Environmental Assessment Worksheet

Frontier Project
27106 State Highway 6
Cohasset, Minnesota 55721

Prepared For

Huber Engineered Woods LLC

Project B2101896
January 18, 2022

Braun Intertec Corporation

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July 2013 version

Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. **Project Title**
   Frontier Project

2. **Proposer**
   Company: Huber Engineered Woods LLC
   Contact person: Michael Lloyd
   Title: Director, Environment, Health, Safety, & Sustainability
   Address: 1446 Hwy 334
   City, State, ZIP: Commerce, GA 30530
   Phone: 706.336.3191
   Fax:
   Email: Michael.lloyd@huber.com

3. **RGU**
   RGU Agency: City of Cohasset
   Contact person: Max Peters
   Title: Director of City Operations
   Address: 305 Northwest 1st Avenue
   City, State, ZIP: Cohasset, MN 55721
   Phone: 218-328-6225, ext. 22
   Email: maxp@cohasset-mn.com

4. **Reason for EAW Preparation:**

   Required:
   ☐EIS Scoping
   ☒Mandatory EAW

   Discretionary:
   ☐ Citizen petition
   ☐ RGU discretion
   ☐Proposer initiated

   If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):
   Rules 4410.4300 Subp. 14 Industrial, Commercial, and Institutional Facilities as modified by the 2021 Minnesota Session Law, 1st Special Session, Chapter 6, Section 129 titled "Facilitate Engineered Wood Product Manufacturing Facility; Itasca County".

5. **Project Location:**
   County: Itasca
   City/Township: Cohasset and an unincorporated area of Itasca County, Morse Township
   PLS Location (¼, ¼, Section, Township, Range): Portions of Sections 6 and 7, Township 55 North, Range 26 West, and portions of Section 31, Township 56 North, Range 26 West
   Watershed (81 major watershed scale): Mississippi River Headwaters (7)
   GPS Coordinates: 47.264282°, -93.702268° (southwest corner of property)
   Tax Parcel Numbers: 05-006-1300, 05-06-2100, 05-006-2200, 05-006-2300, 05-006-2400, 05-006-3100, 05-06-3200, 05-006-3300, 05-006-3400, 05-006-4200, 05-07-2102, 05-007- 2200, 64-031-2402, 64-031-1302, 64-031-2201, 64-031-2302, 64-031-3200, 64-031-3002, 64-031-3300

6. Project Description:

a) Provide the brief project summary to be published in the EQB Monitor, (approximately 50 words).

The proposed 750,000 square-foot oriented strand board (OSB) manufacturing facility will occupy approximately 159 acres of agricultural and undeveloped lands west of the City of Cohasset. One new rail spur would be constructed to an existing rail line along U.S. Highway 2. The rail spur will support raw material deliveries and product shipments, in addition to those made by road transport. New utilities would be constructed to service the new facility.

b) Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

The proposed project is for construction of an approximately 750,000 square foot facility, which will manufacture OSB and be capable of producing 725,000,000 square feet (3/8" basis) of finished product annually. The facility is anticipated to occupy 159.3 acres within an approximately 400-acre undeveloped area. The site location and project area are shown on Figures 1 – 3. The majority of the site is located in the City of Cohasset, however the northern portion of the project area is located in an unincorporated area of Itasca County. A new rail spur will be constructed north of the facility to connect to an existing rail line along U.S. Highway 2. New below-ground utilities will be installed along a private road and State Highway 6 to service the facility. The utilities include potable water, sanitary sewer, electricity, and natural gas.

<u>Site Development Features</u>

Site development features and amenities include a main processing plant and office area, parking, loading and unloading areas, six thawing conveyors flooded with hot water for further processing of logs, and two ponds that will be used for stormwater. There are no future expansions or site development planned after facility construction is completed in 2023/2024.

In addition, in association with this proposed project, the City of Cohasset is proposing to install new water, sanitary sewer, electrical, and natural gas lines to service the new facility. These lines would be underground extensions of existing lines and feed the proposed project along a private road owned by Minnesota Power to the south of the site, ending before the private road meets State Highway 6 (Figure 13).

The City's utility project will include the following actions:

- Purchase of new easements on Minnesota Power lands
- Installation of underground water supply line
- Installation of underground sanitary sewer line
- Installation of underground natural gas line
- Installation of new electrical supply line (conducted by Minnesota Power)

Construction Schedule and Methods

The proposed project will include the following construction activities on portions of the project site from early 2022 through 2024:

- Installation of perimeter silt fence and berms as construction stormwater best management practices (BMPs) (Second Quarter 2022)
- Clearing and grubbing (Second Quarter 2022)
- Topsoil removal and stockpiling (Second Quarter 2022)
- Interim site grading, including temporary and permanent stormwater pond installations (2022)
- Construction of haul road(s) (2022)
- Temporary and permanent wetland impacts (Second Quarter 2022)
- Construction of a rail spur to connect to existing rail line (2022 thru 2023)
- Construction of buildings, storage areas, parking lots, roads, final grades, and associated utilities (2022-2024)
- Commissioning of the facility as an OSB manufacturing facility (2023 - 2024)

The primary equipment anticipated to be used for site grading includes standard earth-moving equipment (bulldozers, scrapers, compactors, excavators). The sequence of construction will follow standard industry-accepted construction methods and practices for conventional land modification. Selection of specific temporary and permanent stormwater best management practices will be determined during development of the project specific Stormwater Pollution Prevention Plan (SWPPP), in accordance with the Minnesota Construction Stormwater General Permit (MNR100001).

Wood Feedstock

The proposed project will not have a dedicated wood supply. Huber Engineered Woods (HEW) will acquire feedstock from the open market, including private, State, and other public sources. HEW does not anticipate acquiring significant quantities of feedstock from federal lands, although it will participate in the federal market when wood is made available. In general, it is expected that the wood would primarily come from central and northern Minnesota. However, the procurement area will be dynamic in response to several factors such as market conditions, wood availability, forest conditions, transportation costs, and public agency wood supply. As a result, wood may be obtained at times from further reaches of Minnesota, Wisconsin, or other locations.

Feedstock is expected to be timbered logs of primarily (75%) Aspen species (*Populus sp.*), augmented by other hardwoods (such as Basswood, Maple, Birch, and possibly Ash). At full capacity, the proposed project would consume approximately 400,000 cords of wood annually.

Sustainability of Wood Feedstock

Wood harvest and sustainability of harvest has been examined periodically. The Minnesota Department of Natural Resources (DNR) conducted a Generic Environmental Impact Study (GEIS) in 1994. Wood supply and harvest was also examined in 2005 in conjunction with the Blandin Paper Thunderhawk Project. The DNR also conducted an extensive review of harvest

levels and sustainability from State lands in 2019 (Minnesota's Forest Resources, 2019 DNR). The 2019 DNR study also examined resource levels and trends on other public and private lands. HEW also retained Professor Mike Kilgore, Chair of the Department of Forest Resources at the University of Minnesota, to review the state of Minnesota forests in relation to the proposed project. A letter of his findings (Kilgore Letter) is provided as Appendix A.

According to the 2019 DNR report, the 2018 statewide Aspen harvest was 1.43 million cords per year, and the annual sustainable harvest for Aspen was 2.358 million cords/year. In other words, annual aspen harvest is about 1 million cords below the DNR estimate of the annual sustainable aspen harvest ("Aspen Excess Capacity"). Assuming that Aspen would be 75% of the proposed project's annual fiber needs, the proposed project would consume about 30% of the Aspen Excess Capacity.

The 2019 DNR study also states that "overall net growth for all species continues to outpace harvest levels and total removals" (Indicator 15, page 35). The "annual gross growth of growing stock on timberland was approximately 8.87 million cords. Annual mortality was approximately 3.10 million cords. Annual net growth is equal to gross growth less mortality, or 5.77 million cords per year. According to mill and fuel wood survey data and recent Minnesota Forest Industry (MFI) data, the volume of wood harvested and utilized by industry and fuel wood users was approximately 3.2 million cords in 2006 and falling to an estimated 2.8 million cords in 2008". In addition, the total pulpwood harvested and used by Minnesota's pulpwood mills is currently 1 million cords/year less than was reported in 2005. As a result, an increase of removals of 400,000 cords/year attributable to the proposed project would still leave Minnesota forests in a net growth condition, and total removals would remain well below removals in 2005. Professor Kilgore concluded that these findings are consistent with understanding of growth/mortality condition of Minnesota forests.

The 2019 DNR study indicates that the amount of forested land in Minnesota has remained relatively stable over the past 30 years. In addition, "recent annual Forest Inventory Analysis (FIA) data indicates that forest land acreage may be increasing slightly in the state from approximately 16,230,000 acres in 2004 to 16,723,532 acres in 2009, due in part to some agricultural lands reverting back to forest lands" (2019 DNR study, p.10). Aspen is the greatest percent of forest cover in Minnesota, accounting for 33% of all timberland according to the 2019 DNR study (2019 DNR study, Figure 19, p.34).

Since the upper-level sustainable timber harvest estimate was made in the GEIS, numerous initiatives have been put in place to help mitigate the environmental impacts from timber harvesting. Professor Kilgore highlighted the following:

- **Timber Harvesting & Forest Management Guidelines (FMGs).** A comprehensive set of practices to address potential timber harvesting effects were finalized in 1999. They address resource impacts with respect to wildlife habitat, water quality, aesthetics, soil erosion, historic/cultural resources, biomass, riparian areas, etc. When the FMGs became available, most public land managers (Minnesota's two national forests, DNR, county land departments through their county boards) formally adopted their use as a matter of policy. Many private landowners, especially those that manage lands for timber harvesting (as opposed to one-off sales) also have adopted the FMGs.

The FMGs have been revised three times (2005, 2008, 2012). The Minnesota Forest Resources Council, the executive branch council responsible for developing the guidelines, is currently in the process of initiating a 4th revision. Since their inception, additional guidelines have been developed (e.g. biomass) and existing guidelines have been revised based on new scientific information (e.g. improvements in management in and near riparian management zones). For example, the biomass guidelines were developed to ensure non-merchantable wood associated with a timber sale (i.e. residuals) is efficiently recovered in an environmentally sound manner for use as an energy source. One of the Minnesota Forest Resources Council's 17 members is a representative of the Minnesota Tribal Affairs Council.

- **Guideline Implementation Monitoring** - Numerous rounds of field-based monitoring of timber harvesting sites have been conducted to evaluate FMG use across all ownerships, both public and private. Overall monitoring results show relatively high compliance with the FMGs.

- **Minnesota Logger Education Program (MLEP)**. MLEP was established in 1995 to provide a comprehensive training program for the state's logging businesses. A central part of this training focuses on use of the FMGs. Most (possibly all) public agencies will not sell timber to a logging company that is not in compliance with MLEP education requirements, which includes FMG training.

- **Forest Certification.** Nearly 8 million acres of Minnesota forest land is certified. The DNR is the single largest FSC-certified land manager in the US (~ 5 million acres). Additionally, over 80% of the 2.7 million acres of county-administered land is certified. The DNR and several counties (Beltrami, Carlton, Crow Wing, Koochiching) are dual certified by the two major forest certification systems, FSC and SFI. Most large private ownerships (e.g., UPM-Blandin, Mopus, PotlatchDeltic) are also certified.

- **DNR Extended Rotation Policy.** In 1994, the DNR implemented an Extended Rotation Policy. This policy focuses on maintaining a range of forest age classes on DNR-managed lands, including some forest stands that are beyond traditional silvicultural rotation age. The Extended Rotation Policy was further refined after recommendations in 2012.

- **DNR old-growth Policy.** Old-growth policies and acreage targets were established in the 1990s to preserve old-growth forests located on state-administered forest lands.

- **CNF – Leech Lake Band of Ojibwe partnership agreement (2019).** In 2019, the Chippewa National Forest ("CNF") and the Leech Lake Band of the Ojibwe entered into a Memorandum of Understanding ("MOU") for management of the CNF. The MOU creates a framework for cooperation and consultation between the Chippewa National Forest and Leech Lake Band of Ojibwe on forest management decisions, including the scale and timing of timber sales so as to protect environmental and policy objectives, including reserved treaty rights.

- **Additional foresters to support private land stewardship.** The 2016 Minnesota Legislature appropriated $2.5 million to the DNR to hire 15-20 new foresters to work with private forest landowners (e.g., write forest management plans). This provided

considerable additional professional support to assist private landowners, including raising awareness of the FMGs when conducting a timber sale.

- **Commitment to use FMGs on private forest lands.** The State's preferential forest property tax program is the Sustainable Forest Incentives Act. As a condition of enrollment, private forest landowners need to follow the FMGs when harvesting timber ("timber harvesting and forest management guidelines must be used in conjunction with any timber harvesting or forest management activities conducted on the land during the period in which the land is enrolled.")

Collectively, these initiatives over the last 25+ years have resulted in additional, tangible measures to address the environmental impacts of timber harvesting, over and above the policies that were in place at the time of the GEIS, when the 5.47 million cord sustainable harvest estimate was made. In Professor Kilgore's view, the implementation of these protective measures indicates that the 5.47 million cord sustainable harvest estimate remains valid. As a result, the statewide cumulative timber harvesting activity that includes harvesting associated with the proposed facility will still be more than 2.2 million cords lower than this upper-level sustainable harvest level.

In looking for sites for the proposed facility, HEW retained Sewall to prepare a Fiber Resource Evaluation (Fiber Resource Evaluation), attached as Exhibit B to the Kilgore Letter (Attachment A).

The Fiber Resource Evaluation selected two 65-mile radius circular zones around two small towns in northern Minnesota (the study area). The two small towns (Northome and Pengilly) were not proposed mill locations but were convenient center points for the wood basin analysis. The Fiber Resource Evaluation then looked at the following:

- Resource Area, including composition by forest type, trends in composition by forest type, ownership composition by forest type, and aspen acres by age class distribution;
- Inventory trends, Growth, and Removals, by species groups and landownership type (excluding federal lands) for both hardwood and softwood species;
- Consumption scenarios, including a base scenario, increased consumption scenarios, and resource impact;
- Infrastructure and sites, including criteria, candidate site comparison, and logging and trucking infrastructure; and,
- Other Factors, include political/regulatory/socioeconomic, supply and price of biomass fuel, and form of roundwood delivery.

The following is a summary of the information from the detailed Fiber Resource Evaluation report. Cohasset is closest to the "Pengilly" circular zone, and therefore the characteristics of that zone are more reflective of the wood supply for the proposed project.

The Fiber Resource Evaluation reviewed the information on both public and private areas. It focused on aspen as a typical resource and of particular interest, although the facility is equally capable of processing other species. It reviewed the age of aspen resources in the study area and found that the aspen stock is heavily skewed to younger ages, with a large "pipeline" of maturing stands in the next 20 years. Note that the Fiber Resource Study analyzed supply and

consumption data in the metric of tons, whereas much of the discussion in this document is designated in cords. One ton of wood equals 0.78 cords of wood.

The Fiber Resource Evaluation report compared the reported amounts of growth and removals for various species for 2009 to 2018. The Evaluation indicated that while removals were relatively constant, annual growth doubled between 2009 and 2018. In addition, the data indicated that aspen inventory rose by more than 10% in both areas in a decade when removals were higher than calculated for 2019. Most of the increase occurred on small private lands.

The Fiber Resource Evaluation report included simulation modeling. The evaluation started with the Forest Service sample plot data and then used a biological forest growth model to project standing volume in 2020 – 2040 if uncut, and then an operational harvest simulation model to cut the desired level of tons each year and observed the effects on total standing inventory.

According to the Fiber Resource Evaluation modeling, without additional consumption, aspen inventory would be up 37% in 20 years. The simulation runs illustrate the region could support almost two mills as proposed while maintaining more growth than removal of aspen, promoting a healthy forest.

It should be noted since the Great Recession of 2007 – 2010, northern Minnesota has lost over 1.4 million cords of annual wood harvested and used, primarily as a result of OSB facility closure. The proposed project is expected to restore only approximately 30% of this lost forest products manufacturing capacity.

Professor Kilgore concluded that the methods and data employed in the Fiber Resource Evaluation were sound and typical of those in industry. He observed that the Fiber Resource Evaluation's focus on 65-mile wood procurement zones likely underestimates the wood supplies available to the proposed facility, because the proposed facility would be expected to also draw wood for broader areas as dynamic market conditions would indicate. HEW confirms that it does not intend to limit its procurement to the 65-mile zones discussed in the Fiber Resource Evaluation; those were simply of use in siting the facility.

For these reasons, construction and operation of the proposed project is not anticipated to have the potential for significant environmental impacts on Minnesota forests.

In addition to overall forest health, potential effects on tribal usufructuary rights were considered. Even though timber harvesting to support the proposed project will not have a significant impact on Minnesota forests, several tribal entities possess rights under various treaties. Impacts to treaty rights, if any, will typically be closely tied to the particular characteristics and resources found in specific tracts of forest. Without knowing the specific tracts and sequence of timber harvesting that will supply the facility, there are several reasons to believe that the exercise of treaty rights is unlikely to be adversely affected.

For this analysis, it is important to identify the ownership of lands supplying wood to the Project. The Fiber Resource Evaluation identified four categories of land ownership: (1) private, (2) county, (3) State, and (4) federal. Tribal usufructuary rights vary by land ownership type. In general, Courts have held that treaties grant usufructuary rights on private lands to the extent those lands were open to the public "generally and indiscriminately." *See., e.g., Mille Lacs Band of Chippewa Indians v. Minnesota*, 124 F.3d 904, 934 (8th Cir. 1997). It is unlikely that many

private lands managed for timber harvest fall into this category, and consequently harvesting from private lands should not impair the exercise of treaty rights.

The Fiber Resource Evaluation assumed that no more than 5% of wood supplying the proposed project would be obtained from federal lands (Fiber Resource Evaluation at 3). To the extent that wood is obtained from federal lands, timber sales are subject to the applicable federal land and forest management plans, which are required by federal law to consider and be protective of reserved treaty rights. Consequently, the proposed project is not expected to adversely affect the exercise of treaty rights on federal lands.

This leaves County and State lands as the primary focus for any potential impacts to tribal usufructuary rights. As noted in the Fiber Resource Study: "State and county land departments in Minnesota are required to manage timberland for full productivity (and timber sales revenue) within the limits of sustainability and the protection of other ecological values. Most have periodic inventory and planning efforts which drive the determination of sustainable harvest levels." (Fiber Resource Study at 12.) As is the case at the federal level, the "protection of ecological and other values" and "planning and inventory" efforts are required by law to consider tribal reserved usufructuary rights in determining whether and to what extent to offer specific tracts of timber for sale. Assuming that county and state timber sales are managed accordingly to law, processing of wood harvested from county and state lands should not result in significant impacts to reserved tribal rights.

Facility Operations

Timber will be delivered by truck and temporarily stored in the outdoor log yard. Woodstock is then transferred indoors either through heated thawing conveyors to clean and thaw the wood prior to entering the next process phase via incline log conveyor.

With the exception of dry fuel storage, bark fuel storage and associated conveying systems, dust handling systems/bag houses, all process equipment and processing phases will be located inside the facility buildings. Logs will be debarked and shaved into strands that are conveyed into storage bins. The strands will be heated in rotary dryers to reduce moisture content. Dryer heat sources will come from the wood fired furnaces supplemented by dust burners, the feedstock bark, fines/trim waste and sander dust. The dust burners can also be fired with natural gas, if needed. The dual fuel burners will be fired in a manner to minimize generation of NOx by utilizing dryer exhaust gases (low O2) as combustion air.

After passing through the dryers the strands will be separated from the exhaust gas in cyclones, with the exhaust gases going through a Dry Electrostatic Precipitator for particulate control before exhausting and the strands being screened before storage. From the dry storage bins the strands will be fed into blending drums where binders and wax are added. The strands will then be oriented into loosely formed mats and hot pressed to form a master panel. The pressed panels are trimmed to desired dimensions and may pass through other finishing processes based on product specification such as sanding, tongue and groove edging, branding and edge sealing. The sheets would be stacked, strapped, and a protective covering applied for transport. The sheets would be stored in the warehouse area for shipping by road or rail.

Normal facility operations will generate domestic wastewaters and solid wastes as described in EAW questions 11 and 12; there will be no industrial wastewater flows. The potable water source and sanitary service will be provided by the City of Cohasset municipal system. Small

quantities of hazardous materials will also be stored in portable containers within the buildings for normal operational use. HEW plants tend to be very small quantity generators of hazardous wastes (<100kg/month). Expected waste materials comprise of small amounts of branding ink wastes or lab packs from trial materials. Universal wastes, such as used oil, may also be generated.

Trucking and other vehicle movements will occur at three new driveway accesses from State Highway 6. Interior looped and two-way roadways will be constructed to safely maneuver throughout the project site. The proposed project is not anticipated to increase traffic congestion or result in a significant increase to the local roadway system (refer to EAW question 20 for additional information).

Due to the scope of the project, the project will not:

1. Modify or improve existing industrial equipment or processes. No equipment or industrial processes currently exist within the project limits.

2. Significantly demolish, remove, or remodel existing structures. The property is presently undeveloped, and no buildings will be demolished as part of this project.

c) Project magnitude:

Table 6-1. Project Size and Type

Total Project Acreage	188 acres*
Linear project length	3.29 miles of single-track railroad spur
Number and type of residential units	Not applicable
Commercial building area (in square feet)	Not applicable
Industrial building area (in square feet)	750,000 square feet**
Institutional building area (in square feet)	Not applicable
Other uses – specify (in square feet)	16 acres of raw and final product outdoor storage yards
Structure height(s): Cyclones Furnace abort stack DESP stack RTO stack Max building structure	 133 ft above grade 100 ft above grade 150 ft above grade 155 ft above grade 105 ft above grade

*Total project site. Includes 159.3-acre facility operational area (facility buildings, storage yards, stormwater ponds, roads, parking lot, and railroad spur area). Remaining 28.7 acres is associated with temporary land cover changes as a result of construction activities.
**Includes a small percentage of office floor space

d) Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

The project purpose is to manufacture OSB for the wholesale construction market. There is a need for increased manufacturing capacity within Huber Engineered Woods' portfolio. Huber Engineered Woods is an established company that strives to provide innovative solutions with high-performance products for roof, wall, and flooring applications for construction projects.

The proposed facility will be a new OSB facility for these products. If the proposed project is not constructed in Cohasset, HEW expects that it would construct a similar facility in another State or Canadian province. HEW identified several promising alternative locations, although none was as attractive as Cohasset.

One of the major attractions of Cohasset is that the project area has ample feedstock used in the production of OSB. By placing the facility near the feedstock, the proposed project reduces transportation of the raw materials. In addition, the proposed facility will provide project materials for the growing construction industry in Minnesota and the surrounding states. The proposed project will also complement existing industries in the area and bring in new jobs to the area.

The proposed project will be carried out by a private party with the utilities constructed by the City of Cohasset and Minnesota Power. The project is not being carried out by a government entity and approval of this project is determined by the City of Cohasset (as Responsible Government Unit for this EAW).

e) Are future stages of this development including development on any other property planned or likely to happen? ☐Yes ☒No

If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

All planned and future project phases of this proposed project are included in this EAW. As part of the purchase agreement with Minnesota Power, Minnesota Power will have access to a large amount of fill dirt generated during construction at the site. Any permitting associated with removing this fill dirt will be Minnesota Power's responsibility.

f) Is this project a subsequent stage of an earlier project? ☐Yes ☒No

If yes, briefly describe the past development, timeline and any past environmental review.

In accordance with MN Rules 4410.4300 Subp. 1, surrounding developments/projects that were previously constructed are not defined as an earlier project. The criteria listed for 'timing' include: the existing project began after April 21, 1997, the construction of the existing project commenced less than three years before the date the application was submitted for the proposed project, and the existing project was not reviewed under a former environmental review. Based on these criteria, the proposed project is not a subsequent stage of an earlier project.

7. Climate Adaptation and Resilience

a. Describe the climate trends in the general location of the project (see EQB guidance: Climate Adaptation and Resilience) and how climate change is anticipated to affect that location during the life of the project.

The proposed site is located within the Mississippi River - Headwaters watershed. The Minnesota Climate Explorer (https://arcgis.dnr.state.mn.us/ewr/climateexplorer/main/historical) was used to evaluate the

climate trends based on this watershed. The 1895 to 2021 profile shows a wide variability of temperature and precipitation data from year to year. The overall trends are described below:

- Average daily mean temperature of 38.02 °F and an increase of 0.26 °F per decade.
- Average daily maximum temperature of 48.93 °F and an increase of 0.21 °F per decade.
- Average daily minimum temperature of 27.11 °F and an increase of 0.32 °F per decade.
- Average annual precipitation of 24.73 inches and an increase 0.09 inches per decade.

The future projected data from the Minnesota Climate Explorer was also used to evaluate the anticipated climate conditions within the Mississippi River – Headwaters watershed during the life of the project. Thus, the mid-century (2040-2059) projections were used in this evaluation, as summarized below. This range of years is assumed at a representative concentration pathway (RCP) of 4.5 which is an intermediate scenario where emissions decline after peaking around year 2040. The values presented below are the model mean, with the upper and lower ranges from the eight general circulation global climate models obtained from CMIP5 (Coupled Model Intercomparison Project, Phase 5 (https://pcmdi.llnl.gov/mips/cmip5/):

- Average daily mean temperature of 43.11 °F with an upper range of 47.03 °F and a lower range of 39.82 °F.
- Average daily maximum temperature of 50.42 °F with an upper range of 54.07 °F and a lower range of 47.52 °F.
- Average daily minimum temperature of 35.99 °F with an upper range of 40.28 °F and a lower range of 32.06 °F.
- Average annual precipitation of 27.42 inches with an upper range of 52.90 inches and a lower range of 14.47 inches.

If future climate conditions follow the projected values, the average daily mean, maximum, and minimum temperatures are each expected to rise over the life of the project. These conditions would create a shorter winter logging season with more reliance on summer wood, which could cause stress in the wood supply chain, as it is presently structured. The climate models also project an increase in the average annual precipitation of approximately 2.69 inches (roughly an 11% increase) over the life of the project.

The Fiber Resource Evaluation briefly examined the potential effects of a changing Minnesota climate on the supply of wood, including effects on plant pests, harvesting, and forest cover (Fiber Resources Study, 35 -36). The Fiber Resources Study concluded that the proposed project would be resilient except over long time horizons in the event that there is a significant change in forest cover.

b. For each Resource Category in the table below: Describe how the project's proposed activities and how the project's design will interact with those climate trends. Describe proposed adaptations to address the project effects identified.

Table 7-1. Climate Considerations

Resource Category	Climate Considerations	Project Information	Adaptations
Project Design	The project will be located in a rural, forested area in Northern Minnesota. The exterior building materials will consist of steel, metal, concrete, EPDM roof membrane, or other building materials in compliance with the Minnesota State Building Code, which are appropriate for this region. Urban heat island effects are not anticipated to significantly increase temperatures in the area near the project site.	Climate change risks and vulnerabilities identified include: • During intense rainfall events, increases in the amount of impervious surface on a site may result in more localized flooding in the immediate area of the project, in addition to other stormwater effects, especially when vegetative buffers are absent.	The facility will utilize stormwater best management practices to effectively manage stormwater runoff. Given the site configuration and surrounding uses, BMPs should be adequate to manage changing stormwater profiles
Land Use	The site is located in an area designated as Zone C, areas of minimal flooding, according to the FEMA map, which is attached as Appendix C. Increased flooding associated with climate change is not anticipated to be of significant concern at the site.	Climate change risks and vulnerabilities identified include: • The removal of wetlands and other low-lying areas reduces the ability of these areas of the land to retain and absorb stormwater, leading to more intense stormwater runoff, nutrient loading, and more effects. • The change in weather will cause increased freeze/thaw, resulting in increased icing of roadways, trails, sidewalks, and parking lots, resulting in the need for increased salting. Chlorides degrade lake water quality and impact aquatic life. Chlorides also degrade soil and can kill landscape plantings. The area of the project that is	The facility will utilize stormwater best management practices to effectively manage stormwater runoff and road salting best management practices to minimize salt usage.

Resource Category	Climate Considerations	Project Information	Adaptations
		subject to de-icing is limited, consisting of the employee parking lot and associated walkways.	
Water Resources	The climate models predict an increase in precipitation.	No climate change risks and vulnerabilities identified.	N/A
Contamination / Hazardous Materials/ Wastes	No hazardous waste is expected to be generated during construction. The facility will likely be a very small quantity generator of hazardous waste. Any hazardous or universal waste generated will be stored indoors in marked containers, in accordance with all applicable laws, and disposed of at facilities licensed to accept such wastes. Changes to climate patterns will not pose any concerns related to storage of hazardous materials or wastes at the site.	No climate change risks and vulnerabilities identified	N/A
Fish, wildlife, plant communities, and sensitive ecological resources (rare features)	The climate models predict an increase in temperature and precipitation, which could affect habitat for fish, wildlife, plant communities, and sensitive ecological resources.	No climate changes risks and vulnerabilities identified.	N/A

8. Cover Types:

Estimate the acreage of the site with each of the following cover types before and after development:

Table 8-1. Land Cover Types (Existing vs. Proposed)

Cover types	Before (Acres)	After (Acres)
Wetlands and shallow lakes**	48.8	20.34
Deep lakes	0	0
Rivers and streams**	0	0
Wooded/forest	44	8.3
Brush/Grassland	58.7	28.5
Cropland	31.8	0
Lawn/landscaping	0	66.66
Impervious surface	1.6***	54.1
Stormwater Pond	0	7.0

Cover types	Before (Acres)	After (Acres)
Other (roadside ditch)	3.1	2.9
Other (lined fire suppression pond)	0	0.2
TOTAL	**188.0**	**188.0***

* Total project site. Includes 159.3 acre facility operational area (facility buildings, storage yards, stormwater ponds, roads, parking lot, and railroad spur area). Remaining 28.7 acres is associated with temporary land cover changes as a result of construction activities

** Estimated wetland impacts (temporary and permanent) to be determined during final design. After acreages assumes permanent wetland impact conversion to upland. Refer to EAW Question 11.b.iv.1 for additional information. Rivers and streams that are two meters (or more) in depth during low flow conditions (per EQB's EAW guidelines, October 2013).

*** Existing railroad

Refer to Figures 4 and 5 for cover type locations.

9. Permits and Approvals Required:

List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.

Table 9-1. Permits and Approvals

Unit of Government	Type of Application	Status
City of Cohasset	Conditional use permit	To be determined
City of Cohasset	Land use permit	To be submitted
Itasca County	Wetland Conservation Act Wetland Boundary and Type Determination	Obtained
Itasca County	Wetland Conservation Act Wetland Replacement Plan	To be determined
Itasca County	Zoning permit	To be submitted
Minnesota Department of Transportation	Entrance/Driveway Access Permit	To be submitted
Minnesota Department of Transportation	Permit for construction of water and sanitary sewer lines within the state road right-of-way	To be submitted by City of Cohasset
Minnesota Pollution Control Agency	NPDES Construction stormwater permit	To be submitted
Minnesota Pollution Control Agency	NPDES Industrial stormwater permit	To be submitted
Minnesota Pollution Control Agency	PSD Air Permit	To be submitted
Minnesota Pollution Control Agency	Sec 401b water quality certification	To be submitted
Minnesota Pollution Control Agency	Sanitary Sewer Extension permit	To be submitted
Minnesota Department of Natural Resources	Utility Crossing License (Public Water)	To be submitted
Minnesota Department of Natural Resources	Non-Game Wildlife Program Special Permit – Eagle Nest	Submitted
U.S. Army Corps of Engineers	Section 404 Approved Jurisdictional Determination	Obtained

Unit of Government	Type of Application	Status
U.S Army Corps of Engineers	Clean Water Act Section 404 Wetland Mitigation/Replacement Plan	To be submitted
U.S. Army Corps of Engineers	Environmental Assessment	Pending
U.S. Fish & Wildlife Service	Eagle Nest Take Permit	Submitted

Table 9-2. Financial Assistance

Funding Source	Structure	Status
IRRRB/DEED	21st Century Fund Forgivable Loan	In process
Mn Dept of Agriculture	MN Production Credit (Legislation)	Approved
City of Cohasset	Provision of infrastructure to project (water, wastewater, natural gas)	In process
Itasca County	Grant	In process
DEED	MN Investment Fund Forgivable Loan	In process
DEED	MN Job Creating Fund	Complete
DEED	MN Business Development Public Infrastructure Program Grant	In process
IRRRB/DEED	MN Job Skills Partnership Program with IRRRB Match	In process
IRRRB/DEED	MN Job Training Inventive Program with IRRRB Match	In process
Itasca County	Negotiated Real Property Tax Assessed Value Benefit	Complete
City of Cohasset	Gas Rate Reduction/Negotiation	Complete

Cumulative potential effects are addressed in response to EAW Item No. 19.

10. Land Use:

a) Describe:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

The property is bordered to the north by US Highway 2, single family residences, agricultural land uses (cultivated and livestock), and undeveloped lands to the west of the project site across State Highway 6 (which borders the project site); to the east by undeveloped wooded/wetlands and the Minnesota Power plant; and on the south by cultivated farmlands, a private access road, and wooded/wetlands.

The site is currently mainly wooded and undeveloped land, as shown on Figure 4. Areas of cultivated farmland are present along the middle and southern portion of the site. Some areas north of the site have previously been used as a sand and gravel borrow pit. Portions of the site along the east were harvested for timber between 2013 to 2018, and is now grassy/brush land.

No local, state, or federal parks or trails are present on or adjacent to the project site. No known vulnerable populations (nursing homes, daycares, schools, etc.) are located within or

adjacent to the project site. Based on the soil survey, 75% of the soils on the site are classified as prime farmland, farmland of state importance, or prime farmland if drained.

ii) Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

The City of Cohasset and Itasca County each have comprehensive land use plans. No other local, regional, state, or federal agency plan would apply to the proposed project. While neither plan specifically mentions the proposed project, both plans contain references to economic growth which would include projects such as the proposed project. No specific land use restrictions are noted in either land use plan for the site area.

The City of Cohasset Comprehensive Plan was updated in 2013 (Cohasset Plan). The Cohasset Plan identifies an Industrial/Commercial Policy Area which identifies areas where commercial or industrial land use would be the primary and preferred use; the proposed project is located in that area.

Itasca County has a Comprehensive Land Use Plan which was effective as of July 1, 2000, and updated in 2013 (Itasca County Plan). The Itasca County Plan notes "the future growth of the economy, however, will also include forestry, recreation/tourism, technology-based businesses, home businesses, small manufacturing, mining and large-scale industry." The proposed project fits within that growth strategy.

iii) Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

The area of the site within the City of Cohasset is zoned as Heavy Industrial with no special districts or overlays. A copy of the City of Cohasset zoning map is attached as Appendix B. The site is located an area designated as Zone C, areas of minimal flooding, according to the FEMA map, which is attached as Appendix C.

Permitted uses in with this zoning district include: fabricating, processing, assembly from raw or semi-finished products; secondary wood products; outdoor storage; accessory uses and structures; major transportation terminals, hangers, switching yards, sidings, runways, heliports, etc.; minor transportation streets, highways, railroad right-of-way, transit shelters, bicycle and pedestrian paths; and general warehouse. This zoning district indicates the maximum building height allowed without a conditional use permit is 60 feet.

The northern portion of the site is within an unincorporated area of Itasca County. This portion of the site is zoned as Farm Residential and Public Lands. Railroad spurs are not specifically listed as approved used in these zoning districts.

b) Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

One of the attributes noted in the Cohasset Plan is "a growing tax base of industrial and commercial properties". The proposed project would support that attribute by providing an

associated industry that would complement other industry (silviculture) already present in the area. As discussed above, the Cohasset Plan identifies an Industrial/Commercial Policy Area which identifies areas where commercial or industrial land use would be the primary and preferred use; the proposed project is located in that area.

The Itasca County Plan notes "the future growth of the economy, however, will also include forestry, recreation/tourism, technology-based businesses, home businesses, small manufacturing, mining and large-scale industry." The proposed project fits within that growth strategy.

The Itasca County Plan identified several larger goals, with specific goals to meet the larger goals. One of the larger goals is Natural Resources, and a specific goal under that section is "Encourage residential and commercial development to occur in areas already fragmented by housing, urban uses, and existing road corridors to minimize adverse impacts and cost of public services." The site of the proposed project is mainly owned by Minnesota Power, which owns and operates a power plant on an adjoining property. Placing the proposed project at this location will minimize costs for utilities, as utilities are available at the existing power plant and can be extended to the proposed project area along an existing road. The site has been previously developed for farmland. In addition, by being located within the City of Cohasset, it will encourage employees to utilize existing housing with the City, supporting the Housing Diversity Objective in the Itasca County Plan.

Finally, the Itasca County Plan includes a Forest Products Industry Objective of "support the continuation and expansion of the forest products industry", which includes the goal of "support development of new value-added forest products and production techniques". The proposed project will utilize forest products grown and harvested in the area and provide a value-added service.

The proposed project use is included within the permitted uses of existing City of Cohasset zoning district except that a conditional use permit (CUP) will be necessary for the building height needed for proposed facility, as the proposed height does not meet the dimensional standards set forth in the zoning ordinance.

As discussed above, the northern portion of the site is within an unincorporated area of Itasca County. This portion of the site is zoned as Farm Residential and Public Lands. The proposed project would use these areas of the site for the railroad spur. Railroad spurs are not specifically listed as approved used in these zoning districts. A CUP would be necessary for construction of the railroad on the northern portion of the site.

c) Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.

The proposed project is generally within the comprehensive plans and permitting uses of the area. Approval of a Conditional Use Permit (CUP) would be necessary for construction of the railroad on the northern portion of the site (within Itasca County) and for the building heights needed on the area within the city of Cohasset. No other potential incompatibility or conflicts between the proposed project and nearby land uses, zoning, or other local or regional plans were identified

11. Geology, Soils, and Topography/Land Forms:

a) Geology - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.

According to published geological information (www.mngs.umn.edu), the site soils consist of glacial outwash – undivided as to moraine association (Hobbs & Goebel, 1982).

The bedrock in the vicinity of the Site is comprised of syntectonic to pretectonic granitoid rocks of the Vermilion Granitic Complex, the Giants Ridge and Bemidji batholiths, as well as smaller intrusion of tonalitic and monzonite of the Algoman orogeny in northern Minnesota (Morey and Meints, 2000). Depth to bedrock ranges from 150 to 200 feet below ground surface (bgs) (Olsen and Mossler, 1982).

No susceptible geologic features (sink holes, shallow limestone, shallow aquifers, or karst features) are known to be present on the site, therefore no project design limitations or mitigation measures have been identified.

b) Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

According to the USDA-NRCS Web Soil Survey, the soil at the proposed project area consists of the following classifications:

Table 11-1. Soils Characteristics

Map Unit Symbol	Map Unit Name	% Project Area	Drainage	Hydric Soil rating	Farmland Classification
116	Redby loamy fine sand, 0 – 3% slopes	1.8	Somewhat poorly drained	Not hydric	Not prime farmland
550	Dora mucky peat	7.3	Very poorly drained	Hydric	Not prime farmland
625	Sandwick loamy fine sand	1.3	Poorly drained	Hydric	Not prime farmland
627	Tawas muck	1.2	Very poorly drained	Hydric	Not prime farmland
630	Wildwood muck	2.9	Very poorly drained	Hydric	Not prime farmland
655	Bearville loamy sand	2.2	Poorly drained	Hydric	Not prime farmland
797	Mooslake and Lupto soils, 0 – 1 percent slopes	8.2	Very poorly drained	Hydric	Not prime farmland
871	Indus and Brickton soils	3.1	Poorly drained	Hydric	Prime farmland if drained
32B	Nebish loam, 1 – 8% slopes	34.8	Well drained	Not hydric	Prime farmland
620B	Cutaway loamy sand, 0 – 8% slopes	30	Well drained	Not hydric	Farmland of statewide importance

Map Unit Symbol	Map Unit Name	% Project Area	Drainage	Hydric Soil rating	Farmland Classification
801B	Taylor and Dalbo silt loams, 0 – 6 percent slopes	7.2	Moderately well drained	Not hydric	Prime farmland
803D	Warba-Menahga complex, 10 – 25% slopes	0.1	Well drained	Not hydric	Not prime farmland

A map of the soil locations is provided as Figure 9 and description of these soils is attached as Appendix D. The south and west portions of the site, that are cultivated, consist of sandy soils presumably from sandy outwash parent material over loamy glacial till. This portion is largely flat or is gently sloping to the south and west. In the central portion of the site, at the highest elevations, soil parent materials were loamy glacial till forming a moraine with undulating topography and wetlands in depressions. The north portion of the project site, consisting of the proposed rail corridor, is largely located on fine textured glacial lake sediments. Where mineral sediments are deep, extensive peat has formed supporting forested wetlands. Near the north end of the site, along the transmission line and railroad corridors, fine clay sediments are common in the soil profile.

The elevations on the site range from approximately 1,290 feet to 1,368 feet as shown on Figure 3. The southern portion of the site is largely flat or gently sloping to the south and west. The highest elevations are in the central portions of the site.

A preliminary geotechnical evaluation was completed February 2021. The borings placed on the investigation area encountered topsoil in all borings up to 24 inches thick, underlain by coarse alluvial deposits, fine alluvial deposits, and glacial outwash. Groundwater was encountered at depths ranging from 8 to 30 feet below the ground surface. The soil borings indicated a layered upper soil provide that is conducive for encountering perched water conditions.

No sinkholes, shallow limestone, or karst features were identified on the site. No soil stability or other soil limitations were identified for the site.

The central portion of the site will be graded for the buildings and operations areas. Soil corrections and soil stabilization are not proposed at this time.

12. Water Resources:

a) Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.

i) Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include and the water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.

There are no designated wildlife lakes, migratory waterfowl feeding/resting areas, trout streams/lakes, MPCA or MDNR listed calcareous fens, Section 303d listed impaired waters, outstanding waters, county or jurisdictional ditches within one mile of the project site.

Three Public Waters as mapped by the DNR are present within one mile of the project site (Figure 8); Unnamed Stream and Little Drum Lake (31074100) to the southwest and Warburg Lake (31056300) to the south.

Thirty-one (31) wetland basins were delineated on the project site (Figure 7), for a cumulative total of 48.8 acres of wetlands in the project boundaries. Delineated wetlands ranged from several small farmed depressional basins covering 0.08 acres to a portion of a large forested wetland complex of several hundred acres, of which greater than 20 acres are within the project area. The wetland delineation was approved by the Wetland Conservation Act Local Government Unit (Itasca County Soil and Water Conservation District) on July 20, 2021. The U.S. Army Corps of Engineers also issued an Approved Jurisdictional Determination (August 9, 2021), determining five of the delineated wetlands to be regulated as a Waters of the U.S. under Section 404 Federal Clean Water Act.

Per the approved wetland delineation report, the following delineated wetlands meet the definition of a Public Waters Wetlands (103G.005 Subd. 15a; 2.5 acres or more in size within an incorporated area):

- Wetland No. 26 (14.27 acres within the 18.49 acre wetland)
- Wetland No. 27 (5.67 acres of the 74.04 acre wetland). This wetland acreage does not include non-delineated portions of the wetland No. 27 that extend outside project limits.

ii) Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

1) According to the Phase I ESA completed in 2021, the depth to groundwater in the vicinity of the site ranges from less than 10 feet to greater than 50 feet below the land surface based on site topography and surrounding surface water bodies.

   The geotechnical report encountered groundwater at 8 feet below the ground surface in one of the borings. The previous and current landowners are not aware of any onsite or adjacent wells, such as old farm wells or artesian wells, that are not registered by the Minnesota County Well Index (MCWI).

2) The project is not located within a MDH wellhead protection area.

3) The Minnesota County Well Index (MCWI), which is a limited database of water well records, was accessed through the Minnesota Department of Health (MDH) website. Not all private water wells are listed in that database. Our review of the MCWI database revealed the following water well located on or near the site:

Table 12-1 Wells

Unique ID	Well Name	Depth (ft)	Aquifer	Listed Use	Date
811031	Monitoring well	131	Not provided	Monitoring	4/13/2016

Based on review of this well location record, this well is likely located adjacent to the site. A map of the wells in the area is provided as Figure 11.

No permanent wells are proposed within the project area once construction has concluded.

b) Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i through Item b.iv below.

i) Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

1) If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.

The facility is expected to generate domestic sanitary discharge from bathrooms and sinks in the office and production areas. The following is an estimate of the flow that will be generated:

90 employees x 2 shifts x 50 gallons per person = 9,000 gallons per day

No process water will be discharged to the public utilities.

The facility will have no wastewater discharges other than domestic sanitary sewer which will be routed to the Grand Rapids Public Utilities. The water and wastewater manager for the Grand Rapids Public Utilities Commission, Mr. Steve Mattson, confirmed they “have plenty of capacity to service the needs” of the project.

Representatives from the City of Cohasset verbally confirmed that the City of Cohasset, which will own and operate the lines that connect the facility to the Grand Rapids Public Utilities, has the capacity to handle the added domestic wastewater loading with no need for expansion or replacement of municipal wastewater infrastructure, other than installing new sanitary sewer lines to the proposed project.

2) If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.

There is no proposed wastewater discharge to any SSTS.

3) If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.

There is no proposed wastewater discharge to any surface or groundwater resources.

ii) Stormwater – Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss environmental effects from stormwater discharges. Describe the stormwater pollution prevention plan (SWPPP) including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.

Currently, stormwater flows overland to existing wetlands, roadside ditches, or infiltrates into the ground. Portions of the proposed project area have historically been row-crop agriculture and forested areas, however timber harvesting occurred in the eastern portion of the site sometime between 2013 to 2018 (based on available aerial photographs). Pre-construction stormwater runoff is typical of an agricultural land use with increased rates of flow and erosion potential during non-cropped portions of the year.

Temporary erosion and sediment control best management practices (BMPs) will initially be installed (per the Project's SWPPP), maintained/repaired, and amended throughout the construction phases as required to remain compliant with the NPDES construction stormwater permit. Temporary BMPs may include (but are not limited to) silt fence, bio-rolls/filter logs, rock construction entrances, mulch/hydro mulch, temporary seeding, and permanent seeding (native and turf, where appropriate).

The project's permittees (primary contractor and owner) will be jointly responsible for all SWPPP components (as defined in the project SWPPP). The primary contractor will be responsible for all SWPPP components during active construction, which include amending the SWPPP as necessary, and the installation, maintenance, and repair of all temporary and permanent erosion and sediment control BMPs.

The quality of post-construction stormwater runoff will be common of an industrial land use, with increased runoff rates from impervious surfaces generating higher concentrations of total suspended solids and total phosphorus than a typical undeveloped site. All stormwater runoff from the facility and rail spur is proposed to be captured on-site within a constructed perimeter ditch. The ditch will drain to two proposed wet sedimentation basins on the west side of the project site near Highway 6. The two proposed wet sedimentation ponds will provide stormwater management and treatment for areas that currently do not receive treatment prior to draining into the surrounding wetlands. The overall site plan (Figure 6) shows all of the proposed stormwater features.

The two proposed ponds are designed to meet the permanent stormwater treatment requirements and water quality volume of one inch over the new impervious surfaces of the current NPDES Construction Stormwater Permit. Land use conversion from agricultural to lawn/landscaping will increase the water quality of stormwater runoff from these areas. In addition, the ponds are designed as a water source for fire suppression of the facility and adjacent log yard. Huber Engineered Woods will be responsible for the long-term operation and maintenance activities for all stormwater features and future NPDES Industrial Stormwater permit requirements.

iii) **Water appropriation - Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.**

Temporary short-term construction dewatering of groundwater may be required at the time of construction (depending on current field conditions) to facilitate construction activities of phased grading, placement of structural footings, and utility trenches/pits. If dewatering is anticipated to exceed 10,000 gallons per day or 1,000,000 gallons per year, the contractor performing the applicable work will be required to obtain a Water Appropriations Permit from the DNR prior to initiating dewatering activities. Measures to avoid, minimize, or mitigate the environmental effects from construction related to dewatering are unknown at this time, and therefore will be determined when developing the dewatering plan as required by a future Stormwater Pollution Prevention Plan (SWPPP) amendment of the NPDES Construction Stormwater Permit.

There are no identified wells within the project boundary that would require sealing. If wells are discovered during construction, appropriate MDH well sealing measures will be followed by a licensed well contractor.

The proposed indoor/outdoor thawing conveyors will require 285,000 gallons of water from the City of Cohasset municipal water supply to initially fill the conveyors over several days. Routine maintenance of each conveyor will occur once a year, where the conveyor will be drained to the other conveyors, cleaned, and then re-filled by transferring the water back from the other conveyors. During normal facility operations, the conveyors will be heated during the winter months by the plant thermal oil system. Make up water (due to absorption, evaporation, and losses in the water filtering process) will also be sourced from the City of Cohasset municipal water supply for routine make up conveyor water lost during operations.

The City of Cohasset has confirmed that the facility has the capacity to handle the added water needs with no need for expansion or replacement of municipal water infrastructure, other than installing new watermain to service the proposed project.

iv) **Surface Waters**

a) **Wetlands - Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed, and identify those probable locations.**

Twenty-six (26) of the delineated 31 wetlands are proposed to be permanently filled or excavated as a result of the proposed project (48.8 acres of delineated wetlands with 28.46 acres of total unavoidable impact). The majority of proposed impacts (20.37 acres) are attributed to filling for the rail spur which crosses two large wetland complexes to the north of the facility. 29 of the 31 delineated wetlands on the site are not Public Waters Wetlands. Portions of Public Waters Wetlands that are proposed to be filled include:

- 8.73 acres of the 14.27 acres of the Public Water Wetland (Wetland No. 26), resulting in 5.54 acres of Public Water Wetland remaining.
- 1.65 acres of the 5.67 acres of the Public Water Wetland (Wetland No. 27) resulting in 3.72 acres of Public Water Wetland remaining.

The proposed permanent wetland impacts will result in a reduction in size but not the elimination of a Public Waters Wetlands, and therefore do not trigger a mandatory EIS (Minnesota Rule 4410.4400 Subpart 20).

Sequencing considerations for avoidance and minimization were identified and incorporated into the proposed design (Figure 6). A detail sequencing analysis will be prepared and provided in the wetland replacement plan for regulatory review and approval by the Itasca Soil and Water Conservation District and U.S. Army Corps of Engineers.

Compensatory mitigation (in excess of the minimum 1 to 1 replacement ratio) is required at a 1.5 to 1 ratio (42.68 wetland credit acres) through the purchase of offsite wetland bank credits from approved wetland banks within the same service area as the proposed project (Bank Service Area #5). This requirement is reflected in the 2021 Minnesota Session Law, 1st Special Session, Chapter 6, Section 129 titled “Facilitate Engineered Wood Product Manufacturing Facility; Itasca County”.

