

North Dakota Transmission
Authority

North Dakota Industrial
Commission

BIL 40101(d) Application

Project Title: Next-Generation Grid Resiliency

Applicant: Otter Tail Power Company

Date of Application: May 30, 2025

Date of Application Revision:

Amount of Grant Request: \$2,843,075

Total Amount of Proposed Project:
\$5,686,150

Duration of Project: 24 months; 2026 &
2027

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Applicant Description

Applicant: Otter Tail Power Company.

Entity Type: Electric Grid Operator, Electricity Generator, Transmission Owner or Operator, and Distribution Provider.

Corporate Structure: Corporation; parent company of Otter Tail Power Company is Otter Tail Corporation.

Number of North Dakota customers served: 59,153.

Average population of North Dakota towns served: 382.

MWh delivered or sold annually in North Dakota: 2,296,189 MWh.

Distribution Line (primary and secondary) in North Dakota: 3,684 miles.

Transmission Line (primary and secondary) in North Dakota: 2,816 miles.

Otter Tail Power Company (OTP) has been providing electricity to rural and tribal communities since 1909. Our vision is growth and success—for our company and the rural communities we serve. We collaborate and prosper through responsible, resourceful action, while balancing community, economic, and environmental commitments. Our customers have trusted us to power their lives for more than a century. As our customer needs continue to evolve, we evolve as well by transitioning to new technologies to help us deliver reliable, cost-effective, and environmentally responsible power for decades to come.

Our company and our employees are reflections of the rural areas and customers we serve. We live, work, and invest in our communities alongside our customers. Our service area has an average population density of two customers per square mile. Today, electric outages have a disproportionate impact on rural communities due to the extended response time for our crews to locate the outage and make repairs. This means that improved grid resiliency, like those enabled through this grant, will have a direct, outsized impact on improving energy equity for citizens in these rural communities. Access to funding through this grant will allow us to deploy the proactive vegetation management to continue investing in improved resiliency and reliability but do so much more cost effectively and with less impact to customer rates.

Project Description

We're excited to propose **Proactive Vegetation Management** for funding consideration by NDTA. The Program will provide increased awareness of vegetation conditions throughout the state of ND and enable new and more efficient processes for managing vegetation mitigation work. This will allow us to reduce the magnitude and duration of grid outages caused by vegetation during major disruptive storms and non-storm events. It will also increase grid and customer resiliency by reducing the frequency and impacts of grid outages. By taking advantage of grant funding, we can lower the costs of vegetation management (VM) for customers and continue to provide low-cost reliable energy for customers in ND. Vegetation contact with utility infrastructure also poses a wildfire risk. This program will help ensure this risk is minimized. Lastly, these funds will accelerate the maturation of new vegetation management software, providing even greater long-term system benefits.

There are three main components to our proposal: Satellite imagery powered VM planning and analysis, preventative tree trimming and removal, and Right of Way (RoW) herbicide management. All of these components work together to ensure a safe, reliable, and cost-effective system for customers.

Satellite Powered Vegetation Management and Preventative Vegetation Management - has a direct and pronounced effect on reliability and resiliency for North Dakota residents. As noted in Image 1 below, vegetation makes up ~21% of all interruptions in the United States per the Edison Electric Institute (EEI). Management of vegetation is complicated by the nature of vegetation ownership and other values it may bring to customers (i.e., weather protection, shading, and esthetic value). Our VM program currently operates on a roughly five-year cycle for distribution feeders (consistent with industry standards) and utilizes an annual inspection review process for transmission assets. We are focused on improving our current program to develop an optimal and more precise preventative trimming program for both transmission and distribution rights of way. This plan will ensure spending is advancing optimum grid resiliency. To accomplish this, we will subscribe to a satellite imagery powered VM software platform. Applying data analytics and modeling to vegetation management allows us to transform the way we approach vegetation management, ultimately improving our resiliency. Access to grant funding will allow us to more affordably make the investment required for such a system, delivering ongoing reduction in disruptive events for our customers.

