Appendix G

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 H

Emergency Services

Service	Name	City	County
Hospital	Appleton Municiple 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 I

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 μT and a twofold excess risk was seen for exposure above 0.4 μT. [In the other study] a relative risk of 1.7 for exposure above 0.3 μT 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, CSTEE) 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, tThis paper goes on to acknowledges 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". (Esmailzedeh 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 J

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 manufacture'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 reseeding 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 K

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

October 2024

Table of Contents

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.

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 requirements[1]. 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] 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.

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

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 L

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_2e[1] (metric tons)	Land Use Change CO_2e[1] (metric tons)	Total CO_2e[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] 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 2. Summary of Operations GHG Emissions from Fuel Combustion

Route, Route Segment, or Alignment Alternative ID	Off-Road Fuel Combustion CO_2e[1] (metric tons/yr)
All	13.27

[1] 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 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.ph

[2] 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_2O	265

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

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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_2e[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
WBLSR01	12.04	2,482.18
WBLSR02	12.07	2,487.49
WBLSR03	12.05	2,484.13
WBLSR04	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] CO_2e and CO_2e rate calculated for the applicants' 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_2e (metric tons)	Approximate Route Length (miles)	CO_2e 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_2O Emission Factor[5] (g/gal)	CO_2 Emission Factor[6] (lb/hr)	CH_4 Emission Factor[6] (lb/hr)	N_2O Emission Factor[6] (lb/hr)	CO_2 (metric tons)	CH_4 (metric tons)	N_2O (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 Setting 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	8	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] CO_2 emissions calculated using the EPA CCCL emission factors for mobile combustion, Table 2: Mobile Combustion CO_2 2025. https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf

Fuel Type	CO2 Emission Factor (kg/gal)
Diesel Fuel	10.21
Motor Gasoline	8.78
Kerosene-Type Jet Fuel	9.75

[5] CH_4 and N_2O emissions calculated using the EPA CCCL emission factors for construction/mining equipment, Table 5: Mobile Combustion CH_4 and N_2O for Non-Road Vehicles, 2025. https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf

Vehicle Type	Fuel Type	CH4 Emission Factor (g/gal)	N2O Emission Factor (g/gal)
Construction/Mining Equipment	Diesel Equipment	1.01	0.94
Construction/Mining Equipment	Diesel Off-Road Trucks	0.92	0.56
Recreational Equipment	Gasoline (4 stroke) - Recreatio	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_2O Emission Factor[4][5] (g/vehicle-mile)	CO_2 (metric tons)	CH_4 (metric tons)	N_2O (metric tons)	CO_2e[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	CO2 Emission Factor (kg/gal)
Diesel Fuel	10.21
Motor Gasoline	8.78

[4] CH_4 and N_2O 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	CH4 Emission Factor (g/gal)	N2O Emission Factor (g/gal)
Gasoline Light-Duty Trucks	2022	0.0079	0.0012

[5] CH_4 and N_2O 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	CH4 Emission Factor (g/gal)	N2O Emission Factor (g/gal)
Medium- and Heavy-Duty Trucks	2007-2022	0.0095	0.0431

[6] 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.

Table 8. Land Use Change Emission Factor Calculations

Temporary Land Use Change	2022 Net CO_2 Flux for Converted Land Type[1] (M metric tons CO_2e)	2022 Total US Land Use Change from Forest Land[2] (thousands of hectares)	CO_2e Emission Factor (metric tons CO_2e/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[1] (acres)	Temporary Land Use Change from Grassland to Settlement[1] (acres)	CO_2e[2][3] (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
SAA04	-	9.93	2.35	2.27
SAA04_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	20.68	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
SAA01	-	32.96	-	5.18
SAA01_South1_Eq	-	14.70	-	2.31
SAA02	-	35.11	-	5.52
SAA02_South2_Eq	-	15.83	-	2.49
SAA03	-	5.92	0.04	0.94
SAA03_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_2O Emission Factor[4] (g/gal)	CO_2 Emission Factor[5] (lb/hr)	CH_4 Emission Factor[5] (lb/hr)	N_2O Emission Factor[5] (lb/hr)	CO_2 (metric tons/yr)	CH_4 (metric tons/yr)	N_2O (metric tons/yr)	CO_2e[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/ENCLOSED_<=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 MEDIUMEQUIP_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] CO_2 emissions calculated using the EPA CCCL emission factors for mobile combustion, Table 2: Mobile Combustion CO_2 2025. https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf

Fuel Type	CO2 Emission Factor (kg/gal)
Diesel Fuel	10.21

[4] CH_4 and N_2O emissions calculated using the EPA CCCL emission factors for construction/mining equipment, Table 5: Mobile Combustion CH_4 and N_2O for Non-Road Vehicles, 2025. https://www.epa.gov/system/files/documents/2025-01/ghg-emission-factors-hub-2025.pdf

Vehicle Type	Fuel Type	CH4 Emission Factor (g/gal)	N2O 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] 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.

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_2e[2][3] (metric tons/yr)
BSSR01	2	221	43	(235.97)
BSSR02	2	128	89	(357.49)
BSSR03	2	172	67	(298.00)
BSSR04	2	176	65	(294.60)
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	(49.47)
S208	-	55	11	(64.07)
S208_South1_Eq	-	43	1	(22.58)
S210	-	79	5	(51.47)
S210_South1_Eq	-	54	4	(37.54)
SAA04	-	10	-	(4.39)
SAA04_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	(48.81)
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)
SAA01	-	33	4	(29.62)
SAA01_South1_Eq	-	15	23	(84.89)
SAA02	-	35	6	(35.22)
SAA02_South2_Eq	-	16	24	(91.81)
SAA03	-	6	4	(15.29)
SAA03_South1_Eq	-	6	4	(16.16)
HSR01	-	159	85	(365.64)
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)
WBLSR01	-	132	85	(354.62)
WBLSR02	0	157	60	(276.68)
WBLSR03	-	178	36	(205.08)
WBLSR04	-	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 M