Priority of purchasing available credits will be placed on banks within the major watershed #7, which is the same watershed as the proposed wetland impacts. Exact locations of suitable mitigation banks are subject to change, and is entirely dependent on available bank credits at the time of the replacement plan application. At the time of this EAW, sufficient wetland credits were available in Bank Service Area #5 to satisfy all of the project’s proposed 42.68 wetland credits needed. The wetland replacement plan will comply with the Minnesota Wetland Conservation Act and Section 401 and 404 Federal Clean Water Act.

b) Other surface waters- Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration.

Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

Surface waters (other than direct impact to wetlands, as discussed previously) will not be physically altered or indirectly effected by the proposed project, however small segments of the State Highway 6 roadside ditch will be permanently filled (with suitable fill and a culvert to covey flows) allows for three driveways to access the project site.

During construction, appropriate methods, activities (such as phased grading), and erosion and sediment control BMPs will be used to contain stormwater runoff on site. Specific BMPs will be incorporated into the construction SWPPP to reduce the potential of off-site stormwater discharges, sediment laden runoff, and other construction related pollutants. No in-water work is proposed to deep water wetlands, lakes, or streams.

All stormwater runoff from the post-construction site will be collected within a proposed perimeter ditch system and conveyed to two onsite stormwater ponds. The overflow discharge point of these ponds is located at the State Highway 6 roadside ditch and Wetland No. 26. Both ponds are designed to exceed state NPDES construction stormwater permit water quality requirements prior to discharging off site.

There is no current watercraft use of the surface waters on or near the proposed project. The proposed project will not affect watercraft use on surface waters located within one mile of the project, such as Little Drum, Warburg, or Blackwater Lakes.

13. Contamination/Hazardous Materials/Wastes:

a) Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.

A Phase I Environmental Site Assessment (ESA) was conducted for the site in 2021. No recognized environmental conditions or controlled recognized environmental conditions were identified. Dumping of solid waste was observed in one area and will be properly disposed of off-site at a permitted landfill.

Based on review of the information prepared for the Phase I ESA of the site, no existing contamination or potential environmental hazards are known to be present on the area of the utilities.

b) Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

Typical construction wastes from the project, such as drywall, wood, metal, and plastic sheeting, etc., will result from construction of the building and associated facilities. The construction contractor will have a waste minimization and recycling program to reduce the volume of solid waste. Wastes produced during construction will be disposed of by a licensed waste hauler at an appropriate facility.

The project proposes to use all biomass produced on site, such as bark and trim waste, in the furnaces for process heat. Wood ash is one waste stream and beneficial reuse options will be sought. The objective is for the facility to be a zero waste to landfill site. There may be times when wood-based residues are regenerated along with pallets; in those cases reuse and recycle opportunities will be identified. Most process raw materials other than wood will be delivered in bulk form and packaging such as empty totes or steel drums will be returned to supplier or recycled.

c) Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.

Toxic or hazardous materials will not be present at the construction site, except for fuel and lubricants as necessary for the construction equipment used on the project. Cleaning solutions and synthetic oils/lubricants may be used during project construction and will be stored in marked containers in accordance with all applicable laws. If a spill were to occur during construction, the Minnesota Duty Officer will be contacted and appropriate action to remediate will be taken immediately in accordance with MPCA guidelines and regulations in place at the time of project construction.

Following construction, the project is anticipated to a very small quantity generator of hazardous waste and may generate universal wastes such as spent lamps, bulbs and used oil. These materials will be labeled, stored, and disposed of in accordance with applicable regulations.

The building to be constructed on the project will be heated by biomass produced on site with natural gas as backup.

Several aboveground storage tanks with spill containment will be used at the proposed facility. These tanks include: ten 25,000-gallon tanks for resin, wax, and release agent; two 3,000-gallon hydraulic oil tanks; smaller hydraulic oil tanks ranging in size from 100- to 1,000-gallons; one 20,000-gallon thermal oil drain tank. Spill reporting procedures and spill prevention planning will be conducted in accordance with applicable regulations.

d) Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.

No hazardous waste is expected to be generated during construction. Hazardous materials and universal wastes (such as used aerosol cans) used during construction will be stored and managed according to construction SWPPP and disposed of by the contractor at facilities licensed to dispose of such wastes.

The facility will likely be a very small quantity generator of hazardous waste (<100kg/month). Wastes expected to be produced will be small amounts of branding ink wastes or lab packs from trial materials. Universal wastes, such as used oil, may also be generated. Any hazardous or universal waste generated will be stored in marked containers, in accordance with all applicable laws, and disposed of at facilities licensed to accept such wastes.

14. Fish, Wildlife, Plant communities, and Sensitive Ecological Resources (rare features):

a) Describe fish and wildlife resources as well as habitats and vegetation on or in near the site.

The project site is situated within rolling hills of upland forest, with several types of wetlands, and agricultural land uses as illustrated on Figure 4. Several common wildlife species are known to occupy the habitats, which are further described in EAW question No. 14.d. An endangered species and biological resources review was conducted by Braun Intertec, which provides a detailed description of the habitats and vegetation. The following is a summary of general landscape and site characteristics based on observations while conducting field studies within the project site.

<u>Southwest</u>

Substantial portions of the west and southwest portions of the site are cultivated fields planted to row crops. This includes small, farmed wetlands that occur in fields in low areas or at toe slopes. Four historic farmsteads were identified on the site, although no buildings remain. The foundation for at least one farm building remains. Farmsteads include scattered, mature native trees such as white pine, red pine, northern red oak, and paper birch. Groundcover consists largely of non-native grasses and forbs such as smooth brome, reed canarygrass, timothy, birdsfoot trefoil, and common tansy.

<u>Southeast/East</u>

In the southeast/east portion of the site, a large area of upland forest has been logged in recent years (2013-2018). Mature northern red oak was left to serve as seed trees for forest regeneration. Planted white pine, red pine, and white spruce seedlings were observed. The groundcover was dominated by non-native grasses and forbs such as smooth brome, timothy,

reed canarygrass, and common tansy. Topography of the logged area generally slopes from east to southwest/west, with sporadic depressions, terraces, and wetlands.

North

In the north portion of the site, the proposed rail corridor crosses a wetland complex that includes a community dominated by black spruce and other thick vegetation. Tamarack occurs primarily on the edge in transition zones between wetland types. Topography is flat with micro topography.

On the far north end of the site is a mosaic of uplands and wetlands with few clear boundaries to distinguish between the two. This mosaic is located at the north end of the proposed rail corridor, on the south edge of a transmission line corridor near US Highway 2. Wetlands include wet meadow with Canada bluejoint, reed canarygrass, and woolgrass, and shrub carr with alder, pussy willow, and quaking aspen. Uplands are dominated by smooth brome, reed canarygrass, common tansy, and quaking aspen. This area appears to have been disturbed by previous logging and is in an early-successional state dominated by aspen saplings.

b) Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number (LA-997) and/or correspondence number (ERDB _____) from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.

Braun Intertec holds a license from the DNR for a local copy of the Natural Heritage Information System (NHIS) geodatabase (License #997). A query of the database was made for Element Occurrences (EO) near the site. The initial query yielded few results, so the search area was expanded to a buffer five miles around the site. Seven Element Occurrences were found in the NHIS database within five miles of the site. None of the EOs are for state or federally threatened or endangered species. Two entries are animal aggregations. The remaining entries are of special concern species, including one fish, one bird, and three plants. None of these entries are federally listed as threatened or endangered.

Table 14-1 Element Occurrences

Scientific Name	Common Name	State Status	Last Observation
Ardea herodias	Great blue heron Nesting Site	NA	4/26/1984
Ardea herodias	Great blue heron Nesting Site	NA	7/5/1994
Etheostoma microperca	Least Darter	SPC	5/27/2001
Falco peregrinus	Peregrine Falcon	SPC	6/15/2010
Botrychium pallidum	Pale Moonwort	SPC	6/20/2010
Platanthera clavellata	Small Green Wood Orchid	SPC	7/24/1977
Ranunculus lapponicus	Lapland Buttercup	SPC	6/18/2008

Two of the EOs are colonial nesting sites of the great blue heron (Ardea herodias). This species is not listed as threatened, endangered or special concern, however the colony site is included in the NHIS database as an animal aggregation site. The two colonies were last observed in 1984 and 1994. They were observed between three and five miles from the site at Bassbrook Wildlife Management Area and Bass Lake.

One fish has been documented between three and five miles from the site, the least darter (Etheostoma microperca), which is designated special concern. This species was found in the Mississippi River and Rice Lake in 2001.

Peregrine falcon (Falco peregrinus) is known from the nearby Boswell Energy Center (within three miles) where a nest box is mounted on a smokestack. Peregrine falcon is designated special concern, and the last documented observation reported to the NHIS database was in 2010.

Pale moonwort (Botrychium pallidum) was reported in 2010 within three miles of the site in sandy soils with short stature vegetation with barren openings. This plant is designated as special concern.

Small green wood orchid (Platanthera clavellata) was reported in 1977 from a black spruce swamp within three miles. This plant is designated as special concern.

Lapland buttercup (Ranunculus lapponicus) was reported in 2008 from a cedar swamp within five miles. This plant is designated as special concern.

An online query was submitted to the US Fish & Wildlife (USFWS) database Information for Planning and Conservation (IPaC; https://ecos.fws.gov/ipac/). The IPaC website allowed for review of potential impacts to one listed species, the northern long-eared bat. The website issued an MA Verification Letter: Northern Long-Eared Bat (NLEB) Consultation and 4(d) Rule Consistency 2021-04-06. The IPaC results (Appendix E) indicated that the site is within the range of one federally listed species, northern long-eared bat (Myotis septentrionalis). This species is federally threatened and state special concern. The IPaC results do not indicate observations of either species have been made in the project vicinity. Rather the IPaC results identifies species that may occur on the project site based on broad geographic ranges of the species (such as occurrence within the county). In contrast, the NHIS results report actual observations within a set distance (five miles was used for this report).

The project site does not occur in or near any designated Critical Habitat and no portion of the project site is located within or adjacent to a Minnesota Biological Survey site (Figure 10).

The IPaC results also noted that bald eagles and migratory birds may occur on the site and are protected under federal statutes administered by the US Fish & Wildlife Service.

A field survey was conducted to search for rare or listed plants, describe landcover and plant communities, and evaluate habitat for protected wildlife species. In preparation for the survey, the DNR's online rare species guide (https://www.dnr.state.mn.us/rsg/index.html) was queried for a list of all threatened, endangered, and special concern species known from Itasca County, covering all types of taxa.

As described above, several species were noted by the NHIS within five miles of the site. During the field surveys, no heron rookeries were noted on or near the site. No surveys for threatened or protected wildlife were conducted, and no evaluation was made for least darter or peregrine falcon. Other than wetlands, no aquatic resources are present on the project site, so no habitat is present for least darter. The status of peregrine falcons nesting at the Boswell Energy Center is unknown. Regardless, development of the proposed site would not affect peregrine falcons.

The three state-listed special concern species were not observed on the site. The survey time was appropriate for locating these species, if they were present. Field surveys were conducted with the entire suite of state-listed species in mind. None of the listed plant species were observed.

No threatened or endangered plants were found along the utility corridor.

One federally-threatened species was noted in IPaC results (Appendix E): northern long-eared bat (Myotis septentrionalis). The project site is within the range of northern long-eared bat. As of June 7, 2021, there are no known hibernacula or roost trees within the same townships as the project site (https://files.dnr.state.mn.us/eco/ereview/minnesota_nleb_township_list_and_map.pdf).

The site is covered with forest of various ages and includes many trees and snags with cavities and loose bark that could provide long-eared bat roosting habitat. There are no known resources for hibernacula on the site.

Two bald eagle nests were noted on the project site, approximately 500 ft apart. These nests are located in the southern portion of the site. Eagles were observed actively using the southern nest, in a large white pine. No eagle activity was observed at the second nest, in a large red pine. Given the proximity of the nests to each other, it is likely that both nests were constructed by the same eagle pair.

c) Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.

Clearing and grubbing, as well as construction, could negatively impact the Northern Long-eared Bat (NLEB) as well as migratory birds, as the undeveloped land cover and plant communities onsite provide abundant resources for bird foraging and nesting. No impacts to state-listed species are likely or anticipated.

The wood stock proposed to be used for the plant will come from the surrounding area so there is not anticipated to be the introduction or spread of invasive species for construction or operation.

The US Fish & Wildlife Service issued a “Verification letter for the 'Huber Engineered Woods' project under the January 5, 2016, Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long- eared Bat and Activities Excepted from Take Prohibitions” (Appendix F). This letter states:

Based upon your IPaC submission, the Action is consistent with activities analyzed in the PBO [Programmatic Biological Opinion]. The Action may affect the northern long-eared bat; however, any take that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o). Unless the Service advises you within 30 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the PBO satisfies and concludes your responsibilities for this Action under ESA Section 7(a)(2) with respect to the northern long-eared bat.

Two bald eagle nests were noted on the project site, approximately 500 ft apart. These nests are located in the southern portion of the site. Eagles were observed actively using the southern nest, in a large white pine. No eagle activity was observed at the second nest, in a large red pine. Development of the site will require removal of these trees and the taking of the nests they support. This impact will require authorization by the US Fish & Wildlife Service (USFWS) and DNR. Federal and DNR eagle nest take permits require mitigation as appropriate to the degree of impact. Nest removal can only occur when the removal will not impact active nesting or eaglet rearing. In addition, eagle populations in the area are growing and nesting sites are abundant. Consequently, regulated removal of the nests is not expected to have a significant environmental effect on individual eagles, eagle populations, or eagle habitat.

d) Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.

Under the 4(d) rule, incidental take of NLEB is not prohibited. However, impacts will be minimized or avoided entirely, such as by restricting tree clearing activities to time periods when any potential bats would be hibernating and not actively roosting in trees (i.e., approximately November 1 – March 31).

Clearing and grubbing of the site could negatively impact migratory birds. Impacts will be avoided by restricting clearing and grubbing activities to periods when migratory birds are not nesting. This time period is generally September 1 – April 30 for most species. Should clearing/grubbing be required outside of these dates, coordination and additional species specific guidance will be conducted with USFWS.

HEW went through a site screening process before selecting the proposed site. There were no other qualifying sites with appropriate zoning, and with lesser environmental consequences. A permit application with USFWS and the DNR has been filed for removal of the bald eagle nests, along with required mitigation in the form of a donation for eagle conservation to help offset loss of the nests. HEW also examined alternative site designs to avoid removal of the nests, but site topography did not allow a configuration that would preserve the nests. Because eagles and nest sites are so abundant in Itasca County, it likely will not be necessary to compensate by creating an artificial nest. Details of any additional mitigation will be resolved during application and approval of the appropriate permit. Nest removal will occur during the season when the nests are not in-use (defined by USFWS regulations as the period during breeding season (approx. February-July) during which there is a presence adult eagles, eggs, or young, and for 10 days after the last presence).

One state-listed species, the least darter, could be present in Blackwater Creek. Excavation for installation of utility lines could impact this species, and its habitat, particularly through degradation of water quality. Mitigation measures should be considered to minimize or avoid

impacts where the utility line crosses Blackwater Creek. Use of horizontal directional drilling under the creek and appropriate stormwater and erosion controls in nearby construction areas could reduce or eliminate potential impacts.

During construction all disturbed lands will be temporarily and permanently seeded with cover crops and native species to reduce the establishment and spread of invasive and non-desirable vegetative species. Construction methods may include stockpiling of topsoil for long periods, phased grading, and herbicide treatments where appropriate.

15. Historic Properties:

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

A Phase IA Cultural Resource Literature Review and Preliminary Reconnaissance of the area was conducted in 2021. The literature review was conducted using files maintained by the Minnesota Office of the State Archaeologist (OSA) and the Minnesota State Historic Preservation Office (SHPO).

Three previously recorded archaeological sites and one previously recorded historic structure were identified within the area reviewed, which was larger than the proposed project. One previously recorded cultural resource, an Alpha Site (21ICdi), was identified as being located within the review area. The majority of the project area reviewed that overlaps with 21ICdi is situated within marsh/wet areas that were inundated with water at the time of the site visit, and therefore it is unlikely the Alpha Site exists within these ground conditions. All three sites are located outside the proposed projects limits. No historic designations or architectural features were identified for the proposed project area. The proposed project will have no direct or indirect adverse impacts to the surrounding archaeological sites or historical properties. However, due to the location of the proposed project, the report recommended a Phase I archaeological survey should be conducted on flat land areas which have not been previously disturbed and will be disturbed by the proposed project.

The SHPO was consulted regarding the proposed project. The response letter is provided as Appendix G. The SHPO concluded that they agree with the previous report that an additional survey should be completed.

Based on the report and the SHPO response, an archaeological survey was conducted in appropriate areas on the proposed project, in accordance with the standards referenced in the SHPO response, and in coordination with the USACE archaeologist for Section 106 compliance. The Phase I Survey included an additional field reconnaissance to evaluate whether Site 21ICdi was located within the proposed project. No artifacts or features were observed within the proposed project area. The report recommended the finding of *No Adverse Effects to Historic Properties.*

The report was submitted to the SHPO for concurrence. The SHPO response, dated December 27, 2021, agreed with the conclusion that the four archaeological sites are not eligible for listing

in the National Register of Historic Places. The letter concluded "there are no properties listed in the National or State Registers of Historic Places, and no significant archeological properties located in the area that will be affected by this project." The response letter is included in Appendix G.

16. Visual:

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

There are no scenic views or vistas in the vicinity of the proposed project. A majority of the land adjacent to the project area is active agricultural land or undeveloped. A power plant is adjoining to the east.

The exterior building materials will consist of steel, metal, concrete, EPDM roof membrane, or other building materials in compliance with the Minnesota State Building Code. The building heights will be up to 105 feet above grade, with other equipment up to 155 ft above grade. Perimeter landscaping and exterior lighting will be determined during the final design, in accordance with the City of Cohasset requirements.

Steam vapor plumes may be visible from plant operations during certain temperature conditions. Mobile equipment operating on site will have yellow flashing warning lights per OSHA requirements as well as blue and red lights per Huber safety standards. Cyclones and stacks may have red warning lights on them per code and regulations.

No visual nuisances, such as intense glare or significant light plumes, are anticipated during normal operations.

17. Air:

a) Stationary source emissions - Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used to assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.

The proposed facility will have emissions of particulate matter (PM), particulate matter < 10 microns (PM_{10}), and particulate matter < 2.5 microns ($PM_{2.5}$) from combustion processes (discussed below), log handling, log debarking, stranding, strand drying operations (discussed below), screening, blending, forming and pressing (discussed below), sheet finishing (sawing and sanding), wood and bark hogging (shredding), wood waste (saw dust and sander dust) conveying and storage, miscellaneous spray coating operations, and vehicle traffic on paved and unpaved roads. PM, PM_{10}, and $PM_{2.5}$ emissions from stranding, blending, forming, sheet finishing operations, and wood waste pneumatic conveying will be controlled using cyclones and fabric filters.

The proposed facility will include two 240 million Btu/hour (MMBtu/hr) wood fines and wet wood-fired furnaces which will provide direct heat to two drum dryers (exhaust gases come in

direct contact with the wood) and indirect heat to two thermal oil heaters (thermal oil is heated using a heat exchanger). Natural gas may be used in the fines-burner sections of each furnace as a small percentage of the total fuel input (approximately 60 MMBtu/hr). The thermal oil heaters will provide process heat to the thawing conveyors, wax system water heater, press, and building heat. The exhaust gases from the furnaces, fines burners, and drum dryers will be controlled by a single electrostatic precipitator (ESP). Emissions from the furnaces and fines burners will include PM, PM_{10}, $PM_{2.5}$, nitrogen oxides (NO_X), sulfur dioxide (SO_2), volatile organic compounds (VOC), carbon monoxide (CO), greenhouse gases (carbon dioxide, methane, nitrous oxide), and various hazardous air pollutants (HAPs) produced from wood and natural gas combustion. The furnaces will each be equipped with an ammonium hydroxide injection selective noncatalytic reduction (SNCR) system for reduction of NO_X emissions.

The drum dryers will be used to dry wood strands to the desired moisture content in order to produce OSB. Emissions from the drum dryers will include PM, PM_{10}, $PM_{2.5}$, VOC, and various HAPs from wood drying including methanol and formaldehyde. A portion of the exhaust gases leaving the dryers will be recirculated back to the furnace combustion chambers for improved thermal efficiency, to oxidize a portion of the VOCs and HAPs, and to reduce NOx formation. The dryers will utilize low-temperature drying technology to reduce VOC and HAP emissions from this process.

After strands are dried, screened, and blended with resin and other proprietary additives, these materials will be fed into the forming machine. Emissions from the forming machine will include PM, PM_{10}, $PM_{2.5}$, VOC, and various HAPs. After the forming machine, the mat is directed to the press. VOC and HAP emissions from the press will be controlled by a regenerative thermal oxidizer (RTO) with a portion of the exhaust gases being routed to the furnace for combustion air. Emissions from the press and RTO will include PM, PM_{10}, $PM_{2.5}$, NO_X, SO_2, VOC, CO, greenhouse gases, and HAPs released from sheet pressing. The RTO will remove the majority of the VOCs and HAPs released from sheet pressing with some HAPs produced from natural gas combustion in the RTO.

After pressing, sheets will pass through sawing and sanding equipment, where they are trimmed into panels (typically 4’ x 8’ panels). Following sawing and sanding operations, various coatings and inks may be applied. Spray booths will be equipped with panel filters to control PM, PM_{10}, and $PM_{2.5}$ emissions from paint overspray. The paints and inks applied will be water-based with low quantities of VOC.

The proposed facility will include two emergency engines (one natural gas-fired emergency generator engine and one diesel-fired fire pump engine). Emissions from the emergency engines will include PM, PM_{10}, $PM_{2.5}$, NO_X, SO_2, VOC, CO, greenhouse gases, and various HAPs produced from natural gas and diesel combustion.

Based on preliminary emissions estimates, the facility will have the potential to emit approximately 528 tons of NO_X, 644 tons of CO, 213 tons of VOC, 167 tons of PM, 154 tons of PM_{10}, 133 tons of $PM_{2.5}$, 34 tons of SO_2, 0.10 tons of Pb (lead), 105 tons of methanol (highest emitted HAP), 248 tons of total HAPs, and 451,000 tons of CO_2e per year (unadjusted for sinks and biogenic offsets). A slightly lower value of about 446,000 tons of CO_2e per year was provided in the previous version of the EAW. The difference between these values is about 5,000 tons per year of CO_2e from the addition of a 10 MMBtu/hr natural gas-fired building back-up heater. Both of these total CO_2e emissions estimates include biogenic emissions.

Greenhouse gas emissions are further discussed in Section 18, including updated adjustments for sinks and offsets. These values may change as additional emission sources are considered and additional calculation refinements are made through preparation and submittal of the air permit application and air dispersion modeling analyses. Small quantities of mercury emissions are anticipated from wood combustion; however, the facility is proposing to limit annual emissions of mercury to less than three pounds per year.

The proposed project will be subject to Prevention of Significant Deterioration (PSD) regulations, which will require several air dispersion modeling analyses to be performed. For each pollutant triggering PSD review, a computer air dispersion modeling analysis will be performed to evaluate the source's impacts with respect to the Significant Impact Levels (SILs). For pollutants that have modeled concentrations that exceed the SILs, a refined air dispersion modeling analysis will be performed to evaluate the impacts from the proposed facility and nearby sources. In addition to the ambient air dispersion modeling mentioned above, air dispersion modeling will be performed to determine the source PSD increment consumption as required under PSD regulations.

In addition to the computer air dispersion modeling, an air emissions risk analysis (AERA) will be performed for Minnesota Air Toxics as a supporting analysis for the air permit application. The AERA will evaluate the acute toxicity, chronic toxicity, cancer, and non-cancer risks associated with emissions from the proposed facility and compare them to risk thresholds. The ambient air concentration modeling, increment consumption modeling, and AERA will each be included with the air permit application and reviewed by MPCA prior to issuance of the air quality permit. These analyses will demonstrate that the proposed facility will not have an adverse impact on ambient air quality. The PSD permit cannot be issued without such a determination.

b) Vehicle emissions - Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

Vehicle tailpipe emissions include particle pollution, carbon monoxide, hydrocarbons, nitrogen oxides, and greenhouse gases and will occur from vehicles traveling to and from the site, as well as vehicles operating on the property. Greenhouse gas emissions from vehicles are discussed in Section 18.

Given the projected vehicle counts described in Section 20, there is little projected increase in traffic congestion to the local roadway system due to the project; therefore, the increase in air pollution from vehicle tail pipe emissions is expected to be minimal.

Best practices to minimize diesel idling from trucks within the site will be evaluated and implemented by the project proposer during operations (if feasible).

c) Dust and odors - Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

The construction of the proposed project will generate dust. Construction is anticipated to last approximately 18 months. Fugitive dust is expected from the handling of soils or other silt-containing or dusty material, including activities associated with debris removal, site preparation, construction, and wind erosion of storage piles. Fugitive dust is also expected from resuspension of loose material on both paved and unpaved roads from construction vehicle traffic. The amount of fugitive dust generated will vary by the type of construction activity, the level of activity, and the prevailing meteorological conditions. Effects on air quality from fugitive dust generated from construction activities will be temporary and localized. Fugitive dust from construction will be minimized with water application as necessary and other best practices to minimize dust that will be outlined in the Construction SWPPP.

Fugitive dust associated with ongoing operation of the project includes dust from resuspension of loose material on paved and unpaved plant roads and bark handling and outdoor storage of bark and ash. Fugitive emissions will be minimized through best management practices outlined in the facility's fugitive dust control plan, as applicable. Examples of measures to reduce dust include watering of paved and unpaved road surfaces. Computer air dispersion modeling described in item 17a will include fugitive dust emissions. The project must demonstrate through the computer air dispersion modeling that with the inclusion of fugitive dust emissions, the facility will not cause or contribute to a violation of the National Ambient Air Quality Standards or Minnesota Ambient Air Quality Standards. Given the amount and types of activities on the site, the facility is not expected to create significant quantities of dust after application of BMPs.

Odors generated by the project are expected to be similar to odors typical of construction or industrial sites. Although there will be outdoor storage of logs at the facility, odors from manufacturing will be limited by the fact that the majority of the mill's processes will occur indoors. Odors generated from the OSB press are expected to be minimized by the use of a regenerative thermal oxidizer.

d) Visibility and Regional Haze

PSD Review includes the evaluation of additional impacts including a visibility impairment analysis to provide an estimate of the impacts to visual quality in the area due to air emissions from the source. The evaluation of visibility impacts on Class I areas was completed by first conducting a screening approach employed by Federal Land Managers based on a ratio of proposed facility emissions (Q) over distance (D) between the facility and the Class I areas.

The more detailed visibility assessment is described in the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report, October 2010. An initial evaluation of this requirement is conducted if the proposed project site is located within 300 km of a federal Class I area. The second step of the initial assessment involves adding up the emissions (in tons per year) for particulate matter less than 10 microns (PM_{10}), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and sulfuric acid (H_2SO_4) and completing a "Q/D" assessment, as discussed below.

There are three federal Class I areas within 300 km of the proposed project site: Voyagers National Park and Boundary Waters Canoe Area Wilderness in northeast Minnesota, and Rainbow Lakes Wilderness in northwest Wisconsin. The closest Class I area to the proposed project site is one of the segments of the Boundary Waters Canoe Area Wilderness.

The screening assessment procedure which is a function of both the sum of emissions and distance is known as a "Q/D" assessment. Q is the sum of the annual emissions of PM_{10}, SO_2, NO_2, and H_2SO_4, in tons per year, based on 24-hour maximum allowable emission rates. D is the distance from the proposed project site and the closest point on the nearest federal Class I area. The threshold prescribed in the FLAG guidance document is defined as a Q/D ratio greater than 10; a Q/D ratio equal to or less than 10 is presumed to have no adverse impact. If Q/D exceeds 10, then additional detailed analyses would be required.

The distance from the proposed project site to the nearest class I area is 123 km (D). Based on preliminary emissions estimates, the facility will have the potential to emit approximately 154 tons of PM_{10}, 34 tons of SO_2, and 528 tons of NO_X. The sum of the facility's potential emissions of PM_{10}, SO_2, NO_2, and H_2SO_4 is 716 tons per year (Q). Q/D is 5.8 and therefore it is presumed that there are no adverse impacts on visibility in Class I areas and additional evaluation for visibility impacts is not required.

18. Greenhouse Gas (GHG) Emissions/Carbon Footprint:

a. GHG Quantification: For all proposed projects, provide quantification and discussion of project GHG emissions. Include additional rows in the tables as necessary to provide project-specific emission sources. Describe the methods used to quantify emissions. If calculation methods are not readily available to quantify GHG emissions for a source, describe the process used to come to that conclusion and any GHG emission sources not included in the total calculation.

Table 18-1 includes a summary of the potential GHG emissions for this project. The supporting calculations are included in Appendix H. These emissions are based on conservative assumptions such as 8760 hours of operation per year and equipment running at full capacity. Actual operations will be less than 8760 hours per year due to periodic downtime for maintenance. Also, some emission sources will operate at partial loads that will have lower emissions than the emissions calculated at full capacity in Table 18-1.

The primary greenhouse gases emitted from the facility include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) from the combustion of wood and fossil fuels. A common way to report emissions of these gases is to multiply the emissions of each gas (in tons) by its global warming potential (GWP) and to report the total GHG emissions as total carbon dioxide equivalents (CO_2e). Before adjustments, the total point source emissions (stationary combustion source emissions) calculated for the site are 451,035 tons[1] per year (tpy) of CO_2e. This includes 372,918 tpy of biogenic CO_2 emissions from fines and bark combustion in the furnace and dryer system. Both EPA guidance and the EQB's draft Revised Environmental Assessment Worksheet (EAW) Guidance (EAW GHG Guidance) state that energy production through the combustion of biomass is to be considered carbon neutral in project accounting.

The EAW GHG Guidance explains that:

[1] A slightly lower value of about 446,000 tons per year of CO2e per year was provided in the previous version of the EAW. The difference between these values is about 5,000 tons per year of CO2e from the addition of a 10 MMBtu/hr building back-up heater.

Beyond emissions from permanent land use change, other emissions of CO_2 from biomass sources or ecosystem or animal respiration generally are not included in project accounting. We recommend that this convention be followed. Unless released to the atmosphere as a result of permanent land use change, CO_2 emitted to the atmosphere from biomass combustion or ecosystem or animal respiration, is often rapidly removed from the atmosphere through subsequent photosynthesis and returned to storage in living biomass and soils.

The guidance lists sawdust, wood waste, and hogged wood (which are fuel types used in the furnaces and fines burners) as biogenic sources of CO_2 for which carbon neutrality may be assumed in carbon footprint development.

Although the EAW GHG Guidance has not been finalized, its treatment of biogenic CO_2 emissions is consistent with EPA's treatment of biogenic CO_2 emissions under its Mandatory Reporting of Greenhouse Gases rule and under the MPCA's Emissions Inventory Program where biogenic CO_2 emissions are reported separately from non-biogenic CO_2 emissions by facilities (40 CFR Section 98.3(c)(4)) and not included in the total CO_2e facility emissions published by EPA and MPCA (e.g. EPA's Facility Level Information on Greenhouse Gases Tool https://ghgdata.epa.gov/ghgp/main.do and MPCA's Permitted Facility Air Emissions Data https://www.pca.state.mn.us/air/permitted-facility-air-emissions-data).

Since biogenic CO_2 emissions are carbon neutral, the total non-biogenic GHG emissions from point sources is 78,117 tpy of CO_2e (451,035 – 372,918). Other direct sources of emissions added under Scope 1 include:

- Land Use Change
- Mobile Sources used for onsite operations (equipment owned and operated by HEW)
- Mobile Sources for transportation operations (equipment not owned or operated by HEW)
- Mobile Sources for construction (equipment not owned or operated by HEW)

With emissions from these sources included, the total Scope 1 GHG emissions are 128,997 tpy of CO_2e.

Indirect Emissions include Scope 2 emissions from offsite electricity generation for electricity consumed at the facility (48,462 tpy of CO_2e) and Scope 3 emissions from offsite waste management (174 tpy of CO_2e).

According to the Potsdam Institute for Climate Impact Research (PIK)[2], oriented strand board products have a double benefit in reducing GHG emissions. First, they can avoid the GHG emissions inherent in cement and steel production. Additionally, these wood products store the CO_2 taken up by the trees that are harvested and used as engineered timber. Based on the Environmental Product Declaration for a representative product that will be manufactured by Huber Engineered Woods, the atmospheric removal of GHGs was calculated to be 233,373 tons

[2] Potsdam Institute for Climate Impact Research (PIK). "Buildings can become a global CO2 sink if made out of wood instead of cement and steel." ScienceDaily. ScienceDaily, 27 January 2020. <www.sciencedaily.com/releases/2020/01/200127134828.htm>

of CO_2e assuming a service life of 60 years for the AdvanTech® Flooring and Sheathing product.[3] This value does not include the GHG offset emissions from using wood instead of cement and steel materials in home construction. The EAW GHG Guidance states that sequestration of 50 years or longer qualifies for full value in accounting (EAW GHG Guidance, pg.at 13). Considering this removal of GHG results in a total of -55,740 tons of CO_2e per year, or a net reduction in GHGs. It is also worth noting that at the end of its service life, it is expected that much of the OSB product will be disposed in solid waste disposal sites that will act as long-term storage pools instead of being released rapidly to the atmosphere.[4] This is consistent with the 2021 Biennial Greenhouse Gas Emissions Reduction Report submitted to the Minnesota Legislature which recognizes that "long-term storage of wood-carbon in residential structures and demolition and construction landfills is included in statewide GHG emission totals [as sequestration] because it is more certain that the materials will remain as carbon stored for a long time."[5]

Table 18-2 includes a summary of the projected actual GHG emissions for this project. These values are based on an expected facility operation of 342 days per year. Additionally, in this summary, the natural gas burners for the dust burners are assumed to be in operation an expected 10% of the time. This table shows that the projected actual GHG emissions from the project are -117,471 tons of CO_2e, which is more than twice the net reductions from assuming continuous and maximum load operations.

[3] Table12 and 15, removals associated with biogenic carbon content of the bio-based product, in: https://www.huberwood.com/uploads/documents/technical/documents/Environmental-Product-Declaration-for-AdvanTech-Subflooring-and-Sheathing-EPD-AdvanTech_2020-09-23-170536.pdf

[4] Skog, K.E. (2008) Sequestration of carbon in harvested wood products for the United States. Forest Products Journal 58:56-72.

[5] 2021 Biennial Greenhouse Gas Emissions Reduction report by the Minnesota Department of Commerce and the Minnesota Pollution Control Agency (MPCA), submitted pursuant to Minn. Stat. § 216H.07 subd 3, March 2021. < https://www.pca.state.mn.us/air/state-and-regional-initiatives>

Table 18-1. Potential to Emit GHG Emissions

Direct Emissions (Scope 1)

Scope	Emission Source	Total CO_2e TPY (includes Biogenic CO_2)	Biogenic CO_2 TPY (1)	Non-Biogenic CO_2e TPY (does not include Biogenic CO_2)
Scope 1 – Stationary Source Emissions	*Furnace 1 and Fines Burner 1 (Stack STRU 1)*	*220,223*	*186,459*	*33,764*
	Furnace 2 and Fines Burner 2 (Stack STRU 1)	*220,223*	*186,459*	*33,764*
	Regenerative Thermal Oxidizer (RTO) (Stack STRU 5)	*5,127*	-	*5,127*
	Emergency Generator (Stacks STRU 7, STRU 8)	*170*	-	*170*
	Fire Pump Engine (Stack STRU 9)	*164*	-	*164*
	Back-Up Building Heater (Insignificant Activity)	*5,127*	-	*5,127*
	Stationary Source Total	451,035	372,918	78,117
Scope 1 – Other Scope 1 Emission Sources	Mobile Sources (Onsite Operations - Equipment Owned and Operated by HEW)	34	-	34
	Mobile Sources (Transportation Operations - Equipment not Owned or Operated by HEW)	50,511	-	50,511
	Mobile Sources (Construction)	83	-	83
	Land-Use (Construction)	253	-	253
All Scope 1 Emissions	Total Direct Emissions	501,915	372,918	128,997

Indirect Emissions (Scope 2 and 3)

Scope	Emission Source	Total CO_2e TPY	Biogenic CO_2 TPY (1)	Non-Biogenic CO_2e TPY
Scope 2	Off-Site Electricity Production	48,462	-	48,462
Scope 3	Off-Site Waste Management	174	-	174

Atmospheric Removals of GHGs

Scope	Emission Source	Total CO_2e Removal TPY
Other	Land-Use (Sinks) (2)	-
Other	Wood Products - Carbon Capture	-233,373

Total Emissions including Sinks = Direct Emissions + Indirect Emissions + Sinks

	Total Direct CO_2e + Total Indirect CO_2e TPY (includes Biogenic CO_2)	Biogenic CO_2 TPY (1)	Net Non-Biogenic CO_2e TPY	CO_2 Carbon Capture TPY	Net CO_2e TPY
Total	550,551	372,918	177,633	-233,373	-55,740

(1) As stated on page 10 of the January 2022 MN EQB EAW guidance, combustion of sawdust, hogged bark, and waste wood is a biogenic source of CO_2 for which carbon neutrality may be assumed in carbon footprint development. CO_2 emissions from the furnaces reflect natural gas combustion (maximum natural gas heat input is 60.25 MMBtu/hr per furnace).
(https://www.eqb.state.mn.us/sites/default/files/documents/EQB_Revised%20EAW%20Form%20Guidance_Climate_Sept%202021.pdf)
(2) Proposed land-use changes are not expected to produce greenhouse gas reductions (sinks).

Table 18-2. Projected Actual GHG Emissions

Direct Emissions (Scope 1)

Scope	Emission Source	Total CO_2e TPY (includes Biogenic CO_2)	Biogenic CO_2 TPY (1)	Non-Biogenic CO_2e TPY (does not include Biogenic CO_2)
Scope 1 – Stationary Source Emissions	*Furnace 1 and Fines Burner 1 (Stack STRU 1)*	*206,346*	*200,734*	*5,611*
	Furnace 2 and Fines Burner 2 (Stack STRU 1)	*206,346*	*200,734*	*5,611*
	Regenerative Thermal Oxidizer (RTO) (Stack STRU 5)	*4,804*	-	*4,804*
	Emergency Generator (Stacks STRU 7, STRU 8)	*18*	-	*18*
	Fire Pump Engine (Stack STRU 9)	*17*	-	*17*
	Back-Up Building Heater (Insignificant Activity)	*323*	-	*323*
	Stationary Source Total	417,853	401,468	16,385
Scope 1 – Other Scope 1 Emission Sources	Mobile Sources (Onsite Operations - Equipment Owned and Operated by HEW)	34	-	34
	Mobile Sources (Transportation Operations - Equipment not Owned or Operated by HEW)	50,511	-	50,511
	Mobile Sources (Construction)	83	-	83
	Land-Use (Construction)	253	-	253
All Scope 1 Emissions	Total Direct Emissions	468,734	401,468	67,266

Indirect Emissions (Scope 2 and 3)

Scope	Emission Source	Total CO_2e TPY	Biogenic CO_2 TPY (1)	Non-Biogenic CO_2e TPY
Scope 2	Off-Site Electricity Production	48,462	-	48,462
Scope 3	Off-Site Waste Management	174	-	174

Atmospheric Removals of GHGs

Scope	Emission Source	Total CO_2e Removal TPY
Other	Land-Use (Sinks) (2)	-
Other	Wood Products - Carbon Capture	-233,373

Total Emissions including Sinks = Direct Emissions + Indirect Emissions + Sinks

	Total Direct CO_2e + Total Indirect CO_2e TPY (includes Biogenic CO_2)	Biogenic CO_2 TPY (1)	Net Non-Biogenic CO_2e TPY	CO_2 Carbon Capture TPY	Net CO_2e TPY
Total	517,370	401,468	115,902	-233,373	-117,471

(1) As stated on page 10 of the January 2022 MN EQB EAW guidance, combustion of sawdust, hogged bark, and waste wood is a biogenic source of CO_2 for which carbon neutrality may be assumed in carbon footprint development. CO_2 emissions from the furnaces reflect natural gas combustion (maximum natural gas heat input is 60.25 MMBtu/hr per furnace).
(https://www.eqb.state.mn.us/sites/default/files/documents/EQB_Revised%20EAW%20Form%20Guidance_Climate_Sept%202021.pdf)
(2) Proposed land-use changes are not expected to produce greenhouse gas reductions (sinks).

b. GHG Assessment

i. Describe any mitigation considered to reduce the project's GHG emissions.

The Project is subject to Best Available Control Technology (BACT) for GHGs under federal Prevention of Significant Deterioration (PSD) regulations. BACT means "an emission limitation based on the maximum degree of reduction of each pollutant subject to regulation…which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such a facility through the application of production process and available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant" (40 CFR Section 52.21(b)(12)).

BACT is established based on a systematic review of available control technologies and reduction strategies. As part of the air emissions permit application received by the Minnesota Pollution Control Agency (MPCA) on October 14, 2021, HEW included a BACT analysis for GHGs. The analysis follows EPA's "top-down" method for determining BACT. The MPCA is responsible for reviewing the BACT analysis and establishing BACT which becomes enforceable conditions of the MPCA-issued air emissions permit.

As described in the air permit application, HEW proposed for CO_2e BACT an energy-efficient furnace and dryer system design, good combustion and maintenance practices, and the use of biomass fuel with natural gas back up. For the proposed facility, the biomass burned will be byproducts from the manufacturing of oriented strand board. The facility is designed such that minimal auxiliary fuel sources will be used. The natural gas burner on each fines burner unit is forecasted to operate about 10% of the time. HEW also proposes to use an energy-efficient furnace/dryer system design, which includes 1) low temperature strand drying technology; 2) recirculation of hot gases for improved thermal efficiency; and 3) the use of thermal oil as a heat transfer fluid.

Furnace gas recirculation will improve the thermal efficiency of the system because less of the available heat from the furnaces is wasted as sensible heat leaving the furnace stack exhaust. This design allows more of the available heat energy to be used for process heating, reducing the overall fuel demands. Lastly, the proposed system design will use thermal fluid for process heating. Thermal fluid heating systems have some energy efficiency advantages over traditional steam boilers, including that they do not experience any boiler efficiency losses due to flashing, blowdown, or de-aeration, and thermal oil heat exchangers are unlikely to experience reductions in heat transfer efficiency over time from fouling which would be expected from a steam heat exchanger.

Additionally, by using a low temperature strand drying technology and utilizing hardwoods with lower VOC content, HEW will reduce the VOC emissions from the drying system and forego the need of a regenerative thermal oxidizer (RTO) to control the exhaust VOC emissions. RTOs are combustion devices used to destroy VOCs that are generally fueled by natural gas and produce GHGs from the combustion of natural gas and VOCs. Therefore, the low temperature drying system will reduce GHG emissions compared to a more conventional dryer system that requires an RTO for VOC control. (As discussed below, an RTO is still needed to control emissions from the press equipment, but the Project's thermal oxidation requirements and thus RTO quantity and sizing will be far smaller than comparable OSB facilities in Minnesota and elsewhere that use higher temperature drying).

Thermal oxidation of exhaust gases from the press is necessary for compliance with the requirements of BACT and may be necessary for compliance with the requirements of the Plywood and Composite Wood Products Maximum Achievable Control Technology (PCWP MACT) Standard. Through evaluation of various control options, Huber Engineered Woods is proposing to design and construct the facility such that exhaust gases from the press may be routed in parallel to both the RTO and to the furnaces in place of combustion air drawn from atmosphere. It is expected that the combustion of the press exhaust gases in the furnace flame zone would provide comparable control efficiency to what the RTO would achieve.

Under these proposed operations, Huber Engineered Woods would collect press exhaust gases from various locations within the press enclosure and would send the portion of the exhaust gases anticipated to contain the lowest VOC concentration to one furnace (50,000 cfm) or to both furnaces (100,000 cfm). The remaining exhaust gases collected from the press, which would be anticipated to contain a higher VOC concentration than those routed to the furnace(s), would be sent to the RTO. The press enclosure is large and in order to comply with the PCWP MACT standard requirement to maintain a wood products enclosure, Huber Engineered Woods must maintain at least 200 feet per minute face velocity at all natural draft openings. Therefore, if the exhaust from the entire wood products enclosure were routed to the RTO it would result in a significant amount of "clean air" being combusted. Huber Engineered Woods has concluded that combustion of a portion of the press exhaust in the furnace flame zone(s) would provide numerous environmental benefits, including 1) reducing natural gas consumption in the RTO; 2) reducing wood combustion requirements in the furnaces (press exhaust gases will be preheated and will contain VOCs which may be used as supplemental fuel); 3) improving reliability and performance of the RTO (the gases sent to the RTO would contain higher concentrations of volatile organics, which would keep the combustion temperature more consistent); and 4) further reductions to $PM/PM_{10}/PM_{2.5}$ and NO_X emissions from the press (through utilization of the electrostatic precipitator and SNCR systems). These benefits will also result in reductions in GHG emissions due to an expected reduction in natural gas usage in the RTO.

Most of the facility's non-biogenic GHG emissions arise from the emission sources outside of HEW's control, such as GHG's emitted in generating electricity for the facility, or vehicles owned by others traveling to and from the site (together totaling approximately 100,000 tons CO_2e). These emissions sources are subject to potential reduction over time as Minnesota's electrical grid and vehicle fleet shifts more toward lower-emitting sources of energy.

There is some potential for further emission reductions as low-emitting heavy equipment engine technology continues to develop. HEW examined the use of electric loaders and similar low-emitting heavy equipment, but concluded that the technology had not yet developed to the point where such equipment is reliable enough for the heavy duty experienced in the log yard. At the same time, the life cycle of this equipment is relatively short, and it is possible that the next generation of loaders, on-site haul trucks, etc., will be able to shift toward lower-emitting technologies.

Overall, HEW has reduced its carbon footprint by 16% since 2017 through ongoing process reviews, and expects to realize further reductions in the future.

ii. Describe and quantify reductions from selected mitigation, if proposed to reduce the project's GHG emissions. Explain why the selected mitigation was preferred.

The use of low-temperature dryers instead of conventional dryer systems will result in less GHG emissions since an RTO will not be necessary to control dryer VOC emissions. HEW operates a facility in Oklahoma, known as the Broken Bow facility. The Broken Bow facility in Oklahoma has an RTO to control dryer emissions that included pinenes associated with softwoods such as southern yellow pine. By using the size of the RTO at Broken Bow and adjusting it based on HEW's estimated dryer exhaust airflow rate, it is estimated that a conventional dryer system at HEW would require a 46.9 MMBtu/hr RTO. This RTO would have potential GHG emissions of 24,048 tons of CO_2e per year. By using a low-temperature dryer system, HEW is expected to forego 24,048 tons of potential CO_2e emissions annually. Thus, the use of a low-temperature dryer and hardwoods as a feedstock will result in a reduction of GHG emissions compared to a more conventional dryer system. HEW selected a low-temperature dryer system due to its environmental benefits and the supply of hardwoods (which emit less VOC during strand drying than softwoods) in the area.

Furnace gas recirculation will also improve the thermal efficiency of the system because less of the available heat from the furnaces is wasted as sensible heat leaving the furnace stack exhaust. This design allows more of the available heat energy to be used for process heating, reducing the overall fuel demands by approximately 2.5 MMBtu/hr. Based on an average expected fuel input to the heat energy systems of 97.5% wood and 2.5% natural gas, recirculation of the dryer exhaust is anticipated to reduce total greenhouse gas emissions by approximately 2,269 tons of CO_2e per year. Additionally, the use of thermal oil as a heat transfer fluid in the dryer system will also result in reductions in GHG emissions. However, given the great variability of designs and limited information available, it is more difficult to quantify such GHG reductions.

Thermal oxidation of exhaust gases from the press has been optimized to reduce criteria pollutant and GHG emissions. To avoid combusting "clean air" by routing the exhaust from the entire wood products enclosure to the RTO, Huber Engineered Woods plans to combust a portion of the press exhaust in the furnace flame zone(s). By doing this, criteria pollutant and GHG emissions will be reduced as explained above. This design was selected for environmental and economic reasons. However, given the limited data from other conventional facilities, it is hard to quantify such GHG reductions.

iii. Quantify the proposed projects predicted net lifetime GHG emissions (total tons/#of years) and how those predicted emissions may affect achievement of the Minnesota Next Generation Energy Act goals and/or other more stringent state or local GHG reduction goals.

It is conservatively assumed that the plant will be in operation for 35 years. Because the net GHG emissions from HEW will be negative (indicating a GHG sink), this facility will help meet the Next Generation Energy Act goals of reducing baseline 2005 GHG emissions by 30% by 2025 and 80% by 2050. It is estimated that the CO_2e emissions removed from the atmosphere, or sequestered, will range from 55,740 to 117,741 tons of CO_2e per year, or total of 1,950,900 to 4,120,935 tons over the life of the project (assuming 35 years). These sequestered emissions will offset GHG emission from other sources in the State, and the Project is one of the largest individual net sequestering projects in the State. By way of illustration, at 117,741 tons/year net sequestration, the HEW facility would fully offset the currently 42nd largest emitter in the State.

Importantly, even if there were no adjustments made for biogenic emissions or product sequestration and the Project was considered a net emitter of GHGs, rejection of the Project

would not improve net carbon emissions. As a private company, HEW has other out-of-state location options for the facility if the Cohasset facility does not get approved, and would pursue them. In other locations, HEW may be required to use a greater fraction of softwoods, potentially necessitating more use of RTOs and the loss of emission benefits associated with use of hardwood-predominant fuels and low temperature dryers. GHGs emitted (or sequestered) have the same atmospheric effects regardless of their point of emission, and consequently location of the facility elsewhere would not improve the effects of GHG emissions and could increase them.

19. Noise:

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

Noise Generated During Construction

The proposed project is expected to generate noise during the construction phase. Daily hours of construction will follow regulatory and construction permit regulated times. Noise will primarily be generated by the construction machinery on-site and placement of pilings during construction. All machinery is equipped with back-up alarms for safety purposes, which would likely be the producers of the loudest noise on the construction site outside of the pile driving. Sounds levels associated with heavy construction equipment generally range from 80 to 120 dBA.

Noise Generated During Operation

Noise from ongoing operation of the facility will consist of noise from trucks and railcars delivering logs and other raw materials to the site and trucks leaving the site with finished product. The facility will also use other diesel off-road equipment such as log loaders to move logs from the log yard to the thawing conveyors and front-end loaders to move bark from outdoor storage to the furnace feed conveyors. Most of this off-road equipment will be equipped with back-up alarms for safety purposes. Some noise will be generated from the manufacturing process such as debarking machines, saws, product handling, and fan systems for building ventilation and air pollution control devices (e.g. baghouses). The majority of the manufacturing process occurs indoors. The facility is expected to operate 24 hours a day, 7 days per week except for downtime for planned maintenance.

