the selected HRR. The estimated HRR of 21.1 MW was distributed evenly across module faces to simulate total cabinet involvement, and modeled weather conditions were consistent with those reported in the LSFT. For a full description of the LSFT and corresponding model, refer to Appendix A.

7.2 Plume Analysis

The plume analysis focused on downwind impacts from a fully developed BESS fire initiated by a thermal runaway event leading to full involvement. The modeling assessed post-combustion gas dispersion and visibility impacts under several configurations, including:

- open or failed deflagration panels and cabinet doors,
- closed or intact cabinets, and
- three wind speeds and two wind directions representing site-specific meteorological conditions.

These combinations produced multiple simulation scenarios that capture both conservative (worst-case) and typical operating conditions. A summary of the modeled scenarios, including door and deflagration panel status and wind profile parameters, is provided in Table 9 below.

Table 9. Scenarios Modeled in FDS

Scenarios	Status		Wind Profile	
	Deflagration panels	Doors	Direction	Speeds (mph)
1.A	Open	Closed	Northwest	0, 10, 18, 26
1.B	Open	Closed	South	0, 10, 18, 26
2.A	Closed	Open	Northwest	0, 10, 18, 26
2.B	Closed	Open	South	0, 10, 18, 26

For all four modeled fire scenarios (1A, 1B, 2A, and 2B), the following findings were observed:

7.2.1 Carbon Monoxide (CO):

The 1,200 ppm IDLH extent for CO did not reach the nearest site boundary at a distance of 220 ft (67 m) under any wind condition. Peak CO concentrations at the boundary ranged from approximately 572 to 773 ppm, indicating that more than 50% of the emitted CO was diluted by entrainment and atmospheric mixing before reaching the boundary. These values are below the IDLH threshold and are only transiently within the AEG Level 2-3 range.

7.2.2 Hydrogen Fluoride (HF):

Hydrogen fluoride concentrations were estimated from CO using a CO:HF correlation ratio of 7:1. Under the 7:1 ratio, HF concentrations briefly exceeded the 30 ppm IDLH value within the plume core but did not persist for 30 minutes, and the extents were contained within the CO plume boundaries. As such, HF concentrations above the IDLH threshold were transient and localized, indicating that hazardous exposures are unlikely to occur beyond the site perimeter.

7.2.3 Carbon Dioxide (CO_2):

CO_2 concentrations remained below the 40,000 ppm IDLH threshold and did not reach the site boundary for any scenario. Elevated CO_2 concentrations were confined to within approximately 16 ft (5 m) of the initiating container and dissipated rapidly due to buoyant rise and atmospheric dispersion.

7.2.4 Visibility (Tenability at 33 ft (10 m)):

Regions of reduced visibility (<33 ft (10 m)) were observed immediately downwind of the fire plume, particularly under higher wind conditions where the flame tilt caused increased ground-level smoke. These low-visibility zones indicate areas of limited tenability; however, regions beyond the 33 ft (10 m) visibility retained visibility levels adequate for safe evacuation and emergency response access.

7.2.5 Plume Analysis Summary

Overall, the analysis demonstrates that toxic gas concentrations and soot visibility impairments diminish rapidly with distance from the source, and hazardous exposure limits are not sustained at or beyond the site boundary for any modeled scenario. The study concludes that, under the evaluated conditions, no off-site tenability or acute inhalation risks are anticipated, and the results are consistent with observed behaviors from LSFT and established FDS modeling principles. Although this analysis was conducted based on the BESS container closest to the property boundary, these conclusions apply regardless of the location of a hypothetical initiating BESS container. This report and its supporting plume analysis are intended to assist the Fire Code Official, Authority Having Jurisdiction, and other project stakeholders in the review of the proposed Midwater BESS design and emergency response planning, ensuring compliance with applicable fire safety codes and standards.

Reference Materials

[1] National Fire Protection Association, "NFPA Glossary of Terms," 2024. [Online]. Available: https://www.nfpa.org/downloadable-resources/definitions/nfpa-glossary-of-terms. [Accessed December 2025].

[2] DNV China Company Limited , "Sungrow Battery Energy Storage System (BESS) PowerTitan 2.0. Large Scale Burn Test Report," Sungrow Power Supply Co., Ltd., 2025.

[3] National Fire Protection Association, "NFPA 855 Standard for the Installation of Stationary Energy Storage Systems," NFPA, 2023.

[4] Underwriters Laboratories, "UL 9540A Test Method for Evaluating Thermal Runaway Fire Propogation in Battery Energy Storage Systems," UL, 2019.

[5] TÜV Rheinland, "UL 9540 Module Level Test," Sungrow Power Supply Co., Ltd., 2023.

[6] National Fire Protection Association, "NFPA 68 Standard on Explosion Protection by Deflagration Venting," NFPA, 2018.

[7] National Fire Protection Association, "NFPA 69 Standard on Explosion Prevention Systems," NFPA, 2019.

[8] National Fire Protection Association, "NFPA 130 Standard for Fixed Guideway Transit and Passenger Rail Systems," NFPA, 2020.

[9] NIOSH (National Institute of Occupational Safety and Health), "Immediately Dangerous To Life or Health (IDLH) Values," CDC, 1996. [Online]. Available: https://www.cdc.gov/niosh/idlh/intridl4.html. [Accessed 17 October 2025].

[10] CCIC-CSA International Certification (Kunshan Branch) Co., Ltd., "CALB Model L173F314 UL 9540A Cell Level Test Report," CALB Group Co., Ltd., 2023.

[11] TÜV Rheinland, "UL 9540 Unit Level Test Report," Sungrow Power Supply Co., Ltd., 2023.

[12] Sungrow Power Supply Co., Ltd., "ST5015UX-2H-US/ST5015UX-4H-US," Sungrow Power Supply Co., Ltd., 2023.

[13] K. McGrattan, S. Hostikka, J. Floyd, R. McDermott, M. Vanella, E. Mueller and C. Paul, "Fire Dynamics Simulator," NIST, 2025.

[14] Midwestern Regional Climate Center, "(2000-2025) Wind and Temperature data - Midwestern States.," MRCC, 2025.

[15] ASHRAE, "ashrae-meteo," [Online]. Available: https://ashrae-meteo.info/v2.0/. [Accessed 2025].

[16] National Research Council (US) Committee on Acute Exposure Guideline Levels, "Carbon Monoxide Acute Exposure Guidelines Levels," National Academy Press (US), 2010. [Online]. Available: https://www.ncbi.nlm.nih.gov/books/NBK220007/. [Accessed 17 October 2025].

[17] World Health Organization, "WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide," WHO, 2021.

[18] J. G. Mayonado, J. E. Ouaragli, S. Flibbert, S. Kraft, J. Lebowitz, J. Hodges and J. Conzen, "Advancing Li-Ion BESS Safety: Comprehensive Testing and Meta-Analysis for Optimized Hazard Mitigation," 2024.

8.0 DISCLAIMER

It must be stated that a change in the assumptions and conditions outlined in this report may result in significantly different incident heat fluxes and post combustion gas concentrations at targets of interest. A suitable site emergency response plan (ERP) may be developed based on the results presented in this analysis. Furthermore, additional site level analysis may be conducted based on the expected site conditions if necessary.

8.1 Limitations

At the request of Midwater BESS, LLC, FRA performed a plume analysis for the PowerTitan 2.0 (PT2) lithium-ion ESS. The PT2 is a fully integrated BESS consisting of battery units, power electronics, control systems, a battery management system, a thermal management system, fire detection and notification system, and an explosion control system. It is meant for outdoor installations, mounted to the ground, for commercial, industrial, and utility applications. This assessment evaluated the plume dynamics from battery vent gas fire from the PT2 at the proposed Midwater BESS. This analysis is based on one PT2 ESS that contains six units with eight modules each.

The scope of services performed during this analysis may not adequately address the needs of other users of this report, and any re-use of this report or its conclusions presented herein are at the sole risk of the user. The opinions and comments formulated during this assessment are based on observations and information available at the time of the analysis from the UL 9540A and large-scale fire test reports, which were conducted by third-party laboratories and provided to FRA by Midwater BESS, LLC.

Any engineering analysis that utilizes modeling and calculations, such as the one presented in this report, has inherent limitations. While the methodology and assumptions used are based on best practices and available data, there are inherent assumptions made in any analysis and there may be additional uncertainties and unknown factors that can affect the accuracy of the results. Additionally, the analysis is limited by the quality and quantity of the data available at the time of the study. Therefore, the results of this analysis should be interpreted with these limitations in mind and should not be considered as absolute or definitive. No guarantee or warranty as to future performance is expressed or implied.

9.0 APPENDIX A

The CSA TS-800:24 LSFT procedure was conducted on PT2 by DNV China Company, Ltd. at their lab in Puyang, China from October 29, 2024 through October 31, 2024. One initiating and three target cabinets were tested in the configuration shown in Figure A 1, Figure A 2, and Figure A 3 (FDS model). The initiating cabinet, BESS A, included a single initiating module with 16 film heaters installed throughout, and the test was initiated with all doors and deflagration panels closed. Sparking devices were installed throughout the initiating cabinet, set to spark every 10 seconds.

