ORIZON CARBONCROP REWARDS PROGRAMME

Document Prepared by Orizon Agriculture (Pty) Ltd

Project Title	Orizon CarbonCrop Rewards Programme
Version	1.0
Date of Issue	23 June 2022
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1 PROJECT DETAILS

1.1 Summary Description of the Project

Orizon's CarbonCrop Programme supports and incentivizes South African farmers/landowners in the transition towards more sustainable agricultural practices by paying out a majority share of the carbon credit revenues resulting from emission reductions and carbon sequestration on our participating project fields. Together with our partners, we support our farmers by providing tailored financial and practical advice, building online tools to assist farmers in their transition, hosting information sessions/webinars and contributing to local research on sustainable agriculture.

Currently, the organic matter ("OM") levels in South African soils are lower than ever, with 65% of soils containing less than 0.5% carbon and only 4% containing more than 2% (Du Preez et al, 2011). Although much of this is due to arid conditions, on average, cultivated soils have seen a 46% loss of organic carbon since cultivation began. On commercial agricultural land, tillage, uncovered soil, selective grazing and high fertilizer rates are the norm while communal lands have been severely degraded through continuous overgrazing and other destructive practices on millions of hectares. While the losses to the largest terrestrial carbon sink itself are alarming, there are other related ecological and social issues, such as soil erosion from wind and water, nitrogen leeching into water systems, decreased nutrients in the produce, inefficient water retention, decreased farm profitability, higher job security risks, long-term food security concerns and much more.

It is for these social, environmental, financial and ecological reasons that we have initiated this project. The encouraged practices all focus on reducing Greenhouse Gas ("GHG") emissions and building Soil Organic Carbon ("SOC"). These regenerative practices also build soil health and productivity in the long-term and result in many wider ecological and social benefits. Amongst others, the following practice categories qualify for inclusion in the project:

- Reducing fertilizer application;
- Improving water management / irrigation;
- Reducing tillage / improving residue management;
- Improving crop planting and harvesting (e.g., crop rotations, cover crops etc.); and/or
- Improving grazing practices

These methods have been shown to sequester more carbon and reduce GHG emissions in comparison to conventional practices, and a farmer will need to adopt at least one of these practice changes to qualify for this project. A practice change is constituted by the start of a new practice, the cessation of pre-existing practices or a material adjustment to a pre-existing practice.

The program, with its project boundaries being the geographic boundaries of the Republic of South Africa, will be registered as a grouped project under VM0042 - Methodology for Improved Agricultural Land Management. Each project activity will be carried out and monitored according to this methodology and its supporting methodologies, standards, and tools. Over time this project will include various types of farming practices /land types by adding instances that meet the additionality and applicability conditions as per the methodology.

Using our online platform, we receive the necessary data from participating farmers to calculate / model the emission reductions and removals as required for the purpose of issuing Verified Carbon Units ("VCUs"). The farmer receives a majority share of the revenues generated from the issued and sold VCUs. The share received by the farmer varies in line with the extent of adopted sustainable practices with more holistically sustainable farms being paid a greater share than those who merely adopt a single soil regenerating practice. This mechanism further incentivizes participating farmers to keep adopting more regenerative practices over time.

The crediting period of this project is 25 years with its lifespan being 100 years. It is estimated that this project will reduce and remove an average of over 100,000 tCO_2e/year for the first crediting period. A more accurate estimate will be calculated and provided for validation.

Our vision is to be a comprehensive partner for our current and future farmers in their regenerative journey, support further research and investment into Regenerative Agriculture ("RA") and to ultimately help drive a national shift to improve soil health and productivity to secure the long-term future of agriculture in South Africa.

1.2 Sectoral Scope and Project Type

This project falls in the VCS Sectoral Scope 14: Agriculture Forestry and Other Land Use ("AFOLU"). It is a grouped project and will follow the guidance of VM0042 – Methodology for Improved Agricultural Land Management, Version 2.0, 21 December 2021 as well as its supporting methodologies.

Note: This document will be updated to reflect any/all updates of Verra methodologies and related tools as and when versions are updated by Verra.

1.3 Project Eligibility

The project meets the eligibility criteria under the VCS Program as:

1. The carbon sequestration and emission reductions resulting from this project would not have taken place in the business-as-usual case. Historical practices prior to implementation of Agricultural Land Management ("ALM") practices were based on advice of expert knowledge at the time and represent the conventional agricultural practices in the project area.

2. This project does not feature on the list of projects that are explicitly excluded project activities under the terms of Verra (VCS Standard, v4.2, Table 1).

3. The VCS Methodology VM0042 eligibility and additionality criteria are assessed for each project instance. Furthermore, this project and all its qualifying planned project activities meet the applicability conditions as set out in VCS Methodology VM0042 version 2.0. These include the management practice, current and historic land use and land type, productivity / leakage, and biochar requirements.
4. The scope of the VCS Program only includes greenhouse gases listed in the Kyoto protocol list of greenhouse gases, being CO_2, CH_4 and N_2O. This project reduces emissions of these listed greenhouse gases.
5. The baseline activities did not originally emit GHG's for the purpose of subsequently generating carbon credits as the project area only includes productive land and the baseline practices were generally practiced even before any carbon credit markets existed.

1.4 Project Design

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

1.5 Project Proponent

Organization name	Orizon Agriculture (Pty) Ltd	
Contact person	Michael Lilje	Heinz Ortmann
Title	Director	Carbon Project Manager
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1.6 Other Entities Involved in the Project

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process

1.7 Ownership

The project proponent, Orizon, will have full ownership of the project and any/all resulting VCUs that are issued.

The project proponent's ownership of the project is based on signed agreements with all participating landowners/farmers. The improved ALM practices are implemented by each farmer and Orizon will have the rights to any VCUs, that occur from the implementation of these practices in each instance.

The majority share of resulting revenues generated by the sale of the issued VCU's will be distributed to the landowners/farmers in line with the signed agreements.

1.8 Project Start Date

The Orizon CarbonCrop Rewards Programme project start date is 1 August 2018. As per the VCS Standard, this start date corresponds to the date from which the initial activities included in the project have started to remove and reduce GHG emissions.

The timing within the year coincides with preparation of the fields for the main planting season in the summer rainfall regions of South Africa and would include the participating farmers who commenced sustainable practices from the 2018/19 planting season.

1.9 Project Crediting Period

As per section 3.8.3 in the VCS standards requirement for AFOLU projects, the crediting period for this program should be a minimum of 20 years with a maximum of 4 renewals within the maximum 100-year crediting period.

