VALIDATION OF AGORO CARBON USA CROPLAND PROGRAM

Document Prepared by TÜV SÜD America Inc. - Ruby Canyon

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Summary:

Agoro Carbon Alliance contracted TÜV SÜD America Inc. - Ruby Canyon (TÜV SÜD) to complete the validation of the Agoro Carbon USA Cropland Program Project. The Project implements a number of regenerative agricultural land management activities including reduced tillage, no tillage, cover cropping, improved nitrogen fertilizer management. This project is an agricultural land management initiative to reduce emissions and increase carbon stocks through change in agricultural practices from the baseline on an initial grouping of 235,204 acres. The Project is a grouped project within the geographic borders of the United States of America excluding Alaska and Hawaii. The initial project instances are in the following USA states: Colorado, Idaho, Illinois, Indiana, Minnesota, Nebraska, Oregon, South Dakota, Texas, Washington, and Wisconsin..

The purpose of validation is to evaluate the reasonableness of the assumptions, limitations and methods that support a statement about the outcome of future activities. The objective of validation is to assess the likelihood that implementation of the GHG-related activities will result in the achievement of GHG outcomes as stated by the responsible party. Note that according to ISO 14064-3:2019 and Verra Standards, no assurance level is provided for validation.

The scope of the validation included the assessment of the project description (PD) and any supporting data and documentation needed to confirm that the project proponents meet the requirements of the VCS Program Guide (Version 4.4) and the VCS Standard (Version 4.6), as well as the project methodology, VM0042 Methodology for Improved Agricultural Land Management (Version 2.0) and associated tools. Any uncertainties with the validation are addressed in the AFOLU non-permanence risk tool completed by the project proponent. Model uncertainties are covered in the model validation report completed by the independent model expert.

The validation was performed through a combination of document review, interviews with relevant personnel during the site visit and several interviews with the project proponents throughout the audit process. During the validation, TÜV SÜD issued 2 corrective action requests, 0 non-material findings, 3 additional documentation requests and 52 clarification requests. The findings are included in APPENDIX 2. TÜV SÜD concludes that the Project correctly applies the Methodology.

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1 INTRODUCTION

1.1 Objective

The purpose of validation is to evaluate the reasonableness of the assumptions, limitations and methods that support a statement about the outcome of future project activities. The objective of validation is to assess the likelihood that implementation of the GHG-related activities will result in the achievement of GHG outcomes as stated by the responsible party. The scope of the validation included the assessment of the project description (PD) and any supporting data and documentation needed to confirm that the project proponents meet the requirements of the VCS Program Guide (Version 4.4) and the VCS Standard (Version 4.6), as well as the project methodology, VM0042 Methodology for Improved Agricultural Land Management, Version 2.0 (Methodology) and associated tools. TÜV SÜD evaluated whether the Project complies with the validations criteria, as set out in the criteria documents listed in Section 1.2 of this report and that the data provided to the validation team can be documented and if errors or omissions were detected, they be corrected by the responsible party.

1.2 Scope and Criteria

This is the validation for the first crediting period from 20 March 2021 to 19 March 2041. The validation scope includes the organizational boundaries of the Project and all associated processes. The GHG emission sources, sinks and reservoirs (SSRs) include soil organic carbon (SOC), enteric fermentation from livestock, manure deposition, use of nitrogen fertilizers, and use of nitrogen fixing species. CO_2 (carbon dioxide), CH_4 (methane) and N_2O (nitrous oxide) are the only GHGs included in the scope of the Project.

The validation team conducted the validation based on the following criteria:

- VM0042 Methodology for Improved Agricultural Land Management – Version 2.0 - 30 May 2023
- VCS Standard, Version 4.6 – 21 March 2024
- VCS Program Definitions, Version 4.5 – 16 April 2024
- VCS Program Guide, Version 4.4 – 29 August 2023
- Registration & Issuance Process, Version 4.4 – 4 October 2023
- AFOLU Non-Permanence Risk Tool, Version 4.2 – 12 October 2023
- VMD0053 Model Calibration, Validation, and Uncertainty Guidance for the Methodology for Improved Agricultural Land Management, Version 2.0 of October 2020

- VCS Validation and Verification Manual, Version 3.2 - 19 October 2016
- ISO 14064-3:2019 “Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas statements”

1.3 Reasonableness of Assumptions

As required by ISO 14064-3:2019, validations are no longer conducted to an assurance level. The validation conclusion is based on evaluation of the PD, evidence gathered by the validation team, and interviews with key personnel involved in developing and implementing the project. The validation determined that the Project was in conformance with the VCS Program rules and that assumptions and methods defined in the PD were reasonable and supported a statement about the outcome of future activities.

The validation was conducted with a quantitative materiality threshold of 1%, meeting the VCS Standard requirements for projects: greater than or equal to 300,000 tonnes CO_2e per year. Qualitative matters that may be material have also been considered.

1.4 Summary Description of the Project

The Agoro Carbon USA Cropland Program is a grouped VCS project implemented by Agoro Carbon Alliance (“Project Proponent”).

The Program will implement a package of regenerative agricultural land management activities. The implementation of these practices will lead to increases in carbon sequestration rates in the soil, reduced soil disturbance and soil erosion, improved crop residue and water management, as well as potentially reducing the total usage of fossil fuels. At the time of validation, there were 83 producers (1440 fields) enrolled in the Project.

The main objective of the Project is to provide the financial, agronomic and educational support needed for farmers to adopt new farming practices that not only produce agricultural products in a sustainable and profitable way, but also have a positive impact on climate change. During the project period, enrolled farmers will be assisted by the Agoro Carbon agronomic team to implement these project activities to transition from conventional to regenerative farming systems. Agoro Carbon's scientifically-based program is designed to overcome existing barriers that otherwise prevent the adoption of improved land management practices. Through its carbon credit Program, Agoro Carbon provides farmers with financial incentives through the issuance of carbon credits.

The baseline practices are the “business as usual” agricultural management practices made by a farmer prior to implementing the practice changes associated with their participation in Agoro Carbon’s Program. For each field within the project area, past management practices (i.e. tillage, planting, harvest, and fertilization events) over a three-year look-back period are recorded and complied to determine the baseline scenario.

In addition to the contribution to the Sustainable Development Goal (SDG) 13 Climate Action, the project activity will contribute to the following SDGs: Zero Hunger (SDG 2), Quality education (SDG 4), Clean Water and Sanitation (SDG 6) and Decent Work, Economic Growth (SDG 8) Climate Action (SDG13), and Life on Land (SDG 15).

2 VALIDATION PROCESS

2.1 Method and Criteria

The validation team performed a review of the project description (PD) and supporting information and documents against VM0042 Version 2.0 and the Criteria listed in section 1.2. The validation team conducted a strategic analysis and risk assessment of the Project. The strategic analysis allowed the validation team to identify types of potential material misstatement and their likelihood of occurrence.

The analysis and assessment were used to develop an evidence gathering plan. The validation team then executed the evidence gathering plan to address any inherent and control risks that were associated with the Project. TÜV SÜD selected areas of medium or high risk identified in the evidence gathering plan for review and assessment. The validation team followed the evidence gathering plan which targeted data and documents provided by the project proponent to confirm applicability conditions, project boundaries, baseline scenarios, additionality, whether the correct quantification methods were included in the PD and the proposed monitoring plan.

The validation process, conducted as an audit, involved a detailed review of the PD and supporting documents. The audit team cross-checked each element against identified requirements, ensuring accuracy and compliance. This included a thorough examination of project documents, financial statements, and contracts. Discrepancies were flagged for corrective action or clarification, and the process focused on comparisons to validate the Project's alignment with specified criteria. The findings were documented and are listed in APPENDIX 2: List of Findings.

TÜV SÜD used a risk-based approach to assess the Project against the VCS Program rules and requirements including the criteria defined in Section 1.2 of this document.

The validation process included the following independent and objective activities:

- Contract award - 14 March 2023
- Complete internal conflict-of-interest (COI) review - 24 April 2023
- Complete Verra Notice Of Verification Services (NOVS) form - 31 March 2023
- Kickoff meeting - 16 May 2023
- Provide initial data request items to TÜV SÜD – 23 May 2023

- Perform strategic analysis and risk assessment and prepare Validation Plan & Evidence Gathering Plan – May - June 2023
- Conduct site visit – 18 – 22 August 2023
- Conduct desktop review – May 2023 - June 2024
- Provide initial list of findings to client – 15 September 2023
- Complete list of findings – 03 June 2024
- Independent Review – 16 July 2024
- Provide draft deliverables to client – 16 July 2024
- Submittal of deliverables to client – 26 August 2024
- Exit meeting – 03 September 2024

2.2 Document Review

The validation process was executed through reviewing the PD and supporting documents to confirm eligibility criteria and by following the evidence gathering plan informed by the strategic analysis. The audit team systematically cross-checked each aspect against the identified and stated requirements (see section 3.3.2 Applicability for a list of exact requirements reviewed and evidence provided by the responsible party). This comprehensive review encompassed a detailed examination of project documents, including the PD, objectives, technical specifications, and data and documentation. The validation team consulted external sources of information to confirm the validity of statements and assumptions made by the project proponent. These external sources included published, peer-reviewed journal articles and technical reports and publications. These documents helped provide a comprehensive and broad understanding of the topics discussed in the PD as well as the complex interactions between the project activities, natural ecosystems, human environments, and socio-economic factors. In many cases, the project proponent provided TÜV SÜD with peer-reviewed journal articles and technical reports and publications to support their statements and assumptions. However, it is still necessary to dive deeper in order to conduct a robust and comprehensive review of the project, the project activities, and any potential impacts of the project activities. These external sources are cited throughout this report. Any citation provided in this report was not provided by the project developer. The complete list of documents provided by the project developer and reviewed by TÜV SÜD can be found in Appendix 3.

Throughout the audit, a keen focus was maintained on precision, with special attention given to numerical data, timelines, and critical information. Any discrepancies or deviations from the identified requirements were documented and brought to the attention of the project proponent for clarification or correction via the issues log. The validation process, characterized by objectivity and thoroughness, yielded findings that were systematically recorded and addressed by the Project Proponent.

2.3 Interviews

The interview process was designed to gather comprehensive insights beyond the details presented in the PD and supporting documents. Key personnel involved in the Project were strategically identified and interviewed. The following individuals played pivotal roles in the interview process:

1. **Yuriy Lozynskyy – Carbon Scheme and Verification Manager:** The verification manager provided an overarching view of the Project, discussing its goals, timelines, and overall strategy. The validation team held several calls via telecommunication to gain an understanding of the Project processes, data collection, and project execution. Yuriy was instrumental in providing details on how the Project is carried out in the field, how data is collected in order to meet requirements of the Methodology and responding to findings raised during the validation.

2. **Technical Experts / Team Members / QA/QC officers: Christopher Chapman – Value Chain Manager, Giulia Sartori – Head of Carbon, Christopher Daley – Carbon Project Development Specialist, Yebin Zhao – Head of Science and Interim MD USA, Susan Wong – Senior Data Scientist, Carbon Modelling.** Interviews were conducted with technical experts or team members who possess specialized knowledge crucial to the Project's implementation and data tracking/recording. These discussions delved into the technical issues regarding data collection from farmers (project participants), how project areas were mapped, monitoring methodologies employed to track key data points, monitoring processes and other criteria related to Project design.

3. **Project Participants (farmers implementing project activities): J. S., K.M., Z.R., C.J., E.C., J.S., T.C., C.T., D.B. C.R., S.R., B.P., K.L., R.F., B.C., D.M., C.A., J.S., J.T., G.W., R.H., M.A.** During the site visit, TÜV SÜD's Lara Hughes-Allen and Phillip Cunningham interviewed project participants to confirm baseline activities, barriers to implementing the project activity, common practices, whether any regulatory requirements exist that require the project activity, data monitoring, collection and transcription, and questions regarding stakeholder engagement by the project proponent.

   The interviews with project participants confirmed many of the claims described in the project description: namely that the carrying out the project activities pose significant financial, cultural and technical barriers to participants, that the suite of proposed practices is not common practice in each region, and that the baseline activities prior to the project were accurately modelled as part of pre-project agricultural land management (ALM) activities.

2.4 Site Visits

TÜV SÜD's Lara Hughes-Allen and Phillip Cunningham conducted site visits from 18 – 22 September 2023 to fields and pastures located in Minnesota, Iowa, Illinois, Texas, Oregon, and Washington associated with 20 different producers. There were 83 producers enrolled in the project at the time of validation (1440 fields). Due to the large number of producers and the substantial geographic area included, TÜV SÜD selected a subset of producers to visit during the site visit. The initial selection of producers was a random selection completed using Python. The selected producers were adjusted to maximize the number of fields and producers it was feasible to visit during the site visit.

Prior to the site visit, the TÜV SÜD team prepared a site visit agenda with the help of the project proponent in order to efficiently visit as many fields as possible over a large area of the United States. During the site visit, the TÜV SÜD team interviewed the project proponents and 21 project participants as noted in section 2.3 of this report.

The validation team used the car rides in-between individual ranches and fields to interview Agoro Carbon's team (specifically Ryan Winter, Shawntel Ervin, Steve Hasselman, Giulia Sartori, Chris Daley, Alex Fiock, and Stella Gama) to gain an understanding of project implementation, review the organizational aspects of the project proponents and project participants, how data is collected, how the proponent confirms that project activity instances are eligible and how stakeholder engagement is carried out.

During the field visits, the validation team arrived at the selected farmer's property and interviewed the ranchers and farmers carrying out the project activity. The team asked questions about past ALM history for fields included in the project (to confirm baseline schedules for crop / practices), took notes and photographed equipment necessary to carry out project activities. The farmer would then take either member of the validation team to specific fields that were included in the project. The team took pictures of individual fields and equipment in order to confirm implementation of project activities (see photos below).

The validation team used information gathered from interviews to compare what a farmer verbally told the team and what data was input into DayCentEVI (the validated model). Farmers demonstrated how planters record data through Deere Operations, a web-based application provided by John Deere, to track a plethora of information including data points input into DayCentEVI. Data included planting and harvesting dates, amounts and types of fertilizers used, crop types planted, row spacing, and number of cultivation passes. Farmers share data from Deere Operations (if available), written records, receipts or pictures of receipts with the Agoro Carbon team. The responsible party reviews all farmer data needed in order to accurately model emissions data. If anomalies are detected, the Agoro Carbon team reaches out to project participants to rectify any errors.

All fields visited were in the process of carrying out project activity(s). The below photographs show either fields that had changed management practice (reduced tillage or cover cropping) or equipment necessary to carry out project activities (vertical tillers, residue choppers and multi-storage crop wagons). For the project areas visited, TÜV SÜD confirmed that the correct GHG SSRs were included in the project boundary and viewed infrastructure put in place in order to carry out project activities.

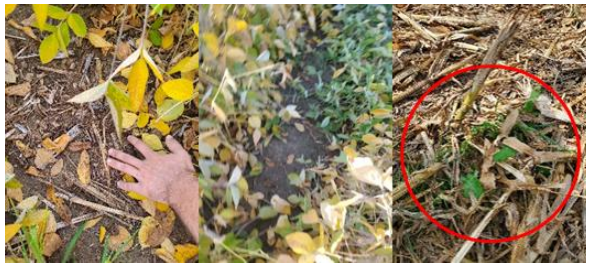

Figure 1. Fields implementing no till with cover crops; note the emergence of cover crop in the picture to the right. Photo credit: P. Cunningham

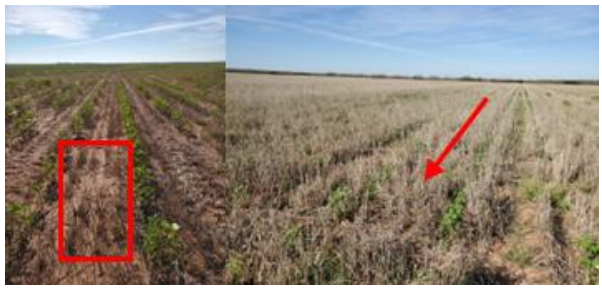

Figure 2. Residue from cover crops and evidence of no-till prior to the emergence of a new cotton crop. Photo credit: P. Cunningham

Figure 3. Fields implementing no till; note the absence of furrows between row crops. Photo credit: P. Cunningham

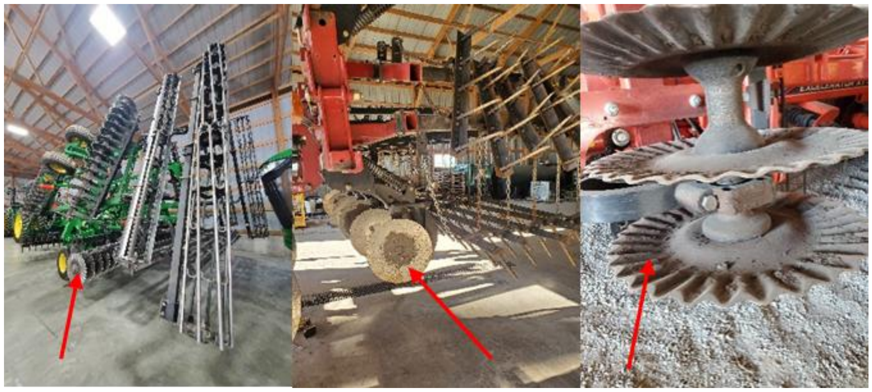

Figure 4. Equipment purchased to implement low impact tilling / no-till. Note the vertical tillage layout of equipment in order to reduce soil disturbances. Photo credit: P. Cunningham

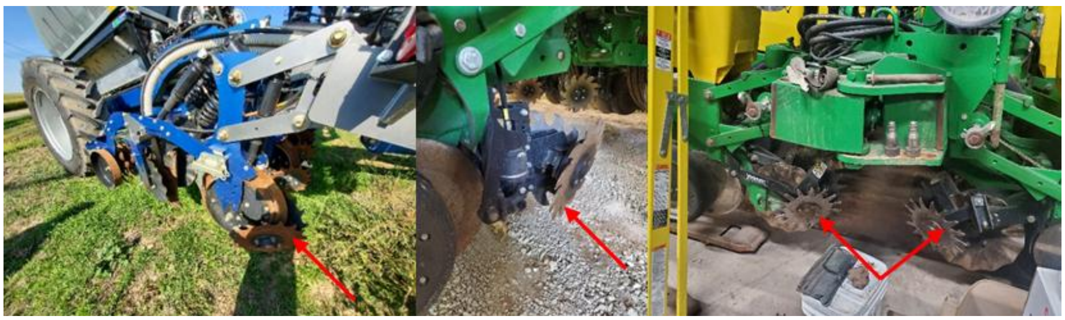

Figure 5. Equipment purchased to implement low impact tilling / no-till. Note the choppers at the back of equipment to assist in knocking down residue from the prior years' crops. When reduced tillage is implemented, residue must be managed due to the lack of conventional tillage and chopping. Photo credit: P. Cunningham

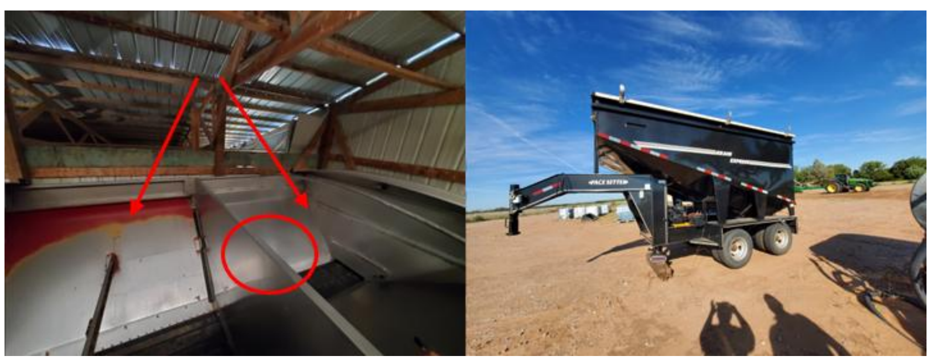

Figure 6. Equipment purchased to implement cover crops. Note the double load out in the trailer on the left to carry different cover crops (the red circle shows the divider in the trailer). The cover crops are spread during / after harvest. Photo credit: P. Cunningham

2.5 Resolution of Findings

The resolution of findings is summarized in the table in APPENDIX 2: List of Findings.

2.5.1 Forward Action Requests

TÜV SÜD is not issuing any forward action requests.

3 VALIDATION FINDINGS

3.1 Project Details

The project is a grouped project under Sectoral Scope 14 (Agriculture Forestry and Other Land Use or AFOLU). The Agoro Carbon USA Cropland Program, managed by Agoro Carbon Alliance, focuses on regenerative agricultural practices across the following US states: Colorado, Idaho, Illinois, Indiana, Minnesota, Nebraska, Oregon, South Dakota, Texas, Washington, and Wisconsin..

The program promotes reduced tillage, no tillage, cover cropping, and improved nitrogen management to mitigate greenhouse gas emissions and foster carbon sequestration. By supporting farmers in adopting these practices, the program aims to make agriculture more sustainable and profitable while combating climate change. Enrolled farmers receive financial, agronomic, and educational support to transition to regenerative farming systems, aided by Agoro Carbon's expert team. Through carbon credit incentives, the program encourages the adoption of environmentally friendly practices, overcoming existing barriers in conventional farming.

The validation team carefully reviewed the Project Description (PD), comparing it against the VCS Standard (Version 4.6, 21 March 2024), as well as relevant templates and guidelines. The PD is comprehensive and aligns with the requirements outlined in the VCS PD template version 4.3, VMD0053, and VM0042. It effectively communicates the project's objectives, baseline scenario, and planned activities for the monitoring periods within the initial crediting period. The team identified corrective action requests regarding fulfilling template instructions, which the Project Proponent promptly addressed before the conclusion of validation (refer to APPENDIX 2: List of Findings). Overall, the PD provides a clear and accurate overview of the project.

