Section I: Applicant Details *(Applies to all applicants)*

1. Subprogram Type: *(See Descriptions Above)*	Devices and Technology Subprogram
2. Applicant name (Legal name of the farm/business applying for the grant):	Emily Haxby
3. Applicant type: *(See Definitions Above)* Proof of applicant type should be included with application as Attachment B.	Agricultural Producer
4. Applicant street address:	8867 SW 86th Rd
4a. Applicant city:	Clatonia
4b. Applicant state:	NE
4c. Applicant zip code:	68328
5. Applicant contact (first and last name):	Emily Haxby
6. Applicant e-mail:	j.e.haxby@outlook.com
7. Applicant phone number:	402-239-7024

8. Executive Summary: Provide an overview of the applicant, detailing the history, mission, and goals of the farm or business. Include specific objectives related to precision agriculture connectivity or technology adoption.

As a fifth-generation farmer, we continue a proud family tradition of raising corn, soybeans, and operating a cow/calf enterprise. For our family, farming is more than a business—it is a way of life, deeply rooted in hard work, resilience, and a commitment to improving the land for future generations. Over the years, the farm has consistently sought ways to increase efficiency and embrace innovation, balancing traditional values with modern advancements.

Our goal is to produce high-quality agricultural products while adopting practices that promote efficiency, sustainability, and technological growth. By leveraging data-driven decision-making and innovative tools, the farm aims to optimize its resources, maximize yields, and reduce its environmental footprint by reducing/optimizing inputs while increasing yields.

To achieve these goals, we are focused on adopting precision agriculture technologies that enable smarter farming practices. These include GPS-guided equipment, variable-rate application systems, and real-time data analysis tools that help optimize inputs such as seed, fertilizer, and water. By enhancing connectivity and improving the farm's ability to collect and analyze data, the operation can make more informed decisions, ultimately leading to higher productivity and greater sustainability.

Grant funding plays a critical role in making these advancements possible. While newer technologies offer tremendous opportunities to improve efficiency and production, they often come with significant costs. The availability of grants provides a pathway for farms like ours to invest in cutting-edge solutions that might otherwise be out of reach. These investments enable the farm to grow technologically, produce more with fewer resources, and contribute to the broader agricultural goal of feeding a growing population while reducing environmental impact.

Section II: Project Details *(Applies to all applicants)*

1. Project name:	Precision Planting Improvement
2. Precision agriculture production type:	Farming/Ranching

3. Project location description: (This should include a detailed description of the project area and location(s) to be served.)

The project will be conducted on approximately 1,500 acres of farmland located throughout rural Gage County, Nebraska. The majority of these acres are dedicated to producing corn and soybeans, with rye planted as a cover crop to support the farm's cow/calf operation. These fields are dispersed across the county and vary significantly in soil type, drainage capacity, topography, and nutrient status.

This variability presents unique challenges that can be effectively addressed through the adoption of precision agriculture technology. A planter capable of variable-rate seed and fertilizer application will allow the farm to adjust input levels based on the specific needs of each field, ensuring optimal productivity and sustainability. By leveraging these advanced tools, the operation can maximize efficiency, improve soil health, and enhance yield potential despite the diverse conditions of the project area.

4. Project Proposal: (a) Description of the precision agriculture project you plan to implement. -AND- (b) Explanation of how the on-farm connectivity or devices and technology will be utilized to enhance productivity, efficiency, and sustainability. *Please include information showing that the applicant is prepared to move forward immediately upon award of grant.*

(a) Description of the Precision Agriculture Project

The proposed project involves acquiring and implementing a state-of-the-art planter capable of variable-rate seed and fertilizer application. This technology will enable precise placement and distribution of inputs based on field-specific data, optimizing plant population and nutrient delivery. By utilizing data from soil tests, soil types, and yield histories, the planter will dynamically adjust seeding rates and fertilizer application in real time to match the needs of different zones within each field.

This project is designed to address the inherent variability across the 1,500-acre operation in Gage County. Fields differ in soil type, moisture levels, and nutrient retention, making uniform applications inefficient and potentially wasteful. By tailoring input use to these specific field conditions, the farm will improve crop productivity, reduce input waste, and promote better soil health over time.

We are currently evaluating either a John Deere or Kinze 16/31 split-row planter for this project. Both dealers have visited the farm to understand our goals and specific requirements for fertilizer application. They are ready to begin work immediately to ensure the selected planter is fully operational by the next planting season. Cost estimates have been obtained, and further discussions will determine which unit best fits the farm's practices. Key considerations include ensuring the planter can be retrofitted with sufficient carrying capacity for liquid fertilizer application while remaining compatible with the farm's existing John Deere 8330 tractor. Once the optimal planter is selected, we plan to proceed right away with retrofitting and integration to meet our operational timeline.

(b) Utilization of On-Farm Connectivity, Devices, and Technology

The success of this project hinges on the seamless integration of on-farm connectivity and precision agriculture devices. The variable-rate planter will work in tandem with GPS and field mapping technologies to ensure accurate input application. Data collected from soil sampling, yield monitoring, and soil types will be analyzed using our farm management software (SMS Advanced), providing actionable insights tailored to each field' s unique requirements. Enhanced connectivity will allow real-time data transfer between equipment and farm management systems, enabling informed and timely decision-making.