Aligned with the most impactful carbon sequestration period, we have chosen a 25-year crediting period with 3 possible renewals. This period also aligns with the minimum generational period from which the subsequent generation would start taking over farming operations and the probability of changing practices is heightened. Therefore, the end of the crediting period is a sensible period to re-assess baseline practices in line with the updated commonly adopted practices in the region.

The project start date as per Section 1.8 above is 1 August 2018. The first crediting period therefore will end on 30 July 2043. The project lifespan i.e., end date will be 30 July 2118.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	X
Large Project	

Table 1: Estimated GHG emission reductions or removals for first crediting period

Year	Estimated GHG emission reductions or removals (tCO_2e)
Year 2018	2,083
Year 2019	6,042
Year 2020	8,542
Year 2021	12,083
Year 2022	19,167
Year 2023	31,250
Year 2024	48,333
Year 2025	68,333
Year 2026	88,333
Year 2027	100,000
Year 2028	100,000
Year 2029	100,000
Year 2030	100,000
Year 2031	100,000
Year 2032	100,000
Year 2033	100,000
Year 2034	100,000
Year 2035	100,000
Year 2036	100,000
Year 2037	100,000
Year 2038	100,000
Year 2039	100,000
Year 2040	100,000
Year 2041	100,000
Year 2042	100,000

Year 2043	58,333
Total estimated ERs	1,942,500
Total number of crediting years	25 years
Average annual ERs	77,700

More information, including a specific estimation of annual and total GHG emission reductions and removals for this grouped project, will be provided during the validation process.

1.11 Description of the Project Activity

The Orizon CarbonCrop Rewards Programme, through a focus on regenerative agriculture, seeks to incentivise and support improved practices such as those outlined in Section 1.1. The project is set up as a grouped project so that it can be expanded across South Africa over time.

Besides Orizon and the farmers, several different stakeholders such as consultants, researchers, agricultural organisations, and legal experts are working together to support farmers to overcome the barriers of transitioning to more sustainable practices.

Participating farmers will need to make one or more practice changes as per the methodology and in line with its requirements. These practice changes often come at big costs and risks, including the cost of new implements, increased investment in livestock and the risk of potential short-term drops in productivity. There are also other challenges, such as investing management time to understand these new practices, combatting soil compaction and acidity levels without tillage, and maintaining yields while reducing synthetic fertilizer to name a few. By directing carbon credit funds to such farmers and providing them with the necessary support and resources, these risks are mitigated, and costs are offset.

The main project practices are outlined in the table below along with some resulting positive environmental impacts (some of which are in addition to those quantified for the issuance of VCU's as part of the project):

Table 2: Improved practice activities and the environmental impact of these changes

Improved Practice Activity	Environmental impact
Reducing fertilizer applications	
- Optimizing fertilizer application rates - Incorporating legumes into crop rotations - Introducing livestock into the cropping system - Planting cover crops including legumes - Replacing synthetic fertilizer with organic sources	- Reduction in N_2O emissions - Reduced water pollution - Reduced fertilizer manufacturing emissions - Accelerated build-up of Soil Organic Matter ("SOM") - Improved pH levels of soils

Improved Practice Activity	Environmental impact
- Using a different form / inhibitor of synthetic fertilizers	
Improving water / irrigation management	
- Irrigation methods that improve water efficiency - Provide alternatives that allow for a reduction in water usage - Efficient timing and quantity of irrigation, including withholding, to support conditions for SOM build-up	- A reduction in CH_4 emissions - More optimal water usage and less wastage lessens the pressure on the water table of the area - Less nutrient and fertilizer leaching - Accelerated SOM build-up
Reducing tillage intensity/improving residue management	
- Eliminating tillage or reducing the intensity of tillage practices - Using tillage to correct soils for optimal root growth and to set up for long-term no-till	- Improve the SOC stock by improving the soil structure and reducing losses from soil inversion / destruction - Allows mycorrhizal to build soil aggregates which facilitate optimal root growth and carbon storage and build a network to transfer nutrients and water improving crop tolerance to droughts and nutrient density of produce
Improving crop planting and harvesting	
- Crop rotations that aid in returning nutrients to the soils or fix nitrogen - Crops or cover crops that have varying root depths - Single- or multi-species cover crops - Intercropping and relay cropping	- Increase the SOC stock and reduce N_2O emissions - Builds soil structure - Regulates soil heat to avoid extreme temperatures which are destructive to soil microbiology - Reduces bare soil component which builds resilience to heavy rain and reduces soil loss / erosion from surface runoff or wind - Increases annual production capacity
Improving grazing management	
- High intensity / density grazing with increased rotation of livestock allowing for sufficient resting of grazing areas - Multi-species grazing	- Increase the SOC stock by allowing grasses to reach and remain in a vegetative state for longer and increasing the plant density - Reduces the risk of desertification from continuous overgrazing - Increases palatable grass species composition - Increases production of Hydroxyl Radical which helps break down GHG's in the atmosphere, especially methane

The project proponent receives the necessary data from the farmer to calculate the emission reductions and removals as required for the purpose of issuing VCUs. The GHG reductions and removals are quantified using the relevant equations and tools as per the methodology with Soil Carbon stocks being modelled using a locally calibrated model using the published RothC methodology.

To ensure maximum continuity and permanence, the project will have an extensive partner-support structure consisting of experts in the field, agricultural consultants, collaboration with research councils/bodies and provide a variety of materials to guide farmers in their regenerative journey. These materials will include webinars, decision-making support, workshops, online tools, financial consults, amongst others. We will also be linking up farmers in the regenerative journey facing similar challenges to allow for a more streamlined network of information sharing amongst farmers that assists them to succeed with their RA practices in the long-term and with minimal risks.

This project is not located within a jurisdiction covered by any jurisdictional REDD+ program.

1.12 Project Location

All project instances are located within the geographic borders of the Republic of South Africa.

Both the location as well as the field boundaries and area of each project instance and sample unit (field) will be clearly defined and will be provided in KML, shapefile or other GIS format during the validation process.

1.13 Conditions Prior to Project Initiation

Ecosystem Type: Figure 1 shows the different biomes in South Africa. Biomes are areas that have similar climatic and other abiotic (non-living) factors such as elevation, humidity, and soil type (Rutherford et al, 2006) which all contribute to the biological communities that thrive in such environments. Additionally, the variables described above all play a role in determining the carbon storage potential of the soils within a specific region. A biome is also considered a broad classification of ecosystem type of a region. Our project instances will be focused on the grassland and savanna biomes, but also aim to expand to regenerate areas within other biomes.

