

Appendix H

Property Values Supplement

Property Value Supplement

Attempts to correlate proximity to transmission lines with impacts to property values are complicated by the interaction of several relevant factors, including geographic region, land use, variability in perceptions over time, and limited sales data for similar properties before and after the construction of transmission lines. Researchers have generally used survey-based techniques and statistical analyses to make inferences and draw conclusions about the relationship between transmission lines and property values. In general, surveys provide useful insights for estimating price effects based on public opinion, yielding what researchers refer to as “stated preferences.” Statistical analyses, on the other hand, reflect the actual behavior of property buyers and sellers in terms of recorded sales prices, providing what researchers refer to as the “revealed preferences.” In other words, there is often incongruity between what people think and how they actually behave. Measuring both perceptions and actual behaviors helps researchers understand the relationship between transmission lines and property values.

A recent literature review (Jackson and Pitts 2010, reference 1) examined 17 studies on the relationship between transmission lines and property values to compare their results and to develop some general conclusions. The 17 studies, spanning the time period between 1956 and 2009, were compiled and reviewed by Real Property Analytics, Inc., a private firm specializing in the valuation of property potentially affected by external environmental factors. The Real Property Analytics review was published in the *Journal of Real Estate Literature*, which is a publication of the American Real Estate Society. The studies evaluated impacts from transmission lines ranging from 69 kilovolts (kV) to 345 kV. They were placed into one of three categories designated by the authors:

- Survey-based studies;
- Statistical sales-based analyses using multivariate analysis to isolate the impact of transmission lines by holding other variables statistically constant; and
- Sales-based analyses not using multivariate analysis but utilizing factors such as sale/resale analysis, price per square foot comparisons, case studies, and “paired sales” analysis, where the values of two homes that are similar in all respects except for proximity to transmission lines are compared.

Upon completion of their review of the studies, Jackson and Pitts (2010, reference 1) concluded the following:

“The studies reviewed...generally pointed to small or no effects on sales prices due to the presence of electric transmission lines. Some studies found an effect but this effect generally dissipated with time and distance. The effects that were found ranged from approximately 2% to 9%. Most studies found no effect and in some cases a premium was observed.”

Jackson and Pitts discussed the utility of both survey-based and statistically-based methods, quoting one of the research papers to note that statistical analyses “reflect what buyers and sellers actually do, opposed to what potential buyers say they might do, under specified hypothetical circumstances” Selected findings from Jackson and Pitts’s literature review are provided below, along with the year and type of study:

Survey-based studies

- Kinnard, 1967 – Questionnaires were sent to property owners intersected by or abutting transmission line right-of-way (ROW) in 17 Connecticut subdivisions. Over 85 percent indicated

they would purchase again in the same location. Kinnard concluded that property value is not significantly affected by proximity to transmission lines.

- Morgan et al., 1985 – A questionnaire asked participants to rank the risk from transmission lines, electric blankets, and 14 other common hazards. Electric blankets and transmission lines were ranked as presenting the least risk. Participants were then provided with information on electric and magnetic fields (EMF) and associated potential health effects. Subsequent questionnaire responses indicated a change in perception and an increased concern about the risk of EMF.
- Solum, 1985 – Presented a questionnaire to 180 agricultural, recreational, or residential property owners in northwest Wisconsin whose land was encumbered by transmission lines. All three types had some level of concern over the proximity of the lines but for varying reasons. Further interviews indicated that all but one of the properties sold at a market price comparable to non-encumbered properties and that none of the buyers had reduced their purchase offers due to the presence of the transmission line.
- Delaney and Timmons, 1992 – Survey results from 219 real estate appraisers found that 84 percent believed that transmission line proximity results in an average ten percent lower market value. Ten percent of respondents found no effect and six percent thought transmission lines increased property value due to larger lots for similar price.
- Kung and Seagle, 1992 – Sent a questionnaire to homeowners in Memphis and Shelby Counties, Tennessee. Half of the respondents considered the transmission line an eyesore; however, 72 percent of those who thought the lines were an eyesore also said the lines had no effect on the purchase price. Prices of homes adjacent to the transmission line are similar to prices of other homes in the same neighborhood.
- Priestly and Evans, 1996 – Conducted a survey of 445 homeowners living near transmission lines in the San Francisco area. Eighty-seven percent of the 267 respondents felt the transmission line was a negative element in their neighborhood.

Statistical Sales Price Analyses

- Brown, 1976 – Conducted regression analysis on sales of farmland in Saskatchewan, Canada, between 1965 and 1970 and found that the relationship of land value to the number of power line structures was not statistically significant and that the lines did not negatively affect property value. Brown also found that the structures can be an impediment to farming operations.
- Colwell and Foley, 1979 – Examined 200 property sales over a ten-year period in Decatur, Illinois, and found that sales prices increase as distance from a transmission line increases. Property values were approximately six percent lower within 50 to 200 feet of the transmission line, but there was no difference in property value beyond 200 feet.
- Colwell, 1990 – Followed up the study above and confirmed that the selling price of residential property increases as distance from the transmission line increases. The rate of increase slows with distance and eventually disappears.
- Rigdon, 1991 – Evaluated 46 properties sold in Marquette County, Michigan over a five-year period and found no statistically significant relationship between sales price and proximity to a transmission line easement.
- Hamilton and Schwann, 1995 – Reviewed previous literature and found that transmission lines can reduce adjacent property values, but that the reduction is generally less than five percent of property value and that the reduction diminishes at 600 feet.
- Des Rosiers, 1998 – Reviewed property values of 507 homes in the Montreal area and found an average drop in property value of 9.6 percent for homes immediately adjacent to the line. He also

found an average increase of up to 9.2 percent in value for homes one to two lots away from the transmission line and no effect beyond 500 feet.

- Wolverton and Bottemiller, 2003 and Cowger, Bottemiller, and Cahill, 1996 – Two studies, both conducted in Portland, Vancouver, and Seattle, the 2003 work repeating the 1996 study with more rigorous analytical methods. Both applied statistical methods to paired-sales analysis and found no price effect on residential property from proximity to transmission lines. The data also show no difference in appreciation rates between homes near a transmission line and homes further away.
- Chalmers and Voorvaart, 2009 – Studied residential properties sold in Connecticut and Massachusetts between 1999 and 2007 and found proximity to transmission lines to have an insignificant effect on sales prices.

Sales-based analyses

- Carll, 1956 – Compared property values and interviewed owners, buyers, and brokers along a transmission line in Los Angeles and found that residences adjoining the ROW had not sold at a discount and that lenders did not adjust loan amounts for lots adjacent to the ROW.
- Bigras, 1964 – Reviewed over 1,900 deeds of sale and mortgages in Quebec and found that prices for vacant land adjacent to transmission lines were generally higher than the average price of all transactions. Land adjacent to transmission lines was sold faster and was developed to a higher degree than land away from the lines.

Jackson and Pitts (2010) concluded from these studies that proximity to transmission lines results in little or no effect on property value. In studies where transmission lines were found to have impacts to property values, the decrease in values typically ranged from approximately two percent to ten percent. In some instances, increases in property value were found. The following additional studies and reviews generally reach a similar conclusion.

Another recent meta-analysis, Brinkley and Leach (2019) evaluated 54 studies spanning 40 years. Their research found that half of the literature and studies on the impact of power lines concluded no effect on property values, and the other half showed a loss in property values of 2 to 10%. While home value studies showed mostly no price impacts, with effects ranging from a 2 to 9% decrease in price, some homes experienced a price premium. Half of the studies showed negative impacts with the range of 3-6%. Significant effects are noticeable to properties closer than 60 meters with an average decrease in value from 0.2 to 27.3%. Ranges of value impact within energy types show a great deal of uncertainty and many under-researched caveats in planning for energy infrastructure. For example, the impact of overhead powerlines is mixed, with results prefaced by access to viewsheds. The distance of maximal impact for powerlines was 200 meters, with a range of average value change of a 10% increase (if including improved access to greenspace) to a 30% decrease.

Brinkley and Leach (2019) found that studies after 1979 showed a more consistent reduction between 5-10%. Though many studies assert that visual impacts are the greatest predictor of property prices, the influence of buried power lines has yet to be assessed and so is not included in this meta-analysis. Research suggests that diminution in price for properties near the power lines tends to disappear anywhere from five to fourteen years after construction. This could be because of vegetation growth that acts as a cover. No studies conducted property value assessments in relation to community perception or knowledge about the development or involvement in job creation.

Thomas and Welke (2017) performed an event study to examine the revealed price effect on residential properties from an upgrade to high-voltage transmission towers that were constructed on an existing ROW. The study looked at a period of two years where existing 220 kV towers that were not in use were upgraded to 500 kV towers, then three years later, they were removed, and the lines were buried. They found a significant loss in value from the upgrade for encumbered (8.3%) and abutting (4.9%) properties, and insignificant losses when the older towers were present, even for lots with an easement. Their conclusions are consistent with previous studies that found the price impact is initially large but diminishes over time. Thomas and Welke (2017) concluded that their results were consistent with other research findings:

- Over time, price impact is diminished.
- Price impact effects vanish beyond about 100 meters.
- The proximate sales results are largely driven by abutting lots.
- Encumbered sales are significantly negatively affected and abutting properties somewhat less so.

They further found no evidence that public information prior to the construction of the towers affected sales prices, even if the property abutted or was encumbered by the ROW. They did find that the burying of the 500 kV cables required disruption to immediately proximate homeowners, but presumably at a much lower level than towers. More research would need to be done on effects post burying of the lines.

Between 1978 and 1982, Jensen and Weber and the Jensen Management Company conducted three studies in west-central Minnesota. The studies in 1978 and 1982 are of particular interest since they consider effects to agricultural land. The 1978 study found that the landowners cited an inconvenience to the presence of the line but had not paid less for their land (Weber and Jensen 1978, reference 2). The 1982 study, however, found there was a broad range of effects from no effect to a 20 percent reduction, which depended on the amount of disruption to farm operations (Jensen and Weber 1982, reference 3).

The David Wyman and Chris Mothorpe's study, "The Pricing of Power Lines: A Geospatial Approach to Measuring Residential Property Values" (Reference 8), examines the relationship between high-voltage transmission lines and vacant property prices in Pickens County, South Carolina, using geospatial techniques. Analyzing 5,455 vacant lot sales in Pickens County, South Carolina, the study concluded that the proximity and visibility of these lines (based on geospatial analysis techniques) influence property values. Vacant lots adjacent to power lines experienced an average price discount of 44.9 percent, while those non-adjacent vacant properties up to 1,000 feet away saw a price discount of 17.9 percent. Visibility, particularly of transmission towers, amplifies this effect, with properties that had an unobstructed view resulting in greater devaluation. They state that their findings are site-specific to this study, and caution that pricing discounts for vacant properties in rural settings may not be generalizable to complex suburban settings or properties with residential housing structures. This study was also limited to a sample that excluded parcels larger than 20 acres in size.

James A. Chalmers' study, "High-Voltage Transmission Lines and Rural, Western Real Estate Values," (Reference 7) investigates the impact of 500 kV transmission lines on property values of agricultural, residential, and recreational uses throughout 640 miles of Montana between 2000 and 2010. The study was done using a combination of 49 transactions and an even larger number of lot sales in 7 subdivisions. The study utilized personal interviews, sales comparisons, and paired sales techniques. The research found that three issues were dominant: Use, size, and substitutes. If the property was more heavily oriented to residential use - it was more vulnerable to transmission line impacts, whereas property-oriented more toward purely recreational use were much less vulnerable to impacts. Properties that were oriented to agricultural use showed no price effects of transmission lines. The larger the

property, the less vulnerable it was to impacts. There can be price and absorption (that is – the time it takes a property to sell) effects if there are alternative properties similar to the subjected property. If the property affected is relatively unique and the transmission line is one of several differentiating factors, the property is less vulnerable to price and absorption effects. The study emphasized that the market response to high-voltage lines varies greatly depending on location, property-specific factors, and the visibility of the lines.

In the final EIS on the Arrowhead-Weston Electric Transmission Line Project, the Wisconsin Public Service Commission (PSC) addressed the issue of property value changes associated with high-voltage transmission lines. This document summarized the findings of approximately 30 papers, articles, and court cases covering the period from 1987 through 1999. The Arrowhead-Weston EIS provides six general observations (reference 4):

- The potential reduction in sale price for single-family homes may range from zero to 14 percent.
- Adverse effects on the sale price of smaller properties could be greater than effects on the sale price of larger properties.
- Other amenities, such as proximity to school or jobs, lot size, square footage of a house, and neighborhood characteristics, tend to have a much greater effect on sale price than the presence of a power line.
- The adverse effects appear to diminish over time.
- Effects on sale price are most often observed for properties crossed by or immediately adjacent to a power line, but effects have also been observed for properties farther away from the line.
- The value of agricultural property is likely to decrease if the power line poles are placed in an area that inhibits farm operations.

The Arrowhead-Weston Electric Transmission Line Project environmental impact statement (EIS) reported that in Midwest states such as Minnesota, Wisconsin, and the Upper Peninsula of Michigan, the average decrease appears to be between four and seven percent. The EIS noted that it is very difficult to make predictions about how a specific transmission line would affect the value of specific properties.

An additional potential adverse effect of transmission lines on adjacent properties is on the ability of homeowners and developers to obtain Federal Housing Administration (FHA) and/or Housing and Urban Development (HUD) loans. Section 2.2(J) of the current HUD guidebook 4150.2 addresses this issue in the following FAQ:

FAQ: Is a property eligible for FHA if there are overhead or high-voltage power lines nearby?

The appraiser must indicate whether the dwelling or related property improvements are located within the easement serving a high-voltage transmission line, radio/TV transmission tower, cell phone tower, microwave relay dish or tower, or satellite dish (radio, TV cable, etc.).

1) If the dwelling or related property improvement is located within such an easement, the lender must obtain a letter from the owner or operator of the tower indicating that the dwelling and its related property improvements are not located within the tower's (engineered) fall distance in order to waive this requirement.

2) If the dwelling and related property improvements are located outside the easement, the property is considered eligible and no further action is necessary. The appraiser, however, is

instructed to note and comment on the effect on marketability resulting from the proximity to such site hazards and nuisances.

In general, and for the safe operation of the line, a residence cannot be located within a transmission line ROW; thus, all residences near the project would fall into category 2 (a dwelling located “outside the easement”). For this category, the HUD appraiser is directed to comment on any effects on marketability resulting from the transmission line. These comments could affect loan values if an appraiser believes the residence is nevertheless located so near the transmission line that the line could be a hazard or nuisance.

The 2023 study from Qinan Lu, et al. “Disamenity or premium: Do electricity transmission lines affect farmland values and housing prices differently?” looks into the effects of transmission lines on nearby farmland and housing property values in 12 Midwest states from 2015 to 2019 (Reference 9). The study combines multiple datasets, including Zillow housing sales data, farmland sales data, satellite data on wind resources, land characteristics data, and other supplementary datasets. Their conclusion is that the results of their analysis reaffirm negative effects of transmission lines on residential property values, with a larger effect on urban houses than houses outside urban areas. General consensus in recent literature has shown largely null effects of transmission lines on farmland property value, potentially due to the adaptation to transmission lines in terms of agricultural production, aesthetic adjustment, and scientific awareness. The study also found contrarian evidence to the recent consensus in literature, that proximity to transmission lines creates higher land prices for farmland owners, especially for those owning parcels with abundant wind resources.

Max Harleman’s 2024 study “Who Bears the Cost of Renewable Power Transmission Lines? Evidence from Housing Values” examines the Competitive Renewable Energy Zones (CREZ) in Texas, one of the largest transmission investment projects in U.S. history. The estimated impact of CREZ on the typical property accounts for a variety of local conditions such as terrain, income, and ruralness, making it more generalizable to other transmission projects. Limitations from the study include that over 90 percent of the evaluated lines are 345 kV, which typically have 150 foot ROWs and have towers that around 130 feet tall. Other limitations include that CREZ runs through areas with sparse vegetation, sampling bias in that Texas is a “non-disclosure state” where buyers and sellers of homes are not legally required to report transaction prices, and the analysis was not able to credibly quantify the effect of the lines on agricultural and vacant properties. Data for this study was used on real estate transactions. The residential properties within 0.5 km, but not crossed by the transmission lines, decreased in value by up to 10 percent on average within three years of construction. Beyond 0.5 km, the lines appear to have no detrimental effect on property values. The author makes an argument for compensating all affected residents, not just where the project infrastructure is sited.

James Chalmers 2019 study “High-Voltage Transmission Lines and Residential Property Values in New England: What Has Been Learned” summarizes work over ten years on the effects of high voltage transmission lines on residential property values in New England. The research reviewed in this article provides guidance to answering two questions:

1. Does the absence of consistent, measurable effects ensure that no properties are adversely affected?
2. Can the Incremental value effects of system upgrades in existing high-voltage transmission line corridors be anticipated for nearby residential properties?

To answer question one, they found that there is a small set of properties (within 100 feet of home to ROW boundary, visibility of structures, and encumbrance) for which there is a significant probability of an adverse sale price effect should all three attributes be present. The article provides guidelines from previous research in identifying the properties that fall into this set. To answer question two depends on whether the system upgrade changes the number of properties that fall into the set of vulnerable properties and on the extent to which the effects of the project can be mitigated. Because of the difficulty for appraisers to develop market evidence to adjust for loss in property value due to factors outside of the property itself, extracting appropriate adjustments from something like a case study approach would be appropriate. Overall, the research summarized that the critical variables to control for are encumbrance, distance of the home from the ROW boundary, and the visibility of structures.

A 2024 study from Cheng Tang and Stephen Gibbons “Are Friends Electric? Valuing the Social Costs of Power Lines Using House Prices” provides evidence on the costs from the impact of new transmission structures on local housing prices in England and Wales. The study compares price changes in neighborhoods that are close to overhead power lines, before and after they are constructed, with price changes in comparable neighborhoods farther away. The study findings suggest that new overhead structure construction reduces prices by 3.9 percent for properties within 1500 meters, suggesting that impacts extend further than previously estimated.

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Appendix I

Emergency Services

Service	Name	City	County
Hospital	Appleton Munciple Hospital	Appleton	Swift
Hospital	Alomere Hospital	Alexandria	Douglas
Hospital	Glacial Ridge Hospital	Glenwood	Pope
Hospital	Ortonville Area Health Services	Ortonville	Big Stone
Hospital	Swift County Benson Health Services	Benson	Swift
Hospital	Stevens Community Medical Center	Morris	Stevens
Fire Station	Hancock Fire	Hancock	Stevens
Fire Station	Starbuck Fire	Starbuck	Pope
Fire Station	Carlos Fire	Carlos	Douglas
Fire Station	Louisburg Fire	Louisburg	Lac Qui Parle
Fire Station	Garfield Fire	Garfield	Douglas
Fire Station	Ortonville Fire	Ortonville	Big Stone
Fire Station	Alexandria Fire	Alexandria	Douglas
Fire Station	Odessa Fire	Odessa	Big Stone
Fire Station	Minnesota Department Of Natural Resources Forestry Division	Alexandria	Douglas
Fire Station	Lowry Fire	Lowry	Pope
Fire Station	Osakis Fire	Osakis	Douglas
Fire Station	Correll Volunteer Fire	Correll	Big Stone
Fire Station	Sedan Fire	Glenwood	Pope
Fire Station	Villard Volunteer Fire	Villard	Pope
Fire Station	Danvers Fire	Danvers	Swift
Fire Station	Kensington Fire	Kensington	Douglas
Fire Station	Forada Fire	Alexandria	Douglas
Fire Station	Bellingham Fire	Bellingham	Lac Qui Parle
Fire Station	Glenwood Fire	Glenwood	Pope
Fire Station	Morris Fire	Morris	Stevens
Fire Station	Cyrus Fire	Cyrus	Pope
Fire Station	Benson Fire	Benson	Swift
Fire Station	Clontarf Fire	Clontarf	Swift
Fire Station	Appleton Fire	Appleton	Swift
Law Enforcement	Douglas County Sheriff	Alexandria	Douglas
Law Enforcement	Stevens County Sheriff	Morris	Stevens
Law Enforcement	Ortonville Police	Ortonville	Big Stone
Law Enforcement	Glenwood Police	Glenwood	Pope

Law Enforcement	Pope County Sheriff	Glenwood	Pope
Law Enforcement	Big Stone County Sheriff	Ortonville	Big Stone
Law Enforcement	Starbuck Police	Startbuck	Pope
Law Enforcement	Benson Police	Benson	Swift
Law Enforcement	Appleton Police	Appleton	Swift
Law Enforcement	Swift County Sheriff	Benson	Swift
Law Enforcement	Morris Police	Morris	Stevens
Law Enforcement	University Of Minnesota - Morris Campus Police	Morris	Stevens
Law Enforcement	Alexandria Police	Alexandria	Douglas

Appendix J

Electric and Magnetic Fields Supplement

Electric and Magnetic Fields Supplement

There is concern about the potential for adverse health effects from exposure to electric and magnetic Fields (EMF) as the result of residing near high voltage transmission lines (HVTLs). Extremely low-frequency (ELF) - EMF that is emitted from HVTLs does not have the energy to ionize molecules or to heat them; however, they are fields of energy and thus have the potential to produce effects.

In the 1970s, epidemiological studies indicated a possible association between childhood leukemia and EMF levels. Since then, various types of research, including animal studies, epidemiological studies, clinical studies and cellular studies, have been conducted to examine the potential health effects of EMF. Scientific panels and commissions have reviewed and studied this research data. These studies have been conducted by, among others, the National Institute of Environmental Health Sciences (NIEHS), the World Health Organization (WHO), the International Agency for Research on Cancer (IARC), the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) and the Minnesota State Interagency Working Group (MSIWG). In general, these studies concur that:

- Based on epidemiological studies, there is a weak association between childhood leukemia and EMF exposure. There is however no consistent association between EMF exposure and other diseases in children or adults.
- Laboratory, animal, and cellular studies fail to show a cause and effect relationship between disease and EMF exposure at common EMF levels. A biological mechanism for how EMFs might cause disease has not been established.

Because a cause and effect relationship cannot be established, yet a weak association between childhood leukemia and EMF exposure has been shown: 1) the potential health effects of EMF are uncertain; 2) no methodology for estimating health effects based on EMF exposure exists; 3) further study of the potential health effects of EMF is needed; and 4) a precautionary approach, including regulations and guidelines, is needed in designing and using all electrical devices.

Researchers continue to study potential health effects related to ELF-EMF and potential causal mechanisms. The following sections provide brief summaries from scientific panels and commissions that have examined the potential health impacts of ELF-EMF.

In 1992, the U.S. Congress authorized the Electric and Magnetic Fields Research and Public Information Dissemination Program (EMF-RAPID program). Congress instructed NIEHS and the U.S. Department of Energy to direct and manage a program of research and analysis aimed at providing scientific evidence to clarify the potential for health risk from exposure to ELF-EMF. The program provided the following conclusions to Congress (NIEHS 1999, reference 1):

- “The scientific evidence suggesting that ELF-EMF exposures pose any health risk is weak.
- Epidemiological studies have serious limitations in their ability to demonstrate a cause and effect relationship whereas laboratory studies, by design, can clearly show that cause and effect are possible. Virtually all of the laboratory evidence in animals and humans and most of the mechanistic work done in cells fail to support a causal relationship between exposure to ELF-EMF at environmental levels and changes in biological function or disease status. The lack of consistent positive findings in animal or mechanistic studies weakens the belief that this

association (the epidemiological association between ELF-EMF and childhood leukemia) is actually due to ELF-EMFs but it cannot completely discount the epidemiological findings.

- The NIEHS concludes that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard. In our opinion, this finding is insufficient to warrant aggressive regulatory concern. However, because virtually everyone in the United States uses electricity and therefore is routinely exposed to ELF-EMF, passive regulatory action is warranted such as a continued emphasis on education both the public and regulated community on means aimed at reducing exposures. The NIEHS does not believe that other cancers or non-cancer outcomes provide sufficient evidence of a risk to currently warrant concern.”