By incorporating this advanced technology, the farm will achieve significant improvements in productivity, efficiency, and sustainability. Accurate input application will reduce input costs, increase yields, and minimize environmental impacts, particularly by curbing fertilizer runoff and over-application. The ability to monitor and adjust operations in real time will ensure resources are allocated where they are most needed, supporting long-term land health, operational profitability, and water resource conservation. The readiness of the selected dealers to begin work immediately ensures this project will move forward quickly upon grant approval, aligning with our objectives to implement and leverage this precision agriculture technology in time for the next planting season.

5. Total Project Cost *(include allowable costs only)*: *See project budget instructions and examples on our website.*	$ 385,000.00

6. Total Match Commitment Amount (in dollars), *if applicable*: NOTE: The project budget (attachment A) must detail any matching funds committed by source. Additionally, documentation of match commitment must be submitted as Attachment E. See "Contribution Certification Form" on our website.	$ 0.00
7. PRO-AG Grant Amount Requested:	$ 385,000.00
8. Estimated number of locations served in project area:	

9. Technology type(s) used in proposed project:

The proposed project will leverage several cutting-edge precision agriculture technologies to improve planting efficiency and optimize resource use. Central to the project is the variable-rate planter, which will adjust seed and fertilizer application rates in real time based on detailed field data. This system ensures that inputs are applied accurately to meet the specific needs of each zone, minimizing waste and enhancing yield potential. The planter will be complemented by GPS guidance systems to maintain precise row spacing and prevent overlap, further boosting operational efficiency. In addition to these core technologies, the farm will use SMS Advanced for Ag software, which will integrate field data, soil tests, and historical yields to generate tailored prescriptions. This software will continuously track equipment performance, allowing for constant refinement of planting and fertilization practices. Hydraulic downforce technology will be employed to map soil compaction across fields, enabling targeted remediation efforts to improve soil health and planting conditions. Enhanced connectivity will ensure seamless communication between equipment and farm management software, allowing for real-time adjustments and data sharing. These technologies will significantly improve productivity,

10. Expected Start Date (*Should <u>not</u> be prior to 4/15/25):*	5/1/25
11. Expected completion date (*Should <u>not</u> be after 4/15/26):*	4/1/26

12. Timeline: Please outline the timeline for your project deployment, including clear milestones and indicators of readiness for immediate action upon grant award. Provide an explanation of any measures you have in place to address potential challenges during the implementation process.

The proposed project will begin shortly after the grant award date of April 15, 2025, with a targeted start date of May 1, 2025, and a projected completion date of April 1, 2026. The first phase of the project will focus on acquiring the necessary variable-rate planter and add-on kits to increase fertilizer capacity, allowing the farm to apply both 32-0-0 and 10-34-0 fertilizers during planting. This step will include modifications to the planter to ensure it has the necessary tank capacities and applicators for the fertilizers. Applying fertilizer directly during planting reduces the risk of leaching, places the fertilizer exactly where it is needed, and minimizes trips across the field. This process also helps decrease the farm's carbon footprint, reduce soil compaction, and limit fuel usage. The farm's welding company and shop will handle much of the work on these modifications, ensuring that all equipment is in place and compatible with existing technologies.

The second phase will focus on equipment integration and testing. During this phase, the planter will undergo testing to ensure that both fertilizers are applied correctly—one in the furrow with the seed and the other a few inches away using a fertilizer opener. We will run calibrations to make sure settings are accurate.

After harvest, we will collect additional soil data and refine prescription maps using information from soil tests and historical yield data. This will allow for further adjustments to the variable-rate planter and fertilizer application settings to ensure they are optimized for the farm's unique soil conditions and planting requirements.

The final phase involves the final testing and full integration of the planter and supporting technologies. During this period, the farm will perform system checks, run planting simulations, and make any necessary final adjustments to ensure that all technologies are fully operational and synchronized. By March 31, 2026, the equipment will be ready for use for the start of the next planting season. Throughout the project, the farm will maintain close communication with equipment dealers and software providers to ensure that any issues are addressed promptly. The farm's in-house capabilities, including welding and access to necessary tools, will help mitigate potential challenges by enabling quick adjustments to the equipment. Additionally, regular data collection and system checks will allow for continuous refinement and ensure that the technology is ready well in advance of the planting season.

13. Sustainability: Provide an explanation of how the project will be sustainable for a minimum of five years; include strategies and considerations for long-term success. Attach any evidence of sustainability to the application as Attachment F.

This project will be sustainable for a minimum of five years through a combination of regular maintenance, software updates, and annual equipment inspections to ensure that all systems are functioning optimally. As with any agricultural equipment, the wear and tear of the planter and its components will require ongoing attention. The farm will implement a routine maintenance schedule to inspect and address any worn parts or malfunctioning components throughout the season. Regular maintenance will include work such as lubricating moving parts, checking for wear on seed meters, ensuring the hydraulic downforce systems are working properly, and replacing any components that show signs of deterioration.

