SOIL CARBON IMPROVEMENT PROJECT THROUGH GRASSLAND MANAGEMENT, IN SOUTH AFRICA

Document Prepared by WeAct Pty Ltd.

Project Title	Soil carbon improvement Project through Grassland Management, in South Africa
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1 PROJECT DETAILS

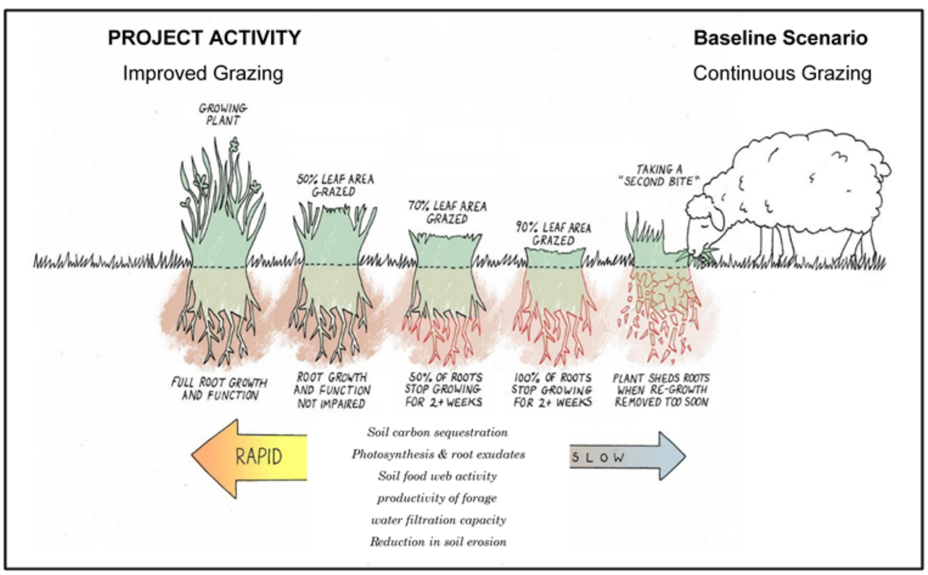
1.1 Summary Description of the Project

The proposed Project Title: Soil Carbon Improvement Project through Grassland Management, in South Africa.

The proposed project aims to remove GHG from atmosphere by implementing sustainable grazing management and controlled fire over a multiple grasslands of Drakensberg area in South Africa. The practice of past over grazing and uncontrolled fire has depleted soil organic matter, greatly reduced perennial vegetation cover and the potential production of forage for livestock.

In the baseline scenario, the pastures are larger and the livestock movement less frequent, allowing for unrestricted and selective grazing of perennial grasses. Loss of perennial grasses in grassland ecosystems results in soil loss and erosion, soil carbon loss, reduced water filtration capacity, and reduced productivity of forage.

Project Activity i.e. planned grazing and controlled burning will increase the rest and rotation on pastures above baseline practices. Smaller pastures implemented by fencing with more rotations allow the recovery of perennial grasses, which foster greater carbon inputs, higher retention of carbon as lignin and cellulose, and greater belowground production. This results in the sequestration of greenhouses gases from the atmosphere to the soil.



The project has been designated as a 'Grouped Project' and plans to increase the number of project instances over a period of time. The first instance includes four land areas Kwazulu Natal (KZN, 6785.4 ha), Eastern Cape (EC, 70737.5 ha), MPL (3773.5 ha) and "Free State" (10654.3 ha) and this first instance aims to recover around 91,950.6 ha of land degraded by unrestricted grazing and uncontrolled fire through the implementation of planned rotational grazing and controlled burning.

The overall purpose of this initiative is to develop soil carbon storage through improved grassland management and expected to result in significant removal of CO_2 from the atmosphere, as documented using the VCS methodology, "VM0026 – Sustainable Grassland Management". With expected annual removals of approximately 221,482 tCO_2e/year on average (without considering buffer credit), eventually the project is estimated to remove about 4.43 million tons CO_2e over the crediting period.

However, the project activity is dependent on financial aid to enable such grassland management activities to achieve improvement in soil carbon. Therefore, project has been designed and developed considering carbon revenue to sustain. Thus, these new practices, which would not occur without significant carbon revenues to motivate change in herder behaviour, fencing construction etc., will allow recovery of perennial grasses and the restoration of soil organic carbon in the entire region being targeted under this project.

Audit Type	Period	Program	VVB Name	Number of years
Validation	08-02-2023	VCS	4K Earth Science	-
Total	-	-	-	-

1.2 Sectoral Scope and Project Type

The project corresponds to VCS sectoral scope 14 "Agriculture, Forestry and Other Land Use (AFOLU)". The AFOLU project category is Agricultural Land Management (ALM). In the ALM category, the proposed project falls under the "Improved Grassland Management (IGM)".

The project is a grouped project.

1.3 Project Eligibility

According to the list of eligible AFOLU Projects described in Appendix 1 of VCS Standard Version 4.4 the present project activity falls under "Improved Grassland Management (IGM)"of the project category "Agricultural Land Management (ALM)" category. The project aims at increasing soil organic carbon (SOC) through adjustment of fire and controlled grazing. The justification of eligibility of the project under the scope of the VCS Program are given in the table below.

Table 1: Eligibility conditions for improved Grassland Management (IGM) under VCS	
Eligibility conditions	Justification/Description

This category includes practices that demonstrably reduce net GHG emissions of grassland ecosystems by increasing soil carbon stocks, reducing N_2O emissions and/or reducing CH_4 emissions.	Past overgrazing in large pasture has greatly reduced perennial vegetation cover and the potential production of forage for livestock and thus results in soil loss and erosion, soil carbon loss, depleted soil organic matter reduced water filtration capacity, The project aims to remove greenhouse gases from the atmosphere by developing soil carbon storage through implementing sustainable grazing management and controlled fire over a large area of grass land in South Africa.
The project area shall not be cleared of native ecosystems within the 10 year period prior to the project start date	The project activity has not cleared any native ecosystem within the 10 year period prior to the project start date. This has been demonstrated through Satellite Imageries[1] (Please refer Appendix A). Land title document, Baseline vegetation survey and interviews with the local farmers/communities on land use/cover history and important events during Participatory Rural Appraisal (PRA).
Where ARR, ALM, IFM or REDD project activities occur on wetlands, the project shall adhere to both the respective project category requirements and the WRC requirements, unless the expected emissions from the soil organic carbon pool or change in the soil organic carbon pool in the project scenario is deemed below de minimis or can be conservatively excluded as set out in the VCS Program document VCS Methodology Requirements, in which case the project shall not be subject to the WRC requirements.	The project activities does not occur on wetlands. All wetlands in the project area mapped and excluded from the project activities boundary and project accounting area reported accordingly. Boundary of the grazing area aligned with farm portion boundaries, those GIS layers were used and the area was calculated using GIS coverages and are provided as KML files.

1.4 Project Design

The proposed project has been designed to include a multiple installation of an activity. The project is a grouped project as defined under the VCS Standard 4.4.

Eligibility Criteria

Table 2 : Eligibility criteria under grouped Project		
Sl. No.	Eligibility conditions under grouped Project	Description / Justification

[1] Google earth pro

1.	Meet the applicability conditions set out in the methodology applied to the project	The applicability conditions set out in the VCS methodology VM0026 (version 1.1) applicable to all project instances.
2.	Use the technologies or measures specified in the project description	The technologies or measures are used within the whole project area as specified in the project description for all the instances.
3.	Apply the technologies or measures in the same manner as specified in the project description	The technologies or measures are used within the whole project area and are applied in the same manner as specified in the project description for all the instances.
4,	Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area	The whole geographic project area (Drakensberg area) within which the project instances located is baseline scenario determined in the project description.
5.	Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area	The characteristics with respect to additionality are consistent for the initial instances as well as for the total geographic project area.

1.5 Project Proponent

Organization name	WeAct Pty Ltd
Contact person	Satish Duvvuru
Title	Director
Address	Level 1, 115, Chapel Street Windsor, Victoria 3181, Australia
Telephone	Ph: +61-409 135 580
Email	satish@weact.com.au

1.6 Other Entities Involved in the Project

Organization name	Endangered Wildlife Trust
Role in the project	Co-ordinating Management Entities (Grazing land management)
Contact person	Pieter Botha
Title	Resource Extension Officer

Address	Postnet Suite # 027 and 28 Austin Road AH, Midrand, 1685, Gauteng, South Africa
Telephone	+27 82 4456439
Email	pieterb@ewt.org.za

1.7 Ownership

Legal title of the land:

The land for implementing the proposed project involves a relatively complex arrangement of farm portions, owners and lessees, with different farm portions owned by different entities (people, companies or trusts). The legal title of the land is evidenced through legally registered land certificates (available upon request), issued by the Government Registrar of Land Titles.

Project ownership:

Land owners have agreed to be part of the project activity through a written agreement between WeAct Pty Ltd and the individual land holder. Land holders have agreed that the management process that generates GHG emission reductions or removals which vests project ownership to the project proponent. Under this agreement, the beneficiary community is committed not to assert any property rights over the carbon credits generated and/or to be generated by the Project during the whole crediting period.

Thus, in order to develop GHG emission reductions or removals project, with support of Endangered Wildlife Trust (EWT), the landowners all agreed to authorize We Act Pty Limited as the project proponent to develop the grassland management project under VCS program and take care of the maintenance and overall management of the grassland during the whole crediting period, including conducting baseline survey, signing consultant agreement for development of carbon credits.

1.8 Project Start Date

Start date of the project activity is considered as: 01/07/2018

As per para 3.8 of the VCS standard 4.4 *"The project start date of an AFOLU project is the date on which activities that led to the generation of GHG emission reductions or removals are implemented"*

The project start date reflects the completion of fence construction and the first ranch participating in the project began grazing livestock using the improved grazing practices that comprises the project activity.

Other participating ranches completed fence construction and started improved grazing practices in different dates[2] in the month of July 2018. Estimated ERR is based on the date of each participating ranch commence implementing the project activities. Please refer ERR sheet.

1.9 Project Crediting Period

The project is applying renewable crediting period. Thus, the 1st crediting period is 20 years.

The 1st crediting period starts on 01/07/2018 and ends on 30/06/2038.

PP has considered the project longevity 30 years[3] which is evident from the Detailed Project Report and the agreement between the PP and project participants.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

The project activity under the first instance proposed falls under small-scale project category since the annual average GHG emission reductions are 221,482 tCO_2e (179,835 tCO2e considering annual buffer credit of 41,646 tCO_2e) which is less than 300,000 tCO_2e. The future instances shall also be considered under 'Project' category.

Project Scale	
Project	✓
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
2018[4]	111,651
2019	221,482
2020	221,482
2021	221,482
2022	221,482
2023	221,482
2024	221,482
2025	221,482

[2] Fence construction completion and start date of practicing improved grazing by different ranches has already submitted to VVB

[3] Detailed Project Report and legal agreement between parties submitted to VVB

[4] 01 July 2018 to 31 December 2018

2026	221,482
2027	221,482
2028	221,482
2029	221,482
2030	221,482
2031	221,482
2032	221,482
2033	221,482
2034	221,482
2035	221,482
2036	221,482
2037	221,482
2038[5]	109,831
Total estimated ERs	44,29,632 (35,96,704 considering buffer credit)
Total number of crediting years	20
Average annual ERs	221,482 (179,835 considering buffer credit)

1.11 Description of the Project Activity

The project activity is dedicated towards removal of GHG from atmosphere by implementing sustainable grazing management and controlled burning over multiple grasslands in the host country 'South Africa'. The past over grazing and uncontrolled fire has depleted soil organic matter, greatly reduced perennial vegetation cover and the potential production of forage for livestock.

The **'Endangered Wildlife Trust'** (also referred to as EWT), will continue to play a support role (Co-ordinating management entity) in the effective implementation of the proposed project i.e. planned rotational grazing practices and controlled fire, as opposed to repeated, permanent grazing simultaneously on all grazing lands and uncontrolled burning sites. EWT also provides the workshops and training applicable to the project participants to support their efforts in improving soil health and sequestering carbon

[5] 01 January 2038 to 30 June 2038

Conservation Outcomes is a non-profit organisation provide support to land that is being developed and managed for biodiversity conservation outside of traditional state protected areas. The focus of the organisation is on securing remnant biodiversity, ecological integrity and resilience whilst contributing to poverty alleviation and meaningful socio-economic development in rural southern Africa through the development of the conservation and wildlife sector. The current land areas under the study have also been supported by the Conservation Outcomes to create awareness and motivate people to adopt sustainable practices. Conservation outcomes also provides the workshops and training applicable to the project participants to support their efforts in improving soil health and sequestering carbon

The Biodiversity Company provide biodiversity specialist services. The team has working experience across South Africa and also west, central and southern Africa, working with national and international standards. In the current project activity, they conducted a field soil survey, and monitoring of Soil Organic Carbon (SOC) and other parameters along with baseline and project vegetation survey.

Hylton Allison Bahori Consulting (Pty) Limited provide the services for conducting stakeholder consultation, PRA study and all the baseline and monitoring services.

The first project instance has been designed with land areas namely MPL, EC, KZN, FS, which was adopted planned rotational grazing in 2018 with the project boundary, in an estimated land area of about 91,950.6 ha.

The proposed project activity is following the below mentioned guidelines to achieve soil carbon sequestration.

Table 3 : The Proposed Project Activity

IGM Activity	Description
Controlled burning	Management plan has been set up for grassland burning on a rotational basis, at intervals of between four/ five years, to maintain the vigour and health of the grassland, reduce the hazard of combustible fuel build-up and prevent the succession of alien vegetation. Please refer to the PRA report for detailed burning plan

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<td>Planned rotational grazing</td>
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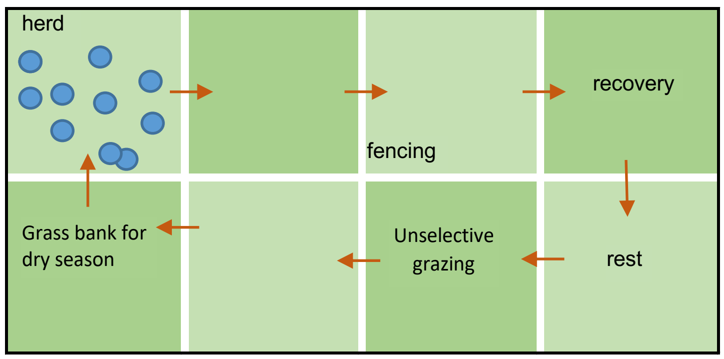
- Livestock operators will decrease the size of their pastures by using fencing to divide up existing pastures.
- Animals will not graze the same location more than once within a wet season or once within a dry season. Project participants increased herder to continually move the livestock to ensure equal grazing across all forage species. This step will be monitored by CME as well as WeAct Pty Ltd.
- Animals will be actively herded and moved to new forage
- Animal herds will be moved across the landscape so as to avoid over-use of areas near settlements or water points.
- Resting serves the purpose of allowing grass seed reserves to recover. A seed rest is important especially where low forage production is expected.
- Resting especially over the wet season is important to allow germination and establishment of decrease species. Resting from October (the beginning of the wet season) until September (end of dry season) is recommended.
- Herders follow agreed-upon plans for livestock movement from grazing committees. Grazing “assistants” employed by the project proponent will monitor and advise herders in the field.



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Overall benefit of the project activity :

➢ The controlled burning can improve grass quality, palatability and availability, because the fire removes dead plant material, causes weed suppression and improves access to new growth,.

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- The rotational grazing of animals will allow plants time to re-grow and to produce seed.
- Animals in herds are generally less selective for forage than those moving in looser smaller groups.
- Larger herds also can produce desirable hoof impacts on soils, i.e. breaking up crusts that promote sheet erosion of soil and decrease rainfall infiltration. Previous research has shown that perennial grasses can increase under a shift from continuous to rotational grazing.

Therefore, it can be concluded that decomposition of the permanent roots of perennials, combined with animal dung, can add carbon to the soil, increase water infiltration and soil water holding capacity, increase herbaceous productivity, mitigate climate variability, and enhance pastoralist livelihoods.

This project is not located within a jurisdiction covered by a jurisdictional REDD+ program. The implementation schedule of this project is listed as follows:

Year	Milestone (s) in the project's development and implementation
2015 - 2017	• Project participants i.e. livestock owner continuously reporting to EWT regarding insufficient availability of forage
2018	• Trainings conducted by EWT on sustainable grassland management • Project participants with the help of EWT started rotational grazing and controlled burning
2019	• Introduction of the project activities to WeAct. • Field visit and initial due-diligence of the project by WeAct with the CMEs • Decision to support the project under the Carbon mechanism so that initiatives undertaken up by the NGOs are extended and positive impacts can be achieved in the long run. Preparatory work started.
2020	• Introduction of Bahori for conducting a rural appraisal • Bahori started communication with the NGOs and ground teams, primary & secondary data review etc. • Preparatory work for Site visit and stakeholders consultations post the pandemic lock down phase.
2021	• Initial information and partial data gathering by Bahori with the help of the NGOs • Consultation rounds and workshops with landowners by Bahori • Process started for contracting and documentary engagement of landowners by WeAct • Data review and VCS PD development by WeAct • Start of VCS Project cycle by WeAct and in parallel continuation of PRA etc.
2022	• Review of VERRA comments by WeAct on initial submission • Achieved VCS listing of the project by WeAct. • Continuation of PRA assessment to finalize the overall project design, boundary, baseline scenario etc. Multiple site visits to interact with farmers and collect data • Primary survey to collect both baseline and project specific data from the landowners • Closure of the PRA assessment and submission of Report

1.12 Project Location

The grouped project activity is expected to have expansion in the large grassland area (Latitude: -28.816641 S, Longitude: 29.529621 E) in the host country the Republic of South Africa (RSA). The project area meets the eligibility criteria described in section 1.4 "Eligibility Criteria for Grouped Projects. This version of the PD includes only the 1st instance considered under the Grouped Project activity, which is demonstrated as follows:

Instance 1:

Project Area: Mpumalanga : (Chrissiesmeer, Dullstroom)

The Drakensberg escarpment divides Mpumalanga into a westerly half consisting mainly of high-altitude grassland called the Highveld and an eastern half situated in low-altitude subtropical Lowveld/Bushveld, mostly savanna habitat. Temperatures in Mpumalanga vary with the elevation, ranging from a mean of 61 °F (16 °C) in the Highveld to a mean of 74 °F (23 °C)[6] in the subtropical Lowveld. So, the temperature here averages 17.6 °C (63.7 °F)[7]. Most of the natural vegetation in the province consists of various types of grassland or savanna parkland, with acacia trees. The driest month is June, with 24 mm (0.9 inch) of rain.[8] Most of the precipitation falls in December, average precipitation ranges from 459 mm to 707 mm.[9]

The project area covers an area of approximately 3773.5 hectares.

Strata No.	Area (ha)	Latitude	Longitude
Strata 20	2195.2	-26.201488 to -26.250672	30.217979 to 30.189974
		-26.36329 to -26.396028	30.155981 to 30.121895
		-26.329176 to -26.371242	30.246507 to 30.208441
		-26.368185 to -26.426543	30.317539 to 30.257818
Strata 17	837.1	-25.51345 to -25.54784	30.180731 to 30.123595
		-25.565237 to -25.572458	30.133469 to 30.102696
Strata 8	741.3	-25.408883 to -25.4499	30.036536 to 29.978677

Project Area: Eastern Cape (Graaf Reniet, Middelburg)

Eastern Cape is the second largest province in South Africa. Eastern Cape is predominantly mountainous. It includes the southern spur of the Drakensberg, rising to more than 9,000 feet

[6] https://www.britannica.com/place/Mpumalanga
[7] https://en.climate-data.org/africa/south-africa/kwazulu-natal/mpumalanga-27228/
[8] climate-data.org
[9] South African Weather Service. 2023. Annual State of the Climate of South Africa 2022. Pretoria. South Africa.

(2,700 m)[10] in the northeast, and descends southward from the great interior plateau (Highveld) of southern Africa to form a relatively narrow coastal plain along the Indian Ocean. the topography is characterized by east-west-trending mountain ranges and valleys. East of the Great Fish River, including the lower valley of the Great Kei River, perennial streams have carved deep valleys on their way to the ocean. The province's natural vegetation is largely grassveld, with some forest on the coast west of Humansdorp. The climate along the coast is subtropical; it is mild at higher elevations to the north. Summers are hot, and snow falls in winter on the high northern mountains. The average temperature varies from 14.9⁰C to 23.7⁰C.[11] The average annual precipitation increases from 541 mm near Port Elizabeth to more than 775 mm[12] along the coast near East London in the east.

The project area covers an area of approximately 70,737.5 hectares.

Strata No.	Area (ha)	Latitude	Longitude
Strata 2	6772.9	-31.9834 to -31.9084	24.3929 to 24.447
Strata 3	4319.8	-31.9354 to -31.8635	24.7916 to 24.9397
Strata 6	4915.8	-31.8036 to -31.698	24.6808 to 24.7856
Strata 9	8643.7	-32.1338 to -32.0107	24.5805 to 24.7836
Strata 10	2860.4	-31.965 to -31.8981	24.4739 to 24.5501
Strata 11	9034.3	-32.5299 to -32.7284	24.6009 to 24.6988
Strata 13	5717.2	-31.9236 to -31.8018	25.1401 to 25.2866
Strata 14	3768.0	-31.62 to -31.5425	25.1276 to 25.2572
Strata 16	6640.8	-31.9071 to -31.7801	24.7687 to 24.8989
Strata 22	18064.5	-32.8068 to -32.5653	24.3328 to 24.5414

Project Area: Kwazulu Natal (Kokstad, Umgeni, Impendle, NottinghamRd)

KwaZulu-Natal is generally hilly or mountainous, especially along its western border. The land rises from the coast to more than 11,000 feet (3,300 metres)[13] along the Drakensberg Escarpment on that border. The slope is not gradual, however, and various rocky outcrops render the terrain into steps of undulating land ascending from an elevation of 500 feet (150 metres) along the coastal plain to areas of 2,000 feet (600 metres) and then 4,000 feet (1,200 metres) in the centre of the province, a region known as the Midlands. Beyond the Drakensberg lies the Highveld, or high plateau. KwaZulu-Natal's climate varies from subtropical to temperate. Average temperature ranges from 23.2 ⁰C to 25,6 ⁰C[14]. Precipitation decreases from 918 mm annually along the coast to 680 mm[15] inland. Temperatures decrease from the

[10] https://www.britannica.com/place/Eastern-Cape-province-South-Africa
[11] https://www.weathersa.co.za/Documents/Corporate/Annual%20State%20of%20the%20Climate%202022_21042023120105.pdf
[12] South African Weather Service. 2023. Annual State of the Climate of South Africa 2022. Pretoria. South Africa.
[13] https://www.britannica.com/place/KwaZulu-Natal
[14] South African Weather Service. 2023. Annual State of the Climate of South Africa 2022. Pretoria. South Africa.
[15] https://www.weathersa.co.za/Documents/Corporate/Annual%20State%20of%20the%20Climate%202022_21042023120105.pdf

frost-free coastal area but still remain warm. In general, summers are hot with occasional rain, while the warm, dry, and sunny winters.

The project area covers an area of approximately 6785.4 hectares.

