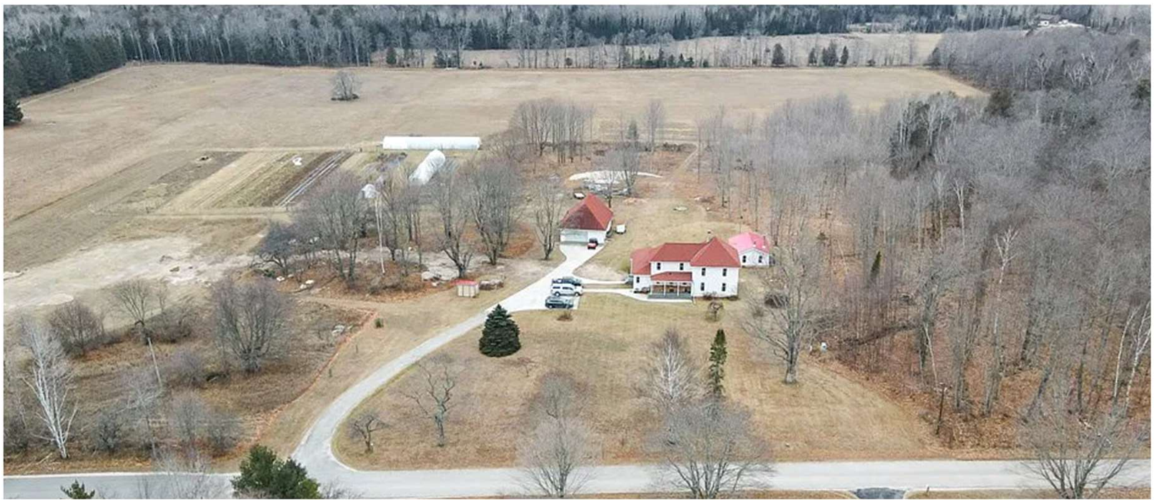
Evaluation of Carbon Neutral Strategies in Farm Facilities and Land Use at Gathering Ground Inc. 501(c)(3) Through Regenerative, Organic, and Biodynamic Frameworks



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“They say that the best time to plant a fruit tree is thirty years ago. Well, the second best time is now.”

Russell Rolffs, Farm Manager

Dedicated to our friends Russell, the Farmer Philosopher, and Alessandra,
the Transplanted L.A. Poet – May God Grant You Many Years!

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I. EXECUTIVE SUMMARY

This capstone project evaluates carbon-neutral strategies in farm facilities and land use at Gathering Ground (GG) on Washington Island, Wisconsin, through the lens of regenerative, organic, and biodynamic agricultural frameworks. The research integrates site analysis, a community survey, and interviews with members of the GG Board of Directors to assess current practices and identify opportunities for improvement.

Washington Island presents a distinct agricultural environment shaped by limestone geology, shallow and variable soils, and geographic isolation. These conditions create both constraints and opportunities. Limited soil depth and nutrient variability challenge conventional agriculture, while low development pressure and a strong community identity support a localized, sustainable food system. As a result, the island serves as a place-based model in which ecological stewardship, resource efficiency, and community engagement are closely interconnected.

Within this context, Gathering Ground plays a critical role as both a working farm and an educational organization. Its dual-site structure integrates perennial systems, such as orchards and vineyards, with annual production and community programming. This model positions GG as a hub for experimentation, demonstration, and knowledge sharing, strengthening the island's food system while advancing long-term sustainability goals.

Findings from the Washington Island Community Agriculture and Sustainability Survey demonstrate broad support for sustainable, biodiverse agricultural practices and active engagement in local food systems. Nevertheless, significant obstacles, specifically, limited access to local products and higher costs, indicate that expanding infrastructure

and production capacity is required to meet prevailing demand. These findings suggest that existing challenges are structural rather than motivational.

Evaluation of GG's agricultural practices indicates substantial adherence to regenerative and organic principles, particularly in the areas of soil health, biodiversity, and comprehensive land management. Assessment of the built environment at the Aznoe Farm reveals identifiable opportunities to reduce carbon emissions through the implementation of renewable energy, increased thermal efficiency, and adoption of low-input operational protocols.

Interviews with the GG Board of Directors illustrate consistent alignment with sustainability-oriented values and long-range ecological objectives, while also delineating fiscal constraints that inform short-term priorities. Board members emphasized that eliminating the Aznoe Farm mortgage constitutes a prerequisite to pursuing more capital-intensive carbon mitigation strategies.

Based on these findings, this report offers prioritized recommendations that align immediate feasibility with longer-term impact. Specifically, recommendations are categorized as follows: (1) low-cost, high-impact measures such as advancements in energy efficiency and resource management; (2) moderate system enhancements to foster local production capacity and infrastructure; and (3) plans for long-term investments in renewable energy and integrated farm design to mitigate carbon emissions. Collectively, these approaches enable Gathering Ground to enhance its position as a case study in regenerative agriculture, community engagement, and climate-conscious land stewardship.

II. INTRODUCTION

Washington Island's geology, defined by the Niagara Escarpment and Silurian-age dolomite, forms a foundation for understanding the unique agricultural challenges and opportunities central to this project's evaluation of carbon-neutral strategies. The distinctive stone features and karst topography directly affect land use and resource management at Gathering Ground.

Glacial history and proglacial lake formation have resulted in thin, rocky soils and diverse terrain, shaping current agricultural practices. Recognizing these geologic influences clarifies why place-based strategies are vital to Gathering Ground's sustainable approaches.

WASHINGTON ISLAND, WISCONSIN

Washington Island's human history begins long before European settlement, with Indigenous peoples, particularly the Potawatomi, who used the island seasonally for fishing, farming, and hunting. They cultivated crops such as corn, beans, and squash. They referred to the island as Wassekiganeso, meaning "his breast is shining," a name inspired by sunlight reflecting off the limestone shoreline. The island remained part of a broader Indigenous network across the Great Lakes until the early 19th century, when increased U.S. presence following the War of 1812 brought exploration, mapping, and eventual renaming of the island in honor of George Washington (Washington Island, n.d.; North American Places, n.d.).

Permanent European settlement began in the 1830s, initially driven by fishing and access to natural resources. Early settlers included Irish and German immigrants, followed by a significant influx of Scandinavian settlers, especially Icelanders, later in the 19th century. By the late 1800s, Washington Island had developed into a close-knit rural community centered around fishing, farming, and maritime activity. Today, the island is recognized as one of the oldest and largest Icelandic communities in the United States, with cultural traditions, architecture, and local identity still strongly reflecting this heritage (Washington Island, n.d.; Washington Island Observer, n.d.).

The island's agricultural history and land-use patterns have been shaped by its relative geographic isolation, limestone bedrock, shallow karst soils in the north, and deep-sand soil farms in the center and southern parts of the island. These environmental characteristics present both constraints and opportunities for sustainable agriculture, land stewardship, and infrastructure development. As a result, Washington Island has become a compelling setting for exploring innovative approaches to agriculture, conservation, and community resilience that are closely tied to place-based ecological conditions.

Early agricultural activity centered on subsistence practices, with farmers raising livestock, maintaining gardens, and producing staple crops suited to the island's conditions. Over time, farming evolved into a mix of pasture-based operations and specialty production, supported by the island's open landscapes and relatively low development pressure. The Washington Island Farm Museum preserves this legacy, showcasing historic barns, heirloom equipment, and traditional farming methods that reflect the island's rural heritage and self-sufficient agricultural roots.

Historically, the island supported a broader range of crops, including cherries, apples, potatoes, wheat, and dairy. Today, agriculture on the island is less robust in scale but continues to play an important role in land use and local identity. Much of the existing farmland consists of open fields and former pastureland, with many older pasture farms now transitioned to hay production due to changing labor availability and market demands. These hay fields help maintain the island's characteristic open scenery while supporting livestock both locally and on the mainland. At the same time, conservation efforts shape how land is used and preserved; the Door County Land Trust protects more than 721 acres on Washington Island, focusing primarily on forests and wetlands to maintain ecological diversity. In addition, small farms and homesteads contribute to a localized food system through niche crops and seasonal production.

While there is no single, definitive figure for the total amount of farmland on Washington Island, agriculture remains a visible and meaningful part of its roughly 15,000 acres. Several key operations illustrate this presence, including Fragrant Isle Lavender Farm, which spans about 21 acres and is one of the largest lavender farms in the region, Folk Tree Farm, which supplies local markets, Sweet Mountain Farm, Birchwood Farm, and Island Orchard Cider, each contributing to the island's diverse and evolving agricultural landscape. In addition, several small market gardeners and a full-time artisan bakery participate in a seasonal weekly farmers market, helping strengthen the island's local food economy. While tourism now dominates the economy, these smaller-scale producers continue to reinforce agriculture as a key element of the island's rural character and working landscape.

Within this context, Gathering Ground plays a central role in advancing sustainable agriculture and environmental education on Washington Island. 501(C)(3) Tax Exempt Organization operates two, distinct, 40-acre working farms. The original site on Lakeview Road was obtained in 2016 and includes a working vineyard, a chestnut research orchard, a mixed fruit orchard, a community garden, and a lowland, marsh woodlot. The second 40-acre site was purchased in 2025. A more traditional island farm, the Aznoe Road site greatly expanded the organization's agricultural scope and consists of a 20-acre (unimproved) pasture, a fenced market garden, 8 acres of woodlands, greenhouses, an outdoor kitchen, and a barn/garage. The gem of the farm is the farmhouse, which features five bedrooms, four bathrooms, a professional kitchen, and a solarium for starting early-spring seedlings. The Aznoe farmhouse houses the Gathering Ground office and is used for Board/Committee meetings and numerous community outreach and fundraising events. Collectively, these properties offer valuable opportunities to evaluate land-use strategies across annual and perennial systems, assess long-term ecological outcomes, and examine the role of agroforestry and perennial crops, such as chestnuts and grapevines, in improving soil health and sequestering carbon. Gathering Ground's educational programming, including the Ground School internship, workshops, school partnerships, and a weekly farmers' market, further reinforces its mission to foster resilient communities grounded in sustainable food systems and ecological stewardship.