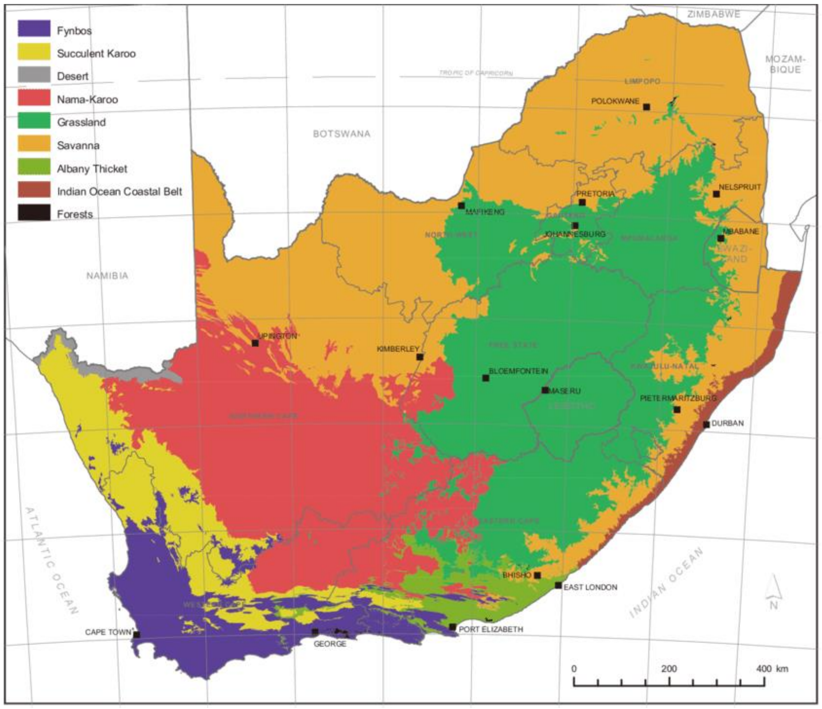

Figure 1: Biomes of South Africa Current and historical land use

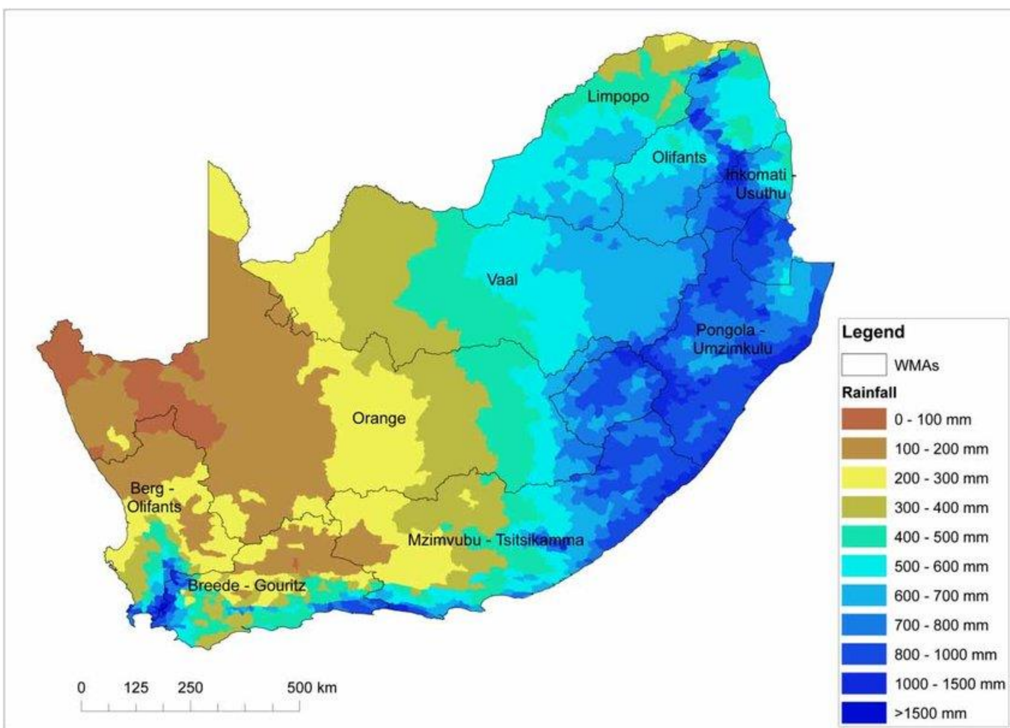

Figure 2: Map of annual rainfall across South Africa's Water Management areas (WMAs) (Cole et al, 2017)

Agricultural Industry and land type: South Africa has a well-established commercial agriculture sector that covers 46,4 million hectares, which represents 37,9% of the total surface area of South Africa (122,5 million hectares) (Stats SA 2018). Commercial agricultural land comprised mainly grazing land (36,5 million hectares) and arable land (7,6 million hectares) (Stats SA 2018). Grazing land is used mainly for livestock whilst arable land is planted with crops and pastures. In the 2020/2021 planting season approximately 4.1 million hectares of crops were planted with maize, contributing 2.8 million hectares, the dominant crop (Esterhuizen 2021). The second most planted crop, soybeans, has seen a sharp increase from ca. 134 000 hectares in the early 2000s to the more than 800 000 hectares now planted (USFDA 2021). Total agricultural land, including commercial, small-scale, subsistence and communal lands has decreased from a high of 101.3 million hectares in 1961 to 96.8 million hectares.

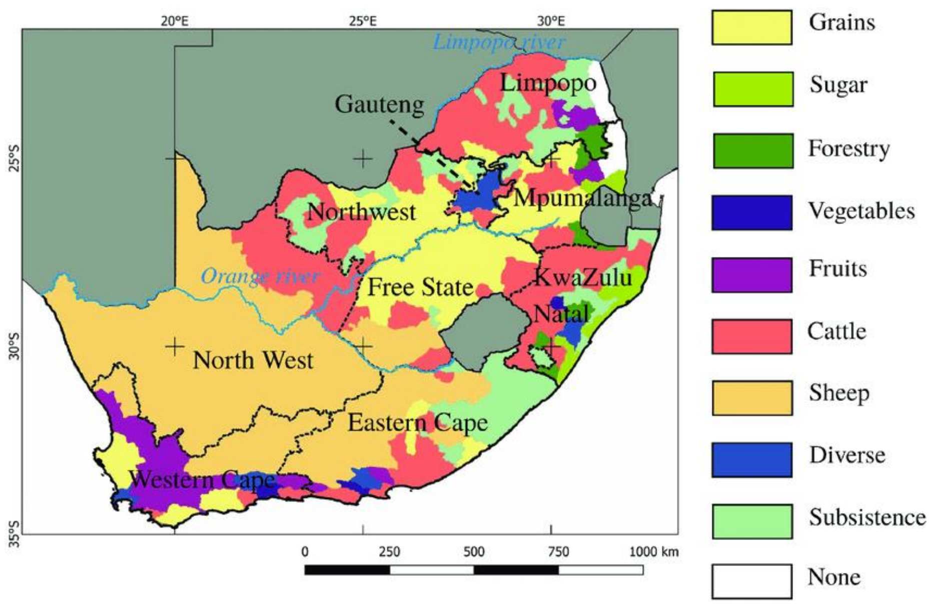

Figure 3: Agricultural regions of South Africa and provincial breakdown (Waldner et al, 2017)