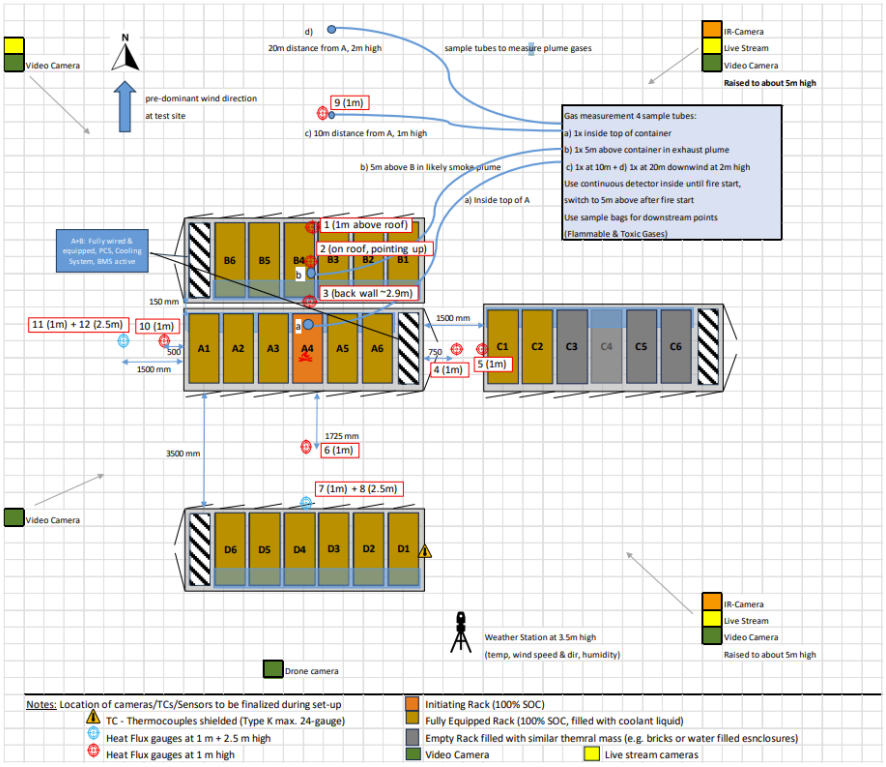


Figure A 1. Test configuration depiction



Figure A 2. Aerial photograph of test configuration

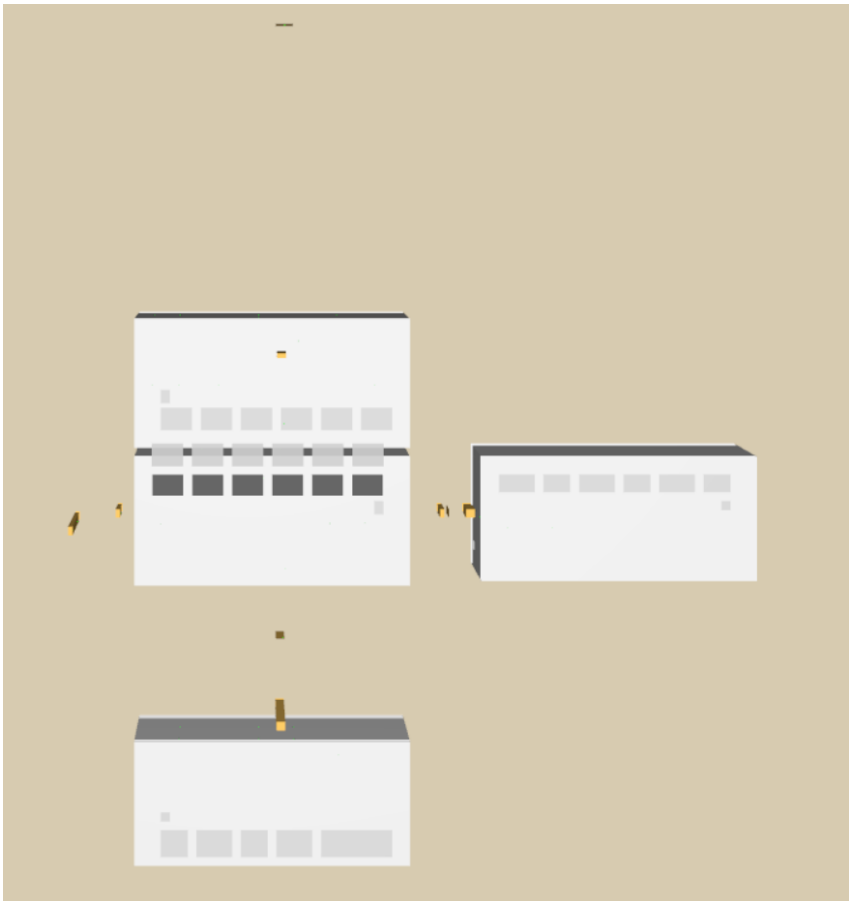


Figure A 3. FDS model of the LSFT configuration

At the beginning of the test, four of the 16 heaters in the initiating module were turned on. After approximately 52 minutes, cells in the initiating module began to vent, and after approximately one hour and two minutes, cells in the initiating module began to enter thermal runaway. The sparking devices installed within BESS A ignited the flammable vent gases and, shortly after thermal runaway was initiated, three out of six of the deflagration panels on the roof of the initiating BESS opened slightly. The initial fire died down, and throughout the time of the test during which only four heaters were active, several other internal fires continued to ignite and burn out.

From two hours and nine minutes to two hours and 41 minutes into the test, the remaining sets of heaters were turned on until all 16 heaters were active in the initiating module. As more cells continued to enter thermal runaway, a deflagration occurred that fully opened all deflagration panels at two hours and 38 minutes, as seen in Figure A 4. The test documentation reports that there were several other smaller deflagrations over the course of the next 30 minutes, at which point flaming through the roof of the initiating cabinet became steadier. In addition to flames being observed through the cabinet roof, flaming was also observed much later in the test from the inlet vent on the left side of BESS A. At four hours and four minutes into the test (1:59 am local time), a large deflagration occurred within the integrated control cabinet of BESS A, causing the sub-compartment's panels to be blown off, hitting and denting the side wall of BESS C in the process, as depicted in Figure A 5. It is important to note that this section of the overall cabinet of BESS A did not contain any battery modules.



Figure A 4. Deflagration from roof of initiating cabinet



Figure A 5. Deflagration in integrated control cabinet of BESS A

The fire experienced its peak burn duration during hour seven to hour eight of the test. After approximately 19.5 hours, the main battery fire self-extinguished. A small fire at the bottom of the control cabinet continued to burn for the next 9.5 hours until all flaming extinguished.

Several observations from the test report suggest that the fire in the LSFT was oxygen-limited and the fuel did not undergo complete combustion. Testing was conducted in a cabinet with its doors closed, which is the initial detail that calls attention to the possibility of the test being oxygen-limited. The occurrence of reignitions throughout the test, more than one of which resulting in a deflagration, also points to oxygen limitation. For instance, the integrated control cabinet does not house any batteries, but it still experienced a large deflagration that blew its panels off the overall BESS cabinet. The integrated control cabinet would not originally have contained any battery vent gas, and as such, it is reasonable to infer that some internal parts of the overall cabinet melted or failed, allowing vent gas to infiltrate the integrated cabinet, come into contact with oxygen, and subsequently ignite. This cycle of oxygen limitation, contact with oxygen, and subsequent reignition reportedly occurred on a smaller scale multiple other times within the initiating cabinet throughout the test.

The extended duration of flaming recorded in the test, along with the dark, sooty smoke from the fire shown in Figure A 6 and Figure A 7, also indicate incomplete combustion and oxygen limitation. Flaming reportedly lasted approximately 19.5 hours, whereas a typical fire scenario from a comparable BESS, in the presence of sufficient oxygen, is expected to last approximately five hours in a worst-case scenario based on FRA's internal experimental data. Additionally, oxygen concentration data from within the initiating BESS, although only provided for

approximately the first 3.75 hours of the test, shows severe oxygen limitation with O_2 concentrations reaching as low as 4% after three hours of testing Figure A 7.



Figure A 6. BESS A char damage/sooty smoke from smoldering flame at 16 hours, 51 minutes