In 2002, the EMF-RAPID program published a detailed question and answer pamphlet summarizing research on ELF-EMF and potential health effects. The pamphlet is available at:

http://www.niehs.nih.gov/health/materials/electric_and_magnetic_fields_associated_with_the_use_of_electric_power_questions_and_answers_english_508.pdf

World Health Organization

In 1996, the WHO established the International EMF Project to study the potential health impacts of EMF. The project develops and disseminates information on EMF and public health. In 2007, the WHO issued an environmental health monograph on ELF-EMF (WHO 2007, reference 2). The monograph concluded:

- “Scientific evidence suggesting that everyday, chronic low-intensity (above 0.3 – 0.4 μT) power-frequency magnetic field exposure poses a health risk is based on epidemiological studies demonstrating a consistent pattern of increased risk for childhood leukemia. Uncertainties in the hazard assessment include the role that control selection bias and exposure misclassification might have on the observed relationship between magnetic fields and childhood leukemia. In addition, virtually all of the laboratory evidence and the mechanistic evidence fail to support a relationship between low-level ELF magnetic fields and changes in biological function or disease status. Thus, on balance, the evidence is not strong enough to be considered causal, but sufficiently strong to remain a concern.
- A number of other diseases have been investigated for the possible association with ELF magnetic field exposures. These include cancers in children and adults, depression, suicide, reproductive dysfunction, developmental disorders, immunological modifications and neurological disease. The scientific evidence supporting a linkage between ELF magnetic fields and any of these diseases is much weaker than for childhood leukemia and in some cases (for example, for cardiovascular disease or breast cancer) the evidence is sufficient to give confidence that magnetic fields do not cause the disease.
- The use of precautionary approaches is warranted. However, electric power brings obvious health, social and economic benefits and precautionary approaches should not compromise these benefits. Furthermore, given both weakness of the evidence for a link between exposure to ELF magnetic fields and childhood leukemia and the limited impacted on public health if there is a link, the benefits of exposure reduction on health are unclear. Thus, the costs of precautionary measures should be very low. The costs of implementing exposure reductions would vary from one country to another, making it very difficult to provide general recommendation for balancing the costs against the potential risk from ELF fields.”

International Agency for Research on Cancer

Since 1969, the IARC has been evaluating the carcinogenic risks of chemicals and other agents, such as viruses and radiation. In 2001, the IARC convened a working group of scientists to evaluate possible carcinogenic risks to humans from exposure to EMF (IARC 2002, reference 3). These scientists concluded that ELF magnetic fields are possibly carcinogenic to humans (a “Group 2B carcinogen”). Group 2B carcinogens are agents for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence for carcinogenicity in experimental animals. The working group concluded:

- “Since the first report suggesting an association between residential ELF electric and magnetic fields and childhood leukemia was published in 1979, dozens of increasingly sophisticated studies have examined this association. In addition, there have been numerous comprehensive review, meta-analyses and two recent pooled analyses. In one pooled analysis...no excess risk was seen for exposure to ELF magnetic fields below 0.4 μ T and a twofold excess risk was seen for exposure above 0.4 μ T. [In the other study] a relative risk of 1.7 for exposure above 0.3 μ T was reported.
- No consistent relationship has been seen in studies of childhood brain tumors or cancers at other sites and residential ELF electric and magnetic fields.
- While a number of studies are available, reliable data on adult cancer and residential exposure to ELF electric and magnetic fields, including the use of appliances, are sparse and methodologically limited.... Although there have been considerable number of reports, a consistent association between residential exposure and adult leukemia and brain cancer has not been established.”

Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR)

The SCENIHR serves as an advisory committee to the European Commission. At the request of the Commission, the SCENIHR reviewed possible adverse health impacts due to EMF. In 2007, the committee concluded (SCENIHR 2007, reference 4):

- “The previous conclusion (by a prior advisory committee, the Scientific Committee on Toxicity, Ecotoxicity and the Environment, CSTE) that ELF magnetic fields are possibly carcinogenic, chiefly based on occurrence of childhood leukemia, is still valid. For breast cancer and cardiovascular disease, recent research has indicated that an association is unlikely. For neurodegenerative diseases and brain tumors, the link to ELF fields remains uncertain.”
- In vitro studies have documented that that low intensity ELF can inhibit the anti-proliferative effect of tamoxifen on a specific subclone of human MCF-7 breast cancer cells (Blackman et al. 2001, reference 5; Ishido et al. 2001, reference 6; Girgert et al. 2005, reference 7). There is a need for independent replication of certain studies suggesting genotoxic effects and for better understanding of combined effects of ELF magnetic fields with other agents, their effects on free radical homeostasis, as well as of the possible implications of ELF field inhibition of tamoxifen effects.

In 2009, the committee updated its prior opinion after reviewing new studies of ELF-EMF (SCENIHR 2009, reference 8) and concluded:

- “The new information available is not sufficient to changes the conclusions of the 2007 opinion. The few new epidemiological and animal studies that have addressed ELF exposure and cancer do not change the previous assessment that ELF magnetic fields are a possible carcinogen and might contribute to an increase in childhood leukemia. At present, in vitro studies did not provide a mechanistic explanation of this epidemiological finding.
- New epidemiological studies indicate a possible increase in Alzheimer’s disease arising from exposure to ELF. Further epidemiological and laboratory investigations of this observation are needed.”
- There remains a need for independent replication of certain studies suggesting genotoxic effects and for better understanding of combined effects of ELF magnetic fields with other agents, their effects on free radical homeostasis, as well as of the possible implications of ELF field inhibition of tamoxifen effects.

Minnesota State Interagency Working Group (MSIWG)

In 2002, the MSIWG on EMF issues was formed to examine the potential health impacts of EMF and to provide science-based information to policy makers in Minnesota. Working group members included representatives from the Department of Commerce, Department of Health, Pollution Control Agency, Public Utilities Commission, and Environmental Quality Board. The working group issued a white paper entitled “A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options” (MSIWG on EMF Issues 2002, reference 9). The white paper concluded:

- “Some epidemiological results do show a weak but consistent association between childhood leukemia and increasing exposure to EMF... However, epidemiological studies alone are considered insufficient for concluding that a cause and effect relationship exists and the association must be supported by data from laboratory studies. Existing laboratory studies have not substantiated this relationship... nor have scientists been able to understand the biological mechanism of how EMF could cause adverse effects. In addition, epidemiological studies of various other diseases, in both children and adults, have failed to show any consistent pattern of harm from EMF.
- The Minnesota Department of Health concludes that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects. However, as with many other environmental health issues, the possibility of a health risk from EMF cannot be dismissed. Construction of new generation and transmission facilities to meet increasing electrical needs in the state is likely to increase exposure to EMF and public concern regarding potential adverse health effects.
- Based on its review, the Work Group believes the most appropriate public health policy is to take a prudent avoidance approach to regulating EMF. Based upon this approach, policy recommendations of the Work Group include:
 - Apply low-cost EMF mitigation options in electric infrastructure construction projects;
 - Encourage conservation;
 - Encourage distributed generation;
 - Continue to monitor EMF research;

- Encourage utilities to work with customers on household EMF issues; and
- Provide public education on EMF issues.”

Health Concern Article Review

During the comment period for the draft environmental impact statement, commenters requested additional information regarding potential impacts to vulnerable populations and brought forth additional studies not previously reflected in this supplement. This section summarizes the findings of those studies. EERA staff was unable to locate peer-reviewed sources that specifically address potential impacts of EMF to fetuses, geriatric people, and those with acute or chronic illnesses.

A study conducted at an infertility clinic in Iran from 2014-2016 found that “After adjusting for confounding factors, women living within 500 meters of the lines carried a higher risk...of infertility compared with women living more than 1000 meters of the lines.” However, “This paper goes on to acknowledge that its results “may be partly subjective in nature, as [the authors] did not directly measure the electromagnetic field strength in residential areas . . . the findings were mainly based on the distance from a power line.” The authors point out that using GIS data is nonetheless valuable. “Furthermore, the cross-sectional nature of the study design did not permit assessment of the temporal and thus potentially causal relation of the exposure and infertility”. (Esmailzadeh et al, 2019, reference 10).

Regarding the effect of EMF on fetus development, a systematic review of EMF studies on non-human mammals found that RF-EMF exposure in utero “probably does not affect offspring brain weight and may not decrease female offspring fertility; on the other hand, RF-EMF may have a detrimental impact on neurobehavioural functions, varying in magnitude for different endpoints, but these last findings are very uncertain” (Cordelli et al. 2023, reference 16). An additional meta-analysis and systematic review looked at studies with human subjects, and found that that ELF-EMF and RF exposure during pregnancy was associated with several fetal complications, including “significant enhancement of oxidant factors, decrease of antioxidant factors, and increase in DNA damage parameters, as well as changes in expression proteins in cord blood genes...” There is also an association of “close maternal exposure in prenatal and postnatal (residence or occupational exposure) with EMFs of high voltages power lines more than 1 mG or 50 Hz with congenital anomalies (CNS defect, spina bifida) and fetal developmental disorders (such as reduced embryonic bud length) and neurodevelopmental disorders in childhood (e.g., speech problems in children).” However, the review concludes “due to the limitations of studies, such as inaccurate measurement of exposure to ELF-EMF...or inaccurate measure of the actual rate of exposure to EMF or case–control model of most studies, the effects of EMF on fetal and childhood abnormalities should be interpreted with caution” (Kashani et al, 2023, reference 17). “The role of electromagnetic fields in neurological disorders” published in the Journal of Chemical Neuroanatomy, found that: “There is some evidence that EMFs can affect brain activity and the sleep cycle in humans. However, the health correlation is not clearly defined and studies cannot explain the precise mechanisms.” It concluded that further studies of these effects are needed” (Terzi et al, (2016), reference 15).

There are multiple studies that suggest the potential for negative effects of EMF on health, including concerns about various cognitive functions (Kazemi et al 2018; Tekieh et al 2018; Aliyari et al 2019; Duan et al 2014, Aliyari et al 2022), melatonin levels (Kazemi et al 2018, Aliyari et al 2022)), psychological effects including stress levels (Aliyari et al 2019, Aliyari et al 2022); cellular health (Garip and Akan 2010); metabolic health including changes in blood composition (Aliyari et al 2022); and neurochemical levels and neuronal health (Duan et al 2014). These studies relied on small sample sizes, short durations of

observation, in-vitro or controlled conditions with consistent exposure levels that would not necessarily reflect actual exposure levels, and/or single species observations not on humans and the findings are therefore limited and further research is required.

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Appendix K

Draft Vegetation Management Plan

DRAFT VEGETATION MANAGEMENT PLAN
Big Stone South to Alexandria 345 kV
Transmission Line Project

MPUC DOCKET NO. E017, ET10/TL-23-160

October 2024

1.0 Introduction

The Big Stone South to Alexandria Project (Project) is a 345 kilovolt (kV) transmission line from the existing Big Stone South Substation in South Dakota, east to the existing Alexandria Substation in Minnesota. The Project will be located in portions of Big Stone, Swift, Stevens, Pope, and Douglas Counties, Minnesota. The Project is one segment of the larger Big Stone South – Alexandria – Big Oaks 345 kV Transmission Project. The Project comprises the Western Segment of the Big Stone South – Alexandria – Big Oaks 345 kV Transmission Project. The Project is proposed by Otter Tail Power Company (Otter Tail) and Western Minnesota Municipal Power Agency (Western Minnesota), through its agent, Missouri River Energy Services (MRES) (collectively, the Applicants).

This draft Vegetation Management Plan (VMP or Plan) is intended to describe the Applicants' standards for handling of vegetation removal and protection of existing vegetation during site preparation and construction and for revegetation of areas of exposed soil during restoration following Project construction. The VMP will be implemented in conjunction with the Agricultural Impact Mitigation Plan (AIMP), construction stormwater permitting and plans (as needed), and other required approvals concerning land disturbance activities associated with construction of the Project. The VMP will also be implemented during operation of the Project.

The Applicants provide this draft VMP for consideration as part of the route permit proceedings currently underway with the Minnesota Public Utilities Commission (Commission).

2.0 General Right-Of-Way Vegetation Management

The Applicants' standard practice is to clear all woody vegetation within the full right-of-way (ROW) width for construction of new transmission lines. This includes cases where a new line will be located within an existing ROW such as for a line rebuild or double-circuiting a new line with an existing line. The purpose of clearing to the full extent of the ROW is to ensure adequate and safe working spaces for crews during construction as well as to provide appropriate clearances for safe reliable operation of the lines once construction is complete. There are limited circumstances when this practice is modified and selected vegetation can remain within the ROW provided National Electric Safety Code (NESC) clearance requirements are met.

While removing woody vegetation within the ROW is necessary, efforts will be made to protect existing compatible low-growing vegetation to minimize construction impacts such as soil erosion, wetland damage, or habitat loss. Implementation of integrated

vegetation management practices help to minimize the impacts of future vegetation management activities on a property. The use of herbicides focuses on controlling woody vegetation within the ROW to reduce the impacts of the need to mow on a property and help establish a sustainable ROW that can be managed with selective herbicide treatments. A timeframe for the conversion of a ROW to establish compatible, non-woody vegetation will vary based on site conditions. A property owner could also encourage this conversion of the ROW to compatible vegetation by allowing selective herbicide use and through planting vegetation that results in increasing compatible vegetation within a ROW.

The following is a list of general practices that will be used to minimize vegetation impacts related to Project construction:

- Use erosion control best management practices (BMPs) to intercept stormwater runoff from areas disturbed as part of clearing operations. Stormwater BMPs will be addressed in the Project-specific Stormwater Pollution Prevention Plan (SWPPP);
- Minimize rutting by using matting materials in wetland areas for all construction activities, including ROW clearing activities and to perform work on firm or frozen ground that can support the equipment used during winter construction;
- Minimize soil disturbance in steeply sloped areas, to the extent possible and/or practicable;
- Limit construction activities, including vegetation removal, to the ROW and off-ROW access;
- To the extent practicable and safe, limit traffic in the ROW between transmission structure locations to a single access path;
- Limit staging and lay-down areas to previously disturbed areas where practicable;
- To the extent practicable, complete construction in wet organic soils when the ground is frozen; and
- When existing, low-growing vegetation is disturbed during construction, focus restoration efforts on establishing compatible (low-growing), non-invasive species within the ROW.

3.0 Vegetation Removal

The Project will require the clearing of vegetation within the ROW and along temporary construction access roads. In addition, tall woody vegetation outside of the ROW at risk of hazardous falls into the ROW that may interfere with safe construction and safe and reliable operation of the transmission line will be removed and managed through the operational life of the Project.

Clearing of vegetation will occur prior to other construction activities as allowed by landowner agreements and permit conditions. Clearing may be accomplished with the use of chainsaws, mowers, and hydraulic tree-cutting equipment. Vegetation will be cut at, or slightly above, the ground surface. Rootstock or stumps will typically be left in place unless transmission structure installation or construction access requires otherwise or at the request of the landowner.

Landowners will be notified to allow them to harvest trees within easement boundaries or hazardous trees outside easement boundaries prior to the initiation of clearing. The landowner will retain the title to all timber material, if desired. Non-merchantable material, including trees, brush, and slash, will be either cut and scattered, placed in windrow piles, or chipped. Non-merchantable felled material may also be removed from the ROW in a fashion that does not cause erosion unless BMPs are installed.

3.1 Upland Vegetation Removal

The cut and scatter method consists of cutting understory trees, branches, and brush, sectioning them into smaller pieces, and scattering them across the site. The cut and scatter method may be used in areas where limited clearing is necessary, and access is challenging. This method will be used to limit the need for unnecessary equipment access and hauling which could potentially disturb existing ground or vegetation.

Woody vegetation may be chipped and scattered over the ROW to a maximum depth of one inch in non-agricultural upland areas.

3.2 Wetland Vegetation Removal

The use of heavy equipment in wetlands will be kept to the minimum extent practicable. Minimization of damage to wetland vegetation and soils will be accomplished by the following BMPs:

- constructing in wetlands during frozen conditions to the extent feasible;

working in dry conditions;

- using low ground-pressure tires or specialized tracked vehicles; and
- using matting materials during non-frozen ground conditions.

Removal of trees and shrubs from forested wetlands may be necessary in some locations. The removal of woody vegetation within forested wetlands will be conducted in accordance with applicable wetland permit conditions. Within these areas, all trees and large shrubs will be cleared to ground level. Small diameter trees and shrubs (less than 6-inch diameter) will be cut and debris scattered in place. Large diameter trees and shrubs (greater than 6-inch diameter) will be hauled out of wetland areas to suitable upland locations and processed as described in **Section 3.0**. If the cut and scatter method is used within wetland areas, no slash material will be left in the wetlands. Chipping or scattering of chips will not occur in wetlands.

Stump removal may occur within wetlands only where stumps interfere with the placement of construction mats or pole locations, or pose a risk to construction tires and equipment. Where removal is required for access, stumps will be ground level with or slightly below the ground surface using low ground-pressure, track-mounted equipment. Woody materials generated by stump grinding may be thin-spread in the wetland but may not be mounded.

4.0 Herbicide Use

Herbicides may be used within the ROW to control regrowth of woody species, prevent the re-sprout of stumps of tall-growing tree species, or to control invasive or noxious weed species. Herbicides will be used in accordance with manufacturer's specifications and all applicable federal and state regulations. Herbicides designated for upland use will not be used within 75 feet of the vegetative buffer of waterbodies. Herbicides used in or near wetlands and waterbodies must be designed for use in wet areas as designated by manufacturer's specifications and federal and state regulations. Herbicides will not be used on public lands without required permits/approvals and will not be used at organic farms or other properties where landowners prohibit their use.

The contractor applying herbicide will be required to obtain any necessary permits and/or certifications prior to herbicide placement and will be required to keep proper documentation of location and timing of herbicide use. Treatment will conform to manufacturers' specifications.

5.0 Noxious Weeds and Invasive Species Control

The Applicants have identified mitigation measures to be implemented to prevent the introduction and spread of noxious weeds and invasive species (NWIS) on lands disturbed by construction activities.

Preventing the introduction of NWIS from outside of the Project area will be primarily accomplished by ensuring that, prior to arrival onsite, equipment is clean and visible dirt or plant parts are removed using methods such as vehicle washing; high-pressure, compressed-air blowers; or brushing. A variety of methods can be used to control NWIS that are already present within the Project ROW or access routes. These include completing tree and brush clearing during the winter, treating NWIS-infested areas with herbicide prior to start of clearing, spreading mulch along access roads, and routing access roads away from NWIS-infested areas.

Winter clearing limits the likelihood of construction equipment coming in contact with NWIS plant parts or seeds and reduces the chances of spreading them throughout the ROW. Treatment of NWIS areas with herbicides before they are able to go to seed can also minimize spread. If mulch is used on the Project, it will consist of state-certified, weed-free material or mulch derived from onsite locations. The contractor will be responsible for locating and documenting the source of certified, weed-free mulch. Copies of the applicable certification documentation must be made available upon request to the appropriate agencies. Mulch derived from onsite locations may be spread up to six inches deep in upland areas to provide ground protection along access roads. Upon abandonment of access roads, woodchip mulch will be spread evenly to a depth no greater than one inch. No mulch will be spread in wetland locations. Major NWIS infestation areas identified during the first growing season will be treated with the use of herbicides or by mechanical methods.

6.0 Seeding and Revegetation

Revegetation of areas disturbed by construction activities will take place as soon as practicable following construction completion in those areas. Seedbed preparation will be dependent on the site conditions following construction activities and may include tilling to a minimum depth of four inches with a disc, field cultivator, or chisel plow, breaking up large clumps and firming the soil surface. Prior to seeding, prepared beds should be sufficiently soft to allow for seed penetration and mulch anchoring, while sufficiently firm to provide surface soil stability. Seeding and mulching should occur parallel to ground contours as practicable.

In areas where stumps remain within areas of cleared forest, it may not be practical to access large areas of ground with seeding and seedbed preparation equipment. In these areas, smaller vehicles may be required to perform tasks such as smoothing ruts, preparing seedbeds with small rakes, and surface packing after seeding. Fertilizers and other soil amendments are not recommended and will only be applied as requested by and agreed to with landowners.

Because of the linear nature of transmission line projects, there are typically many different landcover types and plant communities impacted by Project construction. In cases where there are exposed soils in areas such as roadsides, field edges, and other locations dominated by non-native species, a Minnesota state seed mix from the 25 series (Non-Native Grassland) will typically be used. These are certified seed mixes that are designed for regional land cover types and meet minimum standards for seed purity, germination rate, weed seed content and pure live seed weight, and are certified as noxious-weed free. Seed mixes can be found here: <https://bwsr.state.mn.us/seed-mixes>. In locations where disturbances are within previously undisturbed natural areas which contain native plant species, an appropriate native seed mix will be used. On private agricultural lands, the Applicants will implement applicable portions of the AIMP and will work with landowners to develop appropriate measures for reseeded of disturbed soils which may involve planting of row crops. Pastures will be seeded with landowner-specified seed mix.

6.1 Seeding Methods

Seeding methods may include broadcast, seed drilling, or hydroseeding.

Broadcast seeding is the most commonly used method for relatively small, disturbed areas, which are typically what is seen in transmission line construction. Seed will be uniformly distributed by a mechanical, hand-operated seeder, or in small seeding areas, by hand. Following seeding, the surface will be raked with a cultipacker, harrow, or hand rake. The bed will be firmed as appropriate to site conditions.

Drilled seed will typically be sown at a depth of approximately 0.25 inch; however, some native seed mixes contain small seed which needs to be shallower. If native seed mixes are being installed via seed drill equipment, the equipment will be able to accommodate and uniformly distribute different sizes of seed at the required depth. Feeding mechanisms will be able to evenly distribute different seed types at the rates specified. Seedbed soil will be suitably firmed immediately following seed drilling. Seed drilling will be only used in areas with a larger disturbance footprint.

Hydroseeding involves applying seed in a broadcast, hydromulch slurry. The hydromulch mix allows the installer to see where application has taken place, ensuring uniform coverage of the seeding area. The hydro-seeder must provide for continuous agitation of slurry and provide for a uniform flow of slurry. This method is not recommended for diverse, native seed mixes because of the range of seed size and necessary planting depths.

When used, native seed mixes are typically most successful when installed between April 1 to June 30, or when soil temperatures have fallen below 55 degrees Fahrenheit in the fall. However, seeding will also be completed outside of those time periods, as areas are ready for revegetation, in order to facilitate permanent vegetation cover as soon as possible. Additional seed may be installed in areas where initial seeding is not successful.

Temporary seed (oats or winter wheat) may also be applied in those situations as a cover crop. Temporary seeding of cover crop will occur in locations where unfrozen, bare soil surface conditions and ruts will not be permanently restored within 30 days of completion of active work. Temporary restoration activities will include the repair of rutted surfaces and an even broadcast-seeding of the temporary cover-crop seed mix at a rate appropriate to the cover crop to provide erosion control of the soils. No mulch will be applied in wetland areas.

6.2 Natural Revegetation

In many cases natural revegetation by early successional native species following tree clearing is expected to occur. In areas where native species voluntarily revegetate the ROW, active restoration and seeding may not be required. Regular monitoring will take place to ensure that NWIS are controlled, that desirable native plant species become the dominant vegetation communities in natural areas, and that bare soils are quickly stabilized to reduce erosion. In areas of minimal disturbance, vegetation will be allowed to regenerate naturally.

Where standing water is not present, and where surrounding vegetation is dominated by abundant native species, the seeding of bare soils created by rutting, using the temporary cover-crop seed mix, may be sufficient for cover while native species revegetate the area.

In areas where wetland plant communities are dominated by native species with rhizomatous root systems that will likely rapidly recolonize areas of limited disturbance, bare soils may be broadcast-seeded with the seasonally appropriate temporary cover crop. In areas where disturbed and bare soils are sufficient to preclude revegetation from the local, native seed source, a native wetland seed mix will be applied.