Strata No.	Area (ha)	Latitude	Longitude
Strata 7	2549.9	-29.991207 to -30.019095	29.229899 to 29.189508
		-30.043222 to -30.091697	29.239223 to 29.191039
		-30.105269 to -30.138253	29.334582 to 29.28106
Strata 4	1612.1	-29.59403 to -29.650789	29.969122 to 29.912047
Strata 5	353.6	-29.318722 to -29.352838	30.027205 to 29.994672
Strata 1	183.8	-29.502993 to -29.518424	30.533334 to 30.499104
Strata 15	236.7	-29.518424 to -29.526738	30.525115 to 30.499104
		-29.558473 to -29.558473	30.499104 to 30.499104
Strata 18	1849.3	-28.493004 to -28.535639	29.723485 to 29.627229
		-28.535267 to -28.543149	29.679797 to 29.668397

Project Area : Free state Province (Harrismith)

The province is located on the Highveld, a plateau rising to elevations of 6,000 feet (1,800 m) in the east and sloping to about 4,000 feet (1,200 m)[16] in the west. Two streams drain the province: the upper Orange River, which forms the province's southern boundary, and the Vaal River, part of its northern boundary. The climate varies from warm and temperate with an annual rainfall of 591 mm to 711 mm[17]. Mean annual surface temperatures gradually increase from about 7.8 °C to 27.7 ° C)[18] Frost is common over the entire province from May to September, and, because rainfall is unreliable, long periods of drought are frequent.

The project area covers an area of approximately 10654.3 hectares.

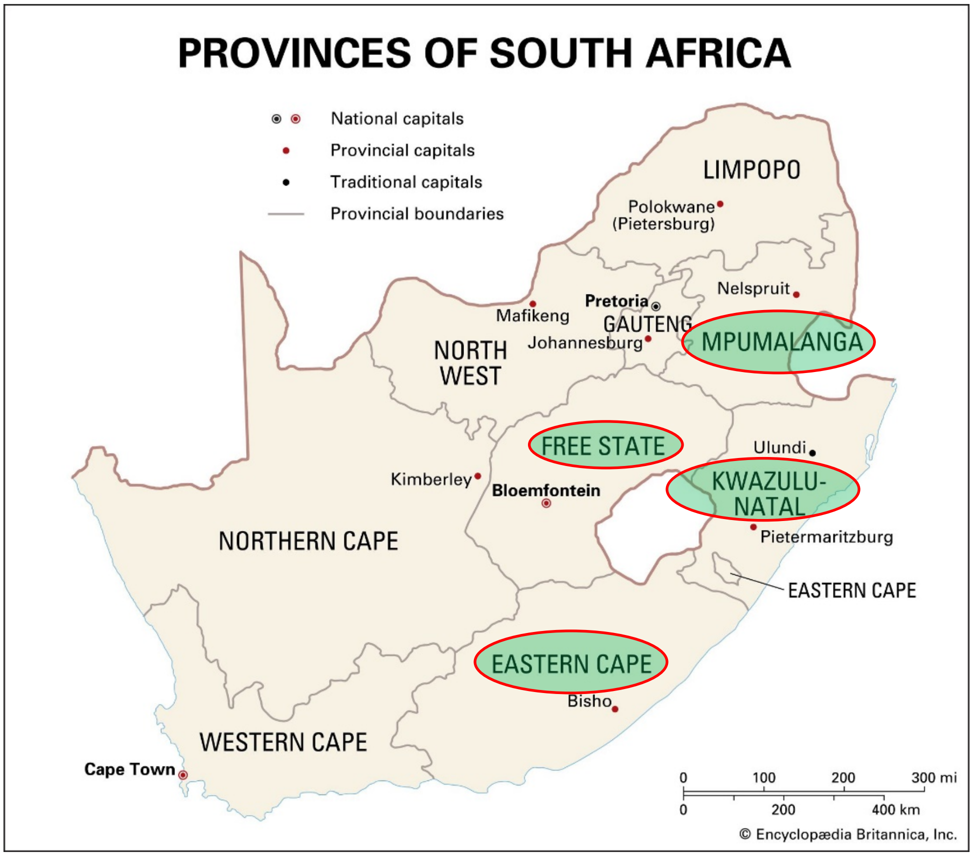
Strata No.	Area (ha)	Latitude	Longitude
Strata 12	2315.3	-28.259019 to -28.287255	29.442933 to 29.411458
		-28.081194 to -28.13577	29.522369 to 29.464966
		-28.1941 to -28.258617	29.358083 to 29.306049

[16] https://www.britannica.com/place/Free-State

[17] South African Weather Service. 2023. Annual State of the Climate of South Africa 2022. Pretoria. South Africa.

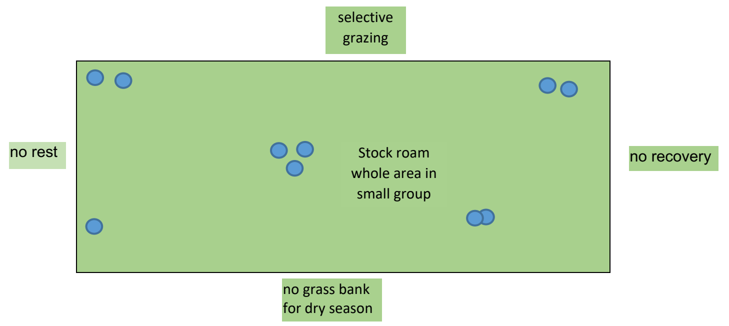
[18] https://www.weathersa.co.za/Documents/Corporate/Annual%20State%20of%20the%20Climate%202022_21042023120105.pdf

Strata 21	454.3	-28.277209 to -28.299471	29.428432 to 29.381385
Strata 19	7884.7	28.360958 to -28.413637	29.280076 to 29.244803
		-28.084136 to -28.116167	29.145692 to 29.088771
		-28.053116 to -28.151029	29.233364 to 29.186858
		-27.996706 to -28.051083	29.287381 to 29.251955
		-28.090088 to -28.148456	29.280675 to 29.248736



1.13 Conditions Prior to Project Initiation

Prior to the project initiation Continuous grazing has been the most popular grazing system since it is simple and requires little labour and management. In the continuous grazing system the pasture is not divided into sub-pastures or paddocks. Livestock are allowed access to all the pasture area at any given time.



Grazing practices before project activity

In the pre project scenario, animals repeatedly graze the same site in small groups, simply as a consequence of the most convenient and least time and energy demanding deployment of livestock near permanent settlements or persistent water points. Moreover, “continuous” grazing system in which loose herds repeatedly graze the same ground, resulting in selective foraging, continuous animal impacts and no rest or recovery of forage. Animals are moved to different grazing areas seasonally, but often only after forage is reduced by more than 95%. Thus creating areas of both overgrazed forage and areas of underused and wasted forage.

Moreover, due to the continuous grazing uneven distribution of manure and resulting ‘nutrient creep’ toward water and shade; change in pasture botanical composition over time favouring plants that are not readily grazed; Loss of desirable forage species, the invasion of weeds, erosion, summer forage shortages with severe shortages in drier years was the most common scenario prior to project initiation.

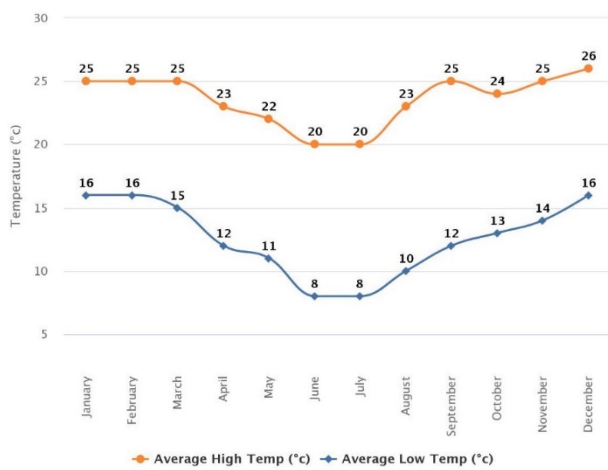
Prior to project initiation there is little history of uncontrolled fire in the project area. For more detail please refer section 3.4 (Baseline scenario) of this PD.

CLIMATE

The climate of South Africa[19] is very diverse due to the varied topography. The northern and northeastern areas such as Limpopo and Mpumalanga have a subtropical climate with hot summers and mild winters. Average temperatures range from 25°C to 30°C in summer and 15°C to 20°C in winter. The interior of the country, including the highland region of Gauteng, has a temperate climate with hot summers. The central plateau also has the greatest temperature fluctuations.

On the Atlantic coast, the Benguela Current coming from the south provides cooling and an almost Mediterranean climate. On the eastern side of South Africa, the warm Agulhas Current from the Indian Ocean brings a tropical to subtropical climate to the coastal regions. The country receives between were varying from 315 mm to 688 mm[20]., with most rainfall occurring during November - March. Project area receives the lowest rainfall in July and the highest in December[21] (World Weather Online).

The temperature regime is described as temperate, with a cool to cold winter and warm summer. The chart below[22] shows the average monthly temperature values for the country.



[19] https://www.worlddata.info/africa/south-africa/index.php

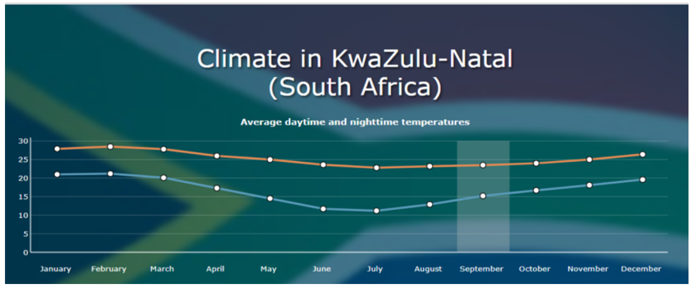
[20] https://www.weathersa.co.za/Documents/Corporate/Annual%20State%20of%20the%20Climate%202021_04042022114230.pdf

[21] World Weather Online

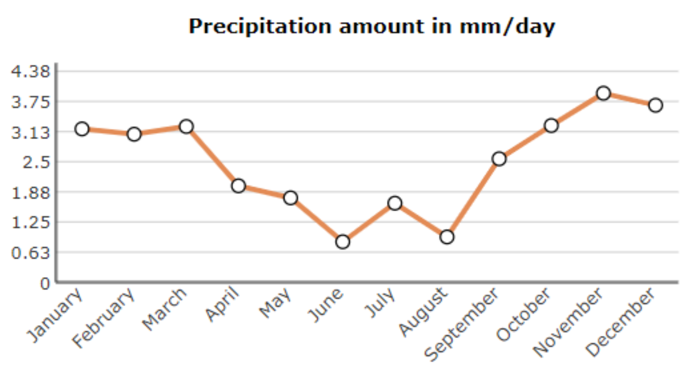
[22] World Weather Online

Climate of Kwazulu Natal[23]

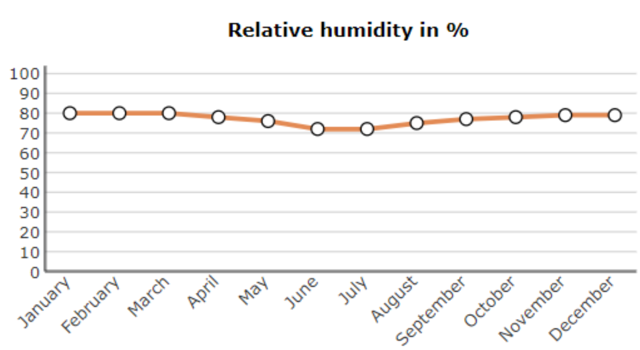
Temperature : The climate is almost moderate, but also offers a few muggy months with high humidity and high temperatures. It is warm to hot all year round.



Precipitation : The amount of precipitation is measured in millimeters per square meter. Thus, at two mm/day, two liters of water fall on one square meter within 24 hours. With only 0.8 mm, the least amount of rain falls in June. November, on the other hand, has the most rain.



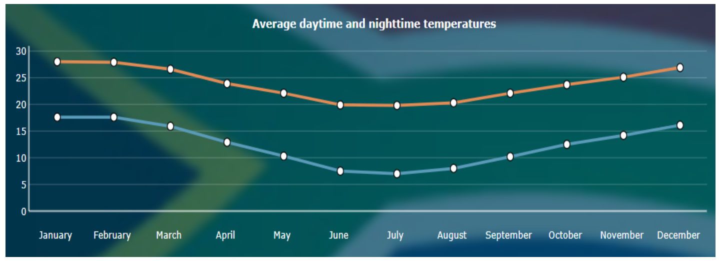
Humidity (Relative Humidity) : Warm air can absorb more moisture than cold air. The relative humidity indicates how much moisture can be physically contained in the air. At high humidity, a person feels uncomfortable and perceives this as oppressive. In general, a relative humidity of 40-60% feels pleasant. With humidity averaging 80%, January is the most uncomfortable. In July, on the other hand, it is easier to endure.



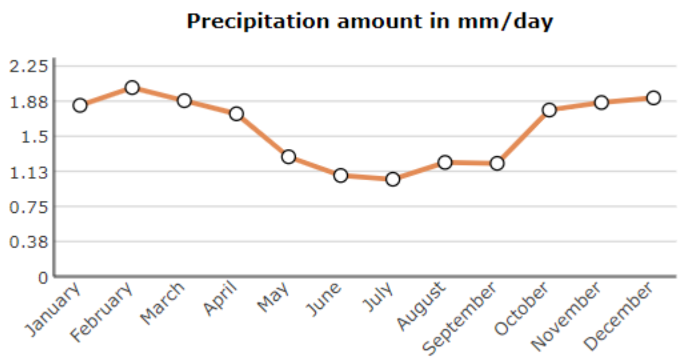
[23] https://www.worlddata.info/africa/south-africa/climate-kwazulu-natal.php

Climate of Eastern Cape[24]

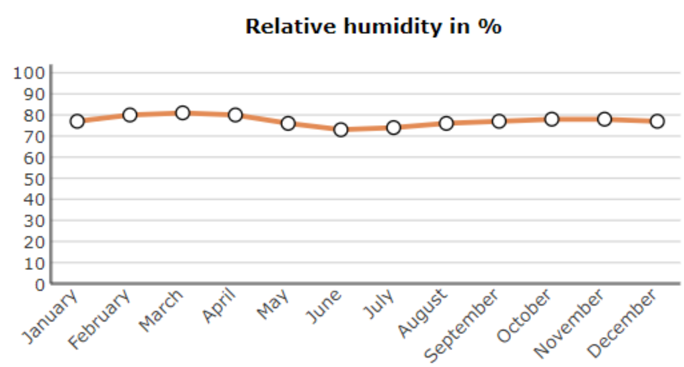
Temperature : Eastern Cape is one of the cooler regions in South Africa, with an average daily high temperature of 24 degrees. For 7 months, the average temperatures are over 25 degrees.



Precipitation : The amount of precipitation is measured in millimeters per square meter. Thus, at two mm/day, two liters of water fall on one square meter within 24 hours. With only 1.0 mm, the least amount of rain falls in July. February, on the other hand, has the most rain.



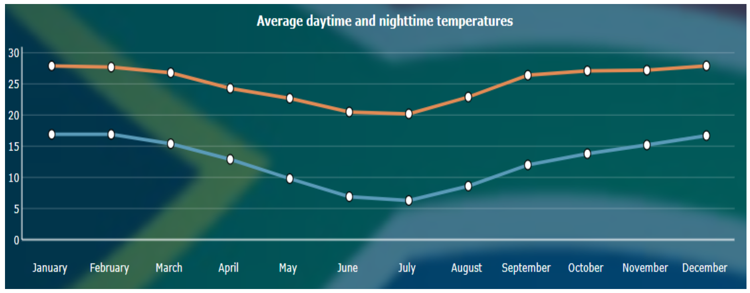
Humidity (Relative Humidity) : Warm air can absorb more moisture than cold air. The relative humidity indicates how much moisture can be physically contained in the air. At high humidity, a person feels uncomfortable and perceives this as oppressive. In general, a relative humidity of 40-60% feels pleasant. With only 73% humidity on average, it is quite dry in June. The highest value of 81% is experienced here in March.



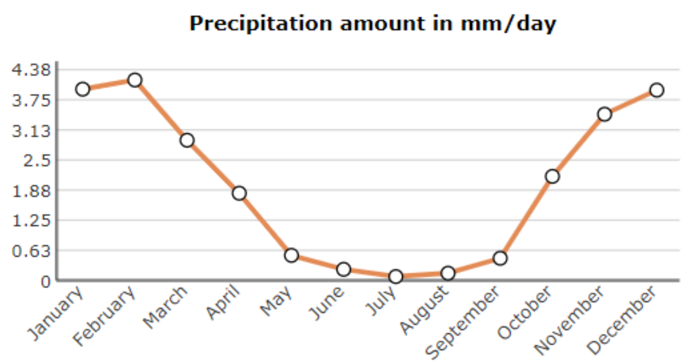
[24] https://www.worlddata.info/africa/south-africa/climate-eastern-cape.php)

Climate of Mpumalanga[25]

Temperature : For several months of the year, it is warm to hot at temperatures continuously above 25 degrees, sometimes up to 28 degrees.

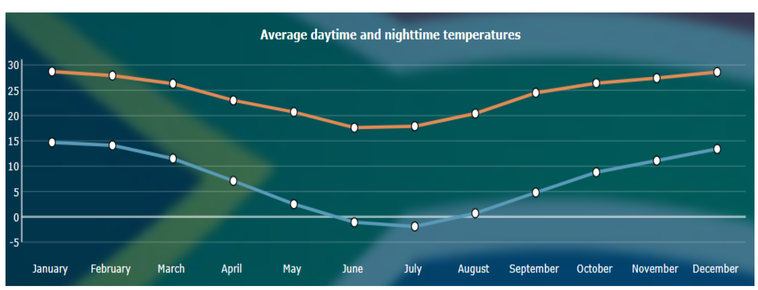


Precipitation : The amount of precipitation is measured in millimeters per square meter. Thus, at two mm/day, two liters of water fall on one square meter within 24 hours. With only 0.1 mm, the least amount of rain falls in July. February, on the other hand, has the most rain.



Climate of Free State[26]

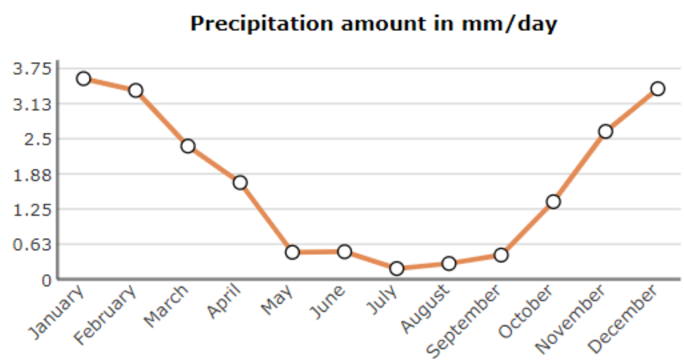
Temperature: Free State is one of the cooler regions in South Africa, with an average daily high temperature of 24 degrees. For several months of the year, it is warm to hot at temperatures continuously above 25 degrees, sometimes up to 29 degrees.



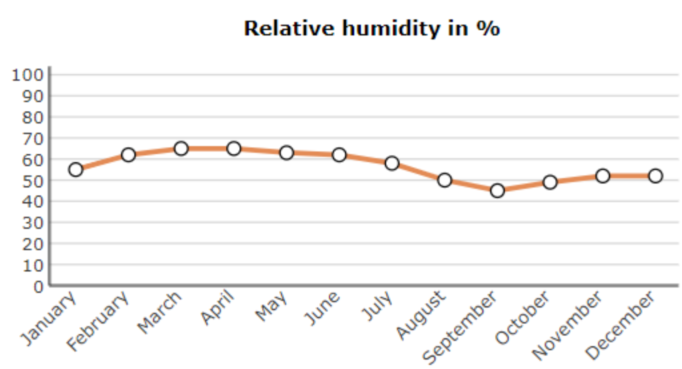
[25] https://www.worlddata.info/africa/south-africa/climate-mpumalanga.php

[26] https://www.worlddata.info/africa/south-africa/climate-orange-free-state.php

Precipitation : The amount of precipitation is measured in millimeters per square meter. Thus, at two mm/day, two liters of water fall on one square meter within 24 hours. With only 0.2 mm, the least amount of rain falls in July. January, on the other hand, has the most rain.



Humidity (Relative Humidity) : Warm air can absorb more moisture than cold air. The relative humidity indicates how much moisture can be physically contained in the air. At high humidity, a person feels uncomfortable and perceives this as oppressive. In general, a relative humidity of 40-60% feels pleasant. With only 45% humidity on average, it is quite dry in September. The highest value of 65% is experienced here in March.



TOPOGRAPHY

South Africa's surface area falls into two major physiographic categories: the interior plateau and the land between the plateau and the coast.

Forming the boundary between these two areas is the Great Escarpment, the most prominent and continuous relief feature of the country. Its height above sea level varies from about 1500 m in the dolerite-capped Roggeveld scarp in the south-west, to 3482 m in the KwaZulu-Natal Drakensberg.[27]

[27] https://www.gov.za/about-sa/geography-and-climate

Inland from the escarpment lies the interior plateau, which is the southern continuation of the great African plateau stretching north to the Sahara Desert. The plateau is characterised by wide plains with an average height of 1200 m above sea level. The dissected Lesotho plateau, which is more than 3000 m above sea level, is the most prominent.[28]

Country consists of a series of plateaus or land surfaces that developed as a result of a number of cycles of upheaval, erosion and displacement. The topography of the area as a whole is displayed as steps, where the individual steps are not always individually identifiable. This is because of the deep cuts as a result of rivers. It is only on the peaks between the rivers where areas of flat land can be seen that represent what was once a continuous land surface. There are three differentiable land surfaces that occur namely plateaus, escarpments and valleys. The project area has an average altitude of 2,000 to 2,500 feet (610 to 760 metres)[29]. As a result of the varying topography of the area, several different micro-climates are present resulting in the different habitat types found on the project area. Furthermore, the project area is ecologically sensitive, because of the high gradient slopes, high rainfall and the presence of soils sensitive to erosion occurring in the area.

Topography of Mpumalanga[30] : The Drakensberg escarpment divides Mpumalanga into a westerly half consisting mainly of high-altitude grassland called the Highveld and an eastern half situated in low-altitude subtropical Lowveld/Bushveld, mostly savanna habitat. The southern half of the Kruger National Park is in the latter region. The Drakensberg exceeds heights of 2000 m in most places, with this central region of Mpumalanga being very mountainous. These regions have alpine grasslands and small pockets of Afromontane forest. The Lowveld is relatively flat with interspersed rocky outcrops. The Lebombo Mountains form a low range in the far east, on the border with Mozambique. The Average elevation is 1,127 m (minimum elevation: 89 m to maximum elevation: 2,312 m).

Topography of Eastern Cape[31] : The average elevation is 778 m (Minimum elevation: 0 m to Maximum elevation: 3,405 m)

Topography of Kwazulu Natal[32] : KwaZulu-Natal has a varied yet verdant climate thanks to diverse, complex topography. Generally, the coast is subtropical with inland regions becoming progressively colder. Durban on the south coast has an annual rainfall of 1009 mm, with daytime maxima peaking from January to March at 28 °C (82 °F) with a minimum of 21 °C (70 °F), dropping to daytime highs from June to August of 23 °C (73 °F) with a minimum of 11 °C (52 °F). Temperature drops towards the hinterland, with Pietermaritzburg being similar in the summer, but much cooler in the winter. Ladysmith in the Tugela River Valley reaches 30 °C (86 °F) in the summer, but may drop below freezing point on winter evenings. The Drakensberg can

[28] South Africa Yearbook 2015/16

[29] https://www.britannica.com/place/Drakensberg

[30] https://en-gb.topographic-map.com/map-v9zs/Mpumalanga/

[31] source https://en-gb.topographic-map.com/map-xkr4s/Eastern-Cape/

[32] https://en-za.topographic-map.com/map-lp814/KwaZulu-Natal/

experience heavy winter snow, with light snow occasionally experienced on the highest peaks in summer. The Zululand north coast has the warmest climate and highest humidity, supporting many sugar cane farms around Pongola. The average elevation is 777 m (Minimum elevation: -1 m to Maximum elevation: 3,405 m)

Topography of Free State[33] : The Free State is situated on a succession of flat grassy plains sprinkled with pastureland, resting on a general elevation of 3,800 feet only broken by the occasional hill or kopje. The rich soil and pleasant climate allow for a thriving agricultural industry. With more than 30,000 farms, which produce over 70% of the country's grain, it is known locally as South Africa's breadbasket. The average elevation is 1,499 m (Minimum elevation: 980 m to Maximum elevation: 3,379 m)

HYDROLOGY

Adjacent area of the project is characterized by the presence of numerous unique inland pans. The surrounding area, includes more than 270 wetlands within a 20 km radius, representing the highest concentration of pans and wetlands, and the largest freshwater lake in South Africa, Lake Chrissie.