Agricultural Practices: Conventional farming production practices have intensified in the commercial sector to make up for increasing input costs and the reduced area under commercial agriculture. The baseline scenario therefore comprises mostly of conventional forms of agriculture (see Section 3.4). The baseline activities did not originally emit GHG's for the purpose of subsequently generating carbon credits as the project area only includes productive land (i.e. it was economically viable to farm on it) and the baseline practices were generally practiced even before any carbon credit markets existed and were based on the advice of experts and accepted best practices at the time.

Soil types: South Africa has a very wide range of soil types, mainly driven by the varying climates, topographies and historic natural events and formations. The maps below provide an indication of the national variation of soil types.

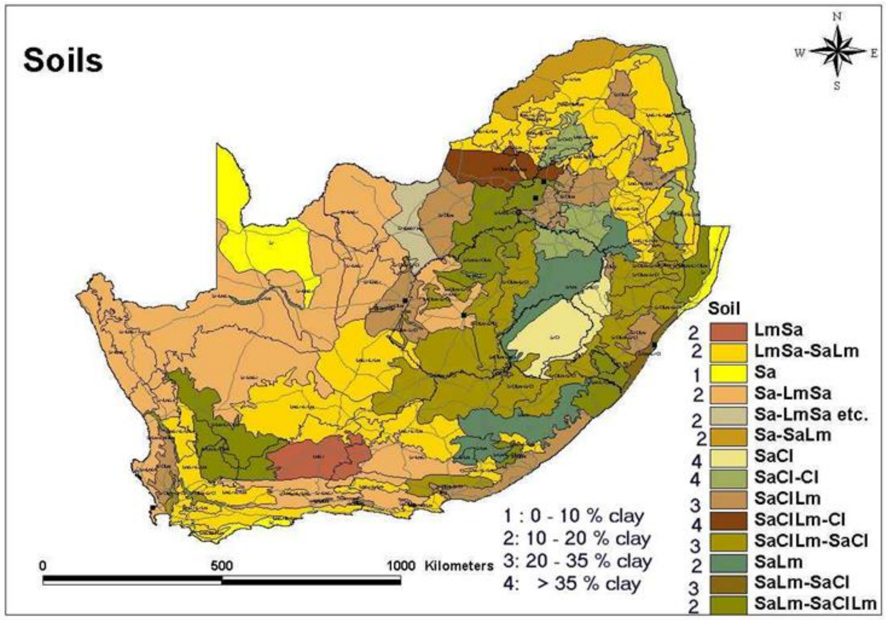

Figure 4: Map of soils classified based on clay content (DWS, 2011)

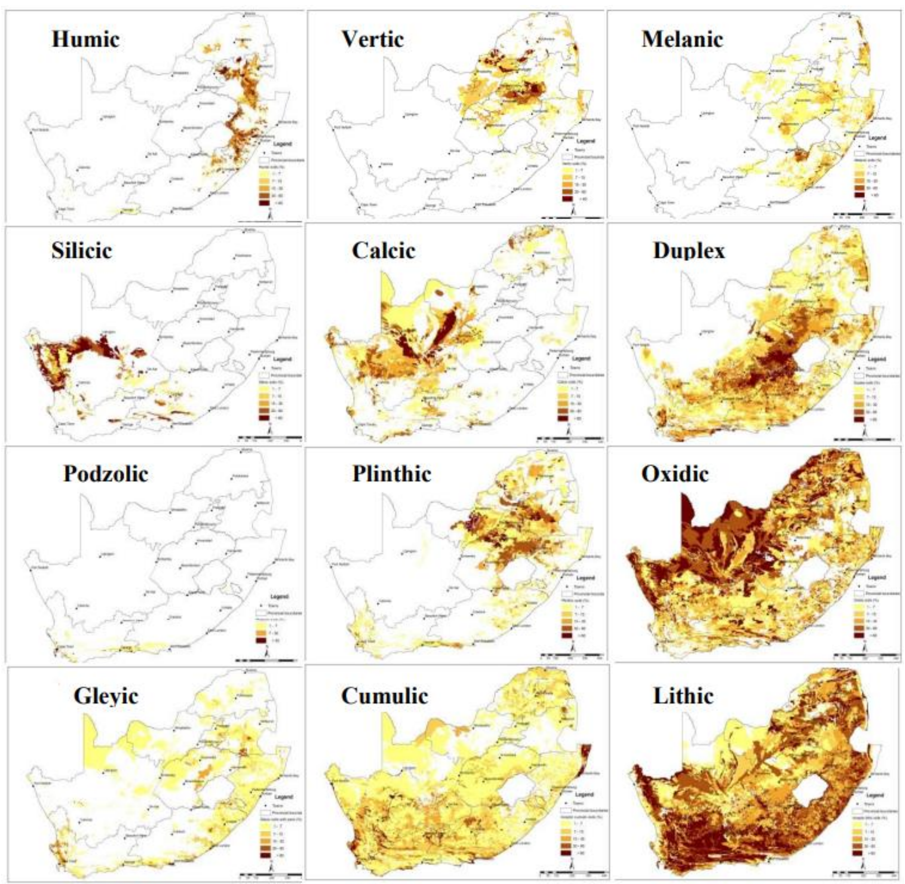

Figure 5: Distribution of the different soil groups across South Africa (Fey, 2010)

Soil Organic Carbon: Carbon levels, storage potential and the potential rate of sequestration is impacted by many factors, including climatic conditions, topography, soil type (primarily clay fraction), soil depth, land use and management practices. Our model takes all of this into account and will be validated for each area in which a field is included in the project.