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Audit history	TÜV SÜD was contracted by the project developer to complete the first validation for this project. The contract was signed by both parties on 15 March 2023. TÜV SÜD held the kick off meeting on 16 May 2023. A site visit was held between 18 September 2023 to 23 September 2023.

Sectoral scope	Sectoral Scope 14 (Agriculture Forestry and Other Land Use or AFOLU). TÜV SÜD confirmed the sectoral scope of this project during the site visit and review of project documentation.
AFOLU project category, if applicable	Agricultural Land Management (ALM). TÜV SÜD confirmed this during the site visit and review of project documentation.
Project activity type	The project activity type is Improved Cropland Management (ICM). TÜV SÜD confirmed the project activity type during the site visit and review of project documentation.
General eligibility of the project to participate in the VCS Program	The project has applied the eligible VCS Methodology VM0042 Methodology for Improved Agricultural Land Management Version 2.0 (30 May 2023) and VMD0053 Model Calibration and Validation Guidance for the Methodology for Improved Agricultural Land management Version 2.0 (30 May 2023). TÜV SÜD found no evidence that carrying out the project activities would lead to a violation of any applicable laws in the specified region. Changes in agricultural practices take place on private land and no permit is required to carry out project activities. Under VM0042, the choice of biogeochemical model is determined by the project developer. The validation team, specifically the independent model expert, reviewed the model and confirmed that DayCentEVI has met VMD0053 requirements (see the Agoro Carbon Alliance Model Validation Report for more information). The independent model expert agrees that the model is appropriate for the project circumstances. The project proponent does not use third-party default factors or standards to determine GHG emissions data or supporting data for establishing baseline scenarios or demonstrating additionality. Instead, Agoro Carbon incorporates field specific data into the approved model to quantify CO_2 sequestration. All VM0042 requirements for additionality were met.

	The project activities are not excluded under Table 1: Excluded Project Activities (from the VCS Standard). The public comment period for this project was from 11 May 2023 - 10 June 2023. The opening meeting between TÜV SÜD and Agoro Carbon was on 16 May 2023. The start date of the project is 20 March 2021. The project was listed on the project pipeline within three years of the project start date, and the VVB opening meeting took place while the project was listed on the project pipeline as under validation, thus meeting all pipeline listing and validation deadlines set out in the VCS Standard, v4.6. VM0042 is eligible under the VCS program and this methodology does not have any scale and/or capacity limit. TÜV SÜD concludes that the project has met the eligibility requirements.
AFOLU project eligibility, if applicable	This is an ALM project that does not occur in a REDD+ jurisdiction or on wetlands. The project activity does not convert native ecosystems to generate GHG credits nor does it drain or degrade hydrological functions in the project area. The validation team confirmed that the project proponent has implemented methods to check whether project areas have been cleared of native ecosystems or drained of wetlands. The validation team reviewed supplementary information provided by the project proponent which detailed the methods used to identify wetlands and clearing of native ecosystems. These methods were found to be well-established, robust, and well-cited in peer-reviewed papers. The validation team reviewed the project proponents' provided outputs of these methods for a subset of farms included in the first set of grouped project activities. The validation team also independently assessed whether project areas occurred on wetlands. This analysis was done in QGIS 3.28 Firenze (QGIS) using wetland data that is freely available and downloaded from the National Wetland Inventory Version 2, surface waters and wetlands. The spatial intersection

	analysis showed negligible overlap between the project areas shapefile and the wetland shapefile. TÜV SÜD also reviewed Agoro Carbon's analysis of clearing and land conversion within 10 years of the project start date. Before signing a contract with Agoro Carbon, growers are interviewed by representatives to ensure the land has not been cleared of native ecosystems for at least 10 years prior to enrolment. If a grower decides to join the project, they must legally confirm in the contract that their enrolled acres have not been cleared of native ecosystems within the 10 years immediately preceding the project start date. Agoro Carbon uses also relies on the USDA's NASS Cropland Data Layer (CDL) to determine land cover before project implementation. Agoro Carbon also employs a "Change Detection" method, which involves analyzing changes in land surfaces over time using satellite and/or aerial imagery. Where these analyses identify project areas that might not be in conformance with the protocol requirements, Agoro Carbon conducts further investigation, which might include calls with the landowner and a site visit. TÜV SÜD independently verified the above analyses using the CDL layer. These analyses were completed in QGIS (Zonal Histogram) and Python. In Python, a function was created to calculate the sum of values within a specified range for each year. This range corresponds to cropland land use pixel values. The percentage of cropland cover is calculated for each project area polygon. The function identifies any polygons which experience a substantial change in the percentage of cropland land use cover within 10 years of the project start date. Any instances where it was unclear if the 10 year no clearing criteria was met were discussed with Agoro Carbon and resolved. This is not a baseline reassessment validation. The project proponent prepared a non-permanence risk report and the validation team confirmed that the information therein was accurate. The validation team also

	requested information to confirm that the selection of each risk category was accurate. TÜV SÜD concludes this is an eligible AFOLU project.
Transfer project eligibility, if applicable	The Project is not transferring from another GHG program, and this section is not applicable.
Project design	VM0042 indicates that grouped projects must include one or more sets of eligibility criteria for the inclusion of new project activity instances ensuring that new project activity instances have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area. VCS 3634 is a grouped project and eligibility criteria for any new instances wishing to participate in the project activity are included in the PD starting on page 7 including: 3.6.10. The geographic area within which a project activity instance may be developed is the political borders of the United States of America excluding Alaska and Hawaii. TÜV SÜD confirmed that all initial project activity instances are within the defined geographic area by running an intersection analysis between the project area shapefile and contiguous United States shapefile in QGIS (Vector Menu→Geoprocessing Tools →Intersection Tool). Geographic areas with no initial project activity instances have not been included in the project. Initial project activity instances are located in the following states: Colorado, Idaho, Illinois, Indiana, Minnesota, Nebraska, Oregon, South Dakota, Texas, Washington, and Wisconsin. 3.6.11. TÜV SÜD verified that the determination of the baseline scenario and demonstration of additionality are based on initial project activity instances. The baseline scenario is 'business-as-usual' cropping practices, which vary based on region and practice change. For example, the baseline practice for farmers implementing no or reduced tillage is conventional tillage. The baseline practice for farmers implementing cover cropping varies based on region, crop type, and traditional farming method, but could include monocropping and/or leaving fields fallow between cultivation of the crop. TÜV SÜD reviewed documentation provided by the Project Proponent

	related to the baseline scenario for a subset of farmers and instances. The subset of farmers were randomly selected from the full list of active farmers and instances using random.choice (Visual Studio Code v.1.88.1; Python programming language). TÜV SÜD reviewed baseline documentation for the selected farmers including instance start date, baseline conditions, and project activities implemented, as well as associated evidence to corroborate these variable (i.e., receipts for equipment needed to implement project changes, planting and harvesting records, yield records, etc.). All instances reviewed had the requisite three years of baseline data. TÜV SÜD confirmed that all initial instances reviewed were developed to a sufficient level of detail to enable their assessment at validation. During the site visit, TÜV SÜD discussed the baseline scenario with farmers and compared their descriptions of the baseline scenario to documentation provided by the Project Proponent. 3.6.12. This project implements multiple project activities: reduced and no tillage, cover crops, and improved nitrogen fertilizer management. Based on the baseline scenario and specific regional characteristics, one or more of these practice changes may be implemented on potential project areas. Implementation of a single or multiple practices changes is not necessarily restricted to any specific geographic region, but rather the suitability of specific project areas. During the site visit, TÜV SÜD discussed the process of determining which practice changes can be implemented on potential fields with members of the Agoro Carbon Alliance grower success team. This determination is based on multiple factors including historical cropping practices, region, existing and planned infrastructure, and potential yield changes, among other variables. The PD details the specifics of the implementation of each practice change and the minimum thresholds that must be achieved for a practice change to be determined to have been successfully implemented, as applicable. For example, growers who implement reduced till must have a tillage system intensity that is at or below 0.144.

	3.6.13. The baseline scenario for this project is based on continuation of pre-project practices. This baseline is determined by examining the field's management history over a 3-year period and/or a full crop rotation. Evidence for this historical analysis includes documents like management plans, field boundaries, machine data, receipts, attestations from farmers, and other similar records. TÜV SÜD reviewed these data for the subset of farmers and fields described above. The data reviewed support the stated baseline scenario for the fields reviewed by TÜV SÜD. The farming practices observed in the 3 years before the project's initiation are consistent with typical practices for the respective regions, as confirmed by USDA and state data. Throughout the project's crediting period, The Project Proponent will reassess the schedule of activities to ensure it reflects the current agricultural production trends in the region. To ensure accuracy, regional agricultural production data from within the 10 years prior to the baseline period's end is consulted. 3.6.14. Adoption rates of reduced till, no till, and cover cropping were determined by state, using the Climate Action Reserve's additionality tool. Agoro Carbon Alliance contracted AGES (Agronomic, Geologic and Environmental Services, University of Missouri) to determine the practice change adoption rate of nitrogen management as this is not included in the Climate Action Reserve's additionality tool. AGES reviewed published, peer-reviewed literature, farmer survey data, and interviewed experts to identify adoption rates for combinations of source, rate, time, and placement (4R nutrient stewardship) of nitrogen that result in a reduction of nitrogen fertilizer application. However, due to the limited availability of survey data, and published literature, AGES relied on expert opinions to describe current practices and estimate adoption rates. A total of 24 experts contributed, with 15 providing direct testimonials. Their analysis covers 20 state-crop scenarios, although the report distinguishes between rainfed and irrigated farming for some states. The crops evaluated were:

	● Winter and spring wheat (ID, OR, WA, KS, CO, WY, TX) ● Corn (IL, IA, KS, MN, MO, NE, ND, SD, WI) ● Potato (MN, WA) ● Cotton (TX). Adoption rates of combinations of best management practices that reduce the amount of nitrogen inputs to crop land were between 5% — 20%. These values are consistent with those presented in the USDA publication 'Conservation-Practice Adoption Rates Vary Widely by Crop and Region' (T. Wade, R. Claassen, and S. Wallander, 2015) reviewed by TÜV SÜD to corroborate the information provided in the AGES analysis. 3.6.15. The factors relevant to the determination of the baseline scenario are determined for each individual project instance. As discussed above, TÜV SÜD reviewed baseline documentation for a subset of farmers including instance start date, evidence corroborating instance start date (ex. receipts for equipment needed to implement project changes), and evidence documenting the baseline scenario (ex. seed receipts and invoices, yield reports, harvesting and planting reports, etc.). All instances reviewed had the requisite three years of baseline data. The factors relevant to the demonstrations of additionality were determined by state, for states in which the project has developed project instances. As discussed above, the Project Proponent used the Climate Action Reserve's additionality tool to determine statewide adoption rates for reduced till, no till, and cover cropping to determine that the adoption rates for these activities are below the common practice threshold. The Project Proponent contracted AGES to determine the practice change adoption rate of nitrogen management as this is not included in the Climate Action Reserve's additionality tool. The adoption rate of nitrogen management was

	also determined by state and crop type to be less than the common practice threshold. 3.6.16. and 3.6.17 The Project Proponent has listed one set of eligibility criteria for the inclusion of new project activity instances in the PD. This set of eligibility criteria is applicable to each combination of project activities and the entire geographic scope of the project (continental US). The following eligibility criteria are described in the PD: the farmer has contracted with Agoro Carbon Alliance to enroll in a Program that requires implementing new agricultural practices, as per VM0042 v.2 guidelines. These practices could include zero or reduced tillage, nitrogen management, or cover cropping. Any quantitative adjustments, such as reduced fertilizer application, must exceed a 5% change from historical values. Project activities must take place on cropland and remain as such throughout the crediting period. The land must not have been cleared of native ecosystems in the past 10 years. Each project area must be uniquely defined and may include multiple landowners. Baseline scenarios and additionality will be assessed across the project's geographic area, ensuring no overlap with other AFOLU projects. The project should not decrease productivity by more than 5% and must avoid wetlands. The baseline is the continuation of existing practices. Carbon sequestration will be measured according to specified methodologies, and projects must follow the established Monitoring Plan. Farmers must not receive other carbon credits for the same practices or have sold related carbon rights. Projects cannot be part of other VCS projects and must have start dates no earlier than the Project's start date. Eligibility for crediting starts from the project activity's start date or the verification period's start date. New project proponents must be added to the project description within five years of the project start date. These eligibility criteria are consistent with the VCS Standard v.4.6
Project ownership	Agoro Carbon Alliance holds ownership and legal rights over the project activities. This ownership is established through a "Carbon Credit Generation Agreement," where

	each participating farmer assigns the title to the carbon credits and related environmental benefits to Agoro Carbon. The Project Proponent has the legal right to design and present projects that lead to GHG emissions reductions and removals. Farmers retain the legal authority to manage the project activities on their land, based on ownership, lease, or other property rights. This is confirmed through an attestation of property rights, which is an addendum to the Carbon Credit Generation Agreement and individually signed by each farmer. Project ownership is authorized through an enforceable and irrevocable agreement with the entity that holds the statutory, property, or contractual rights to the land, vegetation, or other elements involved in the GHG emissions reduction or removal process. This agreement formally grants project ownership to the Project Proponent. Thus, the ownership structure aligns with VCS Standard, par. 3.7.1 6), which requires an enforceable and irrevocable agreement with the entity holding statutory, property, or contractual rights in the land, vegetation, or conservation or management process that yields GHG emissions reductions or removals. This arrangement confers project ownership to the Project Proponent. TÜV SÜD reviewed the Carbon Credit Generation Agreement and found that it meets the GHG credit ownership requirements of the Protocol and VCS Standard. TÜV SÜD also reviewed the Annex included in the Carbon Credit Generation Agreement in which the producer attests to their right to implement project activities on the acres attributed to them either through ownership of the property or a legal lease of the property and found it to be satisfactory. TÜV SÜD confirms that the Project Proponents control 100% of the initial project activity instances through the Carbon Credit Generation Agreement. TÜV SÜD reviewed six fully executed Carbon Credit Generation Agreements and found them to be satisfactory. TÜV SÜD confirms that

	the Project Proponents meet the requirements of section 3.7.1 of the VCS standard.
Project start date	20 March 2021 According to the VCS Standard, the project start date of an AFOLU project is the date on which activities that lead to the generation of reductions or removals are implemented (e.g., preparing land for seeding, planting, changing agricultural or forestry practices, rewetting, restoring hydrological functions, or implementing management or protection plans). This date is the start of activities under the first phase of the grouped project that resulted in the generation of GHG emission removals. This is the date on which a farmer enrolled in the program practiced no till rather than conventional tillage, as in the baseline scenario.
Project crediting period	20-March-2021 to 19-March-2041 This is an AFLOU project that meets the requirements of section 3.9.3 and as such, the initial crediting period is correctly defined as a minimum of 20 years. As stated in the PD, the crediting period may be renewed four times with a total project crediting period not to exceed 100 years. This meets the requirements in the VCS Standard v.4.6.
Project scale	The estimated average annual ERRs for this project is 301,746tCO_2e). This project is therefore defined as a 'large project' under the VCS standard v.4.6.
Likelihood of achieving estimated GHG emission reduction or removals	TÜV SÜD considers it likely that the estimated quantity of emission reductions may be achieved by the Project Activity should the assumptions and operational conditions remain the same, including expansion of the project activity subsequent to project validation. In accordance with ISO 14064-3:2019 and the standard, validation and verification bodies no longer provide a level of assurance for validations.

Technologies and measures implemented by the project activity or activities	The technologies and measures implemented in this Project are reduced and no till agriculture, cover cropping, and improved nitrogen fertilizer management. These activities have been shown in numerous peer reviewed journal articles and reports to improve the organic carbon retention potential of soils (please see section 3.2.4 for examples) . TÜV SÜD confirmed these technologies and measures through careful review of documentation, including invoices, harvest and planting records, and spatial data. These technologies and measures were also witnessed in person during the site visit. Please refer to section 2.4 for pictures and descriptions related to the site visit.
Implementation schedule of the project activity or activities	The implementation schedule starts with the project start date, as confirmed above. TÜV SÜD confirms that the dates related to this validation audit are accurate. Members of the Grower Success Team (Agoro Carbon) confirmed during the site visit that new farmers are enrolled on a rolling basis, as described in the PD. Agoro Carbon is well positioned to handle farmer signup on a rolling basis. They have streamlined information gathering and the process to confirm that potential farmer fields meet the Protocol requirements. Several farmers mentioned the Grower Appreciation Events held by the Project Developer, as described in the PD.
Project location	This is a grouped project with activity instances across the continental United States. The methods used to confirm project location are detailed above.
Conditions prior to project initiation	The baseline practices are standard agricultural management methods that farmers employ before implementing enhanced agricultural land management techniques. These practices typically involve conventional nitrogen fertilizer application, tillage methods, and the lack of cover cropping, among others. To establish the baseline scenario for each field within the project area, historical management practices such as tillage, planting,

	harvesting, and fertilization events are documented over a three-year period. This information is crucial for determining baseline emissions or stock changes, which are then either modeled or directly measured (in the case of soil organic carbon stock change) in relation to the scheduled activities. The crop types and practices assumed in the baseline scenario are regularly reassessed according to the VCS Standard and adjusted as necessary to accurately reflect current agricultural production trends in the respective regions. TÜV SÜD reviewed documentation provided by the Project Proponent related to the baseline scenario for a subset of farmers and instances. The subset of farmers were randomly selected from the full list of active farmers and instances using random.choice (Visual Studio Code v.1.88.1; Python programming language). TÜV SÜD reviewed baseline documentation for the selected farmers including instance start date, baseline conditions, and project activities implemented, as well as associated evidence to corroborate these variable (i.e., receipts for equipment needed to implement project changes, planting and harvesting records, yield records, etc.). All instances reviewed had the requisite three years of baseline data. TÜV SÜD confirmed that all initial instances reviewed were developed to a sufficient level of detail to enable their assessment at validation. During the site visit, TÜV SÜD discussed the baseline scenario with farmers and compared their descriptions of the baseline scenario to documentation provided by the Project Proponent. TÜV SÜD concludes that the requirements related to the conditions prior to project initiation have been met.
Project compliance with applicable laws, statutes and other regulatory frameworks	The project proponent provided evidence and the validation team confirmed that there are no applicable laws, statues or other regulatory framework that mandate the implementation of improved agricultural land management activities employed by the project. Agoro Carbon does not directly execute project activities; instead, it relies on the involvement of participating farmers. All farmers must sign the "Carbon Credit Generation

	Agreement," thus ensuring that all activities conducted on the land are agreed upon through this freely negotiated agreement, which may involve consultation with legal counsel. In the Carbon Credit Generation Agreement, farmers must indicate whether any of their land are classified as tribal or Native American Land. These farmers are held to the same ownership and leasing standards as farmers whose land is not classified as tribal or Native American Land and they must attest to their legal right to operate and implement project activities on the land. Agoro Carbon continually monitors overlap between project areas and tribal and Native American Land. TÜV SÜD reviewed the evidence provided by Agoro Carbon and confirms that the Project activity complies with all applicable laws, statutes and other regulatory frameworks.
Double counting and participation under other GHG programs	The project activities and associated emission reductions are not included in an emissions trading program or binding emission limit. The validation team observed no evidence that the Project is receiving or seeking credit for reductions from the project activity under another GHG program. The validation team's search for the Project in publicly available registries for other GHG programs returned no results. Additionally, the validation team has observed no evidence that the project has been rejected by another GHG program. TÜV SÜD concludes, based on the evidence reviewed, that the project is not participating in other GHG programs.
No double claiming with emissions trading programs or binding emission limits	The project activities and associated emission reductions are not included in an emissions trading program or binding emission limit. TÜV SÜD concludes, based on the evidence reviewed, that the project is not participating under other GHG programs.

No double claiming with other forms of environmental credit	The project proponent stated in the PD that the Project has not sought or received any other form of GHG-related environmental credit, and the validation team has seen no evidence that the Project has sought other credits. TÜV SÜD concludes, based on the evidence reviewed, that the project is not seeking other forms of environmental credit.
Supply chain (Scope 3) emissions double claiming	Agoro Carbon Alliance is not a buyer or seller of any product whose emissions footprint is changed by the project activities.
Sustainable development contributions	The Project Proponent has identified six sustainable development goals (SDGs) that will be positively supported by this project including: *2: Zero hunger* *2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.* According to the USDA, 88% of farms in the U.S. are "small family farms," earning less than $350,000 in gross cash farm income (GCFI) annually. Although the Agoro Carbon Alliance does not require financial statements from growers, it is likely that most fall into this category. The project aims to create a diversified revenue stream for farmers and/or enhance their current revenue sources. Over time, this is expected to allow farmers to command higher prices for their products due to increased demand for low-carbon goods. Additionally, many farmers that TÜV SÜD spoke with during the site visit mentioned a decrease in operation costs (after a substantial upfront investment) related to implementation of the project activities. Agoro Carbon can easily assess the impact of the project on this indicator by tracking the number of farmers enrolled in the project and receiving carbon credit payments.