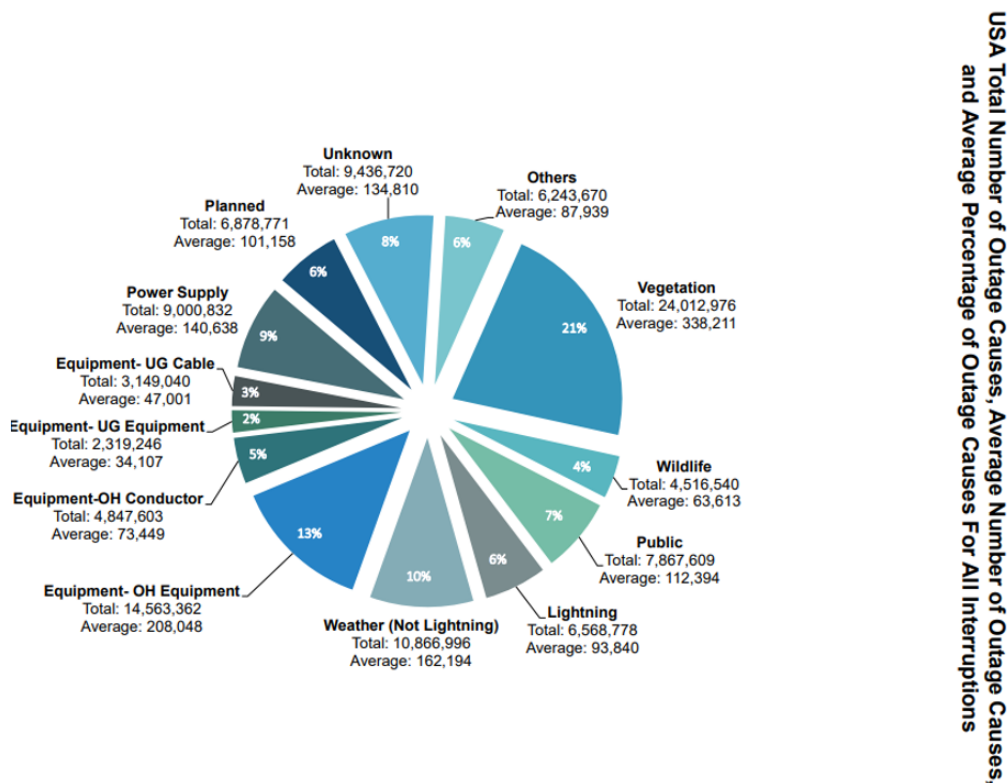
For the software system, we will partner with a vendor who uses high-resolution, multispectral, and synthetic-aperture radar (SAR) data from the leading satellite constellations that are fed into its proprietary artificial intelligence (AI) models to make timely predictions for operation and maintenance activities. These artificial intelligence models empower a software solution, which enables efficient planning, prioritization, execution, review, and audit of VM activities using satellite analytics at scale. Instead of reviewing circuits cyclically for vegetation threats, we will predict threats based on growth observed from satellite imagery which empowers us to precisely target the most critical areas for trimming in a timely fashion. This eliminates the cost associated with inspecting non-threatened assets and allows us to reallocate funds to other areas of the network. This precise measurement and prioritization of vegetation management risks improves reliability beyond what is possible with traditional inspection and planning methods and technologies. Output from the software tool will include prioritization of VM activities that result in the highest resilience benefit. We will then address these prioritized concerns throughout the remainder of the project.

Right-of-Way Herbicide Management: The final part of this Program is to ensure the Right of Way that has been recently trimmed remains free of woody vegetation for as long as possible. To extend the time between trimming cycles, herbicide treatment of a right-of-way is performed. This treatment is not carried out within towns or communities but is used for rural utility

infrastructure. Although spraying requires additional upfront spending, it saves money over time by reducing the frequency of trimming or removing woody vegetation. For example, without spraying, we may need to revisit a right-of-way to manage vegetation within 4-5 years, whereas with spraying, this can be avoided for up to 7 years.