A study from a Huber Engineered Woods OSB facility in Spring City, Tennessee, measured noise at multiple locations on mill property and the 24-hour average A-weighted sound levels ranged from 44.5 dBA to 69.1 dBA. The measured noise results from this study include background noise from the adjacent state highway and railroad. In addition, unlike the proposed project site, the Spring City, Tennessee site has a number of additional mill operations that occur outdoors. Given the noise attenuation expected by the proposed buildings and the distance to nearby residences, noise from manufacturing process is expected to conform to state and local regulations and not cause nuisance conditions.

Existing Noise Sources

From the project area, the closest residential dwellings are located approximately 200 feet to the west of the property boundary across Highway 6. The Minnesota Power Boswell facility is

present on the property adjoining to the east. A railroad track is present on the property adjoining to the north. At present, noise sources in the vicinity of the proposed project are generally associated with automotive traffic on the roads and railroad traffic on the existing rail line.

Nearby Sensitive Receptors

No known especially sensitive receptors such as hospitals or outdoor recreational or leisure spaces are located in the vicinity of the proposed project. The closest residential dwellings are approximately 200 feet to the west of the western property boundary.

Conformance to State Noise Standards

State noise standards are contained in Minn. R. ch. 7030. The noise standards are based on the land use at the location of the person that hears the noise and the sound level in A-weighted decibels (dBA) over ten percent (L10) or fifty percent (L50) of an hour. With the exception of the Minnesota Power property to the east, the land in the vicinity of the site is zoned farm residential or is tax forfeited land. Noise limits for residential locations are L10=65 dBA and L50=60 dBA during the daytime and L10=55 dBA and L50=50 dBA during the nighttime.

Itasca County zoning Ordinance at Section 12.5.1 for Industrial Performance Standards requires that "any Permitted Use shall be so constructed and operated as to create no public nuisance with respect to noise…"

Typical ongoing operations are expected conform to state and local noise standards.

Mitigation Measures

As discussed, the majority of the manufacturing operation will occur indoors. Equipment used on site will be in maintained to minimize noise due to improper operating conditions.

20. Transportation:

a) Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

Currently there are three driveways planned for the site (Figure 6). This will allow for separation of truck traffic from passenger traffic for safety. The proposed layout has been designed to allow truck traffic (both log trucks and finished goods truck) to back up on the site and not on the roads. A map of the road classifications is provided as Figure 12.

The southern drive is for log trucks, which will arrive loaded and depart empty. The expected pattern would be 70% of the trucks would arrive and depart from the north of the site and 30% from the south of the site.

The center drive to the site would be for passenger vehicles. This drive is approximately 900 feet north of the log truck entrance.

The northern drive would be for resin deliveries, paper deliveries, and finished goods trucks. It would be expected that the majority (> 85%) of these trucks would arrive from the north of the

site and depart to the north of the site. This drive is approximately 850 feet from the center drive.

There will be approximately 15 – 20 railcars that would arrive and depart from the site each week, and the site receive railcars 3 – 4 times per week.

1) There are no existing parking areas on the site. The proposed project will have 200 spaces for employees, contractors and visitors.

2) The estimated total average daily trips is 373 – 493. The breakdown of trips is as follows:
   Log delivery – 180 – 300 trips/day
   Finished product – 90 trips/day
   Employee traffic – 100 trips/day
   Resin delivery – 1 trip/day
   Paper deliveries – 2 trips/day

3) The expected maximum peak hour traffic is expected to be less than 200 and would likely occur at the beginning and end of day as employees are coming or leaving the facility. The remaining trips would be spread throughout the day.

4) The trip estimate is from traffic counts at other facilities owned by the project proposer.

5) Transit and other alternative transportation modes for employees are not present in the area of the proposed project. Some product will be shipped out by rail on the rail spur that will be constructed as part of this project.

b) Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system.

If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW. **Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5** ***(available at: http://www.dot.state.mn.us/accessmanagement/resources.html)*** **or a similar local guidance.**

Traffic congestion would be most noticeable during peak hours as the main road that leads to the proposed facility is otherwise lightly used.

The southern entry on Highway 6 is categorized by MN DOT as a 5A (minor arterial) due to the volume and the speed limit on Highway 6. Based on preliminary discussions with MnDOT, this would require the addition of a right turn lane.

Due to the expected volume, the central entrance likely would not require a right turn lane, but one could be provided if deemed necessary in the future. A right turn lane could be added to the northern drive if deemed necessary in the future.

c) Identify measures that will be taken to minimize or mitigate project related transportation effects.

Other than right turn lanes, no other mitigation measures are required at this time.

21. Cumulative Potential Effects:

(Preparers can leave this item blank if cumulative potential effects are addressed under the applicable EAW Items)

a) Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

The proposed project occupies 188 acres and has an expected facility life of 35 years. As discussed in the Feedstock section of Section 6, the facility will drive the harvest of approximately 400,000 cords of timber annually. Air and water emissions will occur over the life of the projects. Impacts to site cover, wetlands, and wildlife (bald eagle nests) are one-time effects occurring during construction. Changes to site cover and wetlands will be permanent.

The proposed project is not part of a planned development. Identified environmental impacts will be required to meet Local, State, and Federal regulations and standards through obtaining relevant permits and providing any required mitigation. Therefore, any potential impacts from the proposed project are not anticipated to combine with other environmental effects to result in a cumulative effect.

b) Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

There are no planned or foreseeable future projects within the area of the proposed project at this time, which would be expected to interact with the environmental effects of the project within the proposed scales and timeframes identified above. The following provides notes by resource type.

Air Emissions including GHGs – As described in Section 17, the facility will obtain a PSD permit to ensure there are no exceedances of the NAAQS. The MPCA reports that there are 1-2 other PSD permit applications presently in process at the agency. None of these are in the immediate vicinity of the proposed project and thereby would not be expected to interact meaningfully with emissions from the proposed project.

Emissions of GHGs are discussed in Section 18. The project will be a net carbon sink, and therefore the net GHGs emitted by the project are expected to interact beneficially (in the sense of partially offsetting) emissions from other sources of GHGs in the State of Minnesota.

Water Emissions – As described in Section 12b.i-iii, there will not be material releases of stormwater or wastewater from the site, and therefore releases of stormwater and wastewater are not anticipated to interact meaningfully with stormwater or wastewater releases from other sources in the vicinity.

Wetlands – As discussed in Section 12b.iv.a, the project will result in the fill of 28.46 acres of wetlands, which will be over-mitigated at a ratio of 1.5-1. Investigation of other wetland filling activity in the watershed reveals that there are substantial credits available in banking service area No. 5 (Mississippi River (Headwaters), there is also relatively low frequency of request for permits to fill wetlands (annual average of 22.75 transactions from 2016-2019. Source - Withdrawal Transactions data, Minnesota Wetland Bank, Minnesota Board of Water and Soil Resources]. As a result, in addition to the fact of 1.5-1 mitigation, impacts to wetlands at the project site are not expected to interact meaningfully with wetland impacts elsewhere in the watershed to create a cumulatively significant impact.

Wildlife – As discussed in Section 12b.i-iii, the only wildlife that the proposed project is anticipated to impact is the bald eagle through the removal of two bald eagle nests. The proposed removal of two bald eagle nests (in close proximity and likely a primary and secondary nest for a single breeding pair) occurs in the larger context of eagle population trends in Minnesota. As a whole, in Minnesota and in the vicinity of the proposed project, eagle populations are trending upward. Minnesota has the largest population of breeding pairs in the Lower 48 States, estimated in 2017 as approximately 10,000 pairs. [6] This reflects an increase from 1,300 nesting pairs in 2007. [7] This is as many nesting pairs in Minnesota as were estimated by the USFWS to exist in the entire Lower 48 States as recently as 2006. [8] More recent trend data is harder to locate, because populations have improved to such an extent that most States have discontinued annual surveys. [9] One other eagle nest was recently permitted (December 2021) for removal by the USFWS and DNR in Rochester, Minnesota. USFWS and DNR report that no other nest removal permits are presently pending, and they are not aware of others being planned. There are also ample alternative nesting sites in the vicinity of the proposed project. For these reasons, any incremental effects associated with nest removal for the proposed project, when considered in addition to other past, present, and reasonably foreseeable future projects that may affect bald eagles, are insignificant.

Wood Harvest - The relationship between the proposed project and other consumption of timber is discussed in detail in Section 6. Regarding other current and future proposed projects, the project proposer was notified that Norbord-West Frasier has stated a desire to expand its existing facility in Bemidji, Minnesota. However, this project has not progressed to the point at which a basis of expectation has been laid. Recent developments in the Minnesota timber industry are summarized in the December 2021 DNR report on Minnesota Forest Resources.[10] Although the report is focused on 2019 data, it includes industry developments at least through June 2021The report does not indicate any other identified projects besides the proposed project that would increase timber harvest, and therefore the proposed project is not expected

[6]Timmons, Bob, "The bald eagle's population in Minnesota is soaring, benefiting from conservation measures." StarTribune, April 2, 2021. <http://e.startribune.com/Olive/ODN/StarTribune/shared/ShowArticle.aspx?doc=MST%2F2021%2F04%2F02&entity=Ar02004&sk=9C6CE591&mode=text>

[7] U.S. Fish & Wildlife Service, Figure of "Estimated Number of Bald Eagle Breeding Pairs (by State)." April 2007. <https://www.fws.gov/midwest/eagle/nestingdata/pdf/be_prsmap_wo2006.pdf>

[8]U.S. Fish & Wildlife Service, "Chart and Table of Bald Eagle Breeding Pairs in Lower 48 States (1963-2006)." Last updated May 5, 2020. <https://www.fws.gov/midwest/eagle/nestingdata/countatdelist.html>

[9]Ibidem.

[10]Minnesota Department of Natural Resources, "Minnesota's Forest Resources 2019." December 2021. <https://files.dnr.state.mn.us/forestry/um/forest-resources-report-2019.pdf>

to interact with other new projects that would collectively create a potential for significant environmental effects.

All source material (regardless of type and commercial or industrial process) that by itself does not trigger a mandatory EAW category, cannot be reasonably identified by source location, determined of future origin, nor quantified for the purposes of completing an EAW. Timber harvest does not induce the project nor is it a prerequisite of the proposed project (connected action). Non-location-specific current and future timber harvest will continue to source existing large-scale wood processing operations in northern Minnesota, such as Norbord Industries in Bemidji, MN. Future timber harvest (by itself with a defined location) is a separate and complete project that may require a mandatory EAW if required by MN Rules 4410.4300.

The Timber Harvesting GEIS concluded the upper-level statewide annual timber harvest is 5.47 million cords/yr. This information is found on pages xxviii (executive summary) and elsewhere (e.g., 7-77 & 7-78) in the Final GEIS. It is also shown in Figure 3.1 of Minnesota's Forest Resources 2019. It is important to note that this harvest level reflects the sustainability of timber production while also perpetuating important non-timber values such as wildlife habitat, water quality, soil productivity, etc. Although this estimate was made 26 years ago, when combined with more recent pieces, such as the 2019 DNR Study and an EIS completed in 2005 for another project, the findings of the GEIS remain valid.

With the addition of the proposed project, Minnesota's statewide timber harvest would be approximately 3.21 million cords/year, which is more than 2.2 million cords/year below the estimated maximum harvest level for both timber and non-timber resource sustainability.

c) Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.

Environmental impacts to air and wetlands will be mitigated or minimized through implemented engineering controls and wetland mitigation, as required by current and applicable regulatory programs. The proposed project's long-term operations may contribute to a minimal increase to the cumulative potential effects on the surrounding air emissions, as allowed by the air permitting process. As discussed in Section 17a above, the proposed project will be subject to Prevention of Significant Deterioration (PSD) regulations, which require several air dispersion modeling analyses to be performed. For each criteria pollutant triggering PSD review, a computer air dispersion modeling analysis will be performed to evaluate the source's impacts with respect to the Significant Impact Levels (SILs). For pollutants that have modeled concentrations that exceed the SILs, a refined air dispersion modeling analysis will be performed to evaluate the cumulative air impacts from the proposed facility, representative background concentrations, and neighboring sources. The refined air dispersion modeling analysis will demonstrate that the potential impacts from the proposed facility, representative background concentrations, and nearby sources will not cause or contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS). In addition to the ambient air dispersion modeling mentioned above, an additional air dispersion modeling evaluation will be performed to determine the source's PSD Class II increment consumption as required under PSD regulations. These modeling evaluations are currently being finalized with feedback from MPCA. Once finalized, these evaluations will be used to inform that the cumulative impacts are below the applicable NAAQS when including the proposed facility, the existing facilities in the

area, and representative background concentrations. Furthermore, the air permit issued to HEW will include conditions to ensure that air quality within the area of impact from the proposed facility is in compliance with the NAAQS.

In addition to the potential environmental impacts addressed by items 1 to 18, the economic, employment, and sociological impacts of the project were considered. The economic and social impacts of the project on the local community are anticipated to be beneficial by bringing additional employment opportunities during construction and operations of the facility.

22. Other Potential Environmental Effects:
If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

There are no other known or potential environmental effects that were not discussed in EAW items 1 to 19.

RGU CERTIFICATION. *(The Environmental Quality Board will only accept **SIGNED** Environmental Assessment Worksheets for public notice in the EQB Monitor.)*

I hereby certify that:

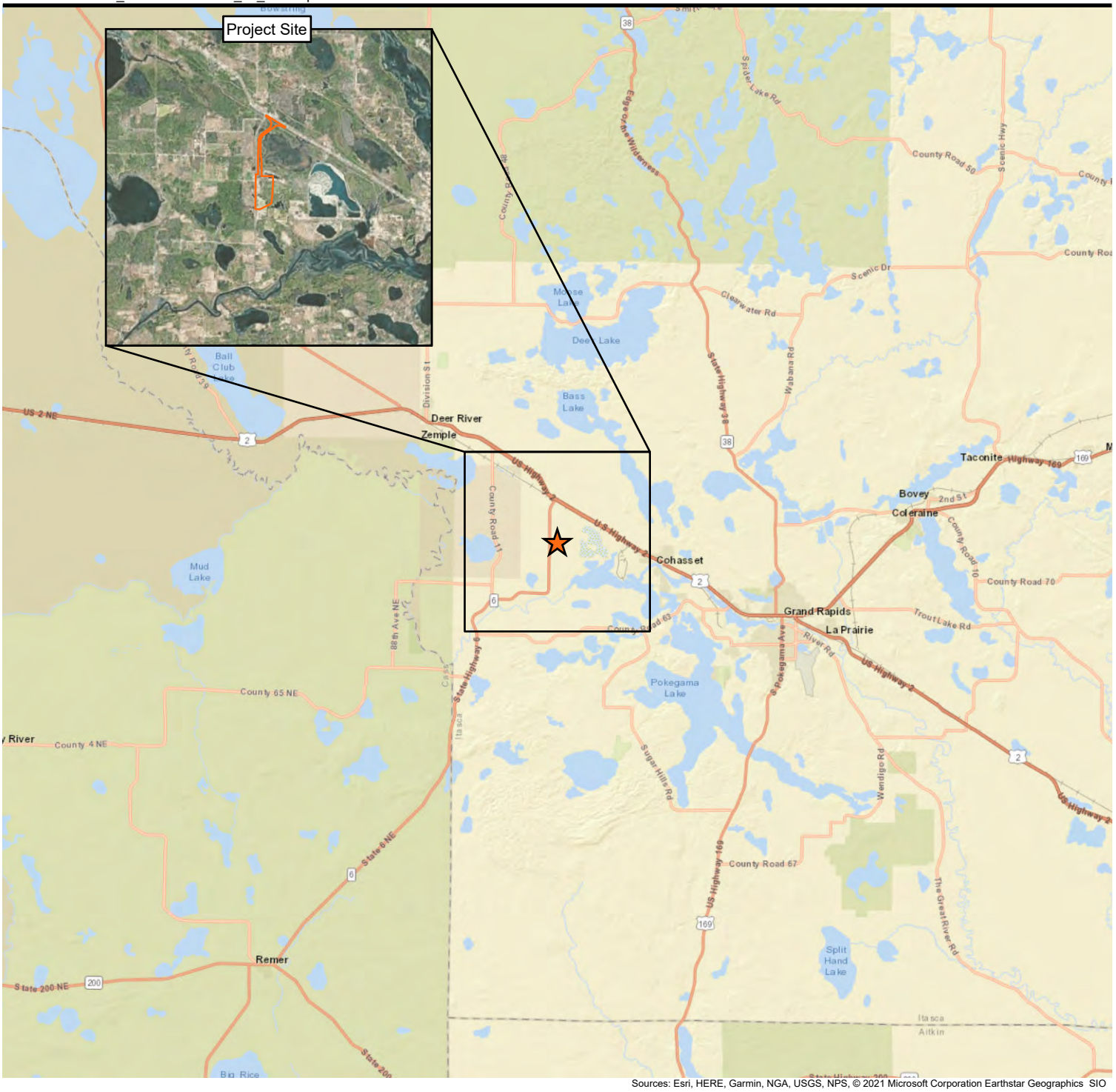
- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Signature _____ Date 1-18-22

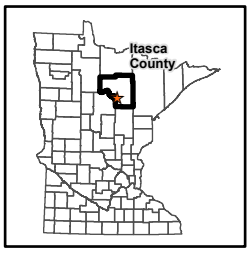
Title Mayor

Figures

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



Sources: Esri, HERE, Garmin, NGA, USGS, NPS, © 2021 Microsoft Corporation Earthstar Geographics SIO



★ Project Site

N

0 2.5 5

Miles

Scale: 1" = 5 mi

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Project No:
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Drawing No:
Fig1_LocMapEAW

Drawn By:	CMF
Date Drawn:	4/7/2021
Checked By:	TF & BR
Last Modified:	9/10/2021

Frontier Project - Huber Engineered Woods

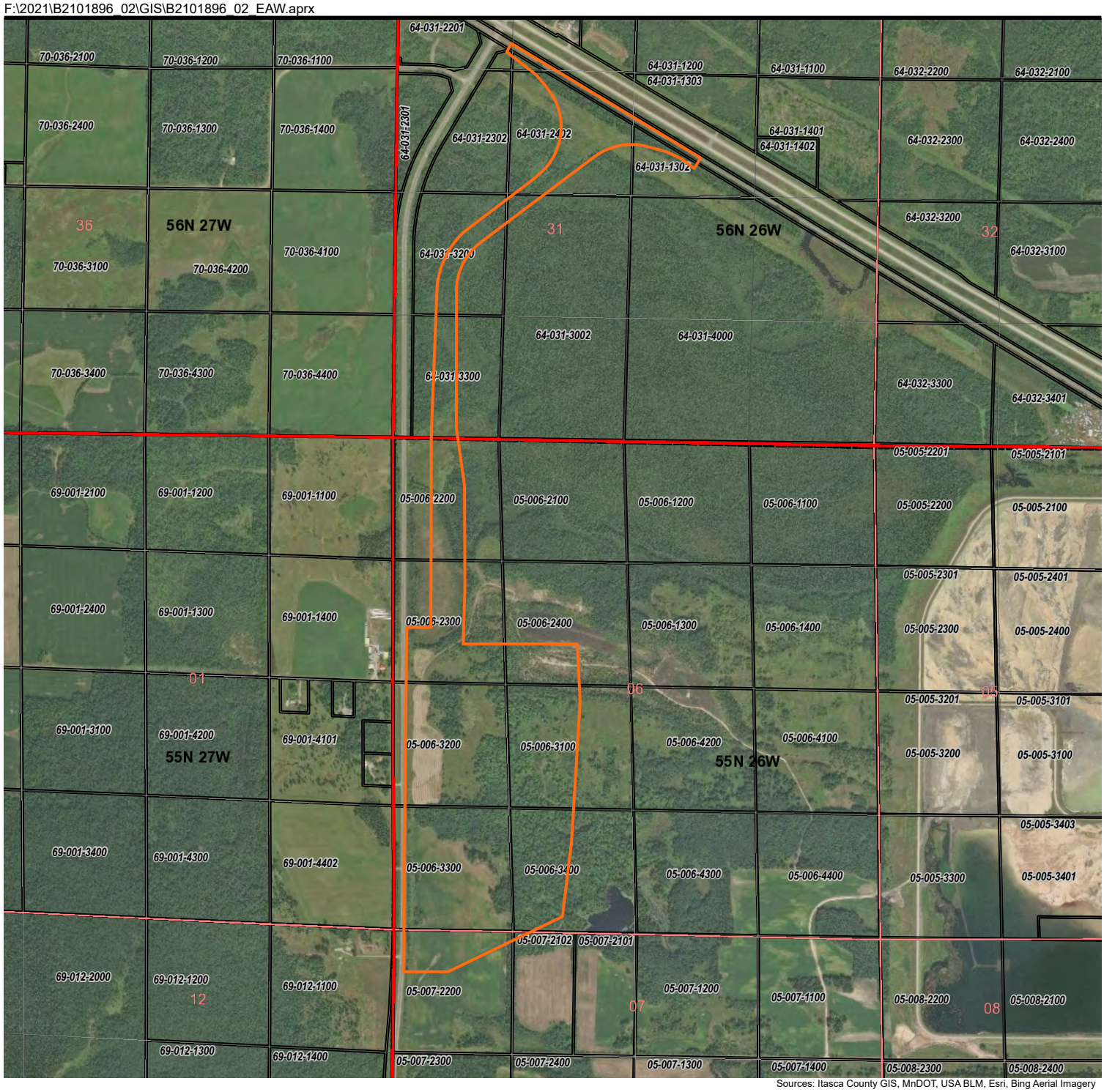
27106 State Highway 6

Cohasset, Minnesota

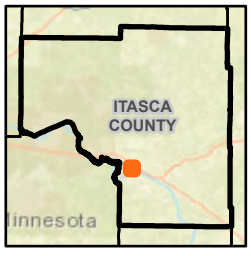
Project Location Map

Figure 1

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



Sources: Itasca County GIS, MnDOT, USA BLM, Esri, Bing Aerial Imagery



- Approximate Site Boundary
- Itasca County Parcels
- PLSS Township
- PLSS Section
- PLSS Intersected

N

0 750 1,500 Feet

Scale: 1"= 1,500 ft.

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Project No: B2101896_02_EAW

Drawing No: Fig2_SiteBndryEAW

Drawn By:	CMF
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Last Modified:	9/10/2021

Frontier Project - Huber Engineered Woods

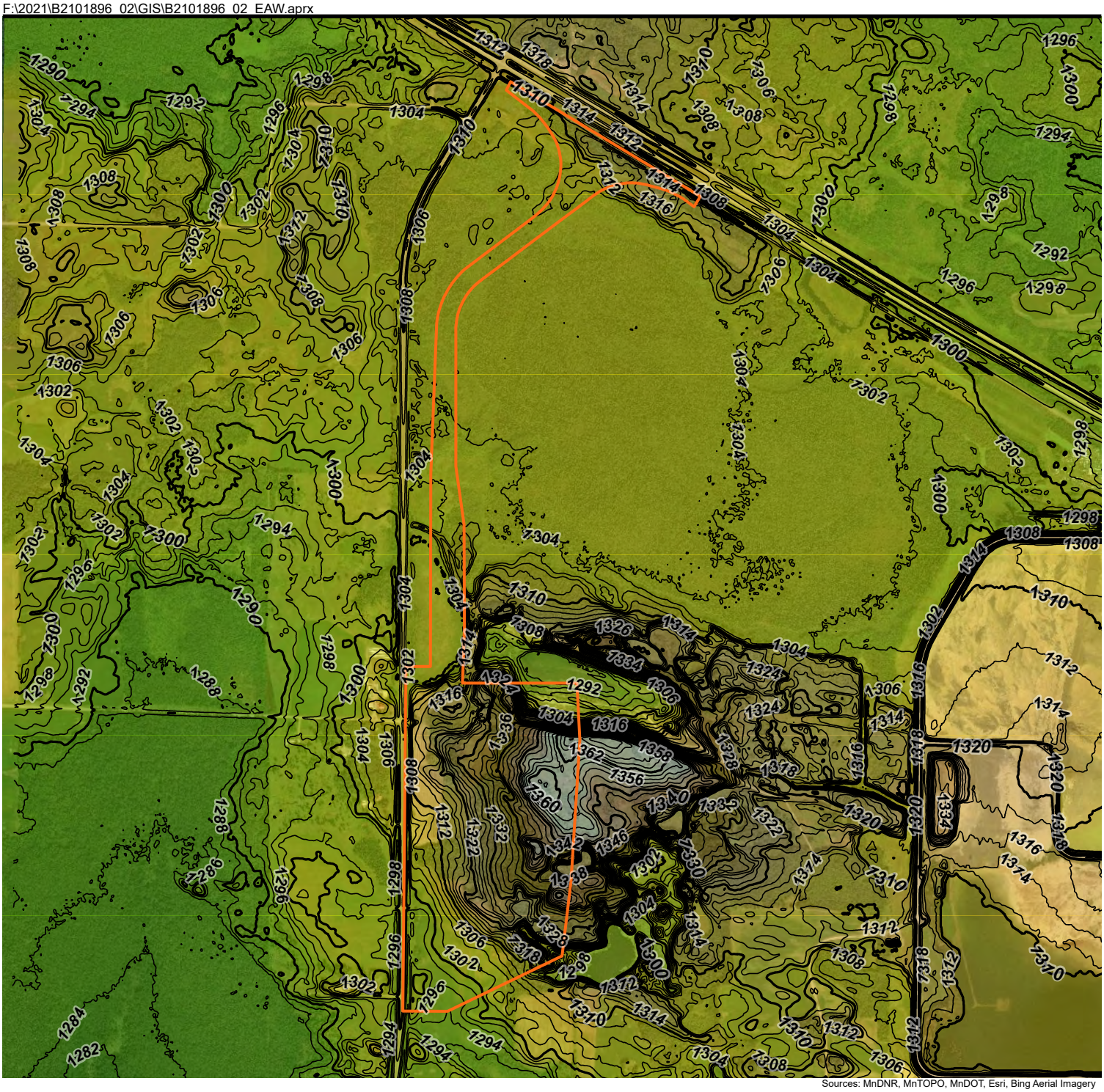
27106 State Highway 6

Cohasset, Minnesota

Site Boundary Map

Figure 2

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



Sources: MnDNR, MnTOPO, MnDOT, Esri, Bing Aerial Imagery

Approximate Site Boundary

MnTOPO Surface Contours

2' Intermediate Contour

10' Index Contour

N

0 750 1,500 Feet

Scale: 1" = 1,500 ft.

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Project No:
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Drawing No:
Fig3_TopoEAW

Drawn By:	CMF
Date Drawn:	4/7/2021
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Last Modified:	9/10/2021

Frontier Project - Huber Engineered Woods

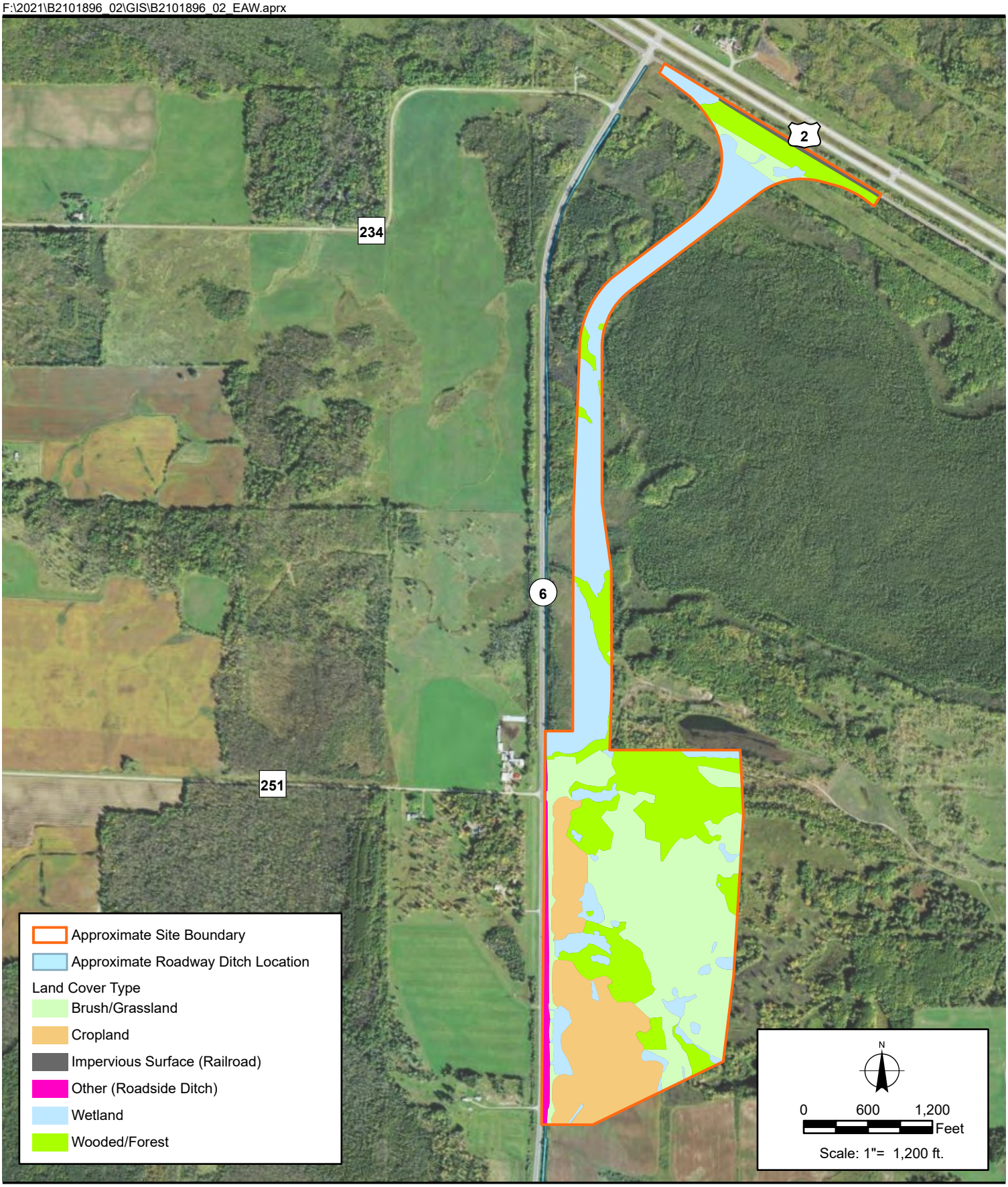
27106 State Highway 6

Cohasset, Minnesota

Topographic Map

Figure 3

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



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Project No: B2101896_02_EAW

Drawing No: Fig4_ExistLandCoverEAW

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Last Modified:	9/10/2021

Frontier Project - Huber Engineered Woods

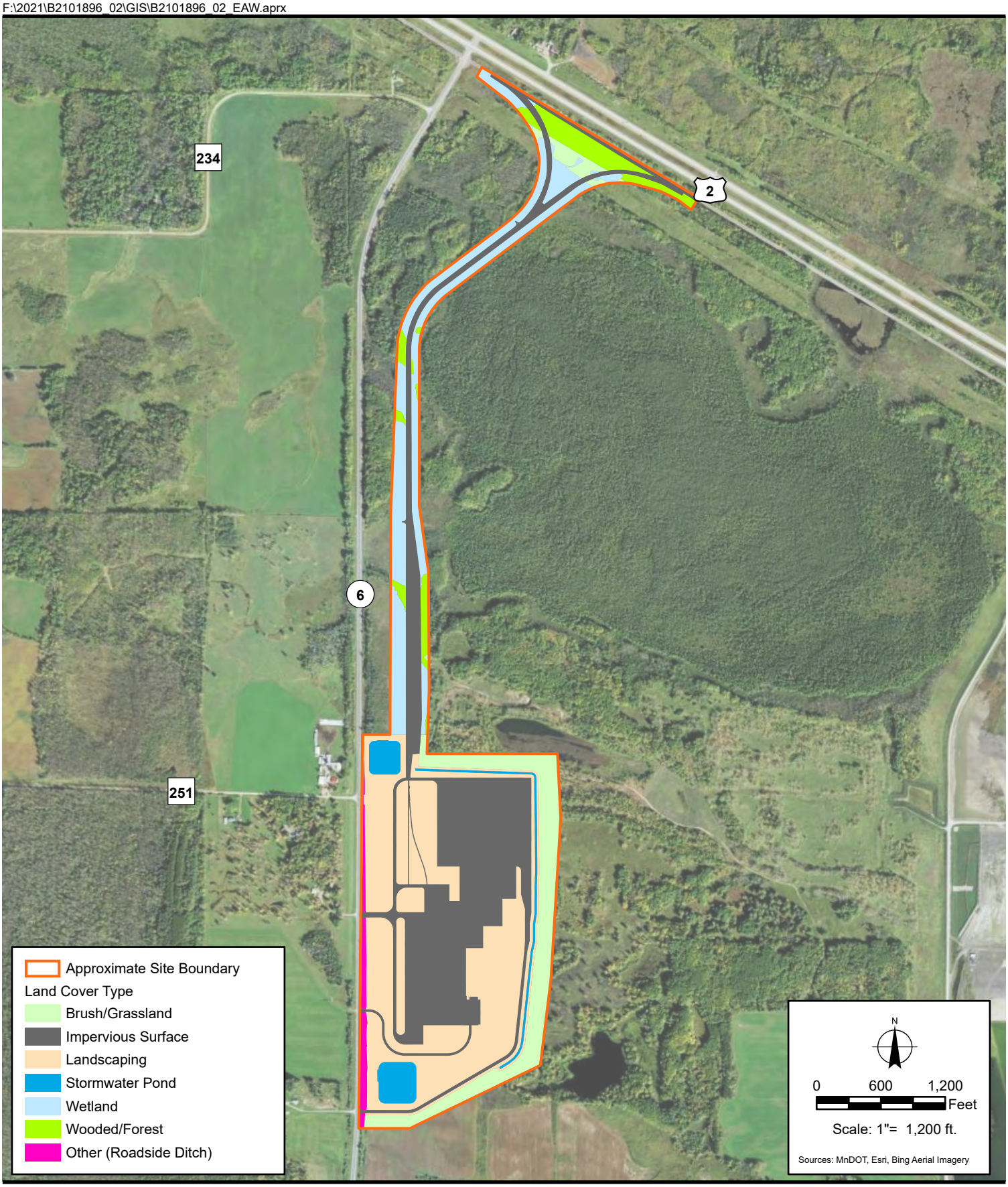
27106 State Highway 6

Cohasset, Minnesota

Existing Land Cover Map

Figure 4

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



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Project No:
B2101896_02_EAW

Drawing No:
Fig5_PropLandCoverEAW

Drawn By:	CMF
Date Drawn:	7/27/2021
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Frontier Project - Huber Engineered Woods

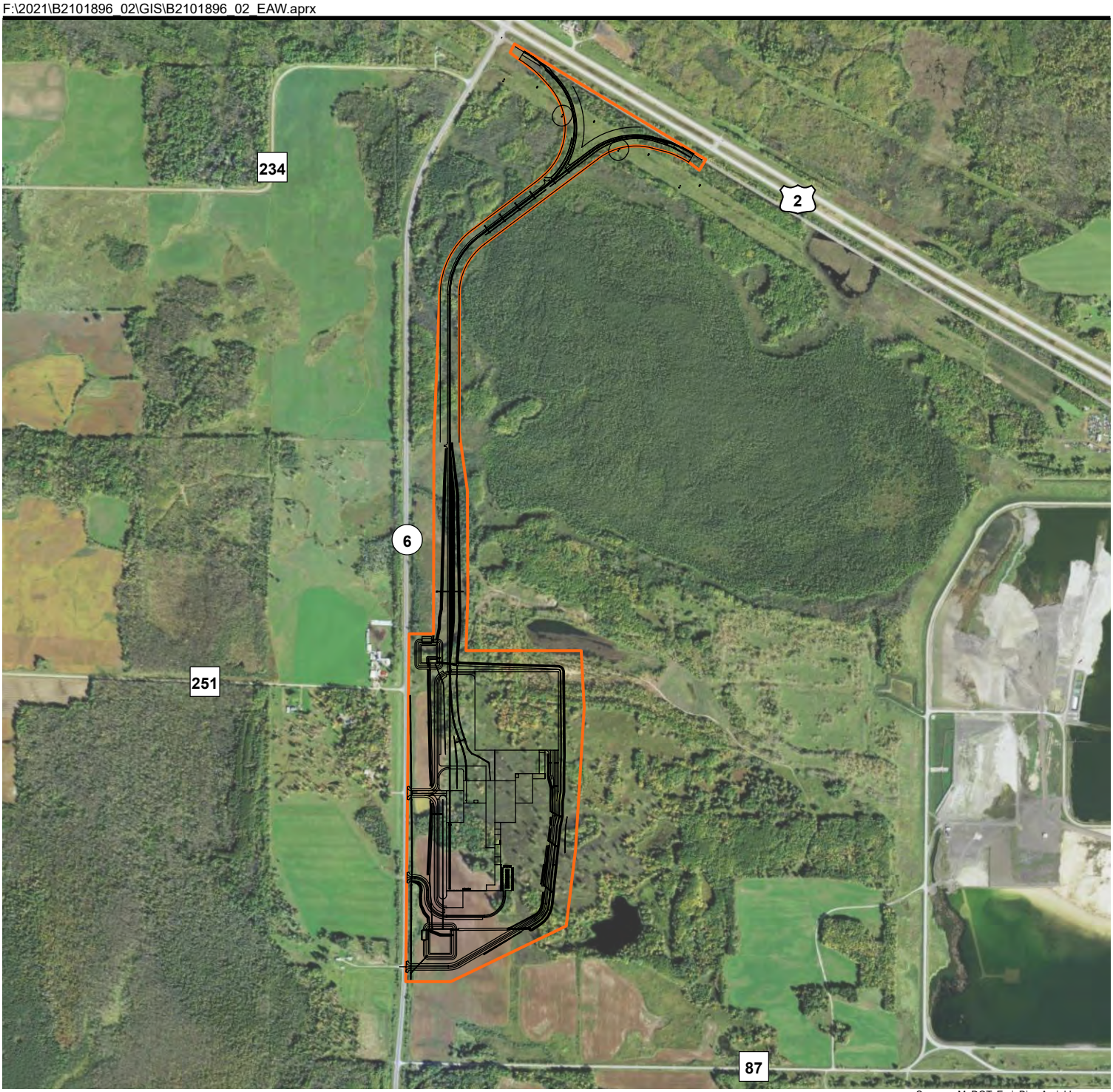
27106 State Highway 6

Cohasset, Minnesota

Proposed Land Cover Map

Figure 5

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



Sources: MnDOT, Esri, Bing Aerial Imagery

Approximate Site Boundary

N

0 750 1,500 Feet

Scale: 1"= 1,500 ft.

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Project No:
B2101896_02_EAW

Drawing No:
Fig6_PropDevelEAW

Drawn By:	CMF
Date Drawn:	7/27/2021
Checked By:	TF & BR
Last Modified:	9/14/2021

Frontier Project - Huber Engineered Woods

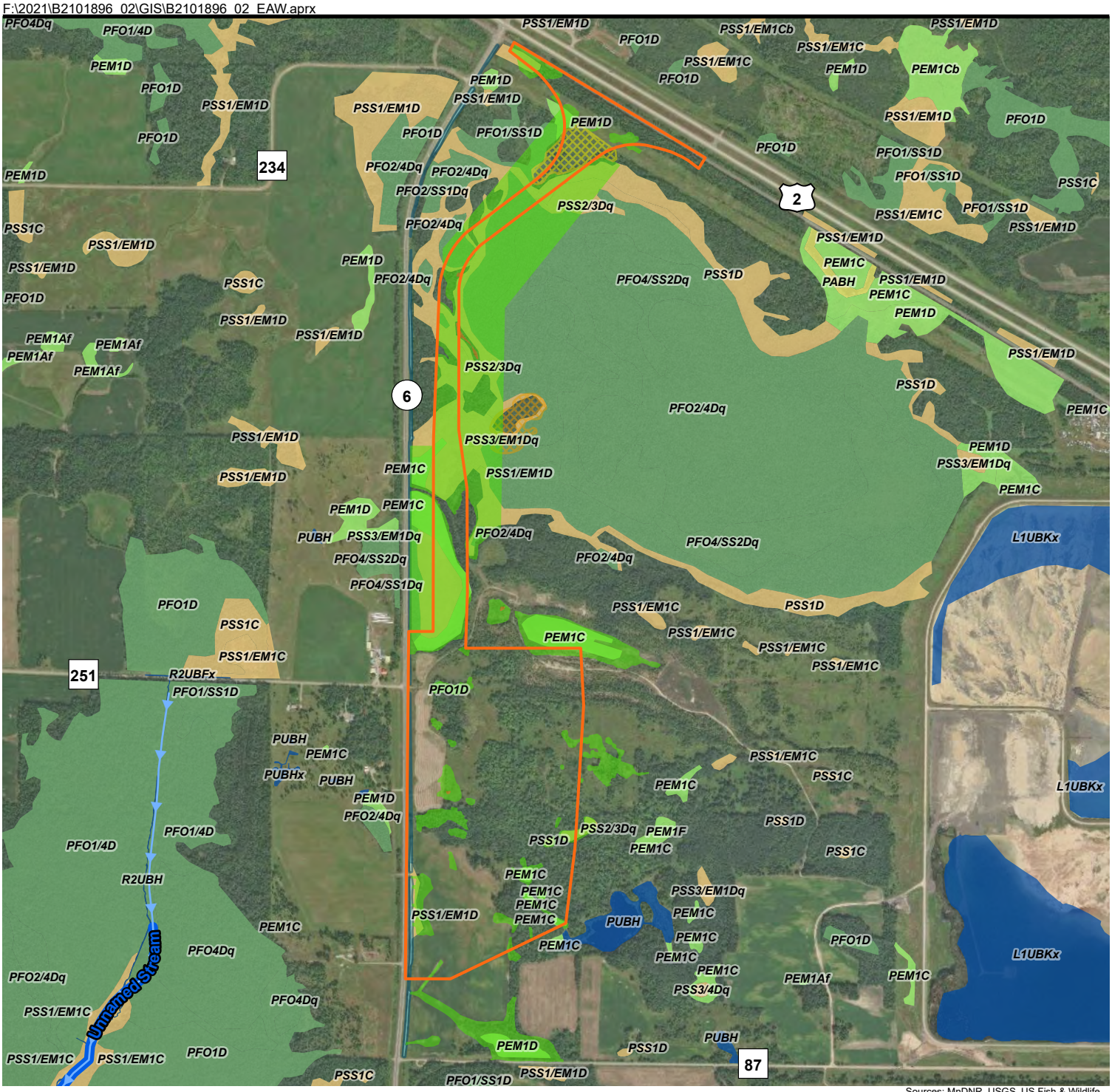
27106 State Highway 6

Cohasset, Minnesota

Proposed Development

Figure 6

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



NWI Cowardin Class
- Aquatic Bed/Nonpersistent Emergent
- Emergent
- Forested
- Scrub-Shrub
- Unconsolidated Bottom (Open Water)

MnDNR Public Waters
- Watercourse

USGS (NHD) Flowline
- Stream River

- Approximate Site Boundary

Delineated Wetlands
- Upland
- Wetland
- Wetland/Upland Mosaic
- Approximate Upland Area Not Delineated
- Approximate Roadway Ditch Location

Sources: MnDNR, USGS, US Fish & Wildlife, MnDOT, Esri, Bing Aerial Imagery

N

0 750 1,500 Feet

Scale: 1" = 1,500 ft.

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Project No: B2101896_02_EAW

Drawing No: Fig7_SurfHydroEAW

Drawn By:	CMF
Date Drawn:	7/27/2021
Checked By:	TF & BR
Last Modified:	9/14/2021

Frontier Project - Huber Engineered Woods

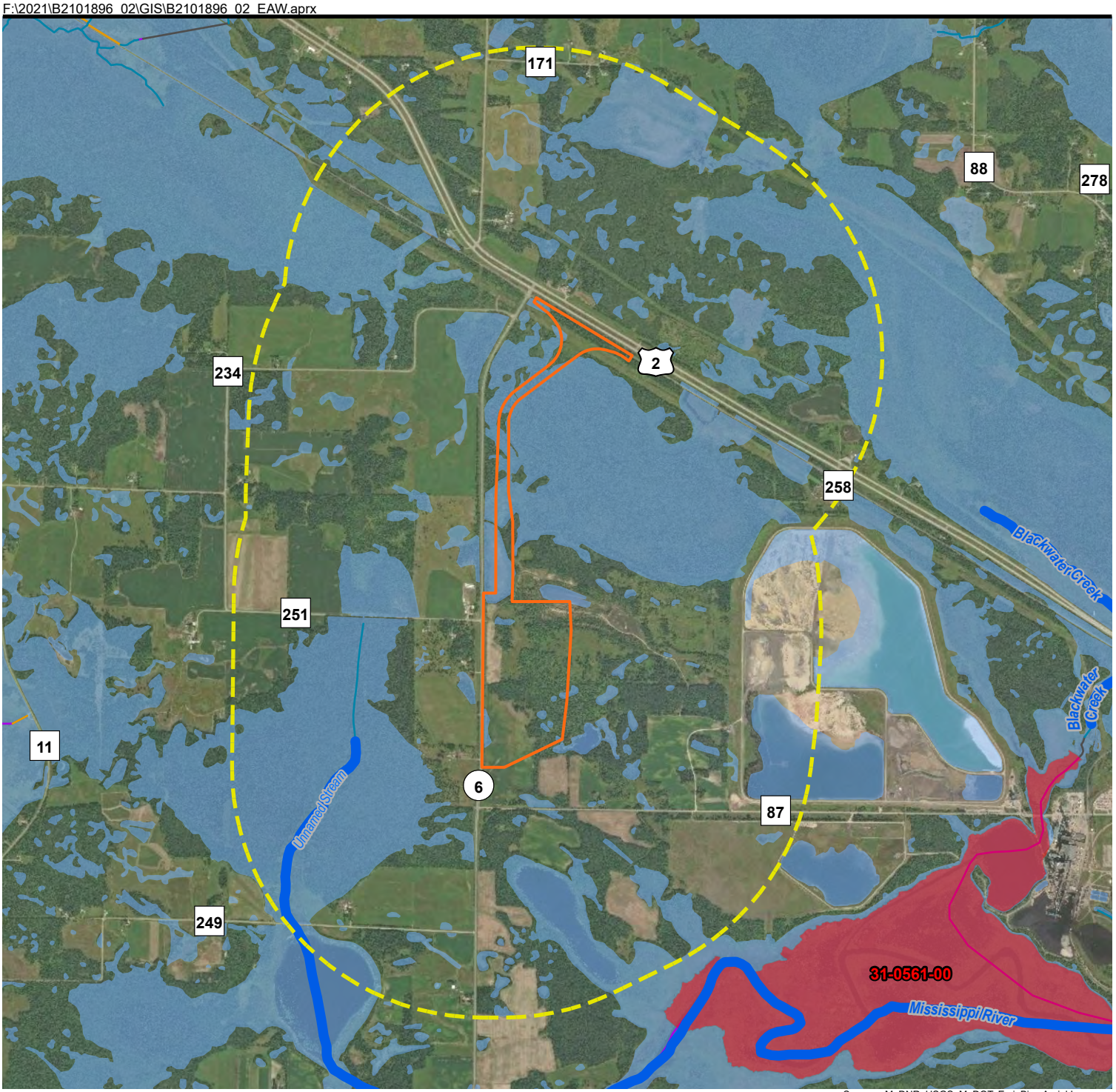
27106 State Highway 6

Cohasset, Minnesota

Surface Hydrology Features

Figure 7

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



Sources: MnDNR, USGS, MnDOT, Esri, Bing Aerial Imagery

- Approximate Site Boundary
- 1 Mile Buffer
- National Wetlands Inventory
- USGS (NHD) Flowline
  - Artificial Path
  - Canal Ditch
- Connector
- Stream River
- Impaired Waters 2018
- MnDNR Public Water Watercourse

N

0 1,500 3,000 Feet

Scale: 1" = 3,000 ft.

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Project No:	B2101896_02_EAW
Drawing No:	Fig8_SpecimpWatersEAW
Drawn By:	CMF
Date Drawn:	7/27/2021
Checked By:	TF & BR
Last Modified:	9/10/2021

Frontier Project - Huber Engineered Woods

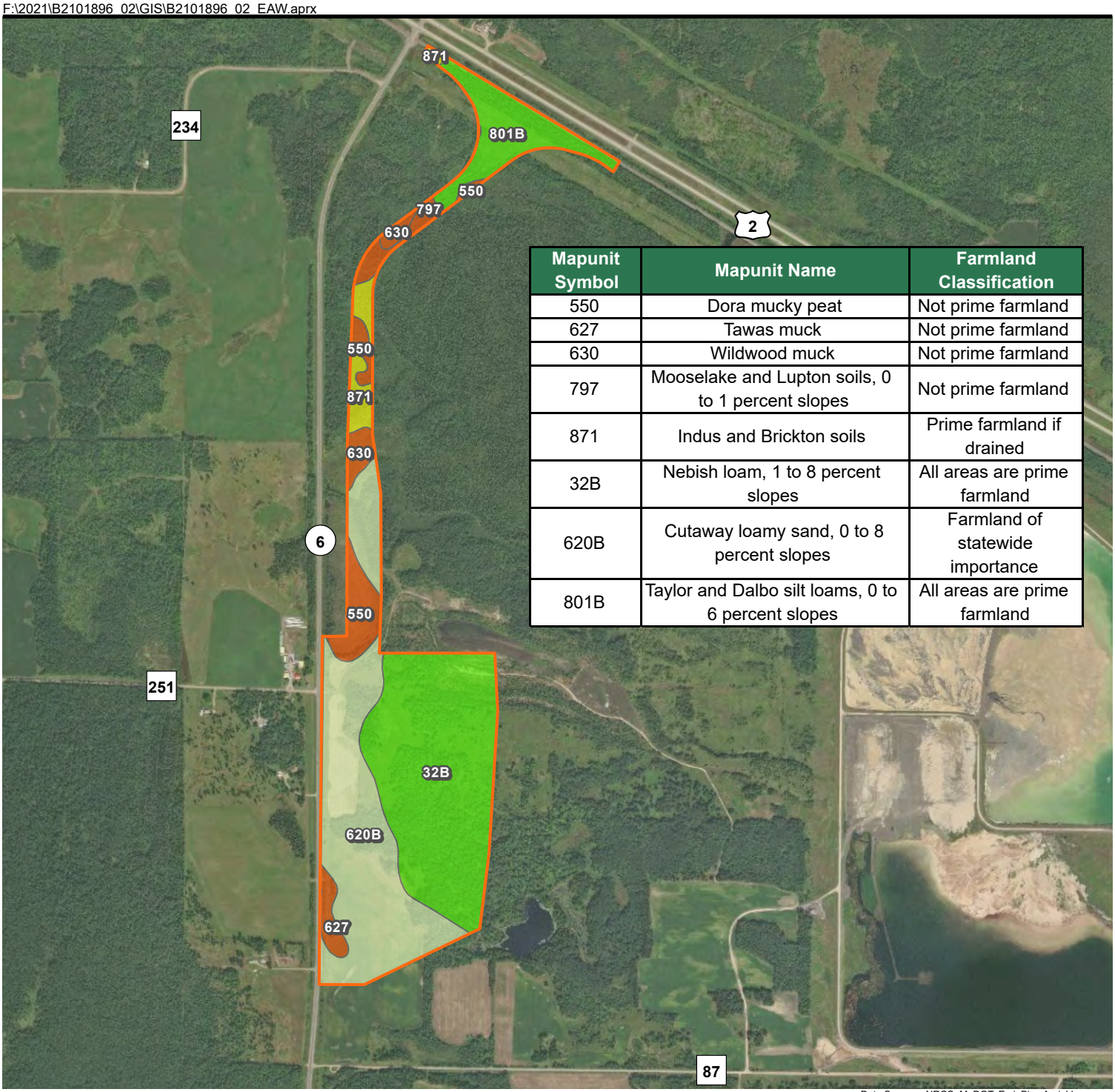
27106 State Highway 6

Cohasset, Minnesota

Special & Impaired Waters Map

Figure 8

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



Mapunit Symbol	Mapunit Name	Farmland Classification
550	Dora mucky peat	Not prime farmland
627	Tawas muck	Not prime farmland
630	Wildwood muck	Not prime farmland
797	Mooselake and Lupton soils, 0 to 1 percent slopes	Not prime farmland
871	Indus and Brickton soils	Prime farmland if drained
32B	Nebish loam, 1 to 8 percent slopes	All areas are prime farmland
620B	Cutaway loamy sand, 0 to 8 percent slopes	Farmland of statewide importance
801B	Taylor and Dalbo silt loams, 0 to 6 percent slopes	All areas are prime farmland

Data Sources: NRCS, MnDOT, Esri, Bing Aerial Imagery

Approximate Site Boundary

Farmland Classification

- All areas are prime farmland
- Farmland of statewide importance
- Prime farmland if drained
- Not prime farmland

N

0 750 1,500 Feet

Scale: 1" = 1,500 ft.