In addition to maintaining the physical components of the planter, the farm will also stay current with software updates. As technology continues to evolve, it will be crucial to ensure that the farm's farm management software and variable-rate technologies remain compatible with any advances in precision agriculture. Regular updates to the software will allow the farm to take advantage of new features, enhanced functionality, and improved data analytics capabilities.

To further ensure long-term success, the farm will conduct an annual inspection of the equipment before the start of each planting season. This will include a thorough check of the planter, including the fertilizer application systems, seed metering, and hydraulic downforce components. Any necessary repairs or adjustments will be made during this inspection, ensuring the equipment is fully operational and ready for the upcoming season.

The farm's ability to handle equipment repairs and modifications in-house, due to its welding company and well-equipped shop, ensures that maintenance can be carried out efficiently and at a lower cost. By establishing and following a comprehensive maintenance and inspection plan, the farm can extend the life of the equipment and ensure that it remains functional and effective for at least five years, contributing to the long-term success of the project.

Section II Project Details – Subsection A: ***Applies to Connectivity subprogram ONLY***	
1. Farm Site Size (acres):	
2. Number of Key Operational Locations:	
3. Number of Connected On-Farm Entities:	
4. Current maximum connection speed bandwidth in project area in Mbps: *(Must be < 25/3 Mbps)*	
5. Speeds upon completion: *(Must be ≥ 100/20 Mbps)*	
6. Do you certify that the farm site(s) to be served are currently unserved or lacking broadband Internet service at speeds of at least 25/3 Mbps download/upload?	
7. Do you certify that upon completion of the project, the farm site(s) served by the project will have access to minimum speeds of 100/20 Mbps for precision agriculture connectivity to on-farm structures and devices, as required by Neb. Rev. Stat. § 86-1404(2)(a)? NOTE: If the FCC National Broadband Map indicates that the location is already receiving speeds of 25/3Mbps or higher, applicants are required to submit evidence refuting the data on the broadband map. (Include as Attachment F)	

Section III: Technical Summary *(Applicants must complete the relevant subsection)*

Section III: Technical Summary – Subsection A: *Applies to Devices and Technology subprogram ONLY*

1. Applicant's Experience: Overview of the applicant's experience and expertise in precision agriculture devices and technology solutions, specifically as related to the devices/technology included in the application. In cases where the applicant lacks direct experience, an explanation is required on how they plan to acquire the necessary skills and knowledge to operate the equipment effectively. Provide details of past successful projects or initiatives related to precision agriculture or similar technologies.

As a 5th-generation farmer, I have been farming my entire life, and adapting to new technologies has been an integral part of our operation. Over the years, I have gained experience integrating various precision agriculture tools, including monitoring systems, yield tracking, and soil sampling technologies. In recent years, I have worked closely with local dealers to introduce monitors into our operations, enabling the collection of valuable data related to yields and soil conditions. This collaboration has been instrumental in improving our farming practices and optimizing inputs.

In addition to hands-on experience, I have been actively learning to use SMS Advanced software to create data points for grid sampling, utilizing online manuals and other resources to deepen my understanding. I recognize the importance of staying current with new technologies and continuously seek opportunities to expand my knowledge. I have been in direct contact with dealers to address any questions I have during the learning process, ensuring that I fully understand how to utilize these technologies effectively. Furthermore, I intend to watch more tutorials to further my skills in integrating and analyzing data collected from various precision agriculture tools. This information will help me refine our ability to make data-driven decisions, ensuring that our farm remains on the cutting edge of efficiency and sustainability.

By leveraging both my practical experience and ongoing education, I am well-equipped to implement the proposed technology and further enhance the farm's operations.

2. Program Details: Provide details about the proposed program involving precision agriculture devices and technology, including specifications and technical requirements. Include an explanation of how the chosen technologies align with the goals of the project.

The proposed project aligns with the goals of the Precision Agriculture Infrastructure Grant (PRO-AG), a state-funded initiative created under the Precision Agriculture Infrastructure Grant Act (Neb. Rev. Stat. 86-1401-1406). This program is designed to propel Nebraska agricultural producers to the forefront of precision agriculture connectivity, sustainability, traceability, and autonomy, supporting the acceleration of rural economic development.

The devices and technologies proposed for this project, including a variable-rate planter integrated with precision agriculture software like SMS Advanced, will directly contribute to the program's objectives. The planter automatically adjusts seed and fertilizer rates based on prescriptions generated from yield data, soil sampling, and soil type information. This technology is crucial for optimizing the use of inputs, particularly fertilizers, which is key to reducing greenhouse gas emissions, combating soil salinization, and preventing water pollution. Variable-rate fertilizer application ensures that fertilizers are applied where and when they are needed most, minimizing excess application and reducing the risk of nutrient runoff, which aligns with environmental conservation efforts.

In addition to improving fertilizer efficiency, the planter's ability to adjust rates based on soil types further enhances the sustainability of the operation. Different soil types have varying water retention capacities, and by tailoring seeding rates to soil characteristics, higher seeding rates can be employed in soils with better water-carrying capacities. This results in more efficient use of water resources, another key goal of the PRO-AG program.