Most of the pans are oval shaped and perennially flooded. The system of pans is essentially a self-contained water catchment, with no apparent surface outflows of water. The system is therefore described as a closed water system.

Moreover, whilst drainage within the pan field is essentially closed, several major river systems arise around the fringes of the field, namely the Vaal River, the Komati River (via the Boesmanspruit), the uMpuluzi River and the Usutu River, uMkomazi River. Elands River which flows into the uMkhomazi River supplying it with high quality water. Water shortages[34] are a chronic and severe problem in much of South Africa. The country has no commercially navigable rivers and no significant natural lakes. Along the coastline are several large lagoons and estuarine lakes, such as Lake Saint Lucia in KwaZulu-Natal.

Surface waterbodies in Mpumalanga: Mpumalanga is known as ‘the Lake District of South Africa’.[35] Four of South Africa’s major rivers – the Tugela, the Vaal, the Olifants and the Pongola – have their sources in Mpumalanga. But most of the waterbodies have become more contaminated (Oberholster et al., 2010) due to human settlements, industry, and agriculture (including crop and livestock production), (Misra, 2014).

Surface waterbodies in Eastern Cape : The main rivers which flow from the Eastern Cape[36] include Mzimvubu, Orange, Bokspruit and Mthatha rivers. Free-flowing rivers that flow from this water source area include the Kobonqaba, iNxaxo, Qhora, Shixini, Nqabarha and Mncwasa rivers.

[33] https://en-za.topographic-map.com/map-3n4gp/Free-State/

[34] https://worldfacts.us/South-Africa-geography.htm

[35] https://www.southafrica.net/gl/en/travel/article/the-grass-and-wetlands-region-watery-paradise-in-mpumalanga-province

[36] https://water.cer.org.za/areas/eastern-cape-drakensberg

Surface waterbodies in Free State : Long sections of the two largest rivers[37] of South Africa form the northern and southern borders of the Free State province. The Vaal and Orange Rivers, together with their tributaries, take care of the largest drainage basin in South Africa. Both of them are controlled by complex systems of dams and have artificial water flows.

Wetlands are commonly referred to as marshes or vleis[38] in the Free State. The wetlands of the wetter northeastern Free State, especially in the Vaal Dam catchment, are typically the well-watered, marshy type that we know as vleis. In the drier west, seasonal pans predominate. Vleis may be temporarily, seasonally or permanentl saturated, ranging from palustrine (saturated soil) to lacustrine (pond or lake). Each vlei is unique and dynamic.

Surface waterbodies in Kwazulu Natal : Relative to the rest of the RSA, KwaZulu-Natal is rich in water supplies. The major rivers of the Province are Thukela River, Mgeni (Umgeni), Klip river, Mkhomazi River[39] etc. A negative aspect of KZN's river systems is the heavy sediment loads carried to the sea. This is the result of the poor conservation status of the catchment areas which are, over large areas, severely overgrazed, causing a high percentage runoff and soil removal. Many of the watercourses are eroded, aggravating the situation.

SOILS

The 73 soil forms[40] of the South African classification can be placed into 14 groups (organic, humic, vertic, melanic, silicic, calcic, duplex, podzolic, plinthic, oxidic, gleyic, cumulic, lithic and anthropic) which are identified by means of an eliminative key based on the presence of defined diagnostic horizons or materials.

The Project area contains three major soil regions[41]. East of approximately longitude 25° E, soils have formed under wet summer and dry winter conditions; the more-important soil types there are laterite (red, leached, iron-bearing soil), unleached subtropical soils, and gleylike (i.e., bluish gray, sticky, and compact) podzolic soils (highly leached soils that are low in iron and lime). A second major region lies within an area receiving year-round precipitation in Western Cape and Eastern Cape and generally contains gray sandy and sandy loam soils. Over most of the rest of the country, which is generally dry, the characteristic soils comprise a sandy top layer, often a sandy loam, underlain by a layer of lime or an accretion of silica. With some exceptions, South Africa’s soils are not characterized by high fertility, and those that are—for example, in coastal KwaZulu-Natal—tend to be easily degraded.

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[37] http://cellierskruger.com/rivers-of-the-free-state/

[38] https://www.dws.gov.za/iwqs/rhp/state_of_rivers/freestate03/FSrivers_A3.pdf

[39] Camp, K.G.T. (1998) The bioresource units of KwaZulu-Natal. Cedara report N/A95/32. KZN Department of Agriculture.

[40] A short guide to the soils of South Africa, their distribution and correlation with World Reference Base soil groups by Martin V. Fey, School of Earth and Environment, The University of Western Australia, Crawley, WA 6009, Australia, Department of Soil Science, Stellenbosch University, Private Bag X1, Matieland, 7602, South Africa

[41] https://www.britannica.com/place/South-Africa/Soils

The project area mainly comprised of sandy (< *20% Clay*), loamy (*20 – 32 % Clay*) and clayey (≥ *32% Clay*)[42]

Soil - Mpumalanga ; The province of Mpumalanga contains within its boundaries evidence of the earliest phases of the history of the world. In the vicinity of Barberton is one of the oldest and best-preserved rock sequences never found anywhere on earth (SOER, 2008).

The Lowveld region of the province is underlaid by African Cratonic Basement rocks which date more than 2 billion years, with the Highveld region made up of Karoo Sequence sedimentary rocks of a younger, Carboniferous to Permian age.

The soil[43] covers red soil which occupies about 18.7%, yellow soil 0.9%, vertic and melanic cover 17.7% while pedologically young soil covers 22.0% and exposed rock 6.9%. Loam soil covers 65% while sandy and clay soils cover 21.4% and 12.8%, respectively.

Soil - Free State : Mispah, Mayo, Milkwood, Sterkspruit etc are the major soil form[44] found in this region.

Soil - Eastern Cape : The most common soils are shallow to medium loams. Soils derived from Tarkastad, molteno, Elliot formations are commonly form duplex soil.

The majority of the soils[45] are of a clayey or loamy or a clayey loam texture with some sandy loam and sandy clay texture . Soil depths range from10 cm to 200 cm, with the shallowest soils (<30 cm) occurring on the rocky and steeply sloped areas. Soils have been described as highly erosive and dispersive caused by the presence of duplex soils, especially for soils developed on the Tarkastad, Molteno and Elliot formations.

Soil - Kwazulu Natal : The area consists of two rock layers. The higher lying areas to the west are characterised by dolerite.

The most common soil group[46] in the Grassland Biome, accounting for just under 50% of the area, is the red—yellow—grey latosol plinthic catena. This is followed by combinations of black and red clays and solonetzic soils, freely drained latosols and black clay soils. These freely drained latosols and black clay soils are mainly limited to the grassland biome. The acid soils of the red-yellow-grey plinthic catena are better represented in the grassland biome than the other biome.

[42] PRA report

[43] https://cer.org.za/wp-content/uploads/2019/01/Phase2.pdf

[44] https://scholar.ufs.ac.za:8080/bitstream/handle/11660/1556/TEKLESA.pdf?sequence=1&isAllowed=y

[45] https://repository.up.ac.za/bitstream/handle/2263/60852/Pretorius_Sediment_2017.pdf?sequence=1

[46] Rutherford, M.C. and Westfall, R.H. 1994. Biomes of southern Africa: An objective categorization. Memoirs of the Botanical Survey of South Africa no. 63. National Botanical Institute, Pretoria.

VEGETATION AND ECOSYSTEMS.

The project area falls within the Grassland Biome. The vegetation is short dense grassland dominated by the usual highveld grass composition[47], with small, scattered rocky outcrops with wiry, sour grasses and some woody species. The area is dominated by strongly seasonal summer rainfall, with very dry winters. Some of the tree sp. Are as follows

S. No.	Common Name	Scientific Name
1	Natal Aloe	*Aloe spectabilis*
2	Rock elder	*Afrocanthium mundianum*
3	Wild apricot	*Dovyalis zeyheri*
4	Blue guarri	*Euclea crispa*
5	Common guarri	*Euclea undulata*
6	Common spike thorn	*Gymnosporia buxifolia*
7	Bushman's grape	*Rhoicissus tridentata*
8	Nana berry	*Searsia dentata*
9	Common crowberry	*Searsia pentheri*
10	Common wild currant	*Searsia pyroides*
11	Sweet thorn	*Vachellia karroo*
12	Paperbark thorn	*Vachellia sieberiana*
13	Small Knobwood	*Zanthoxylum capense*
14	Buffalo thorn	*Ziziphus mucronata*
15	Common cabbage tree	*Cussonia spicata*
16	Bushveld bluebush	*Diospyros lycioides*

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The specific legislations that could be applicable for the present project activity and their relevance with the present project are mentioned as below.

[47] Vegetation survey report

Table 4: Relevant legislation for the management of the 1st Project Instance	
Criteria	Relevant Statutes
Resource Management	**Natural Resource Management:** ▪ Animals Protection Act [No. 71 of 1962] ▪ Atmospheric Pollution Prevention Act [No. 45 of 1965] ▪ Conservation of Agricultural Resources Act [No. 43 of 1983] ▪ Constitution of the Republic of South Africa [No. 108 of 1996] ▪ Environment Conservation Act [No. 73 of 1989] ▪ Forest Act [No. 122 of 1984] ▪ Hazardous Substances Act [No. 15 of 1973] ▪ Mpumalanga Nature Conservation Act [No. 10 of 1998] ▪ National Environmental Management Act [No. 107 of 1998] ▪ National Environmental Management: Biodiversity Act [No. 10 of 2004] ▪ National Environmental Management: Protected Areas Act [No. 57 of 2003] ▪ National Forests Act [No. 84 of 1998] ▪ National Water Act [No. 36 of 1998] ▪ National Water Amendment Act [No. 45 of 1999] ▪ National Veld and Forest Fire Act [No 101 of 1998] ▪ Nature Conservation Ordinance [No. 15 of 1974] **Cultural Resource Management:** ▪ National Heritage Resources Act [No. 25 of 1999] ▪ World Heritage Convention Act [Act No, 49 of 199]
	Financial Resource Management: • Public Finance Management Act. [No. 1 of 1999] **Human Resource Management:** ▪ Basic Conditions of Employment Act [No. 75 of 1997] ▪ Broad-Based Black Economic Empowerment Act [No. 53 of 2003] ▪ Compensation for Occupational Injuries and Diseases Act [No. 130 of 1993] ▪ Employment Equity Act [No. 55 of 1998] ▪ Labour Relations Act [No. 66 of 1995] ▪ Occupational Health and Safety Act [No. 85 of 1993] ▪ Pension Funds Act [No. 24 of 1956] ▪ Skills Development Act [No. 97 of 1998] ▪ Skills Development Levies Act [No. 9 of 1999] ▪ Unemployment Insurance Act [No. 63 of 2001]
Utilization Management	▪ Criminal Procedures Act [1977] ▪ Water Services Act [No. 108 of 1997] ▪ National Building Standards Act [No. 103 of 1977] ▪ National Road Traffic Act [No. 93 of 1996] ▪ Disaster Management Act [No. 57 of 2002] ▪ Development Facilitation Act [No. 67 of 1995]
General Management	▪ Fire Brigade Services Act [No. 99 of 1987] ▪ Local Government: Municipal Systems Act [No. 32 of 2000] ▪ Occupational Health and Safety Act [No. 85 of 1993]

Grazing and grazing resource (water, soil) rights are conferred by land ownership of South Africa via Native Land Act of 1913. These rights are further conferred and superseded by the Communal Land Rights Act 11 of 2004. Rights to benefit from soil conservation are conferred by the right to register lands by the Nature Conservation Ordinance [No. 15 of 1974].

The relevant labour laws include the Employment Equity Act [No. 55 of 1998]; Labour Relations Act [No. 66 of 1995], Occupational Health and Safety Act [No. 85 of 1993], Pension Funds Act [No. 24 of 1956], Unemployment Insurance Act [No. 63 of 2001]. These have been and will continue to be implemented in the project through implementation of PP's hiring policies.

National Environmental Management Act [No. 107 of 1998]. Additional laws protect the integrity of project participants and their ability to engage in contracts

Companies Act. EWT is a registered non-profit organization and WeAct Pty Ltd is registered as limited company and are in good standing to operate in South Africa.

The Trespass Act of 1959. Project participant could use this law to enforce the project area borders and reduce project livestock encroachment outside the project boundary.

Occupational Health and Safety Act [No. 85 of 1993], which ensures medical care for employees in the event of accidents or harm related to exposure, wildlife hazards, and violence associated with enforcing livestock protection laws and grazing rights.

South African Labour Law is informed by the Constitution of South Africa and governed by several key pieces of legislation. The Labour Relations Act, 1995 (Act No. 66 of 1995) regulates the relationship between employers, employees, and trade unions in South Africa. The act which deals with equal opportunity and fair treatment in the workplace, with a focus on addressing discrimination against historically disadvantaged groups, is the Employment Equity Act, 1998 (Act No. 55 of 1998). The minimum rights and conditions of employment is set out the in the Basic Conditions of Employment Act, 1997 (Act No. 75 of 1997) and deals with issues such as working hours, leave, and termination of employment. The Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) aims to protect the health and safety of workers in the workplace, whereas the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003) promotes economic empowerment of ethnic groups oppressed under Apartheid in South Africa The Unemployment Insurance Fund Act, 2001 (Act No. 63 of 2001) provides for the establishment and administration of a fund that provides benefits to employees who become unemployed. Labour in South Africa is governed by several key pieces of legislation that regulates the relationship between employers, employees, and trade unions to promote equal opportunity and fair treatment in the workplace.

The project activity is in complete compliance with the aforementioned applicable legislations.

1.15 Participation under Other GHG Programs

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

The Project has not been registered, or is seeking registration, under any other GHG programs.

1.15.2 Projects Rejected by Other GHG Programs

The project is not rejected by other GHG Programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project will not seek to generate or has received any form of environmental credits, and the GHG emission removals generated by the project will not be used for compliance under such programs or mechanisms.

Hence, it is confirmed that the emission reductions will not be double counted..

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG related credit.

1.17 Sustainable Development Contributions

According to the United Nations Sustainable Development Goals, the project provided many benefits that will help to achieving the goals as following:

SDG1 No Poverty - Local herders live by grazing, so the grassland ecosystem will have a great impact on their traditional livelihood. Since the implementation of the project, local herdsmen are directly affected by the implementation of the project through increased employment opportunities, family income, training and education opportunities etc. This provides an overall positive impact and alignment with this goal Women and vulnerable people who come from the poorest local households were not only provided with equal opportunities but also consciously ensured that they can be part of the project.

SDG2 Zero hunger – The project is directly involved with the cattle raising in an area with low levels of rainfall. By having this project, the land benefits in terms of a higher grasslands yield, thus a higher production of sustainably-sourced meat. This provides an overall positive impact and alignment with this goal.

SDG6 Clean water and sanitation – By restoring grasslands, the topsoil's health improves which allows infiltration[48] and recharges groundwater, preventing runoffs, an increase in

[48] https://carboncowboys.org/images/related_research/pdfs/AMP_grazing_improves_water_infiltration_in_Canadian_grassland_soils.pdf

evapotranspiration and reduce regional desertification[49]. This indirectly impacts regional humidity and water sources at the location and downstream.

SDG13 Climate action – The project's main objective is the sequestration of carbon through the implementation of regenerative grazing practices.

SDG15 Life on land – The project can improve the quality and quantity of the grassland vegetation and provide more habitat for wild animals to enhance biodiversity conservation by scientific grazing and burning.

1.18 Additional Information Relevant to the Project

Leakage Management

Leakage can result from displacement of livestock off the project area (displacement leakage) and from replacement of livestock outside the project area to meet market demand (market leakage)

Displacement leakage : Movement of livestock could result in losses of carbon from higher levels of overgrazing out of the project area, or displacement leakage.

For this project activity, the project area is well structured (fencing of private lands) to keep livestock within the project area. The project proponent prevent incursion of livestock from outside the project area or excursion of livestock from inside the project area through fencing, patrolling by game scouts. Thus Leakage from displaced livestock was judged to be negligible. Refer section 4.3 for detail.

Market Leakage : Market leakage was judged to be negligible since livestock reductions were not a project activity and livestock numbers are driven by grassland capacity and rainfall rather than markets. Refer section 4.3 for detail.

Commercially Sensitive Information

Details of ranch ownership and financial audit plans are removed from the public version of this document to protect landowner privacy..

Further Information

Not Applicable

49 https://www.researchgate.net/publication/282985376_Influence_of_different_grassland_management_on_water_infiltration_and_soil_physical_properties

2 SAFEGUARDS

2.1 No Net Harm

Potential impact on environment and biodiversity

Without the project, the project area will continue degraded with much threat to local climate and biodiversity condition. And the main object of the project is to restore the degraded grassland ecosystem, therefore the net change of biodiversity is positive in the project scenario.

First, the management measures of rest grazing and grazing prohibition will alleviate the grazing pressure, which is conducive to the restoration of grassland vegetation.

Second, through sustainable grassland management, including control grazing, grassland fire prevention and reasonable grazing guidance, the degraded grassland ecosystem is gradually restored. This will make sure the project can bring net biodiversity benefit compared to the baseline scenario.

Third, the implementation of the project can improve grassland productivity and increase the coverage which is beneficial of water conservation, reduce drought and flood risk, promote soil nutrient cycle, improve local micro-climate and other ecological environment. Therefore, the population of animals will increase due to the restoration of the habitat.

Before the project activity start i.e. in the baseline scenario fertilizer is being used to increase the forage value and quantity. But fertilization is being reduced in the project activity. From the project database for mass and nitrogen content of fertilizer, it is confirmed that the amount of fertilization used was small thus has no potential adverse effects on surface water and groundwater by considering the local climate and weather conditions. Therefore, it is concluded that the use of fertilization will not pose harm to the region's environment or communities under this project activity.

Therefore, there are no potential negative impacts on biodiversity and environment.

Potential impact on socio-economic

The project provided job and training opportunities for local residents which would enhance their knowledge, improve their family income, increase the interaction between communities. Also, the project would empower women and build community capacity in gender equity. Therefore, women well-being would be significantly improved.

Furthermore, EWT guided herders to graze reasonably, which is conducive to the restoration of degraded grassland ecosystem and improve their living standard in long-term. And the healthy grassland ecosystem is an attractive landscape which could significantly benefit local resources for the tourist and promote the local economy. Therefore, there is no potential negative socio-economic impact.

2.2 Local Stakeholder Consultation

Before the implementation of the project, the Endangered Wildlife Trust (CME) had contact with local livestock owner on the sustainable grassland management. These farmers expressed reluctance to spend huge cost on fencing and they worried that IGM could have any positive affect on fodder yield. Thus, the EWT contacted WeAct Pty Limited, carbon project developer, to have some funding opportunities as carbon sequestration project. And EWT conducted training to the farmers for rotational grazing and planned burning.

On March-2020, the EWT participated in the meeting on the implementation of the rotational grazing and planned burning with the livestock owner. Here, the EWT was able to gather useful feedback from multiple stakeholder groups, and representatives of various village committees, and use it to modify project designs. Most of the participants made positive comments about the technology of the project.

In 2020, WeAct Pty Ltd appointed Bahori Consulting (Pty) Limited for conducting PRA. To ensure the continued effectiveness of the participation mechanisms, another stakeholder consultation was conducted during PRA survey in 2020, including ranch interviews and questionnaires collected by survey team. The survey team of PRA went to the villages where the project located and took the interview with head of the ranches to collect the basic information of the ranchers and characteristics of local communities.

At the meeting, project proponent first explained the basic information of the project, about the potential costs, risks and benefits to relevant communities and invited them to give their feedback. Questions from the representatives of stakeholders especially on subsidy for rest grazing and potential new job opportunities from the project were clarified by the project proponent and project consultant. The project proponent communicated with stakeholders on issues and discussed the mitigation measures.

During the PRA survey in the 24 ranches were asked to raise their opinions of the project design and their willingness to participate the following implementation. All of them had no opinion on the project design and would like to participate in the implementation and maintenance of the project.

Twenty-four landowners were personally interviewed by means of a structured questionnaire. These landowners are also the potential beneficiaries included under the carbon emissions reduction project activity informed by the WeAct team. Questions were grouped into the following categories: (a) demography of farmers, (b) perceptions and knowledge of farmers on farming practices, (c) controlled burning, (d) rotational grazing (e) stocking rate, (f) veld utilisation and veld assessment, (g) veld rehabilitation, (i) control of alien vegetation, (j) fertilizers utilization practices etc.

This questionnaire was used to obtain information on the study area, farming community, sizes of farms and camps, types of farming enterprises and on adoption of recommended veld management practices in the region.

The representatives covered different experience level, different farm size which were summarized as follows.

Representative information		
Item		Percentage
Experience	<10 years	8
	11 – 20 years	13
	21 – 30 years	50
	31 – 40 years	21
	>40 years	8
Ranch size	<500	17
	501-1000	13
	1001-2000	4
	2001-3000	4
	3001-4000	13
	4001-5000	17
	5001-6000	8
	6001-7000	4
	70001-8000	8
	8001-9000	0
	9001-10000	8
	>10000	4

Survey Results		
Do you know this project will bring carbon revenue?	Yes	87.50%
	No	12.5 %
Do you willing to participate in this project?	Yes	95.83%
	No	4.17%
Do you think this project can bring economic benefits to the local area and promote local sustainable development?	Yes	83.33%
	No	16.67%

How do you want to participate in the project?	Participate in rotational grazing and controlled burning	
Do you think the project has slowed down grassland degradation?	Yes	79.17%
	No	20.83%
How will the project affect local herders engaged in grazing around the project area？	Increased employment opportunities, family income, training and education opportunities	
Do you think the project has improved your living environment?	Yes	91.67%
	No	8.33%
Do you support the project?	Yes	83.33%
	No	16.67%

According to the results of the questionnaire, all the representatives of stakeholders wanted to support in the implementation of the project because most of them thought the project could increase their economic benefits and improve their living environment.

The mechanism for on-going communication with local stakeholders

Set up a grievance register. The grievance registers available with the phone number of contact person in the local offices in each of villages throughout the lifetime of the project. Stakeholders can write their comments or suggestions in grievance register anytime anonymously as they wish. The project proponent will check the book regularly and collect all the comments received.

Besides, the locals can talk directly to the local representatives if they have any opinions.

Meanwhile, the local representatives would also pay a regular visit to the villages and collect comments if any. So, the stakeholders have been and will be communicated on the followings

- As mentioned above, during the stakeholders meeting, the project proponent has explained all the designs of the Improved Grassland Management and carbon development project.
- all the stakeholders have been and will be communicated about the results of monitoring through ranchers' meetings. During the stakeholders meeting, all the risks, costs and benefits the project may bring to local stakeholders have been discussed.
- Also, the project proponent, has also informed farmers of all relevant laws and regulations covering workers' rights in the host country.
- The process of VCS Program validation and verification,
- validation/verification body's site visit has to inform to the stakeholders by personal emails. If there is any negative feedback, a meeting will be immediately organize with the concerned project participant in the village.

There was a series of communications and consultations considered as a part of development of the project, All such stakeholders related communications were recorded and some representative samples of such stakeholders meetings/communication details are attached as Appendix B to this report.

2.3 Environmental Impact

This project activity does not have any negative environmental impact. According to the Environmental Impact Assessment Regulations 2010 (NEMA EIA 2010) neither an EIA nor Basic Assessment is required as the project activities do not trigger any of the Environmental Impact Regulation listed activities published in Government Notice No. R 385 of 2006 (No. R. 386 and 387, 21 April 2006 including amendments 3 July and 9 October 2009). The project activity is completely environmentally friendly and has positive impacts on environment.