Figure A 7. Smoldering flame from BESS A at 17 hours, three minutes

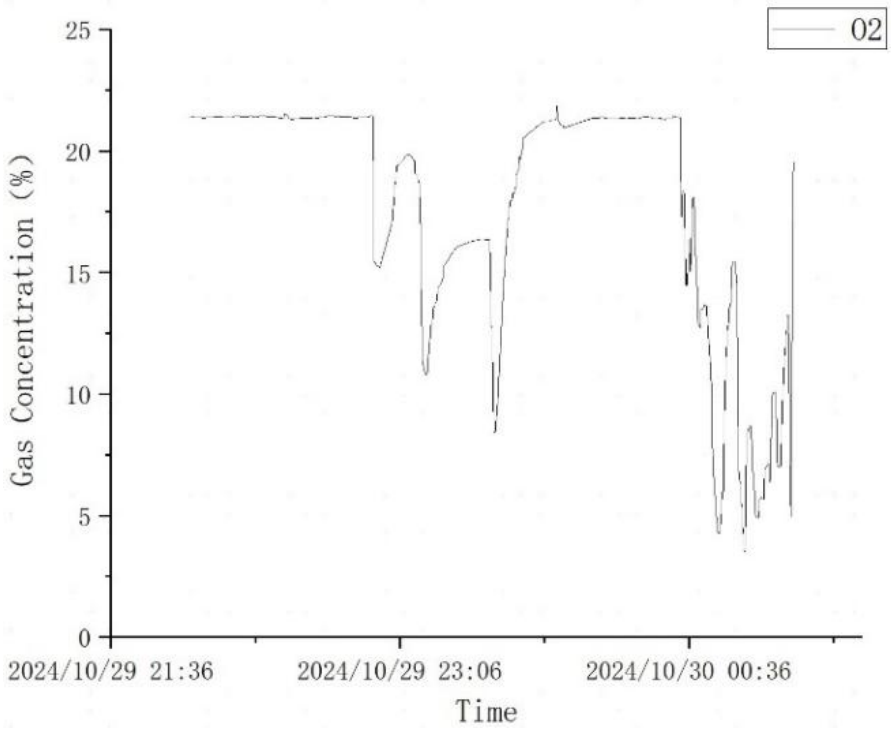


Figure A 8. Oxygen concentration inside BESS A during test initiation

The oxygen limitation of the fire in the LSFT and the resulting deflagration become relevant in creating the post combustion plume analysis model. The goal of the plume analysis is to model a worst-case fire scenario and, in doing so, provide conservative estimates of the extent of a toxic plume emanating from a given BESS. Typically, to create a representative model and ensure that the estimated HRR for a given BESS is representative of the worst case which should be exemplified in the LSFT, a fire source term development model using data from the LSFT is performed. A source term development model was conducted for PT2 using the provided LSFT; however, because the LSFT was understood not to be representative of the worst-case scenario and because the data was confounded by the large deflagration and resulting damage, the goal of the source term development model shifted. Rather than having the goal of aligning the fire source term and model-predicted data directly with observations from the full LSFT, the goal became to validate inputs used for the fire source term and model geometry using the portion of the LSFT prior to the large deflagration, as well as to verify that the LSFT was in fact not the worst-case scenario in doing so. Essentially, the fire source term development model was still performed, despite issues with the LSFT, to better inform the overall model and create as accurate a model as possible with the available data.

For the LSFT correlation, model geometry representative of the PT2 technology and the full LSFT arrangement was built in FDS. While some simplifications of the BESS geometry were made, this is standard procedure due to model capacity and computational effort and is not expected to significantly impact the accuracy of the model. The initiating BESS was simulated as experiencing a fully developed fire involving all 48 modules. The HRR was determined using calculations

converting the total electrical energy of the BESS to combustion energy and a fire duration of five hours to represent a worst-case, non-oxygen-limited scenario. A peak heat release rate (HRR) of 21.1 MW was calculated and applied as a constant value throughout the simulation to conservatively represent a worst-case fire scenario. In reality, the HRR and associated emissions would be expected to fluctuate over time and eventually decrease as fuel is consumed; however, maintaining the peak HRR provides an upper-bound estimate of fire impacts. The simulation was run for 120 seconds to allow the fire plume and thermal conditions to stabilize under the imposed steady-state HRR.

Heat flux and temperature values were obtained for many of the same locations measured in the LSFT, though not all thermocouples or heat flux gauges were replicated in the source term development model due to computational expense. The model incorporates wind from the south, ramping up from 0 to 1 mph (0 to 0.45 m/s), and an ambient temperature of 20° C, similar to what was observed during the majority of the LSFT. Deflagration panels on BESS A were modeled as open, though the cabinet doors remained closed throughout the simulation as they did in the test scenario.

9.1 Temperature Data Collection

In the fire source term development model, temperature data was obtained using maximum adiabatic surface temperature (AST) volume statistics over the general regions where the thermocouples were instrumented in the test. Volume statistics were used as opposed to taking point measurements because the precise locations of the thermocouples in the test were not provided. As such, taking the maximum AST over a small volume helps to ensure that the correct locations of the thermocouples are captured. While it is possible that using the maximum temperature measurement for comparison will result in slightly elevated temperatures given by the model, this approach is in alignment with the goal of producing a conservative model via the selected HRR.

Additionally, it is important to note that the large deflagration seen in the LSFT impacts the validity of the test as well as the ability of the model to capture test events. This deflagration resulted in immediate damage to the initiating cabinet, which caused a more rapid increase in oxygen exposure and subsequent temperatures than what would be seen otherwise. This deflagration could not be captured in the model. As such, for most locations at which data was captured, only data from the LSFT prior to the large deflagration could be used for comparison to the model.

9.1.1 BESS A Temperature Data

Within the model, temperature data for BESS A, the initiating BESS, was sampled along the outside of the doors, on the outside of the left wall, on the outside wall in between the main cabin and the integrated control cabinet, and on the roof. Because BESS A was severely impacted by the deflagration in its integrated control cabinet, only data from the test prior to the deflagration can be used for comparison.

As such, all temperatures observed from BESS A in the LSFT prior to the large deflagration, regardless of location, are significantly lower than what is seen in the model. This is a result of the oxygen-limited nature of the early stages of the test as opposed to the consistent, non-oxygen-limited HRR used in the model. Temperatures for BESS A recorded in both the model and the LSFT are given in Figure A 9 through Figure A 16.