The integration of hydraulic downforce to map and address soil compaction further enhances soil health and water efficiency. By identifying areas with excessive compaction, the farm can make the necessary adjustments to improve water infiltration and root growth, ensuring a better use of water and contributing to overall soil health.

While the project does not yet incorporate fully autonomous machinery, the adoption of these precision technologies is a significant step toward greater automation, improving efficiency, sustainability, and long-term environmental stewardship. These efforts align perfectly with the PRO-AG program's focus on reducing agriculture's water, carbon, and nitrate footprints while advancing farming practices that protect local ecosystems.

3. Expected Useful Life: The expected useful life of devices/technology included in the request for funding. Please identify any components which may require more frequent repair or replacement.

The equipment included in this request is expected to have a useful life well beyond five years with proper care and maintenance. The precision agriculture equipment is built to withstand the demanding conditions of farming, and its lifespan can be extended through regular maintenance.

Typical wear components, such as disc openers, seed tubes, and bearings will need to be replaced periodically due to regular use. Additionally, routine inspections and maintenance of hydraulic hoses, openers, and cylinders are essential to ensure the continued proper functioning of the equipment. Implementing general maintenance practices, including cleaning, lubrication, and timely replacement of worn parts, will contribute to the long-term sustainability of the technology and ensure that it remains operational for many years.

By establishing a proactive maintenance routine and addressing any necessary repairs promptly, the farm can expect to use the equipment for several years, maximizing the return on investment and extending the overall useful life of the technologies.

4. Maintenance Plan: Applicants should explain how the devices/technology funded with PRO-AG grant funds will be maintained for at least five years following project completion.

To ensure the devices and technology funded by the PRO-AG grant are maintained for at least five years following project completion, a comprehensive maintenance plan will be implemented. This plan includes regular inspections and upkeep of all components to ensure they remain in optimal working condition.

A key part of this plan is the use of inspection checklists, which will be employed at the beginning and end of each planting season to thoroughly assess the condition of the equipment. These checklists will guide the inspection process and help identify any worn or damaged components that may need attention, such as seed tubes, disc openers, hydraulic hoses, and tires. By following these checklists, the farm can proactively address any issues before they affect equipment performance.

Routine maintenance activities will include lubricating moving parts, cleaning components, and verifying hydraulic pressure and electrical connections. In addition, tire pressure will be checked regularly to prevent uneven wear and improve fuel efficiency.

Any repairs or part replacements required will be handled promptly to minimize downtime during planting and fertilizing seasons. By staying ahead of maintenance needs through regular inspections and addressing issues as they arise, the equipment will be kept in good working order for many years, ensuring that it continues to contribute to the farm's productivity and sustainability goals.

Section III: Technical Summary – Subsection B: *Applies to Connectivity subprogram ONLY*

1. Applicant's Experience: Describe the applicant's experience providing precision agriculture on-farm connectivity solutions including their technical capability to meet the requirement to provide a minimum 100/20 Mbps. Include details of past successful projects or initiatives related to precision agriculture connectivity or similar technologies. Specifically, whether they currently provide broadband at the minimum 100Mbps/20Mbps speeds, and if so, where.

2. Innovation and Technology: Provide a detailed description of the proposed network architecture including the specific technologies and strategies to provide service, a list of the on-farm structures and devices to be connected by project, placement of access points, data collection devices, and other key elements.

3. Scalability Evaluation: Explain how the solution ensures reliable and scalable connectivity. This could include a plan for network expansion along with a description of strategies for preserving performance with increased device density.

4. Maintenance Plan: Include details regarding the expected useful life of the facilities to be built. Include a statement as to the technological components used, and, if applicable, which components may require more frequent repair or replacement. Applicants should explain how the project will be maintained throughout the useful life of the facilities along with the applicant's plans to meet the minimum speed requirements in place for the PRO-AG grant for a minimum of five years following completion.

5. Latency: Include the expected latency of the network (in ms) upon completion. Explain how the expected latency aligns with the needs of your application. How does this latency impact the ability to perform real-time operations or data transfers in the context of precision agriculture?

Section IV: Legal *(Applicants must complete the relevant subsection)*

Section IV: Legal – Subsection A: *Applies to Devices and Technology subprogram ONLY*

1. Provide a detailed outline of the pertinent qualifications and certifications essential for the proposed devices/technology. Explain whether the applicant currently holds the necessary qualifications and certifications, including any expiration dates. If not currently secured, define the planned steps and timelines for acquiring any essential qualifications and certifications.

There are no specific qualifications or certifications required to utilize the proposed devices and technology for this project. However, ongoing learning will be essential to ensure that the technology is used effectively and maintained properly over its useful life. While no formal certifications are necessary, the applicant recognizes the importance of staying up-to-date with the latest advancements in precision agriculture technologies.

The applicant has demonstrated a commitment to continuous learning through hands-on experience, working with local dealers, and taking online courses related to precision agriculture, such as those focused on SMS Advanced software and equipment maintenance. As the farm continues to integrate more advanced technologies, additional training and education will be pursued to enhance the ability to operate, troubleshoot, and repair the equipment effectively.