	2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality. The activities associated with this project are directly related to ensuring sustainable food production systems and implementing resilient agricultural practices that increase productivity, help maintain ecosystems, strengthen capacity for adaption to climate change, and progressively improve soil quality. Please refer to section 3.2.4 of this report for a detailed discussion of the impacts of this project on these variables. Agoro Carbon can easily assess the impact of the project on this indicator by tracking the number of hectares enrolled in the project. *4: Quality Education* *4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.* This project will support education of farmers on sustainable agriculture practices. The grower success team of Agoro Carbon includes experts on the relevant agricultural practice changes and regional variables that need to be managed. This indicator will be monitored by assessing the number of farmers currently enrolled in the project and receiving training and agronomic advice. *9: Industry, innovation, and infrastructure* *9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.* This project is directly related to the upgrading of infrastructure (tractors, fencing, seed drills, etc.) to make them more sustainable, as evidence by the estimated ERRs generated by the project. Reduced and no-till

	practices preserve soil structure, enhance organic matter, reduce erosion, and sequester carbon, aligning with the adoption of environmentally sound technologies. Improved nitrogen efficiency through precision agriculture and enhanced fertilizers minimizes environmental impact and lowers greenhouse gas emissions, making agriculture more economically sustainable. Cover cropping protects soil from erosion, enhances water retention, improves soil fertility, and suppresses weeds and pests, reducing the need for chemical inputs. These practices collectively contribute to sustainable soil management, better crop yields, and more efficient resource use, supporting the global move towards sustainable and resource-efficient farming systems. This indicator will be monitored by tracking the number of hectares currently enrolled in the project. *13: Climate Action* *13.0 The practices implemented by this project actively improve CO_2 sequestration, helping to combat climate change and it's impacts. This indicator will be monitored by tracking the number of hectares currently enrolled in the project.* *13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries* Reduced and no-till practices enhance soil structure and organic matter, making soil more resilient to erosion and extreme weather events, while also improving water retention during droughts. Improved nitrogen efficiency through precision agriculture and enhanced fertilizers ensures optimal nutrient use, reducing vulnerability to climate-related nutrient loss and minimizing environmental impacts. Cover cropping protects soil from erosion, enhances water retention, and improves soil fertility, which is crucial during extreme weather conditions. These practices collectively enhance the resilience and adaptive capacity of agricultural systems, ensuring they can better withstand and recover from climate-related hazards and

	natural disasters, ultimately supporting sustainable farming practices. This indicator will be monitored by tracking the number of hectares currently enrolled in the project. *15: Life on Land* *15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.* Reduced and no-till practices help maintain soil structure, increase organic matter, and prevent erosion, crucial for restoring degraded land and combating desertification. Improved nitrogen efficiency through precision agriculture and enhanced fertilizers ensures optimal nutrient application, promoting healthier soils and reducing the risk of nutrient runoff that can degrade land. Cover cropping protects soil from erosion, improves water retention, and enhances soil fertility, making land more resilient to drought and floods. Together, these practices restore soil health, prevent land degradation, and support sustainable land management, contributing to a land degradation-neutral world. This indicator will be monitored by tracking the number of hectares currently enrolled in the project.
Additional information relevant to the project	The leakage management plan detailed in Section 4.3 of the PD is appropriate for this project type and uses the methods and equations found in the methodology. The responsible party will monitor leakage occurring from new application of manure from outside the project area (i.e., manure applied in the project from outside of the project area, that was not previously applied in the historical baseline period) and productivity declines. Public version of the PD will exclude the farm names and exact GPS location. This will be uploaded in a confidential version to the Verra registry. There is no additional relevant information that has a bearing on the eligibility of the Project.

3.2 Safeguards and Stakeholder Engagement

3.2.1 Stakeholder Engagement and Consultation

3.2.1.1 Stakeholder Identification

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Stakeholder identification	TÜV SÜD reviewed the project proponents' identification of stakeholders. The stakeholders identified include project participants and their families, channel partners, soil samplers, and local agronomists. Based on the project activities and that they occur on private lands that are either owned or leased by project participants, TÜV SÜD agrees that the project proponent has correctly identified the stakeholders. TÜV SÜD concludes that the correct stakeholders have been identified and informed.
Legal or customary tenure/access rights	TÜV SÜD reviewed project documentation, an example of the contract between enrolled farmers and Agoro Carbon, as well as spatial data to assess the legal or customary tenure/access rights associated with this project. The project activities take place on private, commercial farmland. TÜV SÜD concludes that the project participants hold the rights to the land.
Stakeholder diversity and changes over time	The Project is a long-term engagement in diverse locations across the United States over time. The Project takes place over large regions of the United States, but the stakeholders will always include farmers. Changes over time in stakeholder diversity are not anticipated because there are no anticipated changes in the makeup of stakeholders over time. TÜV SÜD concludes that the correct stakeholders have been identified and informed and that stakeholder diversity will not change substantially over time.

Expected changes in well-being	TÜV SÜD reviewed project documentation, numerous peer-reviewed articles, and interviewed stakeholders during the site visit. Regenerative agriculture can increase soil health, water retention, microbial activity, and the Soil Organic Carbon (SOC) contents of degraded lands. Regenerative agriculture can also improve farm profitability, human and ecosystem health, and food system resilience. The project is aimed at reducing GHG emissions, improving soil health, reducing costs, and thus improving the socio-economic position and resilience of farmers that are increasingly exposed to climate-related threats. TÜV SÜD concludes that the project activities are likely to improve the stakeholder's well-being.
Location of stakeholders	Current stakeholders are in the United States and their land is identified by GIS shape files. No off-project stakeholders have been identified. TÜV SÜD concludes that the correct location of stakeholders has been identified.
Location of resources	All resources in the Project are located on current stakeholders' land in the United States. TÜV SÜD concludes that the correct resources have been identified.

3.2.1.2 Stakeholder Consultation and Ongoing Communication

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Stakeholder engagement process	TÜV SÜD reviewed the project proponents' summary of stakeholder consultation activities. TÜV SÜD also reviewed information that is provided to interested growers and discussed the stakeholder consultation process with growers during the site visit. Stakeholder consultation began 1 May 2021, before the implementation of project activities, as required by section 3.18.2 of the VCS Standard v4.6. Agoro Carbon identified four stakeholder groups including: project participants and their

	families, channel partners, soil samplers, and local agronomists. Before joining the program, participants undergo extensive consultation that can be divided into three categories: 1) before signing a contract, 2) during the contract signing, and 3) after signing but before the implementation of practices. Interested growers receive information on project design and implementation, as well as details on their involvement. These details are reiterated and expanded upon during the contract signing period. On May 1, 2021, interested parties received mailers that included FAQ booklets about the program, information on specific practices, and a postcard with contact details for their relevant Grower Success Team and sales members, along with general contact information for Agoro Carbon. The stakeholder engagement process is ongoing, as producers are enrolled on a rolling basis. During the site visit, the validation team spoke with several participants involved in the project who verbally confirmed that the project proponent had communicated with them several times, that they were satisfied with the amount of engagement taking place and that they knew how to contact the proponent and had done so in the past on different occasions. Farmers also commented that they had used the project proponent as a resource when they had run into problems while carrying out the project activities. Farmers received resources and advice from the project proponent in order to successfully carry out project activities. TÜV SÜD concludes that stakeholders have been appropriately engaged and informed.
Consultation outcome	TÜV SÜD interviewed farmers during the site visit who confirmed that their feedback was considered by the project proponent and incorporated into the Project Design (notably about revisions to contract wording). Consultation is an on-going effort by the Project Proponents, specifically the Grower Success Team and Channel Partners. Farmers can also attend Grower Appreciation Events, where they can network with other farmers, discuss successes and challenges, and address issues directly with the Project Developer.

	TÜV SÜD concludes that the project proponent has appropriately taken into account stakeholder concerns and questions.
Ongoing communication	TÜV SÜD confirmed that it is possible to contact the project proponent with any comments or grievances via their website, by email or phone. As explained above, TÜV SÜD discussed these topics with project proponents and members of the Grower Success Team during the site visit. TÜV SÜD found the project proponents stakeholder identification process and continued engagement process to be robust for the purpose of an emission reduction project.
Stakeholder input	Stakeholder input is received during on-going communications through inquiries to the project proponent. During the site visit, the validation team interviewed farmers and confirmed that the project proponent is actively engaged with the project and regularly reaches out to communicate. Farmers noted that their feedback was actively incorporated into the project's monitoring plans as well as contracting language. TÜV SÜD found the Project Proponent's receipt of stakeholder input and consideration of this input to be appropriate.

3.2.1.3 Free, Prior, and Informed Consent

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Obtaining consent	Agoro Carbon does not carry out project activities but instead relies on the involvement of participating farmers. Each farmer is required to sign the "Carbon Credit Generation Agreement." Consequently, all activities conducted on the land are subject to this agreement, which has been negotiated freely between the parties, sometimes even with consultation from legal advisors. TÜV SÜD reviewed the 'Carbon Credit Generation Agreement' and found it to be sufficiently clear as to describe the project activities and expectations of both parties.

	TÜV SÜD analyzed overlap between project areas and tribal land using tribal land spatial data downloaded from the U.S. Census Bureau's Master Address File / Topologically Integrated Geographic Encoding and Referencing (MAF/TIGER) Database (MTDB) in QGIS. Some project areas occur on designated tribal land. Agoro Carbon requires that farmers whose land occurs on designated tribal land demonstrate that they have explicit consent from tribal authorities to carry out agricultural activities. TÜV SÜD reviewed the evidence of explicit consent to operate on tribal land and found it to be satisfactory. In the Carbon Credit Generation Agreement, farmers must indicate whether any of their land are classified as tribal or Native American Land. These farmers are held to the same ownership and leasing standards as farmers whose land is not classified as tribal or Native American Land and they must attest to their legal right to operate and implement project activities on the land. Agoro Carbon continually monitors overlap between project areas and tribal and Native American Land. Based on the evidence reviewed, TÜV SÜD found that the Project Proponent appropriately obtained consent.
Outcome of FPIC discussion	Agoro's methods for obtaining free and prior informed consent are robust and comprehensive. The duration and scope of applicable contracts reviewed by TÜV SÜD are suitable for this project.

3.2.1.4 Grievance Redress Procedure.

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Development process	All members of the sales and Grower Success teams at Agoro Carbon have backgrounds in agriculture, making them well-versed in the culture and business of the areas they serve. The procedures for ongoing communication with growers have been crafted by this experienced staff, incorporating valuable input from farmers and ranchers. Many members of the sales and Grower Success teams live in the communities they serve and are often farmers and ranchers themselves. During the site visit, the validation team spoke with several participants involved in the project who verbally confirmed that the project proponent had communicated with them several

	times, that they were satisfied with the amount of engagement taking place and that they knew how to contact the proponent and had done so in the past on different occasions. Farmers also commented that they had used the project proponent as a resource when they had run into problems while carrying out the project activities. Farmers received resources and advice from the project proponent in order to successfully carry out project activities. TÜV SÜD found the project proponents grievance redress process and continued engagement process to be robust for the purpose of an emission reduction project.
Grievance redress procedure	TÜV SÜD reviewed project documentation including the Carbon Credit Generation Agreement and discuss the grievance redress procedure with Agoro Carbon and growers during the site visit. At the start of the Agoro Carbon Program, participants meet the sales and Grower Success Team, exchanging contact information to ensure open communication. As part of their ongoing stakeholder consultation efforts, growers can formally air their grievances outside of traditional channels, such as speaking with the Grower Success Team or emailing the Carbon Team. Upon signing the program, the contract is explained in detail to the growers. All grower contracts (Carbon Credit Generation Agreements) include a dispute resolution clause. In the event that a dispute does arise, a summary of the situation and steps to reconcile will be made publicly available on the Agoro Carbon website. If issues remain unresolved with the Grower Success Team or Channel Partner, farmers can escalate grievances to the Agoro Carbon team. The team may mediate or involve a local USDA Agricultural Extension Agent for independent mediation. During the site visit, TÜV SÜD solicited farmers' impressions and concerns regarding their working relationship with Agoro Carbon. The feedback was positive, highlighting satisfaction with initial contact and contract execution, smooth ongoing data transfer, and the responsiveness of the Grower Success Team. TÜV SÜD concludes that the grievance redress procedure meets the requirements of the VCS Standard v4.6.

3.2.1.5 Public Comments

The public comment period for this project was open from 11 May 2023 to 10 June 2023. No public comments were received during or after the public comment period.

3.2.2 Respect for Human Rights and Equity

3.2.2.1 Labor and Work

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Discrimination and sexual harassment	In the PD, the Project proponent displays an acceptable level of understanding of discrimination and sexual harassment. All farmers and those contracted with the Project proponent are required to adhere to relevant state and federal laws related to labor practices. Based on the available evidence, TÜV SÜD does not find any reason that the Project does not meet the requirements for discrimination and sexual harassment.
Management experience	Team members at Agoro Carbon have backgrounds in the same communities where the project participants and local stakeholders live and work, as confirmed by TÜV SÜD during the site visit. TÜV SÜD confirmed that the Project proponent has a qualified and resourceful team well equipped to carry out this project during the site visit and the entire audit process.
Gender equity in labor and work	In the PD, the Project proponent displays an acceptable level of understanding of gender equity in labor and work. All farmers and those contracted with the Project proponent are required to adhere to relevant state and federal laws related to labor practices. Based on the available evidence, TÜV SÜD does not find any reason that the Project does not meet the requirements for gender equity in labor and work.
Human trafficking, forced labor, and child labor	TÜV SÜD reviewed language in the Carbon Credit Generation Agreement signed by all participating farmers related to mandatory code of conduct and found it to be satisfactory. The Carbon Credit Generation Agreement cites the Agoro Carbon Alliance Code of Conduct in which human trafficking, forced labor, and child labor are explicitly cited. Based on the available evidence, TÜV SÜD does not find any reason that the

	Project does not meet the requirements for human trafficking, forced labor, and child labor.

3.2.2.2 Human Rights

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Human rights	The Project Developers ensured free, prior, and informed consent (FPIC) for all project plans and activities in order to respect and promote the rights of IPs, LCs, and customary rights holders. This process involved open discussions of project plans with communities adjacent to project areas during the stakeholder consultation. The project activities take place on private land owned by commercial farmers who sell their products in a competitive market. The crops grown on these farms generate income for the farmers. Based on the evidence reviewed, TÜV SÜD concludes that there is no risk from this Project to indigenous peoples, local communities, nor customary rights holders. TÜV SÜD reviewed the evidence of explicit consent to operate on tribal land and found it to be satisfactory. In the Carbon Credit Generation Agreement, farmers must indicate whether any of their land are classified as tribal or Native American Land. These farmers are held to the same ownership and leasing standards as farmers whose land is not classified as tribal or Native American Land and they must attest to their legal right to operate and implement project activities on the land. Agoro Carbon continually monitors overlap between project areas and tribal and Native American Land. During the site visit and document review, TÜV SÜD found no evidence that the project poses any risk to local communities nor customary rights holders. Stakeholders are not hired or employed by the project beyond the contract executed between the Project Proponent and project participants. The implementation of the project activities does not result in changes to land rights, employment opportunities, or on-farm hiring practices. TÜV SÜD found no evidence of, nor the threat of, human rights violations from the implementation of project activities. This assessment is based on US law, which is in line with the requirements of the VCS Standard. As described elsewhere in this report, the project activities are likely to improve environmental conditions within and immediately surrounding

	the project areas. Access to a clean and healthy environment is a human right under both the United Nations Declaration on the Rights of Indigenous Peoples and ILO Convention 169 on Indigenous and Tribal Peoples. UNDRIP Article 29(1): states that Indigenous Peoples have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources. This implies that they should have access to a clean and healthy environment as part of their rights. ILO Convention 169 Article 15(1): affirms the rights of Indigenous Peoples to the natural resources on their lands, which includes the right to participate in the use, management, and conservation of these resources, further supporting the concept of a clean and healthy environment. Based on the available evidence, TÜV SÜD does not find any reason that the Project does not meet the requirements for human rights.

3.2.2.3 Indigenous Peoples and Cultural Heritage

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Preservation and protection of cultural heritage	The project activities take place on private land owned by commercial farmers who sell their products in a competitive market. The crops grown on these farms generate income for the farmers. There is no risk from this Project to indigenous peoples nor cultural heritage. TÜV SÜD reviewed the evidence of explicit consent to operate on tribal land and found it to be satisfactory. In the Carbon Credit Generation Agreement, farmers must indicate whether any of their land are classified as tribal or Native American Land. These farmers are held to the same ownership and leasing standards as farmers whose land is not classified as tribal or Native American Land and they must attest to their legal right to operate and implement project activities on the land. Agoro Carbon continually monitors overlap between project areas and tribal and Native American Land. Based on the available evidence, TÜV SÜD does not find any reason that the Project does not meet the requirements for preservation and protection of cultural heritage.

3.2.2.4 Property Rights

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Rights to territories and resources	As described above and elsewhere in this report, the project activities take place on private land owned by commercial farmers who sell their products in a competitive market. The crops grown on these farms generate income for the farmers. TÜV SÜD reviewed an example of the contract between Agoro Carbon and participating landowners and it is explicit that the land owner or lessee must attest that they hold the rights to implement agricultural practices on the land in question. In addition, TÜV SÜD reviewed the evidence of explicit consent to operate on tribal land and found it to be satisfactory. In the Carbon Credit Generation Agreement, farmers must indicate whether any of their land are classified as tribal or Native American Land. These farmers are held to the same ownership and leasing standards as farmers whose land is not classified as tribal or Native American Land and they must attest to their legal right to operate and implement project activities on the land. Agoro Carbon continually monitors overlap between project areas and tribal and Native American Land. Based on the available evidence, TÜV SÜD does not find any reason that the Project does not meet the requirements for rights to territories and resources.
Respect for property rights	The project activities take place on private land owned by commercial farmers who sell their products in a competitive market. The crops grown on these farms generate income for the farmers. Farmers retain the legal authority to manage the project activities on their land, based on ownership, lease, or other property rights. This is confirmed through an attestation of property rights, which is an addendum to the Carbon Credit Generation Agreement and individually signed by each farmer. Based on the available evidence, TÜV SÜD does not find any reason that the Project does not meet the requirements for property rights.

3.2.2.5 Benefit Sharing

Not applicable as this project does not impact property rights, as described above.

3.2.3 Risks to Local Stakeholders and the Environment

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Risks to stakeholder participation	Risk to stakeholder participation can undermine a project's success by limiting the involvement of those affected by or interested in it. Key risks include lower crop yields and reduced income for participating farmers. These risks are mitigated by direct and continuous consultation with experts on the Grower Success Team and through payments to the growers by Agoro Carbon. These mitigation strategies were discussed at length during the site visit with members of the Grower Success Team and participating farmers. Based on the available evidence, TÜV SÜD does not find any reason that the Project does not meet the requirements for risks to stakeholder participation.
Working conditions	Working conditions include factors like safety, health, hours, and remuneration. In sustainable agriculture projects on private land, ensuring favorable working conditions involves adhering to labor standards, providing fair wages, and ensuring safe and healthy environments. Key risks include unsafe working environments, unfair wages, excessive working hours, lack of job security, and inadequate health and safety measures. Addressing these risks is crucial for promoting worker well-being, maintaining productivity, and ensuring compliance with labor laws and international standards. Mitigation strategies involve providing appropriate training, ensuring fair wages and reasonable working hours, implementing robust health and safety measures, and offering job security. These risk management strategies were discussed during the site visit with participating farmers and their employees, where available, as well as members of the Grower Success Team. The Carbon Credit Generation Agreement reviewed by TÜV SÜD contains explicit language regarding working conditions. TÜV SÜD did not see any evidence of inappropriate working conditions during the site visit. Most farmers actively manage the day-to-day operations on their farmers and are able to proactively address any issues related to working conditions. Based on the available evidence, TÜV SÜD does not find any reason that the Project does not meet the requirements for working conditions.
Safety of women and girls	Sustainable agriculture projects, while beneficial overall, can pose risks to women and girls due to existing gender inequalities. Women may also have limited access to crucial resources like land, credit, seeds,

	and technology, as well as training programs, which are often male-dominated. Exclusion from decision-making further compounds these issues, leading to strategies that do not consider their needs. Land tenure insecurity is another risk, as women typically have weaker land rights, and sustainable projects can exacerbate this, potentially causing loss of access to essential resources. To mitigate these risks, it is crucial to involve women in planning, ensure their access to resources and training, enhance their land rights and financial access, address health and safety concerns, foster community support, and continuously monitor the project's impact. The project activities are not expected to have a negative impact on the safety of women and girls. Safety measures employed in the baseline will be continued during the project. Based on the available evidence, TÜV SÜD does not find any reason that the Project does not meet the requirements for the safety of women and girls.
Safety of minority and marginalized groups, including children	Ensuring the safety of minority and marginalized groups, including children, is crucial for fostering an inclusive, equitable, and supportive environment. In sustainable agriculture projects on private land, this involves addressing risks such as discrimination, exploitation, inadequate protection, and lack of access to resources. Key risks include physical harm, exploitation, social exclusion, and neglect of specific needs. TÜV SÜD did not see any evidence of risks to the safety of minority and marginalized groups, including children, during the site visit. Most farmers actively manage the day-to-day operations on their farmers and can proactively address any issues related to the safety of minority and marginalized groups. Based on the available evidence, TÜV SÜD does not find any reason that the Project does not meet the requirements for the safety of minority and marginalized groups.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	The project activities are not expected to increase pollutants in any capacity. Implementation of project activities are more likely to measurably decrease pollutants in the project area and adjacent areas. Many studies confirm that there are substantial reductions in fuel consumption (and associated pollutants) per hectare of tilled land when no and reduced till are used compared to conventional tillage (ex. Akbarnia and Farhani (2014); Pittelkow et al. 2015; Yadav et al. 2020). Further, many studies point to improvements in soil structure, decreases in soil erosion, and minimization of pollutant transport

	associated with no till and reduced till, cover cropping, and improved nitrogen fertilizer management (Wang et al. 2017; Skaalsveen et al. 2019; among numerous others). Based on this evidence and visual inspections during the site visit TÜV SÜD concludes that there is no risk of increased pollutants related to the implementation of project activities. Akbarnia, A. & Farhani, Foad. (2014). Study of fuel consumption in three tillage methods. Research in Agricultural Engineering. 60. 142-147. 10.17221/70/2012-RAE. Pittelkow, C. M., Linquist, B. A., Lundy, M. E., Liang, X., Van Groenigen, K. J., Lee, J., ... & Van Kessel, C. (2015). When does no-till yield more? A global meta-analysis. *Field crops research*, *183*, 156-168. Wang, Y., Li, C., Tu, C., Hoyt, G. D., DeForest, J. L., & Hu, S. (2017). Long-term no-tillage and organic input management enhanced the diversity and stability of soil microbial community. *Science of the Total Environment*, *609*, 341-347. Skaalsveen, K., Ingram, J., & Clarke, L. E. (2019). The effect of no-till farming on the soil functions of water purification and retention in north-western Europe: A literature review. *Soil and Tillage Research*, *189*, 98-109. Yadav, G. S., Babu, S., Das, A., Mohapatra, K. P., Singh, R., Avasthe, R. K., & Roy, S. (2020). No-till and mulching enhance energy use efficiency and reduce carbon footprint of a direct-seeded upland rice production system. *Journal of Cleaner Production*, *271*, 122700.