The agricultural practices implemented and explored at Gathering Ground align with broader frameworks of organic, sustainable, and regenerative agriculture. Organic agriculture provides a foundational approach by prohibiting synthetic inputs and prioritizing soil health, biodiversity, and ecological balance. Building upon this foundation, regenerative agriculture emphasizes practices that actively restore ecosystem function, rebuild soil organic matter, enhance biodiversity, and increase the land's capacity to sequester carbon. Biodynamic agriculture further extends regenerative principles by conceptualizing the farm as a self-regulating living system, integrating crop production, soil management, and ecological processes into closed-loop systems that support long-term resilience. These approaches are particularly relevant in island ecosystems, where soil conservation, nutrient cycling, and long-term land productivity are critical concerns.

In parallel with sustainable land management, the pursuit of carbon-neutral farm facilities and agricultural buildings has emerged as an important dimension of environmental sustainability. Carbon-neutral facilities seek to minimize operational greenhouse gas emissions through energy efficiency, renewable energy integration, and low-impact building design, while balancing remaining emissions through sequestration or offset mechanisms. When combined with regenerative land-use practices, particularly perennial cropping systems that store carbon below and above ground, carbon-neutral infrastructure can play a meaningful role in reducing the overall environmental footprint of agricultural operations.

This capstone project assesses current infrastructural, operational, and land-use practices to determine their alignment with advanced ecological frameworks. It identifies pathways for enhanced sustainability performance. By examining both the built infrastructure and diverse land-use systems across multiple properties, this research aims to assess current sustainability performance and develop evidence-based, actionable recommendations. The findings are intended to support long-term ecological stewardship, enhance carbon-neutrality efforts, and inform decision-makers and stakeholders of Gathering Ground options to enhance their unique environmental standing on Washington Island.

III. WASHINGTON ISLAND FOOD STATUS

While the ecological and historical context of Washington Island shapes its agricultural potential, community perspectives ultimately influence how these systems evolve in practice. To capture this dimension, the following section presents findings from the Washington Island Community Agriculture and Sustainability Survey, highlighting local priorities, behaviors, and perceived barriers related to sustainable food systems.

The Washington Island Community Agriculture and Sustainability Survey gathered responses from residents, seasonal community members, and visitors better to understand attitudes toward local food systems and environmental practices. Overall, the results indicate strong support for sustainable agriculture, with a majority of respondents identifying environmentally responsible farming practices as very important. This aligns with broader research demonstrating that public support for sustainable agriculture has increased significantly in recent decades, particularly in rural and environmentally sensitive regions where land-use decisions have visible ecological impacts (Gliessman, 2015; Food and Agriculture Organization [FAO], 2018).

In addition to strong stated values, respondents reported actively participating in local food systems. Most indicated that they intentionally purchase locally grown food often or whenever it is available, suggesting that community behavior aligns with expressed support for sustainability. However, responses also reflect a degree of pragmatism, with many individuals adopting a “glocal” approach, prioritizing local food when possible while continuing to rely on non-local products that cannot be produced on the island. This pattern is consistent with findings from local food system research, which suggests that consumers balance environmental values with practical considerations such as availability, price, and product diversity (Low et al., 2015).

Support for specific agricultural practices was also consistently high. A majority of respondents indicated that organic or organic-style farming methods are important, and an even larger share identified biodiverse farming practices as beneficial to the island's environmental health. Similarly, there was strong support for carbon sequestration practices, such as cover cropping and reduced tillage, indicating that respondents are receptive to climate-aligned agricultural strategies. These findings reflect a growing body of research highlighting the role of regenerative and biodiverse farming systems in improving soil health, enhancing ecosystem resilience, and mitigating climate change through carbon storage (Lal, 2020; FAO, 2018).

When asked about the benefits of sustainable agriculture, respondents prioritized environmental outcomes, particularly water protection, soil health, and support for pollinators and wildlife habitat. At the same time, community and economic benefits—such as increased availability of local food and support for the island economy—were also identified as important. This integrated perspective aligns with agroecological frameworks, which emphasize that sustainable agriculture must simultaneously address ecological integrity, economic viability, and social well-being (Gliessman, 2015).

Despite this strong support, respondents identified several barriers that limit participation in local food systems. The most significant challenges were the limited availability of locally grown food and the cost of local products. These findings indicate that the primary constraint is not lack of interest, but rather structural limitations within the current food system. This is consistent with national and global research showing that supply constraints, distribution challenges, and price differentials are among the most significant barriers to expanding local food system participation (Low et al., 2015; FAO, 2018).

Responses also highlight an existing culture of local food consumption on Washington Island. Many respondents reported consuming island-produced goods, such as eggs, fish, honey, and garden vegetables, when available, demonstrating a strong connection between residents and local food sources. However, some participants expressed limited awareness of the full range of foods available on the island, suggesting an opportunity to improve communication and visibility of local producers. Research on local food networks supports this finding, emphasizing that access to information and transparency are critical to strengthening participation and trust within localized food systems (Low et al., 2015).

Demographic responses indicate that the majority of participants are year-round residents or individuals who spend significant time on the island, providing a strong local perspective. Additionally, many respondents reported owning land or engaging in small-scale food production, such as gardening, which further reinforces the community's connection to agriculture and land stewardship. This level of engagement reflects patterns observed in rural and semi-isolated communities, where household-level food production contributes to both food security and community resilience (FAO, 2018).

Open-ended responses provided additional insight into community perspectives. Common themes included a desire for greater variety and availability of local foods, interest in improved access to information about local producers, and concerns related to pricing and crop protection. At the same time, several respondents expressed strong appreciation for existing efforts to expand local food production, indicating a supportive, engaged community. These responses reinforce the importance of aligning production capacity, communication strategies, and ecological practices to sustain the continued development of a resilient, locally embedded food system.

Overall, the survey results show strong community support for sustainable agriculture and local food systems on Washington Island. At the same time, they point to practical challenges, especially limited availability and cost, that constrain greater participation. These findings suggest that the next step is not building interest, but strengthening the systems and infrastructure needed to meet that demand.

See Appendix C - Washington Island Community Agriculture and Sustainability Survey and Results.

IV. ORGANIC / BIODIVERSE FARMING PRACTICES

Organic and biodiverse farming systems are most effective when understood as integrated, whole-farm approaches in which crops, livestock, and appropriate technologies function together to produce ecological and economic benefits. Rather than relying on external inputs or isolated practices, these systems combine methods such as silvopasture, rotational grazing, cover cropping, diversified crop rotations, living fences, agroforestry, composting, mobile poultry systems (e.g., chicken tractors and egg mobiles), and renewable energy technologies (e.g., solar-powered fencing and wind-powered water systems). When implemented collectively, and in coordination with livestock, these practices generate three interrelated outcomes: improved soil health and long-term productivity, enhanced biodiversity and ecosystem resilience, and reduced external inputs through increased self-sufficiency.

Soil health and long-term productivity form the foundation of these integrated systems. Practices such as cover cropping, composting, and diversified crop rotations build soil organic matter, improve structure, and enhance microbial activity. Livestock play a critical role in accelerating these processes. Through managed grazing, animals distribute manure and urine across pastures, contributing essential nutrients while stimulating plant regrowth and root development. Mobile poultry systems further enhance soil fertility by incorporating manure directly into the soil while reducing pest and weed pressures. In market garden contexts, composted manure becomes a key fertility input, reducing reliance on synthetic fertilizers and supporting consistent crop yields over time. Together, these plant–animal interactions create biologically active soils that are more productive, water-efficient, and resilient (Gliessman, 2015; Lal, 2020).

Biodiversity and ecosystem resilience are also significantly strengthened through the integration of diverse practices and livestock. Agroforestry systems such as silvopasture and alley cropping introduce vertical and horizontal diversity, creating habitats for pollinators and beneficial organisms while moderating microclimates. Living fences and hedgerows further expand habitat connectivity and serve as windbreaks. Livestock contribute to this diversity by influencing vegetation patterns and nutrient distribution, thereby helping maintain dynamic, heterogeneous landscapes. These complex systems are better able to resist pests, diseases, and environmental stressors, reducing the need for chemical interventions. Research consistently shows that diversified agroecosystems are more stable and resilient than simplified monocultures, particularly under changing climatic conditions (Kremen & Miles, 2012).

Finally, integrated organic systems reduce external inputs while increasing farm self-sufficiency. By leveraging ecological processes—such as nutrient cycling through livestock, nitrogen fixation from cover crops, and on-farm compost production—farms can significantly decrease dependence on purchased fertilizers, pesticides, and feed. Livestock further contribute by converting pasture, crop residues, and surplus produce into valuable outputs such as meat and eggs, effectively closing nutrient loops within the system. Renewable technologies, including solar-powered electric fencing and wind-powered water systems, enhance operational efficiency while reducing reliance on fossil fuels. These combined strategies lower production costs, reduce environmental impacts, and increase the farm's adaptability to economic and environmental change (Altieri, 1995; Pretty, 2008).