7.0 Erosion Control

In some cases, temporary erosion control methods will be necessary to stabilize soils and give the seed time to germinate. Erosion control measures may consist of anchored straw mulch, hydromulch, wood chip mulch, or erosion control blankets. When used, the contractor will be responsible for acquiring certified weed-free mulch. If used, erosion-control blanketing will be wildlife-friendly, non-welded weave in order to minimize impacts to small wildlife. Mulch or blanketing will be required on disturbed, exposed soils on all slopes greater than five percent and on dry, sandy soils prone to erosion by wind or rain.

If there are locations where seeding is not possible, and there is adequate seed bank present in the soil, temporary stabilization using erosion control matting or mulch will be installed and maintained in a similar manner as in seeded areas. Dormant seeding may be used after soil temperatures have fallen below 55 degrees Fahrenheit and lower temperatures prevent seed from germinating. If dormant seeding is performed, temporary erosion control measures will be installed as indicated in the Project SWPPP.

8.0 Monitoring

The Applicants will monitor and control NWIS within the ROW through the construction period. The Applicants' Environmental/Agricultural Monitor will inspect and provide information regarding infestations of NWIS along the ROW to the appropriate agencies. The Applicants will be required to meet easement and lease conditions and obligations and will continue to work with landowners and the appropriate agencies to achieve standards set forth in easement or lease agreements.

The Applicants will monitor areas where seeding and erosion control measures have been implemented and will follow-up with reseeding measures where vegetative cover by the specified seed mix, or revegetation by the local, native seed source is inadequate to provide long-term stability and sustainable native plant communities.

9.0 Operations and Maintenance

Once the Project is constructed, Project operations and maintenance activities will likely continue to affect vegetation resources, but at a lower level of intensity than during construction. These activities will likely include periodic vegetation management along the transmission line by using control methods such as manual (chainsaws), mechanical (mowers and other specialized vegetation management equipment including aerial saws where appropriate) and herbicides.

The purpose of operational vegetation management will be to ensure that NESC requirements for clearance between trees and transmission lines be maintained at all times. Trees and other vegetation growing in or adjacent to the ROW will be trimmed to prevent power outages caused by tree contact with a transmission line. Any power line contact with a tree can cause a short circuit which may lead to a blackout or threaten public safety. Trees and other vegetation typically will be pruned beyond the minimum clearance distance to account for the fact that they continuously grow and sway with the wind. Power lines can also sag due to high usage, heat, or snow/ice build-up.

The Applicants may also clear vegetation to allow periodic access for maintenance and repair of the facilities in the surrounding vegetation.

During operations and maintenance, the Applicants will monitor vegetation growth and the control of NWIS as described in **Section 5.0**.

Appendix L

Draft Agricultural Impact Mitigation Plan

DRAFT – AGRICULTURAL IMPACT MITIGATION PLAN
Big Stone South to Alexandria 345 kV Transmission Line
Project

MPUC DOCKET NO. E017, ET10/TL-23-160

July 2025

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Definitions

Capitalized terms used in this Agricultural Impact Mitigation Plan shall have the meanings provided below. The definitions provided for the defined words used herein shall apply to all forms of the words.

Agricultural Land	Land that is actively managed for cropland, hay land, or pasture, and land in government set-aside programs.
Applicants	Otter Tail Power Company (OTP) and Western Minnesota Municipal Power Agency (Western Minnesota), through its agent, Missouri River Energy Services (MRES).
Apply	To intentionally or inadvertently spread or distribute any substance onto the exposed surface of the soil.
Environmental/ Agricultural Monitor	Monitor retained by the Applicants responsible for overall project compliance with permit conditions and commitments made in this document. The Environmental/Agricultural Monitor, or Monitor, shall also report directly to the Minnesota Department of Agriculture and will be responsible for auditing the Applicants' compliance with provisions of this AIMP. The Monitor will have demonstrated experience with electric transmission line construction on Agricultural Land.
Certifying Agent	As defined by the National Organic Program Standards, Federal Regulations 7 CFR Part 205.2.
Cropland	Land actively managed for growing row crops, small grains, or hay.
Decertified or Decertification	Loss of Organic Certification.
Easement	The agreement(s) and/or interest in privately owned Agricultural Land held by the Applicants by virtue of which it has the right to construct, operate, and maintain the transmission line together with such other rights and obligations as may be set forth in such agreement.
Final Clean-up	Transmission line activity that occurs after the power line has been constructed. Final Clean-up activities may include: removal of construction debris, de-compaction of soil as required, removal of temporary erosion control structures, final grading, and restoration of fences and required reseeding. Once Final Clean-up is finished, Landowner will be contacted to settle all damage issues and will be provided a form to sign acknowledging final construction settlement.

APP Exhibit _____, Scheidecker Direct - Schedule C

Inspector	The individual or contractor identified by the Applicants to provide inspection services related to construction of the Project.
Landowner	Person(s), or their representatives, holding legal title to Agricultural Land on the transmission line route from whom the Applicants are seeking, or has obtained, a temporary or permanent Easement.
Non-Agricultural Land	Any land that is not “Agricultural Land” as defined above.
Organic Agricultural Land	Farms or portions thereof described in 7 CFR Parts 205.100, 205.101, and 205.202.
Organic Buffer Zone	As defined by the National Organic Program Standards, Federal Regulations 7 CFR Part 205.2.
Organic Certification or Organic Certified	As defined by the National Organic Program Standards, Federal Regulations 7 CFR Part 205.100 and 7 CFR Part 205.101.
Organic System Plan	As defined by the National Organic Program Standards, Federal Regulations 7 CFR Part 205.2.
Prohibited Substance	As defined by the National Organic Program Standards, Federal Regulations 7 CFR Part 205.600 through 7 CFR 205.605 using the criteria provided in 7 USC 6517 and 7 USC 6518.
Right-of-Way	The Land included in permanent and temporary Easements which the Applicants acquire for the purpose of constructing, operating and maintaining the transmission line.
Subsoil	Soil that is not Topsoil and located immediately below Topsoil.
Tenant	Any Person(s) lawfully renting or sharing land for agricultural production which makes up the “Right-of-Way” as defined in this AIMP.
Tile	Artificial subsurface drainage system.
Topsoil	The uppermost horizon (layer) of the soil, typically with the darkest color and highest content of organic matter.

1.0 Introduction

This Agricultural Impact Mitigation Plan (AIMP) was developed by Otter Tail Power Company (OTP) and Western Minnesota Municipal Power Agency (Western Minnesota), through its agent, Missouri River Energy Services (MRES) (together, referred to as the Applicants), with the Minnesota Department of Agriculture (MDA) in compliance with Minnesota Statutes 216E.10, subdivision 3(b). The Big Stone South to Alexandria Transmission Project (Project) is a 345 kilovolt (kV) transmission line from the existing Big Stone South Substation located west of Big Stone City, South Dakota, east and north to the existing Alexandria Substation near the City of Alexandria, Minnesota. The Project will be jointly owned by OTP and Western Minnesota. The Project is needed to provide additional transmission capacity, to mitigate current capacity issues, and to improve electric system reliability throughout the region as more renewable energy resources are added to the electric system in and around the region.

2.0 Purpose

The overall objective of this AIMP is to identify measures the Applicants will take to avoid, mitigate, minimize, repair, and/or provide compensation for impacts on Agricultural Land. The AIMP and its provisions will be implemented during construction and restoration activities that the Applicants undertake for the Project prior to filing notice of completion of construction with the Minnesota Public Utilities Commission (Commission).

Capitalized words and other defined terms have the meanings given to them in this AIMP.

This AIMP and its construction standards and policies apply only to construction and restoration activities occurring partially or wholly on privately owned Agricultural Land. The measures do not apply to construction or restoration activities occurring entirely on public rights-of-way, railroad rights-of-way, publicly owned land, or private land that is not Agricultural Land. The Applicants will, however, adhere to the same construction and restoration standards relating to the repair of agricultural tile when tiles are encountered, whether on Non-Agricultural Land or Agricultural Land, on public highway rights-of-way, railroad rights-of-way, or publicly or privately owned land.

This AIMP also applies to Organic Agricultural Land as described in the National Organic Program Rules, 7 CFR Parts 205.100, 205.101, and 205.202 (Section 7 of this AIMP). Portions of this AIMP that identify standards and policies as they apply to Organic Agricultural Land apply only to the types of lands defined in the National Organic Program Rules. Further, construction and restoration standards and policies identified in this AIMP can be modified through Easement or other agreement between the Applicants

and the Landowner of Agricultural Land, as appropriate. In such case, the Easement or other agreement will control.

Unless the Easement or other agreement, regardless of nature, between the Applicants and the Landowner or Tenant specifically provides to the contrary, the mitigative actions specified in the construction and restoration standards and policies set forth in this AIMP will be implemented in accordance with the General Provisions in Section 3.0 below.

3.0 General Provisions

The mitigative actions are subject to change by Landowners or Tenants, provided such changes are negotiated with and acceptable to the Applicants.

Certain provisions of this AIMP require the Applicants to consult with the Landowner and Tenant, if known, of a property. The Applicants will engage in a good faith effort to secure the agreement of both Landowner and Tenant in such cases.

Unless otherwise specified, the Applicants will retain qualified contractors to execute mitigative actions. However, the Applicants may negotiate with Landowners or Tenants to carry out the mitigative actions that Landowners or Tenants wish to perform themselves.

Mitigative actions employed by the Applicants pursuant to this AIMP, unless otherwise specified in this AIMP or in an Easement or other agreement negotiated with an individual Landowner or Tenant, will be implemented within 90 days following completion of Final Clean-up on an affected property, weather permitting, or unless otherwise delayed by mutual agreement between Landowner or Tenant and Applicant. Temporary repairs will be made by the Applicants during construction as needed to minimize the risk of additional property damage or interference with the Landowner's or Tenant's access to or use of the property that may result from an extended time period to implement permanent mitigative actions.

The Applicants will implement the mitigative actions contained in this AIMP to the extent that they do not conflict with the requirements of any applicable federal and/or state rules and regulations and other permits and approvals that are obtained by the Applicants for the Project. To the extent a mitigative action required by this agreement is determined to be unenforceable in the future due to requirements of other federal or state permits issued for the Project, the Applicants will so inform the Landowner or Tenant and will work with them to develop a reasonable alternative mitigative action.

Prior to the construction of the transmission line, the Applicants will provide each Landowner and known Tenant with a telephone number and address which can be used

to contact the Applicants, both during and following the completion of construction, regarding the agricultural impact mitigation work which will be performed on their property or other construction-related matters. If the contact information changes at any time before completion of Final Clean-up and/or after the completion of construction, the Applicants will provide the Landowner and Tenant with updated contact information. The Applicants will respond to Landowner and Tenant telephone calls and correspondence within a reasonable time.

The Applicants will use good faith efforts to obtain a written acknowledgement of completion from each Landowner and known Tenant upon the completion of Final Clean-up on their respective property.

If any provision of this AIMP is determined to be unenforceable, no other provision will be affected by that determination, and the remainder of the AIMP will be interpreted as if it did not contain the unenforceable provision.

4.0 Working with Landowners

4.1 Advance Notice of Access to Private Property

The Applicants will endeavor to provide the Landowner and/or known Tenant advanced notice before beginning construction on the property. Prior notice will consist of a personal contact, email, letter or a telephone contact, whereby the Landowner and the Tenant are informed of the Applicants' intent to access the land.

5.0 Environmental/Agricultural Monitor

5.1 Qualifications and Selection of the Environmental/Agricultural Monitor

The Applicants will hire an Environmental/Agricultural Monitor (Monitor) to act as an independent third party to monitor compliance with this AIMP and other permit conditions/regulatory requirements¹. The Applicants will coordinate with the MDA in identifying potential contractors to conduct environmental and agricultural monitoring and to select the Monitor. The Applicants will direct the selected contractor to communicate independently with the MDA and set up a reporting relationship as the MDA instructs.

The selected Monitor will:

1. Have a bachelor's degree in agronomy, soil science or equivalent work experience.
1. Have demonstrated practical experience with electric transmission line

¹ For example, if a Monitor is required to implement other permit requirements (such as a Vegetation Management Plan) the Applicants will hire a Monitor that is qualified to conduct compliance monitoring for all such environmental permits, upon review and approval of applicable permitting authorities.

- construction, restoration, and compliance monitoring on Agricultural Land.
2. Have demonstrated practical experience with soils and hydrology in agricultural settings.
 3. If work is being performed on Organic Agricultural Land, the Monitor will be trained, in organic inspection, by the Independent Organic Inspectors Association, unless the Monitor received such training during the previous three years.

Final selection of the Monitor will be a joint decision between the MDA and the Applicants.

5.2 Roles and Responsibilities of the Environmental/Agricultural Monitor

The Monitor will be retained and funded by the Applicants but will report directly to the MDA. The primary function of the Monitor will be to audit the Applicants' compliance with this AIMP. While the Monitor will not have the authority to direct construction activities and will not have authority to stop construction, the Monitor will be required to immediately report compliance issues and observation of a significant non-compliant activity to the Applicants' Inspector. The MDA may also instruct the Monitor to report non-compliant activities to the MDA. If after reviewing the non-compliant activity, and if judgment is made that continuing the activity will cause damage to the environment or Agricultural Land, the Applicants would issue a stop work order.

The Monitor will have full access to Agricultural Land crossed by the Project and will have the option of attending meetings where construction on Agricultural Land is discussed. Specific duties of the Monitor will include, but are not limited to the following:

1. Participate in preconstruction training activities sponsored by the Applicants and provide construction personnel with training on provisions of this AIMP before construction begins.
2. Monitor construction and restoration activities on Agricultural Land for compliance with provisions of this AIMP. The Monitor will be allowed full access to the Agricultural Land where construction occurs.
3. Work with construction crews to ensure all practices are in compliance with the provisions of this AIMP.
4. Document instances of noncompliance and work with construction personnel to identify and implement appropriate corrective actions as needed.

5. Report instances of noncompliance with the AIMP to the MDA, Applicants, and Applicants' Inspector.
6. Coordinate with the MDA to develop a reporting structure and report directly to the MDA on events or schedule as agreed upon with the MDA.
7. Prepare regular compliance reports and submit to MDA, as requested by the MDA.
8. Act as liaison between Landowners and Tenants and MDA, if necessary, and coordinate communication of Landowner/Tenant concerns to the MDA, if necessary.
9. Maintain a written log of communications from Landowners and/or Tenants regarding compliance with this AIMP. Report Landowner complaints to the Applicants' Inspector and/or Right-of-Way representative. The written log will record whether the Monitor reported each logged concern to the MDA.
10. Be responsible for determining whether weather conditions have caused the soil to become so wet that mitigation measures designed to alleviate soil compaction would be ineffective and would actually reduce the future production capacity of the land. The Monitor would advise the Applicants of these conditions. The Applicants will be solely responsible in making the decision on whether it will proceed with construction under these conditions. Compensation by Landowner, as appropriate, will be determined as described in the "Procedures for Determination of Damages and Compensation" Section 6.8 of this AIMP.
11. In disputes between Applicants and a Landowner and/or Tenant over restoration, advise the MDA on whether the agricultural restoration is reasonably adequate in consultation with the Applicants.

6.0 Impact and Mitigation Practices

The Applicants will make good faith efforts to provide notice to the Landowner and known Tenants in advance of the commencement of initial construction activities on Agricultural Land. Notice may include personal contact, email, letter, or telephone contact. The Applicants will reasonably restore or compensate Landowners and/or Tenants, as appropriate, for damages caused by the Applicants as a result of transmission line or related facility construction, and as outlined in this AIMP. The decision to restore land or compensate Landowners will be made by the Applicants after discussion with the Landowner or Tenant.

Any buildings/structures in or near the transmission ROW will be evaluated on a case by case basis to ensure compliance with IEEE and NESC codes in regards to safe operation of equipment in proximity of the transmission line due to potential inductance. The Applicants

will conduct yearly inspections of the transmission lines and will inspect any associated grounding that may be installed on these structures. The Applicants will coordinate with irrigators within and near the ROW to provide information on safe operation of equipment in proximity to the transmission line.

6.1 Structure Placement

During the design of the Project, the Applicants' engineering, real estate, and permitting staff will seek input from Landowners, as practicable, to address structure placement issues. Prior to construction, the Applicants' agents will review the planned structure locations with the Landowner when requested to do so by the Landowner.

6.2 Structure Removal

If the Project is constructed along existing transmission and distribution lines, and the Applicants determine the existing facilities can be reasonably co-located, the Applicants may remove existing transmission and distribution line structures. For transmission and distribution line structures that do not have a footing, the Applicants will extract the pole from the ground if possible. In the event a pole cannot be extracted by pulling, the Applicants will excavate an area and an attempt will be made to extricate an excavated pole entirely. If an excavated pole cannot be removed in its entirety, the pole will either be cut off at the excavated depth (in the range of approximately five feet) or pushed over if the pole cannot be cut. To the extent that a transmission or distribution structure with a concrete footing needs to be removed, the Applicants will work with the Landowner to determine at what depth the footing must be removed so farming operations can continue on the property. If the Applicants remove an existing pole, all support anchors for the structure will be removed. In these instances, the Applicants will work with the Landowner to identify any tile lines located near the structure prior to removal. Additionally, if any damage to tile occurs as a result of a structure removal, the Applicants will adhere to the Agricultural Tile Section 6.3 of this AIMP.

6.3 Agricultural Tile

6.3.1 Damaged and Adversely Affected Tile

The Applicants will contact affected Landowners or known Tenants for their knowledge of Tile locations prior to the transmission line's installation. Applicants will make every attempt to probe for Tile if the Landowner does not know if Tile is located in the proposed structure location. Tile that is damaged, cut, or removed as a result of this probe will be immediately repaired. The repair will be reported to the Inspector.

If Tile is damaged by the transmission line installation, the Tile will be repaired in a manner that restores the Tile's operating condition at the point of repair. If Tiles on or

adjacent to the transmission line's construction area are adversely affected by the construction of the transmission line, the Applicants will take such actions as are necessary to restore the functioning of the Tile, including the relocation, reconfiguration, and replacement of the existing Tile. The affected Landowner or Tenant may elect to negotiate a fair settlement with the Applicants for the Landowner or Tenant to undertake the responsibility for repair, relocation, reconfiguration, or replacement of the damaged Tile. In the event the Landowner or Tenant chooses to undertake the responsibility for repair, relocation, reconfiguration, or replacement of the damaged Tile, the Applicants will not be responsible for correcting Tile repairs after completion of the transmission line (the Applicants are responsible for correcting Tile repairs after completing construction of the transmission line, provided the repairs were made by the Applicants or their agents or designees).

Where the damaged Tile is repaired by the Applicants, the following standards and policies will apply to the Tile repair:

1. Tiles will be repaired with materials of the same or better quality as that which was damaged. If water is flowing through a damaged Tile, temporary repairs will be promptly installed and maintained until such time that permanent repairs can be made.
2. Before completing permanent Tile repairs, Tiles will be examined within the work area to check for Tile that might have been damaged by construction equipment. If Tiles are found to be damaged, they will be repaired so they operate as well after construction as before construction began.
3. The Applicants will make efforts to complete permanent Tile repairs within a reasonable timeframe after Final Clean-up, taking into account weather and soil conditions.
4. Following completion of the Final Clean-up and damage settlement, the Applicants will be responsible for correcting and repairing Tile breaks, or other damages to Tile systems that are discovered on the Right-of-Way to the extent that such breaks are reasonable found to be the result of transmission line construction. These damages are usually discovered after the first significant rain event. The Applicants will not be responsible for Tile repairs the Applicants have paid the Landowner or Tenant to perform.

6.3.2 Installation of Additional Tiles

The Applicants will be responsible for installing such additional Tile and other drainage measures as are necessary to properly drain wet areas on the Right-of-Way caused by the construction of the transmission line.

6.4 Excavation/Grading

Topsoil and Subsoil layers that are removed during construction for facility structures, structure placement, or temporary road impacts will be stored separately and replaced in the proper sequence after the transmission line is installed. Unless otherwise specified in an Easement or other agreement negotiated between the Applicants and Landowner, the Applicants will not use this soil for other purposes, including creating access ramps at road crossings. No Topsoil or Subsoil (other than incidental amounts) may be removed from Agricultural Land without permission of the Landowner.

6.5 Soil Compaction, Rutting, Fertilization, Liming, and Soil Restoration

Compaction will be alleviated as needed on Cropland traversed by construction equipment. Cropland that has been compacted will be plowed using appropriate deep-tillage and draft equipment. Alleviation of compaction of the topsoil will be performed during suitable weather conditions and must not be performed when weather conditions have caused the soil to become so wet that activity to alleviate compaction would damage the future production capacity of the land as determined by the Agricultural Monitor.

The Applicants will restore rutted land to as near as practical to its pre-construction condition.

If there is a dispute between the Landowner or Tenant and the Applicants as to what areas need to be ripped or chiseled, the depth at which compacted areas should be ripped or chiseled, or the necessity or rates of lime, fertilizer, and organic material application, the Agricultural Monitor's opinion will be considered by the Applicants.

6.6 Excess Soil and Rocks

Excess soil and rock will be removed from the site unless otherwise requested by the Landowner. After Final Clean-up and restoration of Agricultural Lands, Applicants will make good faith efforts to obtain written acknowledgement of completion of such activities from the Landowner.

6.7 Construction Debris

Construction-related debris and material which are not an integral part of the transmission line, and which have been placed there by the Applicants, will be removed from the Landowner's property at the Applicants' cost. Such material to be removed would include excess construction materials or litter generated by the construction crews.

6.8 Procedures for Determining Construction-Related Damages and Providing Compensation

The Applicants will develop and put into place a procedure for the processing of anticipated Landowners' or Tenants' claims for construction-related damages. The procedure will be intended to standardize and minimize Landowner and Tenant concerns in the recovery of damages, to provide a degree of certainty and predictability for Landowners, Tenants and the Applicants, and to foster good relationships among the Applicants, Landowners and their Tenants over the long term.

Negotiations between the Applicants and any affected Landowner or Tenant will be voluntary in nature and no party is obligated to follow any particular method for computing the amount of loss for which compensation is sought or paid. The compensation offered is only an offer to settle, and the offer shall not be introduced in any proceeding brought by the Landowner or Tenant to establish the amount of damages the Applicants must pay. In the event the Applicants and a Landowner or Tenant are unable to reach an agreement on the amount of damages, the Landowner or Tenant may seek recourse through mediation.

6.9 Damaged Soil Conservation Practices

Soil conservation practices such as terraces and grassed waterways which are damaged by the transmission line's construction, will be restored to their pre-construction condition.

6.10 Irrigation Systems

If the transmission line and/or temporary work areas intersect an operational (or soon to be operational) spray irrigation system, the Applicants will establish with the Landowner or Tenant, an acceptable amount of time the irrigation system may be out of service.

If, as a result of the transmission line construction activities, an irrigation system interruption results in crop damages, either on the Right-of-Way or off the Right-of-Way, compensation of Landowners and/or Tenants, as appropriate, will be determined as described in Sections 6.8 and 7.7 of this AIMP.

If it is feasible and mutually acceptable to the Applicants and the Landowner or Tenant, temporary measures will be implemented to allow an irrigation system to continue to operate across land on which the transmission line is also being constructed. Applicants will work with the Landowner or Tenant to identify a preferable construction time.

To the extent practicable, the Applicants will work with the Landowner or Tenant to place transmission structures in locations close to existing Rights-of-Way in an attempt to minimize impacts to existing irrigation systems.

If impacts to an irrigation system cannot be avoided, the Applicants will work with the Landowner to maintain operation of the irrigation system across land on which the

transmission line crosses to the extent practical.

6.11 Access Routes/Temporary Roads

The location of temporary roads to be used for construction purposes will be discussed with the Landowner or Tenant.