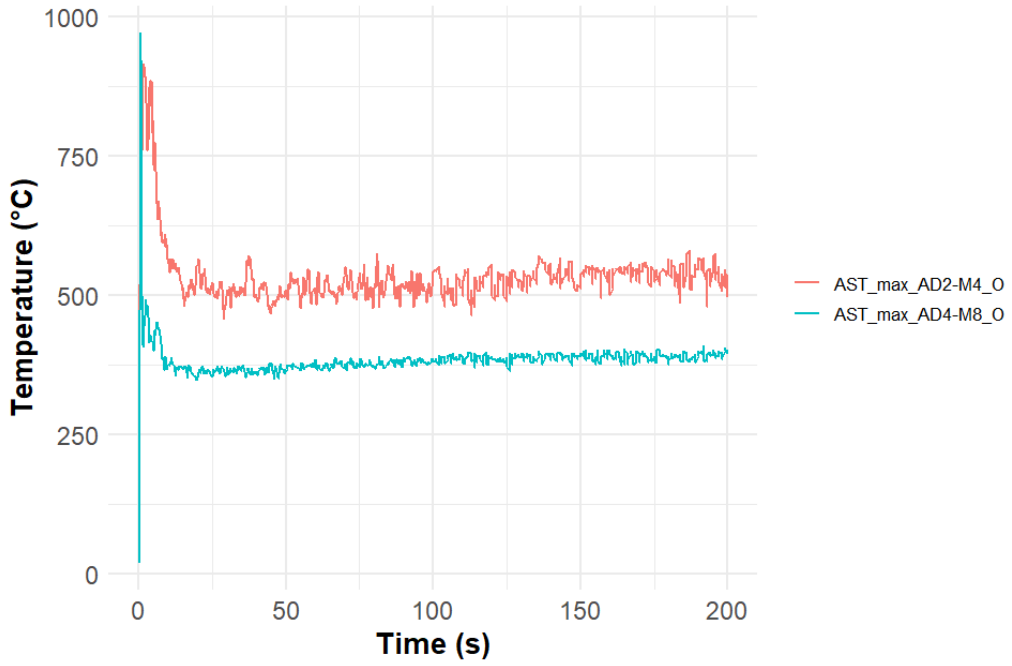


Figure A 9. BESS A door temperatures in source term development model

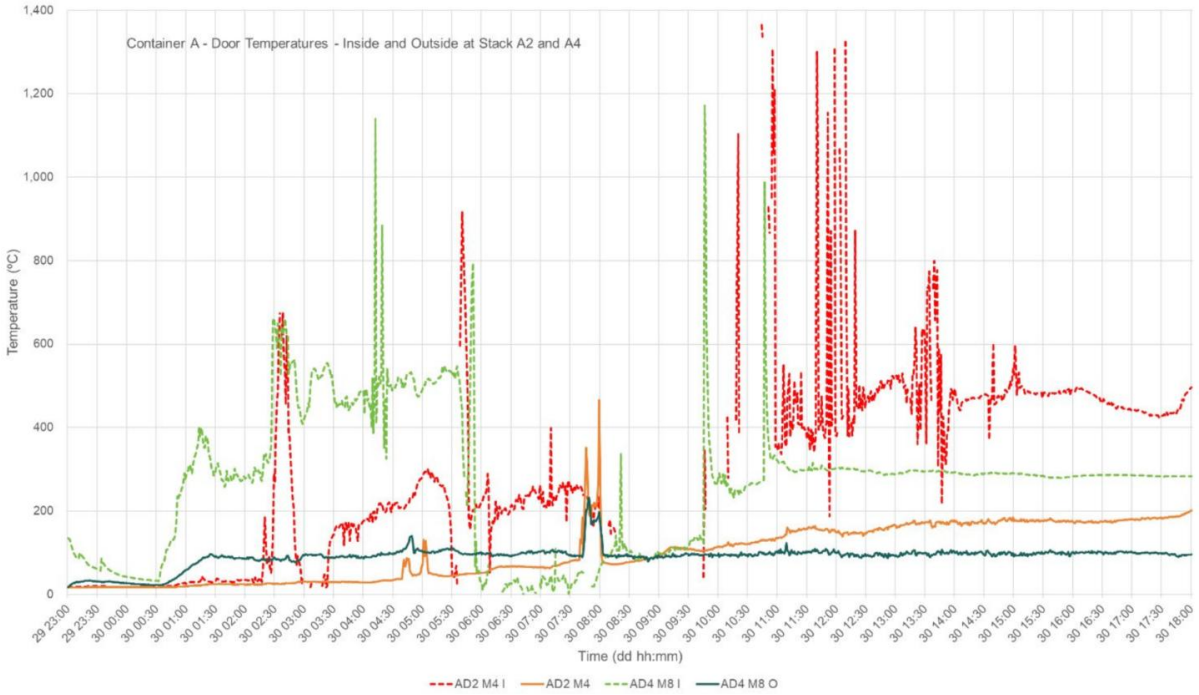


Figure A 10. BESS A door temperatures in LSFT

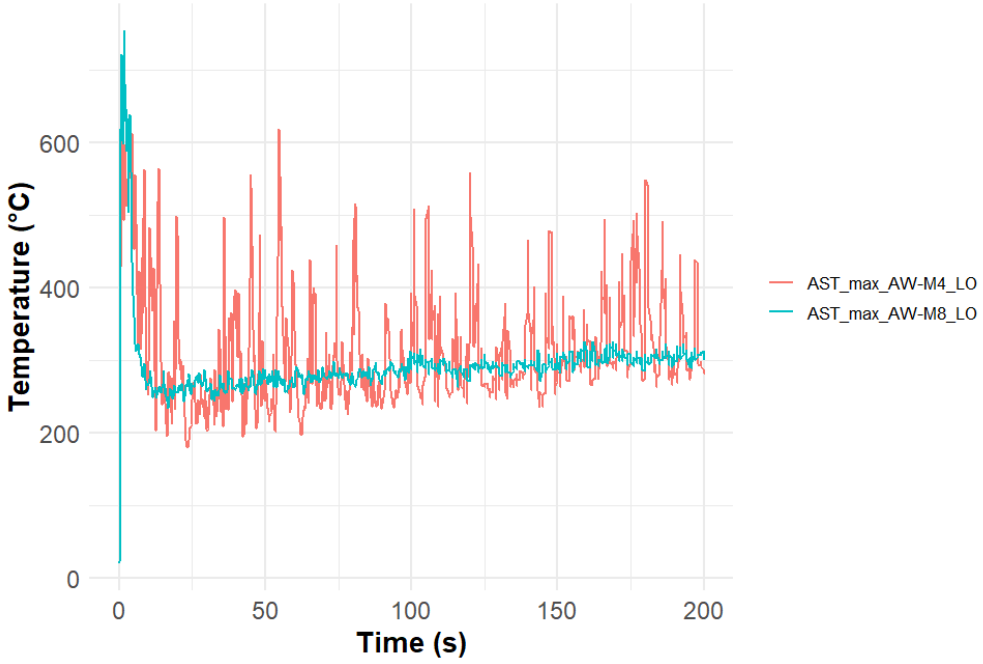


Figure A 11. BESS A left wall temperatures in source term development model

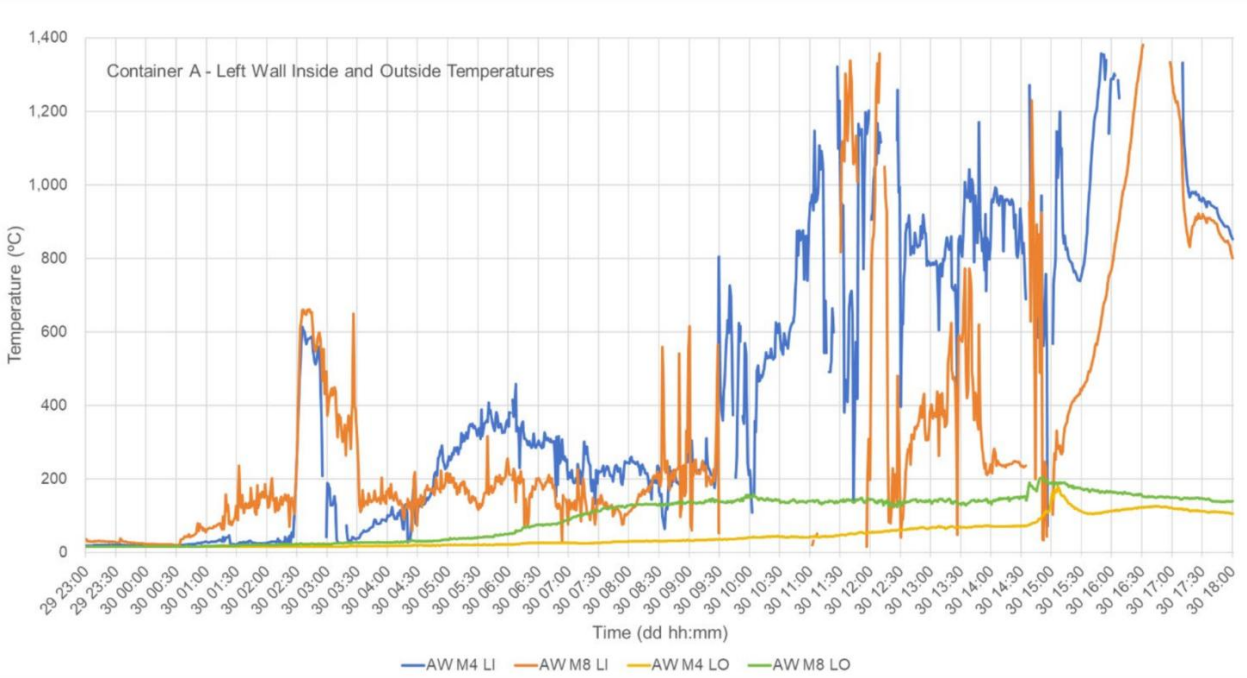


Figure A 12. BESS A left wall temperatures in LSFT

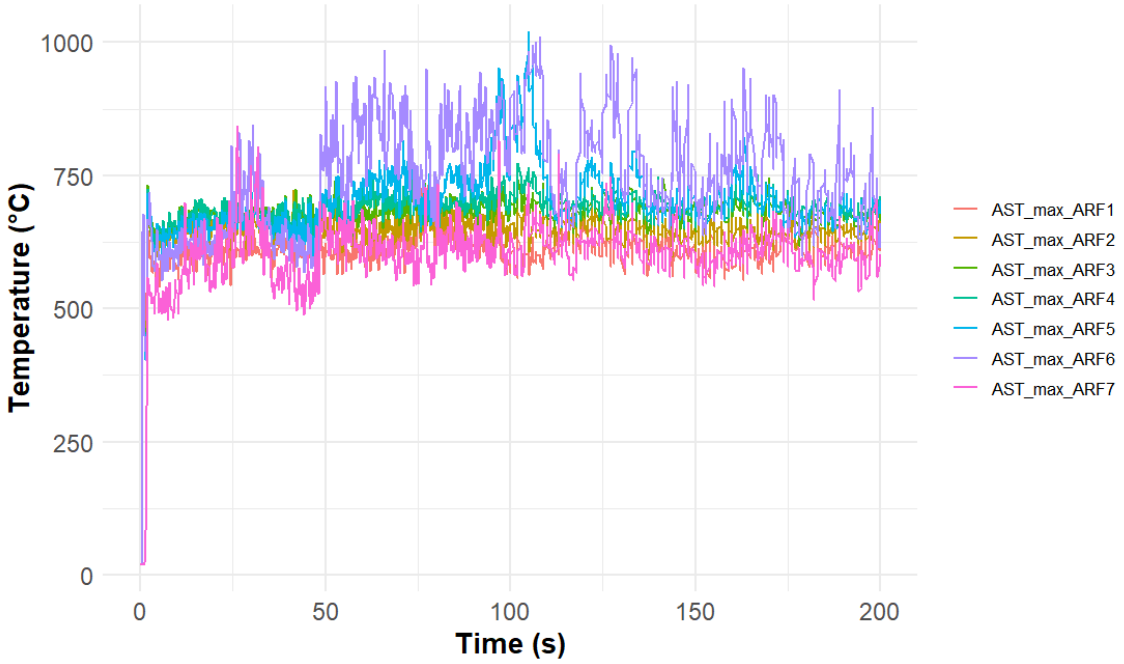


Figure A 13. BESS A roof temperatures in source term development model

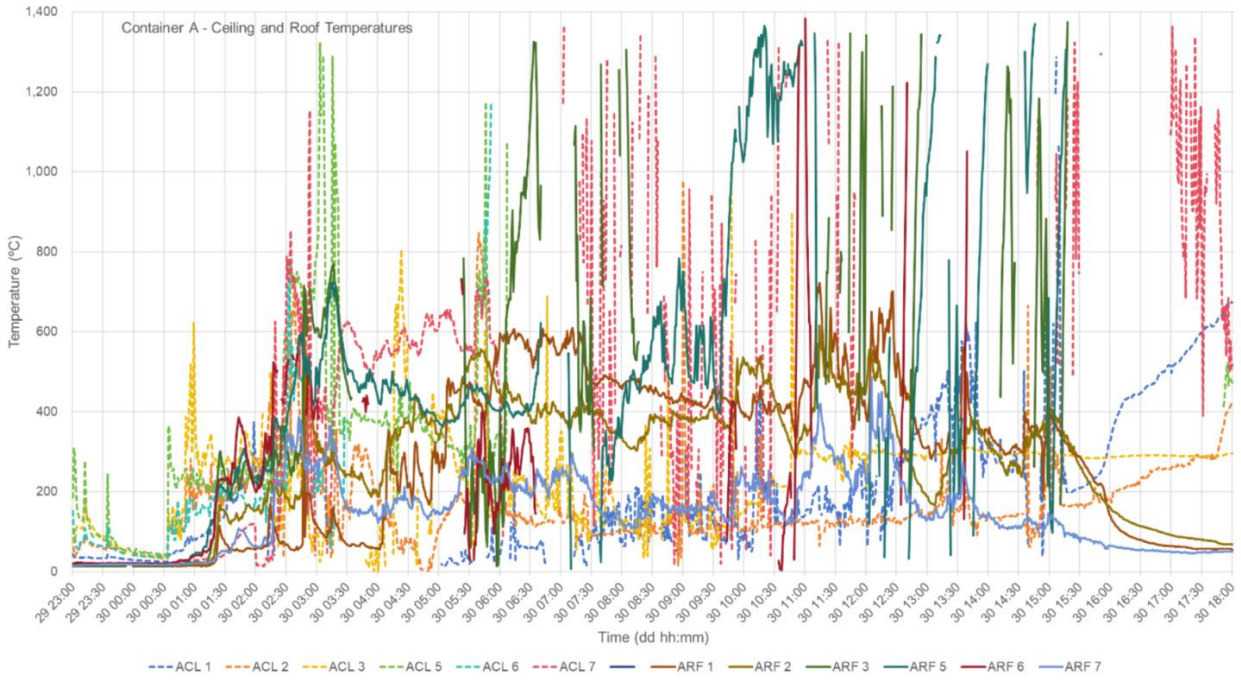


Figure A 14. BESS A roof temperatures in LSFT

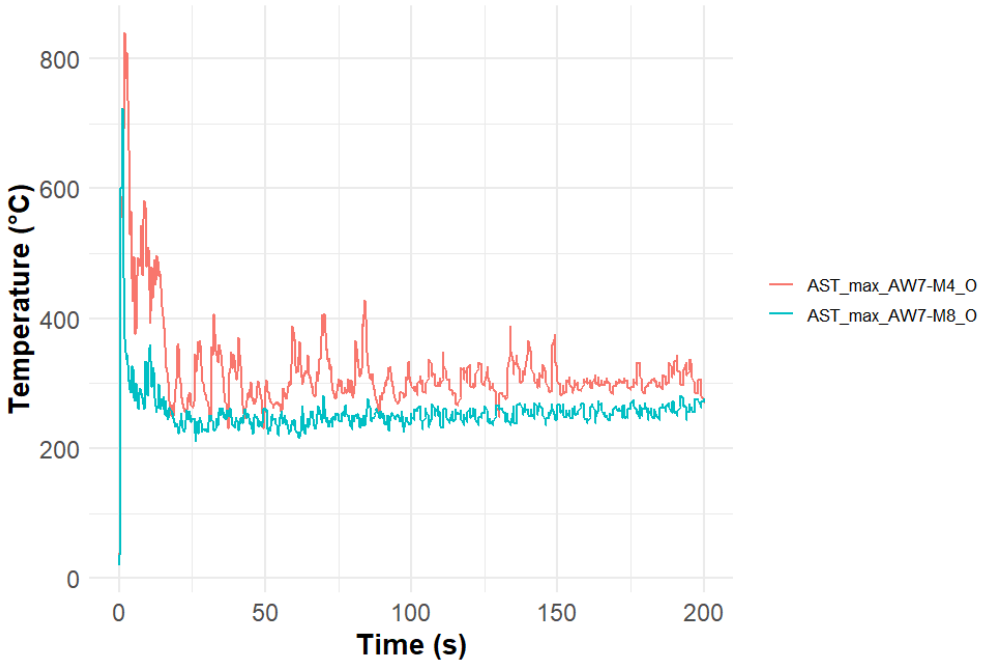


Figure A 15. BESS A integrated control cabinet temperatures in source term development model

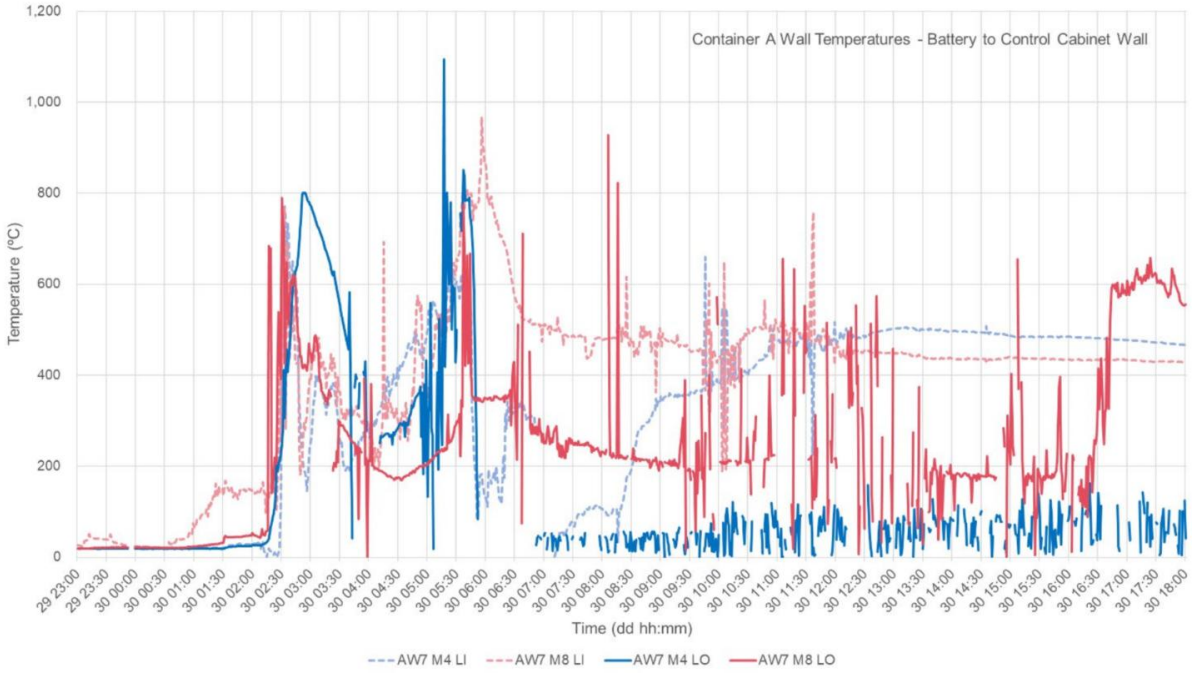


Figure A 16. BESS A integrated control cabinet temperatures in LSFT

9.1.2 BESS B Temperature Data

Temperatures for BESS B were recorded on the roof and back wall in the model. The back wall of BESS B was likely impacted by the large deflagration in BESS A as well, and as such, only data from the early stages of the test prior to the deflagration can be used for comparison. In the model, temperatures taken from the back wall at the height of Module 4 are raised slightly above ambient, maintaining a temperature of approximately 40° C. In the test, however, temperatures from these sampling locations do not increase above ambient. At the height of Module 8, temperatures recorded in the LSFT increase to approximately 40° C. Temperature data from the model at this location is significantly higher with peaks over 250° C. Again, this is a result of the consistent HRR in the model versus the oxygen-limited nature of the LSFT.

The roof of BESS B is less likely to have been greatly impacted by the deflagration in the test and, as such, the full dataset from the LSFT can be used for comparison to the model in this case. Roof temperatures between the model and the LSFT are consistent, exhibiting peaks of slightly under 600° C. The temperature data for BESS B is given in Figure A 17 through Figure A 20.