In addition to using the technology, maintaining it will require staying informed about any updates, troubleshooting procedures, and best practices for repair. The applicant plans to continue learning through resources provided by technology manufacturers, local dealers, and workshops. This ongoing learning approach ensures the applicant remains proficient in managing both the operational and maintenance aspects of the technology, contributing to the long-term success of the project.

2. Detail the applicant's strategies and commitments for sustaining the qualifications and certifications over the five-year post-deployment period.

While no specific certifications are required for the proposed devices and technology, we are committed to sustaining the necessary qualifications and skills for successful operation, maintenance, and troubleshooting of the equipment over the five-year post-deployment period. This will be accomplished through a combination of ongoing education, hands-on experience, and regular engagement with equipment manufacturers and service providers. We plan to continue learning through local dealers, online courses, and manufacturer-provided resources, ensuring that we stay informed about new advancements and updates. Additionally, maintaining an open line of communication with equipment suppliers will provide access to troubleshooting support and insights into best practices for equipment upkeep. Hands-on experience is also critical, and the applicant will continue performing routine inspections, maintenance, and repairs on the equipment, which will further enhance technical skills. By scheduling periodic reviews of the equipment's performance and staying current with industry training, we will ensure the necessary knowledge and capabilities are sustained throughout the five years and beyond, ensuring long-term success and functionality of the technology.

Section IV: Legal – Subsection B: ***Applies to Connectivity subprogram ONLY***	
1. Applicant's Nebraska ETC Status:	
2. Legal Representative Name (Must be licensed and in good standing to practice law in Nebraska or admitted pro hac vice)	
3. Legal Representative Email:	
4. Legal Representative Phone:	
5. A description of any risk factors or legal challenges that must be addressed prior to or during the project in question (examples include local zoning, permitting, access to rights-of-way, etc.), as well as a plan for mitigation. Additionally, explain any engagement measures with proposed project location(s) or impacted communities.	

6. Has the applicant received letter(s) of support or approval from the owner of each farm site included in the grant application? Yes/No. NOTE: Letters of support must be attached to the application as attachment G and should clearly express the owner's consent for the connectivity project and their understanding of the proposed on-farm connectivity services and rates charged for service.	

Section V: Project Impact *(Applies to all applicants)*

1. Demonstrated Substantial Economic Benefit: Describe the significant economic impact your project will have on rural Nebraska. What tangible benefits can you quantify, such as job creation and income generation? Please provide illustrative examples.

The implementation of this precision agriculture project will have a significant economic impact on rural Nebraska, not only by increasing farm productivity but also by creating opportunities for local businesses and contributing to the broader regional economy. The adoption of advanced technologies, including a variable-rate planter and integrated precision agriculture systems, will allow for more efficient use of inputs, maximizing yields while minimizing waste. This translates to higher crop production, leading to increased income generation for the farm, which will have a ripple effect on the local economy.

One of the primary benefits will be the reduction in input waste, especially for fertilizers, by ensuring that nutrients are applied only where and when they are needed. This precision approach reduces waste, resulting in a more sustainable and profitable operation. With increased efficiency and productivity, the farm will be able to produce more while using fewer resources, contributing to greater farm profitability. In addition to direct financial benefits for the farm, the project will also support local businesses. The farm's reliance on local dealers for equipment, software, and ongoing support will provide revenue for area businesses.

The project will also foster job creation and skills development within the local community. The expertise of an agronomist will be utilized to ensure the technology is applied effectively and that soil health is optimized through data-driven decisions. This creates opportunities for local professionals, helping to sustain rural employment. Based on Oliver Borchers Williams' capstone study, if fully connected, there would be an estimated value of $1,606,029.32 for Gage County in increased agricultural yields based on the 2023 growing season which shows the importance of precision agriculture and its impact on Nebraska's economy.

Illustratively, as the farm becomes more efficient with its fertilizer use and planting technology, the increased yields could allow for expanded operations, creating additional income that can be reinvested in the local economy. By boosting farm profitability and supporting local services, the project will foster long-term economic sustainability in the region.

2. Continuing or Increasing Economic and Technological Impacts: How will your project provide ongoing economic and technological benefits over time? Outline the strategies you will implement to ensure sustained growth and progress beyond the initial implementation phase.

The proposed project is designed to provide ongoing economic and technological benefits long after the initial implementation phase. The adoption of precision agriculture technologies will not only improve current operational efficiency but also create long-term opportunities for growth, innovation, and sustainability. As agricultural technology continues to evolve, the farm will remain committed to exploring and incorporating new advancements, including more advanced sensors, data analytics, and autonomous machinery. This ongoing engagement with technology will ensure continued improvements in efficiency, sustainability, and profitability.

By collecting and analyzing data from each planting season, the farm will continuously refine its approach to soil health, crop performance, and resource management. This ongoing data cycle will enable better decision-making, ensuring that inputs like water, seed, and fertilizer are optimized for maximum yield while minimizing waste. Over time, the farm will build even more precise prescription maps that enhance soil health and productivity.