Taken together, integrating organic farming practices and livestock management creates a regenerative system in which each component reinforces the others. Soil is enriched through biological processes, biodiversity is enhanced through structural and functional diversity, and external dependencies are minimized through closed-loop resource flows. For farms such as Gathering Ground, this integrated approach provides a comprehensive framework for achieving environmental sustainability, economic viability, and long-term land stewardship.

V. CARBON NEUTRAL BUILT ENVIRONMENT

In addition to ecological farming practices, recent advancements in small-scale, renewable, and energy-efficient technologies provide significant opportunities to reduce the carbon footprint of diversified farms. These technologies are particularly important for operations like Gathering Ground, where residential, agricultural, and community functions intersect. By strategically integrating renewable energy systems and improving energy efficiency, farms can reduce reliance on fossil fuels, lower operating costs, and better align with regenerative and climate-conscious objectives.

A primary area of opportunity lies in on-site renewable energy generation, particularly through solar and wind systems. Solar photovoltaic (PV) panels can be installed on barns, outbuildings, or residential structures such as the Aznoe House to generate electricity for daily operations, including lighting, refrigeration, and equipment use. Solar energy can also support agricultural infrastructure, such as powering electric fencing systems for rotational grazing or running water pumps for livestock. Small-scale windmills, while more site-dependent, offer an additional renewable energy source for water pumping or supplemental electricity generation. Together, these systems reduce dependence on grid electricity derived from fossil fuels and increase farm energy independence (Pretty, 2008).

Beyond electricity generation, thermal energy systems represent a critical but often overlooked component of farm emissions. The Aznoe House currently relies on a propane boiler system for heat and hot water, as well as propane-fueled cooking stoves/ovens, which contribute to ongoing greenhouse gas emissions. While propane is sometimes considered a cleaner-burning fossil fuel, it remains carbon-intensive relative to renewable alternatives. One immediate improvement would be to integrate a solar water heating system to supplement or partially replace propane-based hot water production. Solar thermal systems are highly efficient and can significantly reduce fuel consumption, particularly during warmer months. Additionally, improving insulation and exploring high-efficiency electric heat pump systems could further reduce reliance on propane over time.

Energy use associated with daily household and farm operations also presents opportunities for reduction. The presence of an electric washer and dryer, combined with the absence of a clothesline, suggests avoidable electricity consumption. Incorporating a simple, low-cost clothesline system would reduce energy demand while aligning with low-input, sustainable living practices. Similarly, transitioning to energy-efficient appliances and optimizing usage patterns can yield incremental yet meaningful reductions in overall energy consumption.

Importantly, these technological inputs are most effective when paired with the broader ecological systems already in place on diversified farms. For example, solar-powered infrastructure can directly support rotational grazing systems, while renewable water pumping technologies enhance pasture management and livestock distribution. When integrated holistically, these technologies complement biodiverse farming practices by reducing external energy inputs and reinforcing the farm's overall sustainability.

For Gathering Ground, adopting a combination of renewable energy generation, improved thermal systems, and energy-efficient household practices represents a practical pathway to reducing its carbon footprint. While some technologies require upfront investment, many offer long-term cost savings and can be implemented incrementally. In this way, technological innovation becomes not a replacement for ecological farming, but a critical partner in advancing a resilient, low-carbon agricultural system.

VI. GATHERING GROUND LEDERSHIP

Gathering Ground (GG) was founded in 2016 by Russell and Alessandra Rolffs, along with a group of community members who shared a vision for sustainable agriculture and environmental stewardship on Washington Island. Established as a 501 (c) (3) nonprofit organization, GG emerged in response to the island's unique ecological conditions and the need to strengthen local food systems through education and regenerative land use. From the outset, the founders envisioned a working farm that would not only produce food but also serve as a demonstration site for regenerative practices and a gathering place for the community. Early efforts focused on restoring and stewarding the Lakeview property, establishing perennial systems such as chestnuts and grapes, and developing programming that connected people to the land through workshops, internships, and hands-on learning. This foundation positioned GG as both a productive agricultural enterprise and an educational resource grounded in place-based sustainability.

This founding vision continues to shape GG's leadership and strategic direction. The organization has intentionally developed as a hybrid model that integrates agricultural production with education, community engagement, and ecological stewardship. Programs such as the Ground School internship, public workshops, and partnerships with local organizations reinforce GG's role as a learning hub within the Washington Island food system. As the organization has expanded to include the Aznoe Farm, this integrated approach has scaled to encompass greater production capacity, infrastructure, and demonstration opportunities. Together, these efforts reflect a leadership philosophy centered on long-term resilience, knowledge sharing, and the practical application of regenerative agriculture within a community context.

The current Board of Directors reflects a diverse range of professional backgrounds and expertise, strengthening the organization's governance and strategic capacity. Members bring experience from fields including education, ecology, law, public policy, conservation, journalism, and nonprofit leadership. This interdisciplinary composition aligns with nonprofit governance research, which finds that board diversity enhances decision-making quality, strategic adaptability, and organizational performance (Brown, 2005; Hillman & Dalziel, 2003). By combining local knowledge of Washington Island with broader professional expertise, the board is well-positioned to address both place-based challenges and long-term strategic opportunities.

From a governance theory perspective, GG's leadership structure reflects elements of both resource dependence theory and stewardship theory. Resource dependence theory suggests that nonprofit boards play a critical role in securing external resources, including funding, partnerships, and legitimacy (Hillman & Dalziel, 2003). This is evident in GG's recent growth, including the expansion associated with the Aznoe Farm acquisition and the success of the $1.1 million Planting for the Future campaign, with approximately $900,000 already donated or pledged. The board's composition and networks contribute directly to these outcomes, reinforcing its role in ensuring financial sustainability and organizational capacity.

At the same time, stewardship theory emphasizes mission-driven leadership, trust, and alignment between board members and organizational goals (Davis, Schoorman, & Donaldson, 1997). This dynamic is reflected in both the board's strategic priorities and findings from board interviews. Members consistently expressed a shared commitment to sustainable, biodiverse agriculture and to integrating ecological principles into decision-making. Communication through regular meetings and email was identified as a key strength in maintaining alignment, accountability, and effective governance. Additionally, board members emphasized a long-term orientation, prioritizing repayment of the Aznoe Farm mortgage before pursuing more capital-intensive carbon-neutral strategies. This reflects a stewardship-based approach in which financial discipline is viewed as essential to preserving mission integrity and enabling future impact.

From a financial perspective, Gathering Ground is currently experiencing significant growth and investment. The organization’s budget increased substantially from 2024 to 2025, largely due to the acquisition of the Aznoe Farm property. This expansion represents a major step forward in production capacity, infrastructure, and programming potential, but it also introduces new financial responsibilities, particularly mortgage obligations. To support this growth, GG launched the $1.1 million “Planting for the Future” campaign, of which approximately $900,000 has already been donated or pledged. While the organization’s primary source of funding remains philanthropic contributions, additional revenue streams are emerging, including market-garden and chestnut-tree sales, as well as anticipated wine sales beginning in 2026.

Importantly, recent grant funding further strengthens GG’s financial and operational position. Gathering Ground was awarded $66,000 through the Destination Door County Community Investment Fund. These funds will support key infrastructure and visitor experience improvements, including the construction of an education pavilion at the Lakeview site, trail enhancements and interpretive signage, and the development of an outdoor produce wash and pack facility at the Aznoe Farm. This investment enhances the organization’s ability to expand programming, improve operational efficiency, and increase community engagement, all without placing additional strain on core financial resources. In this way, external funding serves as a critical mechanism for advancing mission-aligned projects while maintaining focus on long-term financial stability.

Taken together, Gathering Ground’s leadership structure reflects a strong alignment between governance, financial strategy, and mission-driven priorities. The combination of diverse board expertise, effective communication, and a shared commitment to sustainability enables the organization to navigate growth while remaining grounded in its core values. At the same time, the balance between financial constraints and emerging opportunities highlights the importance of phased, strategic decision-making. These dynamics provide a critical foundation for the recommendations that follow, which are designed to align with both the organization’s long-term vision and its near-term financial realities.

VII. BOARD OF DIRECTORS’ INTERVIEW FINDINGS

Interviews with six members of the Gathering Ground (GG) Board of Directors revealed strong alignment in both organizational values and strategic priorities. Across all respondents, communication, primarily through regular meetings and email, was identified as a critical mechanism for maintaining accountability, transparency, and effective decision-making. Board members emphasized that consistent communication supports not only governance functions but also the organization’s ability to remain mission-driven as it grows.

A central theme across all interviews was a shared commitment to sustainable and biodiverse agriculture. All board members expressed a clear understanding that integrating the natural environment with farming practices is foundational to GG’s identity and long-term success. This reflects a holistic approach to agriculture that prioritizes soil health, ecosystem balance, and the interdependence between agricultural systems and the surrounding landscape.

At the same time, board members acknowledged the importance of financial stability in shaping near-term priorities. The primary focus over the next several years is to pay off the Aznoe Farm mortgage before making significant investments in more capital-intensive carbon-neutral infrastructure. While there is strong agreement that renewable energy systems and carbon-reduction strategies are essential, the board views financial resilience as a necessary first step toward achieving these longer-term sustainability goals.