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

MWI Unique Well ID	Status	Depth (Feet)	Static Water Level (Feet) on MWI Report	Use	Route Alternative
562314	Active	40	20	Domestic	Route CSR01
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 N

Protected Species

Alexandria Subregion – Natural Heritage Information System Records

Routing Alternatives					ASR01			ASR02			N10			N11			N9		
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
Athene cunicularia	Burrowing owl	Bird	Endangered	Not Listed															
Coryphantha vivipara	Ball cactus	Vascular plant	Endangered	Not Listed															
Eleocharis wolfii	Wolf's spikerush	Vascular plant	Endangered	Not Listed															
Hesperia dacotae	Dakota skipper	Butterfly	Endangered	Threatened						x									
Isoetes melanopoda	Prairie quillwort	Vascular plant	Endangered	Not Listed															
Lanius ludovicianus	Loggerhead shrike	Bird	Endangered	Not Listed															
Marsilea vestita	Hairy waterclover	Vascular plant	Endangered	Not Listed															
Oarisma poweshiek	Poweshiek skipperling	Butterfly	Endangered	Endangered						x									
Actinonaias ligamentina	Mucket	Mussel	Threatened	Not Listed															
Alasmidonta marginata	Elktoe	Mussel	Threatened	Not Listed															
Bacopa rotundifolia	Waterhyssop	Vascular plant	Threatened	Not Listed															
Berula erecta	Stream parsnip	Vascular plant	Threatened	Not Listed															
Callitriche heterophylla	Larger water starwort	Vascular plant	Threatened	Not Listed															
Cicindela lepida	Ghost tiger beetle	Beetle	Threatened	Not Listed															
Cyperus acuminatus	Short-pointed umbrella sedge	Vascular plant	Threatened	Not Listed															
Notropis anogenus	Pugnose shiner	Fish	Threatened	Not Listed						x						x			
Rhynchospora capillacea	Hair-like beak rush	Vascular plant	Threatened	Not Listed															
Anaxyrus cognatus	Great plains toad	Toad	Special concern	Not Listed															
Argynnis idalia	Regal fritillary	Butterfly	Special concern	Not Listed						x									
Asio flammeus	Short-eared owl	Bird	Special concern	Not Listed															
Astragalus flexuosus var. flexuosus	Slender milk-vetch	Vascular plant	Special concern	Not Listed															
Astragalus missouriensis var. missouriensis	Missouri milk-vetch	Vascular plant	Special concern	Not Listed															
Atrytone arogos iowa	Iowa skipper	Butterfly	Special concern	Not Listed						x									
Buellia nigra	Black disc lichen	Fungus	Special concern	Not Listed															
Catocala abbreviatella	Abbreviated underwing	Moth	Special concern	Not Listed															
Cirsium pumilum var. hillii	Hill's thistle	Vascular plant	Special concern	Not Listed				x	x	x									
Cygnus buccinator	Trumpeter swan	Bird	Special concern	Not Listed															
Cypripedium candidum	Small white lady's-slipper	Vascular plant	Special concern	Not Listed			x			x									x
Desmanthus illinoensis	Prairie mimosa	Vascular plant	Special concern	Not Listed															
Elatine triandra	Three-stamened waterwort	Vascular plant	Special concern	Not Listed															
Eleocharis quinqueflora	Few-flowered spikerush	Vascular plant	Special concern	Not Listed															
Eptesicus fuscus	Big brown bat	Bat	Special concern	Not Listed															
Etheostoma microperca	Least darter	Fish	Special concern	Not Listed						x						x			
Hesperia leonardus pawnee	Pawnee skipper	Butterfly	Special concern	Not Listed															

Routing Alternatives					ASR01			ASR02			N10			N11			N9		
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
Lasmigona compressa	Creek heelsplitter	Mussel	Special concern	Not Listed															
Ligumia recta	Black sandshell	Mussel	Special concern	Not Listed															
Limosella aquatica	Mudwort	Vascular plant	Special concern	Not Listed															
Najas marina	Sea naiad	Vascular plant	Special concern	Not Listed									x						
Necturus maculosus	Mudpuppy	Salamander	Special concern	Not Listed			x												
Pelecanus erythrorhynchos	American white pelican	Bird	Special concern	Not Listed															
Schedonnardus paniculatus	Tumble grass	Vascular plant	Special concern	Not Listed															
Schinia indiana	Phlox moth	Moth	Special concern	Not Listed						x									
Schinia lucens	Leadplant flower moth	Moth	Special concern	Not Listed						x									
Setophaga cerulea	Cerulean warbler	Bird	Special concern	Not Listed						x									
Solidago mollis	Soft goldenrod	Vascular plant	Special concern	Not Listed															
Urocitellus richardsonii	Richardson's ground squirrel	Squirrel	Special concern	Not Listed															
Woodsia oregana ssp. cathcartiana	Oregon cliff fern	Vascular plant	Special concern	Not Listed															
Xanthisma spinulosum var. spinulosum	Cutleaf ironplant	Vascular plant	Special concern	Not Listed															