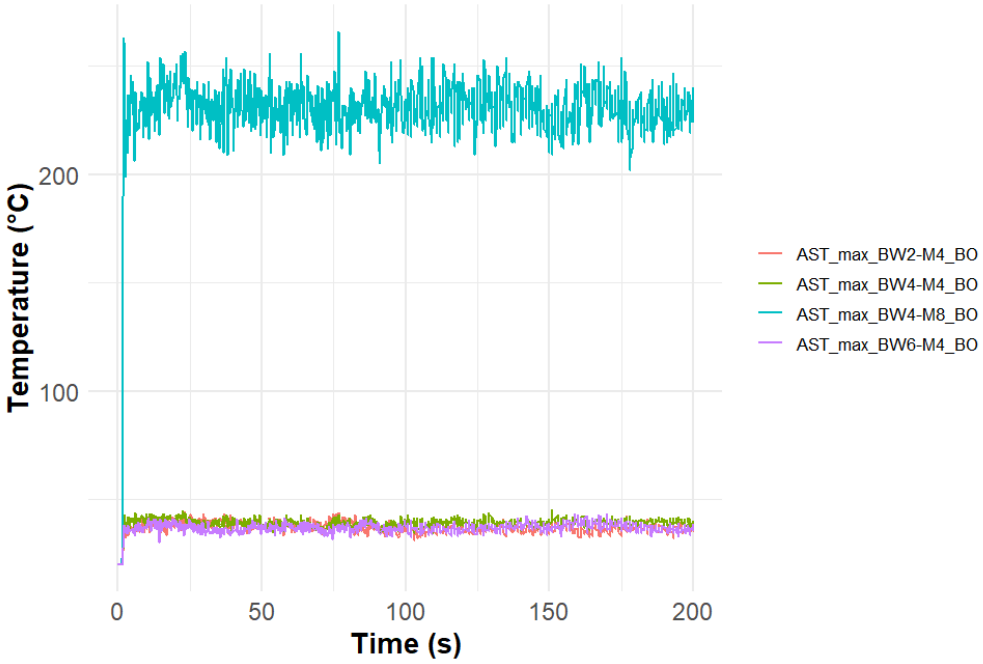


Figure A 17. BESS B back wall temperatures in source term development model

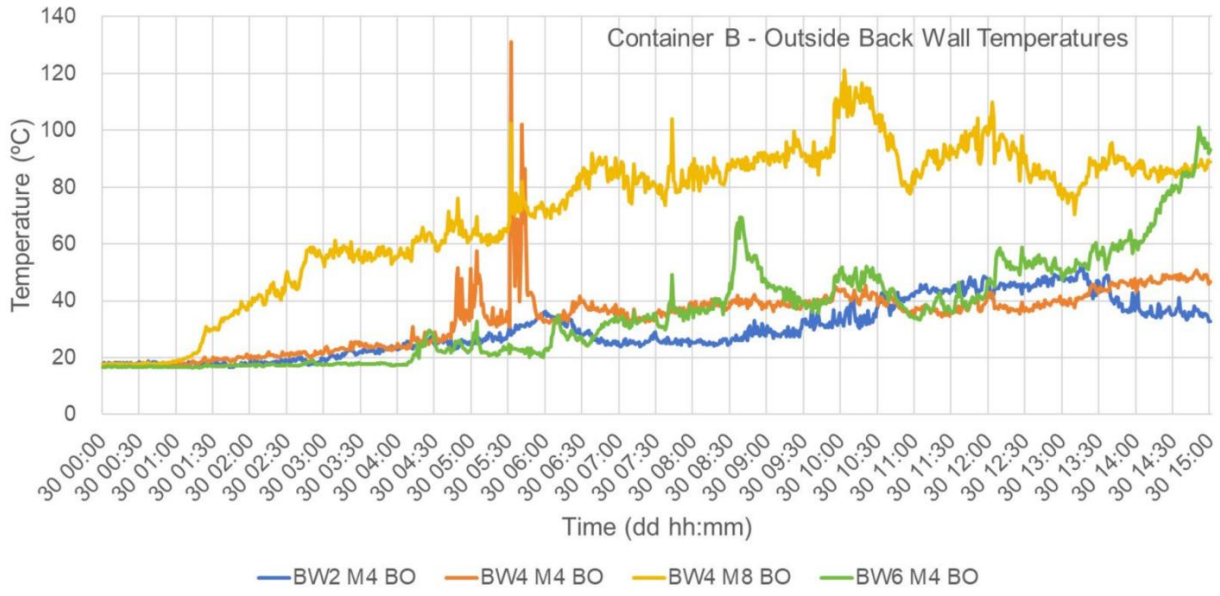


Figure A 18. BESS B back wall temperatures in LSFT

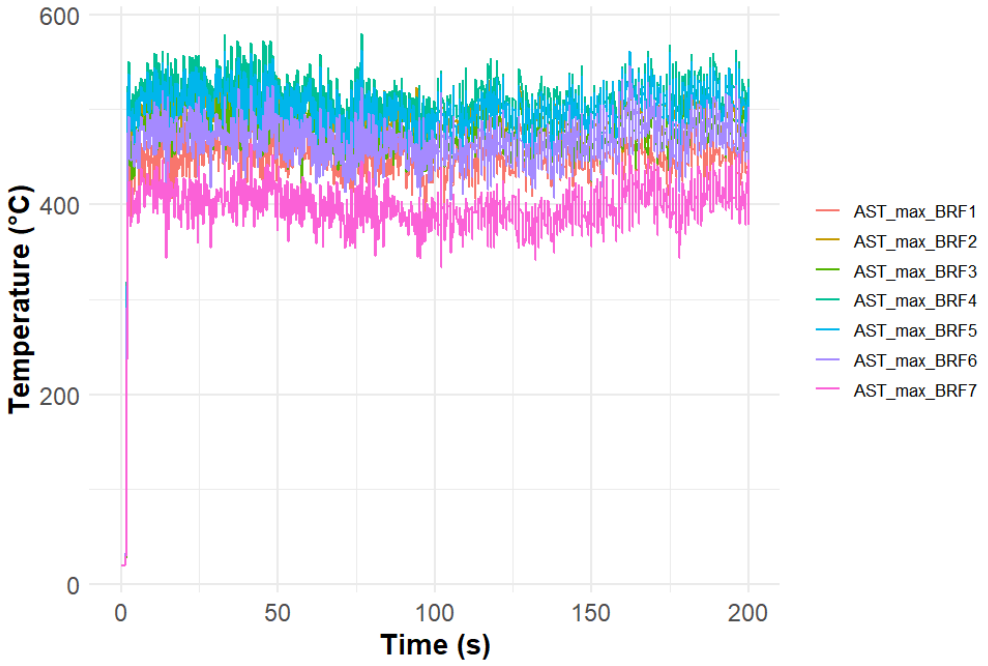


Figure A 19. BESS B roof temperatures in source term development model

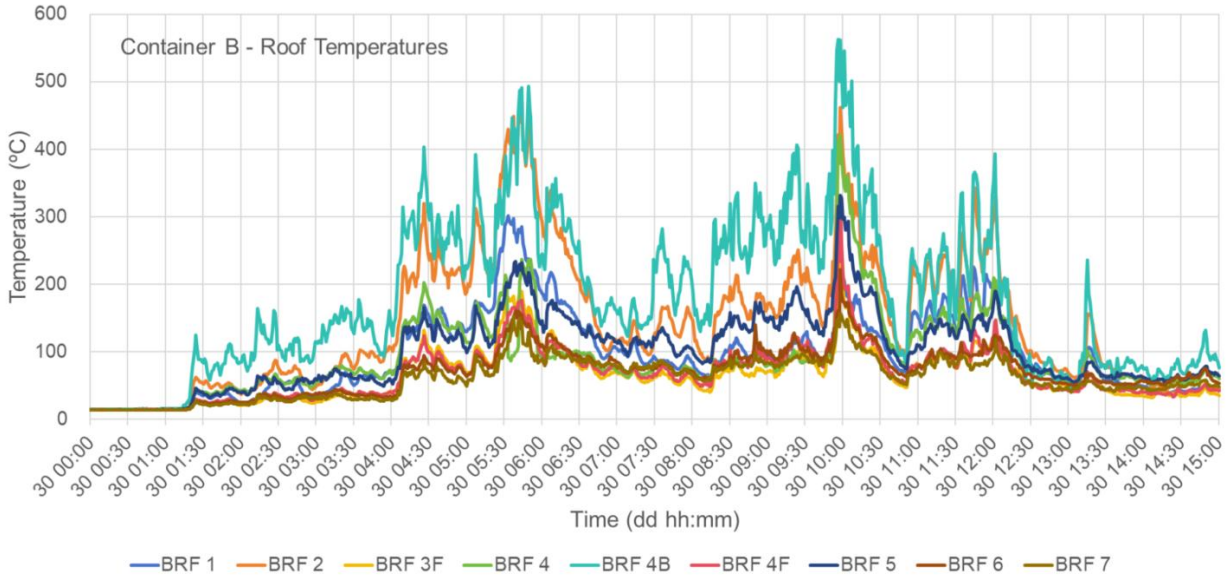


Figure A 20. BESS B roof temperatures in LSFT

9.1.3 BESS C Temperature Data

Temperatures for BESS C were recorded in the model along the outside of the left wall and on the roof. BESS C was impacted by the deflagration in the integrated control cabinet side wall of BESS A as this deflagration resulted in exposure to flaming and the physical impact of pressure and debris on BESS C. Temperatures for BESS C recorded in the LSFT, regardless of location, remain at ambient prior to the deflagration. This is a result of the lack of flame and heat exposure from BESS A before the deflagration. The model once again shows BESS C temperatures as significantly elevated compared to the LSFT due to the consistent heat exposure that was modeled. Temperature data for BESS C is given in Figure A 21 through Figure A 24.