2.4 Public Comments

The project documentation has been published on VCS website and was open for public comment from 03/03/2022 to 02/04/2022. No comments received.

2.5 AFOLU-Specific Safeguards

Local stakeholder identification process and a description of results

The stakeholder's identification starts by listing all the people or groups who might have an influence over or be impacted by the project. The local village committees and village officials were considered as the key informants and focus groups who know best about the local residents.

1) Local residents around project area

At the begining, the project provided short-term work such as fence building but also the long-term work such as the grassland security for local residents around project area, which will increase their household income. Secondly, local herdsmen are directly affected by the implementation of the project due to sustainable management of grassland. Thirdly, the project restored the degraded grassland and improved their living environment. These residents can be divided into the following categories:

Ranch owner

the ownership of grassland belongs to the ranch owner. Therefore, ranch owner that own the grassland has been identified as the prime stakeholders.

Local herders

Local herders live by grazing, so the grassland ecosystem will have a great impact on their traditional livelihood. Since the implementation of the project carries out sustainable management of grassland, local herdsmen are directly affected by the implementation of the project. Also, the project restored the degraded grassland and guided them to graze reasonably.

Grassland coordinator

Grassland coordinator will protect and manage the grassland under the guidance of the project proponent and the EWT and Conservation outcomes.

Tourism companies

The grassland ecosystem in the project zone is seriously degraded, which is not conducive to the sustainable development of tourism. After the successful implementation of the project, the restored grassland is beneficial to rebuild local pleasant and beautiful ecological system which has higher ecological aesthetic value of tour and sightseeing. Therefore, the project will generate a certain degree of impact for all tourism companies within or outside the project zone.

The results of identified stakeholders will be publicly announced on VCS website as part of the PD which can be accessed by everyone in case there is any other person who may consider themselves as one of the project's stakeholders, they can directly contact the project owner for consultation.

Risks to local stakeholders due to project implementation and how the project will mitigate such risks

With improved soil health, the project activity is expected to increase the carrying capacity of the land and therefore increase the number of livestock that can be sustained in the project area. As a result, the project activity is not expected to include trade-offs with food security, land loss, loss of yields, or climate change adaptation. The project provides technical support and expertise (through resource materials, consulting, and workshops) to ensure the project activity can be implemented without adverse risks to participants.

Risks to local stakeholder resources due to project implementation and how the project will mitigate such risks, including the plans to ensure the project will not impact local stakeholder's property rights without the free, prior and informed consent.

Project participants i.e. the livestock owners are informed of the project activity and terms, and they provide letters of interest prior to moving forward with signing contracts with project proponent. The project proponent provides the project participant with a project implementation contract for their review. Project partners (EWT and conservation Outcomes) have acted on behalf of participants. If a project participant leases land, the landowner is notified and asked to sign a statement ensuring their intent and resources to keep land grasslands and managed for improved soil health. As such, all project participants are informed and must sign documents as evidence of consent.

A series of meetings were conducted, please refer Appendix B, to share the key objectives of the proposed project and to assure that there will be no impact on the property rights of the project participants due to the implementation of the project activity. Therefore, it can be concluded that project implementation will not impact local stakeholder's property rights without free, prior and informed consent.[50]. Addition of new instances will also be based upon Free, Prior, and Informed Consent (FPIC)."

All notices regarding all relevant workers' rights and employment law matters are followed in their respective places of work, as required by law.

Processes to ensure ongoing communication and consultation with local stakeholders, including a grievance redress procedure to resolve any conflicts which may arise between the project proponent and local stakeholders

The project activity has no evidence of impact on off-project area stakeholders. In the case that conflicts arise, project participants are aware of project proponent and partner contact information to seek resolutions if needed urgently. Feedback and grievances will additionally be addressed through solicitation and follow up during annual stakeholder meetings.

Grievance Redressal Mechanism /Policy :

Grievance register along with the phone number of contact person will be available at the site office in each of villages throughout the lifetime of the project. Stakeholders can write their comments or suggestions in the book anytime anonymously as they wish. The project proponent will check the book regularly and collect all the comments received.

If there is a conflict of interest between the parties, the stakeholders can appeal to the EWT/ Conservation Outcomes/ WeAct Pty Ltd through the local representative or directly, which is the most effective way to solve the problem. They appeal through the phone number of the relevant contact or can file a complaint during the meeting.

The project proponent has appointed a staff member to record and collect conflicts and dissatisfaction between local communities and individual ranch owner. Monthly inspection of local representative's play an important role in dealing with conflicts and dissatisfaction and report to the Project proponent. Upon receipt of the local representative's report, the relevant management unit should contact and discuss with the relevant ranch or other stakeholders within 3 days. Based on the information collected by the relevant parties, the specific staff member shall propose a solution and mediation plan within one week and solve the conflict within 30 days. A copy of grievance redressal register has been submitted.

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[50] An official Declaration has been submitted by PP

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

VM0026 “Sustainable Grassland Management” , Version 1.1.[51]

Tools :

1. CDM A/R methodological tool Calculation of the number of sample plots for measurements within A/R CDM project activities, version 2.1.0
2. Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities, VT0001 version v3.0
3. CDM Tool for Estimation of Carbon Stocks and Change in Carbon Stocks of Trees and Shrubs in A/R CDM Project Activities, version 4.2
4. CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities, version 01
5. VCS AFOLU Non-Permanence Risk Tool, version 4.0

3.2 Applicability of Methodology

The project activity complies with the applicability conditions of the VCS VM0026 methodology Version 1.1 as follows:

Table 5 : Justification for Methodology Applicability

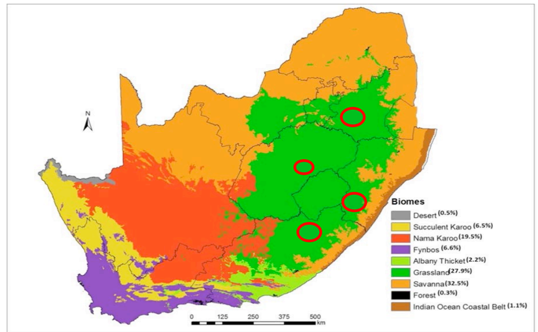
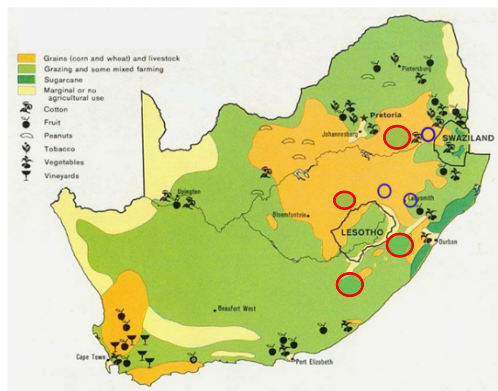
Applicability conditions	Justifications
The project area is grassland at the start of the project. The project area is land that is degraded at the start of the project and degradation will continue in the baseline scenario on the basis that degradation drivers or pressures are still present	The 1st Project instance is broadly located within the Grasslands Biome of South Africa and comprises grassland vegetation. So, the project area is broadly classified as grassland as per South Africa’s Grassland map. All land cover assessments are based on the South African National Land Cover datasets developed and published by the South African Government Department of Forestry, Fisheries, and the Environment (DFFE)[52]. South African National Land-Cover 2018 dataset has been generated from 20 meter multi-seasonal Sentinel 2 satellite imagery. The imagery used represents the full temporal range of available imagery acquired by Sentinel 2 during the period 01 January 2018 to 31

[51] https://verra.org/methodologies/vm0026-methodology-for-sustainable-grassland-management-sgm-v1-0/
[52] https://egis.environment.gov.za/sa_national_land_cover_datasets

Table 5 : Justification for Methodology Applicability	
in the baseline scenario. The procedures outlined the latest version of the CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities must be used to determine both that the land is degraded at the start of the project and that in the baseline scenario the land will continue to degrade	December 2018. The classification consists of 73 classes that allow for precise definitions of land cover eligibility and distinguishing between grasslands and forests. The VCS Program Definitions describe grasslands as "Areas dominated by grasses with a density of trees too low to meet an internationally accepted definition of forest, including savannas (i.e., grasslands with scattered trees). Grasslands also include managed rangeland and pastureland that is not considered cropland where the primary land use is grazing, and which may also include grass-dominated systems managed for conservation or recreational purposes"[53] Forest has been defined by The Department of Forestry, Fisheries, and the Environment (DFFE) which distinguishes forest from a savannah (also called a woodland) and a thicket, which is also reflected in their land cover classification[54]. The forest is defined by DFEE as : i) a largely contiguous canopy; ii) canopy cover greater than 75%; iii) the dominance of trees (self-supporting woody plant greater than 3 m, if single stemmed, or 5 m, if multi-stemmed); and iv) an absent, or rare, grass stratum. As per the VCS Program Definitions of a grassland, the project land is meeting the definition of a grassland, as the project land is dominated by grasses with a density of trees below the South African DFFE definition of a forest.

[53] https://verra.org/wp-content/uploads/2022/12/vcs-program-definitions-v4.3-final.pdf

[54] https://www.dffe.gov.za/sites/default/files/legislations/policyandguidelines_controlofdevelopmentaffecting_naturalforests.pdf

Table 5 : Justification for Methodology Applicability	
	 Figure[55] depicts the project area not included within the forest area.  As described in "Detailed Project Report", all the project land was on degraded grassland and the project's aim is to increase carbon sequestration and contribute to local sustainable development by rotational grazing and planned burning on the degraded grassland and carrying out sustainable grassland management. The procedures outlined in the CDM *Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities (Version 1.0)* is described below. *The presence of one of the following is enough for demonstrating that land is "degraded" and/or "degrading":*

[55] https://pza.sanbi.org/vegetation

Table 5 : Justification for Methodology Applicability	
	(a) Provide documented evidence that the area has been classified as "degraded" under verifiable local, regional, national or international land classification system or peer-review study, participatory rural appraisal, satellite imagery and/or photographic evidence in the last 10 years. If the documented evidence of degradation is older than ten years then: (i) Provide evidence that the natural or anthropogenic degradation drivers and pressures that led to the land becoming "degraded" are still present and/or that there are no insufficient land management interventions to reverse degradation. *(b) Demonstrate through a comparative study that the candidate lands in the proposed project area have similar or equivalent conditions (e.g. vegetation, soil, climate, topography, altitude, soil class and land use) and socio-economic pressures and drivers of degradation to reference degraded lands elsewhere, verifiably classified and documented as degraded lands. The proof of similarity of lands should be made through verifiable documentation and/or visual field assessment and data sets:* *(c) Demonstrate through direct evidence based on selected indicators of land degradation that the area is "degraded" and/or "degrading" through conducting either a visual assessment of the state and condition of the indicators or a verifiable participatory rural appraisal (PRA). The indicators of degradation should be locally relevant and verifiable. Candidate lands shall be declared as "degraded" and/or "degrading" if they show at least one of the following:* *(i) The severity and extent of soil compaction and soil erosion, as determined by the presence of: reductions in topsoil depth (as shown by root exposure, presence of pedestals; exposed sub-soil horizons or armour layers); gully, sheet or rill erosion, landslides, or other forms of mass-movement erosion;* *(ii) Decline in organic matter content and/or recession of vegetation cover as shown by reduction in plant cover or productivity due to overgrazing or other land management practices, thinning of topsoil organic layer, scarcity of topsoil litter and debris (GPS and photo evidence should be provided);*

Table 5 : Justification for Methodology Applicability	
	(iii) Presence of plant species locally known to be related to the condition of degradation of the land or field/lab tests showing nutrient depletion (e.g. reduced growth, leaf loss, dessication, leaf chlorosis), salinity or alkalinity, toxic compounds and heavy metals; *(iv) A reduction in plant cover or productivity due to overgrazing or other land management practices.* Several definitions of land degradation exist in the South African context[56]. For example, Scholes (2009) defines land degradation as 'as a persistent decrease in the capacity of an arid or semiarid ecosystem to supply a range of services, including (but not restricted to) forage, fuel, timber, crops, fresh water, wild-harvested foods, biodiversity habitat and tourism opportunities'. Land degradation is defined by (Safriel et al., 2005). as the tenacious reduction of biological and economic productivity, which impedes the capacity of the land to provide ecosystem services However, all are united by the common theme of a decline in the ability of an ecosystem to deliver valued services. In the PRA study, land degradation is regarded as the reduction in vegetation cover, palatability, burning intensity, grazing intensity and the proliferation of bare soil patches i.e soil health are considered as potential land degradation risk. The mean values of the 5 indicators used to calculate the veld condition score in the Rangeland Health Assessment. The sum of the scores of each indicator adds up to give the veld condition score. The veld condition was classified into excellent, good, intermediate, poor (degraded) and severely degraded. The lower the total score, the poorer the condition of the veld. Under the PRA study, veld score of the project region is 7.45 which is coming under severely degraded veld. It is also evident from the PRA Report that the grassland in the project area has been degraded for more than ten years due to overgrazing and unplanned burning, under the baseline

[56] (Scholes, 2009; Palmer & Bennett, 2013)

Table 5 : Justification for Methodology Applicability	
	scenario, herders still graze on degraded grassland, while no restoration activities are carried out. So, as defined in item (c), iv of CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities (Version 1.0), the land in the project area is degraded at the start of the project and that in the baseline scenario the land will continue to degrade.
The project area is subject to livestock grazing, burning, and/or nitrogen fertilization in the baseline scenario.	According to the PRA Report, in the baseline scenario the project area was subject to livestock grazing, burning and nitrogen fertilization.
In the baseline scenario, more than 95 percent of animal dung from grazing animals deposited on grassland is allowed to lie as is, and is not managed, and in the project scenario no more than 5 percent of the animal dung from grazing animals within the project area is managed with alternative manure management systems.	Project participants allow animal dung to lie and do not move it from pastures. All animal dung from grazing livestiocks deposited on grassland lie as is, and is not managed in either scenario. Thus, under the project scenario, animal dung will not be managed with alternative manure management systems.
The project area must not have been cleared of native ecosystems within the 10 year period prior to the project start date.	The project area is natural grassland, which is continuously degraded due to overgrazing, and have not been cleared of native ecosystems within the 10 year period prior to the project start date which can be evidenced from PRA report.
The project area is located in a region where precipitation is less than	According to previous study the annual precipitation in the study area were varying from 315 mm to 688 mm[57].

[57] https://www.weathersa.co.za/Documents/Corporate/Annual%20State%20of%20the%20Climate%202021_04042022114230.pdf

Table 5 : Justification for Methodology Applicability	
evapotranspiration for most of the year and leaching is unlikely to occur.	The annual evapotranspiration were between 1634 to 2690 mm,[58] The precipitation was less than evapotranspiration , so leaching is unlikely to occur.
If a biogeochemical model is selected for estimation of change in soil carbon stocks, the following conditions must be met: • *The model must comply with the requirements for models as set out in the VCS rules.* • *The model must be appropriate for the region within which the project is situated. There must be studies by appropriately qualified experts (eg, scientific journals, university theses, local research studies or work carried out by the project proponent) that demonstrate that the use of the selected biogeochemical model is appropriate for the IPCC climatic regions (see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 3), or the*	No biogeochemical model is selected in the project. The change of soil carbon stock is calculated based on the content of soil organic carbon which is directly monitored from soil samples.

[58] http://fred.csir.co.za/project/tmg/agrohydrology_atlas/atlas_172t.htm

Table 5 : Justification for Methodology Applicability	
agroecological zone (AEZ) in which the project is situated (see Section 9.3.2).	
Project activities must not include land use change	The project adopts rotational grazing and rest grazing and controlled burning in the degraded grazing land which would not change the land use.
Project activities must not lead to an increase in the use of fossil fuels and fuel wood from non-renewable sources for cooking and heating.	The implementation of rotational grazing through fencing does not increase the use of vehicles or fossil fuels. Also the project activities will not change the source of fuel for cooking and heating..
Project activities must not occur on wetlands or peatlands.	According to the Project Design and related satellite pictures of the project area, the project area is the grassland, not involving wetlands and peatlands.

Therefore, VM0026/Version 1.1 is applicable for the proposed project.

Tool for the demonstration and assessment of additionality in VCS agriculture, forestry, and other land use (AFOLU) project activities (Version 3.0) is applicable under the following conditions:

1) *AFOLU activities the same or similar to the proposed project activity on the land within the proposed project boundary performed with or without being registered as the VCS AFOLU project shall not lead to violation of any applicable law even if the law is not enforced*.

   The restoration of degraded grassland is encouraged in South Africa, and there is no legal prohibition for the project, therefore the proposed project activity on the land within the project boundary does not lead to violation of any applicable law.

2) *The use of this tool to determine additionality requires the baseline methodology to provide for a stepwise approach justifying the determination of the most plausible baseline scenario. Project proponent(s) proposing new baseline methodologies shall ensure consistency between the determination of a baseline scenario and the determination of additionality of a project activity*.

   The baseline scenario is identified using the methodology VM0026 "Sustainable Grassland Management" (Version 1.1), which provides for a stepwise approach justifying the determination of the most plausible baseline scenario. No new baseline methodologies involved.

Therefore, tool for the demonstration and assessment of additionality in VCS agriculture, forestry and other land use (AFOLU) project activities (Version 3.0) is applicable for the proposed project.

Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM AR Project Activities (version 1.0) provides a procedure for the identification of degraded or degrading lands for the purpose of application of A/R CDM methodologies.

There is no mandatory applicability requirement.

According to Appendix of 1 Eligible AFOLU Project Categories of the VCS Standard (version 4.2), eligible ALM activities are those that reduce net GHG emissions on croplands and grasslands by increasing carbon stocks in soils and woody biomass and/or decreasing CO_2, N_2O and/or CH_4 emissions from soils. The project area shall not be cleared of native ecosystems within the 10-year period prior to the project start date. Eligible ALM activities include:

1) Improved Cropland Management (ICM): This category includes practices that demonstrably reduce net GHG emissions of cropland systems by increasing soil carbon stocks, reducing soil N_2O emissions, and/or reducing CH_4 emissions.

2) Improved Grassland Management (IGM): This category includes practices that demonstrably reduce net GHG emissions of grassland ecosystems by increasing soil carbon stocks, reducing N_2O emissions and/or reducing CH_4 emissions.

3) Cropland and Grassland Land-use Conversions (CGLC): This category includes practices that convert cropland to grassland or grassland to cropland and reduce net GHG emissions by increasing carbon stocks, reducing N_2O emissions, and/or reducing CH_4 emissions

The project restored degraded grassland by rest grazing and planned burning. It increases soil carbon stocks, reduce N_2O and CH_4 emissions, which met the requirements of Improved Grassland Management (IGM).

Therefore, all the Tool used is the methodology VM0026/Version 1.1 referenced, and it is applicable for the project.

3.3 Project Boundary

Geographic boundary

The project area generally is the sum of all farms where Improved Grassland Management (IGM) practices are adopted over time. Therefore, the project area is increasing over time depending on how many farms are under IGM adoption. Following the guidance on grouped projects under the VCS (VCS Standard 4.1) the map below figure delineates the total project area within which all project activity instances occur during the crediting period.

The project area encompasses 91,950.6 ha of land widely spaced over KwaZulu Natal, Free State, Mpumalanga and Eastern Cape provinces of South Africa.

Figure : Extended Project Area

Initial project activity instances

The initial project activity instances included in this project description and subject to validation where IGM practices are already adopted or are being planned to adopt and for which the farm boundaries have been tracked.

1st project instances	Total No of Landowners	Total Area (ha)
KwaZulu Natal	6	6,785.4
Free State	03	10,654.3
Mpumalanga	03	3,773.5
Eastern Cape	10	70,737.5

The carbon pools selected for under baseline and project accounting of carbon stock changes are shown in below Table

Carbon Pools	Included?	Justification/Explanation
Aboveground woody biomass	Yes	SGM may change aboveground woody biomass. It is evident from the peer viewed literature[59] that there were significant differences in woody plant heights, proportion of multi- stemmed plants, proportion of dead stems and basal areas between the burnt and unburnt sites[60]. The study results suggest that repeated fires leads to thinner and short- stemmed plants in grassland ecosystems. Repeated burning also increased the proportion of dead stems in the burnt site[61]. Thus in the baseline scenario uncontrolled fire have prevented this carbon pool from increasing. The project activity controls the repeated burning and introduce planned burning in the project scenario. Therefore sustainable grassland management may change aboveground woody biomass and same has been considered as the carbon pool.
Aboveground non-woody biomass	No	The increase of aboveground non-woody biomass resulting from SGM is transient in nature and can be conservatively excluded.
Belowground biomass	No	It is a conservative choice to exclude the below-ground biomass. Study shows that belowground standing crop did not have significant difference[62] between burned and unburned areas of grassland

[59] https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=41ddfc0253c07963ff01309c7601c8daeda629f4

[60] Govender N., Trollope W.S.W. and Van Wilgen B.W (2006), The effect of fire season, fire frequency, rainfall and management on fire intensity in savanna vegetation in South Africa, Journal of Applied Ecology, 43(4), pp 748-758.

[61] Mourik A.A., Van Langevelde F., Van Tellingen E., Heitkönig I.M.A. and Gaigher I (2007), stabIlity of wooded patches in a South African nutrient-poor grassland: Do nutrients, fire or herbivores limit their expansion', Journal of Tropical Ecology, 23, pp 529-537

[62] https://esajournals.onlinelibrary.wiley.com/doi/full/10.1890/ES12-00248.1

		It is found that the grassland significantly increases temperature in the upper few centimeters of soil (Neary et al. 2005). Therefore, rooted woody below ground biomass is having minimal effect by heat from fire.[63] It appears that belowground resistance to disturbances, such as fire, serves as the stabilizing mechanism by which aboveground production in these grasslands gradually recovers from disturbance.[64] Moreover, there is no tillage allowed in the project scenario. Therefore, there is no threat to this carbon pool but rather an improvement due to better fire management in the project, this carbon pool can be conservatively excluded.
Dead wood	No	None of the applicable SGM practices decrease dead wood.
Litter	No	None of the applicable SGM practices decrease the amount of litter.
Soil organic carbon	Yes	A major carbon pool affected by grassland management practices that is expected to increase after adoption of SGM practices.
Wood products	No	None of the applicable SGM practices increases or decreases wood products.

The emission sources and GHGs selected for accounting are shown in below Table.

[63] Enqing Hou, Jennifer A. Rudgers, Scott L. Collins, Marcy E. Litvak, Carleton S. White, Douglas I. Moore, Yiqi Luo, Sensitivity of soil organic matter to climate and fire in a desert grassland, Biogeochemistry, 10.1007/s10533-020-00713-3, 156, 1, (59-74), (2020).

[64] Asuka Koyama, Daisuke Kubo, Yu Yoshihara, Undarmaa Jamsran, Toshiya Okuro, Response of degraded vegetation to introduction of prescribed burning or mowing management in a Mongolian steppe, Grassland Science, 10.1111/grs.12113, 62, 1, (37-44), (2015).