1. The temporary roads will be designed so as to not impede proper drainage and will be built to mitigate soil erosion on or near the temporary roads.
2. If grading is required to create a temporary road, temporary roads may be left intact through mutual agreement of the Landowner or Tenant and the Applicants unless otherwise restricted by federal, state or local regulations.
3. If a temporary road is to be removed, the Agricultural Land upon which the temporary road is constructed will be returned to its previous use and restored to an equivalent condition that existed prior to their construction.

6.12 Construction in Wet Conditions

If it is necessary to construct the transmission line during wet conditions, and if the Agricultural Monitor believes conditions are too wet for continued construction, damages which may result from such construction will be paid for by the Applicants and/or appropriate restoration will be conducted. Compensation for Landowners and/or Tenants, as appropriate, will be determined as described in Sections 6.8 and 7.7 of this AIMP.

7.0 Mitigation Practices for Organic Agricultural Farms

The Applicants recognize that Organic Agricultural Land is a unique feature of the landscape and will treat this land with the same level of care as other sensitive environmental features. This AIMP identifies mitigation measures that apply specifically to farms that are Organic Certified or farms that are in active transition to become Organic Certified and is intended to address the unique management and certification requirements of these operations. All protections provided in the Agricultural Impact Mitigation Plan will also be provided to Organic Agricultural Land in addition to the provisions of this Section.

The provisions of this Section will apply to Organic Agricultural Land for which the Landowner or Tenant has provided to the Applicants a true, correct and current version of the Organic System Plan within 60 days after the signing of the Easement for such land or 60 days after the issuance of a Route Permit to the Applicants by the PUC, whichever is sooner. In the event the Easement is signed later than 60 days after the issuance of the Route Permit, the provisions of this Section are applicable when the Organic System Plan is provided to the Applicants at the time of the signing of the Easement.

7.1 Organic System Plan

The Applicants recognize the importance of the individualized Organic System Plan to the Organic Certification process. The Applicants will work with the Landowner or Tenant, the Landowner's or Tenant's Certifying Agent, and/or a mutually acceptable third-party Organic consultant to identify site-specific construction practices that will minimize the potential for Decertification as a result of construction activities. Possible practices may include, but are not limited to: equipment cleaning, planting a deep-rooted cover crop in lieu of mechanical decompaction, applications of composted manure or rock phosphate, preventing the introduction of disease vectors from tobacco use, restoration and replacement of beneficial bird and insect habitat, maintenance of organic buffer zones, use of organic seeds for any cover crop, or similar measures. The Applicants recognize that Organic System Plans are proprietary in nature and will respect the need for confidentiality.

7.2 Prohibited Substances

The Applicants will avoid the application of Prohibited Substances onto Organic Agricultural Land. No pesticides, fertilizers or seed will be applied unless requested and approved by the Landowner. Likewise, no refueling, fuel or lubricant storage or routine equipment maintenance will be allowed on Organic Agricultural Land. Equipment will be checked prior to entry to make sure that fuel, hydraulic and lubrication systems are in good working order before working on Organic Agricultural Land. If Prohibited Substances are used on land adjacent to Organic Agricultural Land, these substances will be used in such a way as to prevent them from entering Organic Agricultural Land.

7.3 Temporary Road Impacts

Topsoil and subsoil layers that are removed during construction on Organic Agricultural Land for temporary road impacts will be stored separately and replaced in the proper sequence after the transmission line is installed. Unless otherwise specified in the site-specific plan described above, the Applicants will not use this soil for other purposes, including creating access ramps at road crossings.

No topsoil or subsoil (other than incidental amounts) may be removed from Organic Agricultural Land. Likewise, Organic Agricultural Land will not be used for storage of soil from non-Organic Agricultural Land.

7.4 Erosion Control

On Organic Agricultural Land, the Applicants will, to the extent feasible, implement erosion control methods consistent with the Landowner's or Tenant's Organic System

Plan. On land adjacent to Organic Agricultural Land, the Applicants' erosion control procedures will be designed so that sediment from adjacent non-Organic Agricultural Land will not flow along the Right-of-Way and be deposited on Organic Agricultural Land. Treated lumber, non-organic hay bales, non-approved metal fence posts, etc. will not be used in erosion control on Organic Agricultural Land.

7.5 Weed Control

On Organic Agricultural Land, the Applicants will, to the extent feasible, implement weed control methods consistent with the Landowner's or Tenant's Organic System Plan. Prohibited Substances will not be used in weed control on Organic Agricultural Land. In addition, the Applicants will not use Prohibited Substances in weed control on land adjacent to Organic Agricultural Land in such a way as to allow these materials to drift onto Organic Agricultural Land.

7.6 Monitoring

In addition to the responsibilities of the Agricultural Monitor described in the AIMP, the following will apply:

1. The Agricultural Monitor will monitor weather conditions as well as construction and restoration activities on Organic Agricultural Land for compliance with the provisions of this AIMP and will document any activities that may result in Decertification of Organic Agricultural Land.
2. Instances of non-compliance will be documented according to Independent Organic Inspectors Association protocol consistent with the Landowner's Organic System Plan, and will be made available to the MDA, the Landowner, the Tenant, the Landowner's or Tenant's Certifying Agent, the Inspector and to the Applicants.

If the Agricultural Monitor is responsible for monitoring activities on Organic Agricultural Land, he/she will be trained, at the Applicants' expense, in organic inspection, by the Independent Organic Inspectors Association, unless the Agricultural Monitor received such training during the previous three years.

7.7 Compensation for Construction-Related Damages

The settlement of damages will be based on crop yield and/or crop quality determination and the need for additional restoration measures. Unless the Landowner or Tenant of Organic Agricultural Land and Company agree otherwise, at the Applicants' expense, a mutually agreed upon professional agronomist will make crop yield determinations, and the Minnesota Department of Agriculture Fruit and Vegetable Inspection Unit will make

crop quality determinations. If the crop yield and/or crop quality determinations indicate the need for soil testing, the testing will be conducted by a commercial laboratory that is properly certified to conduct the necessary tests and is mutually agreeable to the Applicants and the Landowner or Tenant. Field work for soil testing will be conducted by a Professional Soil Scientist or Professional Engineer licensed by the State of Minnesota. The Applicants will be responsible for the cost of sampling, testing and additional restoration activities, if needed. Landowners or Tenants may elect to settle damages with the Applicants in advance of construction on a mutually acceptable basis or to settle after construction based on a mutually agreeable determination of actual damages.

7.8 Compensation for Damages Due to Decertification

Should any portion of Organic Agricultural Land be Decertified as a result of construction activities, the Applicants will pay damages for crops and/or livestock within the area impacted by the lost Certification equal to the full difference between the market value of conventional crops and/or livestock and the market value of the organic crops and/or livestock lost for three years or the period of time necessary for the Landowner or Tenant to regain Certification, whichever comes first. The market value of the crop will be determined as set forth in the damage claim policy. At the request of the Applicants, the Landowner shall provide verification of its loss of Organic Certification through the accredited certifying agent prior to any compensation for organic crop loss being paid.

Appendix M

Greenhouse Gas Calculations

**Big Stone South to Alexandria Project
GHG Calculations**

Table 1. Summary of Construction GHG Emissions

Route, Route Segment, or Alignment Alternative ID	Fuel Combustion CO ₂ e ^[1] (metric tons)	Land Use Change CO ₂ e ^[1] (metric tons)	Total CO ₂ e ^[1] (metric tons)
BSSR01	3,283.44	62.36	3,345.80
BSSR02	2,816.82	46.26	2,863.08
BSSR03	3,071.59	56.50	3,128.09
BSSR04	3,023.76	52.23	3,075.98
BSSR05	3,086.21	52.68	3,138.89
BSSR06	3,214.69	59.05	3,273.74
BSSR07	3,288.81	58.07	3,346.88
BSSR08	3,024.88	53.49	3,078.37
BSSR09	3,294.27	59.92	3,354.19
BSSR10	3,220.27	54.76	3,275.04
BSSR11	2,907.45	67.93	2,975.37
BSSR12	2,912.81	63.64	2,976.45
S207	410.45	5.97	416.42
S207_South2_Eq	312.77	2.81	315.58
S208	751.88	8.66	760.55
S208_South1_Eq	525.83	7.58	533.41
S210	961.10	12.87	973.97
S210_South1_Eq	770.32	11.04	781.36
SAA04	134.68	2.27	136.96
SAA04_South2_Eq	139.59	2.15	141.75
SSR01	5,363.47	82.79	5,446.26
SSR02	5,186.51	61.44	5,247.95
SSR03	5,256.43	87.49	5,343.92
SSR04	5,261.87	85.83	5,347.70
S18	493.63	6.82	500.45
S18_South2_Eq	301.42	7.11	308.53
S201	538.01	8.70	546.71
S201_South2_Eq	337.45	4.66	342.11
S202	1,669.77	30.61	1,700.38
S202_South2_Eq	683.41	9.38	692.79
S203	366.61	3.51	370.12
S203_South2_Eq	408.97	5.51	414.48
S204	618.46	9.70	628.16
S204_South1_Eq	617.88	6.98	624.86
S205	1,550.44	23.74	1,574.18
S205_South1_Eq	1,752.53	22.67	1,775.20
SAA01	418.50	5.18	423.68
SAA01_South1_Eq	417.78	2.31	420.09
SAA02	457.98	5.52	463.49
SAA02_South2_Eq	451.10	2.49	453.58
SAA03	104.33	0.94	105.27
SAA03_South1_Eq	109.06	0.97	110.03
HSR01	2,765.38	25.06	2,790.43
HSR02	3,618.25	52.06	3,670.31
HSR03	3,607.23	50.33	3,657.56
C203	617.68	7.70	625.38
C203_Central2_Eq	617.10	6.87	623.97
C208	944.68	10.57	955.24
C208_Central2_Eq	980.45	13.38	993.84
CSR01	1,850.89	16.21	1,867.10
CSR02	1,841.13	18.83	1,859.96
CAA01	101.95	0.57	102.52
CAA01_Central2_Eq	96.61	0.31	96.92
WBLSR01	2,482.18	21.28	2,503.46
WBLSR02	2,487.49	27.75	2,515.24
WBLSR03	2,484.13	29.33	2,513.46
WBLSR04	2,485.42	23.04	2,508.45
C202	412.08	6.10	418.18
C202_Central1_2_Eq	413.78	2.94	416.72
ASR01	3,738.03	90.90	3,828.93
ASR02	5,208.34	84.44	5,292.77
N9	626.15	6.38	632.53
N9_North1_Eq	624.73	39.55	664.28
N10	423.92	47.55	471.47
N10_North1_Eq	315.97	7.33	323.30
N11	427.66	5.36	433.03
N11_North2_Eq	438.44	17.22	455.66
N205	268.47	3.75	272.22
N205_North1_Eq	273.32	2.68	276.00
N206	430.06	9.58	439.64
N206_North2_Eq	507.58	7.51	515.09
N207	378.71	5.10	383.81
N207_North2_Eq	468.21	6.51	474.72
South 1	8,647.14	145.14	8,792.28
South 2	8,003.33	107.69	8,111.02
Central 1	7,098.45	62.45	7,160.89
Central 2	7,946.88	98.54	8,045.42
North 1	3,738.03	90.90	3,828.93
North 2	5,208.34	84.44	5,292.77

[1] CO₂e calculated by multiplying the Global Warming Potential (GWP) for each pollutant by the potential pollutant emissions. GWPs (100-Year Time Horizon) are from Table A-1 to Subpart A of Part 98, Title 40.

Big Stone South to Alexandria Project GHG Calculations

Table 2. Summary of Operations GHG Emissions from Fuel Combustion

Route, Route Segment, or Alignment Alternative ID	Off-Road Fuel Combustion CO ₂ e ^[1] (metric tons/yr)
All	13.27

[1] CO₂e calculated by multiplying the Global Warming Potential (GWP) for each pollutant by the potential pollutant emissions. GWPs (100-Year Time Horizon) are from Table A-1 to Subpart A of Part 98, Title 40.

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Table 3. Conversions

Unit	Amount	Unit
ton	2000	lbs
ton	0.907185	metric tons
ton	907.185	kg
ton	907185	grams
lb	0.453592	kg
lb	453.592	grams
MWh	1000	kWh
hectare	2.47105	acres
1 MJ	0.372506136	hp-h
US gallon	3.785	L
US gallon (diesel) ^[1]	144.945	MJ
US gallon (diesel)	53.9929019	hp-h
US gallon (gasoline) ^[1]	126.833	MJ
US gallon (gasoline)	47.24606261	hp-h
US gallon (jet fuel) ^[1]	142.2	MJ
US gallon (jet fuel)	52.97036342	hp-h

[1] US Energy Information Administration, 2024.

<https://www.eia.gov/energyexplained/units-and-calculators/energy-conversion-calculators.php>

[2] [https://www.convertunits.com/from/MJ/to/gallon+\[U.S.\]of+kerosene+type+jet+fuel](https://www.convertunits.com/from/MJ/to/gallon+[U.S.]of+kerosene+type+jet+fuel)

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Table 4. Global Warming Potentials

Greenhouse Gas Name	CAS Number	Chemical Formula	Global Warming Potential (100-yr.) [1]
Carbon dioxide	124-38-9	CO ₂	1
Methane	74-82-8	CH ₄	28
Nitrous oxide	10024-97-2	N ₂ O	265

[1] Global Warming Potentials, 100-Year Time Horizon, Table A-1 to Subpart A of Part 98, Title 40.

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GHG Calculations

Table 5. Construction Emissions from Fuel Combustion Sources

Route, Route Segment, or Alignment Alternative ID	Route, Route Segment, or Alignment Alternative Length ^[1] (miles)	CO ₂ e ^[2] (metric tons)
BSSR01	15.93	3,283.44
BSSR02	13.66	2,816.82
BSSR03	14.90	3,071.59
BSSR04	14.67	3,023.76
BSSR05	14.97	3,086.21
BSSR06	15.59	3,214.69
BSSR07	15.95	3,288.81
BSSR08	14.67	3,024.88
BSSR09	15.98	3,294.27
BSSR10	15.62	3,220.27
BSSR11	14.10	2,907.45
BSSR12	14.13	2,912.81
S207	1.99	410.45
S207_South2_Eq	1.52	312.77
S208	3.65	751.88
S208_South1_Eq	2.55	525.83
S210	4.66	961.10
S210_South1_Eq	3.74	770.32
SAA04	0.65	134.68
SAA04_South2_Eq	0.68	139.59
SSR01	26.02	5,363.47
SSR02	25.16	5,186.51
SSR03	25.50	5,256.43
SSR04	25.52	5,261.87
S18	2.39	493.63
S18_South2_Eq	1.46	301.42
S201	2.61	538.01
S201_South2_Eq	1.64	337.45
S202	8.10	1,669.77
S202_South2_Eq	3.32	683.41
S203	1.78	366.61
S203_South2_Eq	1.98	408.97
S204	3.00	618.46
S204_South1_Eq	3.00	617.88
S205	7.52	1,550.44
S205_South1_Eq	8.50	1,752.53
SAA01	2.03	418.50
SAA01_South1_Eq	2.03	417.78
SAA02	2.22	457.98
SAA02_South2_Eq	2.19	451.10
SAA03	0.51	104.33
SAA03_South1_Eq	0.53	109.06
HSR01	13.41	2,765.38
HSR02	17.55	3,618.25
HSR03	17.50	3,607.23
C203	3.00	617.68
C203_Central2_Eq	2.99	617.10
C208	4.58	944.68
C208_Central2_Eq	4.76	980.45
CSR01	8.98	1,850.89
CSR02	8.93	1,841.13
CAA01	0.49	101.95
CAA01_Central2_Eq	0.47	96.61
WBSR01	12.04	2,482.18
WBSR02	12.07	2,487.49
WBSR03	12.05	2,484.13
WBSR04	12.06	2,485.42
C202	2.00	412.08
C202_Central1_2_Eq	2.01	413.78
ASR01	18.13	3,738.03
ASR02	25.26	5,208.34
N9	3.04	626.15
N9_North1_Eq	3.03	624.73
N10	2.06	423.92
N10_North1_Eq	1.53	315.97
N11	2.07	427.66
N11_North2_Eq	2.13	438.44
N205	1.30	268.47
N205_North1_Eq	1.33	273.32
N206	2.09	430.06
N206_North2_Eq	2.46	507.58
N207	1.84	378.71
N207_North2_Eq	2.27	468.21
South 1	41.95	8,647.14
South 2	38.82	8,003.33
Central 1	34.43	7,098.45
Central 2	38.55	7,946.88
North 1	18.13	3,738.03
North 2	25.26	5,208.34

[1] Route length obtained from GIS data analysis.

[2] CO₂ and CO₂e rate calculated for the applicant's proposed route, in metric tons/mile. Approximate route length was obtained from average length between Route 1 and 2 in the RC

Proposed Route Fuel Combustion CO ₂ e (metric tons)	Approximate Route Length (miles)	CO ₂ e Rate (metric tons/mile)
20,285.41	98.40	206.15

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Table 6. Construction Emissions from Off-Road Fuel Combustion Sources - Proposed Route Calculations

Equipment Type ^[1]	Fuel Type ^[2]	Number of Units ^[1]	Operating Time ^[1] (hours/day/unit)	Days of Operation ^[1]	Operating Time ^[1] (total hours)	Horsepower ^[1]	Fuel Usage ^[1] (kg)	Fuel Usage ^[3] (gal)	CO ₂ Emission Factor ^[4] (kg/gal)	CH ₄ Emission Factor ^[5] (g/gal)	N ₂ O Emission Factor ^[5] (g/gal)	CO ₂ Emission Factor ^[4] (lb/hr)	CH ₄ Emission Factor ^[4] (lb/hr)	N ₂ O Emission Factor ^[4] (lb/hr)	CO ₂ (metric tons)	CH ₄ (metric tons)	N ₂ O (metric tons)	CO _{2e} ^[7] (metric tons)
ATV 4 TO 6 WHEEL W/ DUMP	Gasoline (4 stroke) - Recreational	1	2	219	438	13.5	--	--	8.78	2.74	1.49	5.53	0.00173	0.00094	1.10	3.43E-04	1.86E-04	1.16
BACKHOE W/ LOADER 4X4	Diesel Equipment	2	2	315	1,260	94	--	--	10.21	1.01	0.94	39.19	0.00388	0.00361	22.40	2.22E-03	2.06E-03	23.01
BUCKET 105' WORK HEIGHT	Diesel Equipment	3	8	525	12,600	300	--	--	10.21	1.01	0.94	125.07	0.01237	0.01151	714.79	7.07E-02	6.58E-02	734.21
BUCKET 125' WORK HEIGHT 8X6	Diesel Equipment	1	8	525	4,200	350	--	--	10.21	1.01	0.94	145.91	0.01443	0.01343	277.98	2.75E-02	2.56E-02	285.53
BUCKET 77' WORK HEIGHT SWAMP TRK MTD	Diesel Equipment	2	8	219	3,504	300	--	--	10.21	1.01	0.94	125.07	0.01237	0.01151	198.78	1.97E-02	1.83E-02	204.18
TRUCK MTD 4 T ARTICULATING BOOM W/ FORKS & CLAM	Diesel Equipment	1	2	315	630	450	--	--	10.21	1.01	0.94	187.60	0.01856	0.01727	53.61	5.30E-03	4.94E-03	55.07
CRANE TRUCK 45 T HYDRAULIC 6 AXLE	Diesel Equipment	6	8	525	25,200	450	--	--	10.21	1.01	0.94	187.60	0.01856	0.01727	2,144.38	2.12E-01	1.97E-01	2,202.64
DIGGER DERRICK 15 T CAP	Diesel Equipment	4	8	525	16,800	330	--	--	10.21	1.01	0.94	137.57	0.01361	0.01267	1,048.37	1.04E-01	9.65E-02	1,076.85
DIGGER DERRICK 15 T CAP SWAMP TRACK	Diesel Equipment	2	8	219	3,504	300	--	--	10.21	1.01	0.94	125.07	0.01237	0.01151	198.78	1.97E-02	1.83E-02	204.18
DOZER 10 THRU 12 T W/ WINCH	Diesel Equipment	1	4	315	1,260	80	--	--	10.21	1.01	0.94	33.35	0.00330	0.00307	19.06	1.89E-03	1.75E-03	19.58
DOZER 18 T W/ WINCH	Diesel Equipment	1	4	315	1,260	190	--	--	10.21	1.01	0.94	79.21	0.00784	0.00729	45.27	4.48E-03	4.17E-03	46.50
CRAWLER CARRIER W/ 360 DUMP BOX OR DOZER 18 T W/ WINCH	Diesel Equipment	1	6	219	1,314	80	--	--	10.21	1.01	0.94	33.35	0.00330	0.00307	19.88	1.97E-03	1.83E-03	20.42
EXCAVATOR 25 T	Diesel Equipment	1	4	219	876	172	--	--	10.21	1.01	0.94	71.71	0.00709	0.00660	28.49	2.82E-03	2.62E-03	29.27
FORKLIFT 11,000 THRU 12,000# TELESCOPIC BOOM	Diesel Equipment	3	4	525	6,300	142	--	--	10.21	1.01	0.94	59.20	0.00586	0.00545	169.17	1.67E-02	1.56E-02	173.76
FRONT END LOADER 68,000# 4X4	Diesel Equipment	4	4	525	8,400	386	--	--	10.21	1.01	0.94	160.92	0.01592	0.01482	613.14	6.07E-02	5.64E-02	629.79
GENERATOR 23KW THRU 60KW TRAILER MOUNTED TOW TYPE	Diesel Equipment	4	8	290	9,280	38	--	--	10.21	1.01	0.94	15.84	0.00157	0.00146	66.68	6.60E-03	6.14E-03	68.50
HYDRAULIC BULLWHEEL BUNDLE TENSIONER	Diesel Equipment	1	2	261	522	80	--	--	10.21	1.01	0.94	33.35	0.00330	0.00307	7.90	7.81E-04	7.27E-04	8.11
PULLER ROPE TRAILER 4,000# CAP W/ SPLIT REEL TOW TYPE TANDEM AXLE	Diesel Equipment	1	2	261	522	74	--	--	10.21	1.01	0.94	30.85	0.00305	0.00284	7.30	7.23E-04	6.73E-04	7.50
PULLER CABLE TRAILER 30,000# CAP TOW TYPE TANDEM AXLE	Diesel Equipment	1	2	261	522	400	--	--	10.21	1.01	0.94	166.76	0.01650	0.01535	39.48	3.91E-03	3.64E-03	40.56
PULLER ROPE TRAILER 4 DRUM 3,500# CAP TOW TYPE TANDEM AXLE	Diesel Equipment	1	2	261	522	115	--	--	10.21	1.01	0.94	47.94	0.00474	0.00441	11.35	1.12E-03	1.05E-03	11.66
300T AT Stepping Crane	Diesel Equipment	1	6	435	2,610	577	--	--	10.21	1.01	0.94	240.55	0.02380	0.02215	284.78	2.82E-02	2.62E-02	292.51
60T RT Crane	Diesel Equipment	4	4	525	8,400	320	--	--	10.21	1.01	0.94	133.41	0.01320	0.01228	508.30	5.03E-02	4.68E-02	522.11
SKID STEER LOADER TRACK MTD 80 > 75 HP	Diesel Equipment	5	4	525	10,500	95	--	--	10.21	1.01	0.94	39.60	0.00392	0.00365	188.63	1.87E-02	1.74E-02	193.75
DUMP BOX TRUCK 2-1/2 T 6X6	Diesel Off-Road Trucks	1	2	525	1,050	505	--	--	10.21	0.92	0.56	210.53	0.01897	0.01155	100.27	9.04E-03	5.50E-03	101.98
DUMP BOX TRUCK 1-1/4 & 1-1/2 T	Diesel Off-Road Trucks	2	4	525	4,200	420	--	--	10.21	0.92	0.56	175.09	0.01578	0.00960	333.57	3.01E-02	1.83E-02	339.26
FLATBED (FRAMING) TRUCK 1-1/4 & 1-1/2 T	Diesel Off-Road Trucks	6	4	525	12,600	420	--	--	10.21	0.92	0.56	175.09	0.01578	0.00960	1,000.71	9.02E-02	5.49E-02	1,017.78
TRUCK TRACTOR 2-1/2 T 6X4 & 5 T 6X6	Diesel Off-Road Trucks	6	4	315	7,560	450	--	--	10.21	0.92	0.56	187.60	0.01690	0.01029	643.32	5.80E-02	3.53E-02	654.29
PICKUP TRUCK 3/4 T	Diesel Off-Road Trucks	14	8	525	58,800	420	--	--	10.21	0.92	0.56	175.09	0.01578	0.00960	4,669.99	4.21E-01	2.56E-01	4,749.65
Helicopter - Ground Idle Engine Mode	Jet Fuel	1	1	702	702	55	37057	12177	9.75	0.00	0.30	--	--	--	118.73	0.00E+00	3.65E-03	119.70
Helicopter - Hover and Climb Engine Mode	Jet Fuel	1	1.25	702	878	365	103317	33951	9.75	0.00	0.30	--	--	--	331.02	0.00E+00	1.02E-02	333.72
Helicopter - Approach Engine Mode	Jet Fuel	1	1.25	702	878	193	78923	25935	9.75	0.00	0.30	--	--	--	252.86	0.00E+00	7.78E-03	254.92
Helicopter - Flight Engine Mode	Jet Fuel	1	1	702	5,616	336	630546	207202	9.75	0.00	0.30	--	--	--	2,020.22	0.00E+00	6.22E-02	2,036.69
TOTAL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16,140.31	1.27	1.07E+00	16,458.84

[1] Equipment and usage data obtained from Appendix M of Big Stone South to Alexandria Project Route Permit Application.