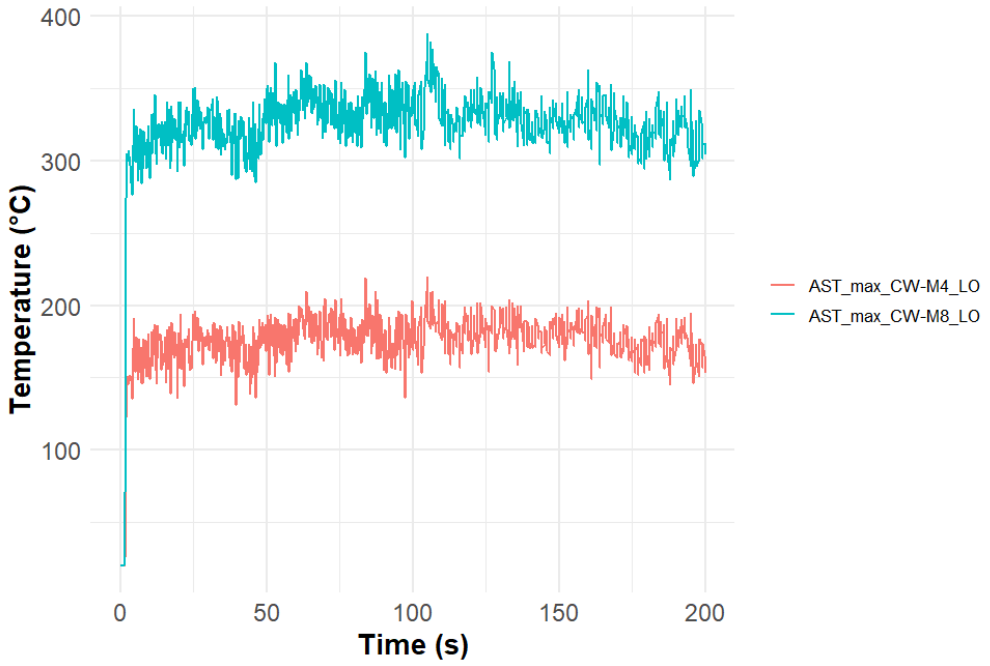


Figure A 21. BESS C left wall temperatures in source term development model

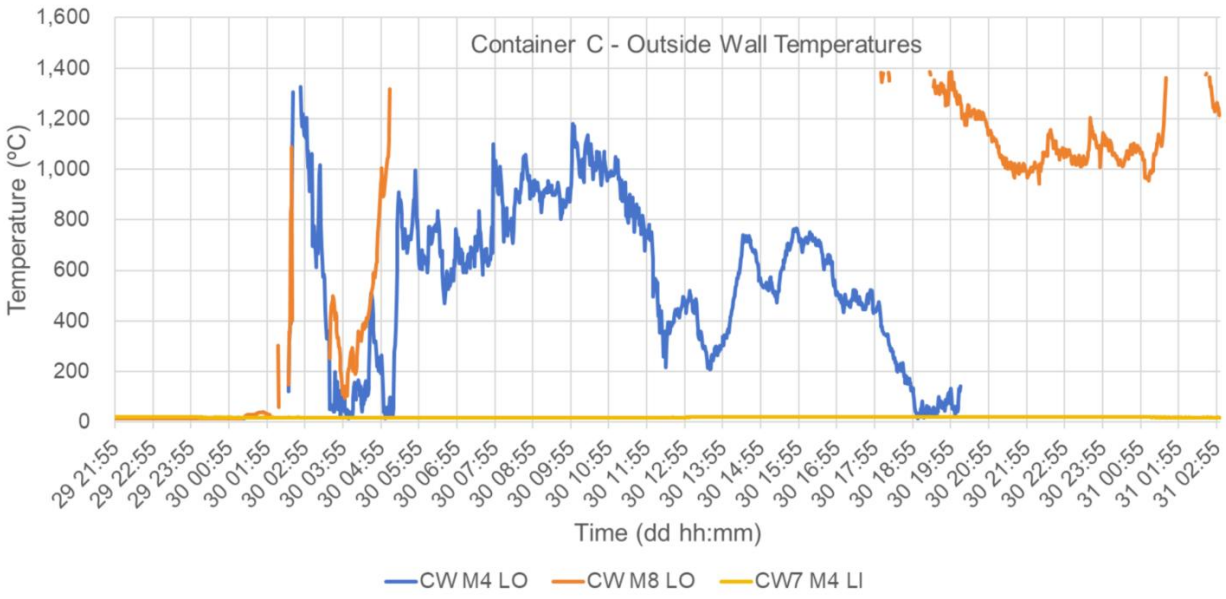


Figure A 22. BESS C left wall temperatures in LSFT

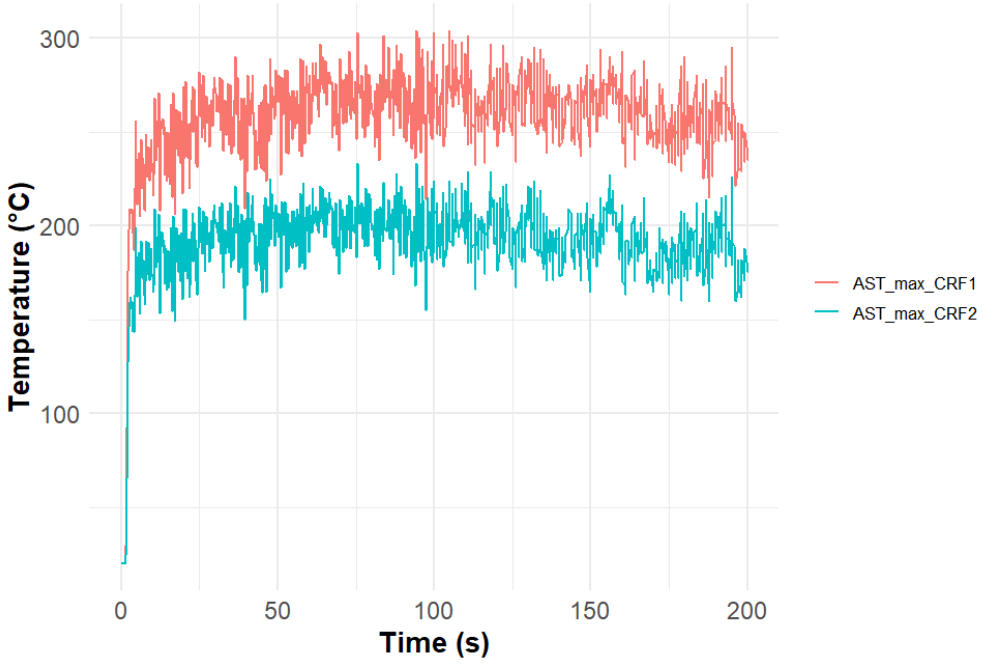


Figure A 23. BESS C roof temperatures in source term development model

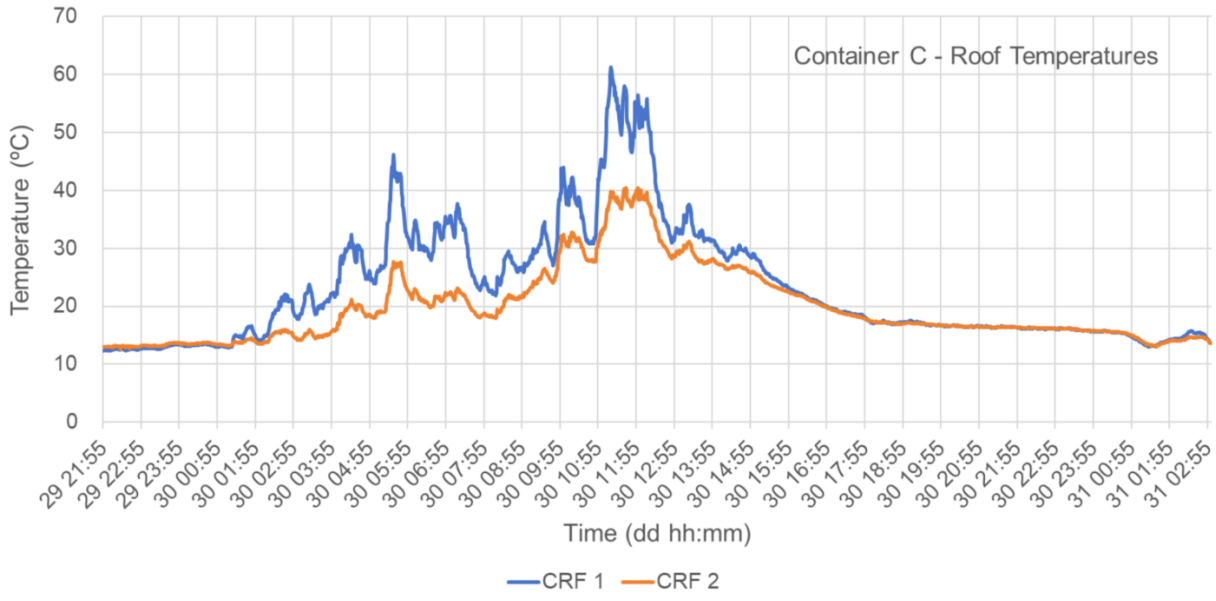


Figure A 24. BESS C roof temperatures in LSFT

9.1.4 BESS D Temperature Data

Temperatures for BESS D were recorded on the outside of the doors as well as the roof in the model. BESS D was also likely impacted by the deflagration in BESS A, albeit minimally, via additional heat exposure that it otherwise would not have experienced. As such, similarly to the

other cabinets, only temperature data from the initial stages of the LSFT can be used for comparison. Prior to the deflagration, temperatures recorded on the doors of BESS D in the LSFT peak only slightly above ambient at approximately 35° C. However, the model shows elevated temperatures exceeding 300° C due to the consistency of the modeled fire.

It is important to note that while temperature data for BESS D is invalid beyond the point of the large deflagration, the reported temperatures for the doors still are significantly less elevated than what is observed in the model. This may be explained by the burner surfaces in BESS A facing directly towards BESS D as well as the consistent, non-oxygen-limited HRR used in the model.