Big Stone Subregion – Natural Heritage Information System Records

Routing Alternatives					BSSR01			BSSR02			BSSR03			BSSR04			BSSR05		
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
Athene cunicularia	Burrowing owl	Bird	Endangered	Not Listed															
Coryphantha vivipara	Ball cactus	Vascular plant	Endangered	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Eleocharis wolfii	Wolf's spikerush	Vascular plant	Endangered	Not Listed						x						x			
Hesperia dacotae	Dakota skipper	Butterfly	Endangered	Threatened			x		x	x			x		x	x			x
Isoetes melanopoda	Prairie quillwort	Vascular plant	Endangered	Not Listed						x						x			
Lanius ludovicianus	Loggerhead shrike	Bird	Endangered	Not Listed			x			x			x			x			x
Marsilea vestita	Hairy waterclover	Vascular plant	Endangered	Not Listed						x						x			
Oarisma poweshiek	Poweshiek skipperling	Butterfly	Endangered	Endangered			x	x	x	x	x	x	x		x	x	x	x	x
Actinonaias ligamentina	Mucket	Mussel	Threatened	Not Listed			x			x			x			x			x
Alasmidonta marginata	Elktoe	Mussel	Threatened	Not Listed															
Bacopa rotundifolia	Waterhyssop	Vascular plant	Threatened	Not Listed			x		x	x			x		x	x			x
Berula erecta	Stream parsnip	Vascular plant	Threatened	Not Listed															
Callitriche heterophylla	Larger water starwort	Vascular plant	Threatened	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cicindela lepida	Ghost tiger beetle	Beetle	Threatened	Not Listed			x			x			x			x			x
Cyperus acuminatus	Short-pointed umbrella sedge	Vascular plant	Threatened	Not Listed															
Notropis anogenus	Pugnose shiner	Fish	Threatened	Not Listed															
Rhynchospora capillacea	Hair-like beak rush	Vascular plant	Threatened	Not Listed			x			x			x			x			x
Anaxyrus cognatus	Great plains toad	Toad	Special concern	Not Listed			x		x	x			x		x	x		x	x
Argynnis idalia	Regal fritillary	Butterfly	Special concern	Not Listed			x		x	x		x	x		x	x		x	x
Asio flammeus	Short-eared owl	Bird	Special concern	Not Listed															
Astragalus flexuosus var. flexuosus	Slender milk-vetch	Vascular plant	Special concern	Not Listed			x	x	x	x			x	x	x	x	x	x	x
Astragalus missouriensis var. missouriensis	Missouri milk-vetch	Vascular plant	Special concern	Not Listed		x	x			x		x	x			x		x	x
Atrytone arogos iowa	Iowa skipper	Butterfly	Special concern	Not Listed			x			x			x			x			x
Buellia nigra	Black disc lichen	Fungus	Special concern	Not Listed						x						x			
Catocala abbreviatella	Abbreviated underwing	Moth	Special concern	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cirsium pumilum var. hillii	Hill's thistle	Vascular plant	Special concern	Not Listed															
Cygnus buccinator	Trumpeter swan	Bird	Special concern	Not Listed															
Cypripedium candidum	Small white lady's-slipper	Vascular plant	Special concern	Not Listed			x		x	x		x	x			x		x	x
Desmanthus illinoensis	Prairie mimosa	Vascular plant	Special concern	Not Listed															
Elatine triandra	Three-stamened waterwort	Vascular plant	Special concern	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Eleocharis quinqueflora	Few-flowered spikerush	Vascular plant	Special concern	Not Listed			x		x	x			x		x	x		x	x
Eptesicus fuscus	Big brown bat	Bat	Special concern	Not Listed															
Etheostoma microperca	Least darter	Fish	Special concern	Not Listed															
Hesperia leonardus pawnee	Pawnee skipper	Butterfly	Special concern	Not Listed			x		x	x			x		x	x			x
Lasmigona compressa	Creek heelsplitter	Mussel	Special concern	Not Listed															