Image 1 – USA Total Number of Outage Causes, Average Number of Outage Causes, and Average Percentage of Outage Causes for All Interruptions.¹

2023 Outage Causes for all interruptions



Cost/Benefit Analysis:

Next-Generation Grid Resiliency is expected to reduce the frequency and/or the magnitude and duration of grid outages. We are estimating Sustained Average Interruption Duration Index (SAIDI) and Customer Average Interruption Duration Index (CAIDI) to improve 7% over the lifetime of the program. We estimate this by assuming the reduction/elimination of VM induced interruptions. Through the Department of Energy's (DOE) Interruption Cost Estimate (ICE)

¹ Edison Electric Institute, 2023 Reliability Survey Report. Published September 2024.

Calculator and the Estimated Value of Reliability Improvement formula² we determined the customer cost benefit of the Program. With the estimate of improving SAIDI and CAIDI by 7%,³ we are expecting to provide an estimated net benefit of \$17 million.

Background and Experience: We’ve recently deployed several significant transmission and generation projects. These complex projects have informed our processes for selecting contractors, securing access to equipment, and ensuring supply chain readiness for future projects. The program components are generally part of our regular business practices, and we have access to the necessary labor, contractors, and suppliers to ensure project completion. We have existing vendor agreements with partners who have demonstrated the required capabilities. These agreements can be expanded to support the anticipated program needs. We also have processes for the sourcing and screening of suppliers. The vendors listed below have been trusted partners for many years. These relationships can be further expanded to support implementation of the Program.

Table 1: Vegetation Management and Potential Software Contractors	
Vendor	Experience Summary
Carr’s Tree Service ⁴	Established in 1974 Carr’s Tree Service is a member of the International Society of Arboriculture (ISA) and Tree Care Industry Association (TCIA) with ten ISA Certified Arborists on staff. Staff are highly skilled in all areas of the tree service industry and are certified line clearance tree trimmers.
Jacobsen Tree Experts ⁵	Jacobsen Tree Experts has over 56 years of experience in utility line clearance and residential work, and 16 years in disaster response.
Central Applicators ⁶	Central Applicators provides VM options for utilities, municipalities, counties, and townships. They invest in the latest innovations in herbicide applications and formulations, VM and restoration equipment, as well as best practices in the fields of invasive species control and utility arboriculture industry.
Davey Tree Group ⁷	In business since 1880, Davey has become one of the largest employee-owned companies in North America and will provide vegetation management services. Davey also provides satellite powered VM planning software.
AiDash ⁸	AiDash is a vertical SaaS company enabling satellite-powered vegetation management.

² <https://icecalculator.com/home>

³ The calculation included an estimated component lifetime of 7 years, weighted for the average of each component relative to the total budget.

⁴ <https://www.carrstreeservice.com/contact/>

⁵ <https://jacobsentree.com/>

⁶ <https://www.centralapplicators.com/about>

⁷ <https://www.davey.com/davey-resource-group/>

⁸ <https://www.aidash.com/>

Asplundh ⁹	As full-service utility partner, Asplundh brings experienced personnel, specialized equipment, innovative technology, and logistical resources to execute successful vegetation management programs. Asplundh has been in business for 95 years.
Wright Tree Service ¹⁰	With a robust history dating back to 1933 and employee-owned since 2002, Wright Tree Service is one of the largest vegetation management contractors in North America. Wright Tree Service has more than 4,000 employees across 16 geographic divisions.

Standards of Success

Our Vegetation Management Program meets the four objectives laid out by the North Dakota Transmission Authority.

Objective 1: Reduced Frequency of Outages: Metric of measure – Sustained Average Interruption Frequency Index (SAIFI) and Momentary Average Interruption Frequency Index (MAIFI)

By keeping trees and vegetation clear of power lines, we can reduce the risk of trees falling onto power lines during storms or high winds, which is a common cause of power outages. In fact, according to Edison Electric Institute’s 2023 Reliability survey, vegetation is the number one cause of outages, accounting for 21% of all outages.¹¹ When a major storm or non-storm event occurs, strong winds and heavy precipitation increase the likelihood and frequency of trees and branches falling onto power lines, poles, and other grid components. Proactive vegetation management reduces the likelihood and frequency of these physical obstructions and acts as a buffer during major storms, decreasing the number of outages. In fact, one of our satellite partners saw a 5% improvement in SAIFI with the implementation of their software.¹² In addition, this reduced number of outages due to VM contacts also provides a wildfire risk reduction as well. With reduced possibility for tree contacts to utility infrastructure, there is a commensurate reduced risk of wildfire caused by tree contacts as well. This increased resilience means that even when storms occur, the grid is better equipped to stay intact without experiencing outages. Fewer obstructions and hazards near power lines also make it safer for workers to assess and repair damage, which can speed up the restoration process. In addition, when outages do occur, they are typically of shorter duration because the grid infrastructure remains relatively undamaged.