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Project No: B2101896_02_EAW

Drawing No: Fig9_SoilClassEAW

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Date Drawn:	4/7/2021
Checked By:	TF & BR
Last Modified:	9/10/2021

Frontier Project - Huber Engineered Woods

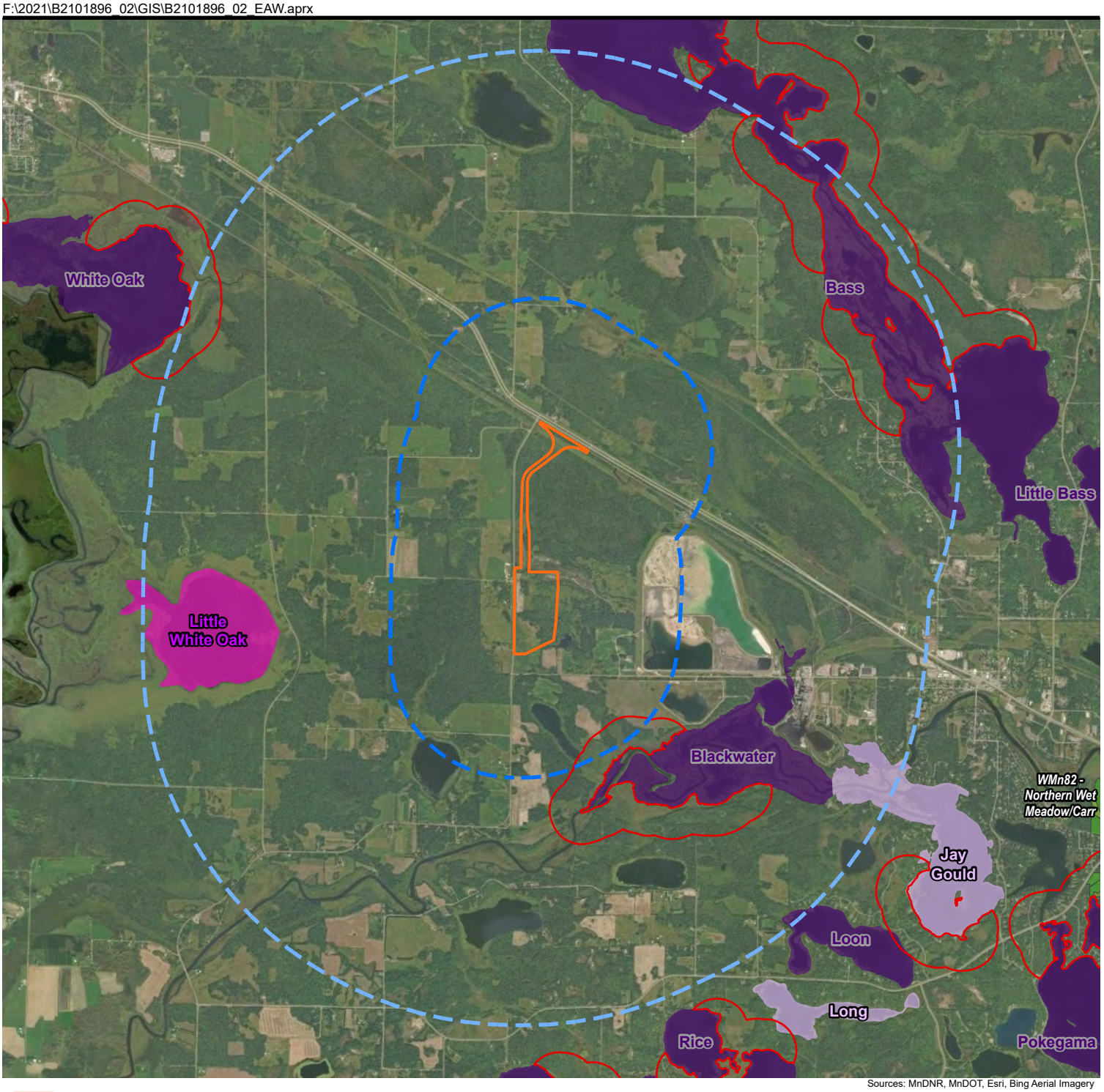
27106 State Highway 6

Cohasset, Minnesota

Soils Classification Map

Figure 9

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



Sources: MnDNR, MnDOT, Esri, Bing Aerial Imagery

- Approximate Site Boundary
- 1 Mile Buffer
- 3 Mile Buffer
- Sensitive Lakeshore - Highly Sensitive Shoreland

DNR Native Plant Communities
- Mesic Hardwood Forest System
- Open Rich Peatland System
- Wet Meadow/Carr System

Lakes of Biological Significance
- Outstanding
- High
- Moderate

N

0 3,000 6,000 Feet

Scale: 1"= 6,000 ft.

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Project No: B2101896_02_EAW

Drawing No: Fig10_NHIS_EAW

Drawn By:	CMF
Date Drawn:	4/7/2021
Checked By:	TF & BR
Last Modified:	9/10/2021

Frontier Project - Huber Engineered Woods

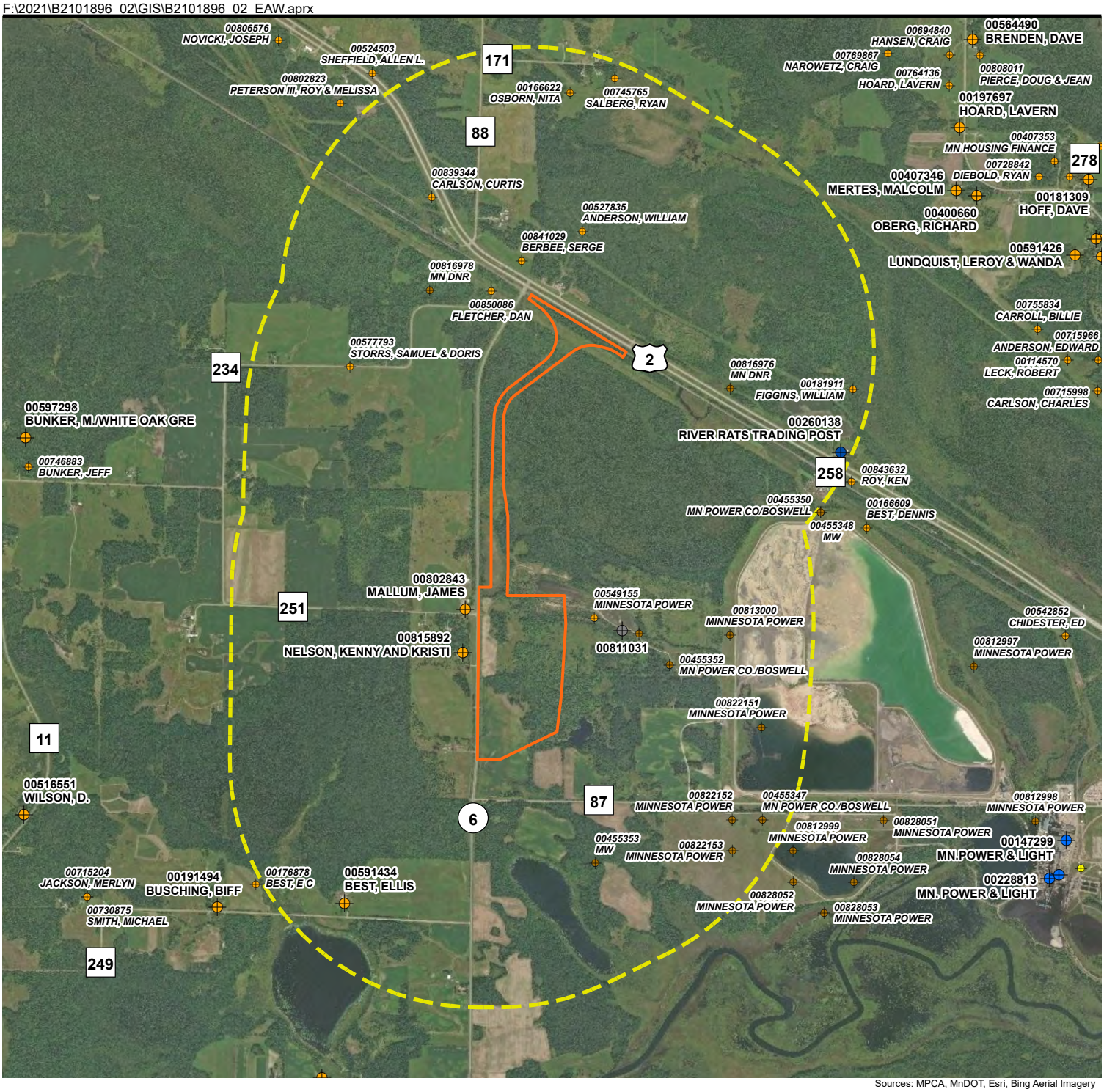
27106 State Highway 6

Cohasset, Minnesota

NHIS Query Results

Figure 10

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



Sources: MPCA, MnDOT, Esri, Bing Aerial Imagery

Approximate Site Boundary
1 Mile Buffer

Minnesota Well Index
Verified Wells
- No Use Assigned
- Domestic
- Public Suppply/Non-Comm.-Transient
- Public Supply/Non-Comm.-Non-Transient

Unverified Wells
- *Domestic*
- *Irrigation*
- *Monitor Well*

N

0 1,500 3,000
Feet

Scale: 1" = 3,000 ft.

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Project No: B2101896_02_EAW

Drawing No: Fig11_MNWellIndexEAW

Drawn By:	CMF
Date Drawn:	7/27/2021
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Last Modified:	9/14/2021

Frontier Project - Huber Engineered Woods

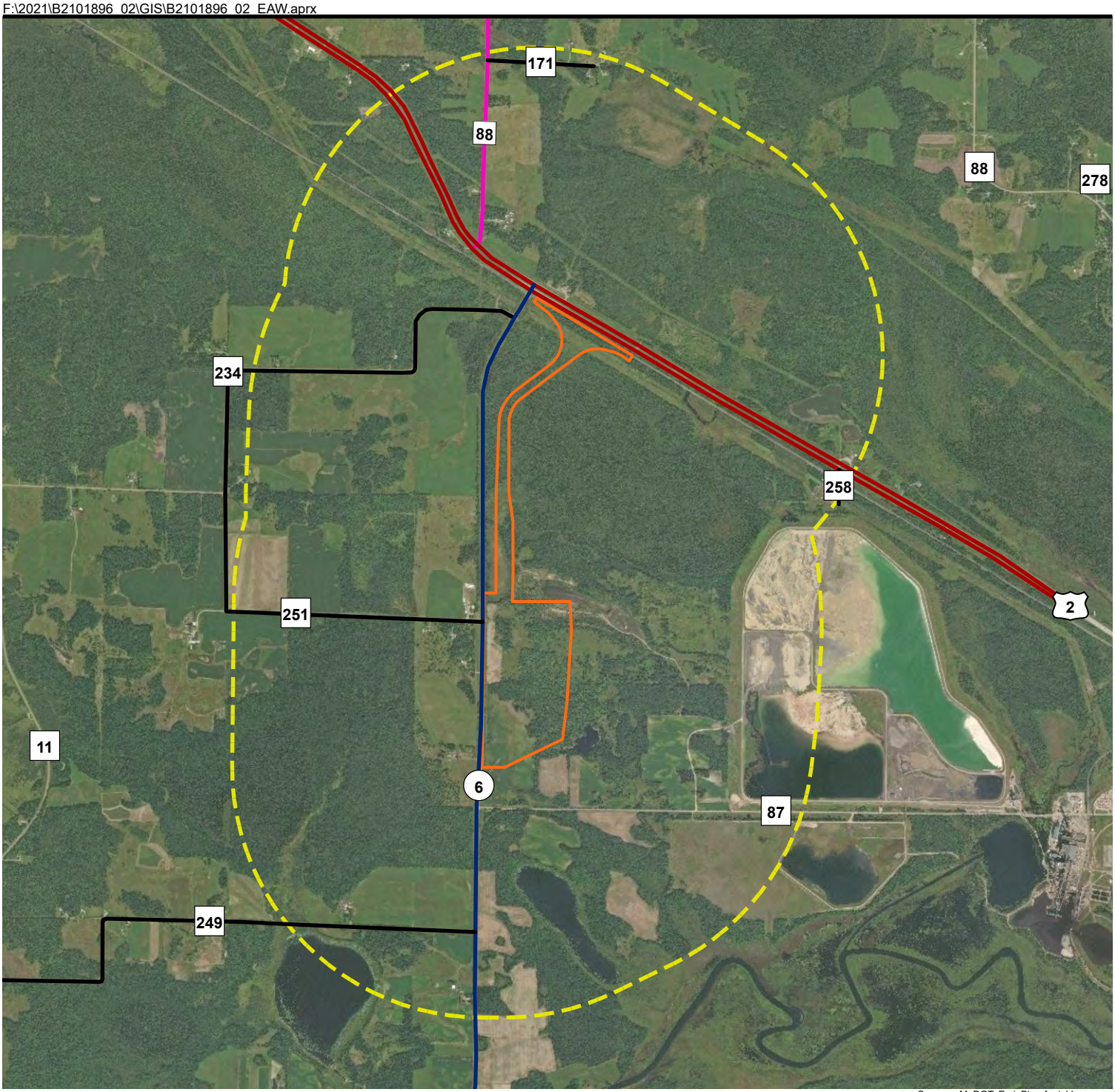
27106 State Highway 6

Cohasset, Minnesota

Minnesota Well Index

Figure 11

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



Sources: MnDOT, Esri, Bing Aerial Imagery

Approximate Site Boundary
1 Mile Buffer

Road Classification
US Highway
State Highway
County State Aid Highway
County Road

N

0 1,500 3,000 Feet

Scale: 1" = 3,000 ft.

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Project No: B2101896_02_EAW

Drawing No: Fig12_RdClassEAW

Drawn By:	CMF
Date Drawn:	7/27/2021
Checked By:	TF & BR
Last Modified:	9/14/2021

Frontier Project - Huber Engineered Woods

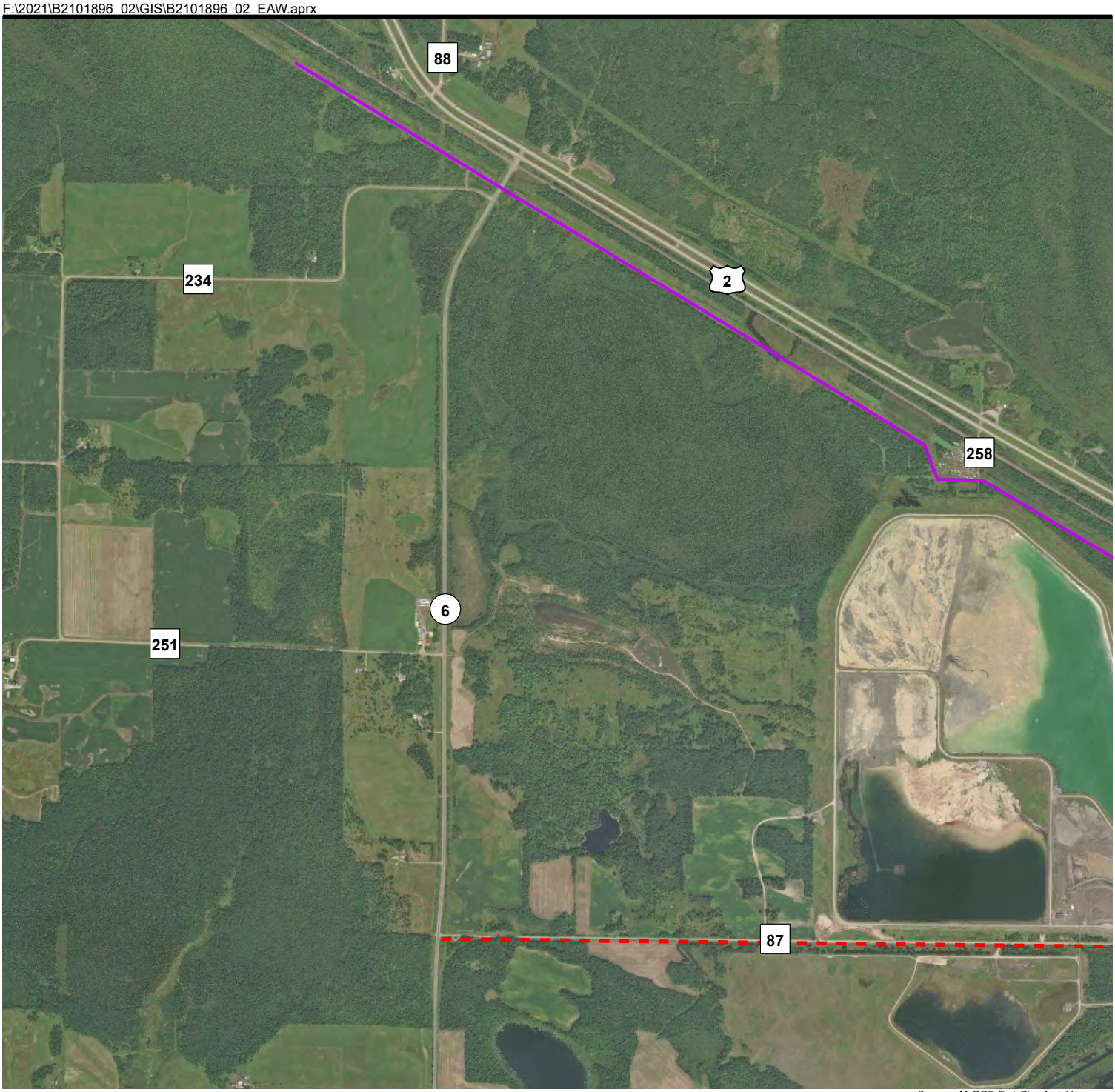
27106 State Highway 6

Cohasset, Minnesota

Road Classification

Figure 12

F:\2021\B2101896_02\GIS\B2101896_02_EAW.aprx



Sources: MnDOT, Esri, Bing Aerial Imagery

230 kV Line

City Utility Corridor

N

0 1,000 2,000 Feet

Scale: 1" = 2,000 ft.

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Project No: B2101896_02_EAW

Drawing No: Fig13_UtilityCorridor

Drawn By:	CMF
Date Drawn:	7/27/2021
Checked By:	TF & BR
Last Modified:	9/15/2021

Frontier Project - Huber Engineered Woods

27106 State Highway 6

Cohasset, Minnesota

Utility Corridor

Figure 13

Appendix A

Kilgore Letter

January 14, 2022

VIA ELECTRONIC MAIL

City of Cohasset, Minnesota
As Responsible Government Unit
c/o Braun Intertec

Re: Environmental Assessment Worksheet for Proposed Huber Engineered Woods Frontier Project – Oriented Strandboard Manufacturing Facility, 27106 State Highway 6 Cohasset, Minnesota

Dear Cohasset City Officials:

I am Dr. Michael Kilgore, Professor and Head of the Department of Forest Resources at the College of Food Agricultural and Natural Resource Sciences of the University of Minnesota. I have been retained by Huber Engineered Woods ("HEW") to provide an evaluation of the potential environmental effects that may arise from the increased harvesting of wood to supply the proposed HEW Oriented Strandboard ("OSB") Manufacturing Facility in Cohasset, Minnesota. Specifically, I have been requested to undertake the following principal tasks:

- Review and comment on a June 11, 2020 Fiber Resource Evaluation prepared by Sewall ("Sewall Fiber Report"); and

- Provide additional information and context on the environmental management of Minnesota's forest resources, for reference in an updated draft of the Environmental Assessment Worksheet ("EAW") for the HEW OSB facility.

Subsets of these topics are described further below.

My Background and Qualifications

My abbreviated curriculum vitae is attached as Exhibit A. As a brief summary, I have been a professor of forest/natural resource economics, policy, and administration in the University of Minnesota's Department of Forest Resources for over 20 years, serving as its Head for the last six years. Prior to joining the University of Minnesota, I was the first executive director of the Minnesota Forest Resources Council, a position I held for six years. In the early 1990s, I was the project manager for the state of Minnesota's Generic Environmental Impact Statement on Timber Harvesting and Forest Management. I have served in several capacities for the state of Minnesota, which include being a member of the Lessard-Sams Outdoor Heritage Council (chair), Governor's Conservation Legacy Council (chair), Minnesota Master Logger Certification Board (chair), and Minnesota Forest Resources Council (research committee chair). I have advised public, private, and nonprofit organizations on a range of forest, natural resource management, and conservation issues, and have served as an advisor to companies on the environmental review documentation associated with their wood-based capital investment initiatives.

Opinions

The following are my own observations and opinions regarding the Sewall Fiber Report and whether the incremental wood fiber consumption associated with the HEW project will have the potential for significant environmental effects on Minnesota's forest resources.

A. Review of Sewall Fiber Report

For my review of the Sewall Fiber Report (attached as Exhibit B), I was asked to provide overall general comments on the report's methods, data, and conclusions, and whether I generally agree with the report's findings. I was also asked to provide any additional information and commentary I believe is relevant to the issues of the adequacy and sustainability of Minnesota's forest resources to supply the proposed facility as well as existing and foreseeable future users. All of the data I present were obtained from publicly-available sources. My principal observations and opinions are as follows:

1. The data and analytic methods employed by the Sewall team are reasonable and sound. They used publicly-available data on the state's forest resources through the USDA-Forest Service's Forest Inventory and Analysis program. Their approach to forecasting wood supply under a range of scenarios employed a combination of the USDA-Forest Service's publicly available Forest Vegetation Simulator (FVS) and Remsoft's Woodstock models. I independently checked a few of the report tables and found them to be accurate (a few slight discrepancies were found, presumably due to rounding and classification differences). I did not attempt to reconstruct of the model runs described in the report.
2. I believe the study's findings are supported by the data and modeling results presented. I did not find any inconsistencies between the data presented and conclusions made by the consultants.
3. The report excludes federal forest lands from any analyses, which has the effect of modestly understating available wood supply in the two wood basin study areas examined (Northome and Pengilly).
4. The study characterizes current conditions and recent trends in the forest resources found in the two study areas examined. It is important to note these two woodsheds are a subset of the area where fiber will be sourced for the Cohasset facility. Primary wood products manufacturing mills have much larger procurement areas than the 65 mile radius associated with the two study areas examined in the report. A mill's woodshed is dynamic, expanding and contracting in response to numerous factors such as market competition, wood availability, forest conditions and access, changing technology for species utilization, and transportation costs. I fully expect this will be the case with the HEW facility. From information gleaned from the report and my discussions with HEW staff, the two woodshed study areas were selected as part of HEW's due diligence in an earlier phase of identifying potential facility locations in northern Minnesota. As such, the wood supply and consumption scenario model output contained in this report have limited relevance today, knowing HEW plans to build an OSB plan in Cohasset. I would add, however, that the proposed facility location is near the center of the Pengilly study area, and the data provided from that study area indicates there is a strong supply of fiber in close proximity to the facility.
5. I would caution readers not to interpret the trends and conditions described in the two study areas examined in the report as necessarily being similar to forest resource conditions when examined from a statewide perspective. In many cases, they may be quite different.

6. An important trend that does not show up in the report is the dramatic decrease in timber harvesting Minnesota has experienced over the past two decades. As late as 2005, approximately 3.75 million cords were harvested across all ownerships. Just a couple of years later, statewide harvest had dropped nearly 1 million cords per year and has since stayed at that level within a narrow range. As the Sewall Fiber Report correctly points out, the greatest opportunity for additional wood supply in the two study areas they examined will come from non-corporate private forests (i.e., family forests). This opportunity is substantial when viewed from a statewide perspective. Timber harvest from the state's family forest lands has declined from over 2 million cords in 1998 to less than 1 million cords today.
7. As a practical matter the Sewall Fiber Report underestimates the availability of fiber for the proposed facility.

B. Comments on Environmental Management of Minnesota's Forest Resources

In addition to my review and commentary on the Sewall Fiber Report, I was asked to discuss how forests are managed in Minnesota to protect important non-timber values and the environment. This includes several sub-topics, including, (1) what processes and requirements are imposed on the sale and harvesting of timber from public lands (including county, state, and federal lands), (2) what requirements are applicable to harvesting from private lands, and (3) how multiple public uses of public forests, especially reserved treaty rights, are considered and protected. In considering these issues, I will make a few observations about how management of Minnesota's forests has evolved over the past two-plus decades. Finally, I will offer my views on whether the additional wood harvest needed to supply the proposed HEW OSB facility has the potential to result in significant environmental effects. This assessment is based on my understanding of Minnesota forest resource conditions, current timber harvesting and forest management practices, policies, and programs, HEW facility's contribution to statewide harvesting activity, and estimates of long-term sustainable harvest levels documented in the Generic Environmental Impact Statement on Timber Harvesting and Forest Management (GEIS). Additional materials I considered or reference in this letter are listed in Exhibit C. My principal observations and opinions are as follows:

1. Minnesota's timber harvesting practices have evolved considerably in the last two-plus decades. Today's harvesting practices place much greater emphasis on protecting and/or enhancing important non-timber forest benefits. The most notable advancement in this area has been the development of sustainable timber harvesting practices for use on public and private forest land in the state, otherwise known as timber harvesting and forest management guidelines or FMGs. The Sustainable Forest Resources Act of 1995 (MN Statutes 89A.05) directed the Minnesota Forest Resources Council (MFRC) to develop guidelines that "address the water, air, soil, biotic, recreational, cultural, and aesthetic resources found in forest ecosystems by focusing on those impacts commonly associated with applying site-level forestry practices." Finalized in 1998, Minnesota's FMGs contain a comprehensive suite of practices to address the potential effects timber harvesting could have on important non-timber resources such as wildlife habitat, water quality, aesthetics, soil erosion, historic/cultural resources, rare, and endangered, or threatened species.

2. At the time they were developed, MN's FMGs were considered the most exhaustive set of non-regulatory harvesting practices of any state. Since that time, several states have

emulated the Minnesota approach. In fact, I was invited to speak to the Wisconsin Governor's Forestry Council in the late 1990s to explain Minnesota's approach to developing its FMGs. Wisconsin subsequently developed its own set of forest management guidelines that, in many respects, emulate Minnesota's FMGs. Minnesota's FMGs have been updated several times (2005, 2008, 2012) since they were first released in 1999 to reflect new science and information (e.g., environmental impacts when harvesting occurs adjacent to lakes, rivers, streams, and wetlands) and/or add new guidelines (e.g., guidelines for sustainably harvesting non-merchantable wood material such as tree limbs and tops for bioenergy).

Minnesota's public land managers have adopted the use of FMGs when timber was harvested on their lands. A study conducted seven years after the FMGs were finalized found that public agencies accounting for 92 percent of all forest land specified the use of FMGs in all of their timber sales. It is my sense that since that 2005 study, additional public forest land management organizations now routinely incorporate the FMGs in their timber sale operating requirements.

Several public land managers require logging contractors to be qualified and designated on their list of responsible operators before being allowed to bid on a timber sale or harvest timber on its forest land. For logging operations on state-administered forest lands (i.e., those managed by the MN DNR), MN Statutes 90.145 specifies that "Before the start of harvesting operations on any permit, the purchaser must certify that a foreperson or other designated employee who has a current certificate of completion, which includes instruction in site-level forest management guidelines or best management practices…"

3. Although the FMGs are voluntary, several policies and programs have developed over the last 20 years to help ensure Minnesota's FMGs are applied when timber harvest is conducted on public and private forest land. These include:

   a) **Minnesota Logger Education Program (MLEP)**. MLEP was established in 1995 to provide a comprehensive training program for the state's logging businesses. A central part of this training is understanding how to correctly apply Minnesota's FMGs. To be a member of MLEP, the individual needs to attend six hours of training on Minnesota's FMGs. I am not aware of any public land management organization in Minnesota that will allow a logging contractor to operate on its lands unless it is a current member of MLEP.

   b) **Forest Certification.** Nearly 8 million acres of Minnesota forest land is certified as being sustainably managed under the Sustainable Forestry Initiative (SFI) or Forest Stewardship Council (FSC). This represents approximately half of the state's commercial forest land base. In order to be certified, forest operations are subject to independent audits by an accredited certification body. As someone who has been part of a team that conducted this independent audit in Minnesota, I can attest to the important role the use of FMGs play when determining whether timber harvesting activities meet the standards required to receive certification status.

      The MN DNR is the single largest FSC-certified land manager in the US, with approximately 5 million acres certified. Beyond the state's forests, over 80% of the 2.7 million acres of county-administered forest land is certified. The MN DNR and several counties (Beltrami, Carlton, Crow Wing, Koochiching) are dual certified by the two

major forest certification systems, FSC and SFI. Most large private ownerships (e.g., UPM-Blandin, Mopus, PotlatchDeltic) are also certified.

c) **Commitment to use FMGs on private forest lands.** The state's preferential forest property tax program is the Sustainable Forest Incentives Act (SFIA). As a condition of enrollment, private forest landowners need to follow the FMGs when harvesting timber ("timber harvesting and forest management guidelines must be used in conjunction with any timber harvesting or forest management activities conducted on the land during the period in which the land is enrolled.") There are currently over 1.1 million acres of private forest land enrolled in the SFIA program.

4. The state has established a program to monitor FMG use when a commercial timber harvest occurs. Since the program's inception over 20 years ago, approximately 1,400 timber harvest sites across public and private have been monitored. Consistent with previous monitoring reports, the most recent (2018) FMG monitoring report found fairly high implementation rates for several key guidelines and improved implementation rates compared to past monitoring results for other guidelines. There were comparatively few guidelines that were found to have low implementation rates or no improvement in implementation rates over time. For these guidelines, they receive a greater focus in future FMG monitoring activities and are given additional emphasis in FMG training efforts.

5. The level of professional assistance to the state's private forest landowners has increased in recent years. This assistance is provided by private consulting foresters and service foresters hired by public agencies such as the MN DNR and soil and water conservation districts. In 2016, the Minnesota Legislature appropriated additional funds that enabled the MN DNR to substantially increase its compliment of foresters to work with private forest landowners in activities such as preparing forest stewardship plans and assisting them in carrying out land management activities such as timber sales. This additional professional support has increased the awareness and use of FMGs among this ownership cohort.

6. There have been additional public policy initiatives that enhance important non-timber forest benefits, especially those associated with older forests. This includes the MN DNR's Extended Rotation Forest (ERF) and Old-Growth policies. The state's ERF policy was established 25 years ago to ensure a wide range of forest age classes exist on state-owned lands, thereby perpetuating important non-timber features (e.g., certain wildlife habitat) associated with older age stands. The DNR's initial assessment identified approximately 12% of its even-rotation forests to be managed under ERG guidelines. The DNR's ERF report acknowledges that due to lower than expected harvest levels, older forests on timberlands statewide (all ownerships) have been maintained and are generally at or above desired levels set for DNR-managed timberlands. The report also states that several FMGs contribute to the perpetuation of older forest conditions. They include leaving trees (either in clumps or individually) within the harvest boundaries, retaining areas adjacent to streams, lakes, wetlands, seasonal ponds, seeps and springs, and maintaining long lived conifer species in riparian management zones. The MN DNR's Old-Growth policy creates a viable statewide network of high-quality old growth forest sites, along with relatively undisturbed, natural-origin younger forests that will be managed to promote old growth characteristics in the future. There are currently 44,000 acres of designated old-growth forests on state-administered land where management activities are not allowed, including timber harvesting.

7. Given the above-listed programs and initiatives, FMGs have become a standard of practice when timber harvesting occurs on Minnesota's public forest lands. For that same reason, private owners who manage their lands for timber are typically conversant with and use the FMGs, even if they are not required by law to do so. One would have difficulty finding a commercial logging business operating in Minnesota that had not received FMG training.

8. As I pointed out in my comments on HEW's wood fiber study, the geographic area needed to provide wood fiber to the proposed HEW facility cannot be precisely defined. Like any wood-using mill, the procurement area will be dynamic in response to numerous factors such changing economic and physical supply conditions. This is true for all primary wood processing facilities that procure wood fiber from forest lands not under their control. At times, wood can be brought to a Minnesota mill from distances greatly exceeding 100 miles. This is illustrated with roundwood import data reported by the MN DNR, which shows MN roundwood imports has been as high as 701 thousand cords in 2005 (between 15%-20% of the total roundwood consumed by Minnesota mills that year).

   Because the HEW facility's wood procurement area is expected to cover northern Minnesota and beyond, the EAW appropriately places the additional timber harvesting activity needed to supply wood to this facility within the broader context of a statewide focus, both respect to the state's forest resources and cumulative timber harvesting.

9. Minnesota's forest resources have evolved over the past two decades in light of the decreased timber harvesting that has occurred over this same period. As recently as 2005, the statewide harvest was approximately 3.73 million cords. Two years later, the harvest level dropped below 3 million cords and has since averaged 2.87 million cords/year through 2018 (the most recent year this data is reported). This nearly 1 million cords/year decrease in statewide timber harvesting has resulted in Minnesota having considerably older forests today than it had 20 years ago. Minnesota's forest inventory data illustrates this trend well; the amount of forests greater than 50 years old has increased by more than 1.1 million acres from 2005 to 2019. Combined with policies to promote older forests (e.g., DNR's Extended Rotation and Old-Growth policies, certain FMGs), many of the important non-timber characteristics associated with older forests are more prevalent today in Minnesota than in 2005.

10. The decline in timber harvesting activity has increased the gap between the additional annual net growth of wood volume and the amount removed each year through harvesting. Statewide, net annual growth (after accounting for mortality and non-harvesting removals) was 5.65 million cords in 2019. When compared to statewide harvesting, the current net growth exceeds harvest by 2.84 million cords/year—twice the current annual harvest rate. This would be the maximum additional harvest that could be sustained if the sole focus was on maximizing the potential of the state's forests to produce wood fiber.

11. Of course, defining an upper sustainable harvest level needs to take into account the important non-timber values provided by forests. Fortunately, Minnesota has an estimate of what this upper harvest level that sustains both timber and non-timber values is. The GEIS examined this upper limit and concluded it to be 5.47 million cords/yr. Again, it is important to note that this was determined to be the highest annual harvest level that can be sustained not only from the standpoint of timber production but also a level that will sustain and perpetuate important non-timber values such as wildlife habitat, water quality, and soil productivity. Although this upper-level estimate was made 26 years ago, the GEIS remains today the most comprehensive environmental assessments of statewide timber harvesting

impacts. There has been no analysis since the GEIS that comes remotely close with respect to the depth and breadth by which the GEIS analyzed cumulative timber harvesting impacts on the state's forest resources. Combined with the new policies, programs, and harvesting practices that have been put in place since the GEIS was completed, it is my opinion that 5.47 million cords remains a valid assessment of a harvest level that is sustainable from the standpoint of the wide range of timber and non-timber goods and services Minnesota's forests provide. With the addition of the HEW facility, Minnesota's statewide timber harvest would be approximately 3.21 million cords/year, still more than 2.2 million cords below the estimated maximum harvest level for both timber and non-timber resource sustainability.

12. In terms of the aspen resource specifically (the largest component of HEW's expected consumption) the most recent statewide aspen inventory, growth, and harvest data shows that the current (2018) statewide aspen harvest is 1.43 million cords/year and aspen's annual sustainable harvest is 2.358 million cords/year. Assuming aspen will be 75% of HEW's annual wood fiber needs, the additional aspen demand represents approximately 30 percent of this 900,000+ cords/year additional aspen utilization capacity. It's worth noting the annual statewide aspen harvest has been as high as 2.5 million cords as recently as 2000, which is more than 1 million cords/year greater than the current statewide aspen harvest level. The cumulative annual aspen harvest with the addition of the HEW facility will still be substantially below 2.5 million cords. Net growth and harvest data for the other hardwood species the HEW facility plans to use also shows considerable capacity to increase harvest, relative to net annual growth.

13. The incorporation of tribal perspectives and input in the management of Minnesota's forest land has evolved over the last decade in several important ways.

    a) As was pointed out in the EAW, a formalized partnership has been established between the Chippewa National Forest and the Leech Lake Band of Ojibwe. This partnership establishes a framework for cooperation and consultation between the Chippewa National Forest (CNF) and Leech Lake Band of Ojibwe on forest management decisions affecting the CNF. There may be other similar arrangements between Minnesota Indigenous bands or tribes and public land management organizations, however this is the only formal agreement I am aware of.

    b) Both forest certification systems, FSC and SFI, have standards that require consultation with Indigenous Communities. Having been part of a 3rd party forest certification audit team, I can attest to the importance the certifying organization places on the level of consultation that occurs between the land management organization seeking certification and tribal governments. I note that SFI recently modified its forest management standard to now include enhanced provisions for respecting Indigenous and Tribal rights and values on both public and private lands.

    c) University of Minnesota forestry students today have greater exposure to tribal natural resource perspectives than was the case a decade ago. My department recently added a tribal natural resource faculty line to enhance our forestry student's understanding of tribal and Indigenous natural resource management, tribal and Indigenous perspectives, and the responsibilities natural resource managers have for tribal and Indigenous communities. Conversations with forestry school deans and department heads suggest similar hires have been made or are planned. I mention this, as it illustrates an important trend in the education and training provided to the next generation of forestry and natural resource management professionals.

14. For these reasons, it is my opinion that timber resources will be made available to HEW (and other users) in a sustainable, environmentally protective manner, and that the incremental consumption of fiber precipitated by the HEW project will not have the potential for significant environmental effects on Minnesota's forest resources.

I hope you find this information useful as you consider the adequacy of the EAW for Huber's proposed oriented strand board facility.

Respectfully submitted,

Michael A. Kilgore

Exhibit A
CV In Brief

Michael A. Kilgore
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University of Minnesota, St. Paul, MN
Phone: (612) 624-6298 email: mkilgore@umn.edu
January 2022

Key Qualifications

Dr. Kilgore is a Professor and Head, Department of Forest Resources, University of Minnesota. From 2008-2016, he was the director of the University's Natural Resources Science and Management graduate studies program. Dr. Kilgore has led or been a key participant in several forest and natural resource economics, planning, and policy studies. He has served on numerous state and national committees addressing forestry and natural resource issues, policies, and programs.

Graduate Education

Ph.D. Forestry; emphasis on forest resources economics and policy, University of Minnesota, 1990.

Positions Held

Head, Dept. of Forest Resources, University of Minnesota. 2016 – present.
Professor, Dept. of Forest Resources, University of Minnesota. 2010 – present.
Director, Natural Resources Science and Management Graduate Studies program. 2008 – 2016.
Director, Center for Environment and Natural Resources Policy. 2002 – present.
Associate Professor, Dept. of Forest Resources, University of Minnesota. 2006 – 2010.
Assistant Professor, Dept. of Forest Resources, University of Minnesota. 2001 – 2006.
Executive Director, Minnesota Forest Resources Council. 1995 – 2001.

Research Focus

Evaluating the economic and social impacts of natural resource use and management practices; the use and effectiveness of various planning and economic and policy tools to promote sustainable natural resources management; the design, administration, and evaluation of forest and related natural resources policies and programs; and the valuation and taxation of forests and other wild lands.

Teaching and Advising

Recurring course instruction:

- Economics and Natural Resource Management
- Methods for Environmental & Natural Resource Policy Analysis
- Economic Analysis of Natural Resources Projects
- Forest Resources Orientation and Information Systems

Annual instructional load ~ 400 student credit hours.
Annual student advising: 2-6 M.S. and PhD students, 15-20 undergraduate students.

Publications and Presentations

- 89 refereed journal articles
- 2 book chapters
- 115 technical and policy reports
- 150+ invited presentations to science and land management practitioner audiences

Extramural Funding (2001 – Present)

Since 2001, Dr. Kilgore and Co-PIs have been awarded 53 competitive grants totaling $3,926,327 in research funds, $2,030,014 of which are projects for which Dr. Kilgore was the lead investigator.

Selected Appointments

Society of American Foresters, National Committee on Forest Policy: 2003 – 2006.
Fellow, Society of American Foresters, 2009.

Selected Service

Associate editor, economics – *Journal of Forestry*: 2008 – 2014.
Chair, CFANS' Graduate and Research Policy and Review Committee: 2009 – 2016.
Chair, Lessard-Sams Outdoor Heritage Council: 2008 – 2011.
Chair: MN Governor Pawlenty's Conservation Legacy Council: 2006 – 2007.
Chair, MN Master Logger Certification Board: 2007 – 2011.
Guardianship Council: Freshwater Society: 2007 – 2014.
Member, MN Master Logger Certification Board: 2007 – 2019.
Member, Minnesota Forest Resources Council 2020 - present

Selected Refereed Journal Articles

Wilson, David C., M.A. Kilgore, S.A. Snyder. 2021. Planning and professional assistance as factors influencing private forest landowner best management practice implementation. *Journal of Forestry*. In press.

Meier, J.T., M.A. Kilgore, G.E. Frey, S.A. Snyder, C.R. Blinn. 2019. A comparison of participants and non-participants of state forest property tax programs in the United States. *Forest Policy and Economics* 102(2019): 10-16.

Noe, R. R., B. L. Keeler, M. A. Kilgore, S. J. Taff and S. Polasky. 2017. Mainstreaming ecosystem services in state-level conservation planning: progress and future needs. *Ecology and Society* 22 (4):4.

Håbesland, D.E., M.A. Kilgore, D.R. Becker, S.A. Snyder, B. Solberg, H.K. Sjølie, B.H. Lindstad. 2016. Norwegian family forest owners' willingness to participate in carbon offset programs. *Forest Policy and Economics* 70: 30-38.

Kilgore, M.A. and S.A. Snyder. 2016. Exploring the relationship between parcelization metrics and natural resource managers' perceptions of forest land parcelization impacts. *Landscape and Urban Planning* 149: 43-48.

Miller, K.A., S.A. Snyder, M.A. Kilgore, M.A. Davenport. 2014. Family forest landowners' interest in forest carbon offset programs: focus group findings from the Lake States, USA. *Environmental Management 54(6):* 1399-1411.

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Ma, Z., D. Becker, and M. Kilgore. 2009. Characterizing the landscape of state environmental review policies and procedures in the United States: a national assessment. *Journal of Environmental Planning and Management 52(8) 1035-1051*.

Kilgore, M. A. and C. R. Blinn. 2005. The impact of timber harvesting guidelines and timber sale attributes on stumpage bidding behavior. *Northern Journal of Applied Forestry*. 22(4):275-280.

Exhibit B
Sewall Fiber Report

Sewall
The evolution of expertise

Fiber Resource Evaluation: Phase 3

Prepared for HUBER ENGINEERED WOODS

By Gary Mullaney
Martin Curnan
Timothy Mack

June 11, 2020

A TFIC Company

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#234.20.01

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Sewall

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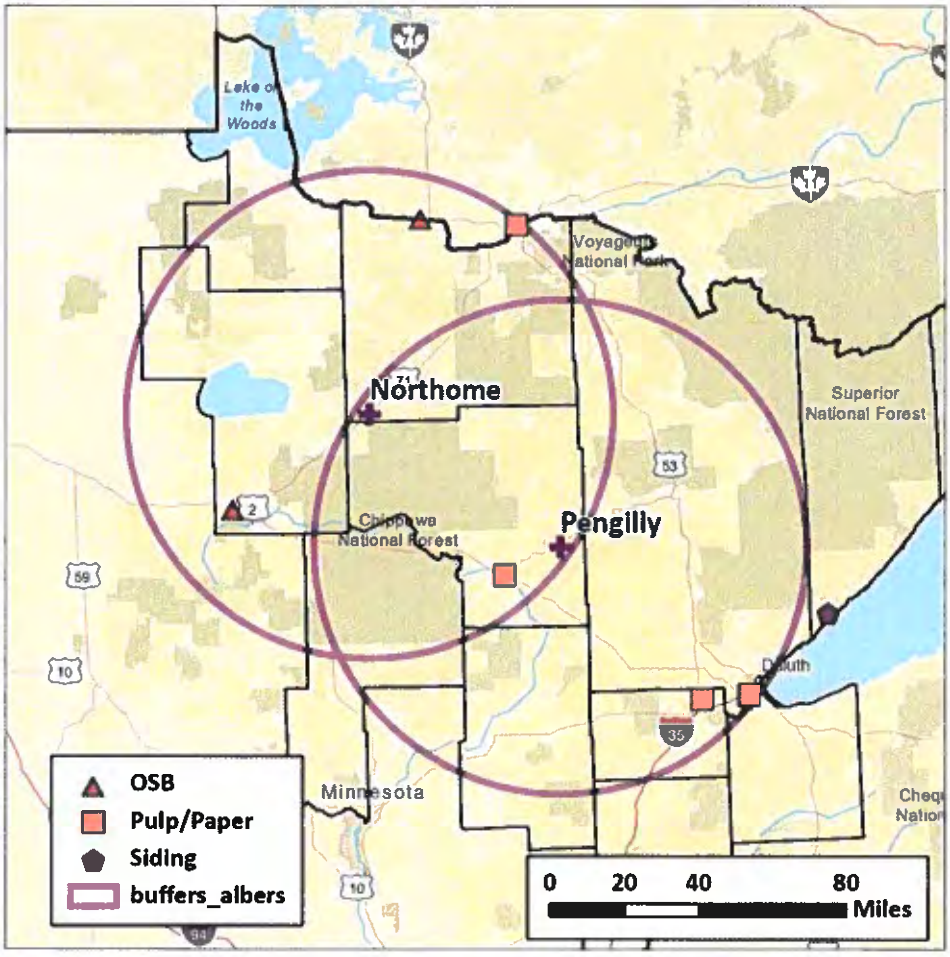
1. BACKGROUND AND OBJECTIVE

Each of HEW's five manufacturing facilities is located in or near a wood basin that provides sustainable, reliable, reasonable cost sources of wood fiber raw material (GA, ME, OK, TN, and VA). At HEW's request in 2019, Sewall provided a "Phase 1" screening assessment of potential wood basins in the western two-thirds of North America. Two regions were then examined more closely in a Phase 2 report which concluded that northern Minnesota was the most promising.

The objective of Phase 3 is to develop the wood supply and cost information that will be incorporated into the overall business decision model for a greenfield project in northern Minnesota. Prior work on forest resources, competitive demand, and infrastructure will be refreshed and expanded. Recognizing that wood consumption in the area might change as firms enter, exit, or change product mix, a range of scenarios will be developed and the consequences of each on future resource availability and cost will be evaluated.

Figure 1-1. Wood Basin Study Areas



In Phase 2, 65-mile-radius circular zones around a town on a major road were selected. The two small towns are *not proposed mill locations*. Rather, they simply serve as convenient center points for the wood basin analysis.

Sewall

2. RESOURCE AREA

Timberland area is the "engine" or factory of a wood basin. A first step in resource assessment is to examine the composition of the forest area and how it may be changing over time.

Northern Minnesota has a unique pattern of land ownership compared to other forested regions in the U.S. After the "timber baron" era, large areas of tax delinquent, cutover and burned-over timberland came to be owned by the state or the counties. Protected and managed, these working forests evolved into significant sources of revenue to support local public school systems and other local government programs.

Figure 2-1. Northome: 5.5 Million Acres (4.9 Million Non-Federal)

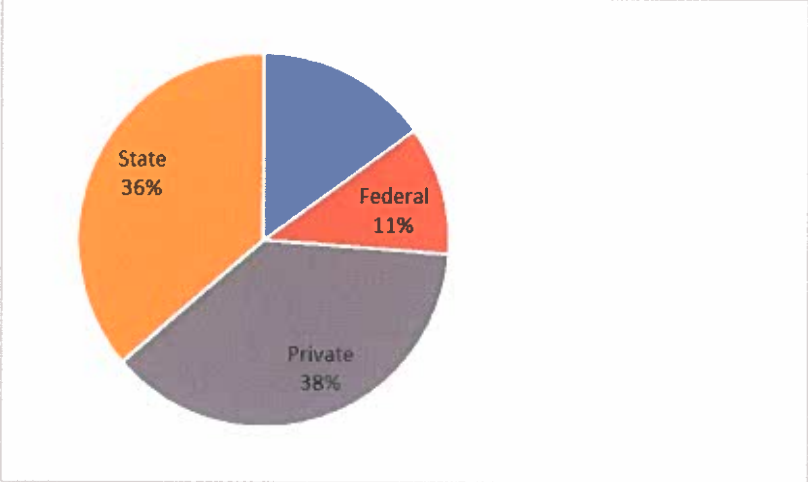
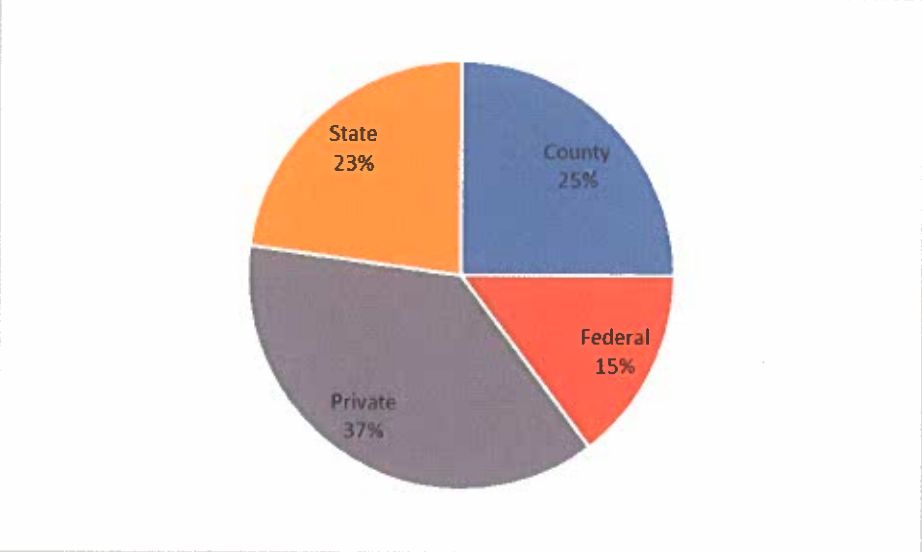


Figure 2-2. Pengilly: 6.3 Million Acres (5.3 Million Non-Federal)



Pengilly has more total timberland, more non-federal timberland, and a higher proportion of county land vs. state. The Northome circular zone includes more agriculture, water, and Canadian territory.