Looking ahead, board members shared a consistent vision for the future of Gathering Ground. Within the next five years, they hope to see the mortgage retired and the organization more deeply integrated into the Washington Island food system, which was described as uniquely collaborative and community-driven. One board member specifically envisioned GG evolving into a space similar to “The Clearing” in Ellison Bay, Wisconsin (an organization known for blending land stewardship, education, and community engagement). This vision reflects an aspiration for GG to function not only as a productive farm but also as a hub for learning, connection, and ecological stewardship.

Gathering Ground was recently awarded grant funding to support key infrastructure and educational improvements across its sites. Planned projects include the construction of an education pavilion at the Lakeview site, trail improvements and interpretive signage, and the development of an outdoor produce “wash and pack” facility at the Aznoe Farm. These investments reflect GG’s commitment to expanding education, improving operational capacity, and enhancing community engagement, while allowing the organization to advance its mission without diverting resources from its primary financial goal of paying down the farm mortgage.

Taken together, these findings highlight strong alignment among GG's mission, governance, and future direction, while underscoring the importance of balancing financial constraints with long-term sustainability goals.

The following recommendations build directly on the findings from the community survey, farm system analysis, and board interviews. They are designed to prioritize practical, financially realistic actions while creating a clear pathway toward long-term carbon neutrality, ecological resilience, and organizational impact.

VIII. RECOMMENDATIONS

Building on the survey results and the analysis of organic, biodiverse farming practices, the Aznoe House and the surrounding farm landscape should be approached as a single, integrated system. Rather than separating household energy use from agricultural practices, the most effective strategy is to align living systems (soil, plants, animals) with built systems (energy, water, infrastructure). This integrated approach strengthens ecological outcomes, reduces the overall carbon footprint, and enhances the farm's role as a demonstration site for regenerative living. The following recommendations are organized by priority and scale, incorporating the house, market garden, pasture, and natural environment.

Planning Recommendations (System Design and Management)

1. Closed-Loop Nutrient and Resource Systems

Developing a fully integrated system in which crop residues feed livestock, livestock manure feeds compost systems, and compost supports the market garden creates a regenerative cycle. This reduces external inputs while increasing system efficiency and resilience.

Implementation costs are primarily associated with management time and labor, rather than infrastructure. Initial planning, system design, and coordination may require approximately 40–80 hours of staff or consultant time, with estimated costs of $1,500-$4,000, depending on expertise. Ongoing labor for compost management, livestock integration, and material movement may add $1,000 to $3,000 annually, depending on scale and staffing.

These systems can reduce fertilizer and soil amendment costs by approximately 30–60%, while improving soil health and long-term productivity (Pretty, 2008). Because implementation relies more on management than capital investment, return on investment is typically realized within 1–3 years, with continued savings and ecological benefits over time.

2. Landscape-Scale Biodiversity Planning

Designing the farm as a connected ecological system, including pasture, garden, hedgerows, and natural areas, enhances habitat connectivity, supports wildlife, and improves ecosystem services. This approach elevates the farm from a set of practices to a functioning agroecosystem.

Costs for landscape-scale planning are primarily tied to design, mapping, and coordination, typically requiring 30–60 hours of planning time or approximately $1,000-$3,500 if external expertise is used, such as a conservation planner or agroecologist. Additional implementation labor may vary depending on site changes but is often incremental and phased over time.

While direct financial returns are less immediate, biodiversity planning can improve ecosystem services such as pollination, pest control, and water management, potentially reducing input costs by 10–30% over time (Kremen & Miles, 2012). ROI is typically medium- to long-term (3–7 years), but these systems significantly enhance resilience, reduce risk, and improve long-term land productivity.

3. Establish Living Fences and Pollinator Strips

Planting hedgerows and native flowering strips around gardens and pastures enhances biodiversity, supports pollinators, and creates natural windbreaks. These features also improve the aesthetic and ecological value of the farm landscape.

Costs for establishing living fences and pollinator strips typically range from $500 to $2,000 per acre, depending on plant selection, density, and site preparation. Labor for installation may require 20–40 hours per acre, adding approximately $500-$1,500 to labor costs. Ongoing maintenance is relatively low once systems are established.

These plantings can improve pollination and pest control services, potentially increasing crop yields and reducing pesticide use, with estimated input cost reductions of 10–25% (Kremen & Miles, 2012). While financial returns vary, payback is typically realized within 3–6 years, with increasing ecological and productivity benefits over time.

These planning recommendations are presented first because they establish the system-level design and management framework that enables subsequent quick wins and capital investments to be more effective and integrated, and because Gathering Ground has already implemented many of these strategies, incorporating elements of this approach since the nonprofit's inception.

Quick Wins (Low Cost, High Impact Across Systems). - These actions require minimal investment and create immediate benefits across both the household and farm landscape.

4. Install a Clothesline to Reduce Household Energy Demand

Adding a clothesline reduces electricity use while reinforcing low-impact living practices. This simple intervention also complements broader sustainability messaging by making conservation visible to visitors and volunteers.

The cost of installing a clothesline is relatively low, typically ranging from $50 to $200 for materials and installation. Despite minimal upfront cost, clothesline use can reduce dryer-related energy consumption by 20–30% annually, resulting in near-immediate cost savings. This low-cost, highly visible practice aligns with GG’s mission by demonstrating practical, everyday sustainability actions to staff, volunteers, and visitors.


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5. Upgrade and Optimize Energy-Efficient Appliances and Walkin Cooling System

Upgrading to ENERGY STAR®-rated appliances across the Aznoe House and farm facilities offers a practical way to reduce energy consumption and operating costs. High-efficiency washers, dryers, and cooling systems use significantly less electricity compared to standard models, aligning with GG's low-input sustainability goals.

The cost of a large-capacity ENERGY STAR washer and dryer set typically ranges from $1,500 to $3,000, while a high-efficiency single-room air conditioning unit generally costs $300 to $800. Commercial-grade walk-in cooler upgrades or efficiency improvements, including compressors, insulation, and controls, can range from $5,000 to $15,000+, depending on system size. These systems can reduce energy use by approximately 15–40%, particularly in high-demand applications such as refrigeration and cooling (U.S. Department of Energy, 2022).

It is important to note that the current high-capacity SUB-ZERO built-in refrigerators and freezers are ENERGY STAR-rated and already meet the organization's operational needs and energy efficiency profile.

Together, these appliances and system upgrades complement low-cost behavioral changes, such as clothesline use, creating a layered approach to energy reduction that is both operationally effective and aligned with GG's sustainability mission. Estimated payback periods for these upgrades typically range from 3 to 7 years, depending on usage and energy costs.

7. Expand Composting Systems (House + Garden + Community Integration)

Food scraps and organic waste from the Aznoe House should be fully integrated into composting systems that support the market garden. Expanding compost capacity enhances soil fertility, reduces waste, and strengthens nutrient cycling between the house and garden. This system can also serve as a visible demonstration of regenerative practices for staff, volunteers, and visitors.

At the farm scale, expanding composting infrastructure typically requires a modest investment in bins, aeration tools, and site preparation, with estimated costs ranging from $500 to $3,000, depending on system size and materials. Annual labor and management costs may range from $1,000 to $3,000, depending on the scale of operations and level of mechanization. These systems can reduce fertilizer and soil amendment costs by approximately 30–60%, with a typical return on investment within 1–3 years due to avoided input costs and improved soil productivity (Pretty, 2008).

If expanded to an island-wide initiative incorporating restaurants, local businesses, and public food waste, composting operations would require additional infrastructure, coordination, and transportation logistics. Initial expansion costs could range from $10,000 to $30,000+, including collection bins, hauling equipment, site expansion, and potential permitting. Ongoing operational costs, including labor, transportation, and system management, may range from $5,000 to $15,000 annually, depending on scale and participation levels. However, the benefits of such expansion are significant. Diverting organic waste from landfills reduces disposal costs and methane emissions, while generating a valuable soil amendment for local agriculture. Because food waste in landfills produces methane, a greenhouse gas approximately 25–30 times more potent than carbon dioxide, shifting to composting can meaningfully reduce the island's overall greenhouse gas footprint (U.S. Environmental Protection Agency [EPA], 2023). At scale, island-wide composting could offset 40–70% of organic waste disposal, while reducing fertilizer costs across participating farms and gardens. Additional benefits include community engagement, educational opportunities, and the potential to position Gathering Ground as a central hub in a circular, island-based food system. While financial ROI may be longer, typically 3–7 years, the broader environmental and community impacts are substantial, aligning closely with GG's mission and long-term sustainability goals.

8. Integrate Poultry Systems (Chicken Tractor and Egg Mobile Expansion)

Integrating poultry into garden and pasture systems strengthens the connection between livestock, soil health, and crop production. Beginning with a small-scale chicken tractor and expanding to a larger egg mobile system allows Gathering Ground to build a regenerative, closed-loop system incrementally. Chickens contribute manure, reduce pests, and assist with bed preparation, directly linking livestock systems to soil health in the market garden.

At a small scale, a chicken tractor system can be constructed or purchased for approximately $300 to $1,000, depending on materials and size. This low-cost entry point offers immediate benefits, including natural fertilization, pest control, and reduced reliance on external soil inputs. Even at this scale, farms can reduce fertilizer and pest management costs by approximately 10–20%, with a return on investment typically realized within 1–2 years.

As the system expands, transitioning to a larger egg mobile setup for pasture-based poultry typically costs between $2,000 and $10,000+, depending on size, materials, and mobility features. As noted by regenerative farmer Joel Salatin, egg mobiles can be built relatively inexpensively using repurposed materials, with costs varying widely based on design but often kept low through on-farm construction and incremental scaling (Salatin, 1998). This larger system supports increased flock size, enabling egg production as an additional revenue stream while improving pasture fertility through manure distribution.