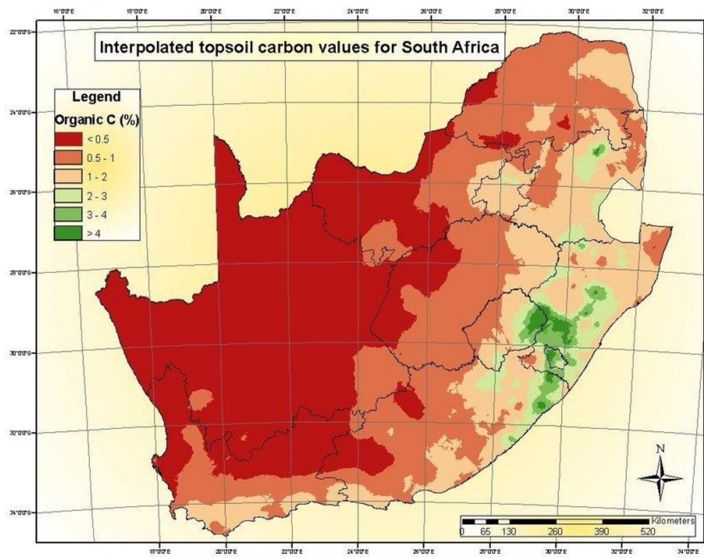

Figure 6: Distribution of soil organic carbon content (% by mass) across South Africa and Lesotho for the topsoil horizon only, based on 4 837 measured values (Stronkhorst and Venter, 2008)

Agricultural policy: The South African government and its agricultural extensions all strongly support the adoption of more sustainable agricultural practices. However, with limited resources, the need for private sector support and funding is clear. Currently, there are no regulations which prohibit a shift to regenerative agriculture, but neither are there any regulations, taxes or incentives which strongly encourage it.

The above all describes the broader / national conditions existing prior to project initiation. The conditions existing prior to project initiation on the specific participating fields were broadly aligned with the above-described conventional farming methods. Each sample unit will be individually assessed, and further details are included in Sections 3.2 and 3.4.

The initial project instances fall under the commercial agriculture sector. The aim of the project is to support both commercial and smallholder farmers in making the shift to improved land management practices. These practices would unlikely change without the commencement of this project due to financial, educational, and systemic barriers.

The baseline scenario will be determined in line with VM0042, which assumes the continuation of historic practices. This will be assessed considering the above conditions which will be continuously reassessed.

Has the land been cleared of native ecosystems within 10 years of the project start date?

☐ Yes ☒ No

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

This project, located within the geographical boundaries of the Republic of South Africa, is compliant with all relevant legislation and regulations. The project proponent has contracted the necessary legal expertise to provide oversight in this regard.

Orizon Agriculture's implementation plan with regards to compliance will include the following key components:

- Review the programme in accordance with applicable laws and regulations;
- Regularly update the list of laws and be aware of their requirements where applicable;
- Ensure clear communication with all staff regarding any changes in applicable laws and regulations directly related to the programme;
- Consistent communication with our legal partners who specialise in local environmental, climate, and carbon tax / market regulations.

Below is a non-exclusive list of identified RSA Regulations and legal frameworks that are adhered to as part of this project:

Table 3: South African legislation and regulations list for the Orizon CarbonCrop Rewards programme

Legislation/Regulation Name	Act Number & Year
Constitution of the Republic of South Africa	Act 108 of 1996
Companies Act	Act 71 of 2008
Carbon Tax Act	Act 15 of 2019
National Environmental Management Act (NEMA)	Act 107 of 1998
All amendments of NEMA up to and including 2014	Act 25 of 2014
National Water Act	Act 36 of 1998
All amendments of National Water Act up to and including 2014	Act 27 of 2014
National Heritage Resources Act	Act 25 of 1999
Conservation of Agricultural Resources Act	Act 43 of 1983
The National Environmental Management: Biodiversity Act	Act 10 of 2004
National Environmental Management: Protected Areas Act	Act 57 of 2003
Agriculture Laws Extension Act	Act 87 of 1996
Fertilizers, Farm Feeds and Remedies Amendment Act	Act 4 of 1980

Legislation/Regulation Name	Act Number & Year
Constitution of the Republic of South Africa	Act 108 of 1996
National Environment Management: Air Quality Act	Act 39 of 2004
Protection of Personal Information Act (POPIA)	Act 4 of 2013
Department of Forestry, Fisheries and Agriculture: Technical Guidelines for the validation and verification of GHG emissions	Government Gazette No. 45452, 12 November 2021

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project, or any of its project instances, has not been registered or is not seeking registration under any other GHG programs. Project instances joining over time will have to confirm this before entering into an agreement with Orizon.

1.15.2 Projects Rejected by Other GHG Programs

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

1.16.2 Other Forms of Environmental Credit

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

1.17 Sustainable Development Contributions

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

1.18 Additional Information Relevant to the Project

Leakage Management

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

Commercially Sensitive Information

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

Further Information

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

2 SAFEGUARDS

2.1 No Net Harm

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

2.2 Local Stakeholder Consultation

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

2.3 Environmental Impact

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

2.4 Public Comments

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

2.5 AFOLU-Specific Safeguards

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Table 4: Methodology

Methodology	Name of Methodology	Version & Scope
VM0042	Methodology for improved agricultural land management	V 2.0, 21 December 2021, Sectoral Scope 14

Table 5: Additional Tools Applicable to the Programme

Tool Name	Version
VCS Standard	Version 4.2, 20 January 2022
VCS Program Definitions	Version 4.1, 20 January 2022
VCS Program Guide	Version 4.1, 20 January 2022
VMD0053 – Model Calibration, Validation, and Uncertainty Guidance for the Methodology for Improved Agricultural Land Management	Version 2.0, 21 December 2021
VCS Registration & Issuance Process	Version 4.0, 19 September 2019
AFOLU Non-permanence Risk Tool	Version 4.0, 19 September 2019

Any additional tools that are required will be finalised prior to validation of the project and the most recent revisions will be included and adhered to.

3.2 Applicability of Methodology

Table 6: Applicability conditions and justification for project applicability

Number	Applicability Condition	Justification for Project Applicability
1	Projects must introduce or implement one or more new changes to pre-existing agricultural management practices as per the below: ● Reducing fertilizer (organic or inorganic) application; ● Improving water management/irrigation; ● Reducing tillage intensity/improving residue management;	• Only activities within this list of categories will be included in the project. • Any other activities will not be considered for registration under this project. • Only activities listed will be included for quantification of emissions reductions and/or removals.