In the most recent ten-year period, federal lands harvested 0.22 tons per acre per year compared to 0.55 tons per acre per year from other ownerships. As a result, only 4% to 6% of all *harvest volume* in the wood basin comes from federal lands. With the persistent low rate of harvesting, forest conditions on federal lands have developed differently, with older ages and higher volumes and mortality rates. In order to see the actual "working forest" more clearly, the remainder of the resource analysis will *exclude federal lands*. When the wood supply picture from non-federal lands is complete, it would be reasonable to assume that an additional 5% would be forthcoming from federal lands.

COMPOSITION BY FOREST TYPE

Figure 2-3. Northome Non-Federal Timberland by Forest Type (4.9 million ac)

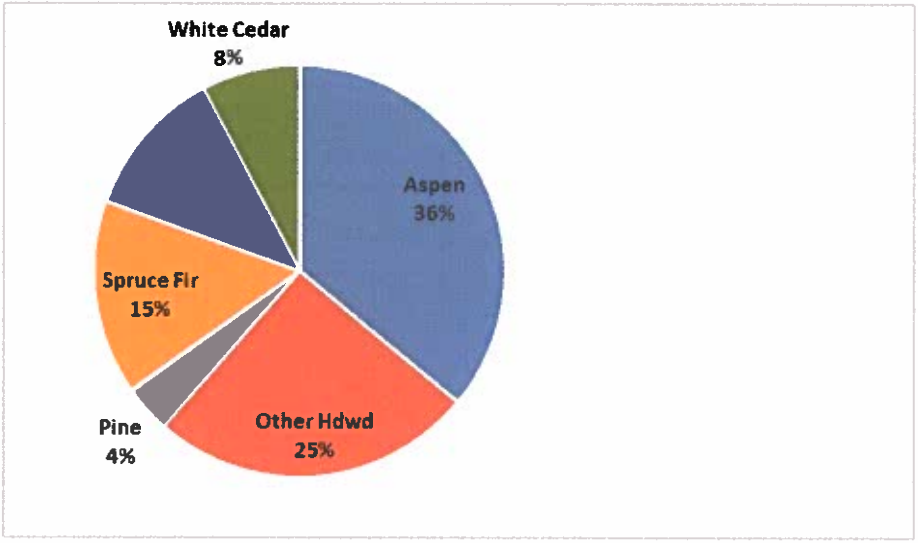
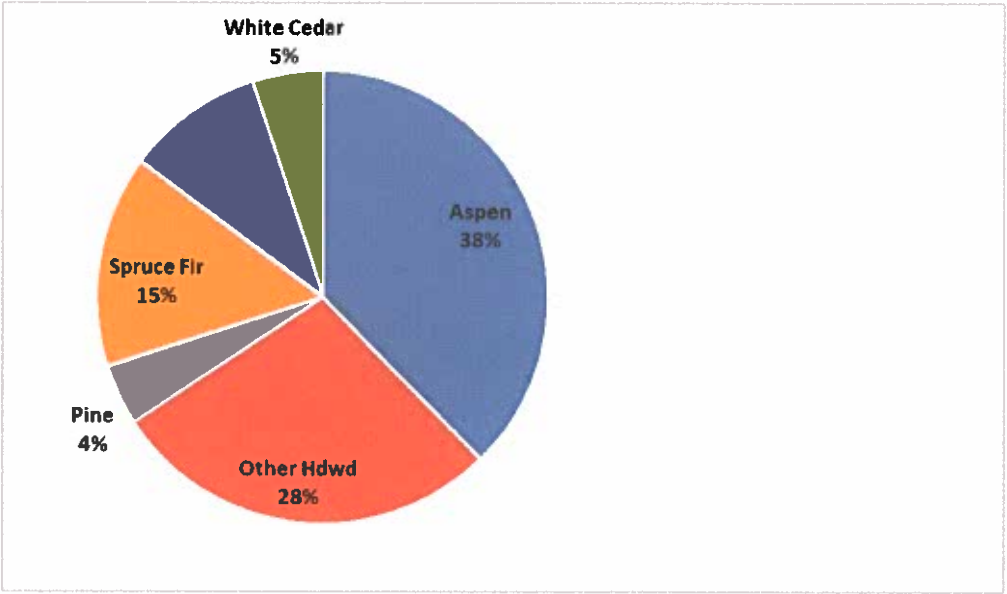


Figure 2-4. Pengilly Non-Federal Timberland by Forest Type (5.3 million ac)



Pengilly has a higher proportion of aspen and other hardwood forest cover types. Softwood has a similar composition in both basins.

TREND IN COMPOSITION BY FOREST TYPE

Table 2-1. Trend in Acres by Forest Type 2009 – 2018[1]

Northome				
Cover Type	2009	2018	Change	Pct Change
Aspen	1,783,030	1,746,824	(36,206)	-2%
Other Hdwd	1,129,534	1,239,707	110,173	10%
Pine	180,543	180,616	73	0%
Spruce Fir	687,290	745,927	58,637	9%
Tamarack	520,680	572,566	51,886	10%
White Cedar	352,356	376,554	24,197	7%
Total	**4,653,434**	**4,862,194**	**208,760**	**4%**
Pengilly				
Cover Type	2009	2018	Change	Pct Change
Aspen	2,016,666	2,011,004	(5,661)	0%
Other Hdwd	1,588,962	1,500,239	(88,722)	-6%
Pine	214,997	232,918	17,921	8%
Spruce Fir	820,675	810,630	(10,045)	-1%
Tamarack	441,611	519,987	78,376	18%
White Cedar	266,642	271,070	4,427	2%
Total	**5,349,553**	**5,345,849**	**(3,704)**	**0%**

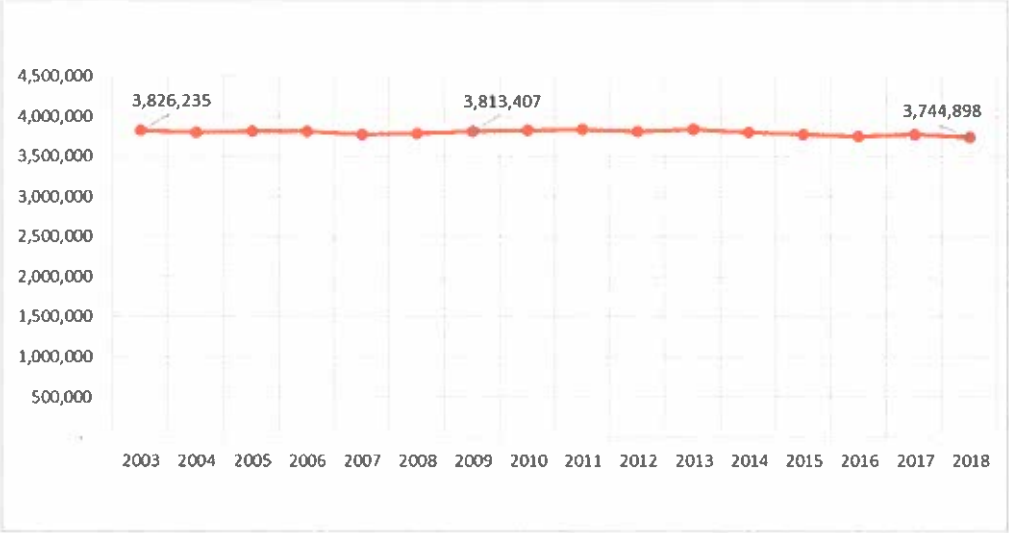
There was neither a significant loss of timberland to other uses, nor a significant gain.

Estimates less than 500,000 acres have high sampling error, which means that the apparent positive trends for pine, tamarack, and white cedar have not been clearly demonstrated.

The most important trend concerns the dominant forest type - aspen, which is level to very slightly declining across the ten year period. The persistence of the aspen type in northern Minnesota is in contrast to Michigan, Wisconsin, and Maine where it is in decline.

[1] Estimates in grey-shaded cells have high sampling errors.

Figure 2-5. Acres of Aspen Forest Type on Non-Federal Land 2003 - 2018[2]



Looking back six years further to the beginning of modern inventory methods in 2003, the persistence of the aspen type is still apparent. The loss is 5,422 acres per year on a base of 3.8 million, or 0.1% per year. If the trend continues, the aspen acreage will decline by 2% across the next twenty years.

[2] Forest Survey Units 1 and 2 – an area slightly larger than the study area.

OWNERSHIP COMPOSITION BY FOREST TYPE

Table 2-2. Area by Forest Type and Non-Federal Ownership Class

Northome						
Forest Type	Acres			Percent of Total		
	County	Private	State	County	Private	State
Aspen	391,839	887,656	467,329	48%	43%	24%
Other Hdwd	229,143	707,648	302,917	28%	34%	15%
Pine	50,483	85,682	44,451	6%	4%	2%
Spruce Fir	70,687	127,734	547,506	9%	6%	28%
Tamarack	27,743	131,281	413,542	3%	6%	21%
White Cedar	49,264	114,432	212,857	6%	6%	11%
TOTAL	**819,159**	**2,054,433**	**1,988,601**	**100%**	**100%**	**100%**
Pengilly						
Forest Type	Acres			Percent of Total		
	County	Private	State	County	Private	State
Aspen	647,184	985,786	378,034	41%	42%	26%
Other Hdwd	383,868	843,743	272,628	24%	36%	19%
Pine	59,376	110,877	62,665	4%	5%	4%
Spruce Fir	227,223	249,521	333,885	14%	11%	23%
Tamarack	159,463	114,195	246,329	10%	5%	17%
White Cedar	90,242	44,091	136,736	6%	2%	10%
TOTAL	**1,567,357**	**2,348,214**	**1,430,278**	**100%**	**100%**	**100%**

County and private lands have a similar composition which is heavy to aspen and other hardwood. State lands in contrast have a smaller component of aspen and other hardwood and higher levels of spruce-fir, tamarack and white cedar. The implication is that state lands can be expected to produce proportionally less aspen and hardwood and more softwood.

ASPEN ACRES BY AGE CLASS

Aspen is a pioneer species adapted to growing vigorously in conditions of full sunlight following severe fire or complete clear-cutting. As a result, a stand age can be estimated for each sample plot which can then be expanded to total area by age class.

Figure 2-6. Northome Aspen by Age Class on Non-Federal Lands

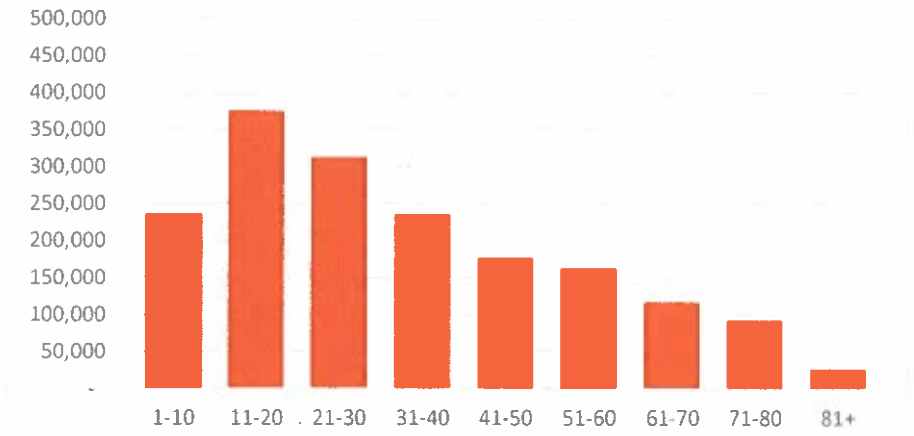
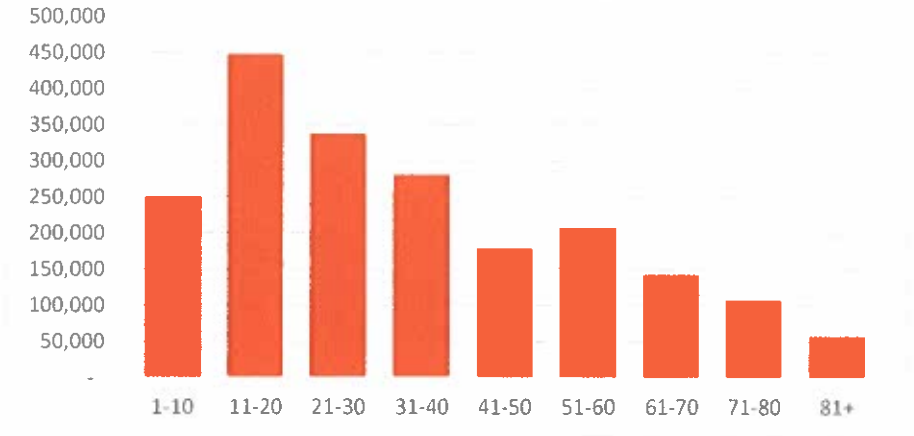
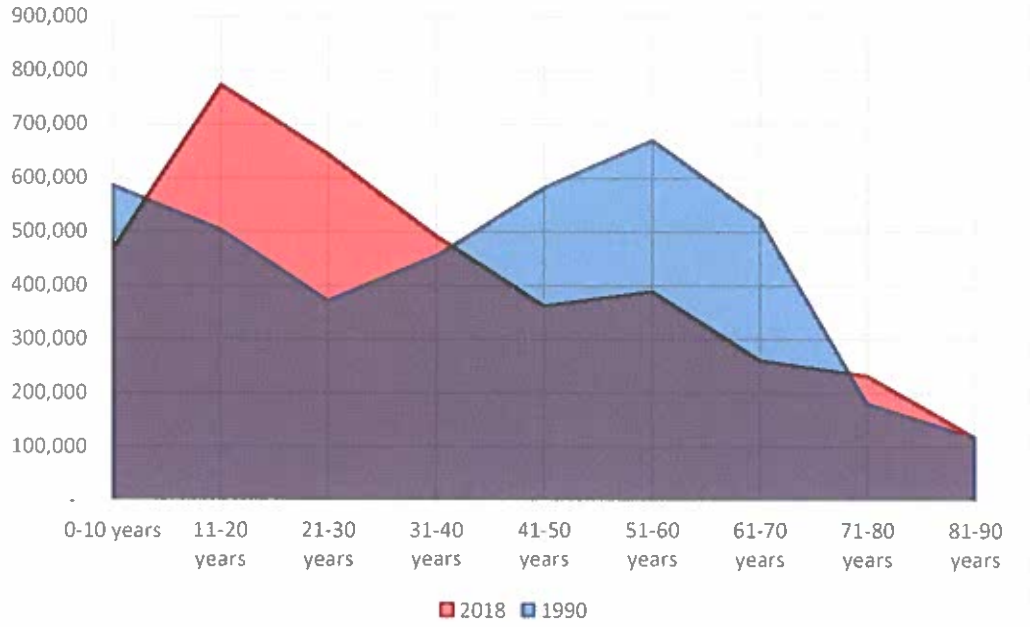


Figure 2-7. Pengilly Aspen by Age Class on Non-Federal Lands



The distribution is skewed to younger ages, centered on about age 20. Most aspen stands are merchantable by age 40. The acreage reaching age 40 will increase significantly across the next 30 years (2019 through 2048) as the large cohorts of younger stands mature.

Figure 2-8. Aspen by Age Class in 1990 vs. 2018[3]



Thirty years ago the aspen resource had a very different age distribution (shaded blue in Figure 2-8). At that time, it was skewed toward age 51-60. As land managers harvested and regenerated the large stock of mature aspen in the intervening decades, they created the pipeline of younger stands that we see in 2018.

[3] Non-federal lands in MN Survey Units 1 and 2, an area somewhat larger than the study area.

3. INVENTORY, GROWTH, AND REMOVALS

Forests, as *dynamic* natural systems, are best understood by observing how conditions are changing over time. Apart from natural catastrophes or radical changes in utilization, the direction and magnitude of change in the recent past is a good indicator of what to expect in the next decade or two. We will compare the most recent set of measured plot data (2018) to one from 2009. Because of the sampling design, the Forest Service data has a lag factor. The two data sets actually describe conditions in the 5 years leading up to and including 2009 vs. the 5 years leading up to and including 2018.

SPECIES GROUPS

Timber inventory, growth and removals are reported by tree species rather than forest cover type. For hardwoods, it is helpful to group species with similar characteristics.

Table 3-1. Composition of Non-federal Hardwood Inventory by Species[4]

Group	Species	Percent	Group Pct
1 - aspen	quaking aspen	41.0%	48.8%
	balsam poplar	4.9%	
	bigtooth aspen	3.0%	
2 - ash	black ash	14.0%	16.4%
	green ash	2.4%	
3 - birch	paper birch	8.7%	8.9%
	yellow birch	0.2%	
4 - other	American basswood	8.0%	8.9%
	American elm	0.8%	
	butternut	0.0%	
	eastern cottonwood	0.0%	
	black willow	0.0%	
5 - maple	red maple	4.1%	8.8%
	sugar maple	4.0%	
	silver maple	0.6%	
	boxelder	0.1%	
6 - oak	bur oak	4.3%	8.3%
	northern red oak	3.6%	
	northern pin oak	0.4%	
Total		100%	100%

Basswood has wood properties similar to aspen. The remaining species in the "other" group are not significant and can be excluded. Oaks have properties that lead OSB makers to exclude or at least minimize the quantities. That leaves four hardwood groups of interest: (1) Aspen including basswood, (2) Ash, (3) Birch, and (4) Maple.

[4] Balsam poplar is often locally referred to as Balm of Gilead, or simply Balm.

Table 3-2. Composition of Non-federal Softwood Inventory by Species

Group	Species	Percent	Group Pct
1 - Spruce-fir	black spruce	15.5%	34.3%
	balsam fir	12.9%	
	white spruce	5.9%	
	blue spruce	0.0%	
2 - Pine	red pine	16.8%	26.4%
	eastern white pine	6.3%	
	jack pine	3.2%	
	Scotch pine	0.1%	
3 - Cedar	northern white-cedar	22.9%	22.9%
4 - Tamarack	tamarack (native)	16.4%	16.4%
Total		100.0%	100.0%

Northern white-cedar is an extraordinarily soft wood (similar to balsa) and is probably not suitable for OSB. Softwood will be reported as Spruce-fir, Pine, or Tamarack.

INVENTORY TREND

Table 3-3. Inventory Trend by Species – State, County, and Private Lands Together

Northome				
Species	Inventory (Million Tons)			Change Pct
	2009	2018	Change	
Ash	10.6	13.4	2.80	26%
Aspen	36.0	40.9	4.90	14%
Birch	4.9	4.5	(0.40)	-8%
Maple	3.8	4.1	0.30	8%
Hardwood	55.3	62.9	7.60	14%
Pine	8.3	10.1	1.80	22%
Spruce-fir	11.9	12.6	0.70	6%
Tamarack	8.1	8.1	-	0%
Softwood	28.3	30.8	2.50	9%

Pengilly				
Species	Inventory (Million Tons)			Change Pct
	2009	2018	Change	
Ash	13.0	15.0	2.00	15%
Aspen	41.4	45.9	4.50	11%
Birch	7.5	6.0	(1.50)	-20%
Maple	8.6	9.0	0.40	5%
Hardwood	70.5	75.9	5.40	8%
Pine	11.7	13.7	2.00	17%
Spruce-fir	14.9	15.4	0.50	3%
Tamarack	7.0	8.3	1.30	19%
Softwood	33.6	37.4	3.80	11%

During the period, which had higher consumption than is true today, aspen inventories increased by more than 10%. This single fact, which is very strong statistically, is perhaps the strongest evidence of some degree of additional capacity for aspen.

Ash rose strongly, birch declined, and maple was up slightly. Pine, a much smaller resource, also showed strong gains.

Is the aspen trend uniform among landowner classes?

Table 3-4. Inventory Trend by Species - Private Lands

Northome				
Species	Inventory (Million Tons)			Change Pct
	2009	2018	Change	
Ash	5.8	7.1	1.30	22%
Aspen	17.3	21.8	4.50	26%
Birch	2.4	2.2	(0.20)	-8%
Maple	2.3	2.7	0.40	17%
Hardwood	27.8	33.8	6.00	22%
Pine	3.4	4.7	1.30	38%
Spruce-fir	3.8	4.6	0.80	21%
Tamarack	2.3	2.0	(0.30)	-13%
Softwood	9.5	11.3	1.80	19%

Pengilly				
Species	Inventory (Million Tons)			Change Pct
	2009	2018	Change	
Ash	7.1	7.8	0.70	10%
Aspen	20.3	23.8	3.50	17%
Birch	3.5	2.9	(0.60)	-17%
Maple	4.4	5.1	0.70	16%
Hardwood	35.3	39.6	4.30	12%
Pine	5.2	6.3	1.10	21%
Spruce-fir	6.4	6.7	0.30	5%
Tamarack	1.8	2.3	0.50	28%
Softwood	13.4	15.3	1.90	14%

Table 3-5. Inventory Trend by Species - State and County Lands

Northome				
Species	Inventory (Million Tons)			Change Pct
	2009	2018	Change	
Ash	4.8	6.3	1.50	31%
Aspen	18.7	19.1	0.40	2%
Birch	2.5	2.2	(0.30)	-12%
Maple	1.4	1.3	(0.10)	-7%
Hardwood	27.4	28.9	1.50	5%
Pine	4.9	5.4	0.50	10%
Spruce-fir	8.1	8.0	(0.10)	-1%
Tamarack	5.8	6.1	0.30	5%
Softwood	18.8	19.5	0.70	4%

Pengilly				
Species	Inventory (Million Tons)			Change Pct
	2009	2018	Change	
Ash	5.9	7.1	1.20	20%
Aspen	21.1	22.0	0.90	4%
Birch	4.0	3.1	(0.90)	-23%
Maple	4.2	3.9	(0.30)	-7%
Hardwood	35.2	36.1	0.90	3%
Pine	6.5	7.4	0.90	14%
Spruce-fir	8.5	8.7	0.20	2%
Tamarack	5.2	6.0	0.80	15%
Softwood	20.2	22.1	1.90	9%

Just over half of the aspen inventory is found on private lands, where nearly all the gains in inventory occurred in the past decade. State and county land departments in Minnesota are required to manage timberland for full productivity (and timber sales revenue) within the limits of sustainability and the protection of other ecological values. Most have periodic inventory and planning efforts which drive the determination of sustainable harvest levels.

In contrast, harvesting on the numerous smaller private tracts has been well below the rate of growth, resulting in the accumulation of standing inventory. The aspen age class distribution is not materially different on private lands vs. state and county lands.

GROWTH AND REMOVALS

Table 3-6. Average Annual Growth and Removals - Northome Non-Federal[5]

Northome						
Species	2009			2018		
	Growth	Removals	G/R	Growth	Removals	G/R
Ash	385	124	3.1	394	78	5.1
Aspen	**880**	**1632**	**0.5**	**1755**	**1673**	**1.0**
Birch	46	137	0.3	50	89	0.6
Maple	153	129	1.2	145	98	1.5
Hardwood	1464	2022	0.7	2344	1938	1.2
Pine	286	250	1.1	376	113	3.3
Spruce-fir	291	325	0.9	321	275	1.2
Tamarack	117	36	3.3	-34	102	(0.3)
Softwood	694	611	1.1	663	490	1.4

Table 3-7. Average Annual Growth and Removals - Pengilly Non-Federal

Pengilly						
Species	2009			2018		
	Growth	Removals	G/R	Growth	Removals	G/R
Ash	320	80	4.0	346	128	2.7
Aspen	**998**	**1536**	**0.6**	**1978**	**1547**	**1.3**
Birch	26	310	0.1	61	163	0.4
Maple	368	241	1.5	237	171	1.4
Hardwood	1712	2167	0.8	2622	2009	1.3
Pine	448	165	2.7	460	275	1.7
Spruce-fir	328	330	1.0	381	300	1.3
Tamarack	193	36	5.4	186	60	3.1
Softwood	969	531	1.8	1027	635	1.6

While aspen annual removals were unchanged, annual growth *doubled* in the recent decade compared to pre-2009. The increase is due to the large acreage of young stands crossing over into merchantable size (referred to as "in-growth"), and to the generally faster growth rates of younger stands after they cross over. Based on the age class distribution, it is safe to assume average annual growth will continue to rise in the next decade. The G/R ratio increased from 0.6 to 1.3 by 2018. Aspen inventories rose during the period.

[5] Grey-shaded rows have few observations and high sampling error.

Table 3-8. Most Recent Growth/Removals Ratio for Aspen by Landowner Class

	Northome	Pengilly
Private	1.3	1.4
State & County	0.9	1.2
All Non-Federal	1.0	1.3

The ratio of annual growth to annual removals for aspen is higher on private lands and lower on state and county lands. These ratios confirm and explain the pattern of rising aspen inventories on private lands vs. unchanging inventory on state and county.

The higher ratios for Pengilly mean that the resource in this zone is not only *larger* in terms of acreage and volume, but that it is *accumulating* faster.

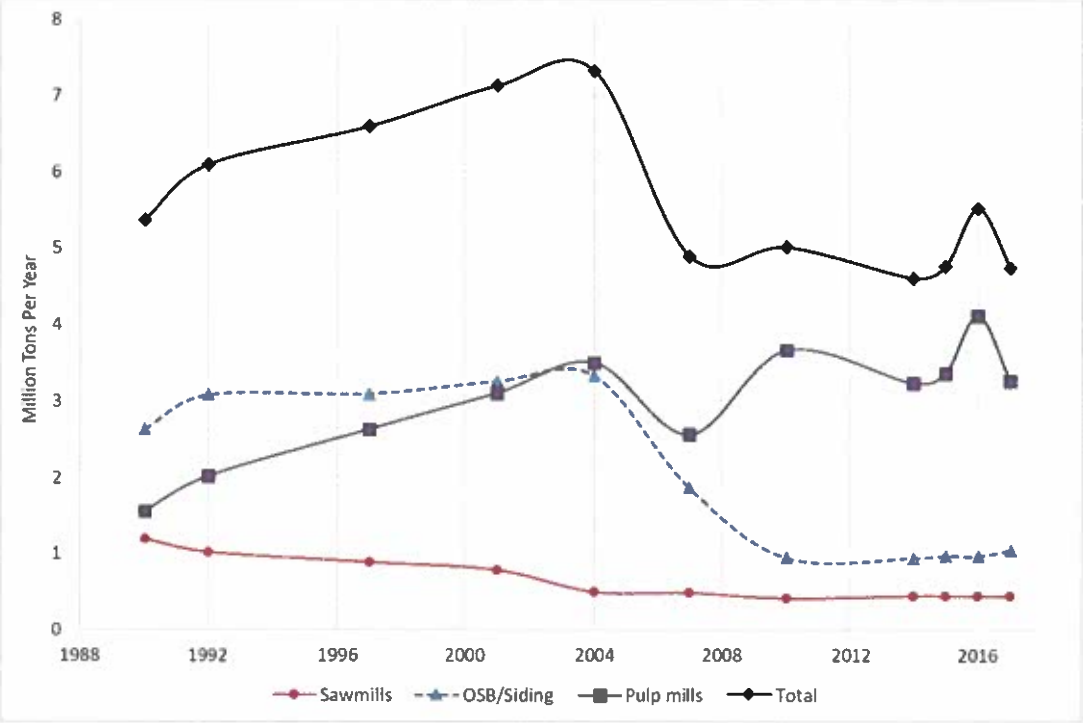
5. CONSUMPTION SCENARIOS

BASE SCENARIO (2019)

The Forest Service removals data (from plots) describes the *average annual removals for the period 2010 through 2018*. The first question to be faced is "How well does this average reflect current practice, expressed as the rate of removals in the last full year (2019)?

For evidence of how the annual rate of removals has evolved year-by-year we turn to industry wood use surveys conducted by the Forest Service.

Figure 5-1. Hardwood Consumption by Mill Type in Minnesota 1990 – 2017[7]



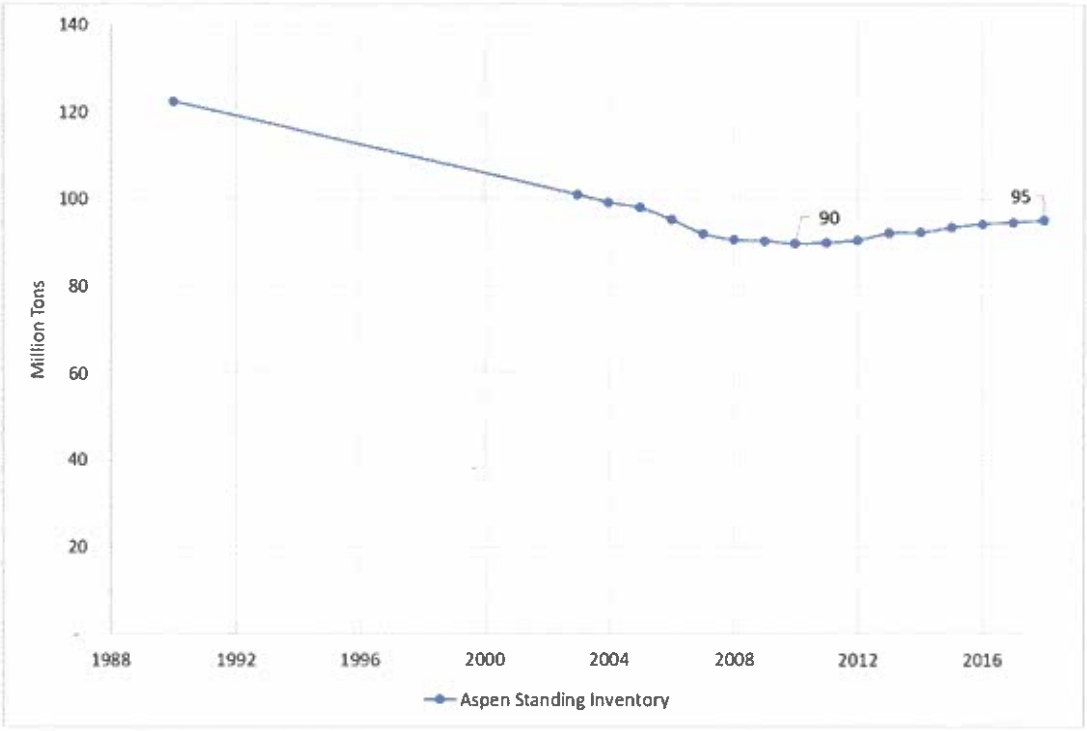
Two-thirds or more of the hardwood is aspen. The OSB/Siding curve is striking: due to several mill closures consumption fell to about one million tons and has remained at that level since 2010. Pulp mill consumption grew until 2004 and since that time has shown no clear trend up or down. With this evidence of removals trending neither down nor up since 2010, it is likely that current (2019) consumption is the same as the Forest Service plot data *except for any mill changes that occurred in 2018 or 2019*. We know of only one such change – the permanent shutdown of #5 paper machine at UPM Blandin in 2018, which led to about 70,000 cords or 154,000 tons per year reduction in aspen. Hence the best estimate of 2019 aspen use is the average annual removals leading up to 2018 minus 154,000 tons.

[7] From USDA Forest Service Resource Planning Act (RPA) and Timber Product Output (TPO);2014 and newer in draft form.

Softwood pulpwood consumption remained essentially unchanged across the period at about 800,000 tons per year.

As an aside, it is worth noting how the aspen inventory has developed under the pattern of consumption shown above in Figure 4-1.

Figure 5-2. Aspen Inventory on Non-federal Lands in MN Units 1 and 2, 1990 - 2018



In an area that is larger than our wood basin but includes it, consumption has been level since 2010, but *inventories are rising*. The rising inventories confirm that annual growth has exceeded annual removals.

Table 5-1. Base Scenario Consumption - Thousand Tons per Year

	Northome	Pengilly
Aspen	1,519	1,393
Other Hdwd	265	462
Softwood	490	635

INCREASED CONSUMPTION SCENARIOS

The base scenario is one where HEW enters a wood basin with (non-HEW) annual consumption *unchanged* from our estimate for 2019 in Table 4-1, and where that usage remains true for at least 10 years.

Any net *reduction* in wood use by local competitors would be beneficial to HEW, so there is no need to consider reduced scenarios in risk assessment.

A net *increase* might occur if another firm adds OSB or siding capacity while consumption by the three aspen-using pulp mills remains the same. Or, some combination of species mix changes at the pulp mills and expanded OSB/siding capacity might result in increased total aspen consumption. Since both industries buy essentially the same product from the same sellers, it would not matter how the increased consumption was distributed – only the magnitude.

The high end of net additional consumption (in light of the region's history and the resource condition) is probably a plant similar to the one under consideration by HEW using 800,000 tons of wood and roughly 700,000 tons of aspen.

More incremental changes might result in half that amount of additional aspen use, or 350,000 tons per year.

Hence the three aspen consumption scenarios that will be examined are:

1. 2019 levels unchanged (today).
2. 2019 levels + 350,000 tons/year (today+350).
3. 2019 levels + 700,000 tons/year (today+700).

In the following sections, we will examine the HEW project in light of resource availability and cost under the three scenarios.

RESOURCE IMPACT

Modeling the Future Development of the Wood Basin

Sewall applied a model of forest growth, harvest, and inventory to predict how the forest resources in the wood basin will respond to different harvest levels. The process of building and using the model was as follows.

1. Collapse the Forest Service plot data into characteristic tree lists for each forest type, age, and site index (productivity) "cell".
2. Apply a growth model to project the timber volume per acre of each cell assuming it is left uncut for the next 20 years (using FVS, the Forest Vegetation Simulator, from the USDA Forest Service).
3. Populate the "starting condition" of the forest operations model (Woodstock) with the actual acreage of each "cell" forest type in the wood basin (Pengilly and Northome, separately)

4. Run the forest operations model three times for each wood basin, with constraints to set the volume to be harvested (Table 5.2)

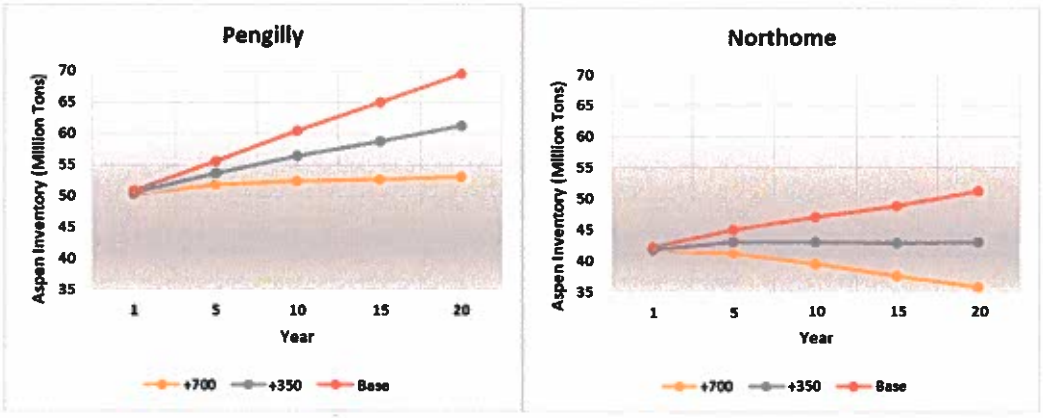
Table 5-2. Annual Harvest by Species Group and Scenario (Thousand Tons)

	Northome	Pengilly
BASE		
Aspen	1,519	1,393
Other Hdwd	265	462
Softwood	490	635
BASE+350		
Aspen	1,869	1,743
Other Hdwd	326	578
Softwood	490	635
BASE+700		
Aspen	2,219	2,093
Other Hdwd	387	694
Softwood	490	635

Although the Woodstock system is designed for optimization rather than simulation, it can be used as a simulator by constraining harvest levels to a narrow range. Constraints on minimum age for harvest and the objective of maximizing net present value of the income from harvests serve to make the harvests more closely resemble actual forest management practices.

5. From the model results, extract the trend in total standing inventory.

Figure 5-3. Aspen Inventory Projection by Wood Basin and Scenario

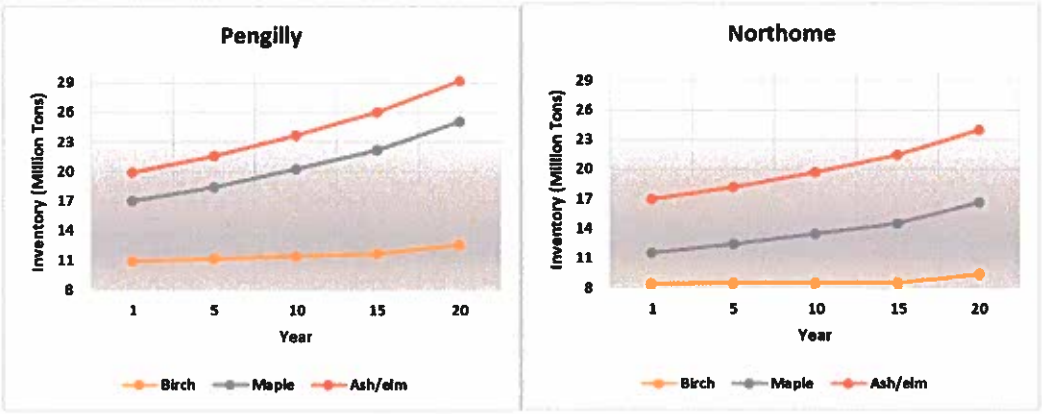


The base scenario in Pengilly shows how the aspen resource will expand at a rapid pace (+37%) if harvesting stays at 2019 levels. This prospect is recognized by the managers of county forest lands in the area – many are scheduling increased harvest levels beginning within the next five years.

With aspen removals increased by 350,000 tons per year, the inventory still rises by 24%. Only when 700,000 tons per year of removals are added does the inventory trend fall to a nearly flat line, rising only 6% in 20 years.

The Northome aspen resource is smaller, and the growth projections reveal that its future development will not be as robust as Pengilly. In the Northome base scenario, aspen inventory rises but at a slower pace (slope) than Pengilly. The addition of 350,000 tons of removals causes inventory to flatten, while 700,000 tons causes inventory levels to fall by 14% across the twenty years.

Figure 5-4. Other Hardwood Inventory Projection for the +700 Scenario

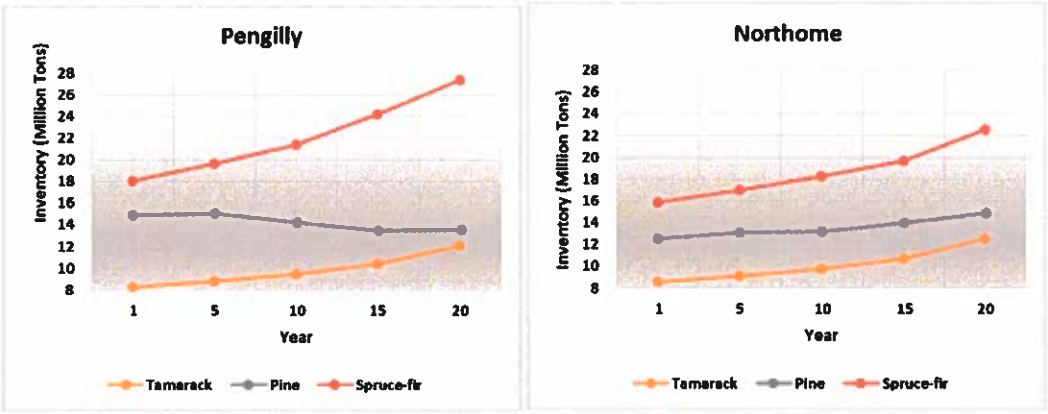


Because utilization of hardwood other than aspen changes little in the different scenarios, we consider how the resource will develop if aspen removals are increased by 700,000 tons per year. The ash/elm resource is largely black ash in swamps. If the Emerald ash borer is kept at bay by the extreme cold, inventory will continue rise as it has in recent decades; however, forest entomologists do not currently know where the cold-limiting line for this pest is.

Maple inventory is projected to continue to expand, rising to 148% of today's level by year 20 (in Pengilly). The much smaller supply of birch will remain essentially unchanged

Softwood Inventory Projection

Figure 5-5. Softwood Inventory Projection



Softwood removals are assumed to remain at current levels in all three scenarios. Spruce-fir is the largest softwood component, and has the distinction of the fastest rising inventory, reaching 152% of today's level by year 20 in Pengilly and 143% in Northome.

Pine declines somewhat in Pengilly and rises in Northome. The current rate of pine consumption in the region can be supported, but there is not room for large increases.

The relatively small tamarack resource is projected to expand, but remain the smallest softwood component. It is also important note that it is currently under attack by a long-running outbreak of the eastern larch beetle, a native forest pest to northern Minnesota.

WOOD COST IMPACT

The U.S. has very thorough data on timber resources; investors choose new sites carefully so there are few examples of how wood costs respond when consumption steps sharply up in excess of the long-term capacity of the local wood basin.

Where it has occurred, two varieties of market response have been observed. Merriam-Webster defines the term "shakeout" as "a period or process in which the relatively weak or unessential are eliminated". Resource economists have observed "shakeout" wood pricing behavior when a new buyer enters a territory. Incumbents bid aggressively in order to prevent the newcomer from establishing a foothold in their preferred zone. Firms that are not able to withstand higher wood costs persisting for two years or more fail and exit. Although there were other factors involved, the failure of the very large Klausner sawmill at Live Oak, FL may have been due in part to a shakeout process.

Another response to local tightness is the combination of stumpage price increases and shifting or enlarging procurement zones. Pine pulpwood in southeast Georgia was fully utilized by the local pulp industry when export pellet makers moved in to take advantage of nearby ports. The result was lasting real increases in local pulpwood stumpage prices, as the only alternative was long-haul wood from more inland sources. The magnitude of stumpage price increases was in the range of 25% to 50%.

The modeled scenarios represent the base consumption by competing firms to which HEW's consumption *will be added*. Hence when we discuss wood cost impact to HEW, we assume 700,000 tons of aspen removals on top of the modeled scenarios, and refer to them as Base+700, Base+1050, and Base+1400. The inventory trajectories for +1,050 and +1,400 were not modelled, but the general pattern of inventory development shown in Figure 5-3 can be assumed to continue for the higher harvest levels.

Pengilly

In the *base+700 scenario*, the Pengilly wood basin can fully absorb the additional HEW consumption without declining inventories. There is no reason to expect lasting increases in stumpage prices. Because it has been several years since consumption declined (primarily due to closed OSB plants),

initial competition for logging and trucking capacity will result in temporary delivered wood cost increases which will subside as producers enter and expand.

In the *base +1,050 scenario*, Pengilly will see delayed, gradual reductions in aspen inventory that will result in modest pressure on stumpage prices after the first five years.

In the *base +1,400* scenario, the addition of the HEW consumption will cause immediate declines in inventory and significant and lasting competition-related stumpage price increases. The effects will become more severe in the second decade, leading to shakeout conditions.

Northome

In the *base+700 scenario*, the Northome wood basin will see delayed, gradual reductions in aspen inventory that will result in modest pressure on stumpage prices after the first five years. As in Pengilly base, initial competition for logging and trucking capacity will result in temporary delivered wood cost increases which will subside as producers enter and expand.

In the *base +1,050 scenario*, Northome will experience immediate declines in inventory and significant and lasting competition-related stumpage price increases. The effects will become more severe in the second decade, leading to shakeout conditions.

In the *base +1,400* scenario for Northome, the addition of the planned HEW consumption will cause immediate and severe shakeout conditions. Because the local physical resource would fall short of the demand and long-haul options are limited (due to prairie ecology to the west), one or more consumers would be forced out. In general, pulp mills have shown more resiliency than structural panel makers to rising pulpwood prices, but a mix of financial and market factors will determine which firms close down their operations in the wood basin.

6. INFRASTRUCTURE AND SITES

CRITERIA

HEW identified five criteria for the high-level screening of locations for the development of a new mill: proximity to adequate population, main roads, rail lines, natural gas pipelines, and post-secondary education including technical schools.

CANDIDATE SITE COMPARISON

Population

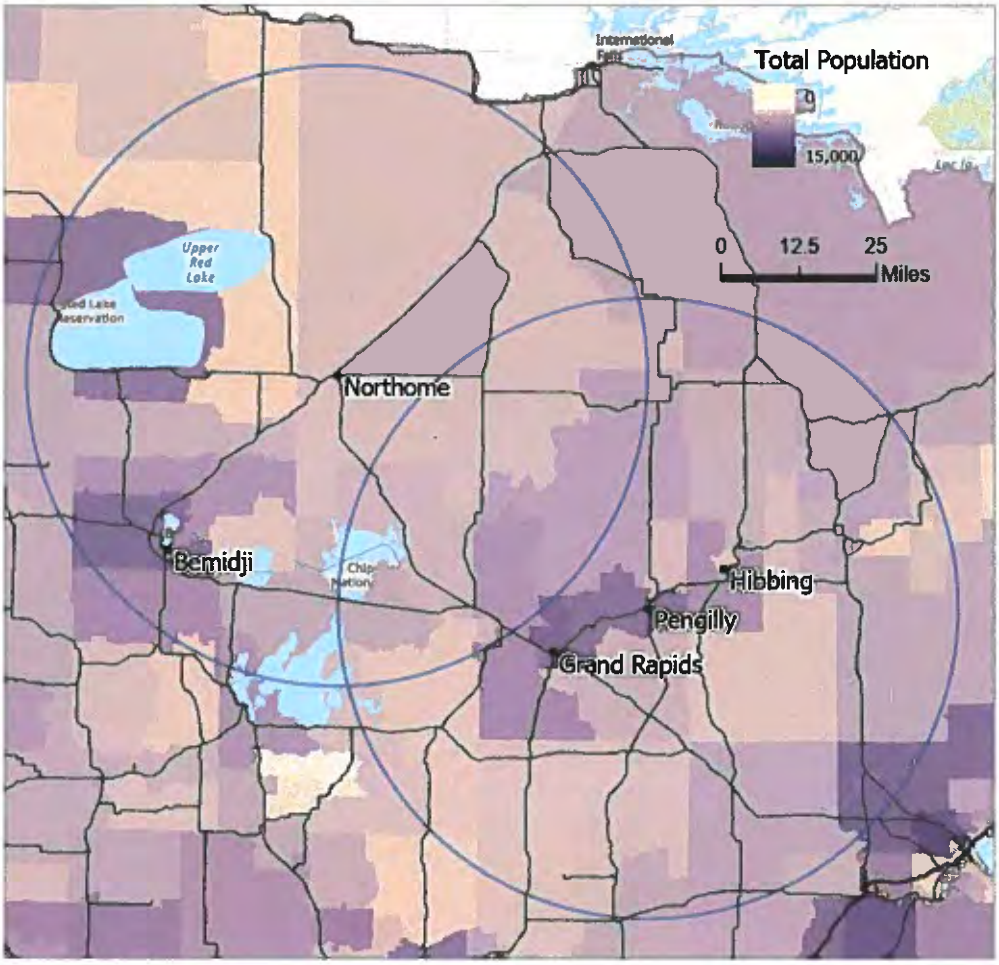
To better understand what to consider adequate population density Sewall conducted an analysis of the existing Huber Engineered Woods mill locations. Total population and total households within 25 and 50 miles radius circles were calculated using census data. Of the five Huber Mills the Easton, ME location has the lowest nearby population density followed by the mill at Broken Bow.

Four locations found within the study areas have populations that are comparable to existing Huber Mills at Easton, ME and Broken Bow, OK. They are Bemidji, Grand Rapids, Pengilly and Hibbing, Minnesota. These four locations were then analyzed against the remaining criteria. Northome, the center of the western study area, is significantly less populated and shown for reference only.

Table 6-1. Census Data for Candidate Sites and Existing Huber Mills

	Total Population		Total Households	
Location	25 mi radius	50 mi radius	25 mi radius	50 mi radius
Northome, MN	6,752	66,781	2,719	25,880
Bemidji, MN	49,477	100,098	19,151	39,934
Pengilly, MN	62,049	122,338	26,798	53,311
Hibbing, MN	60,162	127,891	27,116	55,537
Grand Rapids, MN	42,700	111,623	17,810	48,372
Huber Engineered Woods Mill Locations				
Easton, ME	37,233	62,493	15,745	26,623
Broken Bow, OK	42,332	158,967	16,040	61,839
Crystal Hill, VA	75,358	642,963	31,198	254,271
Spring City, TN	188,711	1,086,268	76,746	436,463
Commerce, GA	423,850	2,290,812	152,088	807,463

Figure 6-1. Census Tract Total Population – 50 mile radius circles



Apart from Bemidji and the Grand Rapids – Hibbing corridor, the region is very sparsely populated.