At this scale, benefits expand to include improved pasture productivity, increased soil organic matter, and the potential for 20–40% reductions in feed and fertilizer inputs through integrated nutrient cycling (Teague et al., 2013). Estimated payback periods for an egg mobile system typically range from 2 to 5 years, depending on egg production, feed costs, and market demand. As the system scales, both ecological and financial returns increase, reinforcing GG’s ability to demonstrate regenerative agriculture in practice while building a diversified and resilient farm system.

Survey findings further indicate that locally raised broiler chickens are difficult to source on Washington Island, and that egg availability, particularly during peak summer months, is limited, suggesting a clear opportunity to expand poultry production to meet unmet local demand.

Moderate Investments (Medium Cost, System Integration Gains) -- These recommendations require moderate investment but significantly improve ecological function and energy efficiency across the farm.

9. Solar Water Heating as a Supplemental System to the Existing Propane Boiler

Installing a solar thermal system as an add-on to the existing propane boiler at the Aznoe House is a practical, incremental step toward reducing fossil fuel use without requiring a full system replacement. This hybrid approach allows solar energy to preheat water, reducing the workload on the propane system while maintaining reliability for household needs and farm applications such as produce washing and sanitation.

The cost of a solar water heating system typically ranges from $4,000 to $10,000 installed, depending on system size, storage capacity, and installation complexity. When used as a supplemental system, solar thermal can offset approximately 50–70% of annual hot water energy demand, resulting in propane cost savings of 30–60% annually (U.S. Department of Energy, 2022).

Estimated payback periods generally range from 4 to 8 years, with shorter timelines possible when energy prices are high or system usage is consistent. By functioning as an add-on rather than a replacement, this approach minimizes upfront cost and risk while delivering immediate reductions in energy use and emissions. This recommendation aligns closely with GG's phased strategy by integrating renewable energy into existing infrastructure in a cost-effective and operationally flexible manner.

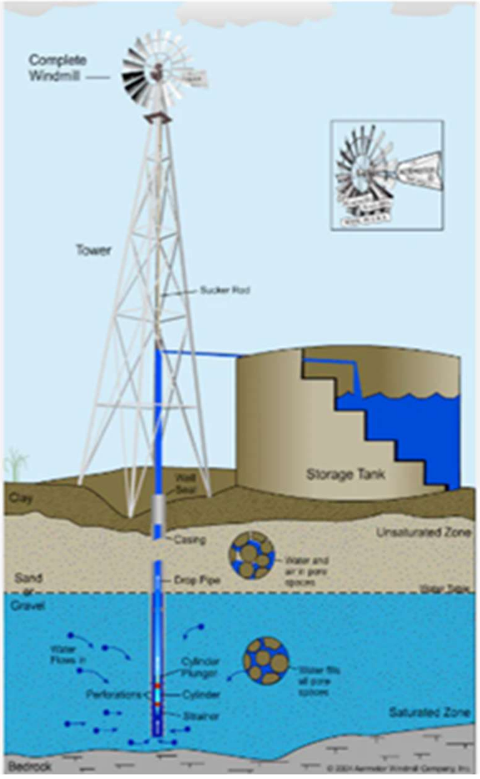
10. Water Management Systems (Rainwater + Renewable Pumping)

Incorporating rainwater catchment and/or solar or wind-powered water pumps can support irrigation for the market garden and provide water access for livestock. This reduces reliance on external water and energy inputs while increasing resilience.

The cost of installing a small-scale solar-powered water pumping system typically ranges from $2,000 to $6,000, depending on pump capacity, solar panel size, and installation complexity. Wind-powered water pumps generally range from $3,000 to $8,000 installed. Water storage systems, such as above-ground tanks or cisterns, typically cost $0.50 to $1.50 per gallon of storage. For example, a 2,000-gallon tank would cost approximately $1,000 to $3,000, bringing the total system cost (pump + storage) to roughly $3,000 to $9,000, depending on configuration.

These systems can reduce water and energy costs associated with pumping and irrigation by approximately 30–70%, particularly when replacing grid-powered or fuel-based systems (International Renewable Energy Agency [IRENA], 2021). In addition, replacing a gasoline-powered generator with a solar-powered pump can significantly reduce carbon emissions. A typical small gasoline generator emits approximately 0.8–1.0 pounds of CO_2 per kWh. When used regularly for water pumping, this can result in an estimated 0.5 to 2 metric tons of CO_2 emissions annually, depending on usage. Transitioning to solar or wind-powered pumping effectively reduces these operational emissions to near zero.

Estimated payback periods generally range from 3 to 8 years, depending on system usage and avoided fuel and electricity costs. Beyond financial returns, these systems increase operational resilience by providing reliable water access during power outages or dry periods, while reinforcing GG's commitment to a low-input, regenerative farming ethos.



tices.

11. Rotational Grazing with Solar-Powered Electric Fencing

Expanding or refining rotational grazing systems using portable, solar-powered electric fencing improves pasture health, increases soil carbon sequestration, and enhances manure distribution. This strengthens the connection between livestock management and soil regeneration.

The cost of implementing rotational grazing with portable, solar-powered electric fencing typically ranges from $200 to $600 per acre, depending on pasture layout, fencing density, and equipment quality. For a system scaled to a maximum of 30 acres, the estimated total cost is $6,000 to $18,000, including solar energizers, polywire or tape, step-in posts, and grounding systems.

To fully utilize this system, livestock investment must also be considered. Startup costs per animal typically range from $800 to $2,000 per calf (cattle), $200 to $500 per sheep, and $150 to $400 per goat, depending on breed and age. A modest initial stocking approach allows GG to scale grazing intensity alongside infrastructure development, minimizing upfront financial risk while building system capacity over time.

While upfront costs are moderate, rotational grazing systems can reduce feed and fertilizer costs by 20–40% by improving forage utilization and nutrient cycling (Teague et al., 2013). Improved pasture productivity can also increase carrying capacity, effectively generating additional value from existing land without expanding acreage.

Estimated payback periods generally range from 2 to 5 years, as savings from reduced feed inputs and improved pasture performance accumulate quickly. In addition to financial benefits, rotational grazing enhances soil structure, increases organic matter, and supports long-term carbon sequestration, making it both an economically and ecologically efficient investment.

12. Agroforestry and Silvopasture Expansion (Next Phase After Grazing System Establishment)

Following the establishment of a managed herd or flock and the implementation of rotational grazing with movable fencing, integrating trees into pasture systems represents the next logical step in developing a fully regenerative farm system. Agroforestry and silvopasture practices, including planting trees within pasture or along alley cropping systems, provide shade for livestock, improve soil health, and increase long-term productivity through additional outputs such as fruit, nuts, or timber. Importantly, Gathering Ground has already established a strong foundation for this approach at its original Lakeview site, where perennial systems, including tree plantings and a vineyard, are in place. Expanding these practices to the Aznoe Farm builds directly on existing knowledge and infrastructure, reducing risk and reinforcing organizational capacity.

The cost of establishing agroforestry or silvopasture systems typically ranges from $500 to $2,500 per acre, depending on tree species, planting density, site preparation, and protection measures such as tree guards or temporary fencing. For phased implementation across portions of a 30-acre system, initial investment may range from $5,000 to $20,000+, depending on scale and planting strategy. Labor requirements for planting typically range from 20 to 40 hours per acre, with additional time required for early-stage maintenance, watering, and protection during establishment. Organizations such as the Savanna Institute emphasize that upfront planning and technical support are key to successful implementation, particularly in the Midwest, where agroforestry systems are gaining traction (Savanna Institute, n.d.).

These systems require a longer time horizon compared to other recommendations. Trees typically begin to provide measurable benefits, such as shade, improved soil conditions, and early yields, within 3 to 5 years, while full production potential may take 5 to 15 years, depending on species. Agroforestry systems can diversify farm income streams and improve long-term financial resilience by producing multiple outputs from the same land area, while also increasing carbon sequestration and overall ecosystem function.

Estimated financial returns are long-term, generally 5 to 12+ years, though some systems begin generating returns within 3–6 years. By sequencing this recommendation after livestock integration and rotational grazing, GG can leverage existing systems to support tree establishment, including natural fertilization and vegetation management. This phased approach reinforces the development of a resilient, multi-layered agroecosystem that aligns with Gathering Ground’s long-term vision for regenerative agriculture, climate resilience, and whole-system land stewardship.

Long-Term Investments (Higher Cost, Transformational Impact) -- These strategies require greater planning but position the entire farm system as a model of regenerative, low-carbon design.

13. Transition from Propane Cooking to All-Electric Range and Ovens

Replacing the existing Wolf propane range and ovens with high-efficiency electric alternatives represents a key step toward full building electrification and long-term decarbonization. Electric induction ranges and convection ovens provide precise temperature control, improved safety, and compatibility with renewable energy systems, particularly when paired with future solar installations. This transition aligns the built environment more closely with Gathering Ground's broader ecological and sustainability goals.

Replacing a high-end propane range with a comparable commercial-grade electric or induction range typically costs $3,000 to $10,000, depending on size and features. Additional electrical upgrades, such as panel capacity or wiring improvements, may add $1,000 to $5,000, bringing the total estimated project cost to $4,000 to $15,000+ (Sub-Zero Group, Inc., n.d.).