3.2.4 Ecosystem Health

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Impacts on biodiversity and ecosystems	It is well documented that the repercussions of traditional agricultural practices disrupt soil biodiversity, thereby jeopardizing soil well-being over prolonged periods. This project promotes the implementation of improved agricultural land management practices, which will have substantial benefits on biodiversity and ecosystems (Nunes et al. 2018; Sánchez-Moreno et al. 2015). Any risk of possible spread of cover crops is mitigated by terminating the cover crops before they go to

	seed. This was confirmed through discussions with growers during the site visit. TÜV SÜD concludes that this project has appropriately assessed and mitigated these risks. Márcio Renato Nunes, Harold Mathijs van Es, Robert Schindelbeck, Aaron James Ristow, Matthew Ryan, No-till and cropping system diversification improve soil health and crop yield, Geoderma, **328** 30-43 (2018) ISSN 0016-7061, https://doi.org/10.1016/j.geoderma.2018.04.031. Sánchez-Moreno, S., Castro, J., Alonso-Prados, E. *et al.* Tillage and herbicide decrease soil biodiversity in olive orchards. *Agron. Sustain. Dev.* **35**, 691–700 (2015). https://doi.org/10.1007/s13593-014-0266-x
Soil degradation and soil erosion	The project activities are not expected to cause soil degradation or increase soil erosion. The project activities are expected to increase soil health. TÜV SÜD conducted its own review of recent relevant literature and found that most studies corroborate the idea that improved agricultural land management will increase soil health or find that these activities will not degrade soil health. Presented here is a very brief summary of some key articles related to the practice changes implemented in this project. In their review paper, Ogle et al. (2019) found that no till reduced soil erosion and conserved water in soil by improving infiltration and reducing evaporation in semi-arid and arid regions. In their review paper, Haruna et al. (2020) found that implementation of cover cropping can lead to as much as 96% reduction in soil loss. Haruna and Nkongolo (2020) and Aryal et al. (2018), among others, highlight the soil conservation benefits of cover cropping by providing a protective vegetative cover during fallow periods and/or between harvest and planting. It is well documented that overuse of chemical fertilizers alters soil physiochemical and biological characteristics. Overuse of chemical fertilizers has been documented to induce the formation of soil crusts, reduce soil fertility, pollute water and soil, and reduce the availability of critical nutrients and minerals (Pahalvi et al. 2021). TÜV SÜD concludes that this project has appropriately assessed and mitigated these risks.

	Ogle, S.M., Alsaker, C., Baldock, J. et al. Climate and Soil Characteristics Determine Where No-Till Management Can Store Carbon in Soils and Mitigate Greenhouse Gas Emissions. Sci Rep **9**, 11665 (2019). https://doi.org/10.1038/s41598-019-47861-7 Haruna SI, Anderson SH, Udawatta RP, et al. Improving soil physical properties through the use of cover crops: A review. Agrosyst Geosci Environ. 2020; 3:e20105. https://doi.org/10.1002/agg2.20105 Aryal, N., Reba, M. L., Straitt, N., Teague, T. G., Bouldin, J., & Dabney, S. (2018). Impact of cover crop and season on nutrients and sediment in runoff water measured at the edge of fields in the Mississippi Delta of Arkansas. Journal of Soil and Water Conservation, 73, 24–34. https://doi.org/10.2489/jswc.73.1.24 Pahalvi, H.N., Rafiya, L., Rashid, S., Nisar, B., Kamili, A.N. (2021). Chemical Fertilizers and Their Impact on Soil Health. In: Dar, G.H., Bhat, R.A., Mehmood, M.A., Hakeem, K.R. (eds) Microbiota and Biofertilizers, Vol 2. Springer, Cham. https://doi.org/10.1007/978-3-030-61010-4_1
Water consumption and stress	In their review paper, Ogle et al. 2019 found that no till reduced soil erosion and conserved water in soil by improving infiltration and reducing evaporation in semi-arid and arid regions. In their review paper, Haruna et al. 2020 found that implementation of cover cropping can increase water infiltration by as much as 630% compared to soils with no cover cropping. They also indicate many studies which have found that cover cropping can reduce evapotranspiration from soils compared to no cover cropping. TÜV SÜD concludes that this project has appropriately assessed and mitigated these risks. Ogle, S.M., Alsaker, C., Baldock, J. et al. Climate and Soil Characteristics Determine Where No-Till Management Can Store Carbon in Soils and Mitigate Greenhouse Gas Emissions. Sci Rep 9, 11665 (2019). https://doi.org/10.1038/s41598-019-47861-7 Haruna SI, Anderson SH, Udawatta RP, et al. Improving soil physical properties through the use of cover crops: A review. Agrosyst Geosci Environ. 2020; 3:e20105. doi.org/10.1002/agg2.20105_

Usage of fertilizers	No till practices are associated with increased fertilizer efficiency by enhancing nutrient retention and availability in the soil (Tan et al. 2022). Several long-term studies (Gomez et al. 2009; Delgado et al. 2007; among others) indicate that implementation of cover cropping reduces loss of critical nutrients (nitrogen and phosphorous) and can reduce the need for high rates of synthetic fertilizer use. One of the project activities implemented in the project is specifically improved nitrogen fertilizer management. TÜV SÜD concludes that this project has appropriately assessed and mitigated these risks. Tan Y, Chai Q, Li G, Hu F, Yu A, Zhao C, Fan Z, Yin W, Fan H. No-till and nitrogen fertilizer reduction improve nitrogen translocation and productivity of spring wheat (Triticum aestivum L.) via promotion of plant transpiration. Front Plant Sci. 2022 Sep 2;13:988211. doi: 10.3389/fpls.2022.988211. PMID: 36119600; PMCID: PMC9478441. Gomez, J. A., Guzman, M. G., Giraldez, J. V., & Fereres, E. (2009). The influence of cover crops and tillage on water and sediment yield, and on nutrient, and organic matter losses in an olive orchard on a sandy loam soil. Soil and Tillage Research, 106, 137–144. https://doi.org/10.1016/j.still.2009.04.008 Delgado, J. A., Dillon, M. A., Sparks, R. T., & Essah, S. Y. (2007). A decade of advances in cover crops. Journal of Soil and Water Conservation, 62, 110–117.

3.2.4.1 Rare, Threatened, and Endangered species

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Species and habitat	TÜV SÜD conducted an analysis of the project's impact on rare, threatened, or endangered species to confirm the information provided by Agoro Carbon. While there is spatial overlap between project areas and the identified habitats of endangered species, project participants must adhere to all local and federal laws regarding the Endangered Species Act of 1973. The project activities do not involve conversion of any other land use type to cropland. Project areas are cropland in the baseline and

	project scenarios. Therefore, there is no risk of habitat loss related to project implementation. Furthermore, there are numerous studies which indicate that cover cropping, no till, and reduced fertilizer use can have a positive impact on the abundance and diversity of flora and fauna ranging from microarthropods and earthworms to insectivorous passerine birds. Wilcoxen et al. (2018) found cover crop fields exhibit higher species densities and greater conservation value for avian communities compared to non-cover crop fields. The denser vegetation found in cover crop fields supports both migratory and resident bird populations. Duarte et al. (2014) recorded higher bird species richness and diversity in vineyards which are not chemically managed (fertilizers and herbicides). Many studies indicate a positive relationship between sustainable agricultural practices and biodiversity and abundance of insects, microorganisms, fungi, etc. within the soil (Fiorini et al. 2022), which are critical for overall ecosystem health and resilience. Additionally, all farmers participating in the project must follow all local and federal laws pertaining to adherence to the Endangered Species Act of 1973. TÜV SÜD concludes that it is unlikely that any project activity will negatively impact any threatened or endangered species. Cassandra A. Wilcoxen, Jeffery W. Walk, Michael P. Ward, Use of cover crop fields by migratory and resident birds, Agriculture, Ecosystems & Environment, Volume 252, 2018, Pages 42-50, ISSN 0167-8809, https://doi.org/10.1016/j.agee.2017.09.039. Duarte, J., Farfán, M. A., Fa, J. E., & Vargas, J. M. (2014). Soil conservation techniques in vineyards increase passerine diversity and crop use by insectivorous birds. *Bird Study*, *61*(2), 193–203. https://doi.org/10.1080/00063657.2014.901294 Andrea Fiorini, Sara Remelli, Roberta Boselli, Paolo Mantovi, Federico Ardenti, Marco Trevisan, Cristina Menta, Vincenzo Tabaglio, Driving crop yield, soil organic C pools, and soil biodiversity with selected winter cover crops under no-till, Soil and Tillage Research, Volume 217, 2022, 105283, ISSN 0167-1987, https://doi.org/10.1016/j.still.2021.105283.

3.2.4.2 Introduction of Species

Species introduced	Evidence gathering activities, evidence checked, and assessment conclusion
Annual rye, clover, wheat, sunn hemp, brassica, sorghum-sudan grass, hairy vetch, lablab, triticale, oats, millet, buckwheat, common vetch, perennial ryegrass, barley, pea, hazlet, cereal rye, corn.	Through discussions with the project proponent and participating farmers during the site visit, TÜV SÜD confirmed that farmers will terminate cover crops before they go to seed, reducing the potential for proliferation of these species. Additionally, many studies point to the effectiveness of cover crops in suppressing the proliferation of invasive species, especially invasive species which have developed herbicide resistance (Tavlos et al. 2017 and references therein). Use of cover crops, especially species with rapid canopy development, has been shown to result in significantly lower invasive species emergence rate and total emergence (Tavlos et al. 2017; Haramoto and Gallandt, 2017). Cover cropping will likely not eliminate the need for soil-applied herbicides, but this method can be effective at reducing application amount needs (Cornelius and Bradley, 2017). Based on this evidence, TÜV SÜD concludes that Agoro's management of the introduction of invasive species is sufficient. Travlos, I. S., Kontopoulou, C. K., Kanatas, P. J., Panagopoulou, M., & Bilalis, D. J. (2017). Cover crops against herbicide-resistant invasive weeds. Haramoto ER, Gallandt ER. Brassica cover cropping: I. Effects on weed and crop establishment. *Weed Science*. 2005;53(5):695-701. doi:10.1614/WS-04-162R.1 Cornelius CD, Bradley KW. Influence of Various Cover Crop Species on Winter and Summer Annual Weed Emergence in Soybean. Weed Technology. 2017;31(4):503-513. doi:10.1017/wet.2017.23

Existing invasive species	Evidence gathering activities, evidence checked, and assessment conclusion
	The productivity and economic revenue of the cropland enrolled in this project is dependent, in part, upon the suppression and mitigation of invasive species. From 1960 to 2020, the reported costs of US biological invasions on the

	agriculture sector was $510 billion. These costs increased 10-fold from 1960-69 to 2010-20 (Fantel-Lepczyk et al. 2022). This is a problem affecting farmers across the US and there is evidence indicating that transiting from traditional agricultural techniques to sustainable methods can improve cropland resilience to invasive species (see references cited above). Efforts to suppress and mitigate the spread of invasive species was occurring on farms currently enrolled in the project before the project start date and these methods will continue throughout the duration of the project. As described above, project activities associated with this project may suppress the emergence and emergence rate of invasive species and reduce the need for soil-applied herbicide. During the site visit, all farmers mentioned invasive species suppression and mitigation as a top priority. Jean E. Fantle-Lepczyk, Phillip J. Haubrock, Andrew M. Kramer, Ross N. Cuthbert, Anna J. Turbelin, Robert Crystal-Ornelas, Christophe Diagne, Franck Courchamp, Economic costs of biological invasions in the United States, Science of The Total Environment, Volume 806, Part 3, 2022, 151318, ISSN 0048-9697, https://doi.org/10.1016/j.scitotenv.2021.151318.

3.2.4.3 Ecosystem conversion

Item	Evidence gathering activities and evidence checked
Ecosystem conversion	TÜV SÜD uses the definition of a native ecosystem as it is defined in the VCS Program Definition v4.4, “a landscape composed of naturally occurring and self-sustaining biotic and abiotic components demonstrated by peer-reviewed literature, expert judgment, or government registry”. TÜV SÜD’s assessment of whether land was cleared or drained of existing natural ecosystems involved an independent spatial analysis using CropScape - Cropland Data Layer | Ag Data Commons (usda.gov) and interviews with farmers during the site visit. In QGIS, the ‘Zonal Histogram’ tool was used with the project boundaries and the CropScape – Cropland Data Layer as inputs. The output Excel file containing pixel counts for each land use category within specific project area polygons served as input for a Python (Visual Studio Code v.1.88.1) script written by L. Hughes-Allen (TÜV SÜD). The Python script uses a dictionary of land use category codes to calculate the percentage of each project area polygon that qualifies

	as either ‘agriculture’ (ex. corn, barley, etc.) or ‘other land use’ (ex. shrubland, forest, wetland etc.). This analysis was completed for three CropScape - Cropland Data Layer scenes (2011, 2012, and 2020). These dates were chosen based on the project start date (20 March 2021) to ensure that project areas did not include native ecosystems at project commencement and that project areas remained agriculture during the subsequent years. Any individual project area which had less than 95% agricultural land cover was investigated further either through additional spatial analysis and/or discussion with the project developer. All initial instances of the project were found to conform to the Protocol guidelines.

3.3 Application of Methodology

3.3.1 Title and Reference

VM0042 Methodology for Improved Agricultural Land Management (Version 2.0) 30 May 2023.

VM0053 Model Calibration, Validation, and Uncertainty Guidance for the Methodology for Improved Agricultural Land Management (version 2.0) 30 May 2023.

3.3.2 Applicability

Methodology ID	Applicability condition	Assessment and conclusion
VM0042	1. Projects must introduce or implement one or more new changes to pre-existing agricultural management practices which: ● Improve fertilizer (organic or inorganic) management ● Improve water management/ irrigation. ● Reduce tillage/improve residue management. ● Improve crop planting and harvesting (e.g., improved agroforestry, crop rotations, cover crops); and/or ● Improve grazing practices.	The project regenerative practices are listed as eligible practices under VM0042 methodology. Agoro ensures that the different project practices will be implemented in each field through contracts with each farmer. Project activities will be monitored using remote sensing data, direct monitoring, and periodic discussions with participating farmers. TÜV SÜD confirmed that the Project meets this applicability condition through careful review of the documentation provided by Agoro Carbon. This documentation includes contracts between Agoro Carbon and participating farmers, as well as receipts

		and records demonstrating purchases and/or upgrades needed to conduct the improved agricultural management practices in this project. Additional evidence reviewed by TÜV SÜD includes independently acquired and analyzed spatial data such as CropScape - Cropland Data Layer scenes. These data show that the project areas are indeed under cultivation and that the proposed practice changes can be implemented on these specific lands. TÜV SÜD also confirmed that the project meets this applicability condition through visual inspection of project areas and conversations with farmers during the site visit. Based on this evidence, TÜV SÜD concludes that the project meets this applicability condition.
VM0042	2. Projects that introduce or implement quantitative adjustments (e.g., decrease in fertilizer application rate) must exceed five percent of the pre-existing value, calculated as the average value over the historical look-back period, developed for the baseline schedule of activities	Agoro Carbon will monitor the necessary quantitative adjustments related to the implementation of practices and will calculate, in such cases, the percentage of the pre-existing value. This calculation will be based on the data monitored during project implementation and the average value over the historical look-back period, which was developed for the baseline schedule of activities, to ensure that a five percent threshold is met. Based on this evidence, TÜV SÜD concludes that the project meets this applicability condition.
VM0042	3. Project activities must be implemented on land that is either cropland or grassland at the project start date and remains cropland or grassland throughout the project crediting period (i.e., land use change is not eligible, including conversion from cropland to grassland and grassland to cropland).	Agoro Carbon ensures that only cropland is included in the project area through contracts with participating farmers and a visual inspection of any potential project area using in-person visits, Google Earth Imagery, and OnX mapping software (to delineate proposed project boundaries).

		TÜV SÜD's assessment of whether project activities are implemented on land that is either cropland or grassland at the project start date involved an independent spatial analysis using CropScape - Cropland Data Layer | Ag Data Commons (usda.gov) and interviews with farmers during the site visit. The spatial analysis was completed in QGIS and using Python (Visual Studio Code v.1.88.1; code written by L. Hughes-Allen (TÜV SÜD). In QGIS, the 'Zonal Histogram' tool was used with the project boundaries and the CropScape – Cropland Data Layer as inputs. The output Excel file containing pixel counts for each land use category within each project area polygon was the input for the Python script. The Python script used a dictionary of land use category codes (Cropland Data Layer – metadata file) to calculate the percentage of each project area polygon that qualifies as either 'agriculture' (ex. corn, barley, etc.) or 'other land use' (ex. shrubland, forest, wetland etc.). This analysis was completed for three CropScape - Cropland Data Layer scenes (2011, 2012, and 2020). These dates were chosen based on the project start date (20 March 2021) to ensure that project areas did not include native ecosystems at project commencement and that project areas remained agriculture during the subsequent years. Any project area polygon which had less than 95% agricultural land cover was investigated further either through additional spatial analysis and/or

		discussion with the project developer. All initial instances of the project were found to conform to the Protocol guidelines.
VM0042	4. Model requirements	Please see rows labeled 'VM0042 and VM0053', below, for details.
VM0042	5. The project area must not have been cleared of native ecosystems within the 10-year period prior to the project start date.	Please refer to the detailed description in section 3.2.4.3 of this report.
VM0042	6. The project activity is not expected to result in a sustained reduction of greater than 5% in productivity, as demonstrated by peer-reviewed and/or published studies on the activity in the region or a comparable region.	Market leakage is expected to be minimal since the land in the project scenario continues to be used for agricultural production. Additionally, farmers are unlikely to adopt and maintain management practices that lead to substantial decreases in productivity, given that their income relies on crop yields. However, to ensure that leakage does not occur, the Agoro will complete the following every 10 years: The average productivity within the project (excluding years with extreme weather events) for each crop/livestock product will be compared to the average productivity before the project for the same crop/livestock product. Alternatively, the ratio of average baseline productivity to regional productivity at a given time will be compared to the average ratio of project productivity to regional productivity ten years later, by crop/livestock product. This comparison will use regional data from sources such as government agencies (e.g., USDA Actual Production History (APH) data), industry reports, published academic studies, or international organizations (e.g., FAO).

		TÜV SÜD considers this to be a low-risk area for the Project considering that agricultural productivity is the project participants' livelihood. It is extremely unlikely that the farmers would participate if production was forecast to decrease based on the project activities. There is evidence which shows that production yields can decrease in the short and long term as well as evidence which shows that production yields can increase in the short and long term following implementation of these practice changes. For example, Tahat et al. (2020) found strong correlation between populations of microorganisms (protected under improved agricultural management practices) and improved crop yield. However, some studies indicate both brief and long-term yield reductions associated with the implementation of no and reduced till, cover cropping, and nitrogen reduction. These reductions are highly site specific, and it is difficult to generalize. For example, Fiorini et al. (2022) found a reduction in crop yield between 1-23% in maize and 1-33% in soybean during the first two years of implementing cover cropping. After the third year, there was no visible effect of cover cropping on crop yield. Pittelkow et al. (2015) found that no-till reduced yields by 5.1% across 50 crops and 6,005 paired observations. Again, these impacts vary across crop type, region, time since practice implementation, etc. Many studies, including Albornoz (2016) indicate that high nitrogen fertilization rates are detrimental for crop yield, suggesting that nitrogen optimization could improve crop yield.