Temperature data for BESS D is given in Figure A 25 through Figure A 27. Note that only a table giving the peak temperatures recorded on the roof of BESS D is given in the LSFT report – with peaks of 44° C – as opposed to temperature graphs detailing the full period of the test. As the peak temperatures on the roof likely occurred after the deflagration, the roof of BESS D is neglected in this comparison.

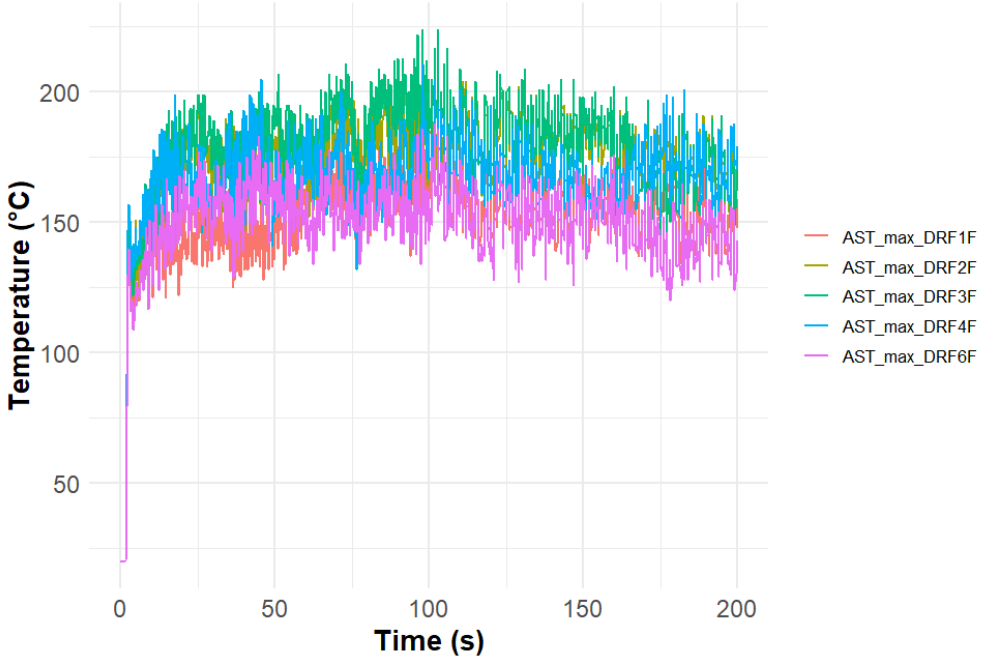


Figure A 25. BESS D roof temperatures in source term development model

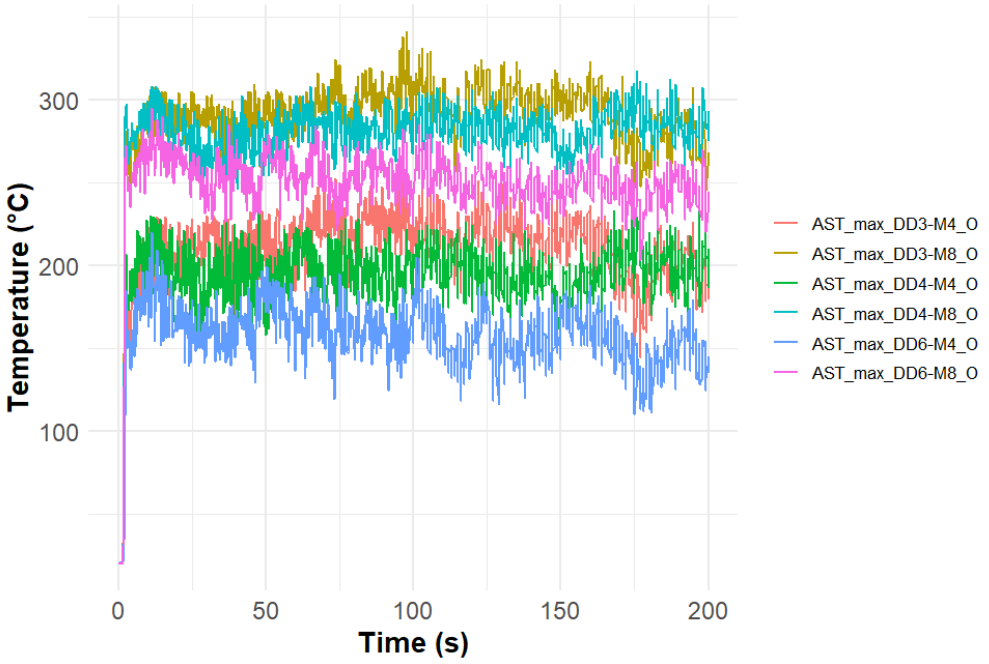


Figure A 26. BESS D door temperatures in source term development model

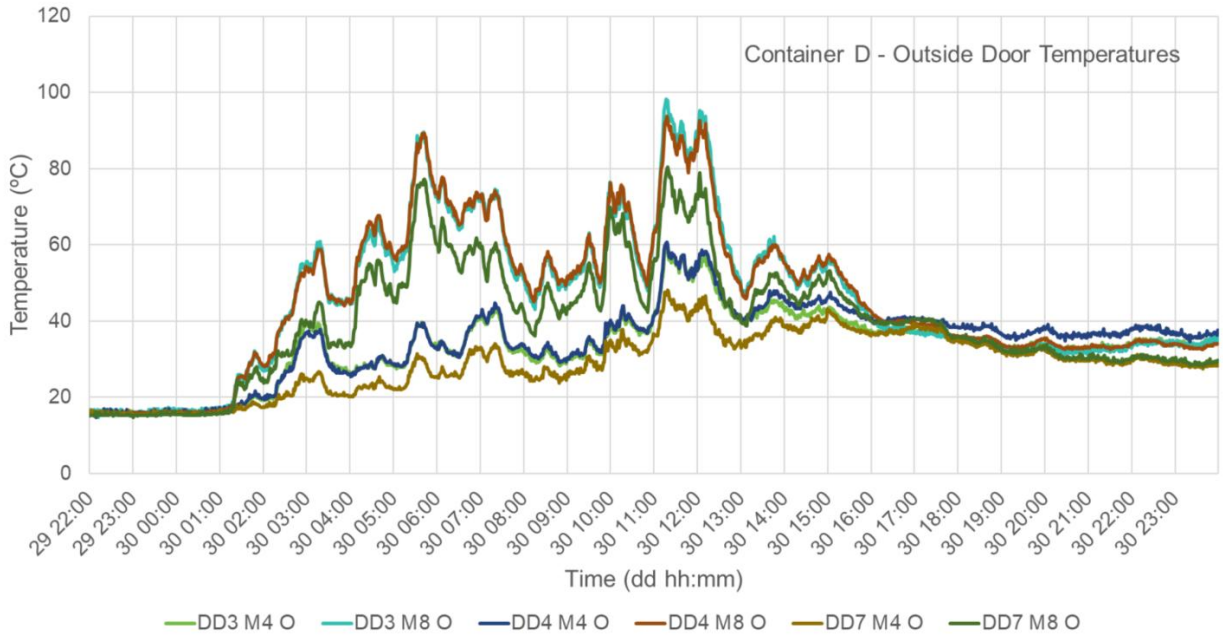


Figure A 27. BESS D door temperatures in LSFT

9.2 Heat Flux Data

The source term development model included heat flux gauges in the specific locations in which they were instrumented in the actual test. As shown previously in Figure A 1, 12 heat flux (HF) gauges were installed during the test. Each of the heat flux gauges was modeled in the source term development, including the three that were reported to be damaged by deflagrations (HF 3, HF 4, and HF 5) for the sake of comprehensiveness. A comparison of the peak heat fluxes recorded by each gauge in the model versus the LSFT is given in Table A 1. Note that some of the reported peak heat fluxes occurred after the large deflagration and the test report only explicitly quantified the peaks.

The maximum heat flux detected by HF 1 in the LSFT and the model are nearly identical. The peak heat flux given by HF 2 in the LSFT is slightly elevated as compared to the model. This is likely a result of greater flame tilt due to wind gusts in the test, which were not captured by the model. Peak measurements from HF 6, HF 7, HF 8, and HF 9 are elevated in the model as compared to the LSFT. These four gauges were likely the least impacted in the test by the large deflagration based on their locations, and as such, their elevation can be explained by the consistent, non-oxygen-limited HRR used in the model. Finally, HF 10, HF 11, and HF 12 each exhibit elevated maximum heat fluxes in the LSFT report. The maximum heat fluxes for HF 10 and HF 11 occur late in the test, at which point the inlet vent on the left side of BESS A had failed and flaming emanated from it toward these gauges. The maximum heat flux for HF 12 aligns with the peak burn period. The magnitude of the elevation in the data reported by HF 12 may be a result of wind gusts blowing towards the sensor at the time of peak burn or, more likely, may be an overestimation by the equipment based on comparison with the remainder of the heat flux data.

Table A 1. Peak Heat Flux Comparison

Heat Flux Gauge	**Heat Flux (kW/m^2)**	
	FDS Model	**LSFT**
HF 1	44.30	43.16
HF 2	34.10	58.46
HF 3	0.96	-
HF 4	0.70	-
HF 5	1.96	-
HF 6	2.42	0.68
HF 7	3.96	0.84

HF 8	9.65	2.25
HF 9	1.63	0.56
HF 10	0.30	1.00
HF 11	1.92	13.5
HF 12	10.00	76.98