Number	Applicability Condition	Justification for Project Applicability
	● Improve crop planting and harvesting (e.g., crop rotations, cover crops etc.); ● Improving grazing management.	
2	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 However, land use change (i.e., conversion from cropland to grassland or vice versa) may be allowed under the following scenarios: • Introduction of temporary grassland into cropland is allowed where it can be credibly demonstrated prior to project validation that the integration of perennial crops (e.g., grasses, legumes) into annual crops is planned as part of a long-term agricultural management system (e.g., Integrated Crop-Livestock System) • Conversion from grassland to cropland or vice versa where it can be credibly demonstrated prior to project validation that project lands in the baseline scenario are degraded and the introduction of improved practices involving land use change would lead to significant improvements in soil health and associated socioenvironmental benefits. In this case, projects must provide documentation demonstrating that lands are degraded at the start of the project and degradation will continue in the baseline scenario due to the presence of degradation drivers or pressures in the baseline	• For this grouped project the inclusion of all new instances will adhere to the requirement of the activity taking place on grassland or cropland throughout the project lifespan. • Satellite imagery will be used as a complimentary tool as well as confirming the status of degraded land that may be converted to grassland/cropland as per V2.0 of VM0042 • The necessary documentation will be provided for any land use change that meets the eligibility criteria as set out for this specific item in the methodology. • The project seeks to incentivize farmers seeking to restore degraded crop and/or grasslands • All necessary information provided to demonstrate land degradation to meet this applicability condition in the methodology as follows: 1. Demonstration of land degradation. The project proponent shall use the CDM Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities to demonstrate both that the land is degraded at the start of the project and that the land will continue to degrade in the baseline scenario. The Tool uses a two-stage process that involves: A. Identification of project lands classified as degraded under any verifiable local, regional, national or international land classification system or credible study produced within the last ten years; or

Number	Applicability Condition	Justification for Project Applicability
	scenario. See Appendix 2 for procedures on how to propose this type of land use change.	B. In the absence of such study, through direct evidence based on indicators of degradation or through comparative studies. Exact procedures are outlined in the Tool. 2. Demonstration of expected improvements resulting from project implementation. The project proponent shall provide an analysis of how the proposed project activities will lead to restoration of project lands. Such analysis shall be based on the degradation indicators identified in Step 1 and shall at minimum include expected impacts on soil health, plant (i.e., crops, forage) productivity, biodiversity, local ecosystems, and livelihoods. Evidence types may include relevant local, regional, national or international studies and local expert analysis. Any experts consulted as part of the analysis should have at least 10 years of relevant experience in the project region and professional credentials (e.g., research scientist, certified agronomist)
3	The project area must not have been cleared of native ecosystems within the 10-year period prior to the project start date.	• The main source for this data will be satellite imagery to determine that no native ecosystems have been removed in the 10-year period prior to the project start date. • Data from peer-reviewed literature as well as landcover data will play a vital role in confirming that this applicability condition is met. • Where satellite imagery is insufficient or unavailable, alternative sources will be used to ensure this applicability condition is met.
4	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	• The project is not expected to have a sustained production reduction over time and therefore there is little risk of carbon leakage.

Number	Applicability Condition	Justification for Project Applicability
	activity in the region or a comparable region.	• Several studies focusing on improved agricultural land management practices support the above statement as soil health improves (World Bank 2006, Branca et al, 2013). The referenced published paper specifically mentions the potential yield increase that sustainable agriculture practices offer in areas of low and variable rainfall. South Africa has wide areas with such rainfall conditions. • RA has the potential to increase average yields of existing produce as well as including diversification products (e.g., more cattle, chicken, pigs, cover crops as livestock feed, agroforestry, etc.) which further increase gross farm production. • Food security is also supported as fields become more drought and disease tolerant through RA practices as the water holding capacity and infiltration increases and nutrient cycling is restored.
Methodology VM0042 is not applicable under the following conditions:		
1	The project activity cannot occur on a wetland. Note that this condition does not exclude crops subject to artificial flooding where it can be demonstrated that crop cultivation does not impact the hydrology of any nearby wetlands.	• Any new project instances will adhere to this condition. • Satellite imagery will be used in conjunction with GPS data regarding the field locations to ensure that no new sample units/fields or any of the initial project activities take place on a wetland.
2	The project activity cannot include application of biochar as a soil amendment	• Any new project instances will adhere to this condition

Additional conditions where models are applied:

Methodology VM0042 does not provide instruction of the use of a specific model. The module VMD0053 applies where empirical or process-based models used to estimate stock change/emissions meet specific conditions. According to the module VMD0053 the applicability conditions for models are as follows:

Table 7: Applicability conditions for when a model is applied

Number	Applicability Condition	Project Applicability Justification
1	Publicly available; though not necessarily free of charge, from a reputable and recognized source (e.g., the model developer's website, IPCC or government agency)	This project will utilize the publicly available Roth C model that has a proven track record for this specific type of project globally (examples include Coleman et al, 1997, Zimmerman et al, 2007, Nieto et al, 2010, Francaviglia et al, 2012)
2	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 project description;	The model appears in several peer-reviewed studies that specifically look at the quantification of Carbon stock (Coleman et al, 1997, Morais et al, 2019, Jebari et al, 2021) and therefore support the relevance and applicability of this model for the purposes of this project
3	Able to support repetition of the project model simulations. This includes clear versioning of the model use 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. Where multiple sets of parameter values are used in the project, full reporting includes clearly 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); and	The Roth C model supports repetition of the project model simulations. This will be shown by the project proponent providing a detailed Model Calibration and Validation Report. The sources for all parameters will be provided. The report will provide the following: • Details of the sources for all parameter datasets and calibration / validation datasets • Evidence of the independence of the calibration data to the validation data • A description of how the model was applied to determine estimates for stock changes/emissions • A description of our calibration and validation procedures The model will be calibrated and validated for each practice category / crop functional group combination included in the project instances. The validation data will include published datasets from each climatic and designated soil type occurring in the project, or a justifiably similar region if data limitations are evident. If for whatever reason a different model should be used, a report will also be provided as per the above outline.
4	Validated per datasets and procedures detailed in VMD0053	The Model Calibration and Validation Report will detail our compliance with the guidance

	"Model Calibration and Validation Guidance for the Methodology for Improved Agricultural Land Management", with model prediction error calculated using datasets as detailed in the same module, using the same parameters or sets of parameters applied to estimate stock change/emissions in the project.	of VMD0053 and will include all calculations and statistical analysis of the data to show model prediction error. The same model used for validation will be used to estimate stock change/emissions in the project.
5	The same model version and parameters/parameter sets must be used in both the baseline and project scenarios	The Report provided will outline how the same model versions and parameters have been used for the baseline and with project scenarios. This will be made available for testing by the validation and verification body ("VVB") along with all other required information and datasets.