GHG Sources Included In or Excluded From the Project Boundary

	Source	Gas	Included?	Justification/Explanation
Baseline	Use of fertilizer	CO_2	No	Not Applicable
		CH_4	No	Not Applicable
		N_2O	Yes	Fertilizer is being used In the baseline scenario. Therefore, it is the main gas for this source Required by VM0026 Indirect N_2O emissions from leaching and runoff has been excluded from the project boundary, following guidance in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, because, annual precipitation is less than annual potential evapotranspiration in the project region.
	Use of N-fixing Species	CO_2	No	Not Applicable
		CH_4	No	Not Applicable
		N_2O	No	Not Applicable
	Burning of biomass	CO_2	No	Not Applicable
		CH_4	Yes	Prescribed fire is a component of grazing management plans in the initial project activity instances. Thus CH_4 emissions from the burning of biomass will be monitored and the associated emissions will be accounted for within the stratum.
		N_2O	Yes	Prescribed fire is a component of grazing management plans in the initial project activity instances. Thus N_2O emissions from the burning of biomass will be monitored and the associated emissions will be accounted for within the stratum.
	Manure deposition on grassland	CO_2	No	Not Applicable
		CH_4	Yes	In the baseline scenario, there is no restrictions or regulations for the deposition of animal dung in the project area, all animal dung from grazing animals deposited on grassland lie as is, and is not managed. Therefore, it is a significant emission source

GHG Sources Included In or Excluded From the Project Boundary

Source		Gas	Included?	Justification/Explanation
		N_2O	Yes	In the baseline scenario, there is no restrictions or regulations for the deposition of animal dung in the project area, all animal dung from grazing animals deposited on grassland lie as is, and is not managed. Therefore, it is the main gas for this source. Annual precipitation in the project area is less than annual potential evapotranspiration, so indirect N2O emissions from leaching and runoff can be excluded from the project boundary.
	Farming Machine	CO_2	No	No farming machinery was used in the baseline scenario. Therefore, it is not main gas for this source. Excluded for simplification.
		CH_4	No	No farming machinery was used in the baseline scenario. Therefore, it is not main gas for this source. Excluded for simplification.
		N_2O	No	No farming machinery was used in the baseline scenario. Therefore, it is not main gas for this source.
	Animal respiration / Enteric Fermentation	CO_2	No	Not Applicable
		CH_4	Yes	Grazing exists in the project area under the baseline scenario and CH_4 is the main gas for this source. Required by VM0026
		N_2O	No	No N_2O emissions from enteric fermentation.
Project	Use of fertilizers	CO_2	No	Not Applicable
		CH_4	No	Not Applicable
		N_2O	Yes	In the project scenario fertilizer will be used but lesser than the baseline scenario. Therefore, it is considered main gas for this source. Required by VM0026 Indirect N_2O emissions from leaching and runoff has been

GHG Sources Included In or Excluded From the Project Boundary

Source		Gas	Included?	Justification/Explanation
				excluded from the project boundary, following guidance in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, because, annual precipitation is less than annual potential evapotranspiration in the project region.
	Use of N-fixing species	CO_2	No	No N-fixing species were planted in the project. Therefore, not Applicable
		CH_4	No	No N-fixing species were planted in the project. Therefore, not Applicable
		N_2O	No	No N-fixing species were planted in the project. Therefore, not Applicable
	Burning of biomass	CO_2	No	Not Applicable
		CH_4	Yes	Prescribed fire is a component of grazing management plans in the initial project activity instances. Thus CH_4 emissions from the burning of biomass will be monitored and the associated emissions will be accounted for within the stratum.
		N_2O	Yes	Prescribed fire is a component of grazing management plans in the initial project activity instances. Thus N_2O emissions from the burning of biomass will be monitored and the associated emissions will be accounted for within the stratum.
	Manure deposition on grassland	CO_2	No	Not applicable
		CH_4	Yes	No animal dung will be managed with alternative manure management systems. Therefore, there is manure deposition under the project scenario. It is a significant emission source.
		N_2O	Yes	No animal dung will be managed with alternative manure management systems. Therefore, it is the main gas for this source.

GHG Sources Included In or Excluded From the Project Boundary				
Source		Gas	Included?	Justification/Explanation
				Annual precipitation in the project area is less than annual potential evapotranspiration, so indirect N_2O emissions from leaching and runoff can be excluded from the project boundary.
	Farming Machine	CO_2	No	No farming machine will be use in the project activity
		CH_4	No	Not main gas for this source. Excluded for simplification.
		N_2O	No	Not main gas for this source. Excluded for simplification.
	Animal respiration / Enteric Fermentation	CO_2	No	Not applicable.
		CH_4	Yes	Main gas for this source. Required by VM0026.
		N_2O	No	No N_2O emissions from enteric fermentation.

3.4 Baseline Scenario

The project baseline scenario includes the geographic area including and outside of the initial project instances. The baseline scenario is defined as continued selective grazing without a prioritization of pasture rest and recovery, and uncontrolled burning. PRA survey data classify land management history within the project area,

According to "Sustainable Grassland Management" (Version 1.1), the project proponent has used the tool: "*Tool for the demonstration and assessment of additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) project activities" (Version 3.0) for the demonstration of the baseline scenario.* This tool includes a 4 step process, which is undertaken below. Step 1 of the aforementioned tool refers to the identification of the Baseline Scenario.

Step 1. Identification of alternative land use scenarios to the proposed VCS AFOLU project activity

Sub-step 1a) Identify and list all credible alternative land use scenarios to the proposed VCS AFOLU project activity:

As stated in section 3. 5, the identified land use scenarios shall at least include:

i. Continuation of pre-project land use

ii. Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project

iii. If applicable, activities similar to the proposed project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate resulting from:

- Legal requirements; or
- Extrapolation of observed similar activities in the geographical area with similar socioeconomic and ecological conditions to the proposed VCS AFOLU project activity occurring in the period beginning ten years prior to the project start date.

For (iii), the lands within the project boundary of the proposed VCS AFOLU project are all with the same legal requirements, there are no legal requirements to carry out similar project activities. And according to the PRA Report, the project area existed as degraded land more than ten years prior to the project start date. So (iii) is not applicable.

Pre-project land use scenario is degraded grassland ecosystem which is the common situation in the project area. None of the laws and regulations mandate the restoration of degraded grassland the same as the project activities in South Africa. Therefore, the degradation of the grassland of the project area would continue in the absence of the project, the restoration measures implemented by the project activities such as rest grazing /rotational grazing, controlled burning are no mandated by any law, statute or other regulatory framework. Thus Scenario (i) remains possible baseline scenario.

Scenario (ii) faces the technical and investment barrier which will be discussed in the next section. However, it does not violate any existing enforced mandatory applicable laws and regulations.

Outcome of Sub-step 1a: List of credible alternative land use scenarios that could have occurred on the land within the project boundary of the VCS AFOLU project.

As described before, the list of credible alternative land use scenarios is Scenario (i) and (ii).

Sub-step 1b) Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations:

All specific legislations that could be applicable for the present project activity and their relevance with the present project are mentioned in section 1.14 of this PD.

All the above policies are taken into consideration while evaluating the alternatives to the project activity and the following alternatives listed are in compliance with the applicable laws and regulations.

Outcome of Sub-step 1b: List of plausible alternative land use scenarios to the VCS AFOLU project activity that are in compliance with mandatory legislation and regulations taking into account *their enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations.*

Thus Scenario (i) Continuation of pre-project land use and

(ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project remains possible baseline scenarios.

Sub-step 1c. Selection of the baseline scenario:

The proposed project is occurring on privately owned land which is significantly degraded due to continuous grazing and unplanned burning. The project is targeting 91,950.6 ha of degraded lands to be restored through rotational grazing and planned burning.

Although planned grazing has been of interest in the area for a significant period, but there exist a multitude of barriers to its implementation, which are described in detail in the additionality section (Section 3.5) below. Such barriers to are limiting alternative scenario (ii) from the outcome of sub-step 1b above i.e., they would prevent the current project activity without being registered as an AFOLU project.

Therefore, it can be concluded from the above discussion that the Scenario (i) Continuation of pre project land use (present land use; characterized by unplanned/ selective grazing activity but with very low yield, and unplanned burning) is the most realistic baseline scenario available to project participants.

3.5 Additionality

Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities (version 3.0) is applied to demonstrate the additionality.

Step 1. Identification of alternative land use scenarios to the proposed VCS AFOLU project activity

Already stated in step 1 of section 3.4 above, which has confirmed the alternative baseline scenarios. A brief description of the same given below.

Sub-step 1a) Identify and list all credible alternative land use scenarios to the proposed VCS AFOLU project activity:

According to *"Sustainable Grassland Management" (Version 1.1),* the project refers to the VCS *Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU)* for guidance on identification of realistic and credible alternative land uses.

<u>Scenario 1: Continuation of pre-project land use (Continuous, unplanned/selective grazing and uncontrolled burning.)</u>

In the pre-project scenario livestock are released on open pastures throughout the grazing season and allowed to overgraze choice of grasses and plants, preventing regeneration of perennial grasses. This is the scenario in the project area which is continuing since their forefathers. Each trust/livestock owner is responsible for the livestock they own and makes its own decisions about where to graze and find water. Livestock are moved according to trust-determined thresholds of forage availability. Animals repeatedly graze the same site in small groups, simply as a consequence of the most convenient and least time and energy demanding deployment of livestock near permanent settlements or persistent water points. Animals are moved to different grazing areas seasonally, but often only after forage is reduced to a great extent. As per the survey assessment it is found that frequent and irregular uncontrolled burning in the region is age old practice.

Scenario 2 : *Project activity (rotational grazing & planned burning) on the land within the project boundary performed without being registered as the VCS AFOLU project*

Livestock operators will decrease the size of their pastures by using fencing to divide up existing pastures. More labour is required to move the livestocks from pasture to pasture to ensure each pasture receives sufficient rest during the growing season.

Animals will be grouped into herds of mixed animals. Herds will be actively guided and moved throughout a day and from day to day by a trained herder, either one of the owners or a hired herder. Animals will not graze the same location more than once within a wet season or once within a dry season and will be moved to a new site. Areas near settlements or water points will be used similarly to other areas in the grazing plan. Some areas will be rested to allow recovery from past grazing or to provide grass banks during the dry season or droughts.

Scenario 3 : If applicable, activities similar to the proposed project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate resulting from:

- Legal requirements; or
- Extrapolation of observed similar activities in the geographical area with similar socioeconomic and ecological conditions to the proposed VCS AFOLU project activity occurring in the period beginning ten years prior to the project start date.

For this scenario, the lands within the project boundary of the proposed VCS AFOLU project are all with the same legal requirements, there are no legal requirements to carry out similar project activities. And according to the PRA Report, the project area existed as degraded land more than ten years prior to the project start date. So (iii) is not applicable

Outcome of Sub-step 1a: As described above, the list of credible alternative land use scenarios is Scenario 1 and 2.

Sub-step 1b. Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations

All specific legislations that could be applicable for the present project activity and their relevance with the present project are mentioned in section 1.14 of this PD.

Grazing and grazing resource (water, soil) rights are conferred by land ownership of South Africa via Native Land Act of 1913. These rights are further conferred and superseded by the Communal Land Rights Act 11 of 2004. Rights to benefit from soil conservation are conferred by the right to register lands by the Nature Conservation Ordinance [No. 15 of 1974].

The relevant labour laws include the Employment Equity Act [No. 55 of 1998]; Labour Relations Act [No. 66 of 1995], Occupational Health and Safety Act [No. 85 of 1993], Pension Funds Act [No. 24 of 1956], Unemployment Insurance Act [No. 63 of 2001]. These have been and will continue to be implemented in the project through implementation of PP's hiring policies.

The Trespass Act of 1959. Project participant could use this law to enforce the project area borders and reduce project livestock encroachment outside the project boundary.

Occupational Health and Safety Act [No. 85 of 1993], which ensures medical care for employees in the event of accidents or harm related to exposure, wildlife hazards, and violence associated with enforcing livestock protection laws and grazing rights.

South African Labour Law is informed by the Constitution of South Africa and governed by several key pieces of legislation. The Labour Relations Act, 1995 (Act No. 66 of 1995) regulates the relationship between employers, employees, and trade unions in South Africa. The act which deals with equal opportunity and fair treatment in the workplace, with a focus on addressing discrimination against historically disadvantaged groups, is the Employment Equity Act, 1998 (Act No. 55 of 1998). The minimum rights and conditions of employment is set out the in the Basic Conditions of Employment Act, 1997 (Act No. 75 of 1997) and deals with issues such as working hours, leave, and termination of employment. The Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) aims to protect the health and safety of workers in the workplace, whereas the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003) promotes economic empowerment of ethnic groups oppressed under Apartheid in South Africa The Unemployment Insurance Fund Act, 2001 (Act No. 63 of 2001) provides for the establishment and administration of a fund that provides benefits to employees who become unemployed. Labour in South Africa is governed by several key pieces of legislation that regulates the relationship between employers, employees, and trade unions to promote equal opportunity and fair treatment in the workplace.

All the above policies and the other legislations mentioned in the section 1.14 of this PD are taken into consideration while evaluating the alternatives to the project activity and the following alternatives listed are in compliance with the applicable laws and regulations.

Sl. No.	Identified Alternatives	Permitted / Not Permitted
1.	Continuation of the pre-project land use: Continuous, unplanned/selective grazing and uncontrolled burning	Permitted

2.	Increased rotation and rest on smaller pastures (Project activity) and planned burning on the land within the project boundary performed without being registered as a VCS AFOLU project	Permitted

Outcome of Sub-step 1b

The following list are the credible land use scenarios :

- Continuation of the pre-project land use: Continuous, unplanned/selective grazing and uncontrolled burning
- Increased rotation and rest on smaller pastures (Project activity) on the land within the project boundary performed without being registered as a VCS AFOLU project

Sub-step 1c. Selection of the baseline scenario:

Scenario 1 is the chosen baseline scenario.

The project has not applied the Step 2 : Investment Analysis. Step 2 is optional if Step 3 is used. The project has applied Step 3, below

Step 3. Barrier analysis

Sub-step 3a. Identify barriers that would prevent the implementation of the type of proposed project activity

The proposed project activity faces a number of investments, technological, infrastructural, institutional and social barriers to its implementation described as below:

a) Investment barriers

The proposed project activity, needs more labour, infrastructural cost for fencing, more labour to open new pastures, employment of experienced staff & workers to monitor the grazing activity regularly. Investment barrier[65] is faced because of huge initial investment required for changing the pattern of grazing activity.

Propject participants i.e. livestock owners experience cultural and social barriers, as well as the difficulty of linking broad principles to highly contextual local application and lack of capacity to adopt sustainable grassland management practices. The initial investment[66] required for infrastructure changes is a common barrier[67] to entry.

The landowners do not have capital to invest. High initial investment without no return is beyond the means of the land owners which is evident in PRA and "Study on Private Land Grazing System in surrounding Grasslands of Project boundary".

[65] Please refer report on "Barrier Analysis for Sustainable Grassland Management Adoption" by third party

[66] http://www.livestockdialogue.org/fileadmin/templates/res_livestock/docs/2014_Global_agenda_FA2_assessment_31_8.pdf

[67] https://www.mdpi.com/2071-1050/11/11/3003

The study indicated that although some farmers knew about Sustainable Grassland Management Practices (SGM), but the level of adoption is still low. Results indicated that traditional grazing i.e. continuous grazing were more likely to be adopted by farmers. In contrast, SGM such as rotational grazing and planned burning were more knowledge (education), capital and labor intensive. Therefore, promoting the adoption of SGM not only needs awareness raising and capacity building but also must fundamentally address resource constraints of South African ranchers such as knowledge, capital and labor.

It is evident from third party report on “Barrier Analysis For Sustainable Grassland Management Adoption” that, there isn't a single fixed figure for the management of one hectare of grassland in the project region of South Africa, as it can range widely based on equipment, infrastructure & amenties cost, conservation focussed management, restoration projects and community driven initiatives.

Therefore, it can be concluded that there are some significant cost points for any grassland owners to invest by their own. Therefore, implementing such grassland management practices, which are being adopted & targeted under the project by WeAct & EWT, is not easy without injecting financial support from outside. Hence it stands as a significant barrier[68].

b) Technological barriers:

It is found from the household survey (as reported under the PRA report) that the level of education of landowners in the project area are very poor. They are far poorly educated to have access to information and knowledge about the benefit of planned rotational grazing. For successful implementation of the project activity, grazing consultants need to be appointed and workshops need to arrange to educate and share the knowledge regarding planned grazing with the locals. Training and skills development offerings for locals are rare. The majority of livestock farmers in rural rangelands have had no formal training in sustainable grazing nor modern livestock farming.[69] WeAct Pty Ltd. encourages the landowners and livestock owners and provides technical support (training, workshop etc.) for the planned grazing activity.

It has been found from the study[70] conducted for barrier analysis that the level of training and awareness of the farmers is one of the principal factors determining the adoption of sustainable grassland management practices. It has been realized during the primary survey interactions, these regions often face issues like limited access to educational resources, trainings, communication barriers, and insufficient infrastructure for disseminating information. So, addressing such barriers involves a multi-faceted approach and it needs continuous engagement of both resources & finances.

[68] Report on “Barrier Analysis For Sustainable Grassland Management Adoption” by third party

[69] “Study on Private Land Grazing System in surrounding Grassland s of Project boundary”

[70] Report on “Barrier Analysis For Sustainable Grassland Management Adoption” by third party

c) Barriers due to local ecological conditions:

Due to overgrazing for decades, the land remained barren with no/very little vegetation cover[71] causing undesired compactness of soil. Due to direct exposure to wind and water erosion, topsoil is almost eroded[72]. Unfavourable metrological conditions like frequent drought in the region are not allowing natural regeneration in the area of project activity. The topography of land is undulated, soil is rocky, deficient in necessary nutrients making the land unfavourable for natural regeneration.

It is evident from the barrier analysis[73] that the costs for restoring degraded grasslands might involve significant expenses for restoration measures, ongoing maintenance etc. Restoration budgets can vary widelydepending on the extent of degradation and required interventions.

d) Barriers due to social conditions:

The barriers due to social conditions are identified as under

- Lack of skill and proper training: The technical know-how and skill for planned rotational grazing on forage production and climate change aspect is lacking.[74] There is no mechanism for training and demonstration on planned grazing, controlled fire, and soil conservation techniques available in the area.
- Lack of organisation: The local communities lack the organisational structure to put together a volunteer effort for planned grazing.

In the project region, farmers indicated that non availability of labour is a major constraints for implementation of Sustainable Grassland Management[75].

The study on "Barrier Analysis for Sustainable Grassland Management Adoption"[76] conducted by a third party entity of South Africa (please refer barrier analysis report). identified the barriers

[71] Participatory Rural Appraisal Appraisal Report

[72] Report on "Barrier Analysis for Sustainable Grassland Management Adoption" by third party

[73] Report on "Barrier Analysis for Sustainable Grassland Management Adoption" by third party

[74] "Study on Private Land Grazing System in surrounding Grassland s of Project boundary"

[75] Report on "Barrier Analysis for Sustainable Grassland Management Adoption" by third party

[76] Please refer to the report "Barrier Analysis for Sustainable Grassland Management Adoption", a third party conducted & verified study report specific to the project activity.

Also, a public version of the report is available in the links: Direct Link: https://shorturl.at/nHT16,

Reference article link: http://bluegreenetc.in/BlueGreenEtc-BlogDetails/Sustainable-GLM

It may also be noted that there are other similar studies/research papers around the globe which recognized similar challenges as common barriers in such projects. Some of the reference studies are as follows:

(1) Wang, T., Jin, H., Kreuter, U., Feng, H., Hennessy, D. A., Teague, R., & Che, Y. (2020). Challenges for rotational grazing practice: Views from non-adopters across the Great Plains, USA. Journal of Environmental Management, 256, 109941.

(2) Teague, R., Provenza, F., Kreuter, U., Steffens, T., & Barnes, M. (2013). Multi-paddock grazing on rangelands: why the perceptual dichotomy between research results and rancher experience? Journal of Environmental management, 128, 699-717

(3) http://www.livestockdialogue.org/fileadmin/templates/res_livestock/docs/2014_Global_agenda_FA2_assessment_31_8.pdf

were real, associated with long term commitment to overcome. The key barriers identified are high initial cost, no cash inflow, unavailability of skilled Labour, Uncertainty in outcomes, lack of knowledge/ information access, land degradation, unfavourable neighbourhood opinion, unfavourable environmental condition (eg, soil quality, drought). A detailed overview of the existing barriers, which have been aligned with the drivers influencing land users decision making for non-adoption are as follows:

Barriers to the adoption of SGM measures from farmers' point of view

Farmers don't see need for / are not interested / don't believe in SGM

- Farmers don't know how to implement SGM
- Long-term SGM benefits do not correspond to farmers' immediate needs
- Farmers perceive SGM as too labour-intensive
- Farmers consider SGM measures as socially/ culturally inappropriate
- Farmers don't have access to required inputs for SGM
- Farmers don't have access to the required financial resources
- Farmers don't receive rewards for SGM
- Farmers don't see benefit for / are not interested / don't believe in changing grazing practice will help in forage production in eroded/ nutrient deficient land
- Farmers don't see benefit for / are not interested / don't believe in changing grazing practice will help in forage availability during unfavourable metrological situation (e.g. drought situation).

(4) Sustainability of Livestock Farming in South Africa. Outlook on Production Constraints, Climate-Related Events, and Upshot on Adaptive Capacity (https://www.mdpi.com/2071-1050/12/7/2582)

(5) Falayi M, Gambiza J, Schoon M (2021). A scoping review of environmental governance challenges in southern Africa from 2010 to 2020. Environmental Conservation 48: 235–243. doi: https://doi.org/10.1017/S0376892921000333

(6) Sustainable Land Management in Practice Guidelines and Best Practices for Sub-Saharan Africa (https://www.fao.org/3/i1861e/i1861e.pdf)

(7) The conservation status of temperate grasslands in southern Africa (https://www.researchgate.net/profile/Clinton-Carbutt/publication/288265725_The_conservation_status_of_temperate_grasslands_in_southern_Africa/links/56af1fd608ae19a385172026/The-conservation-status-of-temperate-grasslands-in-southern-Africa.pdf?origin=publication_detail&_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uIiwicGFnZSI6InB1YmxpY2F0aW9uRG93bmxvYWQiLCJwcmV2aW91c1BhZ2UiOiJwdWJsaWNhdGlvbiJ9fQ)

(8) Thematic Section: Conservation Implications of Social-ecological Change in Africa South of the Equator A scoping review of environmental governance challenges in southern Africa from 2010 to 2020 (https://www.cambridge.org/core/services/aop-cambridge-core/content/view/11390A4A5ABAC6F722B65365F0A74733/S0376892921000333a.pdf/a-scoping-review-of-environmental-governance-challenges-in-southern-africa-from-2010-to-2020.pdf)

(9) Potential for Sustainable Mountain Farming: Challenges and Prospects for Sustainable Smallholder Farming in the Maloti–Drakensberg Mountains (https://bioone.org/journals/mountain-research-and-development/volume-40/issue-1/MRD-JOURNAL-D-19-00058.1/Potential-for-Sustainable-Mountain-Farming--Challenges-and-Prospects-for/10.1659/MRD-JOURNAL-D-19-00058.1.pdf)

(10) Gxasheka, Masibonge & Beyene, Solomon & Mlisa, Lily Rose & Lesoli, Mota. (2017). Farmers' perceptions of vegetation change, rangeland condition and degradation in three communal grasslands of South Africa. Tropical Ecology. 58. 217-228.

Drivers influencing farmer's decision for non-adoption of SGM

- Non-awareness, Inadequate access to information
- Non-access to knowledge and skill
- Non availability of short-term profitability of SGM measures
- High economic risk
- Non availability of labour, high cost of labour, Lack of knowledge in long term benefit
- Non-acceptance and Non-access to knowledge
- No Training / knowledge sharing for modern livestock farming
- Lack of cash or credit for cost sharing and no cash inflow, Uncertainties with the installation and adaptation and management skills, Non availability of profitability of SGM measures, no access to financial resources
- No motivation of soil protection measures
- Non-awareness/ non-access to knowledge
- No Training / knowledge sharing for modern livestock farming

The study found that despite potential benefits of rotational grazing, its adoption rate has stagnated. The study concluded that Investment or Financial barrier is critical and is linked with all other barriers identified.

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternative land use scenarios (except the proposed project activity):.