⁹ <https://asplundh.com/>

¹⁰ <https://www.wrighttree.com/>

¹¹ Edison Electric Institute, 2022 Reliability Survey Report. Published September 2023.

¹² [How National Grid Improved Grid Reliability with Data-Driven Insights from Space \(aidash.com\)](#)

Objective 2: Reduced Outage Time: Measurement – Sustained Average Interruption Duration Index (SAIDI)

Our service areas are subject to natural disasters such as severe snow and ice storms, derechos, tornadoes, flooding, and fires. Extreme weather events within our service area directly affect our infrastructure, causing disruption in service to customers and result in repair or replacement costs due to downed wires and poles or damage to our operating equipment.¹³ Proactive vegetation management helps us prepare and lessen the impact during these weather patterns. During extreme weather, there is an increased likelihood of vegetation encountering overhead power lines, such as a tree branch falling on a power line during a storm, or a tree blown into lines due to high winds. By improving and expanding VM practices with this grant, we can identify and remove potential hazards across more of our remote service territory before they cause problems, thus reducing both the likelihood of an outage as well as the restoration time which improves the overall outage time for customers. Vegetation can also pose a fire risk if it meets power lines, especially during dry or windy conditions. By removing and/or managing vegetation, we can help reduce the risk of wildfires. Any outage that occurs during high wildfire risk periods requires an extended amount of time to restore due to the necessary operational practices that must be followed. By reducing outages during dangerous wildfire periods, we in turn reduce outage time to customers. Applying data analytics and modeling, and adding data sources such as satellites, to VM allows us to transform our VM approach, moving from a static to a dynamic planning model, ultimately improving our climate resiliency.

As mentioned earlier, this increased resilience means that even when storms occur, the grid is better equipped to withstand them without experiencing outages. Fewer obstructions and hazards near power lines also make it safer for workers to assess and repair damage, which can speed up the restoration process. In addition, when outages do occur, they are typically of shorter duration because the grid infrastructure remains relatively undamaged.

There are also intangible benefits for restoration crews that stem from this grant investment. As the duration of storm restoration work is shortened because of improved resiliency, employees benefit from more stable hours and fewer nights away from home. This also allows workers to focus more on preventative work rather than emergency restoration work. Storm restoration can be some of the most dangerous work a lineworker performs due to the weather conditions that exist during restoration. As such, having a more reliable and resilient system that is less prone to severe weather reduces the likelihood and frequency that our lineworkers will work in unstable conditions. As utilities often operate in hazardous environments, such as remote or difficult-to-access locations and high-voltage areas, sending human inspectors into these environments poses significant risks. Satellite imagery eliminates the need for personnel to physically reach these areas, mitigating the potential for accidents and injuries. Slips, trips, and falls are the

¹³ Otter Tail Power, 2021 Annual Report. [Annual Report and Proxy Statement | Otter Tail Corporation](#)

leading cause of workplace fatalities according to OSHA reporting. There are still further beneficial aspects of preventative work relative to emergency restoration. We have estimated, based on pole replacement numbers, that storm work would be 25% to 50% more expensive than the same work on a scheduled basis. Reducing emergency restoration work to preventative work through the Program can have a positive fiscal impact on us and, in turn, our customers.

Objective 3: Reduced Response Time: Measurement – Customer Average Interruption Duration Index (CAIDI)

By proactively conducting VM assessments, we can identify and address potential issues before they lead to power outages. Proactive VM assessments & mitigation work can also help identify and address issues related to environmental impacts, such as reducing the risk of power line-induced wildfires, which can have a significant impact on communities and outage response time. This response time is measured by the industry standard; CAIDI.