		This project has project activities across the continental US, and it is likely that changes in crop yield will vary spatially and temporally, as described above. TÜV SÜD finds the methods proposed by Agoro to monitor changes in crop yield and market leakage sufficient. Pittelkow, C. M., Linquist, B. A., Lundy, M. E., Liang, X., Van Groenigen, K. J., Lee, J., ... & Van Kessel, C. (2015). When does no-till yield more? A global meta-analysis. *Field crops research*, *183*, 156-168. Albornoz, F. (2016). Crop responses to nitrogen overfertilization: A review. *Scientia horticulturae*, *205*, 79-83. Tahat, M., M. Alananbeh, K., A. Othman, Y., & I. Leskovar, D. (2020). Soil health and sustainable agriculture. *Sustainability*, *12*(12), 4859. Fiorini, A., Remelli, S., Boselli, R., Mantovi, P., Ardenti, F., Trevisan, M., ... & Tabaglio, V. (2022). Driving crop yield, soil organic C pools, and soil biodiversity with selected winter cover crops under no-till. *Soil and Tillage Research*, *217*, 105283.
VM0042	5. The project activity cannot be biochar application.	Biochar is not part of this project activity.
VM0042	6. Project activities cannot occur on a wetland, excluding crops subject to artificial flooding where it is demonstrated that crop cultivation does not impact the hydrology of any nearby wetlands.	Along with the methods outlined in section 3.2.4.3 of this report, additional analysis was completed to ensure that wetlands were not included within project areas. Surface waters and wetlands spatial data was downloaded from the National Wetlands Inventory v.2. A spatial intersection (Vector overlay□Intersection) between the wetland data and project area polygons

		was completed in QGIS. This spatial intersection was used to determine the percentage of wetland area within the total project area, which was <1%. TÜV SÜD deemed this threshold acceptable. TÜV SÜD also asked farmers about wetlands on their participating properties and looked for visual evidence of wetlands during the site visit. No wetlands were observed in any project area visited during the site visit.
VM0042 and VMD0053	1. Model must be publicly available;	This project is using DayCent EVI to model carbon stock changes resulting from practice changes. 'EVI' simply signifies that this version of Day Cent has the option to use Enhanced Vegetation Index (known as 'EVI') data. The simulation of SOM for this model focuses on the top 30 cm of the soil layer. Numerous publications indicate that this depth is appropriate based on the practice changes implemented by the project (Komatsuzaki and Ohta, 2006; Ramesh et al. 2019; Feng et al. 2020). In their meta-analysis, Feng et al. (2020) found that of the 360 studies they investigated, 90% of them focused on SOM processes in the top 30 cm of soil depth. DayCent is one of the most widely used agroecosystem models available and is mentioned in more than 2,700 peer reviewed publications. TÜV SÜD contracted with Dr. Gerard Ros (Nutrient Management Institute, NL) and Dr. Tessa van der Voort (Nutrient Management Institute, CH) for the independent evaluation of the model used in this project and confirmed that DayCent EVI is applicable to quantify

		changes in SOC stocks due to changes in crop, soil, and fertilizer management as proposed by Agoro Carbon Alliance.
VM0042 and VMD0053	2. Model must be shown in peer-reviewed scientific studies to successfully simulate changes in soil organic carbon and trace gas emissions resulting from changes in agricultural management included in the PD;	As described above, DayCent is one of the most widely used agroecosystem models available. DayCent has been used extensively to simulate changes in SOC resulting from changes in no-till and reduced till, cover cropping, and improved nitrogen management. DayCent is not a prototype model, it has been widely tested and validated, and found to be robust and reliable.
VM0042 and VMD0053	3. Model must be able to support repetition of the project model simulations. This includes clear versioning of the model used in the project, stable software support of that version, as well as fully reported sources and values for all parameters used with the project version of the model. For stochastic models, this means providing the seeding sequence to the random number generator so that model runs can be reproduced. Where multiple sets of parameter values are used in the project, full reporting includes identifying the sources of varying parameter sets as well as how they were applied to estimate stock change/emissions in the project. Acceptable sources include peer-reviewed literature and statements from appropriate expert groups (i.e., that can demonstrate evidence of expertise with the model via authorship on peer-reviewed model publications or authorship of reports for entities supporting climate-smart agriculture, such as FAO or a comparable organization), and must describe the data sets and statistical processes used to set parameter values (i.e., the parameterization or calibration procedure)	DayCent is developed and maintained by a team at Colorado State University, ensuring a stable versioning system. Each release has a unique version number, allowing users to refer to specific versions when reproducing results. Project documentation (model validation report) states that the project is using DayCent EVI revision 279. DayCent is a deterministic model, although it does have some features that can incorporate stochasticity (ex. weather events). DayCent allows users to define a wide range of parameters that can influence model outcomes. These parameters are described in the user manual (https://www.nrel.colostate.edu/wp-content/uploads/2019/04/DayCent_Manual_full_05.02.108-1.pdf).

VMD0053	4. Validated per datasets and procedures detailed in Section 5.2 in VMD0053 “Model Calibration and Validation Guidance for the Methodology for Improved Agricultural Land Management”, with model prediction error calculated using datasets as described in Section 5.2.5 of VM0053, using the same parameters or sets of parameters applied to estimate stock change/emissions in the project.	The Agoro Carbon Technical Team has developed a Model Validation Report that demonstrates how it meets the requirements. The model has been validated by an independent model expert (IME) contracted by the VVB as per the clarification issued by Verra in August 2022. The model will be revalidated upon verification according to VMD0053 whenever the Grouped Project adds new instances and ecoregions requiring calibration, following the initial project validation.
	5. The same model version and parameters/parameter sets must be used in both the baseline and project scenarios.	The model validation report confirms that the same model version and parameters/parameter sets are used in both the baseline and project scenarios. This is confirmed by the IME in their review report. The model will be revalidated upon verification according to VMD0053 whenever the Grouped Project adds new instances and ecoregions requiring calibration, following the initial project validation.
VM0042 and VMD0053	6. Model input data must be derived following guidance in Table 6 (Section 8.2) and Table 7 (Section 8.3) of VM0042.	When using the model, the guidelines from Table 6 of VM0042 for baseline determination and from Table 7 for project emissions will be strictly followed for both initial assessment (ex-ante) and ongoing monitoring.
VM0042 and VMD0053	7. Model uncertainty must be quantified following guidance in Section 8.6[9] of VM0042.	Model uncertainty has been quantified following the guidance (see Model Validation Report). Before verification, model uncertainty will be redetermined using guidance from section 8.6 of the applied methodology. The model will be revalidated upon verification according to VMD0053 whenever the Grouped Project adds new instances and ecoregions requiring

		calibration, following the initial project validation.
VM0042 and VMD0053	8. Models may be recalibrated or revised based on new data, or a new model may be applied, provided the above requirements are met.	The above procedures will be repeated when the model is updated or a new model is applied.

3.3.3 Project Boundary

This project includes growers across the continental USA and as such, the project boundary is the geographical boundary of the continental USA. TÜV SÜD confirmed this project boundary by reviewing a spatial shapefile provided by the project developer. The validation team confirmed that the PD includes a table identifying relevant GHG sources for the baseline and project scenarios. TÜV SÜD thoroughly examined the project activities, reviewed the project description (PD), project documentation, and additional peer-reviewed articles and reports. The validation teams concluded that the greenhouse gas (GHG) sources for both the baseline and project phases have been accurately identified.

Source		Gas	Included ?	Assessment and conclusion
Baseline	Soil Organic Carbon	CO_2	Included	Soil organic carbon (SOC) is the main carbon pool affected by the project activities. It is expected to increase in the project scenario and changes are quantified as the stock exchange in the soil organic carbon pool. The project proponent will remeasure SOC every five years throughout the project lifetime. TÜV SÜD confirmed that SOC will be accounted for by reviewing the model report and summary calculations for estimating projected emission reductions.
		CH_4	Excluded	n/a; VM0042 does not include this GHG for this SSR
		N_2O	Excluded	n/a; VM0042 does not include this GHG for this SSR
	Fossil Fuel	CO_2	Excluded	The project activities are not expected to result in a significant increase in the use of fossil fuel. As described above, certain practice changes implemented in this project will result in a decrease in

Source		Gas	Included ?	Assessment and conclusion
				fossil fuel usage (i.e., reduced and no till). During the site visit, TÜV SÜD confirmed with farmers that there is no significant increase in fossil fuel usage under the project scenario. TÜV SÜD also reviewed data provided by Agoro Carbon which corroborated the farmer's statements. These data included primary data about fuel consumption collected by machines used in project activities as well as estimates of fuel consumption under improved agriculture scenarios. TÜV SÜD found this evidence to be comprehensive and robust and agrees that CO_2 emissions from fossil fuel are appropriately excluded from the baseline scenario. TÜV SÜD reviewed farmer data and the Field Operations chapter of the Illinois Farm Management Handbook, published by the University of Illinois, which will be used to estimate emissions from fossil fuels in the baseline and project scenario. TÜV SÜD also confirmed that the correct emission factors are described in the PD. TÜV SÜD confirms that the method used by Project Proponents to estimate emissions from fossil fuel use and whether emissions related to fossil fuel use is de minimis is robust and appropriate to the project. The Project Proponents will continue to monitor fossil fuel use throughout the project's crediting period to ensure that it remains de minimis.
	Soil Methanogenesis	CH_4	Excluded	Project activities are not expected to result in a significant increase in soil methanogenesis.
	Enteric fermentation	CO_2	Excluded	n/a; VM0042 does not include this GHG for this SSR

Source		Gas	Included?	Assessment and conclusion
		CH_4	Included	Methane emissions from enteric fermentation are calculated using equation 12, which is appropriate. TÜV SÜD reviewed the ex-ante assumptions and sources for the input data for this equation and found them to be reliable.
		N_2O	Excluded	n/a; VM0042 does not include this GHG for this SSR
	Manure deposition	CO_2	Excluded	n/a; VM0042 does not include this GHG for this SSR
		CH_4	Included	Methane emissions from manure deposition are calculated using equations 13 and 14 (quantification approach 3), which is appropriate. TÜV SÜD reviewed the ex-ante assumptions and sources for the input data for this equation and found them to be reliable.
		N_2O	Included	Nitrous oxide emissions from manure deposition are calculated using equations 27-32 (quantification approach 3). TÜV SÜD reviewed the ex-ante assumptions and sources for the input data for this equation and found them to be reliable.
	Use of nitrogen fertilizers	CO_2	Excluded	n/a; VM0042 does not include this GHG for this SSR
		CH_4	Excluded	n/a; VM0042 does not include this GHG for this SSR
		N_2O	Included	The project proponent used equations 17-26 (quantification approach 3) to calculate nitrous oxide emissions due to nitrogen inputs. TÜV SÜD reviewed the ex-ante assumptions and sources for the input data for this

Source		Gas	Included ?	Assessment and conclusion
				input data for this equation and found them to be reliable.
	Use of nitrogen-fixing species	CO_2	Excluded	n/a; VM0042 does not include this GHG for this SSR
		CH_4	Excluded	n/a; VM0042 does not include this GHG for this SSR
		N_2O	Included	Some nitrogen-fixing species (such as certain legumes) may be planted as cover crops and/or intercrops (e.g. improving annual or perennial grasslands) in the project scenario, hence N_2O emissions from nitrogen-fixing species are included in the project boundary. The project proponent used equations 17-26 (quantification approach 3) to calculate nitrous oxide emissions due to the use of nitrogen fixing species. TÜV SÜD reviewed the ex-ante assumptions and sources for the input data for this equation and found them to be reliable.
	Biomass burning	CO_2	Excluded	Project activities will not result in a significant increase in biomass burning. Biomass burning has been found to be de minimis and therefore it is not included. Field burning of crop residues is not considered a net source of CO_2 emissions because the CO_2 released during burning is reabsorbed by crops in the next growing season. TÜV SÜD concludes that excluding CO_2 from biomass burning is appropriate.
		CH_4	Excluded	Field burning of crop residues does emit CH_4, N_2O, CO, and NO_x. In 2014, about 1.5 million acres in the continental U.S. were burned, producing 19,600 short tons of PM2.5. Annually,

Source		Gas	Included?	Assessment and conclusion
				300-400 million acres are harvested, with 1-3% of this land burned, mostly in the Southeast, Great Plains, and Pacific Northwest. In 2020, U.S. agricultural emissions totaled 594.7 million metric tons, with up to 0.72 million metric tons from field burning. With 244.11 million acres of cropland, this results in 0.003 tCO2/acre from burning. Given a sequestration potential of 0.3 tCO2e/acre/year, burning contributes about 1% to emission reductions (0.003/0.3). Thus, emissions from biomass burning are within the 5% de minimis threshold. TÜV SÜD concludes that excluding CH_4 from biomass burning is appropriate.
		N_2O	Excluded	See above.
	Woody biomass	CO_2	Excluded	Excluded. Project activities will not result in a significant increase in CO_2 related to changes in woody biomass. None of the practice changes implemented by this project are predicted to result in substantial changes to woody biomass. TÜV SÜD agrees that CO_2 emissions from woody biomass are appropriately excluded from the baseline scenario.

Source		Gas	Included?	Assessment and conclusion
Project	Soil Organic Carbon	CO_2	Included	Soil organic carbon (SOC) is the main carbon pool affected by the project activities. It is expected to increase in the project scenario and changes are quantified as the stock exchange in the soil organic carbon pool. The project proponent will remeasure SOC every five years throughout the project lifetime.

Source		Gas	Included ?	Assessment and conclusion
				TÜV SÜD confirmed that SOC will be accounted for by reviewing the model report and summary calculations for estimating projected emission reductions.
		CH_4	Excluded	n/a; VM0042 does not include this GHG for this SSR
		N_2O	Excluded	n/a; VM0042 does not include this GHG for this SSR
	Fossil Fuel	CO_2	Excluded	The project activities are not expected to result in a significant increase in the use of fossil fuel. As described above, certain practice changes implemented in this project will result in a decrease in fossil fuel usage (i.e., reduced and no till). During the site visit, TÜV SÜD confirmed with farmers that there is no significant increase in fossil fuel usage under the project scenario. TÜV SÜD also reviewed data provided by Agoro Carbon which corroborated the farmer's statements. These data included primary data about fuel consumption collected by machines used in project activities as well as estimates of fuel consumption under improved agriculture scenarios. TÜV SÜD found this evidence to be comprehensive and robust and agrees that CO_2 emissions from fossil fuel are appropriately excluded from the project scenario.
	Soil Methanogenesis	CH_4	Excluded	Project activities are not expected to result in a significant increase in soil methanogenesis.

Source		Gas	Included?	Assessment and conclusion
	Enteric fermentation	CO_2	Excluded	n/a; VM0042 does not include this GHG for this SSR
		CH_4	Included	Methane emissions from enteric fermentation are calculated using equation 12, which is appropriate. TÜV SÜD reviewed the ex-ante assumptions and sources for the input data for this equation and found them to be reliable.
		N_2O	Excluded	n/a; VM0042 does not include this GHG for this SSR
	Manure deposition	CO_2	Excluded	n/a; VM0042 does not include this GHG for this SSR
		CH_4	Included	Methane emissions from manure deposition are calculated using equations 13 and 14 (quantification approach 3), which is appropriate. TÜV SÜD reviewed the ex-ante assumptions and sources for the input data for this equation and found them to be reliable.
		N_2O	Included	Nitrous oxide emissions from manure deposition are calculated using equations 27-32 (quantification approach 3). TÜV SÜD reviewed the ex-ante assumptions and sources for the input data for this equation and found them to be reliable.
	Use of nitrogen fertilizers	CO_2	Excluded	n/a; VM0042 does not include this GHG for this SSR
		CH_4	Excluded	n/a; VM0042 does not include this GHG for this SSR
		N_2O	Included	The project proponent used equations 17-26 (quantification approach 3) to calculate nitrous oxide emissions due to

Source		Gas	Included?	Assessment and conclusion
				nitrogen inputs. TÜV SÜD reviewed the ex-ante assumptions and sources for the input data for this equation and found them to be reliable.
	Use of nitrogen-fixing species	CO_2	Excluded	n/a; VM0042 does not include this GHG for this SSR
		CH_4	Excluded	n/a; VM0042 does not include this GHG for this SSR
		N_2O	Included	Some nitrogen-fixing species (such as certain legumes) may be planted as cover crops and/or intercrops (e.g. improving annual or perennial grasslands) in the project scenario, hence N_2O emissions from nitrogen-fixing species are included in the project boundary. The project proponent used equations 17-26 (quantification approach 3) to calculate nitrous oxide emissions due to the use of nitrogen fixing species. TÜV SÜD reviewed the ex-ante assumptions and sources for the input data for this equation and found them to be reliable.
	Biomass burning	CO_2	Excluded	Project activities will not result in a significant increase in biomass burning. Biomass burning has been found to be de minimis and therefore it is not included. Field burning of crop residues is not considered a net source of CO_2 emissions because the CO_2 released during burning is reabsorbed by crops in the next growing season. CO_2 as de minimis from biomass burning is assessed on the project level, rather than a field level. As such, even if a field is burned and not replanted the next

Source		Gas	Included ?	Assessment and conclusion
				year, it can be assumed that CO_2 emissions related to this process are still de minimis when considered at the project level. TÜV SÜD concludes that it is reasonable to exclude CO_2 from biomass burning.
		CH_4	Excluded	Field burning of crop residues does emit CH_4, N_2O, CO, and NO_x. In 2014, about 1.5 million acres in the continental U.S. were burned, producing 19,600 short tons of PM2.5. Annually, 300-400 million acres are harvested, with 1-3% of this land burned, mostly in the Southeast, Great Plains, and Pacific Northwest. In 2020, U.S. agricultural emissions totaled 594.7 million metric tons, with up to 0.72 million metric tons from field burning. With 244.11 million acres of cropland, this results in 0.003 tCO2/acre from burning. Given a sequestration potential of 0.3 tCO2e/acre/year, burning contributes about 1% to emission reductions (0.003/0.3). Thus, emissions from biomass burning are within the 5% de minimis threshold. TÜV SÜD agrees that CH_4 emissions from biomass burning are appropriately excluded from the project scenario.
		N_2O	Excluded	See above.
	Woody biomass	CO_2	Excluded	Excluded. Project activities will not result in a significant increase in CO_2 related to changes in woody biomass. None of the practice changes implemented by this project are predicted to result in

Source		Gas	Included ?	Assessment and conclusion
				substantial changes to woody biomass. TÜV SÜD agrees that CO_2 emissions from woody biomass are appropriately excluded from the project scenario.

3.3.4 Baseline Scenario

VM0042 uses a standardized method based on the project activity to determine the baseline scenario. The baseline scenario in all geographic instances included in the project is the continuation of pre-project agricultural activities. Historical management practices at the field level are assessed through a 3-year look-back period or across a complete crop rotation cycle. Evidence supporting this 3-year look-back period includes management plans, field boundaries, machine data, receipts, and other relevant documentation. The practices carried out during the 3 years leading up to the program align with the most common practices in their respective regions, as corroborated by USDA and state-level data reviewed by the validation team.

The historical data collected for each field is used to create a schedule of activities, which forms the basis for modeling changes in soil organic carbon (SOC) stocks according to VM0042 Approach 1. The modeled schedule of activities will be re-evaluated throughout the crediting period to ensure it reflects current agricultural production trends in the region. For this, published regional agricultural production data from within 10 years prior to the end of the current baseline period has been considered.

In the PD, the Project Proponents describe the qualitative and quantitative specifications of the pre-project ALM activities based on the initial project activity instances included in the validation for each geographic region, respectively. The PD presents qualitative and quantitative specifications, as appropriate, for six pre-project agricultural land management activities that are relevant to the initial project instances. TÜV SÜD reviewed a subset of data and documentation related to the pre-practice agricultural land management practices and found no discrepancies.

For each sample unit, baseline scenario practices are determined by applying a 3-year historic look-back period to produce an annual schedule of activities to be repeated over the first baseline period. Baseline emissions/stock changes are then modelled. The baseline scenario historic look-back period for conventional agricultural practices may include deep and frequent tillage, high rates of nitrogen input, and/or bare fallowing.

The project proponent provided evidence of the 3-year lookback period for a subset of farmers enrolled in the project. TÜV SÜD confirmed that the method for collecting these data is appropriate and robust and was able to fully cross-check source data and documentation used in identification of the baseline scenario.

TÜV SÜD confirmed via the site visit and during interviews with a subset of farmers that, prior to the project commencement, conventional agricultural practices constitute the mostly likely baseline scenario. TÜV SÜD travelled throughout Oregon, Washington, Minnesota, Missouri, and Texas during the site visit and confirmed that farmland surrounding the project area are cultivated under conventional agricultural practices.

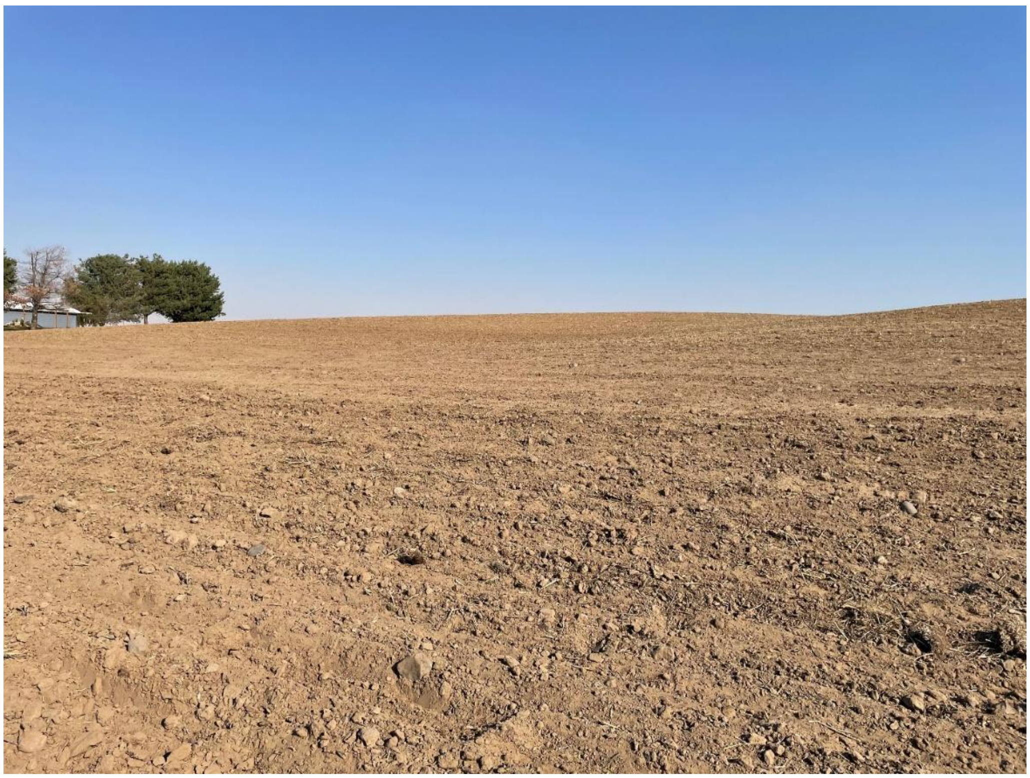

Figure 7. Heavily tilled cropland adjacent to project areas near Harrington, Washington. Photo credit: L. Hughes-Allen

During discussions with the participating farmers as well as members of the Grower Success Team that attended the site visit, it was clear that cultivation using conventional agriculture is the norm in the regions where the project is implemented.