Roads

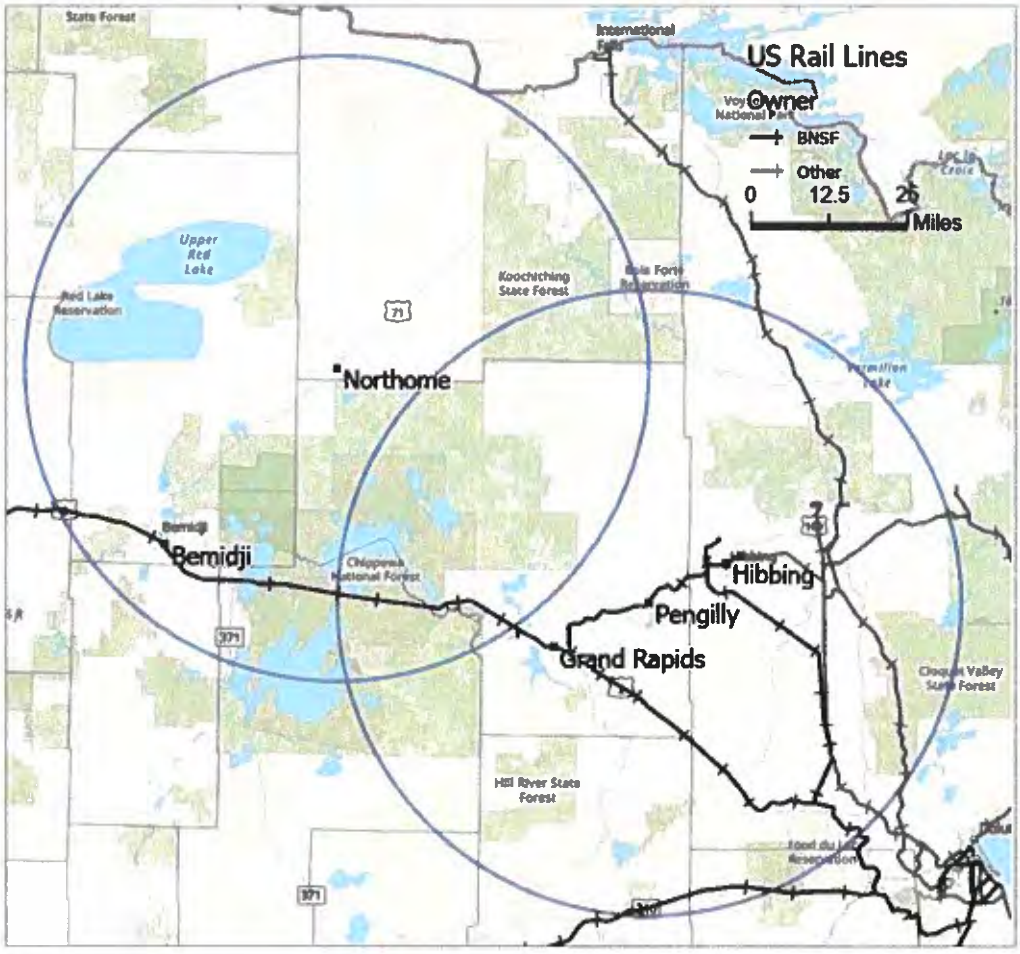
All four candidate towns are located at hubs to main arteries that would facilitate trucking from the wood basin to the mill. The more central location of Grand Rapids and the orientation of the road network offers the possiblity of drawing wood from both study areas.

Figure 6-2. Roads – 50 mile radius circles

Rail Lines

BNSF, the major operator in the region, services Bemidji, Grand Rapids, Pengilly and Hibbing (black lines on map). Rails east of Hibbing (grey lines on map) are owned by CN with BNSF having track rights to certain sections.

Figure 6-3. Rail Lines – 50 mile radius circles

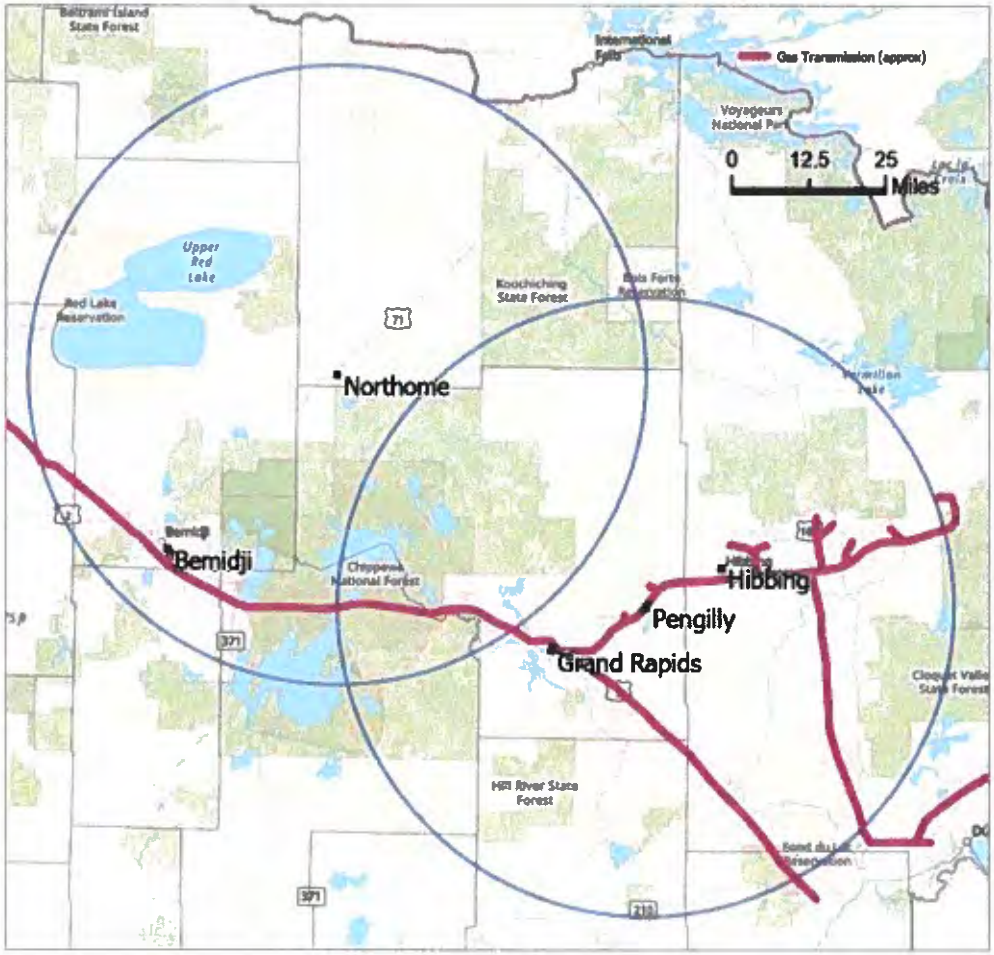


Natural Gas

To identify the availability of natural gas, a web viewer provided by the National Pipeline Management System at www.npms.phmsa.dot.gov was referenced. We then digitized approximate gas pipeline locations as illustrated in Figure 6-4 below.

The Pengilly study area offers gas service across much of the area including Grand Rapids, Pengilly, and Hibbing. Gas service in the Northome study area is limited to its southern edge and includes Bemidji.

Figure 6-4. Gas Transmission Lines– 50 mile radius circles

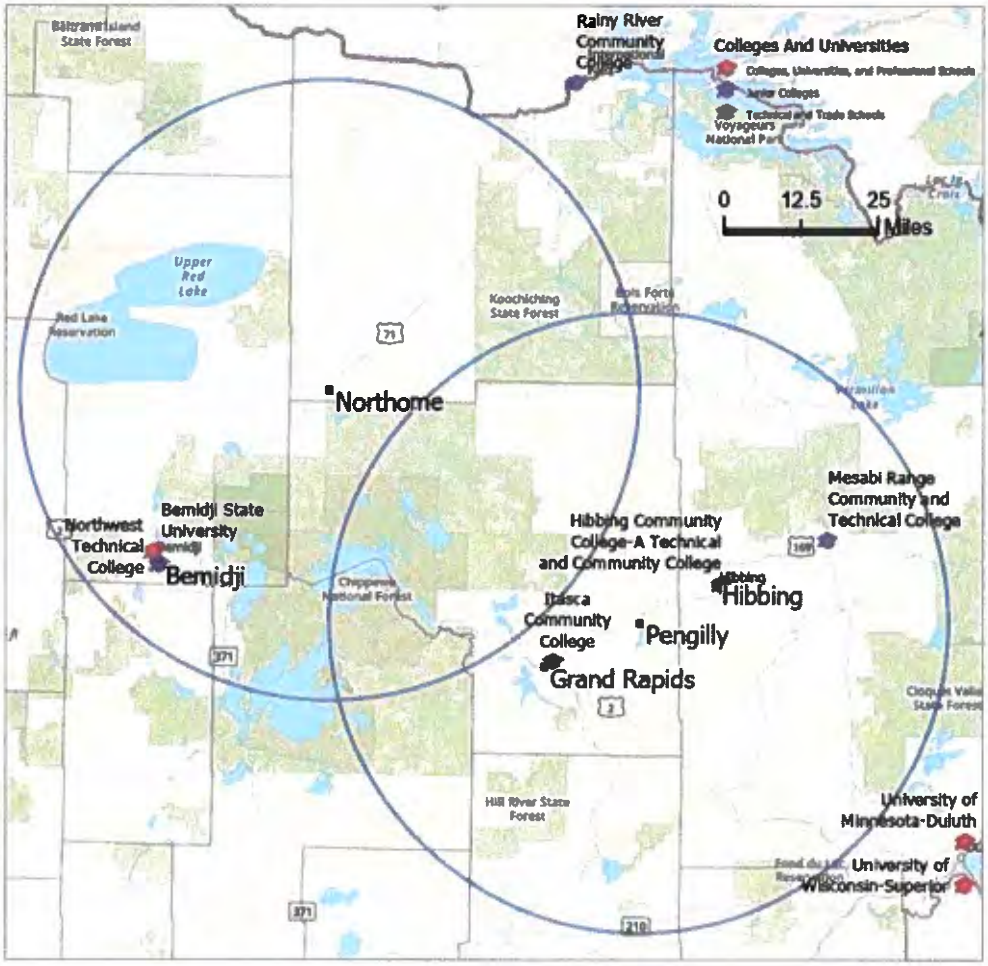


Colleges and Universities

A feature layer utilizing data provided by U.S. Department of Education was used to locate colleges and universities in the study area.

Two colleges in particular offer the potential to recruit skilled labor. Northwest Technical College located in Bemidji offers programs in Manufacturing & Engineering Technology. Mesabi Range Community and Technical College located 24 miles northeast of Hibbing offers programs in Industrial Mechanical Technology, Engineering, Electrical Controls and Maintenance, and Welding Technology.

Figure 6-5. Colleges and Universities– 50 mile radius circles



Note Concerning the Town of Cook, MN

LP owns a former OSB mill site in Cook, 50 miles north and slightly east of Hibbing. It is on the CN rail system and does not (to our knowledge) have natural gas. The population within 25 miles is 22,494 – mostly to the south. Based on our filter criteria and the fact that it is not central to the wood basin, Cook is inferior to the Grand Rapids – Hibbing corridor.

Site Selection Summary

The timber resource analysis clearly favored a location east of Grand Rapids rather than west. The site criteria analysis lends additional weight to the desirability of locating in the east.

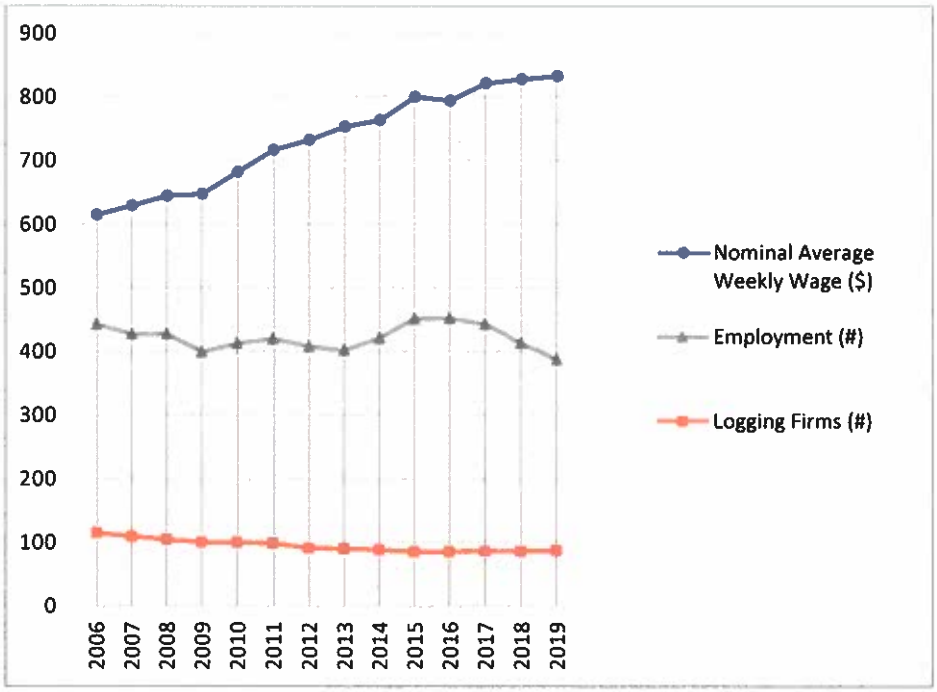
Bemidji is the only suitable town in the west, and it is located is *on the edge of the weaker wood basin*. The average haul distance into Bemidji would be much longer than into a location in the Grand Rapids - Hibbing corridor.

LOGGING AND TRUCKING INFRASTRUCTURE

Sewall obtained and analyzed labor market data from the Minnesota Department of Employment and Economic Development. While employment in the broader Minnesota Forest Products Sector has fallen approximately 33% since 2006, employment in the Logging Industry in Northeast Minnesota has only slightly decreased. Employment in 2019 averaged 387 and was down 3 percent from the low in 2009.

The average weekly wages in 2019 were $832. Over the past 10 years wages have increased more than inflation; with $648 from 2009 having about $775 in buying power in today's dollars. The number of logging firms has decreased 13% over the same time period indicating some consolidation within the industry.

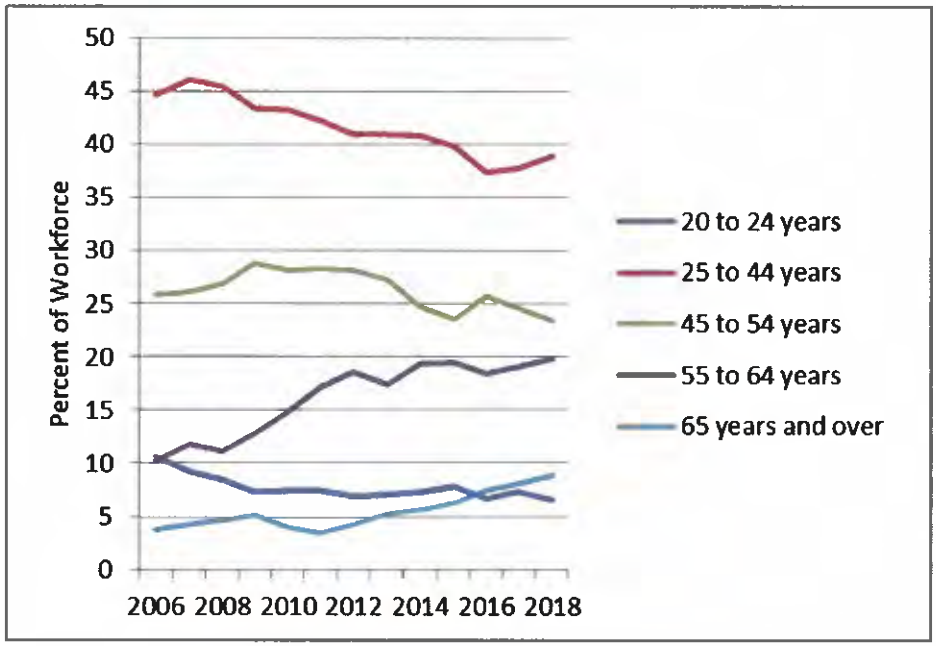
Figure 6-6. Logging (Code 1133) Employment and Wages – Northeast Minnesota



Looking at demographics of the logging workforce, the 25 to 45 age group as a percentage of total workforce has fallen since 2007 and only in the last three years has shown signs of stabilizing Figure

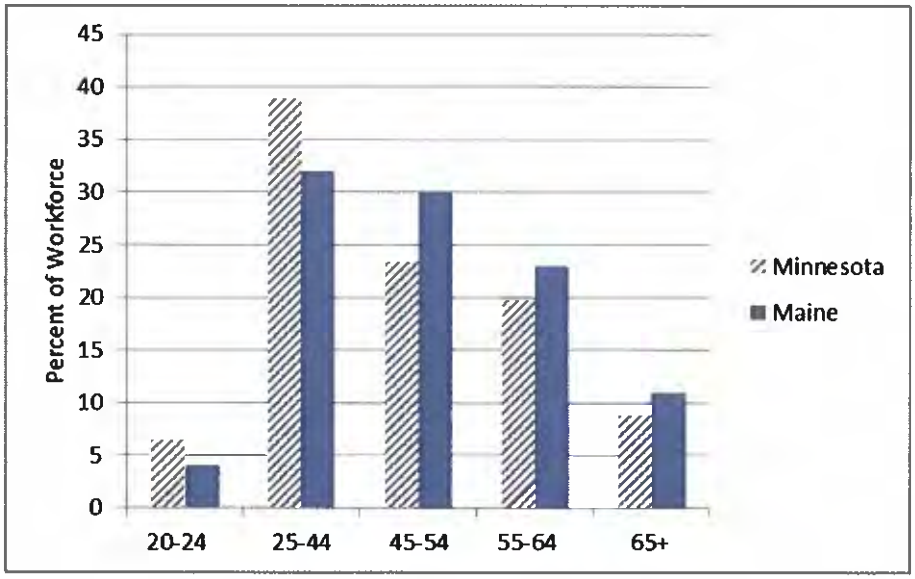
6-7. During the same time period the percentage of workers 55 and older has increased to comprise almost 30 percent of the workforce. The aging of the logging workforce, although concerning, is a trend that is not unique to Minnesota.

Figure 6-7. Logging Workforce by Age Class - Northeast Minnesota



To understand how this trend in Minnesota compares to other regions, Sewall compared the demographic data from Minnesota and Maine. In Maine the problem is even more severe with proportionately more of its workforce found in the older age classes when compared to Minnesota.

Figure 6-8. Comparison of Logging Workforce Demographics



7. OTHER FACTORS

POLITICAL/REGULATORY/SOCIOECONOMIC

A story best illustrates the sociopolitical climate for Minnesota's timber industry. In 2015 and 2016, a recovering industry faced a lower volume of aspen stumpage offered from public lands. Increased competition led to rising stumpage prices, an unwelcome development for industries that were facing other challenges. The industry felt that harvest from state lands was well below the sustainable capacity, and petitioned the governor to increase from 800,000 cords per year to one million cords. The governor directed DNR to conduct a comprehensive study of the one million cords per year option. DNR engaged Mason, Bruce, and Girard to model the timber and other value outputs from a range of options. In the end DNR, together with an advisory council, chose 870,000 cords per year and the governor accepted their choice, thus leaving everybody somewhat dissatisfied, which is one result of genuine compromise.

What is significant about this story is that in 2018 a "blue" state managed to *increase* the level of timber harvests from state lands. The following year, a group of DNR wildlife biologists raised objections concerning how the plan was being implemented on wildlife management areas, but the consensus behind the plan is still holding.

Timber management is not the environmental issue currently generating headlines in the region. A proposal to consider copper sulfide mining near the Boundary Waters Canoe Area Wilderness is attracting intense opposition.

The area has a long tradition and culture of forest products industry. The following are some indicators:

- Management of county lands is intensive, driven by revenue generation for schools and other local government costs
- Three large private timberland holdings persist in the region: Molpus, UPM Blandin, and Potlatch.
- Three different preferential tax treatment programs are available to private landowners who practice sound forest management.
- Forest-sector total employment impact has been estimated at 64,000 jobs.
- Forest industry economic impact is $16 billion per year.
- Forest products is the fifth largest manufacturing sector.
- Minnesota is ranked 12th among the 50 states in forest products gross state product per capita, close to Mississippi, Kentucky, Alabama, Idaho, and Washington.
- There is no explicit regulation of forest practices on private lands.

One environmental issue has caused concern to the timber industry. Northern long-eared bat populations have been decimated by a fungal disease, and the Minnesota Forest Industries Association has had to respond to proposals for inappropriate restrictions on timber harvesting (https://www.minnesotaforests.com/longeared-bats).

Finally, based on anecdotal evidence there is a level of anxiety over the future of the region's wood-based economy. With wood use down 30% or so from the peak in the early 2000's and no counteracting good news, a degree of pessimism prevails. Any announcement of new investment would be extraordinarily well received.

SUPPLY AND PRICE OF BIOMASS FUEL

The woody biomass mandate for Xcel Energy was repealed by the 2017 legislature. This allowed Xcel to cease buying power from two municipal biomass power stations in the study area at Virginia and Hibbing. The two plants have since converted from biomass to natural gas. The biomass boiler at the UPM Blandin pulp mill at Grand Rapids was also converted to natural gas. The overall drop in biomass consumption has led to some sawmills having to landfill wood waste, an expensive practice.

State forestry officials reported that the typical price for delivered biomass fuel prior to the closures was $25 per ton, in line with pricing in other regions. That price probably cannot go lower because it reflects only the cost of production, with little to no "stumpage" value or, in some cases, a negative stumpage value due to leaving a cleaner site.

A new biomass buyer in the region would find boiler-fuel sawmill residuals abundant and cheap, and producers willing to restart in-woods whole tree or tops-and-limbs chipping operations if reliable markets returned.

FORM OF ROUNDWOOD DELIVERY

PCA at International Falls accepts both 8-foot and tree-length wood, but prefers tree length. Sappi, Verso, and UPM Blandin accept only 8-foot pulpwood. Because PCA is a large market, most producers have the capability to deliver tree length.

The use of trailers designed for crosswise loading of 8-foot wood has declined in favor of lengthwise crib-type trailers which can be loaded with 8-foot, 16-foot, or tree length wood.

Were HEW to provide a stable additional market for 16-foot or longer wood, it is likely that producers would be able to respond without additional incentives.

OTHER

The Emerald ash borer, an exotic pest, is present and causing damage to urban trees across the lower half of Minnesota. There has not been significant damage in the widespread black ash wetlands of the northern-most counties in the state. It is uncertain whether the cold will prevent such damage. If it does occur, there would be little impact on a typical OSB operation.

The Eastern Larch beetle is a native insect. With the warmer temperatures of the past few decades, the populations have shown an unprecedented outbreak pattern, causing large clusters of mortality in tamarack stands. If dead or dying tamarack could be utilized, it would represent a very low cost source of wood. Other tree species are not affected.

The issue of a warming climate is a prominent one in the region, as some scientists predict the eventual loss of the boreal forest to low vegetation, which will further compound the CO2 problem in the atmosphere. It is safe to assume that such radical changes are beyond the investment horizon of the current project.

However, timber harvesting in Minnesota has been impacted by a real trend of warmer / shorter winters. NOAA climate data (Figure 7-1) shows rising temperatures since 1981, departing from the

average observed since 1901; the warmest winters on record have occurred in the past 20 years. This pattern means a shorter winter logging season, and more reliance on summer wood, which is causing stress in the wood supply chain.

Figure 7-1. Minnesota Average Winter Temperature 1950-2020

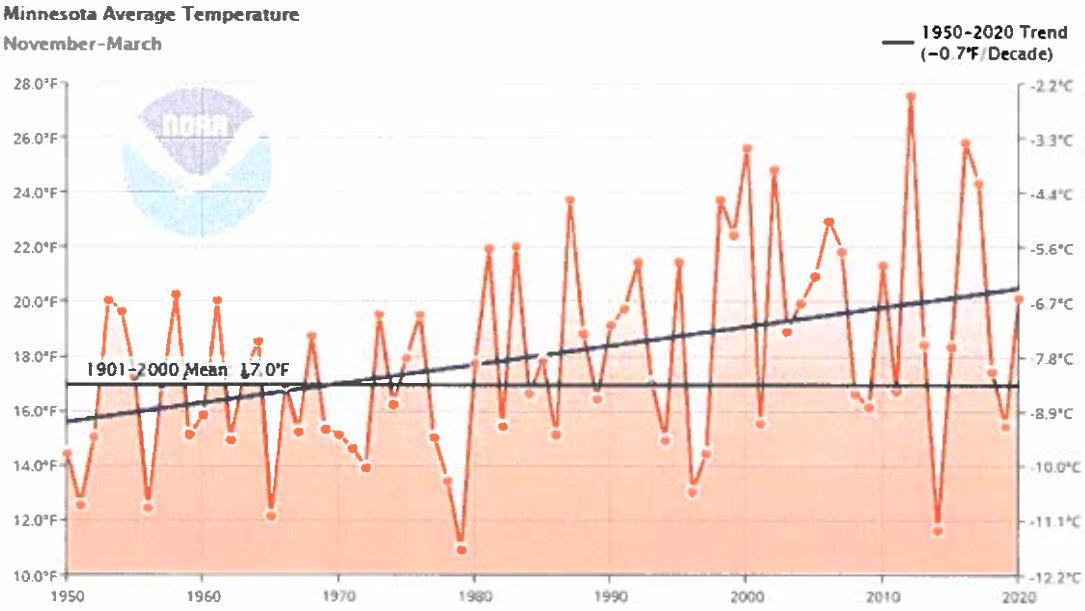


Table 8-7 is derived using a 2019 stumpage price of $4/ton for maple, $11/ton for spruce, $24/ton for logging and trucking, and the multipliers for logging cost from Table 8-2 (base+700 scenario)

NARRATIVE SUMMARY

A more detailed look at the timber resource data reinforced several findings of the earlier work in phase 2:

- Aspen *acreage* is not in decline; conversion to other forest types is not threatening the long-term supply of aspen.
- The age class structure is "left-leaning"; it includes a large acreage of *juvenile stands.*
- Average *annual growth is rising sharply* as these stands enter merchantable size and experience the peak growing years.
- Total standing *inventory of aspen increased* in the past decade, while annual removals were somewhat higher than our estimate for the current (2019) harvest level.

It became clearer in this second pass analysis that the gains in aspen inventory in the past decade occurred primarily on private lands. The implication is that tapping into private lands will be required, particularly in the first five years. This is where the "reserve" has built up. Supply from state and county lands will gradually increase as the juvenile stands mature.

After a $5/cord spike in 2014-15, aspen stumpage prices by 2019 had returned to the recent historic average of about $30 per cord. Logging and trucking for a typical haul distance remains at about $54 per cord, translating to $84 per cord or $37 per ton delivered.

After a closer look at historical consumption patterns, we concluded that the current (2019) annual consumption of aspen was very nearly the same as the Forest Service plot-based average over the prior ten years. Only the scale back of the UPM Blandin operation in 2018 was not reflected.

The current consumption level was used to drive a simulation model to predict how the resource would develop over the next twenty years if consumption does not change. In the Pengilly wood basin result, aspen inventory increased by 37% (19 million tons) across the next 20 years. The simulation provided very strong, independent confirmation that the resource is capable of sustaining additional consumption.

Simulation runs with progressively higher consumption served to confirm that the *limit* of additional aspen capacity is 700,000 tons per year in Pengilly and 350,000 tons per year in Northome.

Spruce-fir, the largest softwood resource, is under-utilized and will be increasingly abundant in the coming decades.

Based on the site selection criteria provided by HEW, four towns in the region are best suited as potential mill sites. Only Bemidji met the criteria in the Northome wood basin, and its location toward one edge would mean longer average haul distances. The site selection result lends more weight to the relative superiority of the Pengilly wood basin. The towns of Grand Rapids, Pengilly, and Hibbing met the criteria in the Pengilly basin.

In the Pengilly basin the addition of 700,000 tons per year of aspen use by HEW to current base consumption could be absorbed while inventories continue to rise slowly (6% in 20 years). After an initial adjustment period, it is reasonable to assume that stumpage and production prices will return to today's levels.

If other parties add 350,000 tons of consumption in Pengilly while HEW adds 700,000 (base +1,050), stumpage price increases are likely to occur and persist, with delivered cost rising to $42 per ton or higher. If other parties add 700,000 tons of annual consumption and HEW adds 700,000 (base+1,400), wood cost will rise sharply to $48 or higher until shakeout conditions cause one or more firms to exit.

The Northome wood basin has less capacity for increased aspen use. HEW's additional 700,000 tons alone would lead to gradual, modest inventory declines, increase competition for stumpage, and some degree of lasting stumpage price increase. If other firms were to also increase consumption in Northome, the effects would occur sooner and be more severe.

As of this writing, there is no public indication that any other firm is planning to increase the consumption of aspen in northern Minnesota. The region's timber resources can support such an increase sustainably for the long term. The economic climate is such that the state, county, and municipal governments can be expected to act aggressively to facilitate new investment.

Exhibit C
Sources Consulted

Minnesota's Forest Resources 2019

Minnesota Statutes Chapter 89A

Minnesota Statutes Chapter 90

Minnesota Forest Management Guidelines

Wisconsin Forest Management Guidelines

Minnesota Logger Education Program

Minnesota's Certified Forests

Minnesota Sustainable Forest Incentives Act

Minnesota Guideline Implementation Monitoring Program

Minnesota Session Laws 2016

Minnesota Department of Natural Resources Extended Rotation Forest Policy

Minnesota Department of Natural Resources Old-Growth Forest Policy

USDA-Forest Service's Forest Inventory and Analysis Program

Minnesota Generic Environmental Impact Statement on Timber Harvesting and Forest Management

Chippewa Natural Forest – Leech Lake Band of Ojibwe Partnership Agreement

Sustainable Forestry Initiative Forest Management Certification Standards

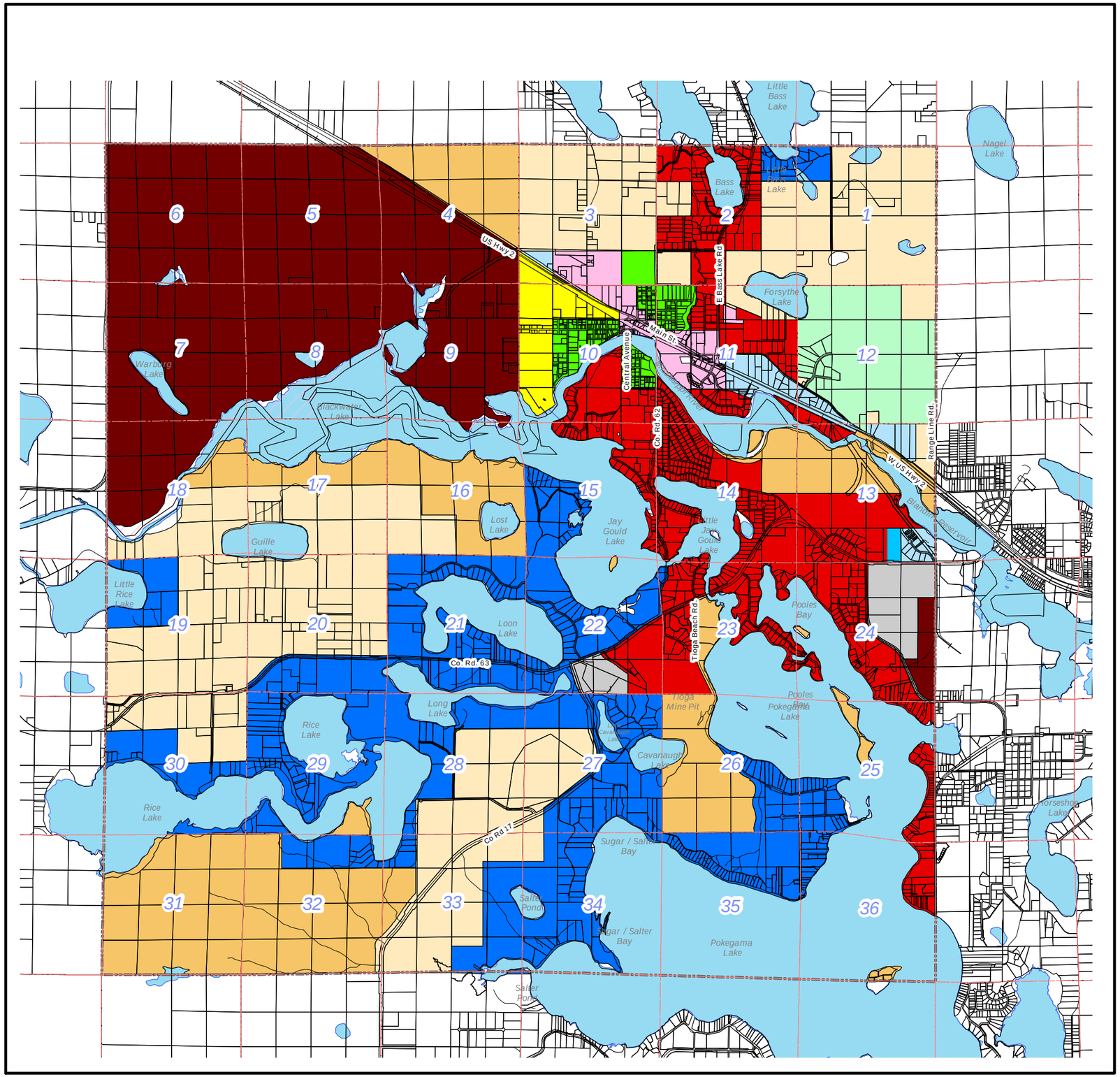
Department of Forest Resources, University of Minnesota

Minnesota Timber Harvesting GEIS: An Assessment of the First 10 Years

Appendix B

City of Cohasset Zoning Map

Zoning Map - 2017



Source: City of Cohasset

Legend

- PLS Section Lines
- Itasca County Tax Parcels
- Roads
- City Limits
- Cohasset Industrial Park
- General Business
- Heavy Industrial
- Highway Commercial
- Light Industrial
- Managed Area
- Municipal Residential
- Rural Commerical
- Rural Industrial
- Rural Residential
- Suburban Residential
- Waterfront Residential
- MP&L
- Railroads
- Lakes & Rivers

N

Feet

0 2,000 4,000

SEH

Appendix C

FEMA Map

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM6	1287.13	Standard Minnesota Highway Department disk (no stamping on) on top of the southeast wingwall of County State Aid Highway 62 bridge (no. 31510) 62 over the Mississippi River, approximately 1320 feet south-southeast of junction with U.S. Trunk Highway 2.
RM7	1282.62	Chiseled X at top and center of northeast wingwall of Minnesota Trunk Highway 6 bridge (no. 8321) over the Mississippi River, 5.5 feet north of Minnesota Trunk Highway 6 centerline and .5 feet above roadway, approximately 7,400 feet west on Minnesota Trunk Highway 6 from its junction with U.S. Trunk Highway 2.

KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary — ZONE B
Zone Designations* With Date of Identification e.g., 12/2/74 — ZONE A1 DATE / ZONE A5 DATE
100-Year Flood Boundary — ZONE B
500-Year Flood Boundary

Base Flood Elevation Line With Elevation In Feet** — 513

Base Flood Elevation In Feet Where Uniform Within Zone** — (EL 987)

Elevation Reference Mark — RM7 ✕

River Mile — • M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION
NOVEMBER 1, 1978

CONVERSION TO REGULAR PROGRAM
NOVEMBER 1, 1978

Refer to the CONVERSION TO REGULAR PROGRAM date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620, or (800) 424-8872.

APPROXIMATE SCALE
2000 0 2000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

ITASCA COUNTY, MINNESOTA
(UNINCORPORATED AREAS)

COMMUNITY-PANEL NUMBER
270200 0675 A

PAGE 675 OF 925
(SEE MAP INDEX FOR PAGES NOT PRINTED)

EFFECTIVE
NOVEMBER 1, 1978

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

Appendix D

USDA Soil Survey

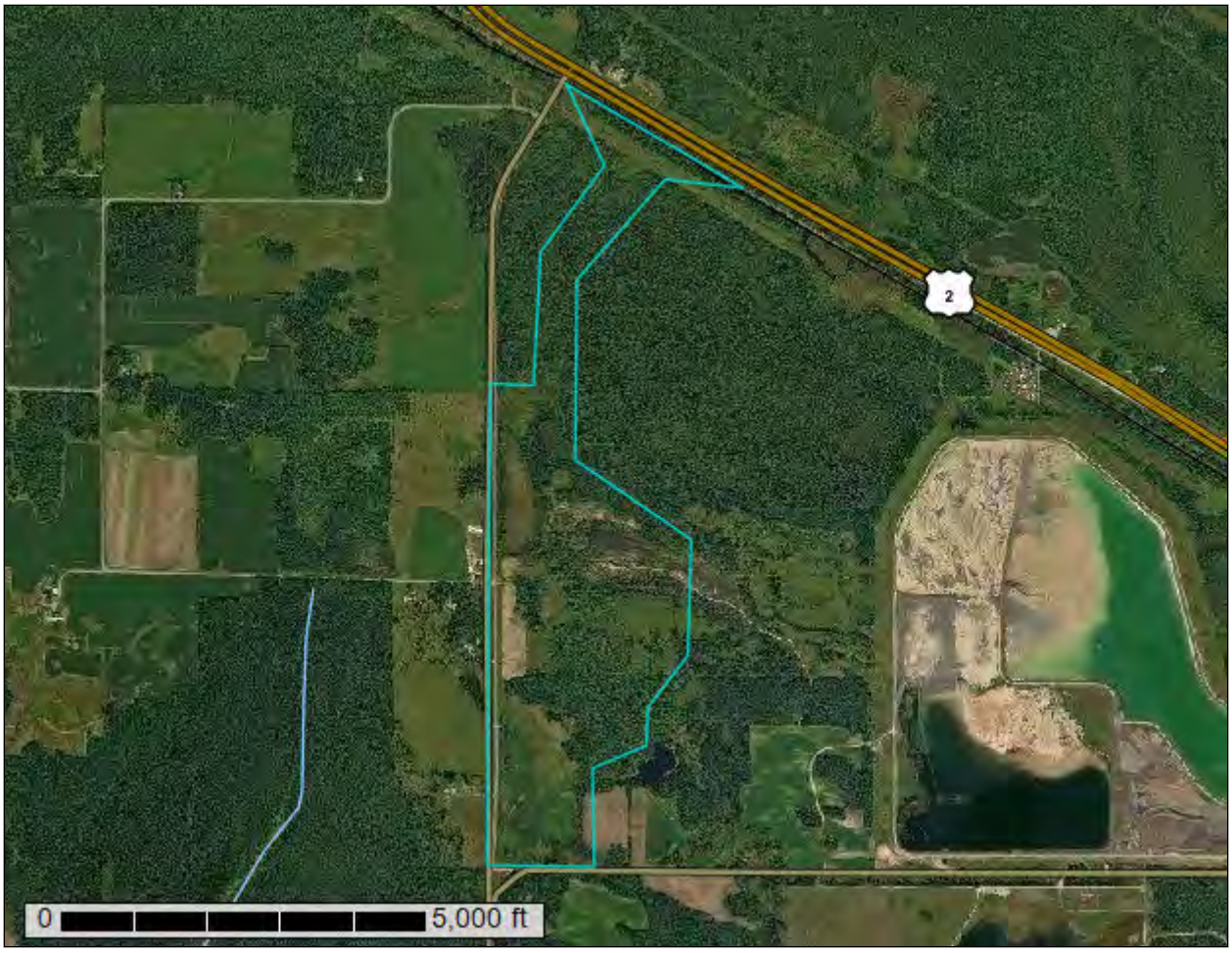
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Itasca County, Minnesota



May 11, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

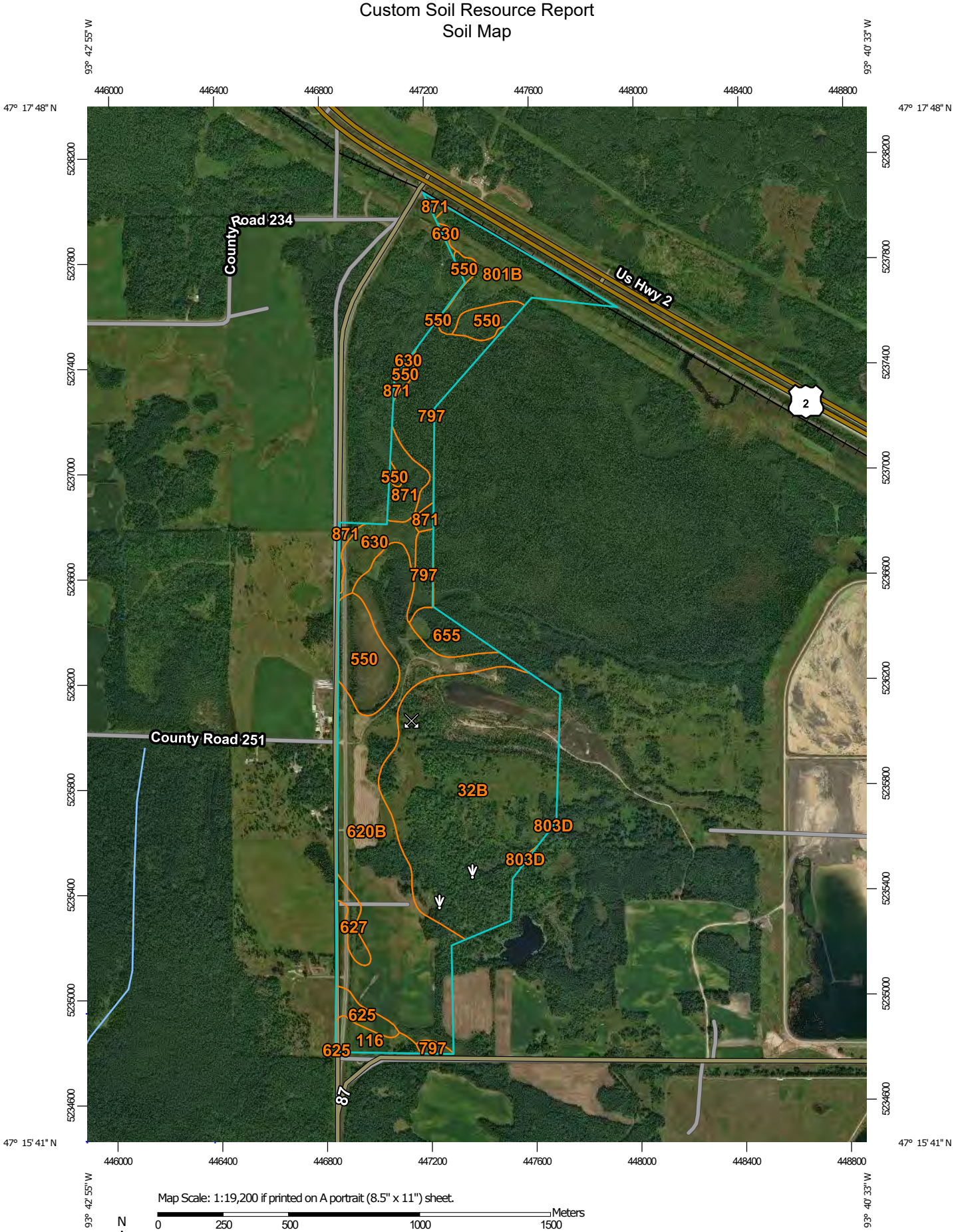
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



Map Scale: 1:19,200 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 250 500 1000 1500

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Itasca County, Minnesota
Survey Area Data: Version 18, Jun 4, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 17, 2015—Oct 16, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
32B	Nebish loam, 1 to 8 percent slopes	130.6	34.8%
116	Redby loamy fine sand, 0 to 3 percent slopes	6.7	1.8%
550	Dora mucky peat	27.3	7.3%
620B	Cutaway loamy sand, 0 to 8 percent slopes	112.7	30.0%
625	Sandwick loamy fine sand	4.8	1.3%
627	Tawas muck	4.3	1.2%
630	Wildwood muck	11.1	2.9%
655	Bearville loamy sand	8.4	2.2%
797	Mooselake and Lupton soils, 0 to 1 percent slopes	30.7	8.2%
801B	Taylor and Dalbo silt loams, 0 to 6 percent slopes	27.0	7.2%
803D	Warba-Menahga complex, 10 to 25 percent slopes	0.3	0.1%
871	Indus and Brickton soils	11.9	3.2%
Totals for Area of Interest		**375.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different

management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Itasca County, Minnesota

32B—Nebish loam, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2x145
Elevation: 590 to 2,030 feet
Mean annual precipitation: 24 to 30 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 110 to 160 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Nebish and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nebish

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy till

Typical profile

A - 0 to 3 inches: loam
E - 3 to 9 inches: fine sandy loam
Bt - 9 to 26 inches: clay loam
BCk - 26 to 79 inches: loam

Properties and qualities

Slope: 1 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F057XY021MN - Loamy Upland Mesic Hardwood Forest
Forage suitability group: Sloping Upland, Acid (G057XN006MN)
Other vegetative classification: Sloping Upland, Acid (G057XN006MN)
Hydric soil rating: No

Minor Components

Kelliher

Percent of map unit: 12 percent
Landform: Moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Other vegetative classification: Sloping Upland, Neutral (G057XN002MN)
Hydric soil rating: No

Beltrami

Percent of map unit: 4 percent
Landform: Moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Level Swale, Neutral (G057XN001MN)
Hydric soil rating: No

Shooker

Percent of map unit: 3 percent
Landform: Moraines
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Level Swale, Neutral (G057XN001MN)
Hydric soil rating: Yes

Cathro, occasionally ponded

Percent of map unit: 1 percent
Landform: Depressions
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Not Suited (G057XN024MN)
Hydric soil rating: Yes

116—Redby loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2x14n
Elevation: 590 to 2,030 feet
Mean annual precipitation: 23 to 30 inches
Mean annual air temperature: 36 to 46 degrees F
Frost-free period: 90 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Redby and similar soils: 84 percent
Minor components: 16 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Redby

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy glaciolacustrine deposits

Typical profile

A - 0 to 5 inches: loamy fine sand
E - 5 to 10 inches: fine sand
Bw - 10 to 35 inches: fine sand
C - 35 to 79 inches: fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00 to 20.00 in/hr)
Depth to water table: About 12 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Forage suitability group: Level Swale, Low AWC, Acid (G088XN007MN)
Other vegetative classification: Level Swale, Low AWC, Acid (G088XN007MN)
Hydric soil rating: No

Minor Components

Cormant

Percent of map unit: 10 percent
Landform: Flats
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Level Swale, Low AWC, Neutral (G088XN003MN)
Hydric soil rating: Yes

Hiwood

Percent of map unit: 4 percent
Landform: Flats
Landform position (three-dimensional): Rise

Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sloping Upland, Low AWC, Acid (G088XN008MN)
Hydric soil rating: No

Leafriver, frequently ponded

Percent of map unit: 2 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic (G088XN014MN)
Hydric soil rating: Yes

550—Dora mucky peat

Map Unit Setting

National map unit symbol: fcm1
Elevation: 980 to 1,310 feet
Mean annual precipitation: 20 to 27 inches
Mean annual air temperature: 37 to 41 degrees F
Frost-free period: 95 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Dora and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dora

Setting

Landform: Depressions on lake plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material over clayey glaciolacustrine deposits

Typical profile

Oe - 0 to 12 inches: mucky peat
Oa1,Oa2 - 12 to 32 inches: muck
A - 32 to 36 inches: mucky silty clay loam
Cg1,Cg2,Cg3 - 36 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent

Calcium carbonate, maximum content: 20 percent
Available water capacity: Very high (about 18.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B/D
Forage suitability group: Organic (G088XN014MN)
Other vegetative classification: Organic (G088XN014MN)
Hydric soil rating: Yes

Minor Components

Indus

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

Brickton

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

620B—Cutaway loamy sand, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: fcm8
Elevation: 980 to 1,640 feet
Mean annual precipitation: 24 to 27 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 100 to 120 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cutaway and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cutaway

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope, summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy outwash over loamy till

Typical profile

E - 0 to 4 inches: loamy sand
Bw1-Bw3,E' - 4 to 35 inches: sand
2B/E,2Bt - 35 to 51 inches: clay loam

2BC,2C - 51 to 60 inches: loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: B
Ecological site: F057XY023MN - Dry Sandy Upland Coniferous Forest
Forage suitability group: Sloping Upland, Acid (G057XN006MN)
Other vegetative classification: Sloping Upland, Acid (G057XN006MN)
Hydric soil rating: No

Minor Components

Sandwick

Percent of map unit: 5 percent
Landform: Flats
Hydric soil rating: Yes

Nebish

Percent of map unit: 5 percent
Landform: Moraines
Hydric soil rating: No

Warba

Percent of map unit: 5 percent
Landform: Moraines
Hydric soil rating: No

625—Sandwick loamy fine sand

Map Unit Setting

National map unit symbol: fcmf
Elevation: 980 to 1,640 feet
Mean annual precipitation: 24 to 27 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 100 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Sandwick and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sandwick

Setting

Landform: Flats on moraines
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy outwash over loamy till

Typical profile

E - 0 to 4 inches: loamy fine sand
Bw,E'1 - 4 to 22 inches: loamy fine sand
2E'2,2Btg1-2 - 22 to 38 inches: loam
2Cg - 38 to 60 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F057XY015MN - Wet Mixed Forest
Forage suitability group: Level Swale, Low AWC, Acid (G057XN007MN)
Other vegetative classification: Level Swale, Low AWC, Acid (G057XN007MN)
Hydric soil rating: Yes

Minor Components

Cutaway

Percent of map unit: 5 percent
Landform: Moraines
Hydric soil rating: No

Warba

Percent of map unit: 4 percent
Landform: Moraines
Hydric soil rating: No

Nashwauk

Percent of map unit: 3 percent
Hydric soil rating: No

Organic soils

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

627—Tawas muck

Map Unit Setting

National map unit symbol: fcmj
Elevation: 980 to 1,310 feet
Mean annual precipitation: 20 to 27 inches
Mean annual air temperature: 37 to 41 degrees F
Frost-free period: 95 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Tawas and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tawas

Setting

Landform: Depressions on outwash plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material over loamy till

Typical profile

Oa1 - 0 to 13 inches: muck
Oa2,Oa3,Oa4 - 13 to 31 inches: muck
2Cg1,2Cg2 - 31 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: Very high (about 13.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: A/D
Forage suitability group: Organic (G088XN014MN)
Other vegetative classification: Organic (G088XN014MN)

Hydric soil rating: Yes

Minor Components

Cowhorn

Percent of map unit: 3 percent
Landform: Swales
Hydric soil rating: No

Menahga

Percent of map unit: 3 percent
Landform: Outwash plains
Hydric soil rating: No

Zimmerman

Percent of map unit: 2 percent
Hydric soil rating: No

Meehan

Percent of map unit: 2 percent
Landform: Swales
Hydric soil rating: No

630—Wildwood muck

Map Unit Setting

National map unit symbol: fcmm
Elevation: 980 to 1,310 feet
Mean annual precipitation: 20 to 27 inches
Mean annual air temperature: 37 to 41 degrees F
Frost-free period: 95 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Wildwood and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wildwood

Setting

Landform: Depressions on lake plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material over clayey lacustrine deposits

Typical profile

Oa1,Oa2 - 0 to 12 inches: muck
A,Bg - 12 to 24 inches: clay
Cg1,Cg2 - 24 to 60 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 30 percent
Available water capacity: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Forage suitability group: Organic (G088XN014MN)
Other vegetative classification: Organic (G088XN014MN)
Hydric soil rating: Yes

Minor Components

Brickton

Percent of map unit: 5 percent
Landform: Flats
Hydric soil rating: Yes

Indus

Percent of map unit: 5 percent
Landform: Flats
Hydric soil rating: Yes

Effie

Percent of map unit: 5 percent
Landform: Flats
Hydric soil rating: Yes

655—Bearville loamy sand

Map Unit Setting

National map unit symbol: fcmn
Elevation: 980 to 1,310 feet
Mean annual precipitation: 20 to 27 inches
Mean annual air temperature: 37 to 41 degrees F
Frost-free period: 95 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Bearville and similar soils: 85 percent
Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bearville

Setting

Landform: Flats on lake plains
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy outwash over clayey glaciolacustrine deposits

Typical profile

A - 0 to 2 inches: loamy sand
E1,E2 - 2 to 16 inches: loamy sand
2Btg1 - 16 to 25 inches: sandy clay loam
3Btg2,3BCg - 25 to 35 inches: clay
3Cg - 35 to 60 inches: clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Forage suitability group: Level Swale, Acid (G088XN005MN)
Other vegetative classification: Level Swale, Acid (G088XN005MN)
Hydric soil rating: Yes

Minor Components

Thistledew

Percent of map unit: 5 percent
Landform: Lake plains
Hydric soil rating: No

Brickton

Percent of map unit: 5 percent
Landform: Flats
Hydric soil rating: Yes

Indus

Percent of map unit: 5 percent
Landform: Flats
Hydric soil rating: Yes

797—Mooselake and Lupton soils, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v0lt
Elevation: 590 to 2,030 feet
Mean annual precipitation: 23 to 33 inches
Mean annual air temperature: 36 to 48 degrees F
Frost-free period: 90 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Mooselake and similar soils: 51 percent
Lupton and similar soils: 49 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mooselake

Setting

Landform: Depressions
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Woody organic material

Typical profile

Oa - 0 to 6 inches: muck
Oe - 6 to 79 inches: mucky peat

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very high (about 29.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: A/D
Ecological site: F057XY006MN - Forested Peatland
Forage suitability group: Not Suited (G088XN024MN)
Other vegetative classification: Not Suited (G088XN024MN)
Hydric soil rating: Yes

Description of Lupton

Setting

Landform: Depressions
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Woody organic material

Typical profile

Oa1 - 0 to 16 inches: muck
Oa2 - 16 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very high (about 23.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Ecological site: F057XY006MN - Forested Peatland
Forage suitability group: Not Suited (G088XN024MN)
Other vegetative classification: Not Suited (G088XN024MN)
Hydric soil rating: Yes

801B—Taylor and Dalbo silt loams, 0 to 6 percent slopes

Map Unit Setting

National map unit symbol: fcmv
Elevation: 980 to 1,310 feet
Mean annual precipitation: 20 to 27 inches
Mean annual air temperature: 37 to 41 degrees F
Frost-free period: 95 to 105 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Taylor and similar soils: 48 percent
Dalbo and similar soils: 38 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Taylor

Setting

Landform: Lake plains
Landform position (two-dimensional): Backslope, summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile

A - 0 to 2 inches: silt loam
E,Bt1,Bt2,BC - 2 to 21 inches: clay
C1,C2 - 21 to 60 inches: clay

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water capacity: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Forage suitability group: Sloping Upland, Acid (G088XN006MN)
Other vegetative classification: Sloping Upland, Acid (G088XN006MN)
Hydric soil rating: No

Description of Dalbo

Setting

Landform: Lake plains
Landform position (two-dimensional): Backslope, summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile

A - 0 to 1 inches: silt loam
E,B/E,Bt,BC - 1 to 35 inches: clay
C - 35 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent

Available water capacity: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Forage suitability group: Sloping Upland, Acid (G088XN006MN)
Other vegetative classification: Sloping Upland, Acid (G088XN006MN)
Hydric soil rating: No

Minor Components

Indus

Percent of map unit: 5 percent
Landform: Flats
Hydric soil rating: Yes

Brickton

Percent of map unit: 5 percent
Landform: Flats
Hydric soil rating: Yes

Wildwood

Percent of map unit: 4 percent
Landform: Depressions
Hydric soil rating: Yes

803D—Warba-Menahga complex, 10 to 25 percent slopes

Map Unit Setting

National map unit symbol: fcmx
Elevation: 980 to 1,640 feet
Mean annual precipitation: 24 to 27 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 100 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Warba and similar soils: 50 percent
Menahga and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Warba

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Loamy till

Typical profile

A - 0 to 1 inches: fine sandy loam
E,E/B,Bt - 1 to 48 inches: clay loam
C - 48 to 60 inches: sandy clay loam

Properties and qualities

Slope: 10 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F057XY017MN - Steep Loamy Upland Forest
Forage suitability group: Sloping; Fine Texture (G057XN023MN)
Other vegetative classification: Sloping; Fine Texture (G057XN023MN)
Hydric soil rating: No

Description of Menahga

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy outwash

Typical profile

A - 0 to 1 inches: loamy coarse sand
E,Bw,BC - 1 to 38 inches: sand
C - 38 to 60 inches: coarse sand

Properties and qualities

Slope: 10 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F057XY018MN - Steep Sandy Upland Forest

Forage suitability group: Sandy (G057XN022MN)
Other vegetative classification: Sandy (G057XN022MN)
Hydric soil rating: No

Minor Components

Stuntz
Percent of map unit: 4 percent
Landform: Swales
Hydric soil rating: No

Talmoon
Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

Cathro
Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

871—Indus and Brickton soils

Map Unit Setting
National map unit symbol: fcn6
Elevation: 980 to 1,310 feet
Mean annual precipitation: 20 to 27 inches
Mean annual air temperature: 37 to 41 degrees F
Frost-free period: 95 to 105 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Indus and similar soils: 48 percent
Brickton and similar soils: 38 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Indus

Setting
Landform: Flats on lake plains
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Clayey lacustrine deposits

Typical profile
A - 0 to 3 inches: clay
Eg - 3 to 6 inches: loam
B/E,Btg,BCg - 6 to 29 inches: clay
Cg1,Cg2 - 29 to 60 inches: clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water capacity: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Forage suitability group: Level Swale, Acid (G088XN005MN)
Other vegetative classification: Level Swale, Acid (G088XN005MN)
Hydric soil rating: Yes

Description of Brickton

Setting

Landform: Flats on lake plains
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Clayey lacustrine deposits

Typical profile

A - 0 to 4 inches: silt loam
E - 4 to 10 inches: silt loam
Btg.BC - 10 to 25 inches: silty clay
Cg1,Cg2 - 25 to 60 inches: clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Available water capacity: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Forage suitability group: Level Swale, Acid (G088XN005MN)
Other vegetative classification: Level Swale, Acid (G088XN005MN)
Hydric soil rating: Yes

Minor Components

Dora

Percent of map unit: 4 percent

Landform: Depressions
Hydric soil rating: Yes

Dalbo

Percent of map unit: 4 percent
Landform: Lake plains
Hydric soil rating: No

Taylor

Percent of map unit: 3 percent
Landform: Lake plains
Hydric soil rating: No

Wildwood

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

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Appendix E

IPaC Response

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
4101 American Blvd E
Bloomington, MN 55425-1665
Phone: (952) 252-0092 Fax: (952) 646-2873
http://www.fws.gov/midwest/Endangered/section7/s7process/step1.html

In Reply Refer To: September 13, 2021
Consultation Code: 03E19000-2021-SLI-1203
Event Code: 03E19000-2021-E-16220
Project Name: Industrial Wood Products Facility

Subject: Updated list of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system to provide information on natural resources that could be affected by your project. The U.S. Fish and Wildlife Service (Service) provides this response under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq*.).