[2] Fuel type assumed based on equipment type.

[3] Fuel usage converted using a density of 0.804 kg/L for jet fuel. <https://whycalculator.com/jet-fuel-weight-calculator/>

[4] CO₂ emissions calculated using the EPA CCCL emission factors for mobile combustion. Table 2: Mobile Combustion CO₂, 2025. <https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf>

Fuel Type	CO ₂ Emission Factor (kg/gal)
Diesel Fuel	10.21
Motor Gasoline	8.78
Kerosene-Type Jet Fuel	9.75

[5] CH₄ and N₂O emissions calculated using the EPA CCCL emission factors for construction/mining equipment. Table 5: Mobile Combustion CH₄ and N₂O for Non-Road Vehicles, 2025. <https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf>

Vehicle Type	Fuel Type	CH ₄ Emission Factor (g/gal)	N ₂ O Emission Factor (g/gal)
Construction/Minning Equipment	Diesel Equipment	1.01	0.94
Construction/Minning Equipment	Diesel Off-Road Trucks	0.92	0.56
Recreational Equipment	Gasoline (4 stroke) - Recreation	2.74	1.49
Aircraft	Jet Fuel	-	0.30

[6] Emission factors converted to lb/hr using conversion rates of 53.993 hp-hr/gal for diesel and jet fuel, and 47.246 hp-hr/gal for gasoline.

[7] CO_{2e} calculated by multiplying the Global Warming Potential (GWP) for each pollutant by the potential pollutant emissions. GWPs (100-Year Time Horizon) are from Table A-1 to Subpart A of Part 98, Title 40.

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Table 7. Construction Emissions from On-Road Fuel Combustion Sources - Proposed Route Calculations

Vehicle Type ^[1]	Fuel Type ^[1]	Total Miles Traveled ^[1]	Fuel Efficiency ^[2] (miles/gal)	Fuel Used (gal)	CO ₂ Emission Factor ^[3] (kg/gal)	CH ₄ Emission Factor ^{[4][5]} (g/vehicle-mile)	N ₂ O Emission Factor ^{[4][5]} (g/vehicle-mile)	CO ₂ (metric tons)	CH ₄ (metric tons)	N ₂ O (metric tons)	CO ₂ e ^[6] (metric tons)
Worker Commute (Gasoline Passenger Truck)	Gasoline	6,560,400	22.6	290,283	8.78	0.0079	0.0012	2,548.69	5.18E-02	7.87E-03	2,552.22
Material Hauling (Single Unit Truck)	Diesel	766,800	7.8	98,308	10.21	0.0095	0.0431	1,003.72	7.28E-03	3.30E-02	1,012.68
Flatbed truck (Combination Long Haul Truck)	Diesel	170,400	6.7	25,433	10.21	0.0095	0.0431	259.67	1.62E-03	7.34E-03	261.66
TOTAL	--	--	--	--	--	--	--	3,812.08	0.06	0.05	3,826.57

[1] Equipment, fuel type, and total miles traveled obtained from Appendix M of Big Stone South to Alexandria Project Route Permit Application.

[2] Fuel efficiency from 2022 values from U.S. Department of Transportation, Federal Highway Administration, Highway Statistics (Washington, DC: Annual Issues), Table VM-1. <https://www.fhwa.dot.gov/policyinformation/statistics/2022/vm1.cfm>

Vehicle Type	Average Fuel Consumption (miles/gal)
All Light Duty Vehicles	22.6
Single-Unit Trucks	7.8
Combination Trucks	6.7

[3] CO₂ emissions calculated using the EPA CCCL emission factors for mobile combustion.

Table 2: Mobile Combustion CO₂, 2025. <https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf>

Fuel Type	CO ₂ Emission Factor (kg/gal)
Diesel Fuel	10.21
Motor Gasoline	8.78

[4] CH₄ and N₂O emissions calculated using the EPA CCCL emission factors for on-road gasoline vehicles.

Table 3: Mobile Combustion CH₄ and N₂O for On-Road Gasoline Vehicles, 2025. <https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf>

Vehicle Type	Model Year	CH ₄ Emission Factor (g/gal)	N ₂ O Emission Factor (g/gal)
Gasoline Light-Duty Trucks	2022	0.0079	0.0012

[5] CH₄ and N₂O emissions calculated using the EPA CCCL emission factors for on-road diesel vehicles.

Table 4: Mobile Combustion CH₄ and N₂O for On-Road Diesel and Alternative Fuel Vehicles, 2025. <https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf>

Vehicle Type	Model Year	CH ₄ Emission Factor (g/gal)	N ₂ O Emission Factor (g/gal)
Medium- and Heavy-Duty Trucks	2007-2022	0.0095	0.0431

[6] CO₂e calculated by multiplying the Global Warming Potential (GWP) for each pollutant by the potential pollutant emissions. GWPs (100-Year Time Horizon) are from Table A-1 to Subpart A of Part 98, Title 40.

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Table 8. Land Use Change Emission Factor Calculations

Temporary Land Use Change	2022 Net CO₂ Flux for Converted Land Type^[1] (M metric tons CO₂e)	2022 Total US Land Use Change from Forest Land^[2] (thousands of hectares)	CO₂e Emission Factor (metric tons CO₂e/acre)
Forest Land to Grassland	46.8	3,894	4.86
Cropland to Grassland	(12.5)	11,444	(0.44)
Settlement to Grassland	(0.8)	93	(3.48)
Forest Land to Settlement	58.6	440	53.90
Cropland to Settlement	2.9	1,228	0.96
Grassland to Settlement	7.5	1,648	1.84

[1] Net CO₂ flux tables for converted land types. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2022.

<https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022>

[2] Table 6-5: Land Use and Land-Use Change for the U.S. Managed Land Base for All 50 States, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2022.

<https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022>

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Table 9. Construction Emissions from Land Use Change

Route, Route Segment, or Alignment Alternative ID	Temporary Land Use Change from Forest Land to Settlement ⁽¹⁾ (acres)	Temporary Land Use Change from Cropland to Settlement ⁽²⁾ (acres)	Temporary Land Use Change from Grassland to Settlement ⁽³⁾ (acres)	CO ₂ e ^(RH) (metric tons)
BSSR01	2.40	221.12	20.98	62.36
BSSR02	1.95	127.82	29.35	46.26
BSSR03	2.40	171.67	27.29	56.50
BSSR04	1.95	175.55	24.30	52.23
BSSR05	2.59	148.79	20.90	52.68
BSSR06	1.76	215.39	31.84	59.05
BSSR07	2.40	192.97	21.42	58.07
BSSR08	1.95	174.73	28.91	53.49
BSSR09	2.59	195.70	20.45	59.92
BSSR10	1.76	187.24	32.28	54.76
BSSR11	3.21	202.77	25.30	67.93
BSSR12	3.21	174.62	25.75	63.64
S207	-	32.51	2.85	5.97
S207_South2_Eq	-	12.41	2.84	2.81
S208	-	55.15	-	8.66
S208_South1_Eq	-	43.05	2.71	7.58
S210	-	78.61	1.71	12.87
S210_South1_Eq	-	53.65	8.63	11.04
SAAO4	-	9.93	2.35	2.27
SAAO4_South2_Eq	-	11.59	1.10	2.15
SSR01	2.61	342.45	19.47	82.79
SSR02	1.27	276.62	22.32	61.44
SSR03	4.17	294.03	14.38	87.49
SSR04	4.08	288.70	14.41	85.83
S18	-	43.43	-	6.82
S18_South2_Eq	0.41	17.45	2.30	7.11
S201	0.11	205.68	14.88	8.70
S201_South2_Eq	-	27.04	1.36	4.66
S202	0.95	139.49	0.88	30.61
S202_South2_Eq	0.00	43.13	8.55	9.38
S203	-	20.15	1.13	3.51
S203_South2_Eq	-	28.19	3.55	5.51
S204	0.28	45.60	0.32	9.70
S204_South1_Eq	-	41.01	1.77	6.98
S205	0.50	118.03	2.43	23.74
S205_South1_Eq	-	130.01	7.43	22.67
SAAO1	-	32.96	-	5.18
SAAO1_South1_Eq	-	14.70	-	2.31
SAAO2	-	35.11	-	5.52
SAAO2_South2_Eq	-	15.83	-	2.49
SAAO3	-	5.92	0.04	0.94
SAAO3_South1_Eq	-	6.08	0.04	0.97
HSR01	-	159.37	0.06	25.06
HSR02	1.26	235.04	13.05	52.06
HSR03	0.84	235.15	19.71	50.33
C203	-	49.01	-	7.70
C203_Central2_Eq	-	41.48	1.16	6.87
C208	-	54.19	6.78	10.57
C208_Central2_Eq	0.42	61.03	0.12	13.38
CSR01	-	98.82	2.27	16.21
CSR02	0.13	102.89	5.08	18.83
CAA01	-	3.61	0.00	0.57
CAA01_Central2_Eq	-	1.98	0.00	0.31
WBLSR01	-	131.80	1.88	21.28
WBLSR02	0.26	156.66	2.75	27.75
WBLSR03	-	178.25	4.39	29.33
WBLSR04	-	140.12	3.38	23.04
C202	-	31.92	3.58	6.10
C202_Central1_2_Eq	-	18.69	-	2.94
ASR01	5.11	263.53	13.99	90.90
ASR02	2.06	336.71	44.03	84.44
N9	-	39.33	0.66	6.38
N9_North1_Eq	3.57	47.42	1.49	39.55
N10	4.85	28.16	0.41	47.55
N10_North1_Eq	0.43	15.95	3.33	7.33
N11	-	21.33	6.65	5.36
N11_North2_Eq	1.34	17.11	8.90	17.22
N205	-	23.56	0.16	3.75
N205_North1_Eq	-	17.07	-	2.68
N206	0.46	34.21	0.49	9.58
N206_North2_Eq	-	37.45	5.37	7.51
N207	-	23.38	4.72	5.10
N207_North2_Eq	-	37.59	2.01	6.51
South 1	5.01	563.55	40.45	145.14
South 2	3.22	404.41	51.67	107.69
Central 1	-	389.39	4.21	62.45
Central 2	1.65	493.98	20.88	98.54
North 1	5.11	263.53	13.99	90.90
North 2	2.06	336.71	44.03	84.44

[1] Land use areas obtained from the National Land Cover Database for the ROW (75 feet).

[2] See land use change emission factors calculation table.

[3] Emissions are calculated for an assumed 60-day duration of temporary disturbance.

Big Stone South to Alexandria Project
GHG Calculations

Table 10. Operations Emissions from Off-Road Fuel Combustion Sources - Proposed Route Calculations

Equipment Type ^[1]	Fuel Type ^[2]	Number of Units ^[1]	Annual Operating Time ^[1] (hours)	Horsepower ^[1]	CO ₂ Emission Factor ^[3] (kg/gal)	CH ₄ Emission Factor ^[4] (g/gal)	N ₂ O Emission Factor ^[4] (g/gal)	CO ₂ Emission Factor ^[5] (lb/hr)	CH ₄ Emission Factor ^[5] (lb/hr)	N ₂ O Emission Factor ^[5] (lb/hr)	CO ₂ (metric tons/yr)	CH ₄ (metric tons/yr)	N ₂ O (metric tons/yr)	CO ₂ e ^[6] (metric tons/yr)
E4_OTL_EQP_PICKUP TRUCK-F350_CREW CAB_8001-11K_4X4	Diesel Off-Road Trucks	1	15	500	10.21	0.92	0.56	208.45	0.01878	0.01143	1.42	1.28E-04	7.78E-05	1.44
K8_OTL_EQP_HEAVY BUCKET TRUCK100 FT_RUBBER TIRE_6X6	Diesel Equipment	1	15	500	10.21	1.01	0.94	208.45	0.02062	0.01919	1.42	1.40E-04	1.31E-04	1.46
N4_OTL_EQP_TRUCK MOUNTEDCRANE_45T/50T_RUBBER TIRE	Diesel Equipment	1	15	500	10.21	1.01	0.94	208.45	0.02062	0.01919	1.42	1.40E-04	1.31E-04	1.46
S2_OTL_EQP_BACKHOE-LOADER_RUBBER TIRE_4X4	Diesel Equipment	1	15	120	10.21	1.01	0.94	50.03	0.00495	0.00461	0.34	3.37E-05	3.13E-05	0.35
U1_OTL_EQP_SKID STEERLOADER_TRACKED	Diesel Equipment	1	15	120	10.21	1.01	0.94	50.03	0.00495	0.00461	0.34	3.37E-05	3.13E-05	0.35
W2_OTL_EQP_ATV/UTV POLARIS/CANAM/ARGO_RUBBER	Diesel Equipment	1	60	25	10.21	1.01	0.94	10.42	0.00103	0.00096	0.28	2.81E-05	2.61E-05	0.29
R1_OTL_EQP_TRAILERUTV/FRAMING/ENCLOS ED_<=12K_RU BBER TIRE_TAN	Diesel Equipment	1	60	120	10.21	1.01	0.94	50.03	0.00495	0.00461	1.36	1.35E-04	1.25E-04	1.40
D2_OTL_EQP_PICKUP TRUCK-F150_6001-8K_4X4	Diesel Equipment	1	60	500	10.21	1.01	0.94	208.45	0.02062	0.01919	5.67	5.61E-04	5.22E-04	5.83
R2_OTL_EQP_TRAILER MEDIUMQUIP_12001-20K_RUBBER TIRE_TANDEM	Diesel Equipment	1	15	120	10.21	1.01	0.94	50.03	0.00495	0.00461	0.34	3.37E-05	3.13E-05	0.35
R3_OTL_EQP_TRAILER LARGEEQUIP_>20K_RUBBER TIRE_TANDEM	Diesel Equipment	1	15	120	10.21	1.01	0.94	50.03	0.00495	0.00461	0.34	3.37E-05	3.13E-05	0.35
TOTAL	--	--	--	--	--	--	--	--	--	--	12.93	0.00	0.00	13.27

[1] Equipment and usage data obtained from Appendix M of Big Stone South to Alexandria Project Route Permit Application.

[2] Fuel type assumed based on equipment type.

[3] CO₂ emissions calculated using the EPA CCCL emission factors for mobile combustion, Table 2: Mobile Combustion CO₂, 2025. <https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf>

Fuel Type	CO ₂ Emission Factor (kg/gal)
Diesel Fuel	10.21

[4] CH₄ and N₂O emissions calculated using the EPA CCCL emission factors for construction/mining equipment, Table 5: Mobile Combustion CH₄ and N₂O for Non-Road Vehicles, 2025. <https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf>

Vehicle Type	Fuel Type	CH ₄ Emission Factor (g/gal)	N ₂ O Emission Factor (g/gal)
Construction/Mining Equipment	Diesel Equipment	1.01	0.94
Construction/Mining Equipment	Diesel Off-Road Trucks	0.92	0.56

[5] Emission factors converted to lb/hr using conversion rates of 53.993 hp-hr/gal for diesel fuel.

[6] CO₂e calculated by multiplying the Global Warming Potential (GWP) for each pollutant by the potential pollutant emissions. GWPs (100-Year Time Horizon) are from Table A-1 to Subpart A of Part 98, Title 40.

Big Stone South to Alexandria Project
GHG Calculations

Table 12. Operations Emissions from Land Use Change

Route, Route Segment, or Alignment Alternative ID	Land Use Change from Forest Land to Grassland ^[1] (acres)	Land Use Change from Cropland to Grassland ^[1] (acres)	Land Use Change from Settlement to Grassland ^[1] (acres)	CO ₂ e ^[2] (metric tons/yr)
BSSR01	2	221	43	(235.97)
BSSR02	2	128	89	(337.49)
BSSR03	2	172	67	(298.00)
BSSR04	2	176	65	(294.66)
BSSR05	3	149	100	(399.59)
BSSR06	2	215	33	(200.60)
BSSR07	2	193	71	(321.52)
BSSR08	2	175	61	(280.23)
BSSR09	3	196	71	(322.33)
BSSR10	2	187	61	(286.20)
BSSR11	3	203	25	(162.66)
BSSR12	3	175	54	(248.22)
S207	-	33	1	(18.52)
S207_South2_Eq	-	12	13	(69.47)
S208	-	55	11	(64.07)
S208_South1_Eq	-	43	1	(22.58)
S210	-	79	5	(51.47)
S210_South1_Eq	-	54	4	(37.54)
SA04	-	10	-	(4.39)
SA04_South2_Eq	-	12	-	(5.12)
SSR01	3	342	105	(503.51)
SSR02	1	277	157	(661.07)
SSR03	4	294	151	(636.63)
SSR04	4	289	156	(650.94)
S18	-	43	0	(20.79)
S18_South2_Eq	0	17	7	(29.45)
S201	0	21	12	(68.81)
S201_South2_Eq	-	27	2	(18.11)
S202	1	139	6	(78.83)
S202_South2_Eq	0	43	8	(46.82)
S203	-	20	9	(41.84)
S203_South2_Eq	-	28	5	(28.81)
S204	0	46	9	(49.21)
S204_South1_Eq	-	41	12	(60.22)
S205	1	118	16	(105.83)
S205_South1_Eq	-	130	15	(108.52)
SA01	-	33	4	(29.62)
SA01_South1_Eq	-	15	23	(84.89)
SA02	-	35	6	(35.22)
SA02_South2_Eq	-	16	24	(91.81)
SA03	-	6	4	(15.29)
SA03_South1_Eq	-	6	4	(16.16)
HSR01	-	159	85	(465.64)
HSR02	1	235	70	(341.64)
HSR03	1	235	63	(318.02)
C203	-	49	6	(42.00)
C203_Central2_Eq	-	41	12	(60.67)
C208	-	54	23	(102.87)
C208_Central2_Eq	0	61	25	(112.87)
CSR01	-	99	62	(261.15)
CSR02	0	103	55	(235.07)
CAA01	-	4	6	(21.63)
CAA01_Central2_Eq	-	2	7	(25.04)
WBSR01	-	132	85	(354.62)
WBSR02	0	157	60	(276.68)
WBSR03	-	178	36	(205.08)
WBSR04	-	140	76	(325.11)
C202	-	32	1	(18.36)
C202_Central1_2_Eq	-	19	18	(71.55)
ASR01	5	264	43	(242.05)
ASR02	2	337	76	(402.90)
N9	-	39	16	(71.71)
N9_North1_Eq	4	47	3	(14.02)
N10	5	28	2	5.07
N10_North1_Eq	0	16	8	(31.73)
N11	-	21	10	(44.68)
N11_North2_Eq	1	17	12	(41.73)
N205	-	24	0	(11.59)
N205_North1_Eq	-	17	7	(33.37)
N206	0	34	3	(23.89)
N206_North2_Eq	-	37	2	(23.74)
N207	-	23	6	(30.06)
N207_North2_Eq	-	38	2	(23.83)
South 1	5	564	147	(738.19)
South 2	3	404	245	(1,017.13)
Central 1	-	389	232	(980.22)
Central 2	2	494	184	(852.15)
North 1	5	264	43	(242.05)
North 2	2	337	76	(402.90)

[1] Land use areas obtained from the National Land Cover Database for the ROW (75 feet).

[2] See land use change emission factors calculation table.