Electric cooking systems are generally more energy-efficient than propane, with induction systems achieving 80–90% efficiency, compared to approximately 40–60% for gas systems (U.S. Department of Energy, 2022). This can result in overall cooking energy savings of approximately 10–30%, depending on usage patterns. When powered by renewable energy, these systems can reduce operational greenhouse gas emissions to near zero. In contrast, propane combustion emits approximately 139 pounds of CO_2 per million BTUs, contributing directly to the farm’s carbon footprint (U.S. Environmental Protection Agency [EPA], 2023).

In addition to energy and emissions benefits, transitioning from propane to electric cooking improves indoor air quality by eliminating combustion-related pollutants such as nitrogen dioxide and carbon monoxide, which are commonly associated with gas appliances (EPA, 2023).

Estimated payback periods typically range from 5 to 10 years, depending on energy costs and system usage. While the financial return is moderate, the environmental and health benefits are significant, particularly when combined with other electrification and renewable energy strategies. This recommendation represents a critical step toward eliminating on-site fossil fuel use and achieving a more fully integrated, low-carbon farm system.

14. Solar Photovoltaic System (Whole-System Energy Integration)

Installing solar panels on the Aznoe House or farm buildings enables on-site renewable electricity generation. This system can power household needs and agricultural infrastructure (fencing, water pumps), and support future electrification efforts, significantly reducing overall carbon emissions.

The installed cost of a solar photovoltaic (PV) system for a property of this scale typically ranges from $2.50 to $3.50 per watt, resulting in an estimated total cost of $20,000 to $50,000+, depending on system size. However, federal tax incentives and grants (if available) can reduce upfront costs by 20–30% or more. Solar systems can offset 50–90% of electricity usage, leading to annual energy cost savings of approximately 40–70%, depending on system sizing and usage patterns (U.S. Department of Energy, 2023). Estimated payback periods generally range from 6 to 12 years, with shorter timelines possible when incentives and high energy usage are present. Over a 25+ year system lifespan, this represents a significant long-term financial and environmental return, while also increasing energy independence and resilience.

15. Transition from Propane Boiler System to Electric Heat Pump System

Gradually replacing the propane boiler and appliances with high-efficiency electric systems powered by renewable energy represents a major step toward decarbonization. This transition aligns the built environment with the farm’s ecological principles.

The cost of installing a high-efficiency air-source or ground-source heat pump system typically ranges from $8,000 to $25,000+, depending on system type, building size, and installation complexity. Despite higher upfront costs, heat pumps are significantly more efficient than conventional propane systems, often reducing heating and cooling energy consumption by 30–60% (U.S. Department of Energy, 2022). This translates into annual operating cost savings of approximately 20–50%, depending on energy prices and system performance. Estimated payback periods generally range from 5 to 10 years, particularly when combined with renewable electricity sources such as solar. In addition to cost savings, this transition reduces greenhouse gas emissions and positions GG to fully.

Recommendations Synopsis: Together, these recommendations emphasize that the greatest benefits emerge when household systems, agricultural practices, and natural ecosystems are intentionally linked. Survey results suggest that stakeholders value practical, visible, and mission-aligned improvements; therefore, early efforts should focus on highly visible integrations such as composting, poultry systems, and clotheslines. Over time, investments in renewable energy and infrastructure can deepen the farm's impact while reducing long-term costs.

Much like the Lakeview site, the Aznoe House and surrounding land can function as a living laboratory, demonstrating how regenerative agriculture and sustainable living practices reinforce one another. By integrating energy systems, livestock, crop production, and ecological design, Gathering Ground can model a holistic approach to sustainability, one that is not only environmentally effective but also educational, replicable, and economically viable.

IX. CONCLUSION

This capstone project demonstrates that Gathering Ground is strongly positioned to serve as a model for integrated, regenerative agriculture and sustainable land use on Washington Island. Across all areas of analysis, community engagement, farming practices, built infrastructure, and organizational leadership, there is clear alignment with ecological principles that support long-term environmental and social resilience.

Survey findings indicate that the island community values sustainable agriculture and actively participates in local food systems, but structural limitations, particularly in terms of availability and cost, constrain broader engagement. This suggests that future efforts should focus on expanding production capacity, improving infrastructure, and strengthening connections between producers and consumers.

At the farm level, Gathering Ground already incorporates many elements of organic and regenerative agriculture, particularly in its emphasis on soil health, biodiversity, and integrated systems. However, opportunities remain to further align the built environment with these principles, especially through renewable energy adoption, improved efficiency, and reduced reliance on fossil fuels.

Board interviews reinforce that the organization’s leadership is both mission-aligned and forward-looking, with a clear vision for sustainability and community impact. At the same time, financial realities, particularly the need to pay down the Aznoe Farm mortgage, necessitate a phased approach to implementing more capital-intensive sustainability initiatives.

Importantly, recent grant funding demonstrates that Gathering Ground is already making progress toward its long-term goals, particularly in areas of education, infrastructure, and community engagement. These developments position the organization to expand its impact while maintaining financial discipline.

Ultimately, the recommendations presented in this report emphasize integration, linking household systems, agricultural practices, and ecological design into a cohesive whole. By pursuing a balanced approach that prioritizes both immediate, low-cost actions and long-term investments, Gathering Ground can continue to evolve as a living model of regenerative agriculture, environmental stewardship, and community-based sustainability.

Appendix A - Terms and Definitions

This appendix defines key terms used throughout the report that may not be part of the common vocabulary but are essential to understanding the agricultural, sustainability, and governance concepts discussed.

Agroforestry
The integration of trees and shrubs into crop and livestock systems to improve biodiversity, soil health, and overall farm productivity (Food and Agriculture Organization [FAO], 2018).

Biodiverse Farming
An agricultural approach that promotes a wide variety of plant and animal species within a farming system to enhance ecosystem resilience and reduce reliance on external inputs (Kremen & Miles, 2012).

Biodynamic Agriculture
A holistic farming approach that views the farm as a self-contained ecosystem, integrating crops, livestock, and natural cycles to support long-term sustainability (Gliessman, 2015).

Carbon Neutral
A condition in which net greenhouse gas emissions are reduced to zero through a combination of emission reductions and carbon offsetting or sequestration (United States Department of Agriculture [USDA], 2022).

Carbon Sequestration
The process of capturing and storing atmospheric carbon dioxide in soil, vegetation, or other materials to reduce greenhouse gas concentrations (Lal, 2020).

Chicken Tractor
A portable, bottomless enclosure used to house poultry, typically moved regularly across pasture or garden areas to allow chickens to forage while distributing manure. This system supports natural fertilization, pest control, and soil improvement, while protecting birds from predators and containing their movement (Salatin, 1998).

Closed-loop System
A system in which outputs, such as waste or byproducts, are recycled as inputs within the same system, reducing external inputs and minimizing waste (Pretty, 2008).

Cover Cropping
The practice of growing crops primarily to protect and improve soil health, prevent erosion, and increase soil organic matter rather than for direct harvest (Lal, 2020).

Egg Mobile
A movable poultry housing system designed for larger flocks of laying hens, typically used in pasture-based egg production. Egg mobiles are rotated across grazing areas, often following livestock, to distribute manure, improve soil fertility, and integrate poultry into regenerative farming systems (Salatin, 1998).

Glocalizing (Glocalization)
A concept describing the adaptation of global ideas, products, or systems to fit local conditions, cultures, and needs. The term was popularized by sociologist Roland Robertson, who used it to explain how global and local dynamics interact rather than operate independently (Robertson, 1995). In agriculture, glocalization reflects the balance between global food systems and locally adapted production practices.

Holistic Farm System
An approach that views the farm as an interconnected system in which soil, plants, animals, water, and human activity are managed together to optimize ecological and economic outcomes (Gliessman, 2015).

Karst Topography
A landscape formed by the dissolution of soluble rock, such as limestone or dolomite, characterized by sinkholes, underground drainage systems, caves, and limited surface water. Karst systems often have thin soils and highly permeable ground, which significantly influence land use and agricultural practices (Ford & Williams, 2007).

Market Garden
A small-scale farming operation that produces a diverse range of crops, typically vegetables, for sale in local markets rather than large-scale commodity systems (Low et al., 2015).

Organic Agriculture
Farming practices that avoid synthetic fertilizers and pesticides, emphasizing natural processes, soil health, and ecological balance (FAO, 2018).

Perennial Crops
Plants that live for multiple years and produce yields over time without needing to be replanted annually, contributing to soil stability and long-term productivity (Lal, 2020).

Regenerative Agriculture
A system of farming practices that restores soil health, increases biodiversity, and enhances ecosystem services, including carbon storage and water retention (Lal, 2020).

Resource Dependence Theory
A governance theory suggesting that organizations depend on external resources, and that boards play a key role in securing funding, partnerships, and legitimacy (Hillman & Dalziel, 2003).

Rotational Grazing
A livestock management practice in which animals are moved between pasture areas to allow vegetation recovery, improving soil health and pasture productivity (Teague et al., 2013).

Silvopasture
An agroforestry practice that combines trees, forage plants, and grazing livestock in an integrated and managed system (FAO, 2018).

Stewardship Theory
A governance theory emphasizing that leaders and board members act as stewards of the organization, prioritizing mission alignment, trust, and long-term success over self-interest (Davis et al., 1997).

Sustainable Agriculture
Farming practices that meet current food needs while preserving environmental quality and natural resources for future generations (Pretty, 2008).

Thermal Energy System
A system used to generate, store, or transfer heat energy, typically for heating water or indoor spaces in residential or agricultural buildings (U.S. Department of Energy, 2022).

- Full references for terms cited in this appendix are included in Appendix E.