Threatened and Endangered Species

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq*.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS IPaC website at regular intervals during project planning and implementation

for updates to species lists and information. An updated list may be requested through the ECOS IPaC system by completing the same process used to receive the enclosed list.

Consultation Technical Assistance

Please refer to the Midwest Region S7 Technical Assistance website for step-by-step instructions for making species determinations and for specific guidance on the following types of projects: projects in developed areas, HUD, CDBG, EDA, pipelines, buried utilities, telecommunications, and requests for a Conditional Letter of Map Revision (CLOMR) from FEMA.

Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species

1. If IPaC returns a result of "There are no listed species found within the vicinity of the project," then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.
2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project – other than bats (see below) – then project proponents must determine if proposed activities will have **no effect** on or **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain Life History Information for Listed and Candidate Species through the S7 Technical Assistance website. If no impacts will occur to a species on the IPaC species list (e.g., there is no habitat present in the project area), the appropriate determination is **No Effect**. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.
3. Should you determine that project activities **may affect** any federally listed, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

Northern Long-Eared Bats

Northern long-eared bats occur throughout Minnesota and Wisconsin and the information below may help in determining if your project may affect these species.

This species hibernates in caves or mines only during the winter. In Minnesota and Wisconsin, the hibernation season is considered to be November 1 to March 31. During the active season (April 1 to October 31) they roost in forest and woodland habitats. Suitable summer habitat for northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches dbh for northern long-eared bat that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, northern long-eared bats could be affected.

Examples of unsuitable habitat include:

- Individual trees that are greater than 1,000 feet from forested or wooded areas,
- Trees found in highly developed urban areas (e.g., street trees, downtown areas),
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees, and
- A stand of eastern red cedar shrubby vegetation with no potential roost trees.

If IPaC returns a result that northern long-eared bats are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** this species **IF** one or more of the following activities are proposed:

- Clearing or disturbing suitable roosting habitat, as defined above, at any time of year,
- Any activity in or near the entrance to a cave or mine,
- Mining, deep excavation, or underground work within 0.25 miles of a cave or mine,
- Construction of one or more wind turbines, or

- Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

If none of the above activities are proposed, project proponents can conclude the proposed activities will have **no effect** on the northern long-eared bat. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.

If any of the above activities are proposed, please use the northern long-eared bat determination key in IPaC. This tool streamlines consultation under the 2016 rangewide programmatic biological opinion for the 4(d) rule. The key helps to determine if prohibited take might occur and, if not, will generate an automated verification letter. No further review by us is necessary. Please visit the links below for additional information about "may affect" determinations for the northern long-eared bat.

NLEB Section 7 consultation

Key to the NLEB 4(d) rule for federal actions that may affect

Instructions for the NLEB 4(d) assisted d-key

Maternity tree and hibernaculum locations by state

Other Trust Resources and Activities

Bald and Golden Eagles - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Should bald or golden eagles occur within or near the project area please contact our office for further coordination. For communication and wind energy projects, please refer to additional guidelines below.

Migratory Birds - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of recommendations that minimize potential impacts to migratory birds. Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

Communication Towers - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed voluntary guidelines for minimizing impacts.

Transmission Lines - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to guidelines developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas that support large numbers of raptors and migratory birds.

Wind Energy - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's Wind Energy Guidelines. In addition, please refer to the Service's Eagle Conservation Plan Guidance, which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

State Department of Natural Resources Coordination

While it is not required for your Federal section 7 consultation, please note that additional state endangered or threatened species may also have the potential to be impacted. Please contact the Minnesota or Wisconsin Department of Natural Resources for information on state listed species that may be present in your proposed project area.

Minnesota

Minnesota Department of Natural Resources - Endangered Resources Review Homepage

Email: Review.NHIS@state.mn.us

Wisconsin

Wisconsin Department of Natural Resources - Endangered Resources Review Homepage

Email: DNRERReview@wi.gov

We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

Attachment(s):

- Official Species List
- Migratory Birds

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Minnesota-Wisconsin Ecological Services Field Office
4101 American Blvd E
Bloomington, MN 55425-1665
(952) 252-0092

Project Summary

Consultation Code: 03E19000-2021-SLI-1203
Event Code: Some(03E19000-2021-E-16220)
Project Name: Industrial Wood Products Facility
Project Type: DEVELOPMENT
Project Description: Location of proposed large scale industrial wood products facility that will include a connecting rail spur. Construction is anticipated to begin later in 2021.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@47.2737106,-93.69628565258483,14z

Counties: Itasca County, Minnesota

Endangered Species Act Species

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Canada Lynx *Lynx canadensis* Population: Wherever Found in Contiguous U.S. There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3652	Threatened
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO FWS MIGRATORY BIRDS OF CONCERN WITHIN THE VICINITY OF YOUR PROJECT AREA.

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical

Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Appendix F

Northern Long-eared Bat Determination

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
4101 American Blvd E
Bloomington, MN 55425-1665
Phone: (952) 252-0092 Fax: (952) 646-2873
http://www.fws.gov/midwest/Endangered/section7/s7process/step1.html

In Reply Refer To: April 06, 2021
Consultation code: 03E19000-2021-TA-1182
Event Code: 03E19000-2021-E-03621
Project Name: Huber Engineered Woods

Subject: Verification letter for the 'Huber Engineered Woods' project under the January 5, 2016, Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-eared Bat and Activities Excepted from Take Prohibitions.

Dear Daniel DeJoode:

The U.S. Fish and Wildlife Service (Service) received on April 06, 2021 your effects determination for the 'Huber Engineered Woods' (the Action) using the northern long-eared bat (*Myotis septentrionalis*) key within the Information for Planning and Consultation (IPaC) system. This IPaC key assists users in determining whether a Federal action is consistent with the activities analyzed in the Service's January 5, 2016, Programmatic Biological Opinion (PBO). The PBO addresses activities excepted from "take"[1] prohibitions applicable to the northern long-eared bat under the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based upon your IPaC submission, the Action is consistent with activities analyzed in the PBO. The Action may affect the northern long-eared bat; however, any take that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o). Unless the Service advises you within 30 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the PBO satisfies and concludes your responsibilities for this Action under ESA Section 7(a)(2) with respect to the northern long-eared bat.

Please report to our office any changes to the information about the Action that you submitted in IPaC, the results of any bat surveys conducted in the Action area, and any dead, injured, or sick northern long-eared bats that are found during Action implementation. If the Action is not completed within one year of the date of this letter, you must update and resubmit the information required in the IPaC key.

This IPaC-assisted determination allows you to rely on the PBO for compliance with ESA Section 7(a)(2) only for the northern long-eared bat. It **does not** apply to the following ESA-protected species that also may occur in the Action area:

- Canada Lynx *Lynx canadensis* Threatened

If the Action may affect other federally listed species besides the northern long-eared bat, a proposed species, and/or designated critical habitat, additional consultation between you and this Service office is required. If the Action may disturb bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act is recommended.

---

[1]Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct [ESA Section 3(19)].

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Huber Engineered Woods

2. Description

The following description was provided for the project 'Huber Engineered Woods':

> Proposed industrial wood product facility.

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@47.27387075,-93.69762812672494,14z

Determination Key Result

This Federal Action may affect the northern long-eared bat in a manner consistent with the description of activities addressed by the Service's PBO dated January 5, 2016. Any taking that may occur incidental to this Action is not prohibited under the final 4(d) rule at 50 CFR §17.40(o). Therefore, the PBO satisfies your responsibilities for this Action under ESA Section 7(a)(2) relative to the northern long-eared bat.

Determination Key Description: Northern Long-eared Bat 4(d) Rule

This key was last updated in IPaC on May 15, 2017. Keys are subject to periodic revision.

This key is intended for actions that may affect the threatened northern long-eared bat.

The purpose of the key for Federal actions is to assist determinations as to whether proposed actions are consistent with those analyzed in the Service's PBO dated January 5, 2016.

Federal actions that may cause prohibited take of northern long-eared bats, affect ESA-listed species other than the northern long-eared bat, or affect any designated critical habitat, require ESA Section 7(a)(2) consultation in addition to the use of this key. Federal actions that may

affect species proposed for listing or critical habitat proposed for designation may require a conference under ESA Section 7(a)(4).

Determination Key Result

This project may affect the threatened Northern long-eared bat; therefore, consultation with the Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.) is required. However, based on the information you provided, this project may rely on the Service's January 5, 2016, *Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions* to fulfill its Section 7(a)(2) consultation obligation.

Qualification Interview

1. Is the action authorized, funded, or being carried out by a Federal agency?

   Yes

2. Have you determined that the proposed action will have "no effect" on the northern long-eared bat? (If you are unsure select "No")

   No

3. Will your activity purposefully **Take** northern long-eared bats?

   No

4. [Semantic] Is the project action area located wholly outside the White-nose Syndrome Zone?

   Automatically answered
   No

5. Have you contacted the appropriate agency to determine if your project is near a known hibernaculum or maternity roost tree?

   Location information for northern long-eared bat hibernacula is generally kept in state Natural Heritage Inventory databases – the availability of this data varies state-by-state. Many states provide online access to their data, either directly by providing maps or by providing the opportunity to make a data request. In some cases, to protect those resources, access to the information may be limited. A web page with links to state Natural Heritage Inventory databases and other sources of information on the locations of northern long-eared bat roost trees and hibernacula is available at www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html.

   Yes

6. Will the action affect a cave or mine where northern long-eared bats are known to hibernate (i.e., hibernaculum) or could it alter the entrance or the environment (physical or other alteration) of a hibernaculum?

   No

7. Will the action involve Tree Removal?

   Yes

8. Will the action only remove hazardous trees for the protection of human life or property?

   No

9. Will the action remove trees within 0.25 miles of a known northern long-eared bat hibernaculum at any time of year?

   No

10. Will the action remove a known occupied northern long-eared bat maternity roost tree or any trees within 150 feet of a known occupied maternity roost tree from June 1 through July 31?

    No

Project Questionnaire

If the project includes forest conversion, report the appropriate acreages below. Otherwise, type '0' in questions 1-3.

1. Estimated total acres of forest conversion:

8

2. If known, estimated acres of forest conversion from April 1 to October 31

8

3. If known, estimated acres of forest conversion from June 1 to July 31

8

If the project includes timber harvest, report the appropriate acreages below. Otherwise, type '0' in questions 4-6.

4. Estimated total acres of timber harvest

0

5. If known, estimated acres of timber harvest from April 1 to October 31

0

6. If known, estimated acres of timber harvest from June 1 to July 31

0

If the project includes prescribed fire, report the appropriate acreages below. Otherwise, type '0' in questions 7-9.

7. Estimated total acres of prescribed fire

0

8. If known, estimated acres of prescribed fire from April 1 to October 31

0

9. If known, estimated acres of prescribed fire from June 1 to July 31

0

If the project includes new wind turbines, report the megawatts of wind capacity below. Otherwise, type '0' in question 10.

10. What is the estimated wind capacity (in megawatts) of the new turbine(s)?

0

Appendix G

SHPO Correspondence

DEPARTMENT OF ADMINISTRATION
STATE HISTORIC PRESERVATION OFFICE

September 1, 2021

Benjamin T. Ruhme
Braun Intertec
11001 Hampshire Ave S
Minneapolis, MN 55438

RE: Frontier Project – Huber Engineered Woods
Construction of a new oriented strand board manufacturing facility & rail spur
T55 R26 S6 & S7; T56 R26 S31, Itasca County
SHPO Number: 2021-2702

Dear Benjamin Ruhme:

Thank you for consulting with our office during the preparation of an Environmental Assessment Worksheet for the above-referenced project.

According to your correspondence, Huber Engineered Woods is proposing to construct a new oriented strand board manufacturing facility and rail spur in Itasca County. We have reviewed the documentation that was submitted for this project, including the letter report *Phase IA Cultural Resource Literature Review and Preliminary Reconnaissance of the Huber Engineered Woods Project, Itasca County, Minnesota* (August 23, 2021) as prepared by In Situ Archaeological Consulting. Our comments are provided below.

Based on our review of the project information, we conclude that there are no properties listed in the National or State Registers of Historic Places in the area that will be affected by this project. However, due to the nature and location of the proposed project, we agree with your consultant's recommendation that a Phase I archaeological survey should be completed. The survey must meet the requirements of the Secretary of the Interior's Standards for Identification and Evaluation and should include an evaluation of National Register eligibility for any properties that are identified. For a list of consultants who have expressed an interest in undertaking such surveys, please visit the website **preservationdirectory.mnhs.org**, and select "Archaeologists" in the "Search by Specialties" box.

We will reconsider the need for survey if the project area can be documented as previously surveyed or disturbed. Any previous survey work must meet contemporary standards. **Note:** plowed areas and right-of-way are not automatically considered disturbed. Archaeological sites can remain intact beneath the plow zone and in undisturbed portions of the right-of-way.

Please note that this comment letter does not address the requirements of Section 106 of the National Historic Preservation Act of 1966 and 36 CFR § 800. If this project is considered for federal financial assistance, or requires a federal permit or license, then review and consultation with our office will need to be initiated by the lead federal agency. Be advised that comments and recommendations provided by our office for this state-level review may differ from findings and determinations made by the federal agency as part of review and consultation under Section 106.

If you have any questions regarding our review of this project, please contact Kelly Gragg-Johnson, Environmental Review Program Specialist, at kelly.graggjohnson@state.mn.us.

Sincerely,

Sarah J. Beimers
Environmental Review Program Manager

DEPARTMENT OF ADMINISTRATION
STATE HISTORIC PRESERVATION OFFICE

December 27, 2021

Craig Picka
In Situ Archaeological Consulting
9717 Valley View Road
Eden Prairie, MN 55344

RE: Frontier Project – Huber Engineered Woods
Construction of a new oriented strand board manufacturing facility & rail spur
T55 R26 S6 & S7; T56 R26 S31, Itasca County
SHPO Number: 2021-2702

Dear Craig Picka:

Thank you for continuing consultation on the above referenced project. We understand that you are consulting with our office in advance of an Environmental Assessment Worksheet that will be prepared for this project.

According to your correspondence, Huber Engineered Woods is proposing to construct a new oriented strand board manufacturing facility and rail spur in Itasca County. We have reviewed the documentation that was submitted for this project, including the report titled *Phase I Cultural Resource Investigation for the Huber Engineered Woods Project, Itasca County, Minnesota, SHPO Number: 2021-2702* (November 16, 2021, In Situ Archaeological Consulting). Four (4) archaeological sites were identified as a result of the investigations, sites **21IC0472, 21IC0473, 21ICaom**, and **21ICaon**. Based on the documentation provided, we agree with your determination that these four (4) sites are **not eligible** for listing in the National Register of Historic Places. Therefore, we conclude that there are **no properties** listed in the National or State Registers of Historic Places, and no significant archaeological properties located in the area that will be affected by this project.

Please note that this comment letter does not address the requirements of Section 106 of the National Historic Preservation Act of 1966 and 36 CFR § 800. If this project is considered for federal financial assistance, or requires a federal permit or license, then review and consultation with our office will need to be initiated by the lead federal agency. Be advised that comments and recommendations provided by our office for this state-level review may differ from findings and determinations made by the federal agency as part of review and consultation under Section 106.

If you have any questions regarding our review of this project, please contact Kelly Gragg-Johnson, Environmental Review Program Specialist, at kelly.graggjohnson@state.mn.us.

Sincerely,

Sarah J. Beimers
Environmental Review Program Manager

Appendix H

GHG Calculations

Process Rates and Assumptions

Furnace 1 with Fines Burner		
Wood Fired, MMBtu/hr (HHV)	240	
Natural Gas Burner Rated Capacity, MMBtu/hr (HHV, 75 LHV)	60.25	Note: includes 0.25 MMBtu/hr pilot light
Heating Value of Wet Wood, Btu/lb	4,500	
Heating Value of Dry Wood, Btu/lb	8,000	
Heating Value of Natural Gas, Btu/scf	1,020	
Hours of Operation, Normal Operations	8,760	
Furnace 2 with Fines Burner		
Wood Fired, MMBtu/hr (HHV)	240	
Natural Gas Burner Rated Capacity, MMBtu/hr (HHV, 75 LHV)	60.25	Note: includes 0.25 MMBtu/hr pilot light
Heating Value of Wet Wood, Btu/lb	4,500	
Heating Value of Dry Wood, Btu/lb	8,000	
Heating Value of Natural Gas, Btu/scf	1,020	
Hours of Operation, Normal Operations	8,760	
RTO		
Heat Input Capacity, MMBtu/hr	10	
Hours of Operation, Normal Operations	8,760	
Heating Value of Natural Gas[2], Btu/scf	1,020	
Emergency Generator Engine		
Rated Capacity, Brake Horsepower (BHP)	570	
Natural Gas Consumption Rate at 100% load, cfh	5,888	
LPG Consumption Rate at 100% load, cfh	1,595	
Natural Gas Rated Capacity, MMBtu/hr	5.9	
LPG Rated Capacity, MMBtu/hr	4.0	
Displacement, liters (12 cylinder)	21.9	
Hours of Operation	500	
Fire Pump Engine		
Rated Capacity, Brake Horsepower (BHP)	575	
Diesel Fuel Consumption Rate, gal/hr	29.1	
Rated Capacity, MMBtu/hr	4.0	
Displacement, liters (6 cylinder)	15.0	
Hours of Operation	500	
Back-Up Building Heater		
Heat Input Capacity, MMBtu/hr	10	
Potential Annual Operating Hours, hr/yr	8,760	
Heating Value of Natural Gas[2], Btu/scf	1,020	

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Greenhouse Gas PTE Summary

Direct Emissions

Operations - Stationary Source Combustion							
Stack ID	**Control Equipment ID**	**Emission Sources**	**CO2**	**CH4**	**N2O**	**Mass Sum**	**CO2e**
			TPY	**TPY**	**TPY**	**TPY**	**TPY**
STRU 1	TREA 1, TREA 7	**Furnace 1 and Fines Burner 1**					
		Including biogenic CO2 emissions	*217,320*	*16.7*	*8.34*	*217,345*	*220,223*
		(Biogenic CO2 emissions - natural gas CO2 emissions)	*186,459*				
		Non-biogenic GHG emissions (does not include biogenic CO2) (1)	**30,861**	**16.7**	**8.34**	**30,886**	**33,764**
STRU 1	TREA 1, TREA 8	**Furnace 2 and Fines Burner 2**					
		Including biogenic CO2 emissions	*217,320*	*16.7*	*8.34*	*217,345*	*220,223*
		(Biogenic CO2 emissions - natural gas CO2 emissions)	*186,459*				
		Non-biogenic GHG emissions (does not include biogenic CO2) (1)	**30,861**	**16.7**	**8.34**	**30,886**	**33,764**
STRU 5	N/A	**RTO**	5,122	9.65E-02	9.65E-03	5,122	5,127
STRU 7, STRU 8	N/A	**Emergency Generator**	162	0.339	3.24E-04	162	170
STRU 9	N/A	**Fire Pump Engine**	163	6.59E-03	1.32E-03	163	164
N/A	N/A	**Back-Up Building Heater (Insignificant Activity)**	5,122	9.65E-02	9.65E-03	5,122	5,127
		Stationary Source Total Including Biogenic CO2 Emissions	445,210	33.9	16.7	445,260	451,035
		Stationary Source Total Non-Biogenic GHG emissions (does not include biogenic CO2) (1)	**72,292**	**33.9**	**16.7**	**72,342**	**78,117**

Operations - Mobile Source Combustion						
	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Mobile Sources (Onsite Operations - Equipment Owned and Operated by Huber Engineered Woods)	33	3.88E-04	1.59E-03	33	34
Mobile Sources (Transportation Operations - Equipment not Owned or Operated by Huber Engineered Woods)	50,408	0.286	0.321	50,409	50,511

Construction - Mobile Source Combustion					
	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Mobile Sources (Construction)	82	1.72E-03	3.83E-03	82	83

Construction - Land-Use	
	CO2e
	TPY
Land-Use (Construction)	252.8

	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Total Direct Emissions	122,815	34.2	17.0	122,866	128,997

Indirect Emissions

Operations - Off-Site Electricity Production					
	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Off-Site Electricity Production	48,110	5.21	0.745	48,116	48,462

Operations - Off-Site Waste Management	
	CO2e
	TPY
Off-Site Waste Management	174

	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Total Indirect Emissions	48,110	5.21	0.745	48,116	48,636

Atmospheric Removals of GHGs

Construction/Operations - Land-Use					
	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Land-Use (Sinks) (2)	0	0	0	0	0

Wood Products - Carbon Capture					
	CO2			**Mass Sum**	**CO2e**
	TPY			**TPY**	**TPY**
Wood Products - Carbon Capture	-233,373			-233,373	-233,373
	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Total Sinks	-233,373	0	0	-233,373	-233,373.2745

Total Emissions including Sinks = Direct Emissions + Indirect Emissions + Sinks

	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Total	-62,448	39	18	-62,391	-55,740

(1) As stated on page 10 of the January 2022 MN EQB EAW guidance, combustion of sawdust, hogged bark, and waste wood is a biogenic source of CO2 for which carbon neutrality may be assumed in carbon footprint development. CO2 emissions from the furnaces reflect natural gas combustion (maximum natural gas heat input is 60.25 MMBtu/hr per furnace).
(https://www.eqb.state.mn.us/sites/default/files/documents/EQB_Revised%20EAW%20Form%20Guidance_Climate_Sept%202021.pdf)

(2) Proposed land-use changes are not expected to produce greenhouse gas reductions (sinks).

Huber Engineered Woods - Cohasset, MN

Project: B2101896

Source: EQUI 1 (Furnace 1 with Fines Burner)

Furnace 1 with Fines Burner	
Assumptions:	
Total rated heat input capacity (bark + fines), MMBtu/hr	240
Hours of Operation, Normal Operations	8,760
Natural Gas Burner Rated Capacity, MMBtu/hr (HHV, 75 LHV)	60.25
Heating Value of Wet Wood1, Btu/lb	4,500
Heating Value of Dry Wood[1], Btu/lb	8,000
Heating Value of Natural Gas[2], Btu/scf	1,020
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298

	Pollutant	EPA Pollutant Type	CAS Number	Control Summary		Wood		Natural Gas		Natural Gas Only		Wood		Wood and Natural Gas		Wood and Natural Gas			
				Control Efficiency	Control Type	AP-42	40 CFR Part 98 3,4	AP-42[3]	40 CFR Part 98 3,4	Potential Emissions (no control) [60.25 MMBtu/hr NG]		Potential Emissions (no control) [240 MMBtu/hr wood]		Potential Emissions (no control) [179.75 MMBtu/hr wood and 60.25 MMBtu/hr NG]		Potential Emissions (no control) Worst-Case		PTE Exhausted Through ESP	
						lb/MMBtu	lb/MMBtu	lb/MMscf	lb/MMBtu	lb/hr	tons/year	lb/hr	tons/year	lb/hr	tons/year	lb/hr	tons/year	lb/hr	tons/year
5	CO2e	GHG	NA	---	---	---	209.50	---	117.07	7,053	30,893	50,279	220,223	37,664	164,968	50,279	220,223	50,279	220,223
3	CO_2	GHG	NA	---	---	---	206.74	---	116.94	7,046	30,861	49,616	217,320	37,168	162,794	49,616	217,320	49,616	217,320
4	CH_4	GHG	NA	---	---	---	0.0159	---	0.0022	0.133	0.582	3.81	16.68	2.85	12.49	3.81	16.68	3.81	16.68
4	N_2O	GHG	NA	---	---	---	0.0079	---	0.0002	1.33E-02	5.82E-02	1.90	8.34	1.43	6.25	1.90	8.34	1.90	8.34

1 Heating value of wet wood (4,500 Btu/lb) and dry wood (8,000 Btu/lb) based on AP-42 Section 1.6

2 Heating value of natural gas taken from AP-42 Appendix A. Typical Parameters of Various Fuels.

3 CO2 emission factor from 40 CFR 98 Subpart C, Table C-1 (wood 93.80 kg CO2/MMBtu, natural gas 53.06 kg CO2/MMBtu), November 29, 2013.

4 CH4 and N2O emission factors from 40 CFR 98 Subpart C, Table C-2 (wood CH4 = 0.0072 kg CH4/MMBtu and N2O = 0.0036 kg N2O/MMBtu, natural gas CH4 = 0.001 kg CH4/MMBtu and N2O = 0.0001 kg N2O/MMBtu), November 29, 2013.

5 CO2e emissions are based on global warming potential from 40 CFR 98 Subpart A, Table A-1 (CO2=1, CH4=25, and N2O=298), November 29, 2013.

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: EQUI 2 (Furnace 2 with Fines Burner)

Furnace 2 with Fines Burner	
Assumptions:	
Total rated heat input capacity (bark + fines), MMBtu/hr	240
Hours of Operation, Normal Operations	8,760
Natural Gas Burner Rated Capacity, MMBtu/hr (HHV, 75 LHV)	60.25
Heating Value of Wet Wood1, Btu/lb	4,500
Heating Value of Dry Wood[1], Btu/lb	8,000
Heating Value of Natural Gas[2], Btu/scf	1,020
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298

	Pollutant	EPA Pollutant Type	CAS Number	Control Summary		Wood		Natural Gas		Natural Gas Only		Wood		Wood and Natural Gas		Wood and Natural Gas			
				Control Efficiency	Control Type	AP-42	40 CFR Part 98 3,4	AP-42[3]	40 CFR Part 98 3,4	Potential Emissions (no control) [60.25 MMBtu/hr NG]		Potential Emissions (no control) [240 MMBtu/hr wood]		Potential Emissions (no control) [179.75 MMBtu/hr wood and 60.25 MMBtu/hr NG]		Potential Emissions (no control) Worst-Case		PTE Exhausted Through ESP	
						lb/MMBtu	lb/MMBtu	lb/MMscf	lb/MMBtu	lb/hr	tons/year	lb/hr	tons/year	lb/hr	tons/year	lb/hr	tons/year	lb/hr	tons/year
5	CO2e	GHG	NA	---	---	---	209.50	---	117.07	7,053	30,893	50,279	220,223	37,664	164,968	50,279	220,223	50,279	220,223
3	CO_2	GHG	NA	---	---	---	206.74	---	116.94	7,046	30,861	49,616	217,320	37,168	162,794	49,616	217,320	49,616	217,320
4	CH_4	GHG	NA	---	---	---	0.0159	---	0.0022	0.133	0.582	3.81	16.68	2.85	12.49	3.81	16.68	3.81	16.68
4	N_2O	GHG	NA	---	---	---	0.0079	---	0.0002	1.33E-02	5.82E-02	1.90	8.34	1.43	6.25	1.90	8.34	1.90	8.34

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: RTO

RTO	
Assumptions:	
RTO Heat Input Capacity, MMBtu/hr	10
Hours of Operation, Normal Operations	8,760
Heating Value of Natural Gas 1, Btu/scf	1,020
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298

	Pollutant	EPA Pollutant Type	CAS Number	Control Summary		Natural Gas		Natural Gas	
				Control Efficiency	Control Type	AP-42	40 CFR Part 98 2,3	Potential Emissions (no control)	
						lb/MMscf	lb/MMBtu	lb/hr	tons/year
4	CO2e	GHG	NA	---	---	---	117.07	1,171	5,127
2	CO_2	GHG	NA	---	---	---	116.94	1,169	5,122
3	CH_4	GHG	NA	---	---	---	0.0022	0.022	0.10
3	N_2O	GHG	NA	---	---	---	0.0002	0.002	0.01

1 Heating value of natural gas taken from AP-42 Appendix A. Typical Parameters of Various Fuels.
2 CO2 emission factor from 40 CFR 98 Subpart C, Table C-1 (wood 93.80 kg CO2/MMBtu, natural gas 53.06 kg CO2/MMBtu), November 29, 2013.
3 CH4 and N2O emission factors from 40 CFR 98 Subpart C, Table C-2 (wood CH4 = 0.0072 kg CH4/MMBtu and N2O = 0.0036 kg N2O/MMBtu, natural gas CH4 = 0.001 kg CH4/MMBtu and N2O = 0.0001 kg N2O/MMBtu), November 29, 2013.
4 CO2e emissions are based on global warming potential from 40 CFR 98 Subpart A, Table A-1 (CO2=1, CH4=25, and N2O=298), November 29, 2013.

Sample Calculations (10 MMBtu/hr natural gas combustion):

CO2 Emission Factor (lb/MMBtu fuel combusted) = CO2 Emission Factor (53.06 kg/MMBtu fuel combusted) x (2.204 lb/kg) = 116.94 lb/MMBtu

CO2 Emissions (ton/year) = Heat Input Rate (10 MMBtu/hr) x CO2 Emission Factor (116.94 lb CO2/MMBtu fuel combusted) x (8,760 hours/year) / (2,000 lb/ton) = 5,122 ton/year

CO2e Emissions (ton/year) = (CO2 Emissions (5,122 tons/year) x CO2 Global Warming Potential (1)) + (CH4 Emissions (0.10 tons/year) x CH4 Global Warming Potential (25)) + (N2O Emissions (0.01 tons/year) x N2O Global Warming Potential

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: EQUI 106 (Emergency Generator)

Emergency Generator	
Assumptions:	
Rated Capacity, Brake Horsepower (BHP)	570
Natural Gas Consumption Rate at 100% load, cfh	5,888
LPG Consumption Rate at 100% load, cfh	1,595
Natural Gas Rated Capacity, MMBtu/hr	5.9
LPG Rated Capacity, MMBtu/hr	4.0
Displacement, liters (12 cylinder)	21.9
Hours of Operation	500
Fuel	Natural Gas/LPG
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298
Btu/MMBtu	1,000,000
hr/yr	8,760

					Natural Gas	LPG	Worst-Case		
	Pollutant	EPA Pollutant Type	CAS Number	AP-42 Emission Factors1 (lb/MMBtu)	Hourly Emissions (lb/hr)	Hourly Emissions (lb/hr)	Hourly Emissions (lb/hr)	Maximum Theoretical Emissions (TPY)	Limited Annual Emissions (TPY)
	CO_2e	GHG	NA	115.8	682	462	682	2,987	170.48
	CO_2	GHG	NA	110.0	648	439	648	2,837	161.92
	CH4	GHG	NA	0.230	1.35	0.917	1.35	5.93	0.339
2	N2O	GHG	NA	2.20E-04	1.30E-03	8.79E-04	1.30E-03	5.68E-03	3.24E-04

1 AP-42 emission factors are based on natural gas and LPG, AP-42 Chapter 3.2 Natural Gas-fired Reciprocating Engines, Table 3.2-3 (4-Stroke Rich-Burn Engines), July 2000.
2 N2O emission factors from 40 CFR 98 Subpart C, Table C-2, (N2O = 1.0 x 10^-4 kg N2O/MMBtu), November 29, 2013.

Huber Engineered Woods - Cohasset, MN

Project: B2101896

Source: EQUI 107 Fire Pump

Fire Pump	
Assumptions:	
Rated Capacity, Brake Horsepower (BHP)	575
Diesel Fuel Consumption Rate, gal/hr	29.1
Rated Capacity, MMBtu/hr	4.0
Displacement, liters (6 cylinder)	15.0
Hours of Operation	500
Fuel	Diesel
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298
Btu/MMBtu	1,000,000
hr/yr	8,760

	Pollutant	EPA Pollutant Type	CAS Number	AP-42 Emission Factors[1] (lb/MMBtu)	Hourly Emissions (lb/hr)	Maximum Theoretical Emissions (TPY)	Limited Annual Emissions (TPY)
	CO_2e	GHG	NA	164.6	656	2,874	164.05
	CO_2	GHG	NA	164.0	654	2,864	163.49
2	CH_4[2]	GHG	NA	0.007	0.0264	0.115	6.59E-03
2	N_2O[2]	GHG	NA	0.0013	5.27E-03	2.31E-02	1.32E-03

1 AP-42 emission factors are based on diesel fuel, AP-42 Chapter 3.3 Gasoline And Diesel Industrial Engines, Tables 3.3-1, and 3.3-2, September 1996.

2 CH_4 and N_2O emission factors from 40 CFR 98 Subpart C, Table C-2, (CH_4 = 0.003 kg CH4/MMBtu and N_2O = 0.0006 kg N_2O/MMBtu), November 29, 2013.

Huber Engineered Woods - Cohasset, MN

Project: B2101896

Source: Building Back-Up Heater (Insignificant Activity)

RTO	
Assumptions:	
Heat Input Capacity, MMBtu/hr	10
Hours of Operation, Normal Operations	8,760
Heating Value of Natural Gas 1, Btu/scf	1,020
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298

	Pollutant	EPA Pollutant Type	CAS Number	Control Summary		Natural Gas		Natural Gas	
				Control Efficiency	Control Type	AP-42	40 CFR Part 98 2,3	Potential Emissions (no control)	
						lb/MMscf	lb/MMBtu	lb/hr	tons/year
4	CO2e	GHG	NA	---	---	---	117.07	1,171	5,127
2	CO_2	GHG	NA	---	---	---	116.94	1,169	5,122
3	CH_4	GHG	NA	---	---	---	0.0022	0.022	0.10
3	N_2O	GHG	NA	---	---	---	0.0002	0.002	0.01

1 Heating value of natural gas taken from AP-42 Appendix A. Typical Parameters of Various Fuels.

2 CO2 emission factor from 40 CFR 98 Subpart C, Table C-1 (wood 93.80 kg CO2/MMBtu, natural gas 53.06 kg CO2/MMBtu), November 29, 2013.

3 CH4 and N2O emission factors from 40 CFR 98 Subpart C, Table C-2 (wood CH4 = 0.0072 kg CH4/MMBtu and N2O = 0.0036 kg N2O/MMBtu, natural gas CH4 = 0.001 kg CH4/MMBtu and N2O = 0.0001 kg N2O/MMBtu), November 29, 2013.

4 CO2e emissions are based on global warming potential from 40 CFR 98 Subpart A, Table A-1 (CO2=1, CH4=25, and N2O=298), November 29, 2013.

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Mobile Sources - Routine Onsite Operations

Vehicle Types	Fuel type	Max. Number of Vehicle Trips per Day	Weekly Railcar Freight (tons/week)	Schedule	Days Per Week	Average Round-Trip Distance Traveled per Trip (mi)	Fuel Usage Rate	Total Vehicle Miles Traveled (VMT/yr)	Total Annual Fuel Usage (gal/yr)	CO2 Emission Factor (kg/gal) 1	Annual CO2 Emissions (ton)	CH4 Emission Factor (g/gal) 1	CH4 Emission Factor (g/mile) 1	Annual CH4 Emissions (ton)	N2O Emission Factor (g/mile) 1	N2O Emission Factor (g/mile) 1	Annual N2O Emissions (ton)	Annual CO2e Emissions (ton)
Log loader (log pile reclaim)	Diesel	100	---	Monday-Sunday	7	0.40	Assume 6 mpg	14,560	2,427	10.21	27	0.10	---	2.67E-04	0.49	---	1.31E-03	27.7
Front end loader	Diesel	64	---	Monday-Sunday	7	0.14	Assume 6 mpg	3,276	546	10.21	6	0.20	---	1.20E-04	0.47	---	2.83E-04	6.23
Total											**33**			**3.88E-04**			**1.59E-03**	**34**

1 CO2, CH4, and N2O emission factors taken from Table 2, Table 4, and Table 5 of EPA's "Emission Factors for Greenhouse Gas Inventories", April 2021 (https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf)

Emission Factor Vehicle Type	Huber Engineered Woods Vehicle Type
Construction/Mining Equipment	Front end loader
Logging Equipment	Log loader

*MN DOT Procedure Manual for Forecasting Traffic on Minnesota's Highway Systems, May 2012, pg. 175 (https://www.dot.state.mn.us/traffic/data/reports/forecast/Forecast_Manual_2012.pdf)

Sample Calculations (Log Loader):

Total Annual Fuel Usage (gal) = Max. Number of Vehicle Trips per Day (100 trips) x Days Per Week (7 days) x Average Round-Trip Distance (0.40 mile/trip) x (52 weeks/year) / Fuel Usage Rate (6 mile/gal) = 2,427 gal/year

CO2 Emissions (ton/year) = Total Annual Fuel Usage (2,427 gal/year) x CO2 Emission Factor (10.21 kg CO2/gal fuel combusted) x (2.204 lb/kg) / (2,000 lb/ton) = 27 tons/year

CO2e Emissions (ton/year) = (CO2 Emissions (27 tons/year) x CO2 Global Warming Potential (1)) + (CH4 Emissions (2.67E-04 tons/year) x CH4 Global Warming Potential (25)) + (N2O Emissions (1.31E-03 tons/year) x N2O Global Warming Potential (298)) = 27.7 tons/year

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Mobile Sources - Transportation Operations

Vehicle Types	Fuel type	Max. Number of Vehicle Trips per Day	Weekly Railcar Freight (tons/week)	Schedule	Days Per Week	Average Round-Trip Distance Traveled per Trip (mi)	Fuel Usage Rate	Total Vehicle Miles Traveled (VMT/yr)	Total Annual Fuel Usage (gal/yr)	CO2 Emission Factor (kg/gal) 1	Annual CO2 Emissions (ton)	CH4 Emission Factor (g/gal) 1	CH4 Emission Factor (g/mile) 1	Annual CH4 Emissions (ton)	N2O Emission Factor (g/mile) 1	N2O Emission Factor (g/mile) 1	Annual N2O Emissions (ton)	Annual CO2e Emissions (ton)
Log Delivery Truck	Diesel	184	---	Monday-Saturday	6	100	Assume 6 mpg	5,740,800	956,800	10.21	10,768	0.0095	---	1.00E-02	0.0431	---	4.55E-02	10,782
Resin, Paper, and Coating Materials Delivery Truck	Diesel	2	---	Monday-Friday	5	320	Assume 6 mpg	166,400	27,733	10.21	312	0.0095	---	2.90E-04	0.0431	---	1.32E-03	313
Waste Trucks (Ash)	Diesel	2	---	Monday-Friday	5	20	Assume 6 mpg	10,400	1,733	10.21	20	0.0095	---	1.82E-05	0.0431	---	8.24E-05	19.5
Finished Product Truck	Diesel	77	---	Monday-Saturday	6	800	Assume 6 mpg	19,219,200	3,203,200	10.21	36,051	0.0095	---	3.35E-02	0.0431	---	0.152	36,097
Employee Traffic	Gasoline/Diesel	115	---	Monday-Sunday	7	30	22 mpg	1,255,800	57,082	8.82	555	---	0.0222	3.07E-02	---	0.0387	5.36E-02	572
Final Product Transportation by Railcar	Diesel	---	588	Monday-Friday	5	1600	423 mpg/ton of freight	---	115,654	10.21	1,302	0.80	---	0.102	0.26	---	3.31E-02	1,314
MDI Resin, Wax and Ammonium Hydroxide Railcar	Diesel	---	723	Monday-Friday	5	1400	423 mpg/ton of freight	---	124,431	10.21	1,400	0.80	---	0.110	0.26	---	3.57E-02	1,414
Total											**50,408**			**0.286**			**0.321**	**50,511**

1 CO2, CH4, and N2O emission factors taken from Table 2, Table 4, and Table 5 of EPA's "Emission Factors for Greenhouse Gas Inventories", April 2021 (https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf)

Emission Factor Vehicle Type	Huber Engineered Woods Vehicle Type		
Gasoline Passenger Cars	Employee Traffic (model year 2000 gasoline emission factors and model year 2007 diesel emission factors assumed as worst-case).	Assumed % Gasoline Passenger Cars*	70.8%
Gasoline Light-Duty Trucks		Assumed % Gasoline Light-Duty Trucks*,**	26.2%
Light Duty Trucks (Diesel)		Assumed % Diesel Light-Duty Trucks*,**	3.0%
Medium- and Heavy-Duty Vehicles (Diesel)	Log delivery truck, resin, paper and coating materials delivery truck, waste trucks, finished product trucks		
Locomotives	Railcar (final product shipping, MDI resin, wax, and ammonium hydroxide receiving)		
Construction/Mining Equipment	Front end loader		
Logging Equipment	Log loader		

*MN DOT Procedure Manual for Forecasting Traffic on Minnesota's Highway Systems, May 2012, pg. 175 (https://www.dot.state.mn.us/traffic/data/reports/forecast/Forecast_Manual_2012.pdf)
"Of the majority of recent tube counts taken in the passenger car class, 69.8% of vehicles were classified as cars, 29.2% as pickups, and 1% as motorcycles."
**It is assumed that 3% of total employee traffic are diesel pickup trucks based on the national average (approximately 7.4 million diesel cars and SUVs out of 250 million passenger vehicles)
Source: https://www.greencarreports.com/news/1097513_which-states-have-the-most-diesel-vehicles-new-data-gives-results

Sample Calculations (Log Delivery Truck):

Total Annual Fuel Usage (gal) = Max. Number of Vehicle Trips per Day (184 trips) x Days Per Week (6 days) x Average Round-Trip Distance (100 mile/trip) x (52 weeks/year) / Fuel Usage Rate (6 mile/gal) = 956,800 gal/year

CO2 Emissions (ton/year) = Total Annual Fuel Usage (956,800 gal/year) x CO2 Emission Factor (10.21 kg CO2/gal fuel combusted) x (2.204 lb/kg) / (2,000 lb/ton) = 10,768 ton/year

CO2e Emissions (ton/year) = (CO2 Emissions (10,768 tons/year) x CO2 Global Warming Potential (1)) + (CH4 Emissions (0.010 tons/year) x CH4 Global Warming Potential (25)) + (N2O Emissions (0.046 tons/year) x N2O Global Warming Potential (298)) = 10,782 ton/year

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Mobile Sources - Construction Activities Estimated Project Life 35 years

Vehicle Types	Estimated Hours of Operation During Construction Period (hours)	Construction Schedule	Fuel type	Fuel Usage Rate (gal/hr)	Approximate Total Fuel Usage During Construction Period (gallons)	CO2 Emission Factor (kg/gal) 1	CO2 Emissions During Construction Period (ton)	CH4 Emission Factor (g/gal) 1	CH4 Emissions During Construction Period (ton)	N2O Emission Factor (g/gal) 1	N2O Emissions During Construction Period (ton)	CO2e Emissions During Construction Period (ton)
9630 Tractor	10,000	April 2022 - October 2022	Diesel	7	70,000	10.21	788	0.28	2.16E-02	0.49	3.78E-02	800
140 Motorgrader	5,000	April 2022 - October 2022	Diesel	5	25,000	10.21	281	0.20	5.51E-03	0.47	1.30E-02	285
D6 Dozer	6,000	April 2022 - October 2022	Diesel	7	42,000	10.21	473	0.20	9.26E-03	0.47	2.18E-02	479
D8 Dozer	4,000	April 2022 - October 2022	Diesel	12	48,000	10.21	540	0.20	1.06E-02	0.47	2.49E-02	548
349 Excavator	2,500	April 2022 - October 2022	Diesel	11	27,500	10.21	310	0.20	6.06E-03	0.47	1.42E-02	314
563 Compactor	5,000	April 2022 - October 2022	Diesel	3	15,000	10.21	169	0.20	3.31E-03	0.47	7.77E-03	171
Sidedumps	9,000	April 2022 - October 2022	Diesel	3	27,000	10.21	304	0.13	3.87E-03	0.49	1.46E-02	308
Total (tons)							**2,864**		**6.02E-02**		**0.134**	**2,906**
Total (tons/year, annualized over project life)							**82**		**1.72E-03**		**3.83E-03**	**83**

1 CO2, CH4, and N2O emission factors taken from Table 2 and Table 5 of EPA's "Emission Factors for Greenhouse Gas Inventories", April 2021 (https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf)

Emission Factor Vehicle Type	Huber Engineered Woods Construction Vehicle Type
Agricultural Equipment	Tractor
Construction/Mining Equipment	Motorgrader, dozer, excavator, compactor
Construction/Mining Offroad Trucks	Sidedump truck

Sample Calculations (Tractor):

Total Fuel Usage During Construction Period (gal) = Fuel Usage Rate (7 gal/hr) x Hours of Operation During Construction Period (10,000 hours) = 70,000 gal

CO2 Emissions During Construction Period (tons) = Total Fuel Usage (70,000 gal) x CO2 Emission Factor (10.21 kg CO2/gal fuel combusted) x (2.204 lb/kg) / (2,000 lb/ton) = 788 ton

CO2e Emissions During Construction Period (tons) = (CO2 Emissions (788 tons) x CO2 Global Warming Potential (1)) + (CH4 Emissions (0.022 ton) x CH4 Global Warming Potential (25)) + (N2O Emissions (0.038 ton) x N2O Global Warming Potential (298)) = 800 tons

Sample Calculations (Annualized CO2e Emissions):

Annual CO2e Emissions (ton/year) = Total CO2e Emissions During Construction Period (2,906 tons) / Estimated Project Life (35 years) = 83 ton/year

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Land Use Changes - Construction Activities

Estimated Project Life 35 years

Land-use category prior to project: forest land (1a)
Land-use category after project: settlement (1b)

2019 Net CO2 Flux from Forest Land Converted to Settlements	62,900,000	Ton CO2e	Source: Reference 1, Table 6-99
2019 Land Converted to Settlements	541,000	hectares	Source: Reference 1, Table 6-5
	1,336,270	acres	

Emission Factor Based on Land Type Carbon Flux (tons CO2e/area) = net CO2 flux from land conversion / total area of land use change in US

Emission Factor (tons CO2e/area) = 47.07

Total HEW Project Acreage	188	acres
CO2e Emissions from Land-Use Changes	**8,849**	**tons**
Annual CO2e Emissions from Land-Use Changes (tons/year, annualized over project life)	**252.8**	**tpy**

1 US EPA "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2019", Chapter 6: Land Use, Land-Use Change, and Forestry (https://www.epa.gov/sites/default/files/2021-04/documents/us-ghg-inventory-2021-chapter-6-land-use-land-use-change-and-forestry.pdf)

1a Forest Land: A land-use category that includes areas at least 120 feet (36.6 meters) wide and at least one acre (0.4 hectare) in size with at least 10 percent cover (or equivalent stocking) by live trees including land that formerly had such tree cover and that will be naturally or artificially regenerated. Trees are woody plants having a more or less erect perennial stem(s) capable of achieving at least 3 inches (7.6 cm) in diameter at breast height, or 5 inches (12.7 cm) diameter at root collar, and a height of 16.4 feet (5 m) at maturity in situ. Forest Land includes all areas recently having such conditions and currently regenerating or capable of attaining such condition in the near future. Forest Land also includes transition zones, such as areas between forest and non-forest lands that have at least 10 percent cover (or equivalent stocking) with live trees and forest areas adjacent to urban and built-up lands. Unimproved roads and trails, streams, and clearings in forest areas are classified as forest if they are less than 120 feet (36.6 m) wide or an acre (0.4 ha) in size. However, land is not classified as Forest Land if completely surrounded by urban or developed lands, even if the criteria are consistent with the tree area and cover requirements for Forest Land. These areas are classified as Settlements. In addition, Forest Land does not include land that is predominantly under an agricultural land use

1b Settlements: A land-use category representing developed areas consisting of units equal to or greater than 0.25 acres (0.1 ha) that includes residential, industrial, commercial, and institutional land; construction sites; public administrative sites; railroad yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment plants; water control structures and spillways; parks within urban and built-up areas; and highways, railroads, and other transportation facilities. Also included are all tracts that may meet the definition of Forest Land, and tracts of less than 10 acres (4.05 ha) that may meet the definitions for Cropland, Grassland, or Other Land but are completely surrounded by urban or built-up land, and so are included in the Settlements category. Rural transportation corridors located within other land uses (e.g., Forest Land, Cropland, and Grassland) are also included in Settlements. (reference 1, page 6-15)

2 Total project site = 188 acres. Includes 159.3 acre facility operational area (facility buildings, storage yards, stormwater ponds, roads, parking lot, and railroad spur area). Remaining 27.7 acres is associated with temporary land cover changes as a result of construction activities.