S. No.	Alternatives	How identified barriers prevent implementation of credible alternatives identified at step 1a.	Prevented /Not prevented by barrier
1.	Continuation of the pre-project land use: Continuous, unplanned/selective grazing and uncontrolled burning	Investment barrier : Letting livestock grazing openly across the landscape requires no additional costs for fencing, or labour to move the livestock to new areas to graze.	Not prevented by any barrier
		Technological/social condition/local ecological condition: There are no educational or workshop resources needed to manage is this way, as it is the most conventional method.	

2.	Increased rotation and rest on smaller pastures (Project activity) on the land within the project boundary performed without being registered as a VCS AFOLU project:	Investment Barrier Investment is needed in the fencing to divide pastures. Labour is continually needed to move the livestock more frequently. As the land takes 5 to 7 years to begin to respond to improved grazing practices, any financial benefit from improved soil health is remote. Necessary payments to professional herders to move large herds of livestock over large distances	Prevented by this barrier
		Technological barrier Livestock operators must first have access to the knowledge and educational resources to understand how to best manage their livestock to ensure maximum productivity of perennial grasses.	Prevented by this barrier
		Barrier due to social condition Lack of skill and proper training and Lack of organisation	Prevented by this barrier
		Lack of confidence in the safety of animals kept far from permanent field, due to risks of wildlife predation and cattle theft.	Prevented by this barrier
Conclusion: From the above discussion it was found that the present land use; characterized by unplanned/ selective grazing activity but with very low yield, and unplanned burning is the most realistic scenario available to project participants. The proposed AFOLU project activity is not the baseline scenario and, hence, it is additional.			

The above barriers would prevent the scenario of the project activity occurring without being registered as an AFOLU project, however they do not affect or prevent the implementation of the following alternative land use scenario:

Scenario 1: Continuation of pre-project land use (continuous livestock grazing and uncontrolled burning) which does not require any investment and is the most common land use in the project area.

Then proceed to Step 4 (Common practice analysis) based on the tool.

STEP 4: Common Practice Analysis

The previous steps shall be complemented with an analysis of the extent to which similar activities have already diffused in the geographical area of the proposed VCS AFOLU project activity. According to the tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities (v 3.0), similar activities are defined as that which are of similar scale, take place in a comparable environment, inter alia, with respect to the regulatory framework and are undertaken in the relevant geographical area, subject to further guidance by the underlying methodology. Considerations shall be limited to the period beginning 10 years prior to the project start date.

In terms of the project, similar activities should meet the applicability of methodology VM0026 Sustainable Grassland Management, v1.1. That is sustainable grassland management practices, such as improving the rotation of grazing animals, limiting the timing and number of grazing animals on degraded pastures and restoration of severely degraded land by controlled burning and ensuring appropriate management i.e. rotational grazing over the long-term.

The project adopted grazing control like rotational and rest grazing by fence building on the degraded grassland and burning control. And considering ±50% of the project scale, the similar project scale is defined as 45,975 to 137,926 ha. The project start date is 01-July-2018, so the similar considerations were limited to the period beginning from July 2008.

Based on the public and accessible information[77], and check with local authority practicing rotational grazing with the aim of restoring rangelands and improving herd structure, productivity, is not common practice in private rangelands in South Africa. Rangelands in South Africa have a long history of degradation (Hoffman & Ashwell, 2001). Most pastoralists currently do not have sufficient resources and financial security to manage planned grazing as is done through activities in the proposed project scenario.

Project proponent has conducted a ”Study on Private Land Grazing System in surrounding Grassland s of Project boundary”. The study reveals that in the surrounding grazing lands of the project boundary is practicing either continuous grazing with unplanned burning or continuous grazing with planned burning, there was no degraded grassland restoration project (rotational grazing with controlled burning) on a scale similar with the project activity have been implemented previously in the Project region.

Also, there are more requirement such as an additional facilitation to implement Rotational grazing and planned burning in degraded pasture with the necessary continuous training, fence building and their maintenance, more manpower requirement etc. which are important pillars to implement the project activities. Financing for all of this was barely existent in the project region and therefore, it can be concluded that the project (Planned rotational grazing and controlled burning) is not identified within the common practice boundary, so step 4 is not satisfied.

[77] “Study on Private Land Grazing System in surrounding Grasslands of Project boundary”

Thus, the proposed project activity is not the baseline scenario which is additional.

3.6 Methodology Deviations

There is no deviation from the methodology.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

4.1.1 Baseline N_2O emissions due to fertilizer use

Baseline N_2O emissions due to fertilizer use equals baseline direct N_2O emission plus indirect N_2O emission, as described using the following:.

$BE_{N2OSN,b}$ =GWP_{N2O} × ($BE_{D,N2OSN,b}$ + $BE_{ID,N2OSN,b}$) ———— Eq. : 1		
$BE_{N2OSN,b}$	(t CO_2e)	Baseline N_2O emissions due to fertilizer use in baseline year b
$BE_{D,N2OSN,b}$	(t N_2O)	Baseline direct N_2O emissions from synthetic nitrogen fertilizer use in baseline year b
$BE_{ID,N2OSN,b}$	(t N_2O)	Baseline indirect N_2O emissions from synthetic nitrogen fertilizer use in baseline year b,
GWP_{N2O}	t CO_2e/t N_2O	Global-warming potential for N_2O

1) **Baseline direct N_2O emissions from synthetic nitrogen fertilizer use**

Baseline direct N_2O emissions from synthetic fertilizer use in year b calculated as following

$BE_{D,N2OSN,b}$ = $F_{SN,b}$ × EF_{Nfert} × 44/28 ———— Eq. : 2		
$BE_{D,N2OSN,b}$	(t N_2O)	Baseline direct N_2O emissions from synthetic nitrogen fertilizer use in baseline year b
$F_{SN,b}$	(t N)	Annual amount of synthetic fertilizer N applied to grassland soils in baseline year b, adjusted for volatilization as NH_3 and NOx
EF_{Nfert}	kg N_2O-N/kg N applied	N_2O emission factor for synthetic N fertilizer use
44/28		Conversion of N_2O-N to N_2O

$F_{SN,b}$ = $\sum_{i=1}^{I} \boldsymbol{M_{SNi,b}} \times \boldsymbol{NC_{SNi,b}} \times (\boldsymbol{1} - \boldsymbol{Frac_{GAS,F}})$ ———— Eq. : 3		
$F_{SN,b}$	(t N)	Annual amount of synthetic fertilizer N applied to grassland soils in baseline yearb, adjusted for volatilization as NH_3 & NOx
$M_{SNi,b}$	(t fertilizer)	Mass of synthetic N fertilizer type i applied in baseline year b
$NC_{SNi,b}$	(g N/g fertilizer)	Nitrogen content of synthetic N fertilizer type i applied in baseline year b
$Frac_{GAS,F}$	(kg N volatilized/kg N applied)	Fraction of synthetic N fertilizer that volatilizes as NH_3 and NOx
I		Index of synthetic N fertilizer types

2) **Baseline indirect N_2O emissions from synthetic nitrogen fertilizer use**

Indirect N_2O emissions from leaching and runoff has been excluded from the project boundary, following guidance in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, because, annual precipitation is less than annual potential evapotranspiration in the project region.

4.1.2 Baseline emissions due to the use of N-fixing specie

According to the methodology (VM0026/Version 1.1), N_2O emissions due to the use of N-fixing species in the baseline are excluded.

4.1.3 Baseline emissions due to burning of biomas

The baseline emissions due to burning of biomass, $BE_{BB,b}$, include CH_4 emissions from biomass burning plus N_2O emissions from biomass burning in baseline year b, as described using the following:

$BE_{BB,b} = BE_{CH4BB,b} + BB_{N2OBB,b}$ ———— Eq. : (5)		
$BE_{BB,b}$	(t CO_2e)	Baseline GHG emissions from biomass burning in baseline year b
$BE_{CH4BB,b}$	(t CO_2e)	Baseline CH_4 emissions from biomass burning in baseline year b
$BB_{N2OBB,b}$	(t CO_2e)	Baseline N_2O emissions from biomass burning in baseline year b

1) **CH_4 emissions from biomass burning :**

CH_4 emissions from biomass burning in baseline year b must be calculated using the following:

$BE_{CH4,BB,b} = \frac{A_{B,b} \times M_{B,b} \times C_f \times EF_{CH4} \times GWP_{CH4}}{1000}$ ————Eq. : (6)		
$BE_{CH4,BB,b}$	(t CO_2e)	Baseline CH_4 emissions from biomass burning in baseline year b
$A_{B,b}$	(ha)	Area burned in baseline year b
$M_{B,b}$	(t biomass/ha)	Aboveground biomass burned in baseline year b
C_f	(t dry matter burnt/t biomass)	Combustion factor
EF_{CH4}	(g CH_4/kg dry matter burnt)	CH_4 emission factor for biomass burning
GWP_{CH4}	(t CO_2e/t CH_4)	Global-warming potential for CH_4

2) **N_2O emissions from biomass burning:**

N_2O emissions from biomass burning in baseline year b calculated using the following:

$BE_{N2O,BB,b} = \frac{A_{B,b} \times M_{B,b} \times C_f \times EF_{N2O} \times GWP_{N2O}}{1000}$ ———— Eq. : (7)		
$BE_{N2OBB,b}$	(t CO_2e)	Baseline CH_4 emissions from biomass burning in baseline year b
$A_{B,b}$	(ha)	Area burned in baseline year b
$M_{B,b}$	(t biomass/ha)	Aboveground biomass burned in baseline year b
C_f	(t dry matter burnt/t biomass)	Combustion factor

EF_{N2O}	(g CH_4/kg dry matter burnt)	N_2O emission factor for biomass burning
GWP_{N2O}	(t CO_2e/t CH_4)	Global-warming potential forN_2O

4.1.4 Baseline emissions due to enteric fermentation

Baseline CH_4 emissions from enteric fermentation has been calculated following

$$BE_{CH4EF,b} = \frac{GWP_{CH4} \times \sum_{l=1}^{L} P_{l,b} \times EF_l \times Days_{l,b}}{1000 \times 365}$$ ——— Eq. : (8)		
$BE_{CH4,EF,b}$	(t CO_2e)	Baseline CH_4 emissions from enteric fermentation in baseline year b
GWP_{CH4}	(t CO_2e/t CH_4)	Global-warming potential for CH_4
$P_{l,b}$	(head)	Population of grazing livestock type l, in baseline year b
l		Index of livestock type
EF_l	(kg CH_4/(head*year))	Enteric CH_4 emission factor per head of livestock type l per year
$Days_{l,b}$	(days	Grazing days inside the project area for each livestock type l in baseline year b

4.1.5 Baseline N_2O and CH_4 emissions due to manure management

Baseline emissions from manure management include N_2O and CH_4 emissions from manure and urine deposited on grassland soil during the grazing season.

$$BE_{GHG_{MD},b} = BE_{N2O_{MD},b} + BE_{CH4_{MD},b}$$ ——— Eq. : (9)		
$BE_{GHG_{MD},b}$	t CO_2e	Baseline GHG emissions from manure management in baseline year *b*
$BE_{N_2O_{MD},b}$	t CO_2e	Baseline N_2O emissions from manure and urine deposited on grassland soil in baseline year b
$BE_{CH4_{MD},b}$	t CO_2e	Baseline CH_4 emissions from manure and urine deposited on grassland soil in baseline year b

1) **Baseline N_2O emissions from manure management**

$$BE_{N2O_{MD},b} = GWP_{N2O} \times (BE_{D,N2O_{MD},b} + BE_{ID,N2O_{MD},b})$$ ——— Eq. : (10)		
$BE_{N2O_{MD},b}$	t CO_2e	Baseline N_2O emissions from manure and urine deposited on grassland soil in baseline year b
GWP_{N2O}	t CO_2e/ t N_2O	Global-warming potential for N_2O
$BE_{D,N2O_{MD},b}$	t N_2O	Direct N_2O emissions from manure and urine deposited on grassland soil during the grazing season in baseline year *b*
$BE_{ID,N2O_{MD},b}$	t N_2O	Indirect N_2O emissions from manure and urine deposited on grassland soil during the grazing season in the baseline year b

2) Baseline direct N_2O emissions from manure and urine deposited on grassland soils

Baseline direct N_2O emissions from manure and urine deposited on grassland soil are calculated using the following:

$BE_{D,N2O_{MD},b} = \sum_{l1=1}^{L1} F_{MD,l1,b} \times EF_{3,PRP,CPP} \times 44/28$ ———— Eq. (11)		
And/ or $BE_{D,N2O_{MD},b} = \sum_{l2=1}^{L2} F_{MD,l2,b} \times EF_{3,PRP,SO} \times 44/28$ ———— Eq. (12)		
$BE_{D,N2O_{MD},b}$	t N_2O	Baseline N_2O emissions from manure and urine deposited on grassland soil in baseline year b
$F_{MD,l1,b}$	t N	Annual amount of nitrogen in cattle, poultry and pigs manure and urine deposited on grassland soil during the grazing season in baseline year b, adjusted for volatilization as NH_3 and NO_X
$EF_{3,PRP,CPP}$	kg N_2O-N/kg N input)	N_2O emission factor for cattle, poultry and pigs manure and urine deposited on grassland soil during the grazing season
$F_{MD,l2,b}$	t N	Annual amount of nitrogen in sheep and other animals manure and urine deposited on grassland soil during the grazing season in baseline year b, adjusted for volatilization as NH_3 and NO_X
$EF_{3,PRP,SO}$	kg N_2O-N/kg N input)	N_2O emission factor for sheep and other animals manure and urine deposited on grassland soil during the grazing season (kg N_2O-N/kg N input)
L1		Index of livestock cattle, poultry and pigs
L2		Index of livestock sheep and other animals

$F_{MD,l1,b}$ and $F_{MD,l2,b}$ must be calculated using the following equation for livestock type l

$F_{MD,l,b} = \frac{P_{l,b} \times Nex_l \times H_{l,b} \times Days_{l,b} \times (1 - Frac_{GAS,MD}}{1000_a \times 24 \times 1000_b}$ ———— Eq. (13)		
$F_{MD,l,b}$	t N	Annual amount of manure and urine deposited on grassland soil from livestock type *l* during the grazing season in baseline year b, adjusted for volatilization as NH_3 and NO_x
$P_{l,b}$	Head	Population of livestock type *l* in baseline year *b*
$W_{l,b}$	kg livestock mass/head	Average weight of livestock type *l* in baseline year *b*
N_{exl}	kg N deposited/(t livestock mass*day	Nitrogen excretion of livestock type *l*
1000_a		Conversion factor for t livestock mass to kg livestock mass
$H_{l.b}$	hour	Average grazing hours per day for livestock type *l* in baseline year *b*
24		Conversion factor for days to hours

Days $_{l,b}$	days	Grazing days for livestock type*l*inside the project area in baseline year *b* (
1000_b		Conversion factor for tonnes N to kg t N
$Frac_{GAS,MD}$	(kg N volatilized/kg of N deposited)	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x
L		Index of grazing livestock types

3) Baseline indirect N_2O emissions from manure and urine deposited on grassland soils

According to the Methodology (VM0026/Version 1.1) as the annual precipitation of the project area is less than annual potential evapotranspiration, so, indirect N2O emissions from leaching and runoff can be excluded.

4) CH_4 emissions from manure management

Baseline CH_4 emissions from manure management are calculated using the following:

$BE_{CH4_{MD},b} = \frac{GWP_{CH4} \times \sum_{l=1}^{l} EF_{lM} \times p_{l,b} \times H_{l,b} \times Days_{l,b}}{1000 \times 365 \times 24}$ ——— Eq. (15)		
EF_{lM}	kg CH_4/(head*year	CH_4 emission factor from manure of livestock type l
$Pl_{,b}$	head	Population of grazing livestock type l, in baseline year b
$H_{l,b}$	hour	Average grazing hours per day for livestock type l in baseline year b
$Days_{l,b}$	days	Grazing days for livestock type l inside the project area in baseline b
1000		Conversion factor for t CH_4 to kg CH_4
365		Conversion factor for years to days
24		Conversion factor for days to hours

4.1.6 Baseline CO_2 emissions due to the use of fossil fuels for grassland management

According to the Participatory Rural Appraisal (PRA) Report, there was no grassland management in baseline scenario, thus did not involve agricultural / other machinery. So, baseline CO_2 emissions due to the use of fossil fuels for grassland management is considered to be 0 tCO2e

4.1.7 Baseline emission removals from existing woody perennials

Baseline removals by existing woody perennials in baseline year b ($BRWP_b$) has been calculated using the following:

$BRWP_B = \sum_{j=1}^{J} \Delta C_{BG,j} - \Delta C_{BL,j}$ ——— Eq. : (17)		
$BRWP_B$	(t CO_2)	Baseline removals from existing woody perennials in baseline year b
$\Delta C_{BG,j}$	(t CO_2)	Average annual increase in carbon stocks of existing woody biomass for species j, under the baseline scenario
$\Delta C_{BL,j}$	(t CO_2)	Average annual loss of carbon stocks of existing woody biomass for species j, under the baseline scenario
J		Index of species

The average annual increase in carbon stocks in existing live woody biomass for each species must be calculated using the following:

$\Delta C_{BG,j} = \sum_{s=1}^{S} A_{B,j,s} \times G_{B,j,s} \times CF_j \times 44/12$ ——— Eq. : (18)		
$\Delta C_{BG,j}$	(t CO_2)	Average annual increase in carbon stocks of existing woody biomass for species j, under the baseline scenario
$A_{B,j,s}$	(ha)	Area of species j in stratum s under the baseline scenario
$G_{B,j,s}$	(t dm/(ha)	Average annual increase in existing woody biomass of species j in stratum s, under the baseline scenario
CF_j	(t C/t dm)	Carbon fraction for species j
S		Index of stratum
44/12		Ratio of molecular weights of CO_2 and C

The average annual increase in existing live woody biomass stocks for each species in a vegetation class in a stratum has been calculated from:

$G_{B,j,s} = G_{AB,B,j,s}$ ——— Eq. : (19)[78]		
$G_{B,j,s}$	(t dm/ha)	Average annual increase in existing woody biomass of species j in stratum s, under the baseline scenario
$G_{AB,B,j,s}$	(tdm aboveground biomass/ha)	Average annual increase in existing above-ground woody biomass of species j in stratum s

4.1.8 Baseline emission removals due to changes in soil organic carbon

Since the applicability conditions limit the project to land that is degraded and is continuing to degrade, it can be conservatively assumed that the changes in SOC in the baseline scenario is zero. Therefore:

BRS = 0

BRS = Baseline removals due to changes in SOC under the baseline scenario (t CO2e)

4.1.9 BASELINE EMISSIONS AND REMOVALS

The emissions and removals in baseline year b are given by:

$BE_b = BE_{N2OSN,b} + BEBB_{,b} + BE_{CH4EF,b} + BE_{GHGMD,b} - BRWP_b$ ———Eq. : (21)		
BE_b	(t CO_2e)	Baseline emissions and removals in year b
$BE_{N2OSN,b}$	(t CO_2e)	Baseline N_2O emissions due to fertilizer use in baseline year b
$BEBB_{,b}$	(t CO_2e)	Baseline GHG emissions from biomass burning in baseline year b
$BE_{CH4EF,b}$	(t CO_2e)	Baseline CH_4 emissions from enteric fermentation in baseline year b
$BE_{GHGMD,b}$	(t CO_2e)	Baseline GHG emissions from manure management in baseline year b
$BRWP_b$	(t CO_2e	Baseline removals from existing woody perennials in baseline year b

[78] Below ground biomass has not included as carbon pool in the project boundary. Therefore, as specified by the methodology the term (1+Rj) has been removed from the equation 19

Baseline average annual GHG emissions/ removals is summarized in the following table, please refer to ER spreadsheet for detailed calculation.

[79]$BE_{N2OSN,b}$	$BE_{BB\ b}$	$BE_{CH4,EF,b}$	$BE_{GHGMD,b}$	$BRWP_b$	BE_b
498.00	263.64	29845.71	10224.65	7988.91	32843.09

4.2 Project Emissions

4.2.1 Project N_2O emissions due to fertilizer use

Project N_2O emissions due to fertilizer use equals the sum of project direct and indirect N2O emissions, as described using the following:

$PE_{N2OSN,t} = GWP_{N2O} \times (PE_{D,N2OSN,t} + PE_{ID,N2OSN,t})$ —— Eq. (22)		
$PE_{N2OSN,t}$	(t CO_2e)	Project N_2O emissions due to fertilizer use in year t
$PE_{D,N2OSN,t}$	(t N_2O)	Project direct N_2O emissions from synthetic nitrogen fertilizer use in year t
$PE_{ID,N2OSN,t}$	(t N_2O)	Project indirect N_2O emissions from synthetic nitrogen fertilizer use in year t,
GWP_{N2O}	t CO_2e/t N_2O	Global-warming potential for N_2O

1) **Project direct N_2O emissions from synthetic nitrogen fertilizer use:**

Project direct N_2O emissions from synthetic fertilizer use in year t calculated as following

$PE_{D,N2OSN,t} = F_{SN,t} \times EF_{Nfert} \times 44/28$ ——— Eq. : (23)		
$PE_{D,N2OSN,t}$	(t N_2O)	Baseline direct N_2O emissions from synthetic nitrogen fertilizer use in year t
$F_{SN,t}$	(t N)	Annual amount of synthetic fertilizer N applied to grassland soils in year t, adjusted for volatilization as NH_3 and NOx
EF_{Nfert}	kg N_2O-N/kg N applied	N_2O emission factor for synthetic N fertilizer use
44/28		Conversion of N_2O-N to N_2O

$F_{SN,t} = \sum_{i=1}^{I} M_{SNi,t} \times NC_{SNi,t} \times (1 - Frac_{GAS,F})$——— Eq. : (24)		
$F_{SN,t}$	(t N)	Annual amount of synthetic fertilizer N applied to grassland soils in year t, adjusted for volatilization as NH_3 and NOx
$M_{SNi,t}$	(t fertilizer)	Mass of synthetic N fertilizer type i applied in year t
$NC_{SNi,t}$	(g N/g fertilizer)	Nitrogen content of synthetic N fertilizer type i applied in year t

[79] Baseline nitrogen fertilization (LAN & Urea) has been sourced from the project database which is the actual amount of fertilization used by each ranch.

$Frac_{GAS,F}$	(kg N volatilized/kg N applied)	Fraction of synthetic N fertilizer that volatilizes as NH_3 and NOx
I		Index of synthetic N fertilizer types

2) **Project indirect N_2O emissions from synthetic nitrogen fertilizer use**

Indirect N2O emissions from leaching and runoff has been excluded from the project boundary, following guidance in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, because, annual precipitation is less than annual potential evapotranspiration in the project region.

4.2.2 Project emissions due to the use of N-fixing species

According to the Project Design, the project did not involve seeding of N-fixing species on the degraded grassland. Thus, emission from this source neglected.