Appendix N

Wells

MWI Unique Well ID	Status	Depth (Feet)	Static Water Level (Feet) on MWI Report	Use	Route Alternative
224176	Active	56	NL	Domestic	Route BSSR01, BSSR03, BSSR05, BSSR07, BSSR09
567320	Active	65	20	Domestic	Route BSSR01, BSSR03, BSSR05, BSSR07, BSSR09
606888	Active	38	12	Domestic	Route BSSR11, BSSR12
541216	Active	98	66	Domestic	Route BSSR11, BSSR12
224178	Active	75	25	Domestic	Route BSSR02, BSSR04
601739	Active	91	56	Domestic	Route BSSR02, BSSR04
793543	Active	94	50	Domestic	Route BSSR02, BSSR04
545050	Active	116	68	Domestic	Route BSSR02, BSSR04
224166	Active	145	50	Domestic	Route Segment S210
272796	Active	117	55	Unknown	Route BSSR01, BSSR03, BSSR06, BSSR07, BSSR10
224160	Active	63	25	Domestic	Route BSSR04, BSSR06, BSSR07
622882	Active	73	45	Domestic	Route Segment S208
224159	Active	66	N/A	Domestic	Route Segment S208
476579	Active	73	28	Domestic	Route Segment S208
878896	Active	42	12	Domestic	Route BSSR01, BSSR04, BSSR06, BSSR08, BSSR09, BSSR11
821955	Active	30	8	Domestic	Route BSSR02, BSSR03, BSSR05, BSSR07, BSSR10, BSSR12
487604	Active	115	-3	Domestic	Route BSSR02, BSSR03, BSSR05, BSSR07, BSSR10, BSSR12
224146	Active	104	25	Domestic	Route Segment SSR02
702639	Active	103	12	Domestic	Route Segment SSR02
224150	Active	214	100	Domestic	Route Segment SSR04, SSR03
236711	Active	89	40	Domestic	Route Segment SSR01
725977	Active	166	90	Domestic	Route Segment SSR04, SSR03
694315	Active	207	55	Domestic	Route SSR02
644095	Active	95	24	Domestic	Route SSR02
121552	Active	101	42	Domestic	Route Segment S202
615099	Active	169	70	Domestic	Route SSR02
188331	Active	170	74	Domestic	Route SSR02
195127	Active	218	80	Domestic	Route SSR02
195143	Active	216	72	Domestic	Route SSR02
781238	Active	254	71	Domestic	Route SSR02, SSR01, SSR04 Alternative Alignment SAA02
767477	Active	112	48	Domestic	Route SSR03
463652	Active	108	65	Domestic	Route SSR03

MWI Unique Well ID	Status	Depth (Feet)	Static Water Level (Feet) on MWI Report	Use	Route Alternative
249035	N/A	212	N/A	Test Well	Route SSR04, SSR01
432408	Active	105	11	Domestic	Route SSR01
248802	Active	32	N/A	N/A	Route SSR01
121141	Active	199	40	Domestic	Route SSR04
579975	Active	217	80	Domestic	Route SSR04
579958	Active	247	10	Other	Route SSR04
598550	Active	110	47	Domestic	Route SSR04
195143	Active	216	72	Domestic	Route SSR02, SSR03
781238	Active	254	71	Domestic	Route SSR01, SSR02, SSR03, SSR04 Alternative Alignment SAA02
103887	Active	242	80	Domestic	Route SSR02, SSR03 Alternative Alignment SAA01
880208	Active	350	89.2	Monitor Well	Route HSR02, HSR03
121142	Active	101	78	Domestic	Route HSR02
501371	Active	65	46	Domestic	Route HSR02
150979	Active	126	50	Domestic	Route HSR02
151114	Active	67	22	Domestic	Route HSR02
831416	Active	310	5	Monitor Well	Route HSR03
249031	N/A	362	N/A	Test Well	Route HSR02, HSR03
811488	Active	47	6	Irrigation	Route HSR02
445527	Active	29	6	Irrigation	Route HSR02
764046	Active	27	10	Irrigation	Route HSR02
779227	Active	104	73	Domestic	Route HSR01
1000029100	Unk.	90	N/A	N/A	Route HSR01
793913	Active	100	62	Domestic	Route HSR01
195442	Active	106	74	Domestic	Route HSR01
495157	Active	185	110	Domestic	Route HSR01
791052	Active	151	26	Irrigation	Route HSR02
786165	Active	88	42	Irrigation	Route HSR02
654753	Active	74	3.7	Irrigation	Route Segment C203
767478	Active	71	15	Domestic	Route HSR02 Route Segment C203
480357	Active	122	94	Domestic	Route HSR02
546562	Active	55	21	Domestic	Route CSR02
562314	Active	63	20	Domestic	Route CSR01
793905	Active	55	15	Domestic	Route CSR02
793914	Active	110	60	Domestic	Route CSR02
562314	Active	40	20	Domestic	Route CSR01

MWI Unique Well ID	Status	Depth (Feet)	Static Water Level (Feet) on MWI Report	Use	Route Alternative
224305	N/A	130	N/A	N/A	Route CSR01
167879	Active	26	7.7	Irrigation	Route CSR01
740895	Active	60	14	Domestic	Route CSR01
815803	Active	172	34	Environmental Bore Hole	Route CSR01
815802	Active	110	34	Environmental Bore Hole	Route CSR01
840052	Active	100	62	Domestic	Route CSR01
793905	Active	55	15	Domestic	Route CSR02
793914	Active	110	60	Domestic	Route CSR02
843302	Active	220	20	Domestic	Route CSR02 Alternative Alignment CAA01
129958	Active	104	74	Domestic	Route WBLSR02
682966	Active	145	25	Industrial	Route WBLSR01, WBLSR03, WBLSR02 Route Segment C202
783985	Active	124	10	Domestic	Route WBLSR01, WBLSR02, WBLSR03
769069	Active	185	11	Domestic	Route ASR01
877974	Active	183	30	Domestic	Route ASR01
179683	Active	163	40	Domestic	Route ASR01
613023	Active	112	55	Domestic	Route ASR02
700041	Active	55	20	Domestic	Route ASR02
694857	Active	208	137	Domestic	Route ASR02
423874	Unk.	160	16	Test Well	Route ASR02
423873	Unk.	140	18	Test Well	Route ASR02
423862	Unk.	160	21	Test Well	Route ASR02
199580	Active	391	100	Domestic	Route ASR02
620392	Active	87	69	Domestic	Route ASR02 Route Segment N206
456272	Active	159	55	Domestic	Route Segment N206
475253	Active	135	49	Domestic	Route ASR02
489320	Active	336	80	Domestic	Route Segment N207
702852	Active	61	17	Domestic	Route ASR01
179668	Active	56	20	Domestic	Route ASR01
666907	Active	66	13	Domestic	Route ASR01
192157	Active	84	13	Domestic	Route ASR01
819247	Active	126	N/A	Domestic	Route Segment N10
601532	Active	71	31	Domestic	Route ASR01

MWI Unique Well ID	Status	Depth (Feet)	Static Water Level (Feet) on MWI Report	Use	Route Alternative
827729	Active	100	37	Domestic	Route ASR01
754438	Active	116	37	Irrigation	Route ASR01
659335	Active	92	26	Domestic	Route ASR01
793423	Active	110	3	Irrigation	Route ASR02
510838	Active	92	3	Irrigation	Route ASR02
836644	Active	90	21	Domestic	Route ASR02
849012	Active	65	20	Observation Well	Route ASR02
849011	Active	133	20	Observation Well	Route ASR02
591160	Active	126	9	Domestic	Route ASR02
485066	Active	75	30	Domestic	Route ASR02
341541	N/A	135	N/A	Test Well	Route ASR02
341540	N/A	135	N/A	Test Well	Route ASR02
779351	Active	56	15	Domestic	Route Segment N11
666940	Active	44	23	Other	Route Segment N11
243789	Unk.	47	N/A	Observation Well	Route Segment N11
837355	Active	95	12	Domestic	Route ASR02
654850	Active	78	10	Domestic	Route ASR02 Route Segment N11
601514	Active	75	16	Domestic	Route ASR02 Route Segment N11
548640	Active	63	19	Domestic	Route ASR02

Appendix O
Protected Species

Routing Alternatives					BSSR01			BSSR02			BSSR03			BSSR04			BSSR05		
Scientific Name	Common Name	Type	State Status	Federal Status	ROW	Route Width	1-Mile												
<i>Ligumia recta</i>	Black sandshell	Mussel	Special concern	Not Listed															
<i>Limosella aquatica</i>	Mudwort	Vascular plant	Special concern	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Najas marina</i>	Sea naiad	Vascular plant	Special concern	Not Listed															
<i>Necturus maculosus</i>	Mudpuppy	Salamander	Special concern	Not Listed															
<i>Pelecanus erythrorhynchos</i>	American white pelican	Bird	Special concern	Not Listed															
<i>Schedonnardus paniculatus</i>	Tumble grass	Vascular plant	Special concern	Not Listed			x						x						x
<i>Schinia indiana</i>	Phlox moth	Moth	Special concern	Not Listed															
<i>Schinia lucens</i>	Leadplant flower moth	Moth	Special concern	Not Listed			x		x	x			x		x	x			x
<i>Setophaga cerulea</i>	Cerulean warbler	Bird	Special concern	Not Listed															
<i>Solidago mollis</i>	Soft goldenrod	Vascular plant	Special concern	Not Listed															
<i>Urocitellus richardsonii</i>	Richardson's ground squirrel	Squirrel	Special concern	Not Listed			x		x	x			x		x	x			x
<i>Woodsia oregana ssp. cathcartiana</i>	Oregon cliff fern	Vascular plant	Special concern	Not Listed															
<i>Xanthisma spinulosum var. spinulosum</i>	Cutleaf ironplant	Vascular plant	Special concern	Not Listed															

Routing Alternatives					BSSR06			BSSR07			BSSR08			BSSR09			BSSR10		
Scientific Name	Common Name	Type	State Status	Federal Status	ROW	Route Width	1-Mile												
<i>Athene cunicularia</i>	Burrowing owl	Bird	Endangered	Not Listed															
<i>Coryphantha vivipara</i>	Ball cactus	Vascular plant	Endangered	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Eleocharis wolfii</i>	Wolf's spikerush	Vascular plant	Endangered	Not Listed			x						x						x
<i>Hesperia dacotae</i>	Dakota skipper	Butterfly	Endangered	Threatened		x	x			x		x	x			x		x	x
<i>Isoetes melanopoda</i>	Prairie quillwort	Vascular plant	Endangered	Not Listed			x						x						x
<i>Lanius ludovicianus</i>	Loggerhead shrike	Bird	Endangered	Not Listed			x			x			x			x			x
<i>Marsilea vestita</i>	Hairy waterclover	Vascular plant	Endangered	Not Listed			x						x						x
<i>Oarisma poweshiek</i>	Poweshiek skipperling	Butterfly	Endangered	Endangered		x	x			x	x	x	x	x	x	x		x	x
<i>Actinonaias ligamentina</i>	Mucket	Mussel	Threatened	Not Listed			x			x			x			x			x
<i>Alasmidonta marginata</i>	Elktoe	Mussel	Threatened	Not Listed															
<i>Bacopa rotundifolia</i>	Waterhyssop	Vascular plant	Threatened	Not Listed		x	x			x		x	x			x		x	x
<i>Berula erecta</i>	Stream parsnip	Vascular plant	Threatened	Not Listed															
<i>Callitriche heterophylla</i>	Larger water starwort	Vascular plant	Threatened	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Cicindela lepida</i>	Ghost tiger beetle	Beetle	Threatened	Not Listed			x			x			x			x			x
<i>Cyperus acuminatus</i>	Short-pointed umbrella sedge	Vascular plant	Threatened	Not Listed															
<i>Notropis anogenus</i>	Pugnose shiner	Fish	Threatened	Not Listed															
<i>Rhynchospora capillacea</i>	Hair-like beak rush	Vascular plant	Threatened	Not Listed			x			x			x			x			x
<i>Anaxyrus cognatus</i>	Great plains toad	Toad	Special concern	Not Listed			x			x		x	x		x	x			x

Routing Alternatives					BSSR06			BSSR07			BSSR08			BSSR09			BSSR10		
Scientific Name	Common Name	Type	State Status	Federal Status	ROW	Route Width	1-Mile												
<i>Argynnis idalia</i>	Regal fritillary	Butterfly	Special concern	Not Listed		x	x			x		x	x		x	x		x	x
<i>Asio flammeus</i>	Short-eared owl	Bird	Special concern	Not Listed															
<i>Astragalus flexuosus var. flexuosus</i>	Slender milk-vetch	Vascular plant	Special concern	Not Listed	x	x	x			x	x	x	x	x	x	x	x	x	x
<i>Astragalus missouriensis var. missouriensis</i>	Missouri milk-vetch	Vascular plant	Special concern	Not Listed			x		x	x			x		x	x			x
<i>Atrytone arogos iowa</i>	Iowa skipper	Butterfly	Special concern	Not Listed			x			x			x			x			x
<i>Buellia nigra</i>	Black disc lichen	Fungus	Special concern	Not Listed			x						x						x
<i>Catocala abbreviatella</i>	Abbreviated underwing	Moth	Special concern	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Cirsium pumilum var. hillii</i>	Hill's thistle	Vascular plant	Special concern	Not Listed															
<i>Cygnus buccinator</i>	Trumpeter swan	Bird	Special concern	Not Listed															
<i>Cypripedium candidum</i>	Small white lady's-slipper	Vascular plant	Special concern	Not Listed			x			x		x	x		x	x			x
<i>Desmanthus illinoensis</i>	Prairie mimosa	Vascular plant	Special concern	Not Listed															
<i>Elatine triandra</i>	Three-stamened waterwort	Vascular plant	Special concern	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Eleocharis quinqueflora</i>	Few-flowered spikerush	Vascular plant	Special concern	Not Listed			x			x		x	x		x	x			x
<i>Eptesicus fuscus</i>	Big brown bat	Bat	Special concern	Not Listed															
<i>Etheostoma microperca</i>	Least darter	Fish	Special concern	Not Listed															
<i>Hesperia leonardus pawnee</i>	Pawnee skipper	Butterfly	Special concern	Not Listed		x	x			x		x	x			x		x	x
<i>Lasmigona compressa</i>	Creek heelsplitter	Mussel	Special concern	Not Listed															
<i>Ligumia recta</i>	Black sandshell	Mussel	Special concern	Not Listed															
<i>Limosella aquatica</i>	Mudwort	Vascular plant	Special concern	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Najas marina</i>	Sea naiad	Vascular plant	Special concern	Not Listed															
<i>Necturus maculosus</i>	Mudpuppy	Salamander	Special concern	Not Listed															
<i>Pelecanus erythrorhynchos</i>	American white pelican	Bird	Special concern	Not Listed															
<i>Schedonnardus paniculatus</i>	Tumble grass	Vascular plant	Special concern	Not Listed			x			x						x			x
<i>Schinia indiana</i>	Phlox moth	Moth	Special concern	Not Listed															
<i>Schinia lucens</i>	Leadplant flower moth	Moth	Special concern	Not Listed		x	x			x		x	x			x		x	x
<i>Setophaga cerulea</i>	Cerulean warbler	Bird	Special concern	Not Listed															
<i>Solidago mollis</i>	Soft goldenrod	Vascular plant	Special concern	Not Listed															
<i>Urocyon richardsonii</i>	Richardson's ground squirrel	Squirrel	Special concern	Not Listed		x	x			x		x	x			x		x	x
<i>Woodsia oregana ssp. cathcartiana</i>	Oregon cliff fern	Vascular plant	Special concern	Not Listed															
<i>Xanthisma spinulosum var. spinulosum</i>	Cutleaf ironplant	Vascular plant	Special concern	Not Listed															

Routing Alternatives					BSSR11			BSSR12			S207			S208			S210		
Scientific Name	Common Name	Type	State Status	Federal Status	ROW	Route Width	1-Mile	ROW	Route Width	1-Mile	ROW	Route Width	1-Mile	ROW	Route Width	1-Mile	ROW	Route Width	1-Mile
<i>Athene cunicularia</i>	Burrowing owl	Bird	Endangered	Not Listed															
<i>Coryphantha vivipara</i>	Ball cactus	Vascular plant	Endangered	Not Listed	x	x	x	x	x	x			x						x

<i>Routing Alternatives</i>					BSSR11			BSSR12			S207			S208			S210			
<i>Scientific Name</i>	Common Name	Type	State Status	Federal Status	ROW	Route Width	1-Mile													
<i>Pelecanus erythrorhynchos</i>	American white pelican	Bird	Special concern	Not Listed																
<i>Schedonnardus paniculatus</i>	Tumble grass	Vascular plant	Special concern	Not Listed									x							
<i>Schinia indiana</i>	Phlox moth	Moth	Special concern	Not Listed																
<i>Schinia lucens</i>	Leadplant flower moth	Moth	Special concern	Not Listed		x	x		x	x						x				
<i>Setophaga cerulea</i>	Cerulean warbler	Bird	Special concern	Not Listed																
<i>Solidago mollis</i>	Soft goldenrod	Vascular plant	Special concern	Not Listed																x
<i>Urocitellus richardsonii</i>	Richardson's ground squirrel	Squirrel	Special concern	Not Listed			x			x			x							
<i>Woodsia oregana ssp. cathcartiana</i>	Oregon cliff fern	Vascular plant	Special concern	Not Listed			x			x										
<i>Xanthisma spinulosum var. spinulosum</i>	Cutleaf ironplant	Vascular plant	Special concern	Not Listed												x				

White Bear Lake Subregion – Natural Heritage Information System Records

Routing Alternatives					WBLSR01			WBLSR02			WBLSR03			WBLSR04		
Scientific Name	Common Name	Type	State Status	Federal Status	ROW	Route Width	1-Mile									
<i>Athene cunicularia</i>	Burrowing owl	Bird	Endangered	Not Listed												
<i>Coryphantha vivipara</i>	Ball cactus	Vascular plant	Endangered	Not Listed												
<i>Eleocharis wolfii3</i>	Wolf's spikerush	Vascular plant	Endangered	Not Listed												
<i>Hesperia dacotae</i>	Dakota skipper	Butterfly	Endangered	Threatened												
<i>Isoetes melanopoda</i>	Prairie quillwort	Vascular plant	Endangered	Not Listed												
<i>Lanius ludovicianus</i>	Loggerhead shrike	Bird	Endangered	Not Listed												
<i>Marsilea vestita</i>	Hairy waterclover	Vascular plant	Endangered	Not Listed												
<i>Oarisma poweshiek</i>	Poweshiek skipperling	Butterfly	Endangered	Endangered												
<i>Actinonaias ligamentina</i>	Mucket	Mussel	Threatened	Not Listed												
<i>Alasmidonta marginata</i>	Elktoe	Mussel	Threatened	Not Listed												
<i>Bacopa rotundifolia</i>	Waterhyssop	Vascular plant	Threatened	Not Listed												
<i>Berula erecta</i>	Stream parsnip	Vascular plant	Threatened	Not Listed												
<i>Callitriche heterophylla</i>	Larger water starwort	Vascular plant	Threatened	Not Listed												
<i>Cicindela lepida</i>	Ghost tiger beetle	Beetle	Threatened	Not Listed												
<i>Cyperus acuminatus</i>	Short-pointed umbrella sedge	Vascular plant	Threatened	Not Listed												
<i>Notropis anogenus</i>	Pugnose shiner	Fish	Threatened	Not Listed												
<i>Rhynchospora capillacea</i>	Hair-like beak rush	Vascular plant	Threatened	Not Listed												
<i>Anaxyrus cognatus</i>	Great plains toad	Toad	Special concern	Not Listed												
<i>Argynnis idalia</i>	Regal fritillary	Butterfly	Special concern	Not Listed			x			x						x
<i>Asio flammeus</i>	Short-eared owl	Bird	Special concern	Not Listed												
<i>Astragalus flexuosus var. flexuosus</i>	Slender milk-vetch	Vascular plant	Special concern	Not Listed												
<i>Astragalus missouriensis var. missouriensis</i>	Missouri milk-vetch	Vascular plant	Special concern	Not Listed												
<i>Atrytone arogos iowa</i>	Iowa skipper	Butterfly	Special concern	Not Listed												
<i>Buellia nigra</i>	Black disc lichen	Fungus	Special concern	Not Listed												
<i>Catocala abbreviatella</i>	Abbreviated underwing	Moth	Special concern	Not Listed												
<i>Cirsium pumilum var. hillii</i>	Hill's thistle	Vascular plant	Special concern	Not Listed												
<i>Cygnus buccinator</i>	Trumpeter swan	Bird	Special concern	Not Listed												
<i>Cypripedium candidum</i>	Small white lady's-slipper	Vascular plant	Special concern	Not Listed												
<i>Desmanthus illinoensis</i>	Prairie mimosa	Vascular plant	Special concern	Not Listed												
<i>Elatine triandra</i>	Three-stamened waterwort	Vascular plant	Special concern	Not Listed												
<i>Eleocharis quinqueflora</i>	Few-flowered spikerush	Vascular plant	Special concern	Not Listed												
<i>Eptesicus fuscus</i>	Big brown bat	Bat	Special concern	Not Listed												
<i>Etheostoma microperca</i>	Least darter	Fish	Special concern	Not Listed												
<i>Hesperia leonardus pawnee</i>	Pawnee skipper	Butterfly	Special concern	Not Listed												
<i>Lasmigona compressa</i>	Creek heelsplitter	Mussel	Special concern	Not Listed			x			x			x			x

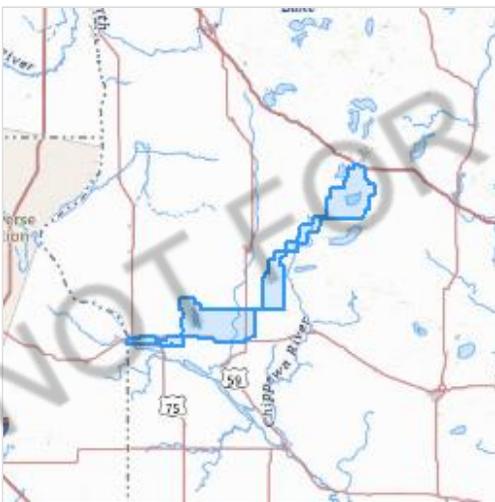
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Minnesota and South Dakota



Local offices

Minnesota-Wisconsin Ecological Services Field Office

☎ (952) 858-0793

3815 American Blvd East
Bloomington, MN 55425-1659

South Dakota Ecological Services Field Office

 (605) 224-8693

 (605) 224-1416

420 South Garfield Avenue, Suite 400

Pierre, SD 57501-5408

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

-
1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
 2. [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.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Birds

NAME	STATUS
Rufa Red Knot <i>Calidris canutus rufa</i> Wherever found There is proposed critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1864	Threatened

Insects

NAME	STATUS
Dakota Skipper <i>Hesperia dactotae</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1028	Threatened
Monarch Butterfly <i>Danaus plexippus</i> Wherever found There is proposed critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9743	Proposed Threatened
Suckley's Cuckoo Bumble Bee <i>Bombus suckleyi</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10885	Proposed Endangered
Western Regal Fritillary <i>Argynnis idalia occidentalis</i> Wherever found No critical habitat has been designated for this species.	Proposed Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act ² and the Migratory Bird Treaty Act (MBTA) ¹. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds
<https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds
<https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC
<https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

There are Bald Eagles and/or Golden Eagles in your [project](#) area.

Measures for Proactively Minimizing Eagle Impacts

For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the [National Bald Eagle Management Guidelines](#). You may employ the timing and activity-specific distance recommendations in this document when designing your project/activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to [Bald Eagle Nesting and Sensitivity to Human Activity](#).

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional [Migratory Bird Office](#) or [Ecological Services Field Office](#).

If disturbance or take of eagles cannot be avoided, an [incidental take permit](#) may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the [Do I Need A Permit Tool](#). For assistance making this determination for golden eagles, please consult with the appropriate Regional [Migratory Bird Office](#) or [Ecological Services Field Office](#).

Ensure Your Eagle List is Accurate and Complete

If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the [Supplemental Information on Migratory Birds and Eagles](#), to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

Review the FAQs

The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
<p>Bald Eagle <i>Haliaeetus leucocephalus</i></p> <p>This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p> <p>https://ecos.fws.gov/ecp/species/1626</p>	Breeds Dec 1 to Aug 31
<p>Golden Eagle <i>Aquila chrysaetos</i></p> <p>This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p> <p>https://ecos.fws.gov/ecp/species/1680</p>	Breeds Jan 1 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "[Supplemental Information on Migratory Birds and Eagles](#)", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

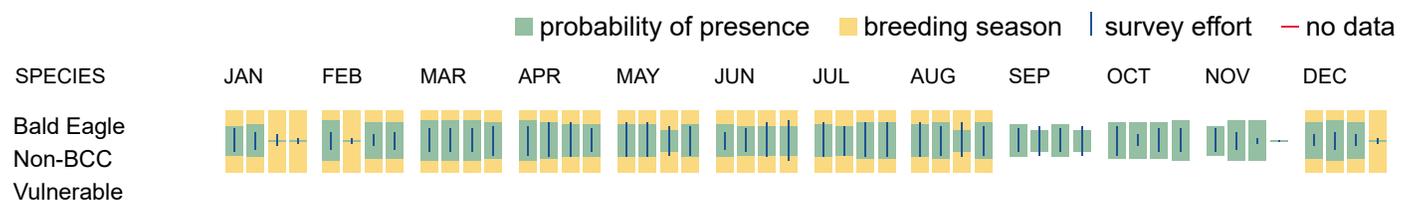
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

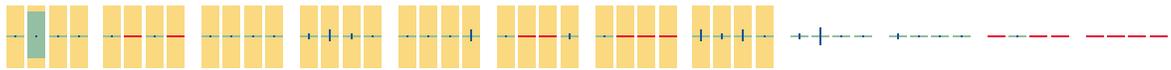
No Data (-)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Bald & Golden Eagles FAQs

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence 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 an eagle ([Bald and Golden Eagle Protection Act](#) requirements may apply).

Proper interpretation and use of your eagle report

On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). 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 line or no data line (red horizontal) 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 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 and associated information help you know what to look for to confirm presence and helps guide you in knowing when to implement avoidance and minimization measures to eliminate or reduce potential impacts from your project activities or get the appropriate permits should presence be confirmed.

How do I know if eagles are breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the [RAIL Tool](#) and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If an eagle on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), 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.

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:

The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Migratory birds

The Migratory Bird Treaty Act (MBTA) ¹ prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds
<https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC
<https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

Measures for Proactively Minimizing Migratory Bird Impacts

Your IPaC Migratory Bird list showcases [birds of concern](#), including [Birds of Conservation Concern \(BCC\)](#), in your project location. This is not a comprehensive list of all birds found in your project area. However, you can help proactively minimize significant impacts to all birds at your project location by implementing the measures in the [Nationwide avoidance and minimization measures for birds](#) document, and any other project-specific avoidance and minimization measures suggested at the link [Measures for avoiding and minimizing impacts to birds](#) for the birds of concern on your list below.