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Off-Site Electricity Emissions

Estimated Electricity Usage Rate (MWh)	CO2 Emission Factor (lb/MWh) 1	Annual CO2 Emissions (tpy)	CH4 Emission Factor (lb/MWh) 1	Annual CH4 Emissions (tpy)	N2O Emission Factor (lb/MWh) 1	Annual N2O Emissions (tpy)	Annual CO2e Emissions (tpy)
10.0	1,098.4	48,110	0.119	5.21	0.017	0.745	48,462

1 CO2, CH4, and N2O emission factors taken from Table 6 of EPA's "Emission Factors for Greenhouse Gas Inventories", April 2021 (https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf). "Total Output" emission factors were used as directed in the Table 6 footnote.
2 Assumed 8,760 hours of operation per year

Sample Calculations (10 MWh Electricity Usage):

CO2 Emissions (ton/year) = Electricity Usage Rate (10 MWh) x CO2 Emission Factor (1,098.4 lb CO2/MWh) x (8,760 hours/year) / (2,000 lb/ton) = 48,110 ton/year

CO2e Emissions (ton/year) = (CO2 Emissions (48,110 ton/year) x CO2 Global Warming Potential (1)) + (CH4 Emissions (5.21 ton/year) x CH4 Global Warming Potential (25)) + (N2O Emissions (0.745 ton/year) x N2O Global Warming Potential (298)) = 48,462 ton/year

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Off-Site Waste Management Emissions

Waste Material	Estimated Annual Fly Ash Generation (tons per year) 1	CO2e Emission Factor (metric tons CO2e/ short ton material) 2	Annual CO2e Emissions (tpy) 3
Fly Ash	7,903	0.02	174

1 Annual ash handling throughout of 7,903 ton/year is based on an annual average fuel demand of 296 MMBtu/hr (fuel demand is lower during the summer).
2 CO2, CH4, and N2O emission factors taken from Table 6 of EPA's "Emission Factors for Greenhouse Gas Inventories", April 2021 (https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf). Fly ash is assumed to be landfilled.
3 Metric tons of CO2e multiplied by 1.102 to convert to US tons of CO2e
4 Primary waste material produced is ash. Other waste materials will be generated in minimal quantities

Sample Calculations (7,903 tons/year fly ash disposal):

CO2e Emissions (ton/year) = Annual Fly Ash Generation (7,903 ton/year) x CO2 Emission Factor (0.02 metric ton CO2/short ton fly ash) x (1.102 short tons/metric ton) = 174 ton/year

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Wood Products - Carbon Capture

Due to absporption of carbon dioxide during photosynthesis, production of wood products (including building materials) effectively capture carbon dioxide from the atmosphere and store it for the usable lifetime of the product. The following estimates for carbon capture are based on the environmental product declaration and expected production of these materials. Other factors such as the potential reuse of these materials prior to disposal may impact the calculated carbon capture per unit volume produced.

Wood Product	Expected Annual Production (MSF/yr)	Expected Annual Volumetric Production (ft3/yr)	Carbon Capture Per Unit Volume (kg CO2/m3) 2	Annual CO2 Capture (tpy) 3	Annual CO2e Capture (tpy) 3
AdvanTech	725,000	22,656,250	330	-233,373	-233,373
Zip System					

1 Based on 31.25 ft^3/MSF 3/8" basis
2 Based on environmental product declaration, Tables 12 and 15, removals associated with biogenic carbon content of the bio based product
https://www.huberwood.com/uploads/documents/technical/documents/Environmental-Product-Declaration-for-AdvanTech-Subflooring-and-Sheathing-EPD-AdvanTech_2020-09-23-170536.pdf
3 CO2 capture is expressed as a negative value to indicate a reduction of net carbon dioxide emissions
4 The carbon content of the AvanTech product is representative of the carboncontent of all product lines proposed to be manufactured at the site.
5 The value for annual carbon capture from wood products is the same for potential to emit GHG emissions and projected actual GHG emissions. The value is based on projected actual production rate because HEW does not realistically expect that production will exceed the forecast level because of facility operational constraints (e.g., required downtime). Using the projected actual production rate in the potential annual carbon capture from wood products is a conservative approach as it lessens the

Sample Calculations (725,000 MSF/year):

CO2 Capture (ton/year) = Annual Production (725,000 MSF) x (31.25 ft^3/MSF) x (1 m^3/35.3 ft^3) x CO2 Capture Per Unit Volume (330 kg CO2/m^3) x (2.204 lb/kg) / (2,000 lb/ton) = 233,373 ton/year

Huber Engineered Woods - Cohasset, MN

Project: B2101896

Mitigation - Low Temperature Drying (Alternative to RTO)

The proposed faciltiy is designed to utilize low-temperature drying, which is an inherently lower VOC-emitting process that does not require operation of a thermal destruction device (such as an RTO) to control VOC emissions in order to meet state and federal requirements. Based on the expected dryer throughput, an RTO with a rated heat input of approximately 46.9 MMBtu/hr would have otherwise been required to control emissions from the dryers. The following calculations demonstrate the avoided greenhouse gas emissions associated with a 46.9 MMBtu/hr RTO.

RTO	
Assumptions:	
RTO Heat Input Capacity, MMBtu/hr	46.9
Hours of Operation, Normal Operations	8,760
Heating Value of Natural Gas 1, Btu/scf	1,020
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298

	Pollutant	EPA Pollutant Type	CAS Number	Control Summary		Natural Gas		Natural Gas	
				Control Efficiency	Control Type	AP-42	40 CFR Part 98 2,3	Potential Emissions (no control)	
						lb/MMscf	lb/MMBtu	lb/hr	tons/year
4	CO2e	GHG	NA	---	---	---	117.07	5,490	24,048
2	CO_2	GHG	NA	---	---	---	116.94	5,485	24,023
3	CH_4	GHG	NA	---	---	---	0.0022	0.103	0.45
3	N_2O	GHG	NA	---	---	---	0.0002	0.010	0.05

1 Heating value of natural gas taken from AP-42 Appendix A. Typical Parameters of Various Fuels.

2 CO2 emission factor from 40 CFR 98 Subpart C, Table C-1 (wood 93.80 kg CO2/MMBtu, natural gas 53.06 kg CO2/MMBtu), November 29, 2013.

3 CH4 and N2O emission factors from 40 CFR 98 Subpart C, Table C-2 (wood CH4 = 0.0072 kg CH4/MMBtu and N2O = 0.0036 kg N2O/MMBtu, natural gas CH4 = 0.001 kg CH4/MMBtu and N2O = 0.0001 kg N2O/MMBtu), Nove

4 CO2e emissions are based on global warming potential from 40 CFR 98 Subpart A, Table A-1 (CO2=1, CH4=25, and N2O=298), November 29, 2013.

Huber Engineered Woods - Cohasset, MN

Project: B2101896

Mitigation - Dryer Exhaust Recirculation

The proposed faciltiy is designed to utilize dryer exhaust recirculation for improved thermal efficiency, which is anticipated to reduce fuel demand from both heat energy systems (Furnace 1 and Furnace 2) by approximately 2.5 MMBtu/hr. In order to quantify the greenhouse gas emissions reductions associated with this fuel decrease, it is assumed that each of the furnaces will typically operate with 234 MMBtu/hr of heat input from wood combustion and 6 MMBtu/hr of the total heat input from natural gas combustion (based on the assumption that the 60 MMBtu/hr natural gas burner only operates 10% of the time, with the remainder of the maximum heat input rate of 240 MMBtu/hr coming from wood combustion). Based on the above assumptions, 97.5% of the heat input from each heat energy system will typically come from wood and 2.5% of the heat input will typically come from natural gas.

Furnace 1 with Fines Burner	
Assumptions:	
Wood heat input reduction from dryer exhaust recirculation, MMBtu/hr	2.4
Hours of Operation, Normal Operations	8,760
Natural Gas heat input reduction from dryer exhaust recirculation, MMBtu/hr (HHV, 75 LHV)	0.06
Heating Value of Wet Wood1, Btu/lb	4,500
Heating Value of Dry Wood[1], Btu/lb	8,000
Heating Value of Natural Gas[2], Btu/scf	1,020
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298

	Pollutant	EPA Pollutant Type	CAS Number	Control Summary		Wood		Natural Gas		Natural Gas Only		Wood		Wood and Natural Gas	
				Control Efficiency	Control Type	AP-42	40 CFR Part 98 3,4	AP-42[3]	40 CFR Part 98 3,4	Potential Emissions (no control) [0.06 MMBtu/hr NG]		Potential Emissions (no control) [2.4 MMBtu/hr wood]		Potential Emissions (no control) [179.75 MMBtu/hr wood and 60.25 MMBtu/hr NG]	
						lb/MMBtu	lb/MMBtu	lb/MMscf	lb/MMBtu	lb/hr	tons/year	lb/hr	tons/year	lb/hr	tons/year
5	CO2e	GHG	NA	---	---	---	209.50	---	117.07	7.32	32.0	511	2,237	518	2,269
3	CO_2	GHG	NA	---	---	---	206.74	---	116.94	7.31	32.0	504	2,207	511	2,239
4	CH_4	GHG	NA	---	---	---	0.0159	---	0.0022	1.38E-04	6.03E-04	0.039	0.169	0.039	0.170
4	N_2O	GHG	NA	---	---	---	0.0079	---	0.0002	1.38E-05	6.03E-05	0.019	0.085	0.019	0.085

	CO2	CH4	N2O	Mass Sum	CO2e
	TPY	TPY	TPY	TPY	TPY
GHG Reductions from Dryer Exhaust Recirculation					
Including biogenic CO2 emissio	*2,239*	*0.170*	*0.085*	*2,239*	*2,269*
(Biogenic CO2 emissions - natu	*2,207*				
Non-biogenic GHG emissions	**32.0**	**0.170**	**0.085**	**32.3**	**61.6**

1 Heating value of wet wood (4,500 Btu/lb) and dry wood (8,000 Btu/lb) based on AP-42 Section 1.6

2 Heating value of natural gas taken from AP-42 Appendix A. Typical Parameters of Various Fuels.

3 CO2 emission factor from 40 CFR 98 Subpart C, Table C-1 (wood 93.80 kg CO2/MMBtu, natural gas 53.06 kg CO2/MMBtu), November 29, 2013.

4 CH4 and N2O emission factors from 40 CFR 98 Subpart C, Table C-2 (wood CH4 = 0.0072 kg CH4/MMBtu and N2O = 0.0036 kg N2O/MMBtu, natural gas CH4 = 0.001 kg CH4/MMBtu and N2O = 0.0001 kg N2O/MMBtu), November 29, 2013.

5 CO2e emissions are based on global warming potential from 40 CFR 98 Subpart A, Table A-1 (CO2=1, CH4=25, and N2O=298), November 29, 2013.

Process Rates and Assumptions

Furnace 1 with Fines Burner		
Wood Fired, MMBtu/hr (HHV)	240	
Natural Gas Burner Rated Capacity, MMBtu/hr (HHV, 75 LHV)	60.25	Note: includes 0.25 MMBtu/hr pilot light.
Heating Value of Wet Wood, Btu/lb	4,500	
Heating Value of Dry Wood, Btu/lb	8,000	
Heating Value of Natural Gas, Btu/scf	1,020	
Hours of Operation, Normal Operations	8,208	Note: assumes 342 operating days/year
Furnace 2 with Fines Burner		
Wood Fired, MMBtu/hr (HHV)	240	
Natural Gas Burner Rated Capacity, MMBtu/hr (HHV, 75 LHV)	60.25	Note: includes 0.25 MMBtu/hr pilot light
Heating Value of Wet Wood, Btu/lb	4,500	
Heating Value of Dry Wood, Btu/lb	8,000	
Heating Value of Natural Gas, Btu/scf	1,020	
Hours of Operation, Normal Operations	8,208	Note: assumes 342 operating days/year
RTO		
Heat Input Capacity, MMBtu/hr	10	
Hours of Operation, Normal Operations	8,208	Note: assumes 342 operating days/year
Heating Value of Natural Gas[2], Btu/scf	1,020	
Emergency Generator Engine		
Rated Capacity, Brake Horsepower (BHP)	570	
Natural Gas Consumption Rate at 100% load, cfh	5,888	
LPG Consumption Rate at 100% load, cfh	1,595	
Natural Gas Rated Capacity, MMBtu/hr	5.9	
LPG Rated Capacity, MMBtu/hr	4.0	
Displacement, liters (12 cylinder)	21.9	
Hours of Operation	52	Note: assumes 1 hour of operation per week
Fire Pump Engine		
Rated Capacity, Brake Horsepower (BHP)	575	
Diesel Fuel Consumption Rate, gal/hr	29.1	
Rated Capacity, MMBtu/hr	4.0	
Displacement, liters (6 cylinder)	15.0	
Hours of Operation	52	Note: assumes 1 hour of operation per week
Back-Up Building Heater		
Heat Input Capacity, MMBtu/hr	10	
Potential Annual Operating Hours, hr/yr	552	Note: assumes backup heater only operated for 23 days/year
Heating Value of Natural Gas[2], Btu/scf	1,020	

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Greenhouse Gas Projected Actual Summary

Direct Emissions

Operations - Stationary Source Combustion							
Stack ID	**Control Equipment ID**	**Emission Sources**	**CO2**	**CH4**	**N2O**	**Mass Sum**	**CO2e**
			TPY	**TPY**	**TPY**	**TPY**	**TPY**
STRU 1	TREA 1, TREA 7	**Furnace 1 and Fines Burner 1**					
		Including biogenic CO2 emissions	*203,626*	*15.6*	*7.82*	*203,649*	*206,346*
		(Biogenic CO2 emissions - natural gas CO2 emissions)	*200,734*				
		Non-biogenic GHG emissions (does not include biogenic CO2) (1)	**2,892**	**15.6**	**7.82**	**2,915**	**5,611**
STRU 1	TREA 1, TREA 8	**Furnace 2 and Fines Burner 2**					
		Including biogenic CO2 emissions	*203,626*	*15.6*	*7.82*	*203,649*	*206,346*
		(Biogenic CO2 emissions - natural gas CO2 emissions)	*200,734*				
		Non-biogenic GHG emissions (does not include biogenic CO2) (1)	**2,892**	**15.6**	**7.82**	**2,915**	**5,611**
STRU 5	N/A	**RTO**	4,799	9.05E-02	9.05E-03	4,799	4,804
STRU 7, STRU 8	N/A	**Emergency Generator**	17	0.035	3.37E-05	17	18
STRU 9	N/A	**Fire Pump Engine**	17	6.86E-04	1.37E-04	17	17
N/A	N/A	**Back-Up Building Heater (Insignificant Activity)**	323	6.08E-03	6.08E-04	323	323
		Stationary Source Total Including Biogenic CO2 Emissions	412,408	31.4	15.6	412,455	417,853
		Stationary Source Total Non-Biogenic GHG emissions (does not include biogenic CO2) (1	**10,939**	**31.4**	**15.6**	**10,986**	**16,385**

Operations - Mobile Source Combustion						
	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Mobile Sources (Onsite Operations - Equipment Owned and Operated by Huber Engineered Woods)	33	3.88E-04	1.59E-03	33	34
Mobile Sources (Transportation Operations - Equipment not Owned or Operated by Huber Engineered Woods)	50,408	0.286	0.321	50,409	50,511

Construction - Mobile Source Combustion					
	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Mobile Sources (Construction)	82	1.72E-03	3.83E-03	82	83

Construction - Land-Use	
	CO2e
	TPY
Land-Use (Construction)	252.8

	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Total Direct Emissions	61,463	31.7	16.0	61,510	67,266

Indirect Emissions

Operations - Off-Site Electricity Production					
	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Off-Site Electricity Production	48,110	5.21	0.745	48,116	48,462

Operations - Off-Site Waste Management	
	CO2e
	TPY
Off-Site Waste Management	174

	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Total Indirect Emissions	48,110	5.21	0.745	48,116	48,636

Atmospheric Removals of GHGs

Construction/Operations - Land-Use					
	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Land-Use (Sinks) (2)	0	0	0	0	0

Wood Products - Carbon Capture					
	CO2			**Mass Sum**	**CO2e**
	TPY			**TPY**	**TPY**
Wood Products - Carbon Capture	-233,373			-233,373	-233,373
	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Total Sinks	-233,373	0	0	-233,373	-233,373

Total Emissions plus Sinks = Direct Emissions + Indirect Emissions + Sinks

	CO2	**CH4**	**N2O**	**Mass Sum**	**CO2e**
	TPY	**TPY**	**TPY**	**TPY**	**TPY**
Total	-123,801	37	17	-123,747	-117,471

(1) As stated on page 10 of the January 2022 MN EQB EAW guidance, combustion of sawdust, hogged bark, and waste wood is a biogenic source of CO2 for which carbon neutrality may be assumed in carbon footprint development. CO2 emissions from the furnaces reflect natural gas combustion (maximum natural gas heat input is 60.25 MMBtu/hr per furnace).
(https://www.eqb.state.mn.us/sites/default/files/documents/EQB_Revised%20EAW%20Form%20Guidance_Climate_Sept%202021.pdf)

(2) Proposed land-use changes are not expected to produce greenhouse gas reductions (sinks).

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: EQUI 1 (Furnace 1 with Fines Burner)

Furnace 1 with Fines Burner	
Assumptions:	
Total rated heat input capacity (bark + fines), MMBtu/hr	240
Hours of Operation, Normal Operations	8,208
Natural Gas Burner Rated Capacity, MMBtu/hr (HHV, 75 LHV)	60.25
Heating Value of Wet Wood1, Btu/lb	4,500
Heating Value of Dry Wood[1], Btu/lb	8,000
Heating Value of Natural Gas[2], Btu/scf	1,020
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298

	Pollutant	EPA Pollutant Type	CAS Number	Control Summary		Wood		Natural Gas		Natural Gas Only		Wood		Wood and Natural Gas		Wood and Natural Gas			
				Control Efficiency	Control Type	AP-42	40 CFR Part 98 3,4	AP-42[3]	40 CFR Part 98 3,4	Potential Emissions (no control) [60.25 MMBtu/hr NG]		Potential Emissions (no control) [240 MMBtu/hr wood]		Potential Emissions (no control) [179.75 MMBtu/hr wood and 60.25 MMBtu/hr NG]		Potential Emissions (no control) Worst-Case		PTE Exhausted Through ESP	
						lb/MMBtu	lb/MMBtu	lb/MMscf	lb/MMBtu	lb/hr	tons/year 6	lb/hr	tons/year	lb/hr	tons/year 6	lb/hr	tons/year	lb/hr	tons/year
5	CO2e	GHG	NA	---	---	---	209.50	---	117.07	7,053	2,895	50,279	206,346	37,664	201,168	50,279	206,346	50,279	206,346
3	CO_2	GHG	NA	---	---	---	206.74	---	116.94	7,046	2,892	49,616	203,626	37,168	198,517	49,616	203,626	49,616	203,626
4	CH_4	GHG	NA	---	---	---	0.0159	---	0.0022	0.133	0.054	3.81	15.63	2.85	15.24	3.81	15.63	3.81	15.63
4	N_2O	GHG	NA	---	---	---	0.0079	---	0.0002	1.33E-02	5.45E-03	1.90	7.82	1.43	7.62	1.90	7.82	1.90	7.82

1 Heating value of wet wood (4,500 Btu/lb) and dry wood (8,000 Btu/lb) based on AP-42 Section 1.6

2 Heating value of natural gas taken from AP-42 Appendix A. Typical Parameters of Various Fuels.

3 CO2 emission factor from 40 CFR 98 Subpart C, Table C-1 (wood 93.80 kg CO2/MMBtu, natural gas 53.06 kg CO2/MMBtu), November 29, 2013.

4 CH4 and N2O emission factors from 40 CFR 98 Subpart C, Table C-2 (wood CH4 = 0.0072 kg CH4/MMBtu and N2O = 0.0036 kg N2O/MMBtu, natural gas CH4 = 0.001 kg CH4/MMBtu and N2O = 0.0001 kg N2O/MMBtu), November 29, 2013.

5 CO2e emissions are based on global warming potential from 40 CFR 98 Subpart A, Table A-1 (CO2=1, CH4=25, and N2O=298), November 29, 2013.

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: EQUI 2 (Furnace 2 with Fines Burner)

Furnace 2 with Fines Burner	
Assumptions:	
Total rated heat input capacity (bark + fines), MMBtu/hr	240
Hours of Operation, Normal Operations	8,208
Natural Gas Burner Rated Capacity, MMBtu/hr (HHV, 75 LHV)	60.25
Heating Value of Wet Wood1, Btu/lb	4,500
Heating Value of Dry Wood[1], Btu/lb	8,000
Heating Value of Natural Gas[2], Btu/scf	1,020
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298

	Pollutant	EPA Pollutant Type	CAS Number	Control Summary		Wood		Natural Gas		Natural Gas Only		Wood		Wood and Natural Gas		Wood and Natural Gas			
				Control Efficiency	Control Type	AP-42	40 CFR Part 98 3,4	AP-42[3]	40 CFR Part 98 3,4	Potential Emissions (no control) [60.25 MMBtu/hr NG]		Potential Emissions (no control) [240 MMBtu/hr wood]		Potential Emissions (no control) [179.75 MMBtu/hr wood and 60.25 MMBtu/hr NG]		Potential Emissions (no control) Worst-Case		PTE Exhausted Through ESP	
						lb/MMBtu	lb/MMBtu	lb/MMscf	lb/MMBtu	lb/hr	tons/year	lb/hr	tons/year	lb/hr	tons/year	lb/hr	tons/year	lb/hr	tons/year
5	CO2e	GHG	NA	---	---	---	209.50	---	117.07	7,053	2,895	50,279	206,346	37,664	201,168	50,279	206,346	50,279	206,346
3	CO_2	GHG	NA	---	---	---	206.74	---	116.94	7,046	2,892	49,616	203,626	37,168	198,517	49,616	203,626	49,616	203,626
4	CH_4	GHG	NA	---	---	---	0.0159	---	0.0022	0.133	0.054	3.81	15.63	2.85	15.24	3.81	15.63	3.81	15.63
4	N_2O	GHG	NA	---	---	---	0.0079	---	0.0002	1.33E-02	5.45E-03	1.90	7.82	1.43	7.62	1.90	7.82	1.90	7.82

Huber Engineered Woods - Cohasset, MN

Project: B2101896

Source: RTO

RTO	
Assumptions:	
RTO Heat Input Capacity, MMBtu/hr	10
Hours of Operation, Normal Operations	8,208
Heating Value of Natural Gas 1, Btu/scf	1,020
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298

	Pollutant	EPA Pollutant Type	CAS Number	Control Summary		Natural Gas		Natural Gas	
				Control Efficiency	Control Type	AP-42	40 CFR Part 98 2,3	Potential Emissions (no control)	
						lb/MMscf	lb/MMBtu	lb/hr	tons/year
4	CO2e	GHG	NA	---	---	---	117.07	1,171	4,804
2	CO_2	GHG	NA	---	---	---	116.94	1,169	4,799
3	CH_4	GHG	NA	---	---	---	0.0022	0.022	0.09
3	N_2O	GHG	NA	---	---	---	0.0002	0.002	0.01

1 Heating value of natural gas taken from AP-42 Appendix A. Typical Parameters of Various Fuels.

2 CO2 emission factor from 40 CFR 98 Subpart C, Table C-1 (wood 93.80 kg CO2/MMBtu, natural gas 53.06 kg CO2/MMBtu), November 29, 2013.

3 CH4 and N2O emission factors from 40 CFR 98 Subpart C, Table C-2 (wood CH4 = 0.0072 kg CH4/MMBtu and N2O = 0.0036 kg N2O/MMBtu, natural gas CH4 = 0.001 kg CH4/MMBtu and N2O = 0.0001 kg N2O/MM

4 CO2e emissions are based on global warming potential from 40 CFR 98 Subpart A, Table A-1 (CO2=1, CH4=25, and N2O=298), November 29, 2013.

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: EQUI 106 (Emergency Generator)

Emergency Generator	
Assumptions:	
Rated Capacity, Brake Horsepower (BHP)	570
Natural Gas Consumption Rate at 100% load, cfh	5,888
LPG Consumption Rate at 100% load, cfh	1,595
Natural Gas Rated Capacity, MMBtu/hr	5.9
LPG Rated Capacity, MMBtu/hr	4.0
Displacement, liters (12 cylinder)	21.9
Hours of Operation	52
Fuel	Natural Gas/LPG
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298
Btu/MMBtu	1,000,000
hr/yr	8,760

					Natural Gas	LPG	Worst-Case		
	Pollutant	EPA Pollutant Type	CAS Number	AP-42 Emission Factors1 (lb/MMBtu)	Hourly Emissions (lb/hr)	Hourly Emissions (lb/hr)	Hourly Emissions (lb/hr)	Maximum Theoretical Emissions (TPY)	Limited Annual Emissions (TPY)
	CO_2e	GHG	NA	115.8	682	462	682	2,987	17.73
	CO_2	GHG	NA	110.0	648	439	648	2,837	16.84
	CH4	GHG	NA	0.230	1.35	0.917	1.35	5.93	0.035
2	N2O	GHG	NA	2.20E-04	1.30E-03	8.79E-04	1.30E-03	5.68E-03	3.37E-05

1 AP-42 emission factors are based on natural gas and LPG, AP-42 Chapter 3.2 Natural Gas-fired Reciprocating Engines, Table 3.2-3 (4-Stroke Rich-Burn Engines), July 2000.
2 N2O emission factors from 40 CFR 98 Subpart C, Table C-2, (N2O = 1.0 x 10^-4 kg N2O/MMBtu), November 29, 2013.

Huber Engineered Woods - Cohasset, MN

Project: B2101896

Source: EQUI 107 Fire Pump

Fire Pump	
Assumptions:	
Rated Capacity, Brake Horsepower (BHP)	575
Diesel Fuel Consumption Rate, gal/hr	29.1
Rated Capacity, MMBtu/hr	4.0
Displacement, liters (6 cylinder)	15.0
Hours of Operation	52
Fuel	Diesel
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298
Btu/MMBtu	1,000,000
hr/yr	8,760

	Pollutant	EPA Pollutant Type	CAS Number	AP-42 Emission Factors[1] (lb/MMBtu)	Hourly Emissions (lb/hr)	Maximum Theoretical Emissions (TPY)	Limited Annual Emissions (TPY)
	CO_2e	GHG	NA	164.6	656	2,874	17.06
	CO_2	GHG	NA	164.0	654	2,864	17.00
2	CH_4[2]	GHG	NA	0.007	0.0264	0.115	6.86E-04
2	N_2O[2]	GHG	NA	0.0013	5.27E-03	2.31E-02	1.37E-04

1 AP-42 emission factors are based on diesel fuel, AP-42 Chapter 3.3 Gasoline And Diesel Industrial Engines, Tables 3.3-1, and 3.3-2, September 1996.

2 CH_4 and N_2O emission factors from 40 CFR 98 Subpart C, Table C-2, (CH_4 = 0.003 kg CH4/MMBtu and N_2O = 0.0006 kg N_2O/MMBtu), November 29, 2013.

Huber Engineered Woods - Cohasset, MN

Project: B2101896

Source: Building Back-Up Heater (Insignificant Activity)

RTO	
Assumptions:	
Heat Input Capacity, MMBtu/hr	10
Hours of Operation, Normal Operations	552
Heating Value of Natural Gas 1, Btu/scf	1,020
Conversion Factors:	
lb/ton	2,000
lb/kg	2.204
CO_2 to CO_2e	1
CH_4 to CO_2e	25
N_2O to CO_2e	298

	Pollutant	EPA Pollutant Type	CAS Number	Control Summary		Natural Gas		Natural Gas	
				Control Efficiency	Control Type	AP-42	40 CFR Part 98 2,3	Potential Emissions (no control)	
						lb/MMscf	lb/MMBtu	lb/hr	tons/year
4	CO2e	GHG	NA	---	---	---	117.07	1,171	323
2	CO_2	GHG	NA	---	---	---	116.94	1,169	323
3	CH_4	GHG	NA	---	---	---	0.0022	0.022	0.01
3	N_2O	GHG	NA	---	---	---	0.0002	0.002	0.00

1 Heating value of natural gas taken from AP-42 Appendix A. Typical Parameters of Various Fuels.

2 CO2 emission factor from 40 CFR 98 Subpart C, Table C-1 (wood 93.80 kg CO2/MMBtu, natural gas 53.06 kg CO2/MMBtu), November 29, 2013.

3 CH4 and N2O emission factors from 40 CFR 98 Subpart C, Table C-2 (wood CH4 = 0.0072 kg CH4/MMBtu and N2O = 0.0036 kg N2O/MMBtu, natural gas CH4 = 0.001 kg CH4/MMBtu and N2O = 0.0001 kg N2O/MMBtu), November 29, 2013.

4 CO2e emissions are based on global warming potential from 40 CFR 98 Subpart A, Table A-1 (CO2=1, CH4=25, and N2O=298), November 29, 2013.

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Mobile Sources - Routine Onsite Operations

Vehicle Types	Fuel type	Max. Number of Vehicle Trips per Day	Weekly Railcar Freight (tons/week)	Schedule	Days Per Week	Average Round-Trip Distance Traveled per Trip (mi)	Fuel Usage Rate	Total Vehicle Miles Traveled (VMT/yr)	Total Annual Fuel Usage (gal/yr)	CO2 Emission Factor (kg/gal) 1	Annual CO2 Emissions (ton)	CH4 Emission Factor (g/gal) 1	CH4 Emission Factor (g/mile) 1	Annual CH4 Emissions (ton)	N2O Emission Factor (g/mile) 1	N2O Emission Factor (g/mile) 1	Annual N2O Emissions (ton)	Annual CO2e Emissions (ton)
Log loader (log pile reclaim)	Diesel	100	---	Monday-Sunday	7	0.40	Assume 6 mpg	14,560	2,427	10.21	27	0.10	---	2.67E-04	0.49	---	1.31E-03	27.7
Front end loader	Diesel	64	---	Monday-Sunday	7	0.14	Assume 6 mpg	3,276	546	10.21	6	0.20	---	1.20E-04	0.47	---	2.83E-04	6.23
Total											**33**			**3.88E-04**			**1.59E-03**	**34**

1 CO2, CH4, and N2O emission factors taken from Table 2, Table 4, and Table 5 of EPA's "Emission Factors for Greenhouse Gas Inventories", April 2021 (https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf)

Emission Factor Vehicle Type	Huber Engineered Woods Vehicle Type
Construction/Mining Equipment	Front end loader
Logging Equipment	Log loader

*MN DOT Procedure Manual for Forecasting Traffic on Minnesota's Highway Systems, May 2012, pg. 175 (https://www.dot.state.mn.us/traffic/data/reports/forecast/Forecast_Manual_2012.pdf)

Sample Calculations (Log Loader):

Total Annual Fuel Usage (gal) = Max. Number of Vehicle Trips per Day (100 trips) x Days Per Week (7 days) x Average Round-Trip Distance (0.40 mile/trip) x (52 weeks/year) / Fuel Usage Rate (6 mile/gal) = 2,427 gal/year

CO2 Emissions (ton/year) = Total Annual Fuel Usage (2,427 gal/year) x CO2 Emission Factor (10.21 kg CO2/gal fuel combusted) x (2.204 lb/kg) / (2,000 lb/ton) = 27 tons/year

CO2e Emissions (ton/year) = (CO2 Emissions (27 tons/year) x CO2 Global Warming Potential (1)) + (CH4 Emissions (2.67E-04 tons/year) x CH4 Global Warming Potential (25)) + (N2O Emissions (1.31E-03 tons/year) x N2O Global Warming Potential (298)) = 27.7 tons/year

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Mobile Sources - Transportation Operations

Vehicle Types	Fuel type	Max. Number of Vehicle Trips per Day	Weekly Railcar Freight (tons/week)	Schedule	Days Per Week	Average Round-Trip Distance Traveled per Trip (mi)	Fuel Usage Rate	Total Vehicle Miles Traveled (VMT/yr)	Total Annual Fuel Usage (gal/yr)	CO2 Emission Factor (kg/gal) 1	Annual CO2 Emissions (ton)	CH4 Emission Factor (g/gal) 1	CH4 Emission Factor (g/mile) 1	Annual CH4 Emissions (ton)	N2O Emission Factor (g/mile) 1	N2O Emission Factor (g/mile) 1	Annual N2O Emissions (ton)	Annual CO2e Emissions (ton)
Log Delivery Truck	Diesel	184	---	Monday-Saturday	6	100	Assume 6 mpg	5,740,800	956,800	10.21	10,768	0.0095	---	1.00E-02	0.0431	---	4.55E-02	10,782
Resin, Paper, and Coating Materials Delivery Truck	Diesel	2	---	Monday-Friday	5	320	Assume 6 mpg	166,400	27,733	10.21	312	0.0095	---	2.90E-04	0.0431	---	1.32E-03	313
Waste Trucks (Ash)	Diesel	2	---	Monday-Friday	5	20	Assume 6 mpg	10,400	1,733	10.21	20	0.0095	---	1.82E-05	0.0431	---	8.24E-05	19.5
Finished Product Truck	Diesel	77	---	Monday-Saturday	6	800	Assume 6 mpg	19,219,200	3,203,200	10.21	36,051	0.0095	---	3.35E-02	0.0431	---	0.152	36,097
Employee Traffic	Gasoline/Diesel	115	---	Monday-Sunday	7	30	22 mpg	1,255,800	57,082	8.82	555	---	0.0222	3.07E-02	---	0.0387	5.36E-02	572
Final Product Transportation by Railcar	Diesel	---	588	Monday-Friday	5	1600	423 mpg/ton of freight	---	115,654	10.21	1,302	0.80	---	0.102	0.26	---	3.31E-02	1,314
MDI Resin, Wax and Ammonium Hydroxide Railcar	Diesel	---	723	Monday-Friday	5	1400	423 mpg/ton of freight	---	124,431	10.21	1,400	0.80	---	0.110	0.26	---	3.57E-02	1,414
Total											**50,408**			**0.286**			**0.321**	**50,511**

1 CO2, CH4, and N2O emission factors taken from Table 2, Table 4, and Table 5 of EPA's "Emission Factors for Greenhouse Gas Inventories", April 2021 (https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf)

Emission Factor Vehicle Type	Huber Engineered Woods Vehicle Type		
Gasoline Passenger Cars	Employee Traffic (model year 2000 gasoline emission factors and model year 2007 diesel emission factors assumed as worst-case).	Assumed % Gasoline Passenger Cars*	70.8%
Gasoline Light-Duty Trucks		Assumed % Gasoline Light-Duty Trucks*,**	26.2%
Light Duty Trucks (Diesel)		Assumed % Diesel Light-Duty Trucks*,**	3.0%
Medium- and Heavy-Duty Vehicles (Diesel)	Log delivery truck, resin, paper and coating materials delivery truck, waste trucks, finished product trucks		
Locomotives	Railcar (final product shipping, MDI resin, wax, and ammonium hydroxide receiving)		
Construction/Mining Equipment	Front end loader		
Logging Equipment	Log loader		

*MN DOT Procedure Manual for Forecasting Traffic on Minnesota's Highway Systems, May 2012, pg. 175 (https://www.dot.state.mn.us/traffic/data/reports/forecast/Forecast_Manual_2012.pdf)
"Of the majority of recent tube counts taken in the passenger car class, 69.8% of vehicles were classified as cars, 29.2% as pickups, and 1% as motorcycles."
**It is assumed that 3% of total employee traffic are diesel pickup trucks based on the national average (approximately 7.4 million diesel cars and SUVs out of 250 million passenger vehicles)
Source: https://www.greencarreports.com/news/1097513_which-states-have-the-most-diesel-vehicles-new-data-gives-results

Sample Calculations (Log Delivery Truck):

Total Annual Fuel Usage (gal) = Max. Number of Vehicle Trips per Day (184 trips) x Days Per Week (6 days) x Average Round-Trip Distance (100 mile/trip) x (52 weeks/year) / Fuel Usage Rate (6 mile/gal) = 956,800 gal/year

CO2 Emissions (ton/year) = Total Annual Fuel Usage (956,800 gal/year) x CO2 Emission Factor (10.21 kg CO2/gal fuel combusted) x (2.204 lb/kg) / (2,000 lb/ton) = 10,768 ton/year

CO2e Emissions (ton/year) = (CO2 Emissions (10,768 tons/year) x CO2 Global Warming Potential (1)) + (CH4 Emissions (0.010 tons/year) x CH4 Global Warming Potential (25)) + (N2O Emissions (0.046 tons/year) x N2O Global Warming Potential (298)) = 10,782 ton/year

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Mobile Sources - Construction Activities Estimated Project Life 35 years

Vehicle Types	Estimated Hours of Operation During Construction Period (hours)	Construction Schedule	Fuel type	Fuel Usage Rate (gal/hr)	Approximate Total Fuel Usage During Construction Period (gallons)	CO2 Emission Factor (kg/gal) 1	CO2 Emissions During Construction Period (ton)	CH4 Emission Factor (g/gal) 1	CH4 Emissions During Construction Period (ton)	N2O Emission Factor (g/gal) 1	N2O Emissions During Construction Period (ton)	CO2e Emissions During Construction Period (ton)
9630 Tractor	10,000	April 2022 - October 2022	Diesel	7	70,000	10.21	788	0.28	2.16E-02	0.49	3.78E-02	800
140 Motorgrader	5,000	April 2022 - October 2022	Diesel	5	25,000	10.21	281	0.20	5.51E-03	0.47	1.30E-02	285
D6 Dozer	6,000	April 2022 - October 2022	Diesel	7	42,000	10.21	473	0.20	9.26E-03	0.47	2.18E-02	479
D8 Dozer	4,000	April 2022 - October 2022	Diesel	12	48,000	10.21	540	0.20	1.06E-02	0.47	2.49E-02	548
349 Excavator	2,500	April 2022 - October 2022	Diesel	11	27,500	10.21	310	0.20	6.06E-03	0.47	1.42E-02	314
563 Compactor	5,000	April 2022 - October 2022	Diesel	3	15,000	10.21	169	0.20	3.31E-03	0.47	7.77E-03	171
Sidedumps	9,000	April 2022 - October 2022	Diesel	3	27,000	10.21	304	0.13	3.87E-03	0.49	1.46E-02	308
Total (tons)							**2,864**		**6.02E-02**		**0.134**	**2,906**
Total (tons/year, annualized over project life)							**82**		**1.72E-03**		**3.83E-03**	**83**

1 CO2, CH4, and N2O emission factors taken from Table 2 and Table 5 of EPA's "Emission Factors for Greenhouse Gas Inventories", April 2021 (https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf)

Emission Factor Vehicle Type	Huber Engineered Woods Construction Vehicle Type
Agricultural Equipment	Tractor
Construction/Mining Equipment	Motorgrader, dozer, excavator, compactor
Construction/Mining Offroad Trucks	Sidedump truck

Sample Calculations (Tractor):

Total Fuel Usage During Construction Period (gal) = Fuel Usage Rate (7 gal/hr) x Hours of Operation During Construction Period (10,000 hours) = 70,000 gal

CO2 Emissions During Construction Period (tons) = Total Fuel Usage (70,000 gal) x CO2 Emission Factor (10.21 kg CO2/gal fuel combusted) x (2.204 lb/kg) / (2,000 lb/ton) = 788 ton

CO2e Emissions During Construction Period (tons) = (CO2 Emissions (788 tons) x CO2 Global Warming Potential (1)) + (CH4 Emissions (0.022 ton) x CH4 Global Warming Potential (25)) + (N2O Emissions (0.038 ton) x N2O Global Warming Potential (298)) = 800 tons

Sample Calculations (Annualized CO2e Emissions):

Annual CO2e Emissions (ton/year) = Total CO2e Emissions During Construction Period (2,906 tons) / Estimated Project Life (35 years) = 83 ton/year

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Land Use Changes - Construction Activities

Estimated Project Life 35 years

Land-use category prior to project: forest land (1a)
Land-use category after project: settlement (1b)

2019 Net CO2 Flux from Forest Land Converted to Settlements	62,900,000	Ton CO2e	Source: Reference 1, Table 6-99
2019 Land Converted to Settlements	541,000	hectares	Source: Reference 1, Table 6-5
	1,336,270	acres	

Emission Factor Based on Land Type Carbon Flux (tons CO2e/area) = net CO2 flux from land conversion / total area of land use change in US

Emission Factor (tons CO2e/area) = 47.07

Total HEW Project Acreage	188	acres
CO2e Emissions from Land-Use Changes	**8,849**	**tons**
Annual CO2e Emissions from Land-Use Changes (tons/year, annualized over project life)	**252.8**	**tpy**

1 US EPA "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2019", Chapter 6: Land Use, Land-Use Change, and Forestry (https://www.epa.gov/sites/default/files/2021-04/documents/us-ghg-inventory-2021-chapter-6-land-use-land-use-change-and-forestry.pdf)

1a Forest Land: A land-use category that includes areas at least 120 feet (36.6 meters) wide and at least one acre (0.4 hectare) in size with at least 10 percent cover (or equivalent stocking) by live trees including land that formerly had such tree cover and that will be naturally or artificially regenerated. Trees are woody plants having a more or less erect perennial stem(s) capable of achieving at least 3 inches (7.6 cm) in diameter at breast height, or 5 inches (12.7 cm) diameter at root collar, and a height of 16.4 feet (5 m) at maturity in situ. Forest Land includes all areas recently having such conditions and currently regenerating or capable of attaining such condition in the near future. Forest Land also includes transition zones, such as areas between forest and non-forest lands that have at least 10 percent cover (or equivalent stocking) with live trees and forest areas adjacent to urban and built-up lands. Unimproved roads and trails, streams, and clearings in forest areas are classified as forest if they are less than 120 feet (36.6 m) wide or an acre (0.4 ha) in size. However, land is not classified as Forest Land if completely surrounded by urban or developed lands, even if the criteria are consistent with the tree area and cover requirements for Forest Land. These areas are classified as Settlements. In addition, Forest Land does not include land that is predominantly under an agricultural land use

1b Settlements: A land-use category representing developed areas consisting of units equal to or greater than 0.25 acres (0.1 ha) that includes residential, industrial, commercial, and institutional land; construction sites; public administrative sites; railroad yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment plants; water control structures and spillways; parks within urban and built-up areas; and highways, railroads, and other transportation facilities. Also included are all tracts that may meet the definition of Forest Land, and tracts of less than 10 acres (4.05 ha) that may meet the definitions for Cropland, Grassland, or Other Land but are completely surrounded by urban or built-up land, and so are included in the Settlements category. Rural transportation corridors located within other land uses (e.g., Forest Land, Cropland, and Grassland) are also included in Settlements. (reference 1, page 6-15)

2 Total project site = 188 acres. Includes 159.3 acre facility operational area (facility buildings, storage yards, stormwater ponds, roads, parking lot, and railroad spur area). Remaining 27.7 acres is associated with temporary land cover changes as a result of construction activities.

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Off-Site Electricity Emissions

Estimated Electricity Usage Rate (MWh)	CO2 Emission Factor (lb/MWh) 1	Annual CO2 Emissions (tpy)	CH4 Emission Factor (lb/MWh) 1	Annual CH4 Emissions (tpy)	N2O Emission Factor (lb/MWh) 1	Annual N2O Emissions (tpy)	Annual CO2e Emissions (tpy)
10.0	1,098.4	48,110	0.119	5.21	0.017	0.745	48,462

1 CO2, CH4, and N2O emission factors taken from Table 6 of EPA's "Emission Factors for Greenhouse Gas Inventories", April 2021 (https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf). "Total Output" emission factors were used as directed in the Table 6 footnote.
2 Assumed 8,760 hours of operation per year

Sample Calculations (10 MWh Electricity Usage):

CO2 Emissions (ton/year) = Electricity Usage Rate (10 MWh) x CO2 Emission Factor (1,098.4 lb CO2/MWh) x (8,760 hours/year) / (2,000 lb/ton) = 48,110 ton/year

CO2e Emissions (ton/year) = (CO2 Emissions (48,110 ton/year) x CO2 Global Warming Potential (1)) + (CH4 Emissions (5.21 ton/year) x CH4 Global Warming Potential (25)) + (N2O Emissions (0.745 ton/year) x N2O Global Warming Potential (298)) = 48,462 ton/year

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Off-Site Waste Management Emissions

Waste Material	Estimated Annual Fly Ash Generation (tons per year) 1	CO2e Emission Factor (metric tons CO2e/ short ton material) 2	Annual CO2e Emissions (tpy) 3
Fly Ash	7,903	0.02	174

1 Annual ash handling throughout of 7,903 ton/year is based on an annual average fuel demand of 296 MMBtu/hr (fuel demand is lower during the summer).
2 CO2, CH4, and N2O emission factors taken from Table 6 of EPA's "Emission Factors for Greenhouse Gas Inventories", April 2021 (https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf). Fly ash is assumed to be landfilled.
3 Metric tons of CO2e multiplied by 1.102 to convert to US tons of CO2e
4 Primary waste material produced is ash. Other waste materials will be generated in minimal quantities

Sample Calculations (7,903 tons/year fly ash disposal):

CO2e Emissions (ton/year) = Annual Fly Ash Generation (7,903 ton/year) x CO2 Emission Factor (0.02 metric ton CO2/short ton fly ash) x (1.102 short tons/metric ton) = 174 ton/year

Huber Engineered Woods - Cohasset, MN
Project: B2101896
Source: Wood Products - Carbon Capture

Due to absporption of carbon dioxide during photosynthesis, production of wood products (including building materials) effectively capture carbon dioxide from the atmosphere and store it for the usable lifetime of the product. The following estimates for carbon capture are based on the environmental product declaration and expected production of these materials. Other factors such as the potential reuse of these materials prior to disposal may impact the calculated carbon capture per unit volume produced.

Wood Product	Expected Annual Production (MSF/yr)	Expected Annual Volumetric Production (ft3/yr)	Carbon Capture Per Unit Volume (kg CO2/m3) 2	Annual CO2 Capture (tpy) 3	Annual CO2e Capture (tpy) 3
AdvanTech	725,000	22,656,250	330	-233,373	-233,373
Zip System					

1 Based on 31.25 ft^3/MSF 3/8" basis
2 Based on environmental product declaration, Tables 12 and 15, removals associated with biogenic carbon content of the bio based product https://www.huberwood.com/uploads/documents/technical/documents/Environmental-Product-Declaration-for-AdvanTech-Subflooring-and-Sheathing-EPD-AdvanTech_2020-09-23-170536.pdf
3 CO2 capture is expressed as a negative value to indicate a reduction of net carbon dioxide emissions
4 The carbon content of the AvanTech product is representative of the carboncontent of all product lines proposed to be manufactured at the site.
5 The value for annual carbon capture from wood products is the same for potential to emit GHG emissions and projected actual GHG emissions. The value is based on projected actual production rate because HEW does not realistically expect that production will exceed the forecast level because of facility operational constraints (e.g., required downtime). Using the projected actual production rate in the potential annual carbon capture from wood products is a conservative approach as it lessens the

Sample Calculations (725,000 MSF/year):

CO2 Capture (ton/year) = Annual Production (725,000 MSF) x (31.25 ft^3/MSF) x (1 m^3/35.3 ft^3) x CO2 Capture Per Unit Volume (330 kg CO2/m^3) x (2.204 lb/kg) / (2,000 lb/ton) = 233,373 ton/year

Appendix I

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