TÜV SÜD confirmed that the baseline scenario is clearly and correctly identified in the PD and it represents the most likely scenario in the absence of the Project.

3.3.5 Additionality

VM0042 uses a project method for the demonstration of additionality. The following requirements have been justified by the project proponent. TÜV SÜD reviewed sufficient evidence to confirm additionality of the project activities. According to the Methodology, project proponents must carry out the following activities:

1. Demonstrate regulatory surplus:

Section 3.5 in the PD describes the analysis used by the project proponent to confirm that the project activity is not legally required in the project area and will not have a negative impact on the environment, project participants, or other stakeholders. TÜV SÜD reviewed relevant national and state laws in the project region and found no evidence that the project activity is mandated. It is extremely unlikely that the agricultural practices implemented in the project scenario would ever be mandated as they are agricultural practices that require no permit and are carried out on private land. TÜV SÜD's believes that there is an extremely low risk that the project activity would ever be legally required by any jurisdiction in the project area. During the site visit, TÜV SÜD interviewed members of the Grower Success team and individual farmers about the existence of any laws or regulations mandating implementation of any or all the project activities. Neither group was aware of any laws or regulations mandating implementation of any or all the project activities. As described in section 2.4 of this report, the validation team visited six different geographic areas of the project and met with numerous farmers and members of the Grower Success Team.

2. Identify barriers that would prevent the implementation of a change in pre-existing agricultural practices:

The project proponent has identified barriers to the implementation of project activities, including substantial financial and investment costs, risks of yield decrease, lack of requisite knowledge and skills related to successfully transitioning from conventional agriculture to sustainable agriculture, as well as social pressures.

During the site visit, farmers and ranchers interviewed by TÜV SÜD, across all six states visited, overwhelmingly cited financial costs related to the transition from conventional agriculture activities to sustainable agriculture as a main barrier to implementation of the project activities. Farmers often lack the infrastructure and capital needed to update equipment and acquire new management skills. For example, the cost of a no-till drill can range between $20,000 to over $100,000 depending on size and other specifications (www.deere.com). The upfront cost does not include regular maintenance and servicing, insurance, or the cost of learning how to properly use the new equipment. Cost savings to the farmer from no and reduced till are typically related to reduced fuel consumption and reduced man-hours. Cusser et al. (2020) found that it takes an average of 13 years to fully recover the initial expenses of continuous no-till management. Often, farmers are operating at cost margins that do not allow for these types of long-term projected payoffs.

The direct costs of cover crops include expenses for seeds, planting, and termination. Indirect costs can involve reduced water availability for the next crop if water is limited, slower soil warming due to increased residue, and potential yield changes in subsequent crops. Additionally, cover crops require more intensive management from the farmer. Roth et al. (2018) found that farmers only recuperate 61% of the costs invested in cover cropping through improvements in subsurface drainage N loading, soil erosion, and improve nitrogen cycling.

Based on this information, it is obvious that without the injection of capital generated directly from the sale of carbon credits, many of the farmers participating in this project would otherwise be excluded from transitioning to sustainable agricultural practices.

As discussed extensively above, there is a risk of short- and long-term yield decreases following the implementation of sustainable agricultural practices. The magnitude of these decreases depends on numerous factors such as cropping type, climate, etc. Without specialized expertise in transitioning from conventional agriculture to sustainable agriculture, there is a greater risk of yield decreases. Many farmers interviewed during the site visit said that they had been previously wary of implementing practices that might lead to yield decreases without the assistance of experts, such as the Grower Success Team. Agoro Carbon is able to mitigate these risks by tailoring practice changes to the specific characteristics and needs of each field, farm, and farmer.

Many of the farmers interviewed during the site visit are multigeneration farmers who have extensive experience in specific conventional agricultural practices. Changing these practices requires a substantial time investment to learn about methods to mitigate risks and maximize outcomes. Many farmers described that they simply did not have the time to research, plan, and implement these practices on their own. Agoro Carbon mitigates these challenges through its dedicated Grower Success Team.

There are also significant cultural and social barriers to implementing sustainable agricultural practices in the project area. The agricultural sector tends to be very cautious about changing historical practices that have been effective in the past. Some farmers interviewed said that they are reluctant to share with neighbors and family members that they are adopting sustainable agriculture practices. Many farmers said that they were skeptical about transitioning to sustainable agricultural practices and that these practices are not common in their regions. Overcoming these cultural barriers would be very difficult without the support of the Grower Success Team, many of whom are farmers and ranchers themselves and live in the communities in which they work.

Based on conversations had during the site visit as well as the data and documentation reviewed, the validation team agrees that the barriers that prevent the implementation of a change in pre-existing agricultural practices are homogeneous across the project area. There is not sufficient spatial heterogeneity to justify a separate analysis for each geographic region of the project separately. This is explicitly allowed for under the VCS Standard v4.6 section 3.6.15 which states, “Where factors relevant to the determination of the baseline scenario or demonstration of additionality require assessment across a given area, the area shall be, at a minimum, the grouped project geographic area. Examples of such factors include, inter alia, common practice; laws, statutes, regulatory frameworks, or policies relevant to demonstration of regulatory surplus; determination of regional grid emission factors; and historical deforestation and degradation rates.” There is also precedence for presenting barriers to the implementation of the project activity at the project scale in other recently validated VM0042 projects.

TÜV SÜD confirmed the credibility of each barrier identified by the project proponent. Sufficient evidence was provided to demonstrate that project participants face major barriers and challenges to implementing project activities and that without the incentive to monetize emission reductions, it is very unlikely that the project activities would be realized.

Cusser S, Bahlai C, Swinton SM, Robertson GP, Haddad NM. (2020). Long-term research avoids spurious and misleading trends in sustainability attributes of no-till. Glob Change Biol. 26: 3715–3725. https://doi.org/10.1111/gcb.15080

Roth, Richard & Ruffatti, Michael & O'Rourke, Patrick & Armstrong, Shalamar. (2018). A cost analysis approach to valuing cover crop environmental and nitrogen cycling benefits: A central Illinois on farm case study. Agricultural Systems. 159. 69-77. 10.1016/j.agsy.2017.10.007.

3. Demonstrate that the adoption of the suite of proposed project activities is not common practice.

The project proponent determined adoption rates of reduced till, no till, and cover cropping by state, using the SEP Additionality Tool v1.0 (September 2020) published by Climate Action Reserve (available at https://www.climateactionreserve.org/how/protocols/soil-enrichment/). . The data and methods used to develop this tool are explained extensively in the CAR Soil Enrichment Protocol v1.1 Appendix A (May 31, 2022; https://www.climateactionreserve.org/how/protocols/ncs/soil-enrichment/). Briefly, project activities must not be included in the negative list for the relevant county and state. This list identifies specific activities and locations in the U.S. that are deemed non-additional, meaning they would likely occur without external intervention. The negative list was developed based on the adoption rates of practices across U.S. counties, with further refinement informed by a detailed analysis of barriers and other factors influencing adoption.

The Climate Action Reserve presents adoption rate of practice changes (reduced till, no till, and cover crops) by county for each state in the US. Agoro Carbon aggregated the county level additionality data presented in the Climate Action Reserve additionality tool to the state level. Step 3 of Section 7 of VM0042 v2.0 states that “to demonstrate common practice, the project area must be stratified to the state or provincial level in the countries where the project is being developed. To determine the state adoption rate of specific practice changes, Agoro Carbon divided the total acreage where the practice change has been adopted by the total acres in each state (ex. 900,000 acres in Illinois implement cover cropping divided by 13,000,000 total cropland acres in the state). In instances where multiple practice changes are stacked, each different situation is assessed separately (i.e., reduced till and nitrogen management; reduced till and nitrogen management and cover cropping, etc.). Individual activities are deemed eligible if the adoption rate of that activity is less than 20% for a given state. The adoption rate of multiple practice changes is calculated as the weighted average of the adoption rate of the multiple practice changes. This method conforms to the requirements of VM0042.

TÜV SÜD carefully reviewed the information used to generate the adoption rates of the practice changes and confirmed the calculations. The CAR SEP additionality tool is widely used and accepted and is a robust and conservative way to prove the additionality of the practice changes implemented in this project.

Agoro Carbon Alliance contracted AGES (Agronomic, Geologic and Environmental Services, University of Missouri) to determine the practice change adoption rate of nitrogen management as this is not included in the Climate Action Reserve's additionality tool. AGES reviewed published, peer-reviewed literature, farmer survey data, and interviewed experts to identify adoption rates for combinations of source, rate, time, and placement (4R nutrient stewardship) of nitrogen that result in a reduction of nitrogen fertilizer application. However, due to the limited availability of survey data, and published literature, AGES relied on expert opinions to describe current practices and estimate adoption rates. A total of 24 experts contributed, with 15 providing direct testimonials. Their analysis covers 20 state-crop scenarios; the report distinguishes between rainfed and irrigated farming for some states. The crops evaluated were:

- Winter and spring wheat (ID, OR, WA, KS, CO, WY, TX)
- Corn (IL, IA, KS, MN, MO, NE, ND, SD, WI)
- Potato (MN, WA)
- Cotton (TX).

Adoption rates of combinations of best management practices that reduce the amount of nitrogen inputs to crop land were between 5% — 20%. These values are consistent with those presented in the USDA publication 'Conservation-Practice Adoption Rates Vary Widely by Crop and Region' (T. Wade, R. Claassen, and S. Wallander, 2015) reviewed by TÜV SÜD to corroborate the information provided in the AGES analysis.

TÜV SÜD concludes that the project proponent used appropriate methods and geographical regions to determine additionality and that the Project is additional based on these methods.

3.3.6 Quantification of GHG Emission Reductions and Carbon Dioxide Removals

The PD, model validation report, and associated documents provide a comprehensive discussion of relevant assumptions and data that are important for the quantification of GHG emissions and carbon removals. These documents explicitly outline various assumptions, such as considerations for regional differences and the adoption of a conservative approach to manage uncertainties. References and sources for these assumptions are included in these documents. The project proponent acknowledges potential regional differences within the project area and justifies the conservative estimation approach based on factors like diverse environmental conditions and the anticipation of improved estimations during verification.

The data and parameter values presented in the PD, model validation report, and associated documents align with the Project's context and adhere to the VCS Program and Standard rules. The document provides a structured overview of the various parameters and data sources used for quantifying emissions and removals.

The use of equations, units, and calculated values are consistent with VCS requirements. The data and parameter values used in the PD are reasonable in the context of the Project and are in conformance with the VCS Program rules.

The PD provides sufficient detail to allow for the reproduction of estimates related to baseline emissions. It offers a comprehensive set of equations and associated parameters for quantifying baseline emissions. The clarity in presenting the Methodology, equations, and associated parameters contributes to the transparency and reproducibility of baseline emission estimates. The reliance on an established model, DayCentEVI, is appropriately documented, providing a basis for the credibility of the emissions estimates.

The project proponent will use Quantification Approach 1 (Measure and Model) for the following variables (baseline and project scenarios):

- Soil Organic Carbon Stock: calculated using equation 6 (VM0042 Section 8.2.1) using the DayCent model. At time t = 0, SOC stocks are determined either by directly measuring SOC content and bulk density at t = 0 or by back-modeling them to t = 0 using data collected within ±5 years of t = 0. This initial SOC measurement is the same for both the baseline and project scenarios at the project's outset (i.e., $SOC_{wp,i,0} = SOC_{bsl,i,0}$) according to Quantification Approach 1. Direct soil sampling will occur every five years or less. The calculation of SOC stocks follows the procedures outlined in Wendt and Hauser (2013).

The project proponent will use Quantification Approach 3 (Default Factors) for the following variables (baseline and project scenarios):

- Methane emissions from livestock enteric fermentation: calculated using equation 12 (VM0042 section 8.2.6)
- Methane emissions from manure deposition: calculated using equations 13 and 14 (VM0042 section 8.2.7)
- Nitrous oxide emissions from nitrogen fertilizers and nitrogen-fixing species: calculated using equations 17-26 (VM0042 section 8.2.9).

- Nitrous oxide emissions from manure deposition: calculated using equations 27-32 (VM0042 section 8.2.10).

Quantification of Leakage Emissions:

- Leakage is zero according to the CDM Tool for testing significance of GHG emissions in A/R CDM project activities.

Summary of GHG Emission Reductions or Carbon Dioxide Removals:

- Net GHG emission removals: calculated using equation 38.
- CO_2 emission reductions and removals: calculated using equation 40.
- CH_4 emission reductions: calculated using equations 46 (livestock enteric fermentation) and 47 (manure deposition).
- N_2O emission reductions: calculated using equation 49.

Uncertainties Associated with Emission Calculations:

- Uncertainties are calculated using Equation 46, considering model prediction error, sample and measurement error, and soil sampling uncertainty. The uncertainty threshold is set at 15%.

Documentation used as the Basis for Assumptions and Data Sources:

- The methodology VM0042 version 2.0.
- The Model Validation Report includes details on the validation of the DayCentEVI
- model and other sources of data.
- The PD document includes relevant information on the project background, data sources, and equations.
- Supplementary documentation provided by the project proponents offers additional details on the information presented in the PD document.

Assessment of the following with respect to the PD:

- All relevant assumptions and data are listed in the PD, including their references and sources. All data and parameter values used in the PD are considered reasonable in the context of the project and are in conformance with the VCS Program rules. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PD.

A brief description of the DayCent modeling as it relates to this project is presented below:
DayCent is a process-based model, which are commonly used to understand ecological systems. Process-based models are based on theoretical understandings of relevant ecological processes, they provide the ability to extrapolate beyond known conditions, and the potential for straightforward analysis of multiple management scenarios. The DayCent model simulates C and N dynamics, phosphorus, sulfur, and soil trace gas (N_2O, CH_4) fluxes in cropland, grassland, savanna, and forest. Management practices such as tillage, fertilization, irrigation, harvest, and grazing directly affect the modeled retention of soil organic matter (SOM) and SOC as well as net CO_2, N_2O, and CH_4 emissions from soils.

The calibration of this, or any model, involves adjusting the model parameters to improve the accuracy in the simulation of measured values. Agoro Carbon used a Bayesian approach for model calibration. The Bayesian approach for model calibration differs from other automated approaches because the model inputs are assumed to be uncertain. Where many methods of automated calibration try to match the prediction to the measured data as closely as possible, the goal of the Bayesian calibration is to reduce the uncertainty in the inputs in a way that is consistent with the patterns and trends of the measured data. The Bayesian approach can also more effectively integrate diverse sources of information to fine-tune model parameters. The DREAM algorithm (a type of Markov Chain Monte Carlo algorithm) was used to help determine the most likely values for these parameters based on the observed information, allowing for a more accurate representation of how the model should behave.

The model underwent calibration and validation simultaneously using a k-fold cross-validation method with k=5. This procedure involves randomly dividing the 30 experimental sites into 5 groups (or folds), each containing six sites. In each iteration of the process, one fold is reserved as a validation dataset, while the remaining four folds are used to train the model. This cycle repeats five times, ensuring that each fold serves as both a validation set and part of the training data across different iterations. This approach meets the requirements of the VMD0053 Model under conditions where data availability is limited. The data used for calibration and validation came from literature reviews (212 treatments across 30 field experiments). It is important to note that while DayCent has hundreds of parameters, only a very small number of these need to be calibrated by users. Many of the internal parameters have been well-established and rigorously evaluated throughout the model's development and practical applications. Agoro Carbon conducted a sensitivity analysis to identify the most influential parameters among those still requiring potential calibration (23 parameters). These parameters directly or indirectly affect SOC dynamics by influencing the decay rate of the soil C pools, C transfer efficiency, or crop productivity.

Model input data can be divided into four broad categories: weather, soil, plan, and management information. Site specific model input and management information includes daily site-specific weather data, soil texture, initial SOC stock, planting dates and methods, crop names for crops and rotations, tillage dates, types and intensities, among many other variables. To confirm that model inputs for these variables align with real world activities and conditions, TÜV SÜD correlated the general model inputs (based on practice change) of 15 randomly selected fields associated with 10 growers to data collected and provided by Agoro Carbon. These data included invoices, receipts, and data collected automatically by farm equipment, among other data. For one grower, TÜV SÜD conducted an in-depth correlation of all necessary model data inputs to available evidence. This in-depth correlation also involved an examination of input and output DayCent files. Based on these analyses, TÜV SÜD concludes that the data transfer process from the field and farmer level to DayCent is accurate and robust. There are many fields, farmers, and practice changes involved in this project and Agoro Carbon is managing these data and model needs appropriately.

Agoro Carbon uses the Monte Carlo method for error propagation to estimate the model error in predicting SOC stocks for baseline and project scenarios. In essence, the Monte Carlo method of error propagation involves repeatedly calculating a quantity while randomly varying the input data within their predefined precision limits. The resulting distribution of the calculated values reveals the impact of the data's imprecision.

3.3.7 Methodology Deviations

There are no methodology deviations.

3.3.8 Monitoring Plan

TÜV SÜD reviewed the data collection, documentation, storage, processing, and analysis procedures detailed by Agoro Carbon in the PD and the Agoro Carbon Standard Operation Procedure (SOP) Report_Sampling_Design to ensure conformity with VM0042 and the VCS Standard v4.6. TÜV SÜD reviewed QA/QC procedures applied during the collection process to confirm that all data is being gathered and accounted for accurately. TÜV SÜD reviewed this information and found the implemented monitoring system to be suitable and concluded that data monitored is robust and accurate for the purposes of calculating emission reductions. TÜV SÜD concludes that the monitoring plan adheres to all requirements of the Methodology.

Quantification of emission reductions and removals for this project involves a combination of Quantification Approach 1 (measure and model) and Quantification Approach 3 (default factors), as detailed elsewhere in this report. The data used to quantify emission reductions and removals include both qualitative and quantitative data (please refer to Table 1 and Table 2). TÜV SÜD reviewed examples of both data types that are similar to the data that will be collected during the monitoring period. TÜV SÜD found the collection and handling of these data to be appropriate and robust. TÜV SÜD review of each data parameter available at validation is summarized in Table 1 below.

This project involves monitoring numerous key parameters to ensure accurate and reliable data collection. These parameters are not listed individually here and can be found in the PD starting on page 101. Descriptions of the data collection process for these parameters can be found throughout this report. Broadly, the identified parameters for monitoring include CO_2 emissions reductions (ER_t), leakage (LE_t), and uncertainties associated with the calculations (UNC_t). Additionally, methane emission reductions (ΔCH_4), methane emissions from livestock enteric fermentation ($\Delta CH_4\_ent_{i,t}$), methane emissions from manure deposition ($\Delta CH_4\_mdi,t$), nitrous oxide emission reductions (ΔN_2O), nitrous oxide emissions from nitrification/denitrification ($\Delta N_2O\_soili,t$) are also monitored. This approach aligns with the VCS requirements and industry best practices. Soil organic carbon will be resampled and analyzed five years after project initiation and again 10 years after project initiation. Soil sampling locations are based on stratification of the project area. TÜV SÜD has extensively reviewed the methods and outputs of the stratification procedure and found them to be robust and appropriate. TÜV SÜD reviewed the Agoro Carbon Standard Operation Procedure (SOP) Report_Sampling_Design and confirms that their soil sampling procedures are in line with VM0042 and industry standards.

Soil sampling locations are determined through the stratification of individual project instances using land cover, slope position, soil texture, topographic wetness index, normalized difference vegetation index, soil color index, precipitation, and management unit. Precipitation is only included as a variable in the stratification process for ranches where there is a greater than 20 mm difference in precipitation across the instance area. As specified in the Protocol, the Project Proponents have utilized variables in the stratification process which are known to affect SOC stock distribution. TÜV SÜD confirmed that the influence of land cover and land management, slope position, soil texture, topographic wetness index, normalized difference vegetation index, soil color index, and precipitation on SOC stock distribution are well supported in the literature (Muñoz-Rojas et al. 2015; Batlle-Bayer, Batjes, and Bindraban 2010; Guillaume et al. 2022; Adhikari et al. 2019; Batjes and Bindraban 2010; Blackburn et al. 2022; S. Xu, Jagadamma, and Rowntree 2018; X. Xu et al. 2016; Luo et al. 2017).

Numerical variables are converted to categorical variables using Proc Fastclus and Proc Cluster representing K-means (www.sas.com) and Hierarchical clustering methods. Proc Fastclus is a tool used for initial clustering to simplify large datasets, making them more manageable for further analysis. The Project Proponents use this step because the subsequent application of Proc Cluster, while potentially more accurate, is computationally demanding. Numerical data layers, such as NDVI, CI, TWI, and soil composition, are grouped into two or three clusters. This grouping aims to balance the creation of meaningful stratifications with the practical considerations of sampling. The resulting cluster data layer serves as a categorical factor in the stratification process. The other variables which are already categorical, land cover, slope position, and management practices, are represented as polygon data layers with specific attributes. The Project Proponents overlay these polygon layers and code the strata based on combined attributes.