Ensure Your Migratory Bird List is Accurate and Complete

If your project area is in a poorly surveyed area, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the [Supplemental Information on Migratory Birds and Eagles document](#), to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

Review the FAQs

The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
American Golden-plover <i>Pluvialis dominica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black Tern <i>Chlidonias niger surinamensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10

Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Eastern Whip-poor-will <i>Antrostomus vociferus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Franklin's Gull <i>Leucophaeus pipixcan</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Golden Eagle <i>Aquila chrysaetos</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Golden-winged Warbler <i>Vermivora chrysoptera</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Grasshopper Sparrow <i>Ammodramus savannarum perpallidus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8329	Breeds Jun 1 to Aug 20
Henslow's Sparrow <i>Centronyx henslowii</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3941	Breeds May 1 to Aug 31
Hudsonian Godwit <i>Limosa haemastica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Le Conte's Sparrow <i>Ammodramus leconteii</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 1 to Aug 15

<p>Le Conte's Sparrow <i>Ammospiza leconteii</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds Jun 1 to Aug 15
<p>Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679</p>	Breeds elsewhere
<p>Marbled Godwit <i>Limosa fedoa</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481</p>	Breeds May 1 to Jul 31
<p>Northern Harrier <i>Circus hudsonius</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8350</p>	Breeds Apr 1 to Sep 15
<p>Pectoral Sandpiper <i>Calidris melanotos</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds elsewhere
<p>Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds May 10 to Sep 10
<p>Ruddy Turnstone <i>Arenaria interpres morinella</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA</p>	Breeds elsewhere
<p>Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA</p>	Breeds elsewhere
<p>Semipalmated Sandpiper <i>Calidris pusilla</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA</p>	Breeds elsewhere
<p>Short-billed Dowitcher <i>Limnodromus griseus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480</p>	Breeds elsewhere

Upland Sandpiper *Bartramia longicauda*

Breeds May 1 to Aug 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

<https://ecos.fws.gov/ecp/species/9294>

Western Grebe *Aechmophorus occidentalis*

Breeds Jun 1 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/6743>

Willet *Tringa semipalmata*

Breeds Apr 20 to Aug 5

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "[Supplemental Information on Migratory Birds and Eagles](#)", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

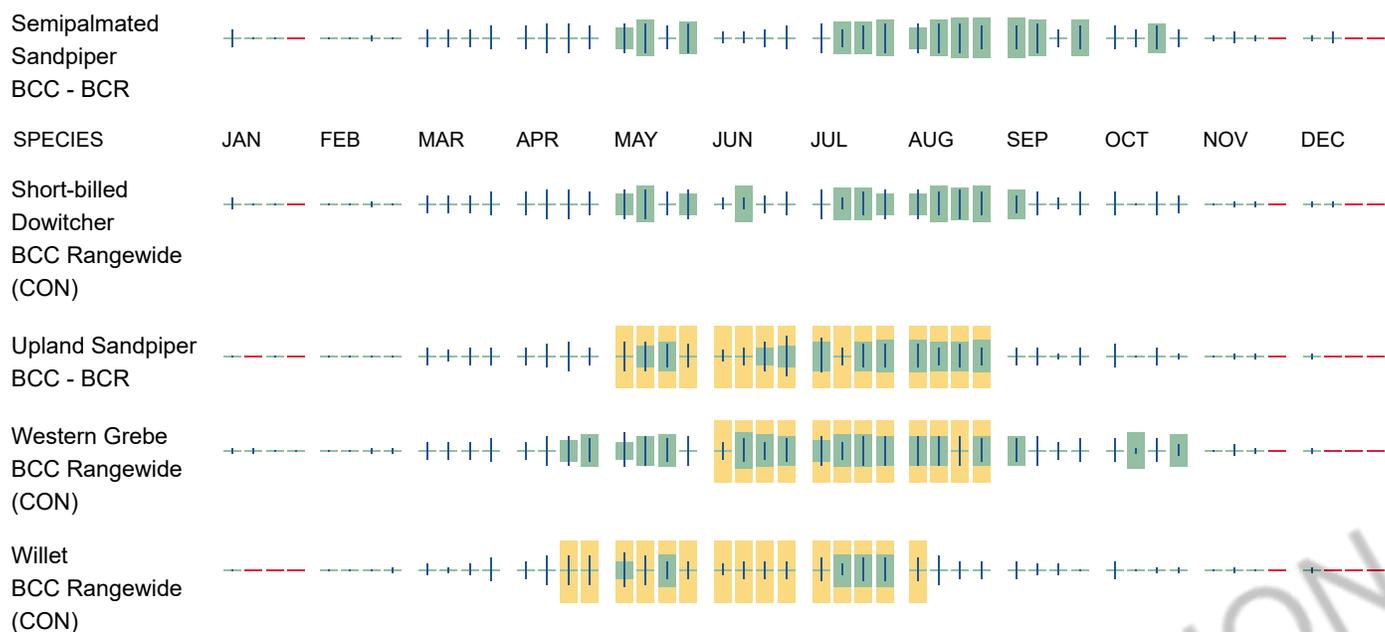
Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.



Migratory Bird FAQs

Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Avoidance & Minimization Measures for Birds](#) describes measures that can help avoid and minimize impacts to all birds at any location year-round. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is one of the most effective ways to minimize impacts. To see when birds are most likely to occur and breed 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 list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location, such as those listed under the Endangered Species Act or the [Bald and Golden Eagle Protection Act](#) and those species marked as “Vulnerable”. See the FAQ “What are the levels of concern for migratory birds?” for more information on the levels of concern covered in the IPaC migratory bird species list.

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) with which your project intersects. These species have been identified as warranting special attention because they are BCC species in that area, an eagle ([Bald and Golden Eagle Protection 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, and to verify survey effort when no results present, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

Why are subspecies showing up on my list?

Subspecies profiles are included on the list of species present in your project area because observations in the AKN for **the species** are being detected. If the species are present, that means that the subspecies may also be present. If a subspecies shows up on your list, you may need to rely on other resources to determine if that subspecies may be present (e.g. your local FWS field office, state surveys, your own surveys).

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 to 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, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the [RAIL Tool](#) and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), 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 [Bald and Golden Eagle Protection 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 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 BCC species. For more information on avoidance and minimization measures you can implement to help avoid and minimize migratory bird impacts, please see the FAQ "Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

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.

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 look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). 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 does not represent all birds present in your project area. 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 and associated information help you know what to look for to confirm presence and helps guide implementation of avoidance and minimization measures to eliminate or reduce potential impacts from your project activities, should presence be confirmed. To learn more about avoidance and minimization measures, visit the FAQ "Tell me about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:

The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Facilities

Wildlife refuges and fish hatcheries

Refuge and fish hatchery information is not available at this time

Wetlands in the National Wetlands Inventory (NWI)

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the [NWI map](#) to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters.

Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION



Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

August 22, 2024

Katie Lueth
HDR Inc

RE: Natural Heritage Review of the proposed **OTP/MRES BSSA**,
Big Stone, Douglas, Pope, Stevens, Swift Counties

Dear Katie Lueth,

For all correspondence regarding the Natural Heritage Review of this project please include the project ID **MCE-2024-00481** in the email subject line.

As requested, the [Minnesota Natural Heritage Information System](#) has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request, the following rare features may be impacted by the proposed project:

Ecologically Significant Areas

- Multiple calcareous fens have been documented in the vicinity of the proposed project. A calcareous fen is a rare and distinctive peat-accumulating wetland that is legally protected in Minnesota. The Wetlands Conservation Act (WCA), authorized by Minnesota Statutes, section 103G.223, states that calcareous fens may not be filled, drained, or otherwise degraded, wholly or partially, by any activity, except as provided for in a management plan approved by the commissioner of the Department of Natural Resources. Many of the unique characteristics of calcareous fens result from the upwelling of groundwater through calcareous substrates. Because of this dependence on groundwater hydrology, calcareous fens can be affected by nearby activities or even those several miles away. For more information regarding calcareous fens, please see the [Calcareous Fen Fact Sheet](#). To minimize stormwater impacts, please refer to the Minnesota Pollution Control Agency's [General Principles for Erosion Prevention and Sediment Control](#) in the Minnesota Stormwater Manual. Please note that calcareous fens are "Special Waters" and a [buffer zone](#) may be required.

Calcareous fens may be impacted by activities within the fen, activities that affect surface water flows (e.g., stormwater flow, erosion), or activities that affect groundwater hydrology (e.g., groundwater pumping, contamination, discharge, or excavation). **To ensure compliance under WCA, please contact the Calcareous Fen Program Coordinator, Keylor Andrews (Keylor.Andrews@state.mn.us)**

- **Artichoke Lake**, a Lake of *Moderate* Biological Significance, may be impacted by the proposed project. [Lakes of Biological Significance](#) are high quality lakes based on the aquatic plant, fish, bird, or amphibian communities present within the lake. The lake is assigned a biological significance of *Outstanding*, *High*, or *Moderate* based on the community with the highest quality. Given the ecological significance of this lake, disturbance should be minimized during construction, operation, and maintenance activities. Actions to avoid or minimize disturbance include, but are not limited to, the following recommendations:
 - Avoid lakebed disturbance / span waterbodies.
 - Avoid the removal of shoreline vegetation.
 - Implement stringent/redundant erosion prevention and sediment control practices.
 - Prevent the spread of invasive species.
 - Use only herbicides approved for application within shoreline/riparian areas.
 - Minimize use of fertilizer.
- The Minnesota Biological Survey (MBS) has identified **25** Sites of Biodiversity Significance within the vicinity of the proposed project ranked as *High* or *Moderate*. MBS Sites have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Factors taken into account during the ranking process include the number of rare species documented within the site, the quality of the native plant communities in the site, the size of the site, and the context of the site within the landscape. Additionally, there are **21** areas within the vicinity of the proposed project ranked as *Below*; these areas do not meet the minimum biodiversity threshold for statewide significance but may have conservation value at the local level as habitat. **The DNR recommends avoidance of MBS Sites of Biodiversity Significance ranked *High* or *Outstanding*.** Please see your MCE-generated Conservation Planning Report for a comprehensive list of MBS Sites of Biodiversity Significance.

There are **58** mapped DNR Native Plant Communities (NPC) that have been documented within the vicinity of the proposed project. DNR NPC types are given a Conservation Status Rank that reflects the relative rarity and endangerment of the community type in Minnesota. Conservation Status Ranks range from S1 (critically imperiled) to S5 (secure, common, widespread, and abundant). *Native plant communities with a Conservation Status Rank of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable to extirpation) are considered rare in the state.* **The DNR recommends avoidance of rare NPCs (ranked S1, S2, or S3).** Please see your MCE-generated Conservation Planning Report for a comprehensive list of native plant communities in your

proposed project area. Of particular concern are project impacts to prairie communities and rock outcrop communities.

- *Prairie Communities*: More than 99% of the prairie that was present in the state before settlement has been destroyed, and more than one-third of Minnesota's endangered, threatened, and special concern species are now dependent on the remaining small fragments of Minnesota's prairie ecosystem. **To avoid incidental take, all native prairie remnants should be avoided.** If avoidance is not feasible, further consultation will be needed to ensure compliance with state law. **If any native prairie remnants are crossed by the final project design, a native prairie protection plan may be needed.** You may contact the Regional Ecologist for details on developing a native prairie protection plan.
- *Rock Outcrop Communities*: Rock Outcrops contain dry, rather sparsely vegetated communities on exposures of granitic bedrock. Vegetation on these outcrops typically occurs as a complex growing on bare rock surfaces, in rock crevices, and in shallow soils less than a couple of feet deep between and around exposures. Plant species in rock outcrop communities are adapted to greater environmental extremes than species in surrounding terrestrial communities. Several threatened and endangered species rely on this rare habitat.
 - We are especially concerned about impacts to Ortonville 22 *High* MBS Site in Big Stone County (T121N R46W Section 22) and recommend avoiding the site entirely to avoid incidental take and to comply with the Wetland Conservation Act (WCA, see more information below). Ortonville 22 *High* MBS Site contains Crystalline Bedrock Outcrop (Prairie), Minnesota River Subtype (ROs12a1), an imperiled (S2) NPC which provides habitat for state-protected plant species such as [ball cactus](#) (*Coryphantha vivipara*), [larger water starwort](#) (*Callitriche heterophylla*), and [waterhyssop](#) (*Bacopa rotundifolia*). For ball cactus, one of the rarest species in Minnesota, impacts to Ortonville 22 *High* MBS Site would likely result in a deleterious effect on its population as thousands of plants have been documented at the site. **To prevent degradation of this ecologically significant area, we strongly recommend that another route is chosen.** Please consider the Alternative Route Requests proposed by Regional Environmental Assessment Ecologists Haley Byron and Owen Baird during project coordination.

The DNR recommends that the project be designed to avoid impacts to these ecologically significant areas. Actions to avoid or minimize disturbance include, but are not limited to, the following recommendations:

- As much as possible, operate within already-disturbed areas.
- Avoid MBS Sites and native plant communities ranked S1, S2, or S3.
- Retain a buffer between proposed activities and the MBS Site.

- Confine construction activities to the opposite side of the road from MBS Sites. If this is not feasible, confine construction activities to the existing road rights-of-way.
- Minimize vehicular disturbance in the MBS Site (allow only vehicles/equipment necessary for construction activities).
- Do not park equipment or stockpile supplies in the MBS Site.
- Do not place spoil in the MBS Site or other sensitive areas.
- If possible, conduct the work under frozen ground conditions.
- Use effective erosion prevention and sediment control measures.
- Inspect and clean equipment prior to operation and follow recommendations to [prevent the spread of invasive species](#).
- Revegetate disturbed soil with [native species suitable to the local habitat](#) as soon after construction as possible.
- Use only weed-free mulches, topsoils, and seed mixes. Of particular concern are birdsfoot trefoil (*Lotus corniculatus*) and crown vetch (*Coronilla varia*), two invasive species that are sold commercially and are problematic in prairies and disturbed open areas.

MBS Sites of Biodiversity Significance and DNR Native Plant Communities can be viewed using the Explore page in [Minnesota Conservation Explorer](#) or their GIS shapefiles can be downloaded from the [MN Geospatial Commons](#). Please contact the [NH Review Team](#) if you need assistance accessing the data. Reference the [MBS Site Biodiversity Significance](#) and [Native Plant Community](#) websites for information on interpreting the data. To receive a list of MBS Sites of Biodiversity Significance and DNR Native Plant Communities in the vicinity of your project, create a [Conservation Planning Report](#) using the Explore Tab in [Minnesota Conservation Explorer](#). **I have uploaded the MCE-generated Conservation Planning Report to the MCE project page.**

- If the Wetland Conservation Act (WCA) is applicable to this project, please note that native plant communities with a Conservation Status Rank of S1 through S3 or wetlands within *High* or *Outstanding* MBS Sites of Biodiversity Significance may qualify as Rare Natural Communities (RNC) under WCA. Minnesota Rules, part 8420.0515, subpart 3 states that a wetland replacement plan for activities that modify a RNC must be denied if the local government unit determines the proposed activities will permanently adversely affect the RNC. If the proposed project includes a wetland replacement plan under WCA, please contact your [DNR Regional Ecologist](#) for further evaluation. Please visit [WCA Program Guidance and Information](#) for additional information, including the [Rare Natural Communities Technical Guidance](#).
 - There are several designated Rare Natural Communities in Ortonville 22 *High* MBS Site in Big Stone Co. (T121N R46W Sect. 22).
 - There are several potential Rare Natural Communities in:
 - Ortonville 21 *Moderate* MBS Site in Big Stone Co. (T121N R46W Sect. 21)
 - Odessa 29 *Moderate* MBS Site in Big Stone Co. (T121N R45W Sect. 29)

- Odessa 28 *Moderate* MBS Site in Big Stone Co. (T121N R45W Sect. 27 & 28)
- Tara 31 *Moderate* MBS Site in Swift Co. (T122N R41W Sect. 31)
- Swift Co. WPA *Moderate* MBS Site in Swift Co. (T122N R41W Sect. 17 & 20)
- Little Chippewa River *Moderate* MBS Site in Pope Co. (T125N R39W Sect. 30 & 31)
- Starbuck WPA *Moderate* MBS Site in Pope Co. (T125N R39W Sect. 30)
- Reno 36 *Moderate* MBS Site in Pope Co. (T126N R38W Sect. 35)
- Cattail Marsh (Prairie) (MRp83b) critically imperiled (S1) NPC in Pope Co. (T126N R37W Sect. 30)
- Southern Seepage Meadow/Carr (WMs83) imperiled (S2) NPC in Douglas Co. (T127N R37W Sect. 22)

State-listed Species

- Many state-listed threatened and endangered plant species have been found within the vicinity of the proposed project and within the project area. This project may impact potential habitat and result in take of threatened or endangered species. Minnesota’s Endangered Species Statute (*Minnesota Statutes*, section 84.0895) and associated Rules (*Minnesota Rules*, part 6212.1800 to 6212.2300 and 6134) prohibit the take of threatened or endangered species without a permit.

The table below lists state-listed plant species within the project vicinity; species found within the proposed project area are marked with an asterisk (*). **All known occurrences of state protected plant species and all potential habitats must be avoided.** If this is not feasible, a qualified surveyor will need to (1) resurvey known occurrences and (2) conduct a habitat assessment to determine if suitable habitat exists within the activity impact area and, if so, conduct a rare plant survey prior to any project activities. The goal of the habitat assessment is to identify potential locations where endangered (END) and threatened (THR) species may occur to help formulate an avoidance plan. Species of special concern (SPC) are also rare and an important component of Minnesota’s natural heritage; we strongly encourage project alternatives that avoid or minimize impacts to known occurrences of these species as well.

Surveys must be conducted by a qualified surveyor and follow the standards contained in the [Rare Species Survey Process](#) and [Rare Plant Guidance](#). Visit the [Natural Heritage Review](#) page for a list of certified surveyors and more information on this process. Project planning should take into account that any botanical survey needs to be conducted during the appropriate time of the year, which may be limited. Please consult with the NH Review Team at Review.NHIS@state.mn.us if you have any questions regarding this process.

MN Status	Common Name	Scientific Name	Habitat	Water Regime
END	Ball Cactus *	<i>Coryphantha vivipara</i>	Rock Outcrop	terrestrial
END	Eared False Foxglove	<i>Agalinis auriculata</i>	Upland Prairie, Lowland Prairie	terrestrial
END	Hairy Waterclove	<i>Marsilea vestita</i>	Rock Outcrop	wetland
END	Prairie Quillwort	<i>Isoetes melanopoda</i>	Rock Outcrop	wetland
END	Wolf's Spikerush	<i>Eleocharis wolfii</i>	Rock Outcrop, Upland Prairie, Savanna, Wet Meadow/Carr	wetland
THR	Hair-like Beak Rush	<i>Rhynchospora capillacea</i>	Non-forested Rich Peatland	wetland
THR	Larger Water Starwort *	<i>Callitriche heterophylla</i>	Marsh, Rock Outcrop, Littoral Zone of Lake	aquatic
THR	Short-pointed Umbrella Sedge	<i>Cyperus acuminatus</i>	Rock Outcrop	wetland
THR	Stream Parsnip	<i>Berula erecta</i>	Wet Meadow/Carr, Small Rivers and Streams, Non-forested Rich Peatland	aquatic, wetland
THR	Waterhyssop *	<i>Bacopa rotundifolia</i>	Marsh, Rock Outcrop	aquatic, wetland
SPC	Cutleaf Ironplant	<i>Xanthisma spinulosum var. spinulosum</i>	Upland Prairie	terrestrial
SPC	Dwarf Spikerush	<i>Eleocharis coloradoensis</i>	Lake Shore	wetland
SPC	Few-flowered Spikerush *	<i>Eleocharis quinqueflora</i>	Lake Shore, Lowland Prairie, Non-forested Acid Peatland, Non-forested Rich Peatland	wetland
SPC	Hill's Thistle *	<i>Cirsium pumilum var. hillii</i>	Savanna, Upland Prairie	terrestrial
SPC	Missouri Milk-vetch	<i>Astragalus missouriensis var. missouriensis</i>	Upland Prairie	terrestrial
SPC	Mudwort *	<i>Limosella aquatica</i>	Lowland Prairie, Rock Outcrop	aquatic, wetland
SPC	Oregon cliff fern	<i>Woodsia oregana ssp. cathcartiana</i>	Rock Outcrop, Talus, Cliff	terrestrial
SPC	Prairie Mimosa *	<i>Desmanthus illinoensis</i>	Lake Shore, Upland Prairie	terrestrial
SPC	Sea Naiad	<i>Najas marina</i>	Littoral Zone of Lake	aquatic
SPC	Slender Milk-vetch *	<i>Astragalus flexuosus var. flexuosus</i>	Upland Prairie	terrestrial
SPC	Small White Lady's-slipper *	<i>Cypripedium candidum</i>	Lowland Prairie, Upland Prairie, Wet Meadow/Carr	terrestrial, wetland
SPC	Spiral Ditchgrass	<i>Ruppia cirrhosa</i>	Littoral Zone of Lake	aquatic
SPC	Three-stamened Waterwort *	<i>Elatine triandra</i>	Littoral Zone of Lake, Rock Outcrop	aquatic
SPC	Tumble Grass	<i>Schedonnardus paniculatus</i>	Rock Outcrop	terrestrial

* = Known to occur within the project area. Please see your license agreement (2022-034) for specific locations.

- [Loggerhead shrikes](#) (*Lanius ludovicianus*), a state-listed endangered bird, have been documented in the vicinity of the project site. Loggerhead shrikes use grasslands that contain short grass and scattered perching sites such as hedgerows, shrubs, or small trees. They can be found in native prairie, pastures, shelterbelts, old fields or orchards, cemeteries, grassy roadsides, and farmyards. Minnesota's Endangered Species Statute (Minnesota Statutes, section 84.0895) and associated Rules (Minnesota Rules, part 6212.1800 to 6212.2300 and 6134) prohibit the take of endangered or threatened plants or animals, including their parts or seeds, without a permit. Given the potential for this species to be found in the vicinity of the project, **tree and shrub removal is required to be avoided during the breeding season, April through July.**

Please contact Review.NHIS@state.mn.us to confirm that the above avoidance measure will be implemented or to inform us that avoidance is not feasible. If avoidance is not feasible, a qualified surveyor needs to conduct a survey for active nests before any trees or shrubs will be removed. Requirements for surveys and lists of DNR certified lists of surveyors can be found at the [Natural Heritage Review website](#).

- [Henslow's sparrow](#) (*Centronyx henslowii*), a state-listed endangered bird species, has been documented in the vicinity of the proposed project. Suitable nesting habitat for this species includes uncultivated and unmowed grasslands and old fields with standing, dead vegetation, and a substantial litter layer. This species nests on the ground, at the base of grass clumps. As such, initial disturbance in these areas should not occur during their breeding season, between May 15th and July 15th. **If avoidance during breeding season is not feasible, areas that will be disturbed that contain suitable nesting habitat will need to be surveyed for active nests prior to any project disturbance.**

Please contact Review.NHIS@state.mn.us to confirm that the above avoidance measure will be implemented or to inform us that avoidance is not feasible. If avoidance is not feasible, the project area will need to be surveyed for active nests prior to any project disturbance. Requirements for surveys and lists of DNR certified lists of surveyors can be found at the [Natural Heritage Review website](#).