3.3 Project Boundary

As per Methodology VM0042, the project boundary is defined as follows: "The spatial extent of the project boundary encompasses all lands subject to implementation of the proposed improved agricultural land management practice(s)." All project instances take place on grassland or cropland as per the eligibility criteria. The geographic boundary of this project and its associated practices is that of the borders of the Republic of South Africa.

Table 7 below outlines the selected carbon pools for both the baseline and project scenarios. Table 8 refers specifically to the GHG emissions sources, those included and those excluded, as part of the project for both the baseline and project scenarios.

Table 8: Selected Carbon Pools for the Baseline and Project Scenario

Pool	Included/Excluded	Justification for Inclusion/Exclusion
Aboveground woody biomass	Included	For the project scenario where new or existing agroforestry practices occur, those eligible for the project, will be included. Aboveground woody biomass will be calculated using the CDM A/R Tools Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities and Simplified baseline and monitoring methodology for small scale CDM afforestation and reforestation project activities implemented on lands other than wetlands. Our initial project instances do not include such projects.
Aboveground non-woody biomass	Excluded	As per the VCS rules this Carbon pool does not have to be included because it is not subject to significant changes, or potential changes are transient in nature. Accordingly, as per methodology VM0042, this pool is excluded.

Pool	Included/Excluded	Justification for Inclusion/Exclusion
Belowground woody biomass	Included	This is an optional pool. For the project scenario where new or existing agroforestry practices occur, those eligible for the project, will be included. Belowground woody biomass is calculated as per the guidelines for aboveground woody biomass. Our initial project instances do not include such projects.
Belowground non-woody biomass	Excluded	As per the VCS rules this Carbon pool does not have to be included because it is not subject to significant changes, or potential changes are transient in nature. Accordingly, as per methodology VM0042, this pool is excluded.
Dead wood	Excluded	As per the VCS rules this Carbon pool does not have to be included because it is not subject to significant changes, or potential changes are transient in nature. Accordingly, as per methodology VM0042, this pool is excluded.
Litter	Excluded	As per the VCS rules this Carbon pool does not have to be included because it is not subject to significant changes, or potential changes are transient in nature. Accordingly, as per methodology VM0042, this pool is excluded.
Soil Organic Carbon	Included	Soil Organic Carbon is the main carbon pool affected by the project activity. The implementation of new practices and regenerative agriculture has an impact on SOC. It is expected to increase in the project scenario.
Wood products	Excluded	Carbon pool is optional for ALM project methodologies and may be excluded from the project boundary as per the VCS rules. For this project this pool is excluded.

Table 9: GHG sources included In or Excluded from the Project Boundary in the Baseline and Project Scenario

Source	Gas	Included/Excluded	Justification for Inclusion/Exclusion
Soil Organic Carbon	CO_2	Included	SOC is a major GHG source. It is quantified as stock change in the pool, rather than an emission source (see Table 7).
Fossil Fuel	CO_2	Included	The source of fossil fuel emissions are vehicles and mechanical equipment as required by the ALM activity. The project will reduce the use of these sources or minimize where possible.

Source	Gas	Included/Excluded	Justification for Inclusion/Exclusion
Soil Methanogenesis	CH_4	Excluded	Excluded from both the baseline and project scenarios. It is beyond the scope of the model being utilized for this project. Furthermore, this project is not expected to increase CH_4 emissions.
Enteric Fermentation	CH_4	Included	These emissions must be included in the project boundary as some of the farms have livestock. For all eligible project activities these emissions are included.
Manure Deposition	CH_4 & N_2O	Included	As per previous point. For all eligible project activities, the CH_4 and N_2O emissions from manure deposition and management must be included in the project boundary.
Use of Nitrogen Fertilizers	N_2O	Included	This is a major source of emissions. N_2O emissions from fertilizers must be included in the project boundary. In the project scenario farmers will often reduce fertilizer use. This will be done in conjunction with the utilization of soil testing and a more regulated use of fertilizer and fertilizer substitutes.
Use of Nitrogen fixing Species	N_2O	Included	Nitrogen fixing species are planted in the project, either as cover crops or as intercrops, N_2O emissions from nitrogen fixing species must therefore be included in the project boundary. This is for the project scenario compared to the baseline scenario.
Biomass Burning	CO_2	Excluded	CO_2 emissions under burning are assumed as zero and therefore not included. Any change in soil carbon stocks however will be calculated as per VM0042 guidelines.

Source	Gas	Included/Excluded	Justification for Inclusion/Exclusion
	N_2O & CH4	Included	For eligible sample units changing from a regime of burning to options with less burning. This is likely to apply to sugarcane mostly but also has scope within forestry and grazing areas. Any change in Carbon stocks will be calculated as per VM0042 guidelines. Must be included where the project activity may significantly increase emissions compared to the baseline scenario and may be included where the project activity may reduce emissions compared to the baseline scenario. Included as the project scenario is expected to decrease emissions compared to the baseline as a reduction in burning will be incentivized in the project scenario.
Woody Biomass	CO_2	Included	It is quantified as stock change in the pool, rather than an emissions source (see Table 7). It will be calculated using the CDM A/R Tools Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities and Simplified baseline and monitoring methodology for small scale CDM afforestation and reforestation project activities implemented on lands other than wetlands.

The project instances are set to occur in several provinces, primarily and initially including the Kwa-Zulu Natal, Free State, Gauteng, Mpumalanga and the North West Province. Future instances will include other provinces. The exact locations and specific details of each instance will be provided in the documentation for validation in the required formats. The below figure provides an overview of the provinces of South Africa:

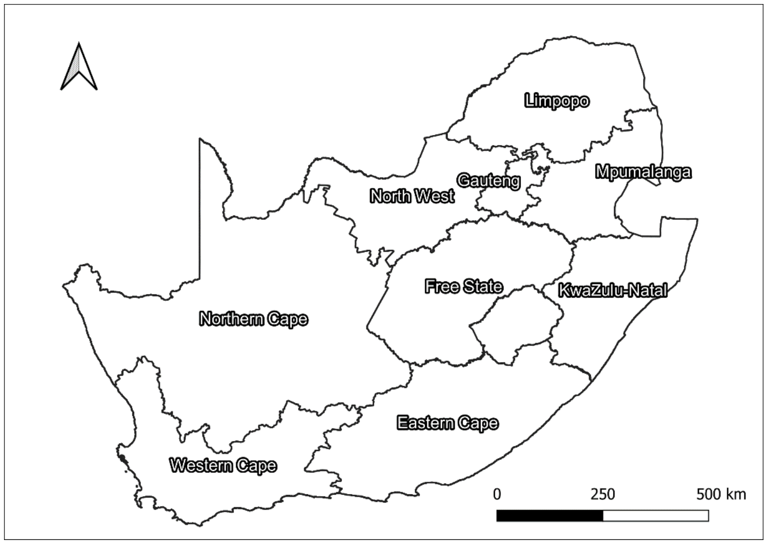

Figure 7: Provincial boundaries of South Africa

3.4 Baseline Scenario

As per the Methodology, the most likely baseline scenario is the continuation of pre-project agricultural management practices. For each sample unit (e.g., for each field), practices applied in the baseline scenario are determined applying a historic look-back period to produce an annual schedule of activities to be repeated over the first crediting period. As per the methodology, the look-back period should be a minimum of 3 years and include at least one crop rotation.

Baseline emissions/stock change are then modelled (for SOC stock change only), directly measured or calculated using accepted conservative benchmark calculations. The crops and practices assumed in the baseline scenario are re-evaluated as required by the VCS Standard and revised, if necessary, to reflect current agricultural production in the region.

Data for the determination of the annual schedule of activities will align with the specific locations in the project. This data will be received directly from the farmers for each location and will be based on their actual management activities on participating fields prior to the implementation of improved ALM practices. This data will be supported by satellite data and other sources and studies performed on the practices of farmers within a certain area. Where this information is not available, we will source the information elsewhere (e.g., the Agricultural Research Council) to determine the annual schedule of activities through accepted means as per the methodology.

The GHG reduction calculations are set out in VM0042 for both the project and baseline scenarios. Essentially these are quantified by comparing the project scenario to the performance of the baseline scenario. Quantification Approach 1, measure and model is used to quantify Soil Organic Carbon (SOC) stocks in sample units, using a calibrated and validated model and taking into account the climatic conditions, soil type, soil texture, bulk density and other aspects of the farmland. The model chosen for this project is the RothC (Rothamsted C) model. The value at t=0 initiates the model for each project instance. The model's performance will be corroborated by comparing SOC measurements to the estimations of the model. This will be done following a standardised procedure by taking soil samples from the same location at the same time and on the same date in intervals as prescribed by the requirements for 'true-up'/re-calibration of the model. Initial direct measurements or samples will be taken at project start date or within 5 years thereafter and then back-modelled. We eagerly await further clarifications and guidance around the "true-up" process to support best practice and standardisation across the industry.

Where aboveground and belowground woody biomass is included, these will be calculated by using the CDM A/R Tools Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities and Simplified baseline and monitoring methodology for small scale CDM afforestation and reforestation project activities implemented on lands other than wetlands.

The methodology provides a set of equations that will be applied under Quantification Approach 3 to quantify the baseline emissions. These baseline emissions are reduced in the project scenario due to the application of the new project activities i.e., any applied improved land management practices as part of RA.

More details will be provided upon validation.

3.5 Additionality

Methodology VM0042 uses a project method for the demonstration of additionality. Regulatory surplus must be shown in accordance with the requirements of the methodology as well as through the following two steps:

<u>Step 1: Identify barriers that would prevent the implementation of a change in pre-existing agricultural management practices</u>

Some of the identified barriers pertaining to this project include the following:

- Financial aspects including but not limited to:
    - Capital investment for implements required for no till practices and planting / terminating of cover crops.
    - Capital investment for livestock (e.g., increasing stocking rate).
    - Concern over potential drops in yields in the initial years of adopting regenerative practices (NB – this risk is minimised through proper planning, consultations and soil preparation).
- Decreased availability of finance for such investments as the Agricultural Land and Development Bank is in financial difficulties and commercial banks are not yet able to cover that capacity.
- Comparatively high interest rates which make debt financing of capital investments expensive.

- No subsidies, tax deductions or any other incentives to motivate the adoption of RA practices.
- Awareness/Education around the issue of climate change and the positive impact that RA has as well as some of the misconceptions associated with the term RA that provide farmers with incorrect information and therefore a resistance to RA in general.
- Perception that sustainable practices are only suitable to very specific areas (e.g., cover crops are not feasible in drier areas or no-till systems are impossible in sandy soils)
- Technical Capacity – Financial and otherwise (such as extensively available technical expertise / consultants) to shift to RA.
- Record high national farm debt levels mean there is limited capacity for many farmers to absorb additional financing.
- Decreased historic profitability means farmers are hesitant to make big changes which can threaten their short-term profitability and entire operations.
- Social/cultural barriers - RA is not the social norm for South Africa and farmers making changes run the risk of being ostracized from the farming community as this different method of farming may not be seen as agreeable with the community.
- Social/cultural barriers – A high level of respect in South African farmers for their fathers and grandparents (and the way in which they farmed) often limits adaptation to a changing climatic and financial environment.

Step 2: Demonstrate that the adoption of the suite of proposed project activities is not common practice.

The South African agricultural sector is dominated by mostly conventional methods. These methods generally do not include the practices considered as part of the improved land management practices as set out in VM0042, although some sustainable practices have already been extensively adopted (such as marginally improved residue management and some livestock integration).

The South African government acknowledges the need for more sustainable practices as mentioned in the National Development Plan for 2030 (NDP 2012). However, there are currently no formal regulatory frameworks prescribing or incentivising sustainable practices.

Project instances and their associated practices for this CarbonCrop Rewards Programme will be determined as not common practice by comparing it to the regional adoption rate of the practice of suite of practices in question. Where such an activity is determined to be adopted by more than 20% within the region, we will calculate the weighted average adoption rate of at least 3 (or more) predominant project activities within the project spatial boundary and that these practices are below the current threshold of 20% as set out in methodology VM0042.

Further details specifically outlining the determination of this programme's additionality will be provided prior to project validation.

3.6 Methodology Deviations

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

4.2 Project Emissions

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

4.3 Leakage

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

4.4 Net GHG Emission Reductions and Removals

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

5 MONITORING

5.1 Data and Parameters Available at Validation

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

5.2 Data and Parameters Monitored

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

5.3 Monitoring Plan

This section has been omitted in accordance with the VERRA Registration and Issuance Process v4.0 19 September 2019 - §3.1.3 – Pipeline Listing Process.

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