4.2.3 Project emissions due to burning of biomass

The project GHG emissions equals CH_4 emissions from biomass burning plus N_2O emissions from biomass burning under the project, as described using the following:

$PE_{GHGBB,b} = PE_{CH4BB,t} + PE_{N2OBB,t}$ ——— Eq. : (28)		
$BE_{GHGBB,t}$	(t CO2e)	Project GHG emissions from biomass burning in year t
$BE_{CH4BB,t}$	(t CO2e)	Project CH4 emissions from biomass burning in year t
$BB_{N2OBB,t}$	(t CO2e)	Project N2O emissions from biomass burning in year t

1) **CH_4 emissions from biomass burning under project:**

CH_4 emissions from biomass burning in year t must be calculated using the following:

$PE_{CH4,BB,t} = \frac{A_{B,t} \times M_{B,t} \times C_f \times EF_{CH4} \times GWP_{CH4}}{1000}$ ——— Eq. : (29)		
$BE_{CH4,BB,t}$	(t CO2e)	Project CH4 emissions from biomass burning in year t
$A_{B,t}$	(ha)	Area burned in year t
$M_{B,t}$	(t biomass/ha)	Aboveground biomass burned in year t
C_f	(t dry matter burnt/t biomass)	Combustion factor
EF_{CH4}	(g CH4/kg dry matter burnt)	CH4 emission factor for biomass burning
GWP_{CH4}	(t CO2e/t CH4)	Global-warming potential for CH4

2) **N_2O emissions from biomass burning under project:**

N_2O emissions from biomass burning in baseline year b must be calculated using the following:

$PE_{N20,BB,t} = \frac{A_{B,t} \times M_{B,t} \times C_f \times EF_{N20} \times GWP_{N20}}{1000}$ ——— Eq.; (30)		
$BE_{N20BB,b}$	(t CO_2e)	Project CH_4 emissions from biomass burning in year t
$A_{B,t}$	ha)	Area burned in year t
$M_{B,t}$	t biomass/ha	Aboveground biomass burned in year t
C_f	t dry matter burnt/t biomass	Combustion factor
EF_{N20}	g CH4/kg dry matter burnt	N_2O emission factor for biomass burning
GWP_{N20}	t CO_2e/t CH_4	Global-warming potential forN_2O

4.2.4 Project methane emissions due to enteric fermentation

Project CH_4 emissions from enteric fermentation has been calculated following

$PE_{CH4EF,t} = \frac{GWP_{CH4} \times \sum_{l=1}^{L} P_{l,t} \times EF_l \times Days_{l,t}}{1000 \times 365}$ ——— Eq. : (31)		
$BE_{CH4,EF,t}$	(t CO_2e)	Project CH_4 emissions from enteric fermentation in baseline year b
GWP_{CH4}	(t CO_2e/t CH_4)	Global-warming potential for CH_4
$P_{l,t}$	(head)	Population of grazing livestock type l, in project year t
l		Index of livestock type
EF_l	kg CH_4/(head*year	Enteric CH_4 emission factor per head of livestock type l per year
$Days_{l,t}$	(days	Grazing days inside the project area for each livestock type l in project year t

4.2.5 Project N_2O and CH_4 emissions due to manure management

The Project emissions from manure management include N_2O and CH_4 emissions from manure and urine deposited on grassland soil during the grazing season.

$PE_{GHG_{MD},t} = PE_{N_2O_{MD},t} + PE_{CH4_{MD},t}$ —— Eq. (32)		
$PE_{GHG_{MD},t}$	t CO_2e	Project GHG emissions from manure management in year t
$PE_{N_2O_{MD},t}$	t CO_2e	Project N_2O emissions from manure and urine deposited on grassland soil in year t
$PE_{CH4_{MD},t}$	t CO_2e	Project CH_4 emissions from manure and urine deposited on grassland soil in year t

1) Project N_2O emissions from manure management

$\mathbf{PE_{N2O_{MD},t} = GWP_{N2O} \times (PE_{D,N2O_{MD},t} + PE_{ID,N2O_{MD},t})}$ − − − − − **Eq. (33)**		
$PE_{N2O_{MD},t}$	t CO_2e	Project N_2O emissions from manure and urine deposited on grassland soil in year t
GWP_{N2O}	t CO_2e/ t N_2O	Global-warming potential for N_2O
$PE_{D,N2O_{MD},t}$	t N_2O	Project direct N_2O emissions from manure and urine deposited on grassland soil during the grazing season in year t

$PE_{ID,N2O_{MD},t}$	t N_2O	Project indirect N2O emissions from manure and urine deposited on grassland soil during the grazing season in the year t

2) Project direct N_2O emissions from manure and urine deposited on grassland soils

Project direct N_2O emissions from manure and urine deposited on grassland soil are calculated using the following:

$$PE_{D,N2O_{MD},t} = \sum_{l1=1}^{L1} F_{MD,l1,t} \times EF_{3,PRP,CPP} \times 44/28$$ ——— Eq. (34)		
And/ or $$PE_{D,N2O_{MD},t} = \sum_{l2=1}^{L2} F_{MD,l2,t} \times EF_{3,PRP,SO} \times 44/28$$ ——— Eq. (35)		
$PE_{D,N2O_{MD},t}$	t N_2O	Project direct N_2O emissions from manure and urine deposited on grassland soil in baseline year b
$F_{MD,l1,t}$	t N	Annual amount of nitrogen in cattle, poultry and pigs manure and urine deposited on grassland soil during the grazing season in year t, adjusted for volatilization as NH3 and NO_X
$EF_{3,PRP,CPP}$	kg N_2O-N/kg N input)	N_2O emission factor for cattle, poultry and pigs manure and urine deposited on grassland soil during the grazing season
$F_{MD,l2,t}$	t N	Annual amount of nitrogen in sheep and other animals manure and urine deposited on grassland soil during the grazing season in year t, adjusted for volatilization as NH_3 and NO_X
$EF_{3,PRP,SO}$	kg N_2O-N/kg N input)	N_2O emission factor for sheep and other animals manure and urine deposited on grassland soil during the grazing season (kg N_2O-N/kg N input)
L1		Index of livestock cattle, poultry and pigs
L2		Index of livestock sheep and other animals

$F_{MD,l1,t}$ and $F_{MD,l2,t}$ must be calculated using the following equation for livestock type l

$$F_{MD,l,t} = \frac{P_{l,t} \times Nex_l \times H_{l,t} \times Days_{l,t} \times (1 - Frac_{GAS,MD}}{1000_a \times 24 \times 1000_b}$$ ——— Eq. (36)		
$F_{MD,l,t}$	t N	Annual amount of manure and urine deposited on grassland soil from livestock type *l* during the grazing season in year t, adjusted for volatilization as NH3 and NOx
$P_{l.t}$	Head	Population of livestock type *l* in year *t*
$W_{l,t}$	kg livestock mass/head	Average weight of livestock type *l* in year *t*
Nex_l	kg N deposited/(t livestock mass*day	Nitrogen excretion of livestock type *l*
1000_a		Conversion factor for t livestock mass to kg livestock mass
$H_{l.t}$	(hour)	Average grazing hours per day for livestock type *l* in year *t*

24		Conversion factor for days to hours
Days $_{l,t}$	days)	Grazing days for livestock type *l* inside the project area in year *t*
1000_b		Conversion factor for tonnes N to kg t N
$Frac_{GAS,MD}$	kg N volatilized/kg of N deposited	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NOx
L		Index of grazing livestock types

3) Project indirect N_2O emissions from manure and urine deposited on grassland soils

According to the Methodology (VM0026/Version 1.1),as the annual precipitation of the project area is less than annual potential evapotranspiration, so, indirect N_2O emissions from leaching and runoff can be excluded.

4) CH_4 emissions from manure management

Baseline CH_4 emissions from manure management are calculated using the following:

$$PE_{CH4_{MD},t} = \frac{GWP_{CH4} \times \sum_{l=1}^{l} EF_{lM} \times p_{l,t} \times H_{l,t} \times Days_{l,t}}{1000 \times 365 \times 24} \text{ ——— Eq. (38)}$$

$PE_{CH4_{MD},t}$	t CO_2e	Project CH_4 emissions from manure and urine deposited on grassland soil in year t
$Pl_{,bt}$	head	Population of grazing livestock type l, in year t
EF_{lM}	kg CH_4/(head*year	CH_4 emission factor from manure of of livestock type *l*
$H_{l,t}$	hour	Average grazing hours per day for livestock type l in year t
$Days_{l,t}$	days	Grazing days for livestock type l inside the project area in year t
1000		Conversion factor for t CH_4 to kg CH_4
365		Conversion factor for years to days
24		Conversion factor for days to hours

4.2.6 Project CO_2 emissions due to the use of fossil fuels

The project activity is associated with grazing management and controlled burning which is not required use of any fossil fuel. Therefore, emission from fossil fuel use considered 0 tCO_2

4.2.7 Project removals from existing woody perennials

Project removals by existing woody perennials in project year t ($PRWP_t$) has been calculated using the following:

$$PRWP_t = \sum_{j=1}^{J} \Delta C_{PG,j,t} - \Delta C_{PL,j,t} \text{ ——— Eq. : (40)}$$

$PRWP_t$	(t CO2)	Project average net change in carbon stocks of existing woody biomass in year t
$\Delta C_{PG,j,t}$	(t CO2)	Project average increase in carbon stocks of existing woody biomass for species j, in year t

$\Delta C_{PL,j,t}$	($t\ CO_2$)	Project average loss in carbon stocks of existing woody biomass for species j, in year t
J		Index of species

The average annual increase in carbon stocks in existing live woody biomass for each species must be calculated using the following:

$\Delta C_{PG,j,t} = \sum_{s=1}^{S} A_{P,j,s,t} \times G_{P,j,s,t} \times CF_j \times 44/12$ ——— Eq. : (41)		
$\Delta C_{PG,j,t}$	*($t\ CO_2$)*	Project average increase in carbon stocks of existing woody biomass for species j, for year t
$A_{P,j,s,t}$	(ha)	Area of species j in stratum s under project in year t
$G_{P,j,s,t}$	(t dm/(ha)	Project average increase in existing woody biomass for species j in grassland management stratum s in year t
CF_j	(t C/t dm)	Carbon fraction for species j
S		Index of stratum
44/12		Ratio of molecular weights of CO2 and C

The average annual increase in existing live woody biomass stocks for each species in a vegetation class in a stratum has been calculated from:

$G_{P,j,s,t} = G_{AB,P,j,s,t}$ ——— Eq. : (42)[80]		
$G_{P,j,s,t}$	(t dm/ha)	Average annual increase in existing woody biomass of species j in stratum s, under the baseline scenario
$G_{AB,P,j,s,t}$	(tdm aboveground biomass/ha)	Average annual increase in existing above-ground woody biomass of species j in stratum s

4.2.8 Project removals due to changes in soil organic carbon

Estimate of project removals due to changes in SOC using a direct measurement approach (Option 2). According to the methodology, for measuring soil organic carbon stock changes, soil sampling must follow a scientifically established method or a nationally-approved standard. For the project, the nationally-approved standard was used for sampling process. National standard Method for Determination of Soil Organic Matter was used to measure SOC of the soil samples.

The minimum necessary sample size for each stratum was evaluated using the 'CDM Tool for the Calculation of the number of sample plots for measurements within A/R CDM project activities' as prescribed by VM0026. Sampling procedures were designed such that the statistical significance of soil carbon stock changes between the baseline carbon stock and the carbon stock in time t can be determined with a 95 percent confidence interval.

[80] Below ground biomass has not included as carbon pool in the project boundary. Therefore, as specified by the methodology the term ($1+R_j$) has been removed from the equation 42.

Sampling Design and Stratification

As mentioned above, the project removals due to changes in SOC will be determined by direct measurement approach (Option 2) by using soil sampling procedures according to nationally approved standard.

According to the methodology (VM0026/Version 1.1), four main requirements was met before the stratified sampling is chosen:

- Population must be stratified in advance of the sampling.

  The project area was stratified before sampling.

- Classes must be exhaustive and mutually exclusive (i.e., all elements of the population must fall into exactly one class).

  For the project, classes were determined by each ranch within project boundary (see below Table for details), which are exhaustive and mutually exclusive and all elements of the population fell into exactly one class.

- Classes must differ in the attribute or property under study, otherwise there is no gain in precision over simple random sampling.

  The grazing situation in the project area of each ranch is basically the same, but the climatic condition of each ranch is different, which has a certain impact on the accumulation of soil carbon. For the project, based on the ranch the project ex ante strata are listed in the following table.

  All the participating ranches adopted, rotational grazing and burning control as the management practice in July 2018. In addition, different ranch is having different vegetation coverage and types, so their effects on soil carbon accumulation are also different. The growth status of grassland vegetation is different in each ranches, which has a certain impact on the accumulation of soil carbon. Therefore, for the project, the stratification is based on the each ranch i.e. ranch level.

- Selection of items to represent each class (i.e., the sample drawn from each class) must be random.

  To avoid subjective choice of plot locations, the sample plots will be located systematically with a random start. This will be accomplished with the help of a GPS in the field. The geographical position (GPS coordinate) of each plot will be recorded and archived. It is to be ensured that the sampling plots are distributed randomly, and as evenly spread as possible.

Sampling framework

Sampling procedures were designed such that the statistical significance of soil carbon stock changes between the baseline carbon stock and the carbon stock in time t can be determined with a 95 percent confidence interval. The minimum necessary sample size for each stratum was evaluated using the ‘CDM Tool for the Calculation of the number of sample plots for measurements within A/R CDM project activities’ as prescribed by VM0026.

Number of sample plots required for estimation of biomass stocks within the project boundary is calculated iteratively. In the first iteration, the number of sample plots for the project area is calculated as:

$$n = \frac{N \times tval^2 \times (\sum_i w_i \times s_i).^2}{N \times E^2 + tval^2 \times \sum_i w_i \times s_i.^2}$$

n	Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless
n_i	Number of sample plots allocated to stratum i; dimensionless
N	Total number of possible sample plots within the project boundary (i.e. the sampling space or the population); dimensionless
t_{val}	Two-sided Studentís t-value, at infinite degrees of freedom, for the required confidence level; dimensionless
W_i	Relative weight of the area of stratum i (i.e. the area of the stratum i divided by the project area); dimensionless
S_i	Estimated standard deviation of biomass stock in stratum i; t d.m. (or t d.m. ha-1)
E	Acceptable margin of error (i.e. one-half the confidence interval) in estimation of biomass stock within the project boundary; t d.m. (or t d.m. ha-1), i.e. in the units used for i s
i	1, 2, 3, ... biomass stock estimation strata within the project boundary

The mean SOC and the standard deviation of SOC in was estimated from a preliminary sample, and calculated the mean value and standard deviation of the biomass stock in each strata which were used to calculate the final number of sample sites based on the sample.

The calculated sample size is 41 by using a precision of 15 percent at the 95 percent confidence level, considering the large area of the project boundary, the actual sample size has been increased into 123 by tripling the individual sample size of each stratum with a minimum number of 3. For some regions, the sample size is 18. Preliminary data were used to calculate the sample size and establish baseline SOC under VM0026 v.1.1. Please refer to Sample Size Calculation Table for details.

Strata No.	Region	Area (ha)	Calculated sample size	Actual sample size
Strata 1	Kwazulu Natal	183.8	1.0	3
Strata 2	Eastern Cape	6772.9	3.0	9
Strata 3	Eastern Cape	4319.8	2.0	6
Strata 4	Kwazulu Natal	1612.1	1.0	3
Strata 5	Kwazulu Natal	353.6	1.0	3
Strata 6	Eastern Cape	4915.8	2.0	6
Strata 7	Kwazulu Natal	2549.9	1.0	3
Strata 8	MPL	741.3	1.0	3
Strata 9	Eastern Cape	8643.7	3.0	9
Strata 10	Eastern Cape	2860.4	1.0	3
Strata 11	Eastern Cape	9034.3	3.0	9
Strata 12	Free State	2315.3	1.0	3
Strata 13	Eastern Cape	5717.2	2.0	6
Strata 14	Eastern Cape	3768.0	2.0	6
Strata 15	Kwazulu Natal	236.7	1.0	3
Strata 16	Eastern Cape	6640.8	3.0	9
Strata 17	MPL	837.1	1.0	3
Strata 18	Kwazulu Natal	1849.3	1.0	3
Strata 19	Free State	7884.7	3.0	9
Strata 20	MPL	2195.2	1.0	3
Strata 21	Free State	454.3	1.0	3
Strata 22	Eastern Cape	18064.5	6.0	18
Total		91,950.6	41	123

The SOC stock in stratum s, sampling site i, under project in year t are calculated using the following:

$P_{SOCmG,s,i,t} = SOC_{mG,s,i,t} \times BD_{mG,s,i,t} \times Depth \times (1 - FC_{mG,s,i,t}) \times 0.1$ ---------- Eq. : (45)		
$P_{SOCmG,s,i,t}$	(t C/ha)	SOC stock in the top 30 cm (or greater depth if required) of soil for management practice mG, stratum s, sampling site i under project in year t
$SOC_{mG,s,i,t}$	(g C/kg soil)	SOC content in the top 30 cm of soil (or greater depth if required) for management practice mG, stratum s, sampling site i, under project in year t
$BD_{mG,s,i,t}$	(g soil/cm^3)	Soil bulk density in the top 30 cm of soil (or greater depth if required) for management practice mG, stratum s, sampling site i, under project in year t
$Depth$	(cm)	Top soil depth, for calculating grassland SOC stock in the top 30 cm of soil (or greater depth if required)

$FC_{mG,s,i,t}$	(percent)	Percentage of rocks larger than 2mm, roots, and other dead residues with a diameter in the top 30 cm of soil (or greater depth if required), for management practice mG, stratum s, sampling site i under project in year t
0.1		Conversion factor for SOC to t C/ha
mG		Index of management practice
s		Index of stratum
i		Index of sampling site

The $SOC_{mG,s,i,t}$, $BD_{mG,s,i,t}$ and $FC_{mG,s,i,t}$ were measured by "The Biodiversity Company". The result of soil testing report is listed in ER table. Please refer to ER table for relevant parameter references and values.

Calculate average carbon stock of all monitored sites in management practice mG, stratum s, under project using the following:

$P_{SOCmG,s,t} = \frac{\sum_i^I P_{SOC_{mGs,i,t}}}{I}$ ------------ Eq. : (46)		
$P_{SOC,mG,s,t}$	(t C/ha)	Average carbon stock in stratum s under project
$P_{SOC,mG,s,i,t}$	(t C/ha)	SOC stock in the top 30 cm (or greater depth if required) of soil for management practice mG, stratum s, sampling site i under project in year t
I		Monitored sites in stratum s, under project

The following is used to calculate the difference between the carbon stock for management practice mG under project in year t, and the carbon stock under the baseline scenario, for all strata.

$P_{mG,t} = \sum_{s=1}^{S}(P_{SOCmG,s,t} - SOC_{s,baseline}) \times PA_{mG,s,t}$ ----------------- Eq. : (47)		
$P_{mG,t}$	(t C)	Difference in the carbon stock between the project in year t and the baseline scenario
$P_{SOCmG,s,t}$	(ha)	Project areas with management practice mG in stratum s in year t
$SOC_{s,baseline}$	(t C / ha)	Average carbon stock in stratum s under project in year t
$PA_{mG,s,t}$	(t C / ha)	Baseline SOC stock of stratum s, in the top 30 cm soil layer (or greater depth if required)
S		Strata under project
s		Index of stratum

The following is applied to calculate average carbon stock of all management practice, under project in year t.

$Pt = \sum_{mG=1}^{M} P_{mG,t}$ ------------------- Eq. : (48)		
P_t	(t C)	Carbon stock under project in year t
M		Number of management practice

For the first monitoring of SOC stock, the annual project removals due to changes in SOC stock in year t must be calculated using the following:

$PR_t = \frac{(P_t)}{n} \times 44/12$ ------------------ Eq. : (49)		
PR_t	(t CO_2e)	Project removals due to changes in SOC in year t
n	(years)	Number of years from the project start date to year t

According to the above calculation formula, project removals due to changes in SOC in year t is calculated in ER table. Please see the ER table for the detail.

Uncertainty analysis

All parameters are selected according to section 9.1 and 9.2 of the methodology (VM0026, Version 1.1), and soil organic carbon data are obtained by laboratory tests. For the project, the project proponent conducted a survey of all project participants whose livestock grazed in the project area prior to the project start date. This survey covered a full census of project participants whose livestock graze in the project area during the baseline period, and collected grazing data in the project area under the baseline scenario, such as the number and days of grazing, etc recorded in the Detailed Project Report. So the parameters about grazing, burning and woody perennials are conservative, and the uncertainty is considered to be 0.

As mentioned before, the project use Option 2 (measurement approach) to estimate project removals due to changes in SOC, the measured SOC changes is derived from sample surveys undertaken within the project area, and the sample size is large, therefore a conservative estimate of carbon sequestration by carbon pools in the project scenario should be given by adopting a value that represents the lower bound of the 95 percent confidence interval (sample mean - 1.96 × standard error).

PROJECT EMISSIONS AND REMOVALS

Project net GHG emissions by sources and removals by sinks are calculated as follows:

$PE_t = PE_{N2OSN,t} + PE_{GHGBB,t} + PE_{CH4EF,t} + PE_{GHGMD,t} - PRWP_t - PR_t$ ———————— Eq. : (57)		
PE_t	(t CO_2e)	Project net GHG emissions by sources and removals by sinks in year t
$PE_{N2OSN,t}$	(t CO_2e)	Project N2O emissions due to fertilizer use in year t (t CO2e)
$PE_{GHGBB,t}$	(t CO_2e)	Project GHG emissions from biomass burning in year t
$PE_{CH4EF,t}$	(t CO_2e)	Project CH4 emissions from enteric fermentation in year t
$PE_{GHGMD,t}$	(t CO_2e	Project GHG emissions from manure management in year t
$PRWP_t$	(t CO_2)	Project average net change in carbon stocks of existing woody biomass in year t
PR_t	(t CO_2)	Project removals due to changes in SOC in year t

Project net GHG emissions/ removals during the crediting period is summarized in the following table, please refer to ER spreadsheet for detailed calculation.

Crediting year	[81]$PE_{N2OSN,t}$	$PE_{GHGBB,t}$	$PE_{CH4EF,t}$	$PE_{GHGMD,t}$	$PRWP_t$	PR_t
2018[82]	222.89	46.36	15810.89	5416	7305.6	109285
2019	442.14	91.97	31364.00	10743	14492.0	216788
2020	442.14	91.97	31364.00	10743	14492.0	216788
2021	442.14	91.97	31364.00	10743	14492.0	216788
2022	442.14	91.97	31364.00	10743	14492.0	216788
2023	442.14	91.97	31364.00	10743	14492.0	216788
2024	442.14	91.97	31364.00	10743	14492.0	216788
2025	442.14	91.97	31364.00	10743	14492.0	216788
2026	442.14	91.97	31364.00	10743	14492.0	216788
2027	442.14	91.97	31364.00	10743	14492.0	216788
2028	442.14	91.97	31364.00	10743	14492.0	216788
2029	442.14	91.97	31364.00	10743	14492.0	216788
2030	442.14	91.97	31364.00	10743	14492.0	216788
2031	442.14	91.97	31364.00	10743	14492.0	216788
2032	442.14	91.97	31364.00	10743	14492.0	216788
2033	442.14	91.97	31364.00	10743	14492.0	216788
2034	442.14	91.97	31364.00	10743	14492.0	216788
2035	442.14	91.97	31364.00	10743	14492.0	216788
2036	442.14	91.97	31364.00	10743	14492.0	216788
2037	442.14	91.97	31364.00	10743	14492.0	216788
2038[83]	219.25	45.61	15553.11	5327	7186.4	107503
Total	8842.83	1839.43	627279.97	214860	289840.25	4335752.16

[81] Project nitrogen fertilization (LAN & Urea) has been sourced from the project database which is the actual amount of fertilization used by each ranch.

[82] 01 July 2018 to 31 December 2018

[83] 01 January 2038 to 30 June 2038

4.3 Leakage

Methodology VM0026 considers two types of leakage.

1) Market leakage due to reduction in the production of livestock products within the project boundary;

2) Displacement of grazing beyond the project boundary

$LE_t = LE_{M,t} + LE_{GD,t}$ ---------------- Eq. : (58)		
LE_t	(t CO_2e)	Leakage emissions in year t
$LE_{M,t}$	(t CO_2e)	Leakage emissions due to market leakage in year t
$LE_{GD,t}$	(t CO_2e)	Leakage emissions due to grazing displacement in year t

Market leakage was judged to be negligible since livestock reductions were not a project activity and livestock numbers are driven by grassland capacity and rainfall rather than markets.

For this project activity, the project area is well structured (fencing of private lands) to keep livestock within the project area. The project proponent prevent incursion of livestock from outside the project area or excursion of livestock from inside the project area through fencing, patrolling by game scouts. Thus Leakage from displaced livestock was judged to be negligible.