The project will also foster ongoing education and skills development. We will continue to learn through online courses, workshops, and hands-on experience with the technology, ensuring all personnel, including the agronomist, are equipped with the knowledge to operate and maintain the equipment effectively. Furthermore, partnerships with local experts will promote knowledge exchange, encouraging the continued adoption of best practices in precision agriculture.

From a financial perspective, the project will deliver sustained growth by reducing input costs, improving yields, and optimizing resource use. As the farm becomes more efficient, it will have the capacity to expand operations, generating more income and creating additional opportunities for investment in local businesses and services. This long-term profitability will not only benefit the farm but will also support job creation and economic growth in the surrounding community.

Lastly, the project will have a lasting positive environmental impact. By using fertilizers and water more efficiently, the farm will reduce its ecological footprint, preserving soil health, preventing runoff, and protecting local water sources. These sustainable practices will set an example for other farmers, potentially encouraging broader adoption of similar technologies, and fostering a culture of environmental stewardship throughout rural Nebraska.

3. Water Conservation Focus: If applicable, please explain in what ways does your project prioritize water conservation? Explain the innovative strategies, technologies, or practices you plan to implement to promote sustainable water management and mitigate water usage.

This precision agriculture project is designed to prioritize water conservation through a variety of innovative strategies and technologies that will ensure water is used efficiently and sustainably. The project focuses on optimizing fertilizer application and seed placement, which not only maximizes yield but also promotes judicious water usage.

One of the key technologies in farming that support water conservation is the variable-rate planter, which adjusts seed placement and fertilizer application based on soil conditions, including soil type and water-holding capacity. By tailoring these applications to the unique needs of each field, the field is planted to ensure the population reflects the soils ability to retain water or lack thereof, preventing overuse in areas that may already retain sufficient moisture.

Additionally, the integration of hydraulic downforce technology helps manage soil compaction, which is critical for improving water infiltration and reducing surface runoff. The ability to adjust downforce allows the planter to maintain proper seed depth and optimal soil contact, which enhances the efficiency of water absorption and reduces the risk of erosion or water wastage.

By optimizing fertilizer placement through variable-rate technology, the project also reduces the risk of nutrient runoff into water systems, which can be exacerbated by excessive water or poorly managed applications. This precision approach ensures that water and nutrients are applied exactly where crops need them, maximizing plant health and minimizing waste. The project aligns with the broader goal of sustainability by directly contributing to more efficient water usage in agricultural practices.

Section VI: Financial Projections *(Applies to all applicants)*

1. Provide comprehensive financial projections for the project. This should include both short-term (1-3 years) and long-term (4+ years) forecasts, detailing anticipated costs, revenues, and key financial health indicators such as net cash flow and profitability ratios. The projections should demonstrate a realistic estimate of income and expenses and the overall financial impact of the project.

Farming is inherently a dynamic industry, with input costs and commodity prices subject to frequent and unpredictable fluctuations. Therefore, projecting precise financial figures for the proposed precision agriculture project is challenging, as both costs and revenues can change daily. Inputs such as fuel, parts, chemicals, seed, and fertilizer all vary in price, and similarly, the price of corn and soybeans can fluctuate substantially on a daily basis. Despite this, we can provide a general outlook based on the projected improvements in efficiency and profitability that will result from the integration of precision agriculture technologies.

Short-Term Projections (1-3 Years):

In the short term, the project will focus on the implementation of the new technologies, including the acquisition of the variable-rate planter, integration with the dry spreader's nutrient application plans, and the use of SMS Advanced for data-driven decision-making. The anticipated cost reductions will primarily come from better management of inputs, such as seed and fertilizer, thanks to the ability to adjust application rates based on precise soil conditions and yield data. While the price of seed and fertilizer may fluctuate, this technology allows for more accurate application, meaning that input costs will be optimized, reducing waste and over-application.

We expect that, in the first 1-3 years, while input costs may remain volatile, the farm will experience a reduction in the amount of fertilizer and seed used in less productive areas, while being able to apply more in areas with better soil health. Based on online research, the potential for increased profitability through variable-rate technology is significant, with estimates suggesting that farmers using VRT may net between $63 to $100 more per acre compared to traditional methods. The overall cost reduction, combined with these gains, will improve net profitability for the farm.

Long-Term Projections (4+ Years):

In the long term, the farm is expected to see more stable financial benefits from the precision agriculture technologies. Over the course of 4+ years, the efficiencies gained through precise input application and better utilization of resources will become more apparent. As the farm continues to collect data, refine its prescriptions, and gain a deeper understanding of soil types and moisture retention, we expect to further optimize inputs and maximize yields. While commodity prices remain unpredictable, the improved efficiency from technology adoption will help buffer the farm against market volatility.

Additionally, the integration of technologies like hydraulic downforce for soil compaction management and better fertilizer application will help increase yields per acre. These technologies will allow the farm to apply the right amount of nutrients at the optimal conditions, reducing waste and improving crop productivity, which will directly translate to improved financial returns.