TÜV SÜD confirms that the methods described above are robust, applicable to the project and geographic areas of the project, and meet industry standards. TÜV SÜD reviewed the project strata to ensure that they are more homogenous than the project area in its entirety. This was accomplished in QGIS using a combination of freely available data including land cover and soil texture, and data provided by the Project Proponents on management type. Based on this analysis, it is clear that the strata delineated by the Project Proponents are more similar compared to the project area in its entirety. TÜV SÜD reviewed the number and distribution of soil sampling plots within the strata and confirms that larger strata have higher numbers of samples that must be taken within the stratum.

As specified in the protocol, the baseline will be re-evaluated every 10 years.

Based on the documentation reviewed, TÜV SÜD finds that the monitoring plan adheres to the requirements of VM0042.

Table 1. Description and assessment of data and parameters available at validation.

Data/parameter	Description	Assessment
AR (Percent)	Weighted mean adoption rate calculated for the project across all activity instances	The validation team re-calculated the weighted mean adoption rates identified in the project description using the third-party data set and confirmed that the adoption of project activities was not common practice in each identified geographic region.
$Area_{ay}$ (hectare)	Area of proposed project-level adoption of activity *ay*	The validation team re-calculated the weighted mean adoption rates identified in the project description using the third-party data set and confirmed that the adoption of project activities was not common practice in each identified geographic region.
EA_{ay} (percent)	Adoption rate of the y most common (by area covered) proposed project activity in the region	The validation team re-calculated the weighted mean adoption rates identified in the project description using the third-party data set and confirmed that the adoption of project activities was not common practice in each identified geographic region.
a_Y (unitless)	Proposed project activity commitments a1 to ay, where a1 covers the largest area in the project region	The validation team re-calculated the weighted mean adoption rates identified in the project description using the third-party data set and confirmed that the adoption of project activities was not common practice in each identified geographic region.
GWP_{CH4} (t CO_2e/t CH_4)	Global warming potential for CH_4	The validation team confirmed the correct global warming potential from the IPCC Fifth Assessment

		report is correct according to section 3.15.4 of the standard.
GWP_{N2O} (t CO_2e/t N_2O)	Global warming potential for N_2O	The validation team confirmed the correct global warming potential from the IPCC Fifth Assessment report is correct according to section 3.15.4 of the standard.
$M_{bsl,SF,i,t}$ (t fertilizer)	Mass of N-containing synthetic fertilizer type SF applied in sample unit i in year t in the baseline scenario	Information about the quantity and type of synthetic fertilizer comes from information provided by participating farmers including self-reporting, receipts, etc. These data are specific to each instance. Some farmers use farm management software, such as John Deere, to automatically record these data during fertilizer application. Other farmers provide information about the amount and type of fertilizers applied directly to the Project Proponents. This information is corroborated by additional document evidence such as receipts and management logs. TÜV SÜD discussed this process during the site visit and the desktop review and concludes that the source of this parameter is suitable and well-justified. TÜV SÜD reviewed the evidence of fertilizer application such as John Deere outputs and receipts and found no discrepancies.
$M_{bsl,OF,i,t}$ (t fertilizer)	Mass of N-containing organic fertilizer type OF applied in the baseline scenario for sample unit i in year t	Information about the quantity and type of organic fertilizer comes from information provided by participating farmers including self-reporting, receipts, etc. These data are specific to each instance. Some

		farmers use farm management software, such as John Deere, to automatically record these data during fertilizer application. Other farmers provide information about the amount and type of fertilizers applied directly to the Project Proponents. This information is corroborated by additional document evidence such as receipts and management logs. TÜV SÜD discussed this process during the site visit and the desktop review and concludes that the source of this parameter is suitable and well-justified. TÜV SÜD reviewed the evidence of fertilizer application such as John Deere outputs and receipts and found no discrepancies.
$MB_{g,bsl,i,t}$ (t dm)	Annual aboveground and belowground dry matter of N-fixing species g returned to soils in the baseline scenario for sample unit i in year t.	The data for this parameter is specific to each project instance. The calculation of this parameter follows the IPCC Guidelines, using Table 11.2 to define above-ground residue dry matter and Equation 11.7 for harvested dry matter yield. The harvested dry matter yield is calculated based on the monitored fresh yield for each crop, along with the dry matter fraction of the harvested crop as specified in Table 11.1A. To estimate the total below-ground crop residue, Equation 11.6 is applied. This includes the total annual harvested area (monitored), the fraction of the area under each crop type that is renewed annually (set to 1), and the default ratio of below-ground root biomass to

		above-ground shoot biomass provided in Table 11.1A. TÜV SÜD discussed this process during the site visit and the desktop review and concludes that the source of this parameter is suitable and well-justified. TÜV SÜD reviewed the evidence of harvested fresh yield for each crop such as John Deere outputs and harvest records and found no discrepancies.
$P_{bsl,\mathrm{p}}$ (Productivity (e.g., kg) per hectare)	Average productivity for product p during the historical look-back period	Ranchers report average livestock weight during enrollment in the project activities. TÜV SÜD discussed this process during the site visit and the desktop review and concludes that the source of this parameter is suitable and well-justified.
$\mathrm{RP}_{bsl,\mathrm{p}}$ (Productivity (e.g., kg) per hectare)	Average regional productivity for product p during the same years as the historical baseline period	Regional productivity data are sourced from the USDA National Agricultural Statistics Service (USDA_NASS) database. For each product, annual yield averages are calculated for relevant counties and baseline years. If county data are not available, average state yields will be used. TÜV SÜD reviewed this process during the desktop review and concludes that the source of this parameter is suitable and well-justified. TÜV SÜD reviewed examples of these data for specific counties and products and found no discrepancies.
A (hectares)	Project area	The Project Proponents calculate project area as the sum of all eligible lands associated with each project instance. The eligible land

		associated with each project instance is first defined in the contract with enrolled farmers. This area is cross-checked using spatial mapping software to ensure that no ineligible lands are included. The methods used by TÜV SÜD to validate these methods and the included areas are described in detail in section 3.1 of this report.
$Pop_{bsl,l,i,t,P}$ (head)	Population of grazing livestock of type l in the baseline scenario in sample unit i for productivity system P in year t	The source of this data parameter is rancher attestations and/or farm management records. This is appropriate based on Box 1 of VM0042. TÜV SÜD discussed this process during the site visit and the desktop review and concludes that the source of this parameter is suitable and well-justified. TÜV SÜD also reviewed examples of evidence associated with this parameter and found no discrepancies.
$W_{bsl,l,i,t,P}$ (kg animal mass/head)	Average weight in the baseline scenario of livestock type l for sample unit i in productivity system P in year t	The source of this parameter is rancher attestations and/or farm management records. In the event that this information is not available, the Project Proponents will use the values presented in the 2019 the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4, Chapter 10, Annex 10A.1, Table 10A.5 or other nationally relevant publications. TÜV SÜD discussed this process during the site visit and the desktop review and concludes that the source of this parameter is suitable and well-justified. TÜV SÜD also reviewed examples of evidence

		associated with this parameter and found no discrepancies.
$MS_{bsl,l,i,t}$ (Fraction of N deposited)	Fraction of nitrogen excretion of livestock type l that is deposited in sample unit i in year t in the baseline scenario	The value for this parameter is based on the amount of time that livestock spend grazing within the project area. Farmers keep detailed records of grazing time and number of livestock, as witnessed by TÜV SÜD during the site visit and desktop review. In the case that this information is not available, a value of 1 will be applied. This would conservatively assume that livestock spend 100% of their time grazing within the project area. TÜV SÜD concludes that the source of this parameter is suitable and well-justified.

Table 2. Description of model input data and parameters. Where the assessment states that the data source meets the requirements of the Protocol, this is referring to Tables 6 and 8 of VM0042, which state that any quantitative information on ALM practices will be supported by one or more forms of documented evidence pertaining to the selected sample field and relevant monitoring period (e.g., management logs, receipts or invoices, farm equipment specifications.

Data/parameter	Description	Assessment
Cover crop variables	CC_type (categorical) CC_Planting_Date CC_Termination_Date CC_Termination_Method (categorical) CC_termination_product (categorical)	Data related to cover crop variables are field specific and determined by farmer attestations. These data are relatively straightforward and there is generally low risk of errors in data collection or transcription.
Fertilizer variables	Date_Applied_SN Date_Applied_OF Organic Fertilizer application Synthetic Fertilizer application	Data related to fertilizer variables are field specific and determined by machine logs, invoices, and/or farmer attestations. This meets the requirements of the Protocol. Many of the farmers interviewed during the site visit described and/or provided detailed evidence related to fertilizer use, as this can be a substantial expense.

	Soil Amendment Application	
Planting variables	Planting Event Planting methods Crop names	Data related to planting variables are field specific and determined by farmer attestations to the Project Proponents, possibly supported by receipts, invoices, and/or machine logs, as available. These data are relatively straight forward and there is low risk of errors in data collection or transcription. The source of these data meets the requirements of the Protocol.
Tillage variables	Tillage_Date Tillage_Type Tillage Event	Similar to fertilizer variables, many farmer utilize machines which automatically collect data related to tillage variables. This greatly simplifies the data collection and transfer process. In instances where this method of data collection is not available, the Project Proponents will rely on attestations from farmers. The source of these data meets the requirements of the Protocol.
Irrigation variables	Irrigation_Amount Irrigation_Type Irrigation_Start_Date Irrigation_End_Date	Data related to irrigation variables are field specific and determined by farmer attestations to the Project Proponents, possibly supported by receipts, invoices, and/or machine logs. These data are relatively straight forward and there is low risk of errors in data collection or transcription. The source of these data meets the requirements of the Protocol.
Harvest variables	Harvest_Date	Data related to harvest variables are field specific and determined by farmer attestations to the Project Proponents, possibly supported by receipts, invoices, and/or machine logs. These data are relatively straight forward and there is low risk of errors in data collection or transcription. The source of these data meets the requirements of the Protocol.
Residue management variables	Burn_Date_Month Burn_Type Grain, straw/Stover/Hay/Removal	Data related to residue management variables are field specific and determined by farmer attestations to the Project Proponents, possibly supported by receipts, invoices, and/or machine logs. These data are relatively straight forward and there is low risk of errors in data collection or transcription. The source of these data meets the requirements of the Protocol.
Soil variables	Soil texture	Soil texture, bulk density, and organic matter fraction will be determined during laboratory

	Bulk density pH Wilting point Field capacity Root fraction Organic matter fraction Saturated hydraulic conductivity	testing of soil samples collected *in-situ* across the project area. Field capacity, wilting point, and saturated hydraulic capacity are calculated using the DayCent utility mksitesoil and soil texture, percent sand, and percent clay as inputs. The source of these data meets the requirements of the Protocol.
Weather variables	Daily minimum air temperature Daily maximum air temperature Average daily precipitation Solar radiation Relative humidity Wind speed	The PRISM database is used to determine minimum and maximum air temperature as well as daily precipitation. Solar radiation, relative humidity, and wind speed are calculated by the DayCENT model.

3.4 Non-Permanence Risk Analysis

Based on the documentation provided and VM0042, TÜV SÜD concludes that the project proponent correctly and appropriately utilized the non-permanence risk tool. Detailed information is provided below.

1.1 Project Management (total = 0)

Q1. This project has an adaptive management plan in place that includes a monitoring plan. Three objectives are identified in the adaptive management plan: 1) assure correct and efficient implementation of project practices and achievement of maximum potential for carbon sequestration, 2) assure project longevity and permanence of carbon credits, and 3) assure project continuity, expansions, and sustainable project implementation. The adaptive management plan details qualitative and quantitative approaches to evaluating ongoing risks to the project as well as possible solutions to mitigate these risks. The adaptive management plan highlights ongoing communication between farmers, the Grower Success Team, and the Agoro Carbon management team. Ongoing communication between these parties will enable Agoro Carbon to dynamically adapt management practices, data collection techniques, and address any other issues related to the project.

Q2.

a) No previous GHG emissions have been issued for any of the project activities or project instances. A risk rating score of zero is appropriate.
b) All project instances are on privately held, commercial farms. TÜV SÜD has reviewed the contract employed by Agoro Carbon, which specifies land ownership, leasing, and property rights, and found it to be satisfactory. There is negligible risk that outside actors will encroach into the project land area or remove or change the project activities. Commercial farming is a well-established sector of the local economy and is protected by legislation and regulations. A risk rating score of zero is appropriate.
c) The management team is comprised of competent personnel in all technical and project management areas required to successfully implement the project. All Project Instances will be on commercially farmed land and will be under the direct control of experienced farmers who are contracted as part of the project. Farmers receive ongoing support from the Grower Success Team. The Grower Success Team is composed of skilled agronomists who have experience with executing soil and sustainability analyses on farms. A risk rating score of zero is appropriate.
d) The management team maintains a presence in the continental United States and is less than one day of travel from the project sites. A risk rating score of zero is appropriate.
e) The management team has not previously failed to submit a loss report within two years of detecting a loss event. A risk rating score of zero is appropriate.
f) All farmers participating in the project have received training on the improved ALM practices implemented as part of the project. A risk rating score of zero is appropriate.
g) All farmers are aware of the potential for yields to decrease temporarily due to the transition to improved agricultural practices. TÜV SÜD discussed this topic with farmers during the site visit and they all indicated that they had been made aware of this risk by the members of the Grower Success Team during initial meetings about the project and their eligibility to transition to improved agricultural practices. TÜV SÜD also discussed this topic separately, with accompanying members of the Grower Success Team and they reiterated that discussing possible yield decreases is an integral part of initial and ongoing discussions with potential and participating farmers. A risk rating score of zero is appropriate.

Quality of the documentation and data provided to support the risk score: The evidence reviewed by TÜV SÜD included an example of the contract executed between the Project Proponent and participating farmers, and independent spatial analysis. During the site visit, TÜV SÜD interviewed farmers about their knowledge of the potential risks associated with participating in the project, possible encroachment by outside actors, and ongoing support by the Project Proponent. During periodic meetings with the Project management team, TÜV SÜD was able to assess the qualifications and competencies of the Project management team.

Conclusion regarding the appropriateness of the risk score: TÜV SÜD confirms that the Project proponent possesses the necessary expertise and resources to ensure that the project is maintained at a high standard. A total project management risk rating score of zero is appropriate.

1.2 Financial Viability (total = 1)

Q3.

d) The payback period is greater than four years and up to and including seven years from the current risk assessment. The first issuance of credits is expected to occur approximately four years after Project registration. The Project Proponent expects to at least break even upon issuance of the VERs associated with the project. This result is based on review of Agoro Carbon's internal financial analysis. A risk rating of one is appropriate.

Q3.

i) The Project has secured 80 percent or more of the funding needed to cover the total cash out before the project reaches breakeven. Agoro Carbon Alliance is a wholly owned subsidiary of Yara International, a company with a robust financial standing. Yara International has committed to funding Agoro Carbon's operations, providing significant financial support. Since the project's inception, Yara International, through Agoro Carbon, has contributed over 80% of the total funding required for the project's success. A risk rating score of zero is appropriate.

Quality of the documentation and data provided to support the risk score: TÜV SÜD reviewed a confidential funding memo between Yara North America Finance and Agoro Carbon Board from 2024. This memo corroborates the information provided by Agoro Carbon in the non-permanence risk report.

Conclusion regarding the appropriateness of the risk score: A total financial viability risk rating score of one is appropriate.

1.3 Opportunity Cost (total = 0)

Q1. The baseline activities are not subsistence-driven.

Q2.

d) The most profitable alternative land use activity is the continuation of the existing baseline scenario ('business as usual' scenario). The net present value of the most profitable alternative land use activity is expected to be 20 percent or less than that of project activities.

Quality of the documentation and data provided to support the risk score: Agoro Carbon supported their choice of option 'd' by briefly explaining their analysis of baseline and project net present values. TÜV SÜD conducted an independent literature review to understand the economic implications of continuation of the baseline scenario and adoption of the practice changes implemented in the project.

Conclusion regarding the appropriateness of the risk score: A difference in NPV between the baseline scenario and the project activities of 20% or less indicates that the implementation of the project activities provides a modest economic benefit. As described extensively earlier in this report, the economic benefits from shifting to sustainable agriculture practices are often small and slow to be realized. TÜV SÜD agrees with the choice of option ‘d’.

1.4 Project Longevity (total = 17)

Q1. The project requested registration on or after 1 January 2024.

Q2. The project does not have a legally binding agreement that covers at least a 100-year period from the project’s start date. The contract example reviewed by TÜV SÜD between the Project Proponent and enrolled farmers covers a 10-year period. These contracts are renewable.

Q3. The project longevity is 40 years. Section 3.2.11 of the VCS Standard v.4.6 states that projects shall have a minimum of a 40-year project longevity.

Q4. The project has a management, financial, and monitoring plan for the entire project longevity. TÜV SÜD reviewed the management, financial, and monitoring plan for the project. The management, financial, and monitoring plan covers the entire project longevity and describes ongoing financial and other incentives for farmer participation in the project. This plan also describes the process of monitoring the implementation and continuation of project activities (permanence) through interviews with farmers, site visits, and remote sensing analysis. TÜV SÜD found the management, financial, and monitoring plan to be sufficient.

Q5. This project is not an ARR or IRM project with harvesting.

Q6. The project proponent has demonstrated a commitment to continue the management practice. Evidence of this commitment is the thorough management, financial, and monitoring plan and other documentation provided to TÜV SÜD such as the PD. Ongoing discussions with members of the Agoro Carbon team and the Grower Success Team during the site visit highlight the commitment of these individuals to this project, sustainable agriculture, and sustainability goals in general.

Q7. This project does not have a legal Agreement or requirement to continue the management practices.

  a. This project does not have legal agreement or requirement to continue the management practices.

Q8. This project is a grouped project where contract durations with individuals project activity instances are less than the project longevity. The contracts reviewed by TÜV SÜD between the Project Proponent and enrolled farmers cover a 10-year period, which is less than the project longevity. This contract is renewable.

Quality of the documentation and data provided to support the risk score: TÜV SÜD reviewed land ownership contracts for a subset of farmers which demonstrate that they legally own the land and have the right to implement project activities on their land. In instances where farmers are leasing the land, TÜV SÜD reviewed a subset of contracts which demonstrate that the farmers are legally able to implement project activities on the leased land. It is difficult to efficiently assess whether there are any disputes over land tenure, ownership, or access and use rights within the project boundary. This is a large project with instances across the US. As such, TÜV SÜD must rely on the assertion of the project developer that none of the properties involved in the project are a part of any land dispute. During the site visit, TÜV SÜD did not see any evidence of land disputes within the project boundary. Many of the farms visited on the site visit have been in the family of the person who has a contract with Agoro Carbon for many years if not several generations. The Project Proponents have an adaptive management plan in place which includes provisions for monitoring for reversals should an instance leave the project. These monitoring activities include remote sensing and in person site visits.

Conclusion regarding the appropriateness of the risk score: A total project longevity risk rating score of 17 is appropriate.

2.1 Land Tenure and Resource Access/Impacts (total = 2)

Q1. There have been no recorded disputes over ownership and land, resources access, or use rights. TÜV SÜD reviewed a subset of contracts between the Project Proponent and enrolled farmers in which farmers attest to their right to utilize the land for project activities.

Q2. The Project Proponent and enrolled farmers both sign a contract in which the farmer affirms, guarantees, and asserts that they hold a valid, legal, and uncontested property interest in the Covered Acres, sufficient to grow crops and implement all required Regenerative Practices on the Covered Acres, and to meet all requirements of the Agoro Carbon Alliance Program. The Seller further affirms, guarantees, and asserts that these rights will remain in effect for the Term and any additional period necessary to fulfill all obligations to Agoro Carbon. In other words, growers and ranchers sign an attestation letter declaring and ensuring their ability to implement the practices and generate the credits.

Q3.

b. In some instances, farmers enrolled in the project are not the owners of the land on which project activities are carried out. In these instances, the farmers are renting the land. TÜV SÜD reviewed the contract between producers and Agoro Carbon, in which farmers attest that they can carry out project activities on any leased land. A risk rating score of two is appropriate.

Q4. Is the project in a country/jurisdiction with a history of national, sub-national, or local government ("Government") intervention in land or resource use?

e. There have been no instances of Government intervention in the past 20 years, nor specific instances of expropriation and government intervention in land rights within the project area. A risk rating score of zero is appropriate.

Q5. What percentage of the project area is affected by disputes over land tenure or ownership?

h. No disputes exist. See Q2 for a summary of the contract language. A risk rating score of zero is appropriate.

Q6. What percentage of the project area has disputes over access or use rights?

k. No disputes exist.

Q7. This project is not a WRC project.

Q8. There are no disputes over land tenure, ownership, or access and use rights. A risk rating score of zero is appropriate.

Quality of the documentation and data provided to support the risk score: TÜV SÜD reviewed land ownership contracts for a subset of farmers which demonstrate that they legally own the land and have the right to implement project activities on their land. In instances where farmers are leasing the land, TÜV SÜD reviewed a subset of contracts which demonstrate that the farmers are legally able to implement project activities on the leased land. It is difficult to efficiently assess whether there are any disputes over land tenure, ownership, or access and use rights within the project boundary. This is a large project with instances across the US. As such, TÜV SÜD must rely on the assertion of the project developer that none of the properties involved in the project are a part of any land dispute. During the site visit, TÜV SÜD did not see any evidence of land disputes within the project boundary. Many of the farms visited on the site visit have been in the family of the person who has a contract with Agoro Carbon for many years if not several generations.

Conclusion regarding the appropriateness of the risk score: A total land tenure and resource access/impacts risk rating score of two is appropriate.

2.2 Stakeholder Engagement (total = 0)

Q1. Local populations, including those living in the project area or within 20 km of the boundary are reliant on the project area.

Q2. More than 50 percent of stakeholders living within the project area and who are reliant on the project have been consulted.