Appendix B: IRB Exempt Approval Letter

UNIVERSITY of WISCONSIN
GREEN BAY

March 6, 2026

Dear Mr. Petrick,

On behalf of the UW–Green Bay Institutional Review Board (IRB) for the protection of human research participants, I am pleased to inform you that your research proposal entitled,” Evaluation of Carbon Neutral Strategies in Farm Facilities and Land Use at Gathering Ground Through Regenerative, Organic, and Biodynamic Frameworks” (protocol# 26_SP_11) has been approved through May 31, 2026

Your research has been approved as **Exempt** because there are only minimal risks involved. IRB proposals are given one year of approval. Since your research has Exempt approval, you will need to provide an annual report of your research in accordance with federal regulations (see IRB website for the annual report form). Please note that all IRB approvals require the Principal Investigator (PI) and Co-Investigators to adhere to all recommendations and requirements in the policy documents while safely conducting research. It also is our expectation that you will be in full compliance with all CDC federal regulations as well as those consistent with ethical research expectations here at the University of Wisconsin-Green Bay.

Please note that it is the principal investigator's responsibility to promptly report to the IRB any changes to the research project (via the Project Modification Form: https://www.uwgb.edu/UWGBCMS/media/irb/files/Modification-and-Extension-Form.pdf). In addition, if harm or discomfort to anyone becomes apparent during the research, the principal investigator must contact the IRB Chairperson. Harm or discomfort includes, but is not limited to, adverse reaction to psychology experiments, biologics, radioisotopes, labeled drugs, or to medical or other devices used.

Thank you for your efforts to ensure the safety and respect of human subjects. If you have any questions or concerns, please contact me or another member of the IRB.

Congratulations and good luck with your research!
Sincerely,

James Kabrhel (he/his/him)
IRB Chair
Associate Professor of Chemistry
University of Wisconsin – Green Bay
1 University Drive
Sheboygan, WI 53081
kabrhelj@uwgb.edu
920-663-7334

Appendix C - Washington Island Community Agriculture and Sustainability Survey and Results.

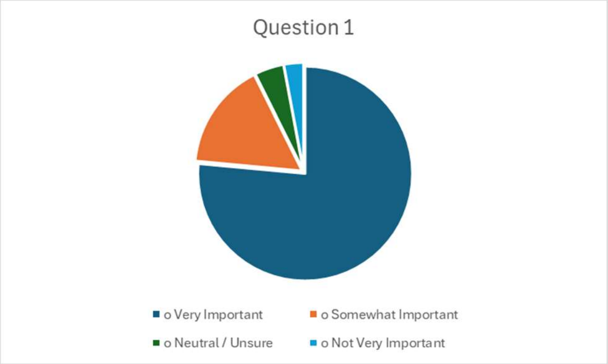
The following survey was distributed to residents, seasonal community members, and visitors to Washington Island to assess perspectives on local food systems, agriculture, and sustainability practices.

UNIVERSITY of WISCONSIN
GREEN BAY

Powered by Qualtrics

Q1. Sustainable farming practices, including soil conservation, responsible water use, and reduced chemical inputs, help maintain productive farmland and healthy ecosystems. How important is it to you that farms on Washington Island use sustainable farming practices?

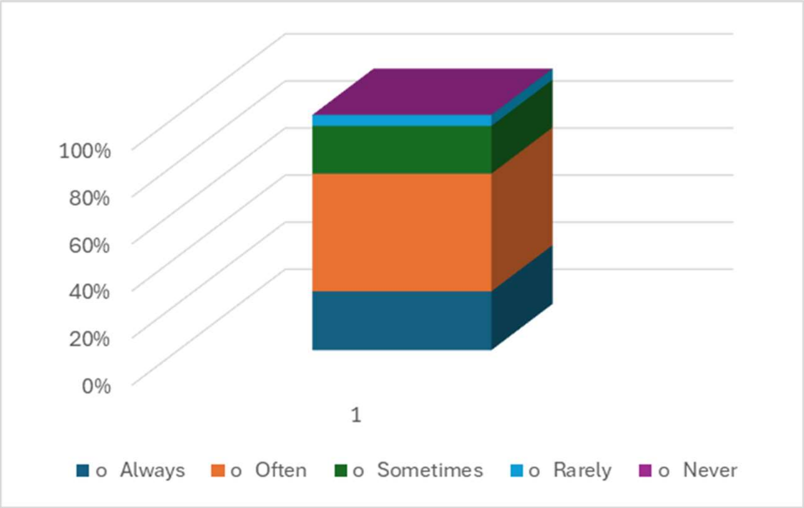
Answer Choices	**Number**	
o Very Important	52	76%
o Somewhat Important	11	16%
o Neutral / Unsure	3	4%
o Not Very Important	2	3%
Total Responses:	68	



Q2. Local food systems can support farmers, strengthen communities, and reduce environmental impacts from long-distance transportation. How often do you intentionally purchase locally grown food when it is available?

Question 2

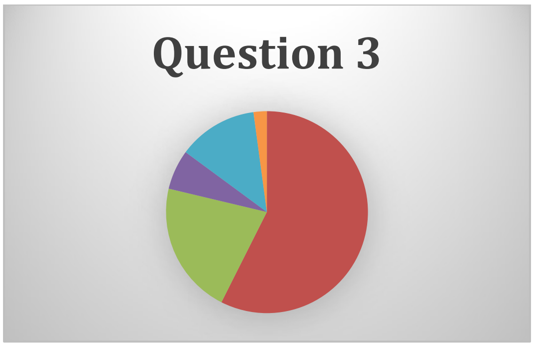
Answer Choices	Number	Percentage
○ Always	16	24%
○ Often	32	47%
○ Sometimes	13	19%
○ Rarely	3	4%
○ Never	0	0%



Q3. Organic farming generally avoids synthetic pesticides and fertilizers while emphasizing soil health, biodiversity, and natural ecological processes. How important is it to you that food grown on Washington Island is produced using organic or organic-style methods

Question 3

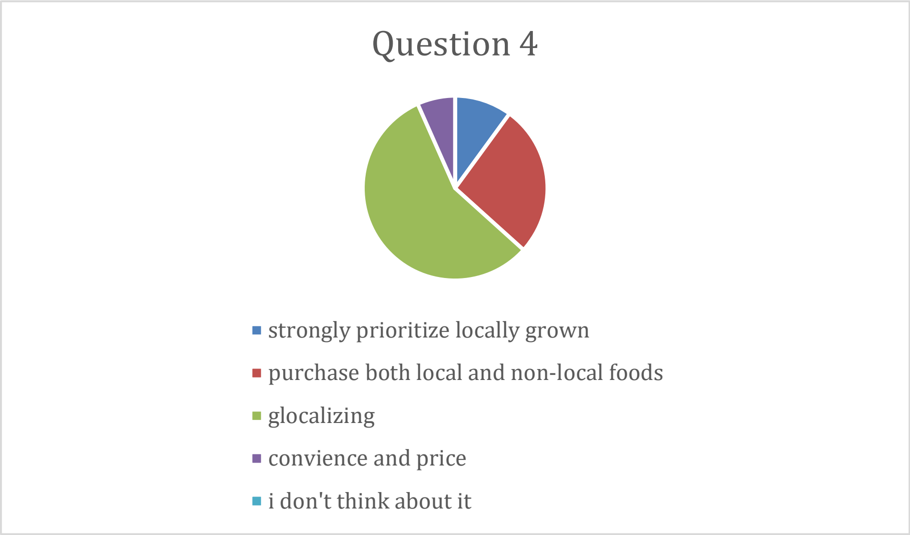
Answer Choices	**Number**	
o Very important	27	57%
o Somewhat important	10	21%
o Neutral / Unsure	3	6%
o Not very important	6	13%
o Not important at all	1	2%
Total Responses:	47	



Q4. Many consumers practice “glocalizing,” meaning they prioritize local foods when possible while purchasing some foods from global sources that cannot be produced locally; longer supply chains are generally associated with larger carbon footprints. Which statement best describes your typical food purchasing approach?

Answer Choices

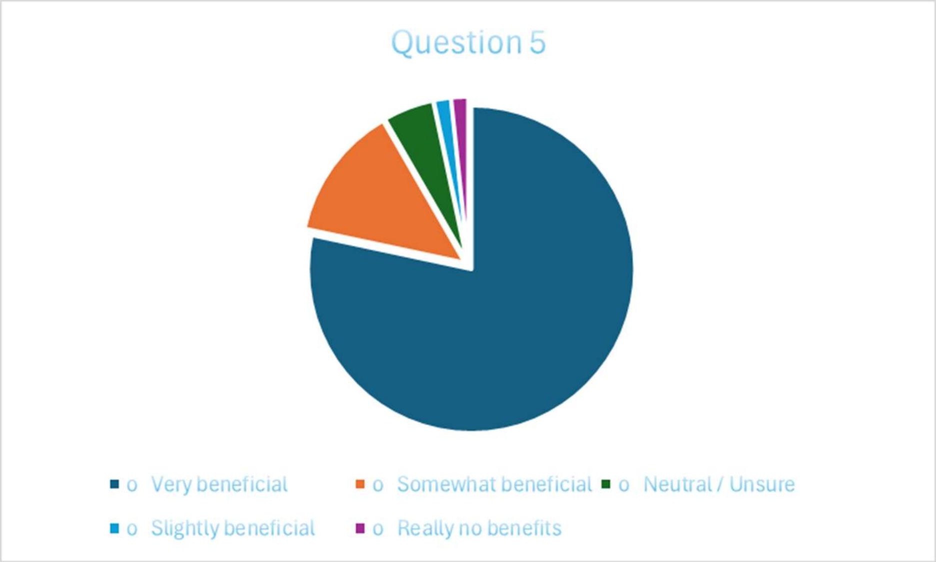
- I strongly prioritize locally grown food and try to avoid imported food whenever possible – **Top Choice = 6**
- I purchase both local and non-local foods without prioritizing one over the other – **Top Choice = 16**
- I practice “glocalizing” — I buy local food when available, but purchase some global foods such as organic olive oil, avocados, kiwi, or Fair-Trade coffee. **Top Choice = 34**
- Convenience or price matters more to me than whether food is local or imported – **Top Choice = 4**
- I rarely think about where my food was grown, raised or produced. **Top Choice = 0**



Q5. Biodiverse farming systems—such as growing multiple crops and supporting pollinators can improve soil health and ecological resilience. How beneficial do you believe biodiverse farming practices are for the environmental health of Washington Island?