Routing Alternatives					BSSR01			BSSR02			BSSR03			BSSR04			BSSR05		
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**
Ligumia recta	Black sandshell	Mussel	Special concern	Not Listed															
Limosella aquatica	Mudwort	Vascular plant	Special concern	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Najas marina	Sea naiad	Vascular plant	Special concern	Not Listed															
Necturus maculosus	Mudpuppy	Salamander	Special concern	Not Listed															
Pelecanus erythrorhynchos	American white pelican	Bird	Special concern	Not Listed															
Schedonnardus paniculatus	Tumble grass	Vascular plant	Special concern	Not Listed			x						x						x
Schinia indiana	Phlox moth	Moth	Special concern	Not Listed															
Schinia lucens	Leadplant flower moth	Moth	Special concern	Not Listed			x		x	x			x		x	x			x
Setophaga cerulea	Cerulean warbler	Bird	Special concern	Not Listed															
Solidago mollis	Soft goldenrod	Vascular plant	Special concern	Not Listed															
Urocitellus richardsonii	Richardson's ground squirrel	Squirrel	Special concern	Not Listed			x		x	x			x		x	x			x
Woodsia oregana ssp. cathcartiana	Oregon cliff fern	Vascular plant	Special concern	Not Listed															
Xanthisma spinulosum var. spinulosum	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**	**ROW**	**Route Width**	**1-Mile**	**ROW**	**Route Width**	**1-Mile**	**ROW**	**Route Width**	**1-Mile**	**ROW**	**Route Width**	**1-Mile**
Athene cunicularia	Burrowing owl	Bird	Endangered	Not Listed															
Coryphantha vivipara	Ball cactus	Vascular plant	Endangered	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Eleocharis wolfii	Wolf's spikerush	Vascular plant	Endangered	Not Listed			x						x						x
Hesperia dacotae	Dakota skipper	Butterfly	Endangered	Threatened		x	x			x		x	x			x		x	x
Isoetes melanopoda	Prairie quillwort	Vascular plant	Endangered	Not Listed			x						x						x
Lanius ludovicianus	Loggerhead shrike	Bird	Endangered	Not Listed			x			x			x			x			x
Marsilea vestita	Hairy waterclover	Vascular plant	Endangered	Not Listed			x						x						x
Oarisma poweshiek	Poweshiek skipperling	Butterfly	Endangered	Endangered		x	x			x	x	x	x	x	x	x		x	x
Actinonaias ligamentina	Mucket	Mussel	Threatened	Not Listed			x			x			x			x			x
Alasmidonta marginata	Elktoe	Mussel	Threatened	Not Listed															
Bacopa rotundifolia	Waterhyssop	Vascular plant	Threatened	Not Listed		x	x			x		x	x			x		x	x
Berula erecta	Stream parsnip	Vascular plant	Threatened	Not Listed															
Callitriche heterophylla	Larger water starwort	Vascular plant	Threatened	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cicindela lepida	Ghost tiger beetle	Beetle	Threatened	Not Listed			x			x			x			x			x
Cyperus acuminatus	Short-pointed umbrella sedge	Vascular plant	Threatened	Not Listed															
Notropis anogenus	Pugnose shiner	Fish	Threatened	Not Listed															
Rhynchospora capillacea	Hair-like beak rush	Vascular plant	Threatened	Not Listed			x			x			x			x			x
Anaxyrus cognatus	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**	**ROW**	**Route Width**	**1-Mile**	**ROW**	**Route Width**	**1-Mile**	**ROW**	**Route Width**	**1-Mile**	**ROW**	**Route Width**	**1-Mile**
Argynnis idalia	Regal fritillary	Butterfly	Special concern	Not Listed		x	x			x		x	x		x	x		x	x
Asio flammeus	Short-eared owl	Bird	Special concern	Not Listed															
Astragalus flexuosus var. flexuosus	Slender milk-vetch	Vascular plant	Special concern	Not Listed	x	x	x			x	x	x	x	x	x	x	x	x	x
Astragalus missouriensis var. missouriensis	Missouri milk-vetch	Vascular plant	Special concern	Not Listed			x		x	x			x		x	x			x
Atrytone arogos iowa	Iowa skipper	Butterfly	Special concern	Not Listed			x			x			x			x			x
Buellia nigra	Black disc lichen	Fungus	Special concern	Not Listed			x						x						x
Catocala abbreviatella	Abbreviated underwing	Moth	Special concern	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cirsium pumilum var. hillii	Hill's thistle	Vascular plant	Special concern	Not Listed															
Cygnus buccinator	Trumpeter swan	Bird	Special concern	Not Listed															
Cypripedium candidum	Small white lady's-slipper	Vascular plant	Special concern	Not Listed			x			x		x	x		x	x			x
Desmanthus illinoensis	Prairie mimosa	Vascular plant	Special concern	Not Listed															
Elatine triandra	Three-stamened waterwort	Vascular plant	Special concern	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Eleocharis quinqueflora	Few-flowered spikerush	Vascular plant	Special concern	Not Listed			x			x		x	x		x	x			x
Eptesicus fuscus	Big brown bat	Bat	Special concern	Not Listed															
Etheostoma microperca	Least darter	Fish	Special concern	Not Listed															
Hesperia leonardus pawnee	Pawnee skipper	Butterfly	Special concern	Not Listed		x	x			x		x	x			x		x	x
Lasmigona compressa	Creek heelsplitter	Mussel	Special concern	Not Listed															
Ligumia recta	Black sandshell	Mussel	Special concern	Not Listed															
Limosella aquatica	Mudwort	Vascular plant	Special concern	Not Listed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Najas marina	Sea naiad	Vascular plant	Special concern	Not Listed															
Necturus maculosus	Mudpuppy	Salamander	Special concern	Not Listed															
Pelecanus erythrorhynchos	American white pelican	Bird	Special concern	Not Listed															
Schedonnardus paniculatus	Tumble grass	Vascular plant	Special concern	Not Listed			x			x						x			x
Schinia indiana	Phlox moth	Moth	Special concern	Not Listed															
Schinia lucens	Leadplant flower moth	Moth	Special concern	Not Listed		x	x			x		x	x			x		x	x
Setophaga cerulea	Cerulean warbler	Bird	Special concern	Not Listed															
Solidago mollis	Soft goldenrod	Vascular plant	Special concern	Not Listed															
Urocitellus richardsonii	Richardson's ground squirrel	Squirrel	Special concern	Not Listed		x	x			x		x	x			x		x	x
Woodsia oregana ssp. cathcartiana	Oregon cliff fern	Vascular plant	Special concern	Not Listed															
Xanthisma spinulosum var. spinulosum	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**
Athene cunicularia	Burrowing owl	Bird	Endangered	Not Listed															
Coryphantha vivipara	Ball cactus	Vascular plant	Endangered	Not Listed	x	x	x	x	x	x			x						x