Key Financial Health Indicators:

While the precise numbers will vary, the farm expects to see an increase in profit margins over time due to reduced waste and more efficient resource use. The cost-benefit of precision agriculture is that, although the initial investment in technology may be significant, it has the potential to deliver long-term savings and increased revenue through more effective use of inputs. According to research, the implementation of variable-rate technology can result in up to $100 more profit per acre, a significant return on investment over the course of several years. This improved profitability will be crucial for sustaining the farm's operations and contributing to local economic growth.

Conclusion:

Although it is difficult to predict exact financial figures due to the ever-changing nature of farming, the adoption of precision agriculture technologies is expected to provide measurable improvements in both cost management and profitability. By optimizing inputs and utilizing data-driven decisions, the farm stands to gain long-term financial benefits. The projected increases in profit, especially through better placement of seed and fertilizer, will not only enhance the farm's bottom line but will also support the sustainability of the operation in an increasingly unpredictable agricultural landscape.

Section VII: Cost Benefit Analysis *(Applies to all applicants)*

1. Provide a detailed cost-benefit analysis for the project. This analysis should quantify the expected return on investment (ROI), outlining the financial impact of the project in both the short-term (1-3 years) and long-term (4+ years). The analysis should clearly demonstrate the financial returns of the investment.

We currently do not have auto seed or fertilizer shutoffs or the ability to variable rate anything to change the rates or pumps automatically. The sprockets on our planter and gears on the fertilizer pumps are manually set for a target rate, and rate checks show that we are close, yet we use more than anticipated. When the shutoff is based on the ground drive and the operator lifting and lowering the planter for operation, it leaves significant room for error. We estimate an extra 2% over our target on seed and fertilizer. Based on target rates of 22,500 seeds per acre for corn at $250/unit and 155,000 seeds per acre on beans at $65/unit, the estimated seed costs per acre are $70.31 for corn and $71.96 for beans. Fertilizer costs for corn include 400 pounds per acre of 32-0-0 at $400/ton, 132.2 pounds per acre of 10-34-0 at $600/ton, 18 pounds per acre of 12-0-0-26 at $300/ton, and 0.25 gallons per acre of zinc at $11/gallon, totaling $125.11 per acre. Since we do not fertilize beans, the cost for beans would only include seed.

Over 1,500 acres, we estimate planting 750 acres of beans and 750 acres of corn each year. With our current setup, the 2% overplanting and fertilizer errors result in inefficiencies. By implementing auto seed and fertilizer shutoffs and variable rate technology, we can reduce overplanting and fertilizer waste, leading to an estimated 2% reduction in inputs and a conservative estimate of 3% overall yield boost. Variable rate technology will also allow us to adjust seed and fertilizer rates based on soil type and productivity, optimizing inputs in lower productivity areas and pushing rates in higher productivity zones.

These adjustments not only reduce input waste but also increase yields in high-performing areas, resulting in better overall efficiency and profitability for the operation. With the estimated savings and yield improvements, this technology will provide both short-term financial benefits and long-term sustainability for the farm.

Short-Term ROI (1-3 years):

Over 750 acres of corn and 750 acres of beans, the estimated seed and fertilizer cost savings due to a 2% reduction in overplanting and fertilizer errors equate to approximately $3,750 in seed savings for corn, $1,125 in seed savings for beans, and $1,875 in fertilizer savings for corn annually. This totals $6,750 in annual input cost reductions. Coupled with a 3% yield increase, and assuming an average corn yield of 145 bushels per acre at $4.50/bushel and soybean yield of 45 bushels per acre at $9.50/bushel, the additional revenue would be approximately $14,663 for corn and $9,609 for beans annually. This results in a total short-term benefit of $31,022 annually.

Long-Term ROI (4+ years):

In the long term, the benefits compound as the technology continues to optimize inputs and increase yields. Over a 5-year period, total input cost savings would amount to $33,750, while increased revenue from yield improvements would amount to $155,110, resulting in a cumulative benefit of $188,860. The technology's ability to adapt to evolving farming practices and input prices ensures sustained profitability and environmental benefits over time. The reduced carbon footprint, improved soil health, and better water resource management further enhance the long-term value of the project.

While this analysis conservatively captures potential ROI based on inputs and outputs, it does not account for unquantified benefits such as improved soil health, reduced carbon footprint, and enhanced water resource protection. These invaluable environmental and sustainability gains add to the overall impact of the project, ensuring its contribution to the future of agriculture.

Section VIII: Monitoring and Evaluation *(Applies to all applicants)*

1. Clearly list the major milestones that will be used to track the progress of your project. This should include a timeline for deployment of connectivity OR devices and technology. Each milestone should include an expected completion date. Examples: (1) Installation of connectivity infrastructure by [insert date]. (2) Deployment of smart sensors by [insert date]. (3) Full project implementation by [insert date].

The project will be tracked through key milestones to ensure successful implementation. By August 1, 2025, a John Deere or Kinze 16/31 split-row planter will be selected, purchased, and delivered. Following this, the planter will be retrofitted with additional liquid fertilizer capacity and equipped with variable-rate technology by November 1, 2025. All systems, including GPS, monitors, and modems, will be integrated and tested to ensure seamless operation. By March 1, 2025, field-specific prescriptions will be developed using soil and yield data. Pre-planting field tests will confirm full functionality by March 31, 2026, with the project fully implemented and operational for the 2026 planting season. Initial performance evaluations will be completed by December 31, 2026, assessing input reductions and yield improvements.