As mentioned earlier, the improved resilience from this program means that even when storms occur, the grid is better equipped to withstand them. Fewer obstructions and hazards near power lines (such as VM) make it safer for workers to assess and repair damage, which can speed up the restoration process. In addition, when outages do occur, they are typically of shorter duration because the grid infrastructure remains relatively undamaged.

Without this investment, customers in our service area could be at risk of reduced resilience due to the increasing number and intensity of weather events. The Program will improve and enhance our current programs and improve the resiliency and reliability of service to the rural customers we serve.

Objective 4: Increased Power Quality (voltage, momentary outages): Success Measure – Momentary Average Interruption Frequency (MAIFI)

Anytime there is tree contact with utility infrastructure, it will either result in a sustained interruption or a momentary interruption. Both of which can create voltage depressions for neighboring customers in the vicinity. Momentary interruptions are measured by the Momentary Average Interruption Frequency Index or MAIFI. By helping keep our Right of Ways free of VM, we will thus in turn reduce momentary interruptions to customers as well as subsequent voltage depressions.

Project Timeline

We propose to complete our program over the course of 2 years; 2026 and 2027. We will rely on existing patrol reports and information for commencing herbicide spraying and vegetation management on the transmission system in 2026. We will also engage with a satellite imagery contractor for an updated assessment of VM needs on the distribution system in ND in 2026. Then, in 2027, we will continue transmission VM mitigation and spraying, as well as tackle the most critical distribution areas identified by the 2026 satellite assessment coupled with our identified areas of highest wildfire risk. With an assumed start date of January 1, 2026, we plan to complete all work by the end of 2027.

Table 2 – Program Timeline

Program Timeline	2026				2027				2028			
Program Components	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Annual Reporting						★				★		
Quarterly Reporting	★	★	★	★	★	★	★	★	★			
Satellite VM Assessment												
Vegetation Management & Spraying												

Project Budget

Proactive Vegetation Management is estimated to be completed with a total budget of \$5,686,150. Our cost share totals \$2,843,075, 50% of the total program budget. NDTA's cost share, \$2,843,075, 50% of the total program budget. These loaded rates include our payroll loading rate (50.2%). The payroll loading rate includes qualified pension expense; 401k match; 401k enhanced contributions; post-retirement medical; active medical less premiums paid by employees; active dental less premiums paid by employees; health savings account company contributions; life and long-term disability (LTD) insurance premiums; post-employment LTD expense; workers compensation; taxable meals; vacation and vacation accrual; FICA and unemployment taxes; holidays and floating holidays; sick leave; and other miscellaneous lost time activity. Table 9 outlines the complete budget breakdown for the Program. An inflation rate of 3% was applied to all personnel costs for each year. It is important to note that we are not expecting any additional grant funding beyond the NDTA to support these critical resiliency

efforts for our North Dakota customers.¹⁴ It should also be noted that any transmission VM and reliability improvements not only improves service to OTP customers but also neighboring utility customers as well.

Table 3: Program Budget

Project Associated Expense	NDIC Grant	Applicant's Share (Cash)	Total
Satellite VM software	\$0.13M	\$0.13M	\$0.25M
Distribution VM	\$1.5M	\$1.5M	\$3.0M
Transmission VM	\$0.55M	\$0.55M	\$1.1M
RoW Spraying	\$0.38M	\$0.38M	\$0.75M
Internal Labor and Fringe	\$0.18M	\$0.18M	\$0.35M
Audit & Controls	\$0.1M	\$0.1M	\$0.2M
Total	\$2.84M	\$2.84M	\$5.7M

Conclusion: Otter Tail Power customers depend on our ability to provide reliable and resilient electric service. Proactive vegetation management will provide improved resiliency throughout our ND service territory by lessening the risk of vegetation induced interruptions to our customers which, per EEI, represents the largest share of total interruption causes in 2023. As noted by our objective metrics, this program will improve all major reliability indices. This grant funding will enable us to accelerate critical right-of-way management for our customers and for North Dakota.

¹⁴ Environmental review costs are not included within Table 9. If during award negotiations the NDTA or DOE determine OTP needs to complete an environmental review, OTP will comply and adjust the budget accordingly.