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**
Eleocharis wolfii	Wolf's spikerush	Vascular plant	Endangered	Not Listed			x			x									
Hesperia dacotae	Dakota skipper	Butterfly	Endangered	Threatened		x	x		x	x						x			
Isoetes melanopoda	Prairie quillwort	Vascular plant	Endangered	Not Listed			x			x									
Lanius ludovicianus	Loggerhead shrike	Bird	Endangered	Not Listed			x			x				x	x	x			
Marsilea vestita	Hairy waterclover	Vascular plant	Endangered	Not Listed			x			x									
Oarisma poweshiek	Poweshiek skipperling	Butterfly	Endangered	Endangered		x	x		x	x						x			x
Actinonaias ligamentina	Mucket	Mussel	Threatened	Not Listed			x			x									
Alasmidonta marginata	Elktoe	Mussel	Threatened	Not Listed															
Bacopa rotundifolia	Waterhyssop	Vascular plant	Threatened	Not Listed	x	x	x	x	x	x			x						
Berula erecta	Stream parsnip	Vascular plant	Threatened	Not Listed			x			x									
Callitriche heterophylla	Larger water starwort	Vascular plant	Threatened	Not Listed			x			x		x	x						x
Cicindela lepida	Ghost tiger beetle	Beetle	Threatened	Not Listed			x			x									
Cyperus acuminatus	Short-pointed umbrella sedge	Vascular plant	Threatened	Not Listed															
Notropis anogenus	Pugnose shiner	Fish	Threatened	Not Listed															
Rhynchospora capillacea	Hair-like beak rush	Vascular plant	Threatened	Not Listed	x	x	x	x	x	x									
Anaxyrus cognatus	Great plains toad	Toad	Special concern	Not Listed	x	x	x	x	x	x			x			x			
Argynnis idalia	Regal fritillary	Butterfly	Special concern	Not Listed		x	x		x	x						x			x
Asio flammeus	Short-eared owl	Bird	Special concern	Not Listed															
Astragalus flexuosus var. flexuosus	Slender milk-vetch	Vascular plant	Special concern	Not Listed	x	x	x	x	x	x	x	x	x						x
Astragalus missouriensis var. missouriensis	Missouri milk-vetch	Vascular plant	Special concern	Not Listed									x						x
Atrytone arogos iowa	Iowa skipper	Butterfly	Special concern	Not Listed			x			x									
Buellia nigra	Black disc lichen	Fungus	Special concern	Not Listed			x			x									
Catocala abbreviatella	Abbreviated underwing	Moth	Special concern	Not Listed	x	x	x	x	x	x			x						
Cirsium pumilum var. hillii	Hill's thistle	Vascular plant	Special concern	Not Listed															
Cygnus buccinator	Trumpeter swan	Bird	Special concern	Not Listed															
Cypripedium candidum	Small white lady's-slipper	Vascular plant	Special concern	Not Listed			x			x			x			x			
Desmanthus illinoensis	Prairie mimosa	Vascular plant	Special concern	Not Listed															x
Elatine triandra	Three-stamened waterwort	Vascular plant	Special concern	Not Listed	x	x	x	x	x	x	x	x	x						x
Eleocharis quinqueflora	Few-flowered spikerush	Vascular plant	Special concern	Not Listed	x	x	x	x	x	x									
Eptesicus fuscus	Big brown bat	Bat	Special concern	Not Listed															
Etheostoma microperca	Least darter	Fish	Special concern	Not Listed															
Hesperia leonardus pawnee	Pawnee skipper	Butterfly	Special concern	Not Listed		x	x		x	x									
Lasmigona compressa	Creek heelsplitter	Mussel	Special concern	Not Listed															
Ligumia recta	Black sandshell	Mussel	Special concern	Not Listed															
Limosella aquatica	Mudwort	Vascular plant	Special concern	Not Listed	x	x	x	x	x	x	x	x	x						x
Najas marina	Sea naiad	Vascular plant	Special concern	Not Listed															
Necturus maculosus	Mudpuppy	Salamander	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**
Pelecanus erythrorhynchos	American white pelican	Bird	Special concern	Not Listed															
Schedonnardus paniculatus	Tumble grass	Vascular plant	Special concern	Not Listed									x						
Schinia indiana	Phlox moth	Moth	Special concern	Not Listed															
Schinia lucens	Leadplant flower moth	Moth	Special concern	Not Listed		x	x		x	x						x			
Setophaga cerulea	Cerulean warbler	Bird	Special concern	Not Listed															
Solidago mollis	Soft goldenrod	Vascular plant	Special concern	Not Listed															x
Urocitellus richardsonii	Richardson's ground squirrel	Squirrel	Special concern	Not Listed			x			x			x						
Woodsia oregana ssp. cathcartiana	Oregon cliff fern	Vascular plant	Special concern	Not Listed			x			x									
Xanthisma spinulosum var. spinulosum	Cutleaf ironplant	Vascular plant	Special concern	Not Listed												x			

Hancock Subregion – Natural Heritage Information System Records

Routing Alternatives					C203			C208			HSR01			
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
Athene cunicularia	Burrowing owl	Bird	Endangered	Not Listed			x						x	
Coryphantha vivipara	Ball cactus	Vascular plant	Endangered	Not Listed										
Eleocharis wolfii	Wolf's spikerush	Vascular plant	Endangered	Not Listed										
Hesperia dacotae	Dakota skipper	Butterfly	Endangered	Threatened										
Isoetes melanopoda	Prairie quillwort	Vascular plant	Endangered	Not Listed										
Lanius ludovicianus	Loggerhead shrike	Bird	Endangered	Not Listed										x
Marsilea vestita	Hairy waterclover	Vascular plant	Endangered	Not Listed										
Oarisma poweshiek	Poweshiek skipperling	Butterfly	Endangered	Endangered										
Actinonaias ligamentina	Mucket	Mussel	Threatened	Not Listed										
Alasmidonta marginata	Elktoe	Mussel	Threatened	Not Listed										
Bacopa rotundifolia	Waterhyssop	Vascular plant	Threatened	Not Listed										
Berula erecta	Stream parsnip	Vascular plant	Threatened	Not Listed										
Callitriche heterophylla	Larger water starwort	Vascular plant	Threatened	Not Listed										
Cicindela lepida	Ghost tiger beetle	Beetle	Threatened	Not Listed										
Cyperus acuminatus	Short-pointed umbrella sedge	Vascular plant	Threatened	Not Listed										
Notropis anogenus	Pugnose shiner	Fish	Threatened	Not Listed										
Rhynchospora capillacea	Hair-like beak rush	Vascular plant	Threatened	Not Listed										
Anaxyrus cognatus	Great plains toad	Toad	Special concern	Not Listed										
Argynnis idalia	Regal fritillary	Butterfly	Special concern	Not Listed										
Asio flammeus	Short-eared owl	Bird	Special concern	Not Listed										
Astragalus flexuosus var. flexuosus	Slender milk-vetch	Vascular plant	Special concern	Not Listed										
Astragalus missouriensis var. missouriensis	Missouri milk-vetch	Vascular plant	Special concern	Not Listed										
Atrytone arogos iowa	Iowa skipper	Butterfly	Special concern	Not Listed										
Buellia nigra	Black disc lichen	Fungus	Special concern	Not Listed										
Catocala abbreviatella	Abbreviated underwing	Moth	Special concern	Not Listed										
Cirsium pumilum var. hillii	Hill's thistle	Vascular plant	Special concern	Not Listed										
Cygnus buccinator	Trumpeter swan	Bird	Special concern	Not Listed										
Cypripedium candidum	Small white lady's-slipper	Vascular plant	Special concern	Not Listed						x			x	
Desmanthus illinoensis	Prairie mimosa	Vascular plant	Special concern	Not Listed									x	
Elatine triandra	Three-stamened waterwort	Vascular plant	Special concern	Not Listed										