Quality of the documentation and data provided to support the risk score: The project activities take place on private land owned by commercial farmers who sell their products in a competitive market. The crops grown on these farms generate income for the farmers. The validation team has reviewed the stakeholder engagement process employed by the Project Proponents as well as the records of the implementation of this process. TÜV SÜD agrees that it is likely that 50 percent of the stakeholders living within the project area and who are reliant on the project have been consulted.

Conclusion regarding the appropriateness of the risk score: A total stakeholder engagement risk rating score of zero is appropriate.

2.3 Political Risk (total = 0)

Q1. The governance score for the United States is 1.05.

Q2.

f. The United States is party to the Paris Agreement and submitted an NDC to the UNFCCC Secretariate on 22 April 2021. A risk rating score of zero is appropriate.

Quality of the documentation and data provided to support the risk score: The governance score for the United States is published by the World Bank.

Conclusion regarding the appropriateness of the risk score: A total political risk rating score of zero is appropriate.

3.1 Natural Risk (total = 2)

Fire:

Natural Risk Score: 0
Mitigation: 0
Sub-total Risk: 0
Affected by climate change: yes.

Pest and disease outbreaks:

Natural Risk Score: 0
Mitigation: 0
Sub-total Risk: 0
Affected by climate change: yes.

Extreme weather:

Natural Risk Score: 4
Mitigation: 0.5
Sub-total Risk: 2
Affected by climate change: yes.

Geological risk:

Natural Risk Score: 0
Mitigation: 0
Sub-total Risk: 0
Affected by climate change: no.

Quality of the documentation and data provided to support the risk score: The Project Proponents provided explanations in support of the risk scores and mitigations. TÜV SÜD conducted an independent literature review to assess the appropriateness of the natural risk scores for each natural risk assessment.

Fire The Project Proponents have indicated that fire poses a low risk to the stored carbon stocks accumulated as a result of the project activity. The validation team reviewed the data and documentation provided by the Project Proponents as well as additional peer-reviewed literature to assess this assertion. Many studies have identified the resiliency of SOC after fire events. Fu et al. (2017) for example, found that the relative differences between the post-disturbance stable states and the pre-disturbance states were not significantly different from zero for most carbon cycle-related variables grassland ecosystems. TÜV SÜD agrees that based on the scientific evidence, fire does not pose a significant risk to soil organic carbon in the geographic areas included in the project.

TÜV SÜD conducted a spatial analysis of the spatial proximity of project areas to known past fire events using the fire burned areas boundaries dataset (continental US) provided by Monitoring Trends in Burn Severity (mtbs.gov). Fire events were filtered to include only events which occurred after January 1, 2010. An intersection analysis showed only a 0.6% overlap between project areas and burned areas. While this does not necessarily mean that fire is not a future possibility for the project areas, the historical occurrence of fire in these areas is low.

Doerr, Stefan H. and Santín, Cristina (2016) Global trends in wildfire and its impacts: perceptions versus realities in a changing world Phil. Trans. R. Soc. B37120150345 http://doi.org/10.1098/rstb.2015.0345

Fu, Z., Li, D., Hararuk, O., Schwalm, C., Luo, Y., Yan, L., & Niu, S. (2017). Recovery time and state change of terrestrial carbon cycle after disturbance. Environmental Research Letters, 12(10), 104004. https://doi.org/10.1088/1748-9326/aa8a5c

Pellegrini, A.F.A., Reich, P.B., Hobbie, S.E. et al. (2023) Soil carbon storage capacity of drylands under altered fire regimes. Nat. Clim. Chang. 13, 1089–1094. https://doi.org/10.1038/s41558-023-01800-7

Pest and disease outbreaks:

In most pest and disease outbreak situations, plant residue persists, and the associated carbon is still able to be stored long term in the soil. It is only in the most extreme and/or prolonged situations where loss of SOC can be expected. TÜV SÜD concludes that the risk of SOC loss due to pest and disease outbreaks is low for this project.

Rezgui, C., Trinsoutrot-Gattin, I., Benoit, M., Laval, K., & Riah-Anglet, W. (2021). Linking changes in the soil microbial community to C and N dynamics during crop residue decomposition. Journal of Integrative Agriculture, 20(11), 3039-3059. https://doi.org/10.1016/S2095-3119(20)63567-5

Extreme weather: Extreme weather events that could affect the project areas include higher than average rainfall and flooding, droughts and above average temperatures, changes in the timing and intensity of freeze events, etc. Similar to pests and disease outbreaks, extreme weather could lead to a reduction in crop residues returned to the soil due to reduced crop yields, resulting in less organic matter available for decomposition and contribution to SOC. Intense rainfall and flooding can cause severe soil erosion, washing away the topsoil rich in organic carbon. Prolonged droughts and heatwaves decrease soil moisture content, negatively impacting microbial activity and plant growth, which are essential for organic matter decomposition and SOC formation. Rising temperatures accelerate the decomposition of organic matter, leading to faster SOC turnover and reduced long-term carbon storage in soils. Additionally, flooding and waterlogging can lead to soil compaction, reducing pore space and aeration, which inhibits microbial activity necessary for organic matter decomposition.

In most extreme weather situations, plant residue persists, and the associated carbon is still able to be stored long term in the soil. It is only in the most extreme and/or prolonged situations where loss of SOC can be expected. TÜV SÜD concludes that the risk of SOC loss due to extreme weather is low for this project.

Six, J., Elliott, E.T. and Paustian, K. (2000), Soil Structure and Soil Organic Matter II. A Normalized Stability Index and the Effect of Mineralogy. Soil Sci. Soc. Am. J., 64: 1042-1049. https://doi.org/10.2136/sssaj2000.6431042x

Walker, T.W.N., Kaiser, C., Strasser, F. et al. Microbial temperature sensitivity and biomass change explain soil carbon loss with warming. Nature Clim Change **8**, 885–889 (2018). https://doi.org/10.1038/s41558-018-0259-x

Geologic risk: None of the project areas on located in or near regions that have high geologic risk, such as volcanic activity.

Conclusion regarding the appropriateness of the risk score: An aggregated sub-total risk for natural risk associated with climate impact of 2.0 is appropriate. The total natural risk score is 2.4 (aggregated sub-total risk x future impact factor).

3.2 Future Climate Impact

The reference regions relevant to this project are C. North-America (18%) and W. North-America (82%). It is well established that these regions will experience increases in mean air temperature and occurrences of extreme heat, and decreases in mean precipitation, which could have negative impacts on the project. The magnitude and frequency of agricultural and ecological drought is expected to increase. However, the timescale of these changes compared to the timescale of the project suggests that the effects of these changes on project activities will be limited. As described extensively above, the implementation of the project activities can improve the resiliency of the project areas to these and other climate related changes.

Quality of the documentation and data provided to support the risk score: TÜV SÜD conducted an independent literature review to assess the appropriateness of the future climate impact on natural risk.

Conclusion regarding the appropriateness of the risk score: A total future impact risk rating score of 1.2 is appropriate. The total natural risk score is 2.4 (aggregated sub-total risk x future impact factor).

4 VALIDATION OPINION

4.1 Validation Summary

The scope of the validation includes the project activities, which are the transition from "business as usual" agriculture to improved agricultural management practices. Baseline practices generally include conventional nitrogen fertilizer use, standard tillage techniques, and not using cover crops, among other traditional approaches. Project activities include no tillage and reduce tillage, implementation of cover cropping, and improved nitrogen fertilizer management across the continental United States. The project conforms with the validation criteria for projects set out in VCS Standard Version 4.6 without qualification or modifications. The validation of the GHG statement was conducted in accordance with ISO 14064-3:2019.

The goal of the validation is to ensure that the PD and GHG calculation methods are materially correct and meet the Methodology requirements. The Project meets the eligibility requirements of the VCS program and the Methodology, and the planned Project could reasonably be expected to achieve the claimed emission reductions based on the information provided by the project proponent.

TÜV SÜD confirms that the validation was performed in accordance with the VCS Program Guide, Version 4.4, and VCS Standard, Version 4.6 in addition to VM0042 Methodology for Improved Agricultural Land Management, Version 2.0. The Project Activity will result in additional soil organic carbon sequestration by implementing regenerative grazing in the project area. The project proponents provided the validation team with data that is relevant, complete, consistent, accurate, transparent, and conservative. TÜV SÜD concludes that the baseline is valid and that the sequestration attributable to the Project Activity are additional to any emission reductions that would occur in the absence of the Project.

4.2 Validation Conclusion

The data and information supporting the GHG statement is hypothetical / projected in nature. TÜV SÜD has reviewed the PD, projected emission reduction and sequestration spreadsheet, and associated documents and agrees that the assumptions, limitations, and methods that support the claims about future activities are reasonable and conform to the VCS Standard version 4.6 and the applied methodology VM0042 version 2.0. TÜV SÜD raised 2 corrective action requests, 3 additional document requests, and 52 clarification requests.

Actual verified emission reductions will likely vary from what is listed in the table below because estimates and assumptions for each project instance will vary based upon model inputs and geographic location. TÜV SÜD provides no assurance for validations, in accordance with ISO 14064-3:2019, as these activities are projected into the future. However, based on the data that was provided by the project proponent, it is reasonable to assume that the estimated GHG reductions and carbon dioxide removals noted below will be achieved in the future if the Project is scaled to the full area that is noted in the PD.

TÜV SÜD concludes that all relevant VCS validation criteria have been satisfied and the Project Activity properly applies the criteria of VM0042. TÜV SÜD concludes that the baseline is valid and that the sequestration attributable to the Project Activity are additional to any emission reductions that would occur in the absence of the Project.

Crediting period: From 20 March 2021 to 19 March 2041

Validated estimated GHG emission reductions and carbon dioxide removals for the project crediting period:

The non-permanence risk rating (%)	22%
If applicable, the Long-term Average (LTA), whether it has been properly updated, and if it has been reached.	N/A for this project type

This table describes the VCUs for the initial set of project instances included in the PDD.

Vintage period	Estimated baseline emissions (tCO_2e)	Estimated project emissions (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated buffer pool allocation (tCO_2e)	Estimated reduction VCUs (tCO_2e)	Estimated removal VCUs (tCO_2e)	Estimated total VCU issuance (tCO_2e)
20-March 2021 to 31-Dec-2021	72,680	41,788	0	3,975	12,822	14,094	26,916
01-Jan 2022 to 31-Dec-2022	92,432	53,145	0	5,056	16,307	17,925	34,232
01-Jan 2023 to 31-Dec-2023	130,006	60,734	0	9,859	24,461	34,953	59,414

01-Jan 2024 to 31-Dec-2024	167,580	68,323	0	14,662	32,614	51,982	84,596
01-Jan 2025 to 31-Dec-2025	205,154	75,911	0	19,464	40,768	69,010	109,778
01-Jan 2026 to 31-Dec-2026	242,727	83,500	0	24,267	48,921	86,039	134,960
01-Jan 2027 to 31-Dec-2027	280,301	91,089	0	29,070	57,075	103,067	160,142
01-Jan 2028 to 31-Dec-2028	317,875	98,678	0	33,873	65,228	120,096	185,324
01-Jan 2029 to 31-Dec-2029	355,448	106,266	0	38,676	73,382	137,124	210,506
01-Jan 2030 to 31-Dec-2030	393,022	113,855	0	43,479	81,535	154,153	235,688
01-Jan 2031 to 31-Dec-2031	430,596	121,444	0	48,282	89,689	171,181	260,870
01-Jan 2032 to 31-Dec-2032	468,170	129,033	0	53,085	97,842	188,210	286,052
01-Jan 2033 to 31-Dec-2033	505,743	136,621	0	57,888	105,996	205,238	311,234
01-Jan 2034 to 31-Dec-2034	543,317	144,210	0	62,691	114,149	222,267	336,416
01-Jan 2035 to 31-Dec-2035	580,891	151,799	0	67,494	122,303	239,296	361,598
01-Jan 2036 to 31-Dec-2036	618,464	159,388	0	72,297	130,456	256,324	386,780

01-Jan 2037 to 31-Dec-2037	656,038	166,977	0	77,099	138,610	273,353	411,962
01-Jan 2038 to 31-Dec-2038	693,612	174,565	0	81,902	146,763	290,381	437,144
01-Jan 2039 to 31-Dec-2039	731,186	182,154	0	86,705	154,917	307,410	462,326
01-Jan 2040 to 31-Dec-2040	768,759	189,743	0	91,508	163,070	324,438	487,508
01-Jan 2041 to 19-March-2041	172,312	42,170	0	20,582	36,590	72,971	109,561
Total	8,426,313	2,391,392	0	941,914	1,753,494	3,339,513	5,093,007

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

No commercially sensitive information has been disclosed that should be excluded from any public versions of this report or the PD.

APPENDIX 2: LIST OF FINDINGS

APPENDIX 3: DOCUMENTS REVIEWED

all_producers3.cpg

all_producers3.dbf

all_producers3.prj

all_producers3.qmd

all_producers3.shp

all_producers3.shx

Agoro Carbon Credit Generation Agreement.pdf

Agoro_Producer_fields_for selection_baseline data validation by VVB.xlsx

AppSheet.ViewData.2023-10-19.csv

Common practice assessment_PDD_Cropland USA_final draft.xlsx

contract_highlight1.png

contract_highlight2.png

NMI note 1589.N.23-10 review revision Agoro Cropland_Model Validation.pdf

Report_Sampling_Design_V2.pdf

WhatToExpectBooklet Digital 5.25.23.pdf

AFOLU_NPRT_Notes_3634_cropland.pdf

Natural Risk Assessment_Cropland and Grassland_USA.docx

Non-permanence risk report_3634_cropland.pdf

Agoro Adaptive Management Plan_DRAFT_final-202404191027253532.pdf

Agoro Funding_Memo Yara_confidential (1)-202404191027253608.pdf

Annex 2 Contract-202404191027253592.pdf

Annex 2 Contract-202404191027253594.pdf

Financial Model_Agoro_confidential-202404191027253599.png

History of mitigation actions cropland_final-202404191027253462.pdf

VCS3634_Cropland_Agoro Management_Financial_Monitoring Plan_DRAFT_final-202404191027253545.pdf

1-s2.0-S004896972103641X-main (1).pdf

fulltext.pdf

NCA4_Ch02_Changing-Climate_Full.pdf

NCA4_Ch10_Agriculture_Full.pdf

NCA4_Ch21_Midwest_Full.pdf

NCA4_Ch22_Northern-Great-Plains_Full.pdf

NCA4_Ch24_Northwest_Full.pdf

Ansley 2006 - Soil organic carbon and black carbon storage and dynamics under different.pdf

Dass_2018_Environ._Res._Lett._13_074027.pdf

Findlay et al. 2022.pdf

Follet et al. 2000.pdf

Ghimire 2019.pdf

Humphreys_2022.pdf

IPCC_Chp3_4_Grassland.pdf

Johnson 2006 (2).pdf

Lei et al_ Drought and Carbon Cycling of Grassland_2016.pdf

Novara 2013.pdf

Núñez_2022_Environ._Res._Commun._4_035004.pdf

Smith 2019_2010-2019_ A landmark decade of U.S. billion-dollar weather and climate disasters _ NOAA Climate.gov.pdf

Svejcar-et-al-2008-REM.pdf

US Fire Administration_Multiple-Fatality Fires_2002.pdf

USDA ERS - Crop Insurance at a Glance.pdf

Xu 2019 - A global meta-analysis of soil organic carbon response to corn stover removal.pdf

Call 3_8_24.txt

History of mitigation actions cropland_final-20240128213758 7452.pdf

VCS3634_Cropland_Agoro Adaptive Management Plan_DRAFT_final (1).pdf

VCS3634_Cropland_Agoro Management_Financial_Monitoring Plan_DRAFT_final.pdf

VCS_NPR_REP_3634_8_1_2021_12_31_2024.pdf

pasture_wetland_intersect.xlsx

Rangeland - As of 6_7_2023.xlsx

Rowcrop - As of 6_7_2023.xlsx

Screenshot 2023-12-01 120720.jpg

VCS 3634_Cropland PDD_Version 3.2_May 2024.pdf

VCS 3634_Cropland PDD_Version 3.2_May 2024_CLEAN.docx

VCS 3634_Cropland PDD_Version 3.2_May 2024_tracked changes.docx

VCS-Listing-Representation-Single-Representor-v4.1 Agoro Carbon USA Cropland Program.docx.pdf

101_V1.2_PAR_Principles-Requirements.pdf

Cropland PDD_Version 2_draft_VM0042 Updated_Image_10.jpg

Cropland PDD_Version 2_draft_VM0042 Updated_Image_11.jpg

Cropland PDD_Version 2_draft_VM0042 Updated_Image_115.jpg

Cropland PDD_Version 2_draft_VM0042 Updated_Image_13.jpg

Cropland PDD_Version 2_draft_VM0042 Updated_Image_138.jpg

Cropland PDD_Version 2_draft_VM0042 Updated_Image_14.jpg

Cropland PDD_Version 2_draft_VM0042 Updated_Image_142.jpg

Cropland PDD_Version 2_draft_VM0042 Updated_Image_146.jpg

Cropland PDD_Version 2_draft_VM0042 Updated_Image_148.jpg

Cropland PDD_Version 2_draft_VM0042 Updated_Image_149.jpg

Cropland PDD_Version 2_draft_VM0042 Updated_Image_152.jpg

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Cropland PDD_Version 2_draft_VM0042 Updated_Image_44.jpg

Cropland PDD_Version 2_draft_VM0042 Updated_Image_56.jpg

Cropland PDD_Version 2_draft_VM0042 Updated_Image_89.jpg

Agoro Carbon 3634- Track Changes.docx

Agoro Carbon USA Cropland Program - Clean -.docx

Agoro Carbon USA Cropland Program.pdf

Cropland PDD_Version 2_draft_VM0042 Updated.docx.docx

Cropland PDD_Version 2_draft_VM0042 Updated.docx.pdf

VCS3634_Agoro Carbon USA Cropland Program_PDD v3.docx

VCS3634_Agoro Carbon USA Cropland Program_PDD v3.pdf

VCS_PROJ_DESC_PCP_3634_08APR2023.pdf

Data Priority List for Carbon Modeling of Baseline Emissions.pdf

JonathanXData.xlsx

Model input mapping.pdf

RCE sample AppSheet.ViewData.2023-10-19.csv

RCE sample AppSheet.ViewData.2023-10-19.xlsx

Carricker T 3 Data.png

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Copy of C TERRY FARMS - 2021 APH.pdf

Copy of Fuel Data 2022.jpg

Rhinehart.png

Rinehart field APH Database Form.PNG

Roberts T1 Data.png

scan_20230913065635.pdf

scan_20230913065910.pdf

scan_20230913070026.pdf

Heider_Audit.jpg

Ludwig80Grain1.PDF

Ludwig80Grain2.PDF

Ludwig80Grain3.PDF

Ludwig80Grain4.PDF

Sherwood Farms 2019 2023.xlsx

SherwoodAudit1.pdf

2023 Jonathan X Data.xlsx

Copy of Copy of 2019-2021 Data, Jonathan Stock.pdf

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John Stock Sampling.docx

rce sampling 2023 Jonathan Stock Data.xlsx

STOCK-Invoice34013293 (1) (1).pdf

4 ac off Peck Rd - Bean Burndown.pdf

4 ac off Peck Rd - Bean Fungicide.pdf

4 ac off Peck Rd - Bean Post.pdf

Around Mike_s House - Corn Post.pdf

Around Mike_s House - Corn Pre.pdf

Around Mike_s House - Fall Fert.pdf

Corner by Fischer Drive - Bean Burndown.pdf

Corner by Fischer Drive - Bean Fungicide.pdf

Corner by Fischer Drive - Bean Post.pdf

Hess 80 - Bean Burndown.pdf

Hess 80 - Bean Fungicide.pdf

Hess 80 - Bean Post Liberty.pdf

Hess 80 - Bean Post Xtendimax.pdf

Hess North 40 - Corn Post.pdf

Hess North 40 - Corn Pre.pdf

Hess North 40 - Spring Fert.pdf

Hess South 40 - Corn Post.pdf

Hess South 40 - Corn Pre.pdf

Hess South 40 - Spring Fert.pdf

Lynn East - Bean Burndown.pdf

Lynn East - Bean Fungicide.pdf

Lynn East - Bean Post.pdf

Lynn East - RoundUp.pdf

Lynn West - Corn Post.pdf

Lynn West - Corn Pre.pdf

Lynn West - Fall Fert.pdf

Miller East of Lane - Corn Post.pdf

Miller East of Lane - Corn Pre.pdf

Miller Front Patch - Corn Post.pdf

Miller Front Patch - Corn Pre.pdf

Miller Morgan County - Corn Post.pdf

Miller Morgan County - Corn Pre.pdf

Miller Morgan County - Fall Fert.pdf

Miller West of Lane - Corn Post.pdf

Miller West of Lane - Corn Pre.pdf

Miller West of Lane - Fall Fert.pdf

North of Mike_s House - Bean Burndown.pdf

North of Mike_s House - Bean Fungicide.pdf

North of Mike_s House - Bean Post.pdf

Poage North - Bean Burndown.pdf

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Poage North - Bean Post.pdf

Poage North - RoundUp.pdf

Poage South - Corn Post.pdf

Poage South - Corn Pre.pdf

Poage South - Fall Fert.pdf

Ring Shed - Bean Burndown.pdf

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Robertson - Corn Post.pdf

Robertson - Corn Pre.pdf

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Jon X 23 SOY Harvest.png

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Corner By Fischer Drive - Corn Pre.pdf

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Hess 80 - Fall Fert 22.pdf

Hess 80 - Lime Fall 22.pdf

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Hess North 40 - Bean Pre.pdf

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