As markets and inputs can vary not only in price but availability, parts and equipment are also subject to these fluctuations. These dates try to provide a reasonable timeline while allowing flexibility to accommodate potential delays in obtaining necessary components.

2. Identify the specific Key Performance Indicators (KPIs) that will be used to measure the success of the project following implementation. Each KPI should be measurable and aligned with the project's objectives. Examples: (1) [X]% increase in crop yield by [insert date]. (2) [X]% reduction in water usage within [insert time frame]. (3) [X] number of devices connected to the system by [insert date]. (4) [X]% improvement in farm operational efficiency by [insert date].

The success of the project will be measured by several specific and measurable Key Performance Indicators (KPIs). First, a 3% increase in crop yields is anticipated within the first year of implementation, with the goal of maintaining or exceeding this level for at least five years. While external factors such as hail, wind, or drought may impact results, consistent monitoring through annual yield data collection will ensure progress toward this objective. Improved soil health will also be a key focus, with periodic soil tests conducted to evaluate nutrient balance and organic matter levels, aiming for steady enhancements over time.

System integration will be a critical milestone, with all precision agriculture devices, including the variable-rate planter and dry spreader, fully operational and connected by the grant's completion date. Operational efficiency will be another measurable outcome, targeting a 2% reduction in input waste, such as seed and fertilizer, within the first year and striving for further optimization thereafter. Annual maintenance and updates will play a significant role in sustaining these outcomes, with all equipment and software inspected, maintained, and updated regularly to ensure continued functionality and performance.

By focusing on these KPIs, the project is designed to deliver tangible improvements in yield, efficiency, and sustainable farm management, ensuring long-term success and alignment with the project's objectives.

3. Please explain the plan for monitoring and evaluating the success of the precision agriculture project. Include a detailed explanation of how Key Performance Indicators (KPIs) included in Section VII, field 2 above will be tracked and monitored throughout the project. Include specific metrics, tools, and timelines that will be used to track progress and measure outcomes.

The success of the precision agriculture project will be monitored and evaluated using a combination of data collection, performance analysis, and ongoing review of Key Performance Indicators (KPIs). Yield data will be tracked during harvest through the farm's existing monitoring system, providing precise measurements of crop production by field and zone. This information will be compared year-over-year to determine if the overall target of a 3% yield increase is achieved and maintained. End-of-year summaries will also include an analysis of average bushels per acre per field to track overall improvements in productivity. Input usage and efficiency will be evaluated by analyzing seed and fertilizer usage across different soil types and productivity zones.

Data from yield monitors, soil sampling, and planting operations will be compiled and analyzed using SMS Advanced software, which will generate reports and maps to visualize progress and guide adjustments to prescriptions and practices. Key metrics such as yield data, input usage, and soil health will be reviewed after each harvest season starting in 2026. This structured approach ensures the project's goals for increased productivity, efficiency, and sustainability are thoroughly monitored and achieved.

Attach/Include (see Program Guide for details):

***ALL* Applicants Must Include:**

- ☒ Attachment A. Project Budget/Documentation
- ☒ Attachment B. Eligible Entity Documentation
- ☒ Attachment C. Cybersecurity
- ☐ Attachment D. DJI Attestation
- ☒ Attachment E. Match Documentation
- ☐ Attachment F. Other Supporting documentation (if applicable)

Connectivity Subprogram Applicants Must Also Include:

- ☐ Attachment G. Legal
- ☐ Attachment H. Technical
- ☐ Attachment I. Financial Statements
- ☐ Attachment J. Rate Comparability
- ☐ Attachment K. Shapefiles
- ☐ Attachment L. Project Diagram
- ☐ Attachment M. List of Key Operational Locations

APPLICANT CERTIFICATION:

I, the undersigned Emily Haxby [Legal Name] representing Emily Haxby [Farm/Business Name], hereby certify the eligibility of our entity/project for the Precision Agriculture Grant (PRO-AG). By signing this statement, I confirm the legal name, contact details, size, and location of the farm site(s), along with our eligibility type as a Agricultural Producer [Provider/Agricultural Cooperative/Agronomist/Agricultural Producer]. Attached are supporting documents validating our eligibility, and I declare adherence to all requirements outlined in Precision Agriculture Connectivity Infrastructure Grant Act (Neb. Rev. Stat. § 86-1401 et seq.) & Commission Order C-5600. I certify that all information we have submitted on this application and its supporting documents is true and correct. I certify that we are not currently using, nor will we use, prohibited communications equipment and services developed by organizations on the Federal Communications Commission's Covered List pursuant to 47 U.S.C. § 1601. I understand that the submission of any false information or failure to comply with Commission requirements may result in penalties towards me and/or my organization.

Your signature confirms the accuracy and authenticity of the provided information. It will be considered binding for all purposes related to this application and any subsequent agreements or certifications.

Emily Haxby — 1/17/25

Printed Name of Authorized Person — Date

Owner

Title of Authorized Person

Emily M Haxby

Signature of Authorized Person

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