Routing Alternatives					C203			C208			HSR01			
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
Eleocharis quinqueflora	Few-flowered spikerush	Vascular plant	Special concern	Not Listed										
Eptesicus fuscus	Big brown bat	Bat	Special concern	Not Listed										
Etheostoma microperca	Least darter	Fish	Special concern	Not Listed										
Hesperia leonardus pawnee	Pawnee skipper	Butterfly	Special concern	Not Listed										
Lasmigona compressa	Creek heelsplitter	Mussel	Special concern	Not Listed			x							
Ligumia recta	Black sandshell	Mussel	Special concern	Not Listed										
Limosella aquatica	Mudwort	Vascular plant	Special concern	Not Listed										
Najas marina	Sea naiad	Vascular plant	Special concern	Not Listed										
Necturus maculosus	Mudpuppy	Salamander	Special concern	Not Listed										
Pelecanus erythrorhynchos	American white pelican	Bird	Special concern	Not Listed										
Schedonnardus paniculatus	Tumble grass	Vascular plant	Special concern	Not Listed										
Schinia indiana	Phlox moth	Moth	Special concern	Not Listed										
Schinia lucens	Leadplant flower moth	Moth	Special concern	Not Listed										
Setophaga cerulea	Cerulean warbler	Bird	Special concern	Not Listed										
Solidago mollis	Soft goldenrod	Vascular plant	Special concern	Not Listed										
Urocitellus richardsonii	Richardson's ground squirrel	Squirrel	Special concern	Not Listed			x							
Woodsia oregana ssp. cathcartiana	Oregon cliff fern	Vascular plant	Special concern	Not Listed										
Xanthisma spinulosum var. spinulosum	Cutleaf ironplant	Vascular plant	Special concern	Not Listed										

Cyrus Subregion – Natural Heritage Information System Records

Routing Alternatives					CAA01			CSR01			CSR02		
Scientific Name	Common Name	Type	State Status	Federal Status	ROW	Route Width	1-Mile	ROW	Route Width	1-Mile	ROW	Route Width	1-Mile
Athene cunicularia	Burrowing owl	Bird	Endangered	Not Listed						x			x
Coryphantha vivipara	Ball cactus	Vascular plant	Endangered	Not Listed									
Eleocharis wolfii	Wolf's spikerush	Vascular plant	Endangered	Not Listed									
Hesperia dacotae	Dakota skipper	Butterfly	Endangered	Threatened									
Isoetes melanopoda	Prairie quillwort	Vascular plant	Endangered	Not Listed									
Lanius ludovicianus	Loggerhead shrike	Bird	Endangered	Not Listed				x	x	x	x	x	x
Marsilea vestita	Hairy waterclover	Vascular plant	Endangered	Not Listed									
Oarisma poweshiek	Poweshiek skipperling	Butterfly	Endangered	Endangered									
Actinonaias ligamentina	Mucket	Mussel	Threatened	Not Listed									
Alasmidonta marginata	Elktoe	Mussel	Threatened	Not Listed									
Bacopa rotundifolia	Waterhyssop	Vascular plant	Threatened	Not Listed									
Berula erecta	Stream parsnip	Vascular plant	Threatened	Not Listed									
Callitriche heterophylla	Larger water starwort	Vascular plant	Threatened	Not Listed									
Cicindela lepida	Ghost tiger beetle	Beetle	Threatened	Not Listed									
Cyperus acuminatus	Short-pointed umbrella sedge	Vascular plant	Threatened	Not Listed									
Notropis anogenus	Pugnose shiner	Fish	Threatened	Not Listed									
Rhynchospora capillacea	Hair-like beak rush	Vascular plant	Threatened	Not Listed									
Anaxyrus cognatus	Great plains toad	Toad	Special concern	Not Listed						x			
Argynnis idalia	Regal fritillary	Butterfly	Special concern	Not Listed									
Asio flammeus	Short-eared owl	Bird	Special concern	Not Listed									
Astragalus flexuosus var. flexuosus	Slender milk-vetch	Vascular plant	Special concern	Not Listed									
Astragalus missouriensis var. missouriensis	Missouri milk-vetch	Vascular plant	Special concern	Not Listed									
Atrytone arogos iowa	Iowa skipper	Butterfly	Special concern	Not Listed									
Buellia nigra	Black disc lichen	Fungus	Special concern	Not Listed									
Catocala abbreviatella	Abbreviated underwing	Moth	Special concern	Not Listed									
Cirsium pumilum var. hillii	Hill's thistle	Vascular plant	Special concern	Not Listed									
Cygnus buccinator	Trumpeter swan	Bird	Special concern	Not Listed									
Cypripedium candidum	Small white lady's-slipper	Vascular plant	Special concern	Not Listed									
Desmanthus illinoensis	Prairie mimosa	Vascular plant	Special concern	Not Listed									
Elatine triandra	Three-stamened waterwort	Vascular plant	Special concern	Not Listed									
Eleocharis quinqueflora	Few-flowered spikerush	Vascular plant	Special concern	Not Listed									
Eptesicus fuscus	Big brown bat	Bat	Special concern	Not Listed									
Etheostoma microperca	Least darter	Fish	Special concern	Not Listed									
Hesperia leonardus pawnee	Pawnee skipper	Butterfly	Special concern	Not Listed									

Routing Alternatives					CAA01			CSR01			CSR02		
Scientific Name	Common Name	Type	State Status	Federal Status	ROW	Route Width	1-Mile	ROW	Route Width	1-Mile	ROW	Route Width	1-Mile
Lasmigona compressa	Creek heelsplitter	Mussel	Special concern	Not Listed			x	x	x	x	x	x	x
Ligumia recta	Black sandshell	Mussel	Special concern	Not Listed			x	x	x	x	x	x	x
Limosella aquatica	Mudwort	Vascular plant	Special concern	Not Listed									
Najas marina	Sea naiad	Vascular plant	Special concern	Not Listed									
Necturus maculosus	Mudpuppy	Salamander	Special concern	Not Listed									
Pelecanus erythrorhynchos	American white pelican	Bird	Special concern	Not Listed				x	x	x	x	x	x
Schedonnardus paniculatus	Tumble grass	Vascular plant	Special concern	Not Listed									
Schinia indiana	Phlox moth	Moth	Special concern	Not Listed									
Schinia lucens	Leadplant flower moth	Moth	Special concern	Not Listed									
Setophaga cerulea	Cerulean warbler	Bird	Special concern	Not Listed									
Solidago mollis	Soft goldenrod	Vascular plant	Special concern	Not Listed									
Urocitellus richardsonii	Richardson's ground squirrel	Squirrel	Special concern	Not Listed									
Woodsia oregana ssp. cathcartiana	Oregon cliff fern	Vascular plant	Special concern	Not Listed									
Xanthisma spinulosum var. spinulosum	Cutleaf ironplant	Vascular plant	Special concern	Not Listed									