- [Burrowing owl](#) (*Athene cunicularia*), a state-listed endangered species, was documented in the vicinity of the proposed project in Stevens County. Burrowing owls use open, grazed pastures or native prairies populated by burrowing mammals. Areas of intensive agricultural use are usually, but not always, avoided. Burrowing owls are now extremely rare in Minnesota, and we don't know of any regularly occurring breeding populations in the state. However, burrowing owls are most likely to use prairie habitats occupied by [Richardson's ground squirrel](#) (*Spermophilus richardsonii*), a state-listed species of special concern, which has been documented in Ortonville 22 High MBS Site in Big Stone County (T121N R46W Sect. 22) and in Pope County (T124N R40W Sect. 29 & 30) within the footprint of the proposed project. **Please report any sightings using the [Quick Species Observation Form](#).**

- [Dakota skipper](#) (*Hesperia dacotae*), a federally listed threatened and state-listed endangered species, has been documented within the vicinity of the proposed project. The Dakota skipper is a small butterfly found exclusively on remnant native prairie habitats. This rare butterfly is sensitive to several types of artificial and natural disturbances and are almost always absent from remnant prairies that are overgrazed or otherwise degraded. Dakota skipper populations have declined historically due to widespread conversion of native prairie for agriculture and other uses and are now threatened, in part, due to the isolation of remaining populations. Remaining Dakota skipper populations are generally so small and isolated that they are subject to genetic drift, which is likely to further reduce their genetic viability. Additionally, [regal fritillary](#) (*Argynnis idalia*) and [Pawnee skipper](#) (*Hesperia leonardus pawnee*), both butterfly species of special concern, have been documented in the footprint of the proposed project in Shible 9 Moderate MBS Site in Swift County (T121N R43W Sect. 9) and several MBS sites in Big Stone County (T121N R46W Sect. 21 & 22). To protect the Dakota skipper and other prairie obligate butterfly species, **it is imperative that the destruction and disturbance of native prairie be avoided.**
- [Elktoe](#) (*Alasmodonta marginata*), a state-listed threatened mussel species has been documented in the Pomme de Terre River. [Black sandshell](#) (*Ligumia recta*) and [creek heelsplitter](#) (*Lasmigona compressa*), both state-listed species of special concern, have been documented in the Chippewa River. As such, effective erosion prevention and sediment control practices must be implemented and maintained near these rivers throughout the duration of the project and incorporated into any stormwater management plan. If project details change and these rivers are expected to be impacted in any way, contact Review.NHIS@state.mn.us as further action may be needed.
- [Big brown bat](#) (*Eptesicus fuscus*), a state-listed species of special concern, has been documented in the vicinity of the proposed project. During the active season (approximately April-November) bats roost underneath bark, in cavities, or in crevices of both live and dead trees. Tree removal can negatively impact bats by destroying roosting habitat, especially during the pup rearing season when females are forming maternity roosting colonies and the pups cannot yet fly. To minimize these impacts, **the DNR recommends that tree removal be avoided from June 1 through August 15.**
- [American white pelican](#) (*Pelecanus erythrorhynchos*), a state-listed species of special concern, has been documented at Marsh Lake, Artichoke Lake, and several lakes in Pope County within the vicinity of the proposed project. This migratory species typically nests in colonies on bare islands, isolated from predators and humans. Marsh Lake, which is located on the borders of Big Stone, Lac qui Parle, and Swift counties approximately 3.5 miles from the proposed project, is the largest known colony in North America. **The DNR recommends installing avian flight diverters on power cables near waterbodies to reduce bird collisions with power cables.**

- [Trumpeter swan](#) (*Cygnus buccinator*), a state-listed species of special concern, have been documented nesting in the vicinity of the proposed project. During the breeding season, trumpeter swans select small ponds and lakes with extensive beds of cattails, bulrush, sedges, and/or horsetail. Ideal habitat includes about 100 m of open water for take-off, stable levels of unpolluted water, emergent vegetation, low levels of human disturbance, and the presence of muskrat (*Ondatra zibethicus*) houses and American beaver (*Castor canadensis*) lodges for use as nesting platforms. If any of the wetlands on site provide suitable habitat, swans may choose to nest in these wetlands. **The DNR recommends avoiding construction activities late April through early June near suitable nesting habitat and installing avian flight diverters on power cables near waterbodies to reduce bird collisions with power cables.**
- [Short-eared owl](#) (*Asio flammeus*), a species of special concern, has been documented in the vicinity of the proposed project in Swift County (T121N R42W Sect. 14, 15, 22, 23). This species nests on the ground in open areas such as grasslands, marshes, and peatlands. **Minimize disturbance as much as feasible to nesting habitat during nesting season, May through June.**
- [Great Plains toad](#) (*Anaxyrus cognatus*), a state-listed species of special concern, was documented in the vicinity of the proposed project along U.S. Highway 75 in Big Stone County. This species is found in remnant prairies and grasslands in Western Minnesota. They breed from May to July in highly ephemeral water-filled prairie depressions and have adapted to breed in flooded agricultural fields. **Given the presence of these rare toads, the DNR recommends that the use of erosion control mesh, if any, be limited to [wildlife-friendly materials](#).**
- Please visit the [DNR Rare Species Guide](#) for more information on the habitat use of the species mentioned above and recommended measures to avoid or minimize impacts. For further assistance with these species, please contact the appropriate [Regional Ecologist](#).

Federally Protected Species

- Dakota skipper is a federally threatened species. **To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online [Information for Planning and Consultation \(IPaC\) tool](#).** For additional information on this species, see the [USFWS Dakota Skipper Information Page](#). For information on conservation measures for this species, including habitat preservation and restoration, see the [USFWS Dakota Skipper Conservation Guidelines](#).

Environmental Review and Permitting

- We understand that the planning for this project was not finalized when this Natural Heritage Review was conducted. Given the presence of rare ecologically significant areas and state-protected species with the current route, further Natural Heritage Review will be needed for alternate routes and/or the finalized route. Resubmission will ensure compliance with state

statute and rules. Please reference this project (2024-00481) when submitting alternate routes and/or the finalized route for future Natural Heritage Review.

- Please include (1) a copy of this review letter, (2) the MCE-generated Conservation Planning Report, and (3) the MCE-generated Final Project Report in any state or local license or permit application. The Public Utilities Commission (PUC) Route Permit Application should address potential impacts to the above rare features and identify avoidance or mitigation measures that will be implemented. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and project description provided with the request. **If project details change or the project has not occurred within one year, please resubmit the project for review within one year of initiating project activities.**

The Natural Heritage Review does not constitute project approval by the Department of Natural Resources. Instead, it identifies issues regarding known occurrences of rare features and potential impacts to these rare features. Visit the [Natural Heritage Review website](#) for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, you may contact your [DNR Regional Environmental Assessment Ecologist](#).

Thank you for consulting us on this matter and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

Molly Barrett

Digitally signed by Molly Barrett
Date: 2024.08.22 16:58:15 -05'00'

Natural Heritage Review Specialist

Molly.Barrett@state.mn.us

Cc: [Owen Baird](#), Regional Environmental Assessment Ecologist, Northwest (Region 1)

Cc: [Becky Marty](#), Regional Ecologist, Northwest (Region 1)

Cc: [Haley Byron](#), Regional Environmental Assessment Ecologist, South (Region 4)

Cc: [Megan Benage](#), Regional Ecologist, South (Region 4)

Cc: [Jennie Skancke](#), Wetlands Program Coordinator

Cc: [Kaylor Andrews](#), Calcareous Fen Program Coordinator



Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

December 6, 2024

Katie Lueth
HDR Inc

RE: Natural Heritage Review of the proposed **OTP/MRES BSSA Supplemental Areas**,
Big Stone, Douglas, Pope, Stevens, Swift Counties

Dear Katie Lueth,

For all correspondence regarding the Natural Heritage Review of this project please include the project ID **MCE-2024-00815** in the email subject line.

As requested, the [Minnesota Natural Heritage Information System](#) has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request, the following rare features may be impacted by the proposed project:

Ecologically Significant Areas

- Multiple calcareous fens have been documented in the vicinity of the proposed project in Big Stone County. A calcareous fen is a rare and distinctive peat-accumulating wetland that is legally protected in Minnesota. The Wetlands Conservation Act (WCA), authorized by Minnesota Statutes, section 103G.223, states that calcareous fens may not be filled, drained, or otherwise degraded, wholly or partially, by any activity, except as provided for in a management plan approved by the commissioner of the Department of Natural Resources. Many of the unique characteristics of calcareous fens result from the upwelling of groundwater through calcareous substrates. Because of this dependence on groundwater hydrology, calcareous fens can be affected by nearby activities or even those several miles away. For more information regarding calcareous fens, please see the [Calcareous Fen Fact Sheet](#). To minimize stormwater impacts, please refer to the Minnesota Pollution Control Agency's [General Principles for Erosion Prevention and Sediment Control](#) in the Minnesota Stormwater Manual. Please note that calcareous fens are "Special Waters" and a [buffer zone](#) may be required.

Calcareous fens may be impacted by activities within the fen, activities that affect surface water flows (e.g., stormwater flow, erosion), or activities that affect groundwater hydrology (e.g., groundwater pumping, contamination, discharge, or excavation). **To ensure compliance under WCA, please contact the Calcareous Fen Program Coordinator, Keylor Andrews (Keylor.Andrews@state.mn.us)**

- The Minnesota Biological Survey (MBS) has identified **9** Sites of Biodiversity Significance within the vicinity of the proposed project ranked as *High* or *Moderate*. MBS Sites have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Factors taken into account during the ranking process include the number of rare species documented within the site, the quality of the native plant communities in the site, the size of the site, and the context of the site within the landscape. Additionally, there are **3** areas within the vicinity of the proposed project ranked as *Below*; these areas do not meet the minimum biodiversity threshold for statewide significance but may have conservation value at the local level as habitat. **The DNR recommends avoidance of MBS Sites of Biodiversity Significance ranked *High* or *Outstanding*.** Please see your MCE-generated Conservation Planning Report for a comprehensive list of MBS Sites of Biodiversity Significance.

There are **8** mapped DNR Native Plant Communities (NPC) that have been documented within the vicinity of the proposed project. DNR NPC types are given a Conservation Status Rank that reflects the relative rarity and endangerment of the community type in Minnesota. Conservation Status Ranks range from S1 (critically imperiled) to S5 (secure, common, widespread, and abundant). *Native plant communities with a Conservation Status Rank of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable to extirpation) are considered rare in the state.* **The DNR recommends avoidance of rare NPCs (ranked S1, S2, or S3).** Please see your MCE-generated Conservation Planning Report for a comprehensive list of native plant communities in your proposed project area. Of particular concern are project impacts to prairie communities.

- *Prairie Communities:* More than 99% of the prairie that was present in the state before settlement has been destroyed, and more than one-third of Minnesota's endangered, threatened, and special concern species are now dependent on the remaining small fragments of Minnesota's prairie ecosystem. **To avoid incidental take, all native prairie remnants should be avoided.** If avoidance is not feasible, further consultation will be needed to ensure compliance with state law. **If any native prairie remnants are crossed by the final project design, a native prairie protection plan may be needed.** You may contact the Regional Ecologist for details on developing a native prairie protection plan.

The DNR recommends that the project be designed to avoid impacts to these ecologically significant areas. Actions to avoid or minimize disturbance include, but are not limited to, the following recommendations:

- As much as possible, operate within already-disturbed areas.
- Avoid MBS Sites and native plant communities ranked S1, S2, or S3.
- Retain a buffer between proposed activities and the MBS Site.
- Confine construction activities to the opposite side of the road from MBS Sites. If this is not feasible, confine construction activities to the existing road rights-of-way.
- Minimize vehicular disturbance in the MBS Site (allow only vehicles/equipment necessary for construction activities).
- Do not park equipment or stockpile supplies in the MBS Site.
- Do not place spoil in the MBS Site or other sensitive areas.

- If possible, conduct the work under frozen ground conditions.
- Use effective erosion prevention and sediment control measures.
- Inspect and clean equipment prior to operation and follow recommendations to [prevent the spread of invasive species](#).
- Revegetate disturbed soil with [native species suitable to the local habitat](#) as soon after construction as possible.
- Use only weed-free mulches, topsoils, and seed mixes. Of particular concern are birdsfoot trefoil (*Lotus corniculatus*) and crown vetch (*Coronilla varia*), two invasive species that are sold commercially and are problematic in prairies and disturbed open areas.

MBS Sites of Biodiversity Significance and DNR Native Plant Communities can be viewed using the Explore page in [Minnesota Conservation Explorer](#) or their GIS shapefiles can be downloaded from the [MN Geospatial Commons](#). Please contact the [NH Review Team](#) if you need assistance accessing the data. Reference the [MBS Site Biodiversity Significance](#) and [Native Plant Community](#) websites for information on interpreting the data. To receive a list of ecologically significant areas in the vicinity of your project, create a [Conservation Planning Report](#) using the Explore page in MCE. **I have uploaded the MCE-generated Conservation Planning Report to the MCE project page.**

- If the Wetland Conservation Act (WCA) is applicable to this project, please note that native plant communities with a Conservation Status Rank of S1 through S3 or wetlands within *High* or *Outstanding* MBS Sites of Biodiversity Significance may qualify as Rare Natural Communities (RNC) under WCA. Minnesota Rules, part 8420.0515, subpart 3 states that a wetland replacement plan for activities that modify a RNC must be denied if the local government unit determines the proposed activities will permanently adversely affect the RNC. If the proposed project includes a wetland replacement plan under WCA, please contact your [DNR Regional Ecologist](#) for further evaluation. Please visit [WCA Program Guidance and Information](#) for additional information, including the [RNC Technical Guidance](#).

State-listed Species

- Many state-listed threatened and endangered plant species have been found within the vicinity of the proposed project and within the project area. This project may impact potential habitat and result in take of threatened or endangered species. Minnesota's Endangered Species Statute (*Minnesota Statutes*, section 84.0895) and associated Rules (*Minnesota Rules*, part 6212.1800 to 6212.2300 and 6134) prohibit the take of threatened or endangered species without a permit.

The table below lists state-listed plant species within the project vicinity; species found within the proposed project area are marked with an asterisk (*). **All known occurrences of state protected plant species and all potential habitats must be avoided.** If this is not feasible, a qualified surveyor will need to (1) resurvey known occurrences and (2) conduct a habitat assessment to determine if suitable habitat exists within the activity impact area and, if so, conduct a rare plant survey prior to any project activities. The goal of the habitat assessment is to identify potential locations where endangered (END) and threatened (THR) species may occur to help formulate an avoidance plan. Species of special concern

(SPC) are also rare and an important component of Minnesota’s natural heritage; we strongly encourage project alternatives that avoid or minimize impacts to known occurrences of these species as well.

Surveys must be conducted by a qualified surveyor and follow the standards contained in the [Rare Species Survey Process](#) and [Rare Plant Guidance](#). Visit the [Natural Heritage Review](#) page for a list of certified surveyors and more information on this process. Survey proposals should be submitted to Reports.NHIS@state.mn.us prior to initiating survey work. Project planning should take into account that any botanical survey needs to be conducted during the appropriate time of the year, which may be limited. Please consult Review.NHIS@state.mn.us if you have any questions regarding this process.

MN Status	Common Name	Scientific Name	Habitat	Water Regime
END	Ball Cactus *	<i>Coryphantha vivipara</i>	Rock Outcrop	terrestrial
END	Hairy Waterclove	<i>Marsilea vestita</i>	Rock Outcrop	wetland
END	Prairie Quillwort	<i>Isoetes melanopoda</i>	Rock Outcrop	wetland
THR	Larger Water Starwort *	<i>Callitriche heterophylla</i>	Marsh, Rock Outcrop, Littoral Zone of Lake	aquatic
THR	Waterhyssop	<i>Bacopa rotundifolia</i>	Marsh, Rock Outcrop	aquatic, wetland
SPC	Missouri Milk-vetch *	<i>Astragalus missouriensis var. missouriensis</i>	Upland Prairie	terrestrial
SPC	Mudwort *	<i>Limosella aquatica</i>	Lowland Prairie, Rock Outcrop	aquatic, wetland
SPC	Narrow-leaved Water Plantain	<i>Alisma gramineum</i>	Littoral Zone of Lake	aquatic
SPC	Prairie Mimosa	<i>Desmanthus illinoensis</i>	Lake Shore, Upland Prairie	terrestrial
SPC	Sea Naiad	<i>Najas marina</i>	Littoral Zone of Lake	aquatic
SPC	Slender Milk-vetch	<i>Astragalus flexuosus var. flexuosus</i>	Upland Prairie	terrestrial
SPC	Small White Lady's-slipper	<i>Cypripedium candidum</i>	Lowland Prairie, Upland Prairie, Wet Meadow/Carr	terrestrial, wetland
SPC	Three-stamened Waterwort *	<i>Elatine triandra</i>	Littoral Zone of Lake, Rock Outcrop	aquatic
SPC	Tumble Grass *	<i>Schedonnardus paniculatus</i>	Rock Outcrop	terrestrial

* = Known to occur within the project area. Please see your license agreement (2022-034) for specific locations.

- [Loggerhead shrikes](#) (*Lanius ludovicianus*), a state-listed endangered bird, have been documented in the vicinity of the project site. Loggerhead shrikes use grasslands that contain short grass and scattered perching sites such as hedgerows, shrubs, or small trees. They can be found in native prairie, pastures, shelterbelts, old fields or orchards, cemeteries, grassy roadsides, and farmyards. Minnesota’s Endangered Species Statute (Minnesota Statutes, section 84.0895) and associated Rules (Minnesota Rules, part 6212.1800 to 6212.2300 and 6134) prohibit the take of endangered or threatened plants or animals, including their parts or seeds, without a permit. Given the potential for this species to be found

in the vicinity of the project, **tree and shrub removal is required to be avoided during the breeding season, April through July.**

Please contact Review.NHIS@state.mn.us to confirm that the above avoidance measure will be implemented or to inform us that avoidance is not feasible. If avoidance is not feasible, a qualified surveyor needs to conduct a survey for active nests before any trees or shrubs will be removed. Requirements for surveys and lists of DNR certified lists of surveyors can be found at the [Natural Heritage Review website](#).

- [Burrowing owl](#) (*Athene cunicularia*), a state-listed endangered species, was documented in the vicinity of the proposed project in Stevens County. Burrowing owls use open, grazed pastures or native prairies populated by burrowing mammals. Areas of intensive agricultural use are usually, but not always, avoided. Burrowing owls are now extremely rare in Minnesota, and we don't know of any regularly occurring breeding populations in the state. However, burrowing owls are most likely to use prairie habitats occupied by [Richardson's ground squirrel](#) (*Spermophilus richardsonii*), a state-listed species of special concern, which has been documented in Ortonville 22 High MBS Site in Big Stone County (T121N R46W Sect. 22). **Please report any sightings using the [Quick Species Observation Form](#).**
- [Dakota skipper](#) (*Hesperia dacotae*), a federally listed threatened and state-listed endangered species, has been documented within the vicinity of the proposed project. The Dakota skipper is a small butterfly found exclusively on remnant native prairie habitats. This rare butterfly is sensitive to several types of artificial and natural disturbances and are almost always absent from remnant prairies that are overgrazed or otherwise degraded. Dakota skipper populations have declined historically due to widespread conversion of native prairie for agriculture and other uses and are now threatened, in part, due to the isolation of remaining populations. Remaining Dakota skipper populations are generally so small and isolated that they are subject to genetic drift, which is likely to further reduce their genetic viability. Additionally, [regal fritillary](#) (*Argynnis idalia*), a butterfly species of special concern, has been documented in the footprint of the proposed project in several MBS sites in Big Stone County (T121N R46W Sect. 21 & 22). To protect the Dakota skipper and other prairie obligate butterfly species, **it is imperative that the destruction and disturbance of native prairie be avoided.**
- [Black sandshell](#) (*Ligumia recta*) and [creek heelsplitter](#) (*Lasmigona compressa*), both state-listed species of special concern, have been documented in the Chippewa River. As such, effective erosion prevention and sediment control practices must be implemented and maintained near the river throughout the duration of the project and incorporated into any stormwater management plan.
- [American white pelican](#) (*Pelecanus erythrorhynchos*), a state-listed species of special concern, has been documented at Marsh Lake and several lakes in Pope County within the vicinity of the proposed project. This migratory species typically nests in colonies on bare islands, isolated from predators and humans. Marsh Lake, which is located on the borders of Big Stone, Lac qui Parle, and Swift counties approximately 3.5 miles from the proposed project, is the largest known colony in North America. **The DNR recommends installing avian flight diverters on power cables near waterbodies to reduce bird collisions with power cables.**

- [Short-eared owl](#) (*Asio flammeus*), a species of special concern, has been documented in the vicinity of the proposed project in Swift County (T121N R42W Sect. 14, 15, 22, 23). This species nests on the ground in open areas such as grasslands, marshes, and peatlands. **Minimize disturbance as much as feasible to nesting habitat during nesting season, May through June.**
- [Great Plains toad](#) (*Anaxyrus cognatus*), a state-listed species of special concern, was documented in the vicinity of the proposed project along U.S. Highway 75 in Big Stone County. This species is found in remnant prairies and grasslands in Western Minnesota. They breed from May to July in highly ephemeral water-filled prairie depressions and have adapted to breed in flooded agricultural fields. **Given the presence of these rare toads, the DNR recommends that the use of erosion control mesh, if any, be limited to [wildlife-friendly materials](#).**
- The Natural Heritage Information System (NHIS) tracks bat roost trees and hibernacula plus some acoustic data, but this information is not exhaustive. Even if there are no bat records listed nearby, all of Minnesota's bats, including the federally endangered northern long-eared bat ([Myotis septentrionalis](#)), can be found throughout Minnesota. During the active season (approximately April-November) bats roost underneath bark, in cavities, or in crevices of both live and dead trees. Tree removal can negatively impact bats by destroying roosting habitat, especially during the pup rearing season when females are forming maternity roosting colonies and the pups cannot yet fly. To minimize these impacts, **the DNR recommends that tree removal be avoided from June 1 through August 15.**
- Please visit the [DNR Rare Species Guide](#) for more information on the habitat use of the species mentioned above and recommended measures to avoid or minimize impacts. For further assistance with these species, please contact the appropriate [Regional Ecologist](#).
- Please report incidental sightings of state-listed species using the [Quick Species Observation Form](#).

Federally Protected Species

- Dakota skipper is a federally threatened species. **To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online [Information for Planning and Consultation \(IPaC\) tool](#).** For additional information on this species, see the [USFWS Dakota Skipper Information Page](#). For information on conservation measures for this species, including habitat preservation and restoration, see the [USFWS Dakota Skipper Conservation Guidelines](#).

Environmental Review and Permitting

- We understand that the planning for this project was not finalized when this Natural Heritage Review was conducted. Given the presence of rare ecologically significant areas and state-protected species with the current route, further Natural Heritage Review will be needed for alternate routes and/or the finalized route. Resubmission will ensure compliance with state statute and rules. Please reference the original project (2024-00481) and this project (2024-00815) when submitting alternate routes and/or the finalized route for future Natural Heritage Review.

- Please include (1) a copy of this review letter, (2) the MCE-generated Conservation Planning Report, and (3) the MCE-generated Final Project Report in any state or local license or permit application. The Public Utilities Commission (PUC) Route Permit Application should address potential impacts to the above rare features and identify avoidance or mitigation measures that will be implemented. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available and is the most complete source of data on Minnesota's native plant communities, rare species, and other rare features. However, the NHIS is not an exhaustive inventory and does not contain the locations of all rare features in the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and project description provided with the request. **If project details change or the project has not occurred within one year, please resubmit the project for review within one year of initiating project activities.**

The Natural Heritage Review does not constitute project approval by the Department of Natural Resources. Instead, it identifies issues regarding known occurrences of rare features and potential impacts to these rare features. Visit [Natural Heritage Review](#) for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, please contact your [DNR Regional Environmental Assessment Ecologist](#).

Thank you for consulting us on this matter and for your interest in preserving Minnesota's rare natural resources.

Sincerely,



Digitally signed by Molly Barrett
Date: 2024.12.06 16:37:59 -06'00'

Natural Heritage Review Specialist

molly.barrett@state.mn.us

Cc: [Owen Baird](#), Regional Environmental Assessment Ecologist, Northwest (Region 1)

Cc: [Becky Marty](#), Regional Ecologist, Northwest (Region 1)

Cc: [Haley Byron](#), Regional Environmental Assessment Ecologist, South (Region 4)

Cc: [Megan Benage](#), Regional Ecologist, South (Region 4)

Cc: [Jennie Skancke](#), Wetlands Program Coordinator

Cc: [Keylor Andrews](#), Calcareous Fen Program Coordinator