Answer Choices:

o Very beneficial	47
o Somewhat beneficial	8
o Neutral / Unsure	3
o Slightly beneficial	1
o Really no benefits	1
Total Responses:	60

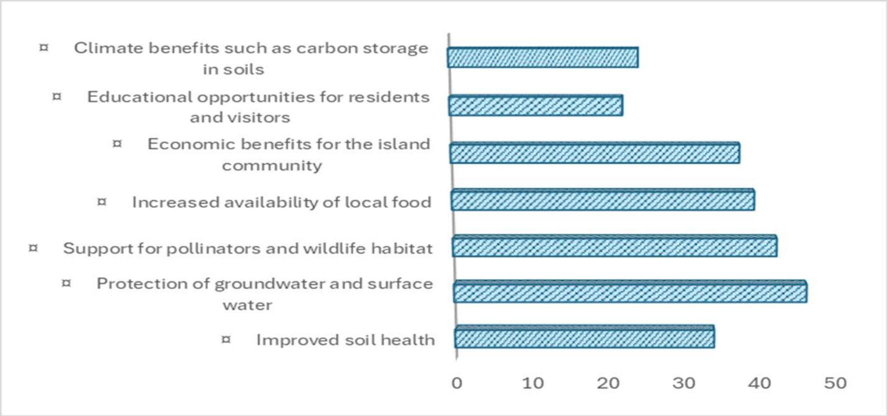


Q6. Carbon sequestration refers to capturing and storing carbon in soils and plants through practices such as cover crops, compost use, and reduced tillage. How supportive would you be of farming practices on Washington Island that increase soil carbon storage?

- Very Supportive - **41**
- Somewhat Supportive - **11**
- I am skeptical of the concept - **5**

Q7. Sustainable agriculture can provide environmental, economic, and community benefits beyond food production. Which potential benefits of sustainable or biodiverse farming are most important to you? (Select all that apply)

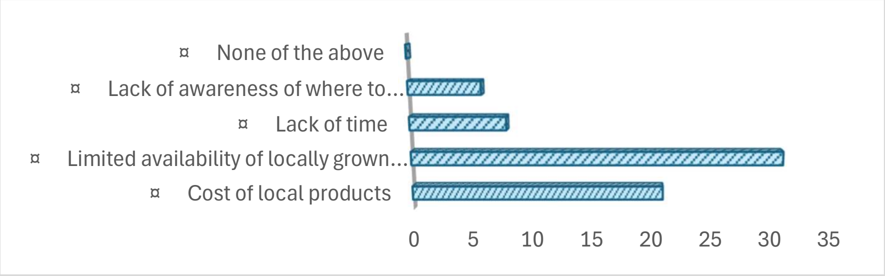
¤ Improved soil health - 34
¤ Protection of groundwater and surface water - 46
¤ Support for pollinators and wildlife habitat - 42
¤ Increased availability of local food - 39
¤ Economic benefits for the island community - 37
¤ Educational opportunities for residents and visitors - 22
¤ Climate benefits such as carbon storage in soils - 24



Q8. Participation in local food systems can be influenced by practical, economic, or informational factors. What factors might limit your participation in local agriculture or food programs on Washington Island? (Select all that apply)

Answers:

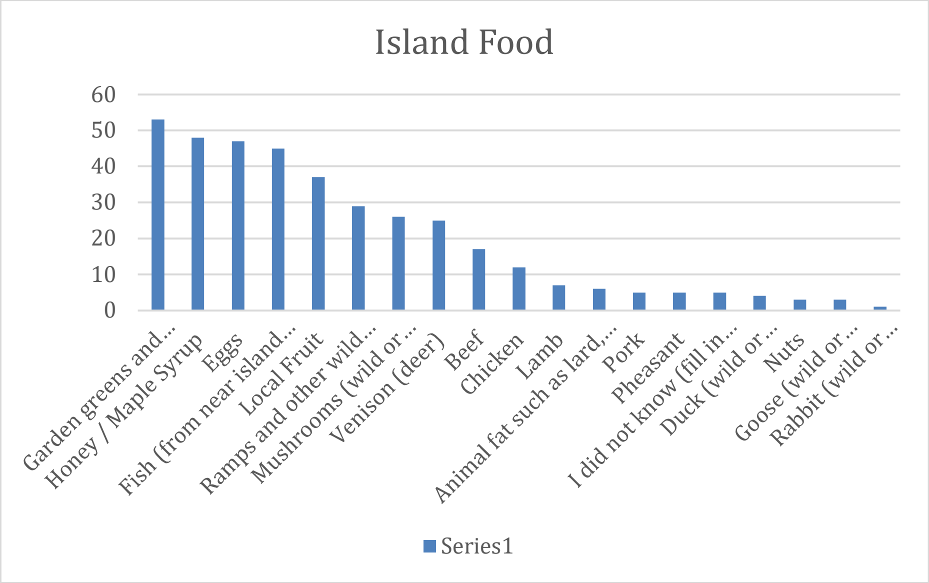
¤ Cost of local products	21
¤ Limited availability of locally grown food	31
¤ Lack of time	8
¤ Lack of awareness of where to purchase	6
¤ None of the above	0



Q9. Healthy ecosystems are especially important on small islands because chemicals or pollutants used on land can move into groundwater, surrounding waters, and the local food system. When I am on Washington Island, and when available, I eat the following island-raised, foraged, caught, or hunted foods: (Select all that apply)

Answers	Responses
Garden greens and other veggies	53
Honey / Maple Syrup	48
Eggs	47
Fish (from near island waters)	45
Local Fruit	37
Ramps and other wild spring greens	29
Mushrooms (wild or cultivated)	26
Venison (deer)	25
Beef	17
Chicken	12
Lamb	7
Animal fat such as lard, tallow or goose fat	6
Pork	5
Pheasant	5
I did not know (fill in the blank) was available on the island	5
Duck (wild or domesticated)	4
Nuts	3
Goose (wild or domesticated)	3
Rabbit (wild or domesticated)	1

**I did not know (fill in the blank) was available on the island: Chicken, I will pay a high price for local chicken, Tallow, Beef and Mushrooms. We need more local eggs in the summer!



Q10. Understanding how much time respondents spend on Washington Island helps interpret community perspectives on agriculture and land stewardship. Approximately how much time do you spend on Washington Island each year?

- Year-round resident - **36**
- Seasonal resident (6–11 months per year) – **11**
- Frequent visitor (1–5 months per year) - **8**
- Occasional visitor (less than 1 month per year) - **1**

Q11. Land ownership or stewardship can influence how individuals interact with local agriculture and conservation practices. Which best describes your relationship to land on Washington Island?

- I own farmland used for agriculture (including hay and trees) - **6**
- I own residential land with a garden or food production - **25**
- I own residential land without food production - **18**
- I do not own land but reside on the island - **5**
- Visitor/non-resident - **2**

Q12. Age groups may have different experiences or perspectives related to agriculture, sustainability, and land stewardship. What is your age range?

- Under 20 = **6 Responders**
- 20 – 30 = **4 Responders**
- 30 – 44 = **8 Responders**
- 44 – 59 = **9 Responders**
- 60 – 74 = **26 Responders**
- Older than 74 = **8 Responders**
- Prefer not to say = **3 Responders**

Q13. Do you have any questions, comments or concerns about local food on Washington Island? (Fill in the Blank)

No, great Survey!

It would be nice to purchase grapes and chicken from the island, greens, if the price was a bit lower

The community garden run by Gathering Grounds is amazing!

It would be nice on the island if we supported each other through garden swaps so that we had a variety more than what we've had in the past at the farmers market

The range and supply of local crops are so limited on the Island. What practical suggestions can residents use to help address these limitations?

How many local farmers provide food to Islanders (at Mann's, the Farmers Market, or independently)?

Could Gathering Ground provide this information in a brochure or in an advertisement in The Island Observer?

None at this time...looks great

Protecting food from deer eating crop

Eggs at the Farmers Market

Appendix D:

Board of Directors' Interview Questions:

1. How would you describe Gathering Ground's mission and long-term vision?

2. What role do sustainability and regenerative agriculture play in the organization's future?

3. What are the organization's current priorities?

4. How do financial considerations influence strategic decision-making?

5. What are the biggest challenges currently facing Gathering Ground?

6. How does the Board communicate and make decisions?

7. What opportunities do you see for expanding Gathering Ground's impact?

8. How do you envision Gathering Ground evolving over the next five years?

9. What role should carbon-neutral or renewable energy systems play in future planning?

10. Is there anything else you would like to add?

Appendix E - References

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