Swift Subregion – Natural Heritage Information System Records

Routing Alternatives					S201			S202			S203			S204			S205		
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
Athene cunicularia	Burrowing owl	Bird	Endangered	Not Listed															
Coryphantha vivipara	Ball cactus	Vascular plant	Endangered	Not Listed															
Eleocharis wolfii	Wolf's spikerush	Vascular plant	Endangered	Not Listed															
Hesperia dacotae	Dakota skipper	Butterfly	Endangered	Threatened															
Isoetes melanopoda	Prairie quillwort	Vascular plant	Endangered	Not Listed															
Lanius ludovicianus	Loggerhead shrike	Bird	Endangered	Not Listed															
Marsilea vestita	Hairy waterclover	Vascular plant	Endangered	Not Listed															
Oarisma poweshiek	Poweshiek skipperling	Butterfly	Endangered	Endangered															
Actinonaias ligamentina	Mucket	Mussel	Threatened	Not Listed															
Alasmidonta marginata	Elktoe	Mussel	Threatened	Not Listed															
Bacopa rotundifolia	Waterhyssop	Vascular plant	Threatened	Not Listed															
Berula erecta	Stream parsnip	Vascular plant	Threatened	Not Listed															
Callitriche heterophylla	Larger water starwort	Vascular plant	Threatened	Not Listed															
Cicindela lepida	Ghost tiger beetle	Beetle	Threatened	Not Listed															
Cyperus acuminatus	Short-pointed umbrella sedge	Vascular plant	Threatened	Not Listed															
Notropis anogenus	Pugnose shiner	Fish	Threatened	Not Listed															
Rhynchospora capillacea	Hair-like beak rush	Vascular plant	Threatened	Not Listed															
Anaxyrus cognatus	Great plains toad	Toad	Special concern	Not Listed															
Argynnis idalia	Regal fritillary	Butterfly	Special concern	Not Listed													x		x	x
Asio flammeus	Short-eared owl	Bird	Special concern	Not Listed															
Astragalus flexuosus var. flexuosus	Slender milk-vetch	Vascular plant	Special concern	Not Listed															
Astragalus missouriensis var. missouriensis	Missouri milk-vetch	Vascular plant	Special concern	Not Listed															
Atrytone arogos iowa	Iowa skipper	Butterfly	Special concern	Not Listed															
Buellia nigra	Black disc lichen	Fungus	Special concern	Not Listed															
Catocala abbreviatella	Abbreviated underwing	Moth	Special concern	Not Listed															
Cirsium pumilum var. hillii	Hill's thistle	Vascular plant	Special concern	Not Listed															
Cygnus buccinator	Trumpeter swan	Bird	Special concern	Not Listed															
Cypripedium candidum	Small white lady's-slipper	Vascular plant	Special concern	Not Listed															
Desmanthus illinoensis	Prairie mimosa	Vascular plant	Special concern	Not Listed		x	x		x	x	x	x	x						x
Elatine triandra	Three-stamened waterwort	Vascular plant	Special concern	Not Listed															
Eleocharis quinqueflora	Few-flowered spikerush	Vascular plant	Special concern	Not Listed															
Eptesicus fuscus	Big brown bat	Bat	Special concern	Not Listed															
Etheostoma microperca	Least darter	Fish	Special concern	Not Listed															
Hesperia leonardus pawnee	Pawnee skipper	Butterfly	Special concern	Not Listed															

Routing Alternatives					S201			S202			S203			S204			S205		
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
Lasmigona compressa	Creek heelsplitter	Mussel	Special concern	Not Listed															
Ligumia recta	Black sandshell	Mussel	Special concern	Not Listed															
Limosella aquatica	Mudwort	Vascular plant	Special concern	Not Listed															
Najas marina	Sea naiad	Vascular plant	Special concern	Not Listed															
Necturus maculosus	Mudpuppy	Salamander	Special concern	Not Listed															
Pelecanus erythrorhynchos	American white pelican	Bird	Special concern	Not Listed															
Schedonnardus paniculatus	Tumble grass	Vascular plant	Special concern	Not Listed															
Schinia indiana	Phlox moth	Moth	Special concern	Not Listed															
Schinia lucens	Leadplant flower moth	Moth	Special concern	Not Listed															
Setophaga cerulea	Cerulean warbler	Bird	Special concern	Not Listed															
Solidago mollis	Soft goldenrod	Vascular plant	Special concern	Not Listed															
Urocitellus richardsonii	Richardson's ground squirrel	Squirrel	Special concern	Not Listed															
Woodsia oregana ssp. cathcartiana	Oregon cliff fern	Vascular plant	Special concern	Not Listed															
Xanthisma spinulosum var. spinulosum	Cutleaf ironplant	Vascular plant	Special concern	Not Listed															

Routing Alternatives					SAA01			SAA02			SSR01			SSR02			SSR03			SSR04		
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	ROW	Route Width	1-Mile
Athene cunicularia	Burrowing owl	Bird	Endangered	Not Listed																		
Coryphantha vivipara	Ball cactus	Vascular plant	Endangered	Not Listed																		
Eleocharis wolfii	Wolf's spikerush	Vascular plant	Endangered	Not Listed																		
Hesperia dacotae	Dakota skipper	Butterfly	Endangered	Threatened																		
Isoetes melanopoda	Prairie quillwort	Vascular plant	Endangered	Not Listed																		
Lanius ludovicianus	Loggerhead shrike	Bird	Endangered	Not Listed																		
Marsilea vestita	Hairy waterclover	Vascular plant	Endangered	Not Listed																		
Oarisma poweshiek	Poweshiek skipperling	Butterfly	Endangered	Endangered																		
Actinonaias ligamentina	Mucket	Mussel	Threatened	Not Listed									x				x	x	x	x	x	x
Alasmidonta marginata	Elktoe	Mussel	Threatened	Not Listed								x	x						x			x
Bacopa rotundifolia	Waterhyssop	Vascular plant	Threatened	Not Listed																		
Berula erecta	Stream parsnip	Vascular plant	Threatened	Not Listed																		
Callitriche heterophylla	Larger water starwort	Vascular plant	Threatened	Not Listed																		
Cicindela lepida	Ghost tiger beetle	Beetle	Threatened	Not Listed																		
Cyperus acuminatus	Short-pointed umbrella sedge	Vascular plant	Threatened	Not Listed									x									
Notropis anogenus	Pugnose shiner	Fish	Threatened	Not Listed																		
Rhynchospora capillacea	Hair-like beak rush	Vascular plant	Threatened	Not Listed																		

Routing Alternatives					SAA01			SAA02			SSR01			SSR02			SSR03			SSR04		
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**	**ROW**	**Route Width**	**1-Mile**
Anaxyrus cognatus	Great plains toad	Toad	Special concern	Not Listed																		
Argynnis idalia	Regal fritillary	Butterfly	Special concern	Not Listed								x	x			x	x	x	x	x	x	x
Asio flammeus	Short-eared owl	Bird	Special concern	Not Listed									x				x	x	x	x	x	x
Astragalus flexuosus var. flexuosus	Slender milk-vetch	Vascular plant	Special concern	Not Listed																		
Astragalus missouriensis var. missouriensis	Missouri milk-vetch	Vascular plant	Special concern	Not Listed																		
Atrytone arogos iowa	Iowa skipper	Butterfly	Special concern	Not Listed																		
Buellia nigra	Black disc lichen	Fungus	Special concern	Not Listed																		
Catocala abbreviatella	Abbreviated underwing	Moth	Special concern	Not Listed																		
Cirsium pumilum var. hillii	Hill's thistle	Vascular plant	Special concern	Not Listed																		
Cygnus buccinator	Trumpeter swan	Bird	Special concern	Not Listed									x			x			x			x
Cypripedium candidum	Small white lady's-slipper	Vascular plant	Special concern	Not Listed			x			x			x			x			x			x
Desmanthus illinoensis	Prairie mimosa	Vascular plant	Special concern	Not Listed									x	x	x	x			x			x
Elatine triandra	Three-stamened waterwort	Vascular plant	Special concern	Not Listed																		
Eleocharis quinqueflora	Few-flowered spikerush	Vascular plant	Special concern	Not Listed																		
Eptesicus fuscus	Big brown bat	Bat	Special concern	Not Listed									x				x	x	x	x	x	x
Etheostoma microperca	Least darter	Fish	Special concern	Not Listed																		
Hesperia leonardus pawnee	Pawnee skipper	Butterfly	Special concern	Not Listed																		
Lasmigona compressa	Creek heelsplitter	Mussel	Special concern	Not Listed									x				x	x	x	x	x	x
Ligumia recta	Black sandshell	Mussel	Special concern	Not Listed																		
Limosella aquatica	Mudwort	Vascular plant	Special concern	Not Listed																		
Najas marina	Sea naiad	Vascular plant	Special concern	Not Listed																		
Necturus maculosus	Mudpuppy	Salamander	Special concern	Not Listed																		
Pelecanus erythrorhynchos	American white pelican	Bird	Special concern	Not Listed																		
Schedonnardus paniculatus	Tumble grass	Vascular plant	Special concern	Not Listed																		
Schinia indiana	Phlox moth	Moth	Special concern	Not Listed																		
Schinia lucens	Leadplant flower moth	Moth	Special concern	Not Listed																		
Setophaga cerulea	Cerulean warbler	Bird	Special concern	Not Listed																		
Solidago mollis	Soft goldenrod	Vascular plant	Special concern	Not Listed																		
Urocitellus richardsonii	Richardson's ground squirrel	Squirrel	Special concern	Not Listed																		
Woodsia oregana ssp. cathcartiana	Oregon cliff fern	Vascular plant	Special concern	Not Listed																		
Xanthisma spinulosum var. spinulosum	Cutleaf ironplant	Vascular plant	Special concern	Not Listed																		

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

Routing Alternatives					WBLSR01			WBLSR02			WBLSR03			WBLSR04		
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
Ligumia recta	Black sandshell	Mussel	Special concern	Not Listed			x			x			x			x
Limosella aquatica	Mudwort	Vascular plant	Special concern	Not Listed												
Najas marina	Sea naiad	Vascular plant	Special concern	Not Listed												
Necturus maculosus	Mudpuppy	Salamander	Special concern	Not Listed												
Pelecanus erythrorhynchos	American white pelican	Bird	Special concern	Not Listed												
Schedonnardus paniculatus	Tumble grass	Vascular plant	Special concern	Not Listed												
Schinia indiana	Phlox moth	Moth	Special concern	Not Listed												
Schinia lucens	Leadplant flower moth	Moth	Special concern	Not Listed												
Setophaga cerulea	Cerulean warbler	Bird	Special concern	Not Listed												
Solidago mollis	Soft goldenrod	Vascular plant	Special concern	Not Listed												
Urocitellus richardsonii	Richardson's ground squirrel	Squirrel	Special concern	Not Listed												
Woodsia oregana ssp. cathcartiana	Oregon cliff fern	Vascular plant	Special concern	Not Listed												
Xanthisma spinulosum var. spinulosum	Cutleaf ironplant	Vascular plant	Special concern	Not Listed												