So, for the project activity, total leakage calculated as $LE_t = LE_{M,t} + LE_{GD,t} = 0$

4.4 Net GHG Emission Reductions and Removals

The amount of emission reductions achieved by the project in project year t must be calculated as follows:

$ER_t = BE_b - PE_t - LE_t$ --------------- Eq. : (59)	
ER_t	Emission reductions in year t (tCO_2e)
BE_b	Baseline emissions and removals in year b (t CO_2e)
PE_t	Project emissions and removals in year t (t CO_2e)
LE_t	Leakage emissions in year t (t CO_2e)

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)	Buffer Credit[84]	VCUs
	BE_b	PE_t	LE_t	ER		
2018	16557	95094	0	111651	20986.25	90665
2019	32843	188639	0	221482	41630.33	179851
2020	32843	188639	0	221482	41630.33	179851
2021	32843	188639	0	221482	41630.33	179851
2022	32843	188639	0	221482	41630.33	179851
2023	32843	188639	0	221482	41630.33	179851
2024	32843	188639	0	221482	41630.33	179851
2025	32843	188639	0	221482	41630.33	179851
2026	32843	188639	0	221482	41630.33	179851
2027	32843	188639	0	221482	41630.33	179851
2028	32843	188639	0	221482	41630.33	179851
2029	32843	188639	0	221482	41630.33	179851
2030	32843	188639	0	221482	41630.33	179851
2031	32843	188639	0	221482	41630.33	179851
2032	32843	188639	0	221482	41630.33	179851
2033	32843	188639	0	221482	41630.33	179851
2034	32843	188639	0	221482	41630.33	179851
2035	32843	188639	0	221482	41630.33	179851
2036	32843	188639	0	221482	41630.33	179851
2037	32843	188639	0	221482	41630.33	179851
2038	16287	93544	0	109831	20964.81	88866
Total	656862	3772770	0	4429632	832927.36	3596704

[84] As per section 1.1.4 of Non-permanence risk analysis only needs to be applied to GHG removals or avoided emissions through carbon sinks only.

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	GWP_{N2O}
Data unit	t CO_2e/t N_2O
Description	Global-warming potential for N_2O
Source of data	IPCC AR5
Value applied	265
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of Data	Determination of baseline and project emissions
Comments	NA

Data / Parameter	EF_{Nfert}
Data unit	kg N_2O-N/kg N applied
Description	N_2O emission factor for synthetic N fertilizer use
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	0.01
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of Data	Calculation of baseline emissions Calculation of project emissions
Comments	

Data / Parameter	$M_{SNi,b}$
Data unit	t fertilizer
Description	Mass of synthetic N fertilizer type i applied in baseline year b
Source of data	Documented management records
Value applied	Please refer ER sheet (“Fertilizer_baseline”) E 10 to E31, F10 to F31, G10 to G31, H10 to H31, I10 to I31
Justification of choice of data or description of measurement methods and procedures applied	Mass of synthetic fertilizer were obtained based on fertilizer application in each ranch in the project area year prior to the project start date during the baseline period.
Purpose of Data	Calculation of baseline emissions
Comments	NA

Data / Parameter	$NC_{SNi,b}$
Data unit	g N/g fertilizer
Description	Nitrogen content of synthetic N fertilizer type i applied in baseline year b
Source of data	Manufacturer product label
Value applied	LAN : 0.28 Urea : 0.468
Justification of choice of data or description of measurement methods and procedures applied	Value obtained from the product description stated by the manufacturer on the product label.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$Frac_{GAS,F}$
Data unit	kg N volatilized/kg N applied

Description	Fraction of synthetic N fertilizer that volatilizes as NH_3 and NO_x
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	0.11
Justification of choice of data or description of measurement methods and procedures applied	Default value from 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 4, Chapter 11), Table 11.3
Purpose of Data	Calculation of baseline emissions
Comments	NA

Data / Parameter	$A_{B,b}$
Data unit	Ha
Description	Area burned in baseline year b
Source of data	Documented management record
Value applied	Please refer ER sheet ("Burning_baseline") be E8 to E29, F8 to F29, G8 to G29, H8 to H29, I8 to I29
Justification of choice of data or description of measurement methods and procedures applied	Area burned in each year during the baseline period based on documented fire management records averaged over the five year period prior to the project start date.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$M_{B,b}$
Data unit	t biomass dm/ha
Description	Aboveground biomass in terms of dry matter burned in baseline year b
Source of data	Documented management records
Value applied	Refer ER sheet ("Burning_baseline")

	J8 to J29, K8 to K29, L8 to L29, M8 to M29, N8 to N29
Justification of choice of data or description of measurement methods and procedures applied	Aboveground biomass burned under baseline based on documented fire management records averaged over the baseline period.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	C_f
Data unit	t dry matter burnt/t biomass
Description	Combustion factor
Source of data	IPCC 2006 volume 4 : Agriculture, Forestry and Other Land Use, Table 2.6, Chapter 2
Value applied	0.35
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	EF_{CH4}
Data unit	g CH_4/kg dry matter burnt
Description	CH_4 emission factor for biomass burning
Source of data	IPCC Guidelines for National Greenhouse Gas Inventories (Table 2.6, Chapter 2, Volume 4)
Value applied	2.3
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of Data	Calculation of baseline emissions, and Calculation of project emissions

Comments	-

Data / Parameter	GWP_{CH4}
Data unit	t CO_2e/t CH_4
Description	Global-warming potential for CH_4
Source of data	VCS Standard (Version 4.2)
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	Default values
Purpose of Data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	$P_{l,b}$
Data unit	Head
Description	Population of grazing livestock type l, in baseline year b
Source of data	Documented management records
Value applied	Refer ER Sheet “BE_PE_CH4 Emission_Livestock” F7 to F72
Justification of choice of data or description of measurement methods and procedures applied	Population of grazing livestock must be based on documented management records, averaged over the baseline period.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$W_{l,b}$
Data unit	kg
Description	Average weight of livestock l, in baseline year b
Source of data	Average weights based on IPCC 2006 (Table 10 A2)
Value applied	Cattle: 300 Sheep: 45 Other cattle: 275
Justification of choice of data or description of measurement methods and procedures applied	Average weights has been considered from default data of South Africa from IPCC 2006 (Table 10 A2)
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	EF_l
Data unit	kg CH_4/(head * year)
Description	Enteric CH_4 emission factor per head of livestock type l per year
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories s (Table 10.10 & 10.11, Chapter 10, Volume 4)
Value applied	Cattle : 46 Sheep :5 Other cattle : 31
Justification of choice of data or description of measurement methods and procedures applied	The default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 10.10 or 10.11, Chapter 10, Volume 4).
Purpose of Data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	$Days_{l,b}$
Data unit	Days
Description	Grazing days for livestock type l in baseline year b
Source of data	Sample surveys/ PRA study
Value applied	365
Justification of choice of data or description of measurement methods and procedures applied	During the baseline period livestock are conservatively assumed to graze all days of the year.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$H_{l,b}$
Data unit	Hours
Description	Average grazing hours for livestock type l per day during the grazing season in baseline year b
Source of data	PRA study (Page 3 of the PRA study report)
Value applied	8
Justification of choice of data or description of measurement methods and procedures applied	During the baseline period livestock are conservatively assumed to graze 8 hours/ day
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$A_{B,j,s}$
Data unit	Ha
Description	Area of trees and shrubs under baseline, for species j in stratum s
Source of data	Documented management records

Value applied	Please refer ER sheet ("BR_woody perennials") 2013 : G9 to G108 2014 :K9 to K108 2015 : R9 to R108 2016 :Y9 to Y108 2017 : AF9 to AF108 Database
Justification of choice of data or description of measurement methods and procedures applied	Area of trees and shrubs under the baseline scenario must be obtained from a field survey before the project start date
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	CF_j
Data unit	t C/t dm
Description	Carbon fraction for species j
Source of data	Default values in the CDM A/R Methodological Tool for Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities
Value applied	0.5
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of Data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	$G_{AB,B,j,s}$
Data unit	t dm/ha
Description	Average annual increase in existing aboveground woody biomass of species j in stratum s, under baseline

Source of data	Measured
Value applied	Refer ER sheet ("BR_woody perennials") 2014 : N9 to N108 2015 : U9 to U108 2016 :AB9 to AB108 2017: AI9 to AI108
Justification of choice of data or description of measurement methods and procedures applied	A 100m X 2m belt transect was used for the woody transects (Van Rooyen et al., 2013; Smit, 2014). Plot size differed depending on woody density. Very densely populated plots had smaller plot sizes, which made sampling more manageable and more efficient All woody plants rooted, within the transect, were identified and their diameter at breast height (DBH), area of each species was measured and recorded. Tree and stem densities were determined from the number of trees and stems in each subplots and extrapolated[85] to hectares. As per CDM tool I for Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities.
Purpose of Data	Calculation of baseline emissions
Comments	All woody plants rooted, within the transect, were identified and their diameter at breast height (DBH), area of each species were measured and recorded. Tree and stem densities were determined from the number of trees and stems in subplots and extrapolated to hectares. For multistem species DBH will be calculated as [DBH = ($\sqrt{d1^2 + d2^2 + d3^2 + d4^2}$)], where d1,d2,d3 etc are each stem's DBH value

Data / Parameter	$EF_{3,PRP,CPP}$
Data unit	kg N_2O-N/kg N input
Description	N_2O emission factor for cattle (dairy, non-dairy and buffalo), poultry and pigs manure and urine deposited on of applied to grassland
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

[85] A belt transect uses series of quadrat to sample a strip or belt of vegetation along the transect line. In this method, the transect line is laid out across the area to be surveyed and a quadrat is placed on the first marked point on the line. A number of quadrats were studied to acquire reasonable data to realise different analytic and synthetic characters of the plant community. All quadrats are sampled along the way down the transect line, at each marked point on the line. Thus, it covers 1 ha land in each of the sampling plot.

Value applied	0.002
Justification of choice of data or description of measurement methods and procedures applied	The default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 11.1, Chapter 11, Volume 4) of IPCC good practice guidance for AFOLU have been followed. Since the project area belongs to dry climate the default factor is 0.002.
Purpose of Data	Calculation of baseline emissions Calculation of project emissions
Comments	-

Data / Parameter	$EF_{3,PRP,SO}$
Data unit	kg N_2O-N/kg N input
Description	N_2O emission factor for sheep and other animals' manure and urine deposited on of applied to grassland
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	0.003
Justification of choice of data or description of measurement methods and procedures applied	The default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 11.1, Chapter 11, Volume 4) have been followed.
Purpose of Data	Calculation of baseline emissions Calculation of project emissions
Comments	-

Data / Parameter	Nex_l
Data unit	kg N deposited/(t livestock mass * day)
Description	Nitrogen excretion of livestock type l
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	Cattle: 0.44 Sheep:0.32 Other cattle : 0.45

Justification of choice of data or description of measurement methods and procedures applied	The default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 10.19, Chapter 10, Volume 4)
Purpose of Data	Calculation of baseline emissions Calculation of project emissions
Comments	-

Data / Parameter	$Frac_{GAS,MD}$
Data unit	kg N volatilized/kg of N deposited
Description	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	0.212
Justification of choice of data or description of measurement methods and procedures applied	The default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. As the project activitiy is not involve with the manure management system, so Table 8A.1, Chapter 11, Volume 4 are adopted.
Purpose of Data	Calculation of baseline emissions Calculation of project emissions
Comments	-

Data / Parameter	$EF_{l,M}$
Data unit	kg CH4/ (head * year)
Description	CH_4 emission factor from manure of livestock type *l*
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	0.6
Justification of choice of data or description of measurement methods and procedures applied	The default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Table 10.14, Chapter 10, Volume 4 has been applied

Purpose of Data	Calculation of baseline emissions Calculation of project emissions
Comments	-

Data / Parameter	SOC $_{s,baseline}$
Data unit	tonnes C/ ha
Description	Baseline soil organic carbon stock in the top 30 cm soil layer in stratum s
Source of data	Third party soil analysis data gathered from peer reviewed literature which has been verified by "The Biodiversity Company"
Value applied	8.5 (for conservative approach highest values has been considered, Please refer ER sheet "Soil analysis data_baseline" for more detail)
Justification of choice of data or description of measurement methods and procedures applied	Option 2 was applied to estimate project removals due to changes in SOC,. The $SOC_{S,Baseline}$ was the data taken from 2017-2018, which is less than two years prior to the project start time. The organic carbon, bulk density and sand-gravel ratio (percentage of rocks larger than 2mm, roots, and other dead residues with a diameter in the top 30 cm of soil) of soil samples were considered. Ex-ante SOC stocks for determining sample size were gathered on project strata as part of a preliminary study in 2017-18. 22 samples were considered in total (5 – 6 samples per region, 1 from each strata) to 30 cm depth, and SOC stocks were calculated following equation 45 of VM0026. Soil data for baseline was gathered from peer reviewed literature[86,87] which is sourced from Agricultural Research Council (ARC) and verified by "The Biodiversity Company". Therefore, it can be concluded that nationally approved standard method was used to measure SOC of the soil samples.
Purpose of Data	Calculation of baseline emissions
Comments	At the time of VCS project development, PP had access to two sets of baseline SOC data, viz. (i) results from sample surveys

[86] Department of Environmental Affairs, 2019. Identification and mapping of soils rich in organic carbon in South Africa as a climate change mitigation option. Department of Environmental Affairs, Pretoria, South Africa.

[87] Odebiri, O, Mutanga, O, Odindi J and R Naicker, 2022. Modelling soil organic carbon stock distribution across different land-uses in South Africa: A remote sensing and deep learning approach. ISPRS Journal of Photogrammetry and Remote Sensing Volume 188, June 2022, Pages 351-362.

	conducted by EWT for internal analysis (across 43 sample strata, can be referred in the project DPR) and (ii) publicly available data from literature review (which was sourced from Agricultural Research Council (ARC) and further reviewed by "The Biodiversity Company". However, the sampling survey was not taken up for any third party review and certification, hence this survey was considered as internal assessment whereas literature reviewed value was identified as more credible as well as more conservative value, hence applied as the baseline result. Thus, baseline carbon stock measurements have only been sourced from peer reviewed literature, hence sampling survey related approach, calculations, etc. are not applicable. However, this will not affect the accuracy or conservativeness of estimated GHG benefits as mentioned below. The estimated GHG benefit unlikely to have significant effect since highest value for baseline soil organic carbon stock has been considered to calculate the SOC change over the project scenario. As the highest SOC data has been considered, the change between baseline and project SOC stocks could appear to be lower if the samples had been collected in 2018, reducing estimated emissions removals and increasing the conservativeness of estimated GHG benefits.

Data / Parameter	EF_{N2O}
Data unit	g N_2O/kg dry matter burnt
Description	N_2O emission factor for biomass burning
Source of data	IPCC Guidelines for National Greenhouse Gas Inventories (Table 2.5, Chapter 2, Volume 4)
Value applied	0.21
Justification of choice of data or description of measurement methods and procedures applied	Default value from IPCC Guidelines for National Greenhouse Gas Inventories (Table 2.5, Chapter 2, Volume 4)
Purpose of Data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	*f*
Data unit	Year
Description	SOC monitoring frequency
Source of data	Project records
Value applied	5 years
Justification of choice of data or description of measurement methods and procedures applied	Where the project applies option 2 to directly measure SOC, the frequency of SOC measurements must be at least once every five years.
Purpose of Data	Calculation of Project emissions
Comments	-

5.2 Data and Parameters Monitored

Data / Parameter	$M_{SNi,t}$
Data unit	t fertilizer
Description	Mass of synthetic N fertilizer type i applied in year t
Source of data	Project records
Description of measurement methods and procedures to be applied	The mass must be recorded just after the application of synthetic N fertilizer for each fertilizer type applied for each year.
Frequency of monitoring/recording	Each application of fertilizer during year t
Value applied	Refer ER sheet ("Fertilizer_project") E9 to E30 F9 to F30 G9 to G30 H9 to H30 I9 to I30
Monitoring equipment	None
QA/QC procedures to be applied	Guidelines provided in IPCC, 2003 Chapter 5 or IPCC, 2000 Chapter 8 will be followed
Purpose of data	Calculation of project emissions

Calculation method	Measured directly
Comments	-

Data / Parameter	$NC_{SNi,p}$
Data unit	g N/g fertilizer
Description	Nitrogen content of synthetic N fertilizer type i applied under project
Source of data	Manufacturer product label or other manufacturer data
Description of measurement methods and procedures to be applied	The nitrogen content must be recorded for each synthetic N fertilizer type i that has been applied in the baseline scenario or project. The value must be obtained from the product description stated by the manufacturer on the product label.
Frequency of monitoring/recording	Each application during project crediting period in year t
Value applied	Refer ER sheet ("Fertilizer_project") J9 to J30
Monitoring equipment	-
QA/QC procedures to be applied	Guidelines provided in IPCC, 2003 Chapter 5 or IPCC, 2000 Chapter 8 will be followed
Purpose of data	Calculation of project emissions
Calculation method	Measured directly
Comments	-

Data / Parameter	$A_{B,t}$
Data unit	Ha
Description	Area burnt in year t during the project crediting period
Source of data	Project records
Description of measurement methods and procedures to be applied	Measure and record the area burnt after the fire occurrence

Frequency of monitoring/recording	Each burning activity in year t during project crediting period
Value applied	Refer ER sheet (“Burning_project”) 2018 : E9 to E30 2019: F9 to F30 2020: G9 to G30 2021: H9 to H30 2022: I9 to I30 Refer project database
Monitoring equipment	-
QA/QC procedures to be applied	Where the difference between the recorded burnt area and the new reading is more than 10 percent, reasons for the difference must be discussed with the person responsible for taking both measurements, and if necessary the burnt area will be re-measured.
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	-

Data / Parameter	$M_{B,t}$
Data unit	t biomass/ha
Description	Aboveground biomass burnt, excluding litter and dead wood under project in year t.
Source of data	Project records
Description of measurement methods and procedures to be applied	Measure the aboveground biomass of grassland before and after the fire management for at least three plots (1m*1m). The difference of the aboveground biomass is the aboveground biomass burnt.
Frequency of monitoring/recording	Each burning activity in year t during the project crediting period
Value applied	Refer ER sheet (“Burning_project”) 2018 : J9 to J30 2019: K9 to K30 2020: L9 to L30

	2021: M9 to M30 2022: N9 to N30 Refer project database
Monitoring equipment	
QA/QC procedures to be applied	A sufficient number of plots for sampling $M_{B,t}$ will be used to ensure that a precision of 15 percent at the 95 percent confidence level is attained. Guidance provided in IPCC, 2003 chapter 5 or IPCC, 2000 chapter 8 will be applied and guidance on sampling methods and QA/QC procedures will be adopted.
Purpose of data	Calculation of project emissions
Calculation method	
Comments	-

Data / Parameter	$P_{l,t}$
Data unit	Head
Description	Population of livestock typel under project in year t
Source of data	Project records
Description of measurement methods and procedures to be applied	Record numbers of grazing livestock by type. The sample size of household number must ensure that a precision of 15 percent at the 95 percent confidence level is attained. The value must be based on the grazing numbers; annual or seasonal average population of grazing livestock by type
Frequency of monitoring/recording	Annually
Value applied	Refer ER sheet (“BE_PE_CH4 emission_Livestock”) 2018 :G7 to G72 2019: H7 to H72 2020: I7 to I72 2021:J7 to J72 2022: K7 to K72 Refer project database
Monitoring equipment	

QA/QC procedures to be applied	Guidance provided in IPCC, 2003 chapter 5 or IPCC, 2000 chapter 8 is applied
Purpose of data	Calculation of project emissions
Calculation method	
Comments	-

Data / Parameter	$W_{l,p}$
Data unit	kg
Description	Average weight of livestock under project
Source of data	Average weights has been considered from IPCC 2006 (Table 10 A2)
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	Average weights based on IPCC 2006 (Table 10 A2)
Value applied	Cattle : 300 Sheep:45 Other Cattle : 275
Monitoring equipment	-
QA/QC procedures to be applied	Average weights has been considered from IPCC 2006 (Table 10 A2).
Purpose of data	Calculation of project emissions
Calculation method	Not calculated
Comments	-

Data / Parameter	$Days_{l,t}$
Data unit	Days
Description	Grazing days of livestock in year t under project
Source of data	Project records

Description of measurement methods and procedures to be applied	Record the grazing days in year t. All livestock are conservatively assumed to graze for 365 days per year under the project scenario
Frequency of monitoring/recording	No monitoring: 365 will be applied
Value applied	365
Monitoring equipment	
QA/QC procedures to be applied	Crosscheck with previous records and reconduct the survey if there is a significant change observed
Purpose of data	Calculation of project emissions
Calculation method	Not calculated
Comments	-

Data / Parameter	$H_{l,t}$
Data unit	Hours
Description	Average grazing hours for livestock type l per day during the grazing season in year t
Source of data	PRA study (page number 3, 37 & 38 of the PRA report)
Description of measurement methods and procedures to be applied	Ground team of the project proponent will visit all the project participant every year to investigate the project situation
Frequency of monitoring/ recording	Annually
Value applied	8
Monitoring equipment	N/A
QA/QC procedures to be applied	Guidance provided in IPCC, 2003 chapter 5 or IPCC, 2000 chapter 8 is applied
Purpose of data	Calculation of project emissions
Calculation method	-

Data / Parameter	$G_{AB, j,s,t}$
Data unit	t dm/ha
Description	Average increase in existing aboveground woody biomass of species j, in stratum s, under project for year t.
Source of data	Project records
Description of measurement methods and procedures to be applied	A 100m X 2m belt transect was used for the woody transects (Van Rooyen et al., 2013; Smit, 2014). Plot size differed depending on woody density. Very densely populated plots had smaller plot sizes, which made sampling more manageable and more efficient All woody plants rooted, within the transect, were identified and their diameter at breast height (DBH), area of each species were measured and recorded. Tree and stem densities were determined from the number of trees and stems in subplots and extrapolated to hectares. As per CDM tool I for Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities.
Frequency of monitoring/recording	At the end of every monitoring period
Value applied	Refer ER sheet ("PR_woody perennials") 2018: AL9 TO AL146 2019 : AE9 to AE146 2020 : X9 to X146 2021 :Q9 to Q146 2022: J9 to J146
Monitoring equipment	Measuring tape
QA/QC procedures to be applied	Quality control/quality assurance (QA/QC) procedures prescribed under national forest inventory will be applied.
Purpose of data	Calculation of project emissions
Calculation method	All woody plants rooted, within the transect, were identified and their diameter at breast height (DBH), area of each species were measured and recorded. Tree and stem densities were determined from the number of trees and stems in subplots and extrapolated to hectares. For multistem species DBH will be calculated as [DBH = ($\sqrt{d1^2 + d2^2 + d3^2 + d4^2}$)], where d1,d2,d3 etc are each stem's DBH value
Comments	-

Data / Parameter	$A_{P,j,s,t}$
Data unit	Ha
Description	Area of trees and shrubs of species j in stratum s under project in year t
Source of data	Project records
Description of measurement methods and procedures to be applied	
Frequency of monitoring/recording	Annually
Value applied	Refer ER sheet (“PR_woody perennials”) 2018: AI9 TO AI146 2019 : AB9 to AB146 2020 : U9 to U146 2021 :N9 to N146 2022: G9 to G146
Monitoring equipment	Field based GPS
QA/QC procedures to be applied	Where the difference between the recorded area of trees and shrubs and the new reading is more than 10 percent, reasons for the difference must be discussed with the staff responsible for taking both measurements, and if necessary the area of trees and shrubs should be re-measured.
Purpose of data	Calculation of project emissions/ removals
Calculation method	Field based GPS measurement
Comments	-

Data / Parameter	$PA_{mG,s,t}$
Data unit	Ha
Description	Project areas of grassland with management practice mG in stratum s in year t
Source of data	Project records
Description of measurement methods	Record the area of grassland with management practice mG in stratum s

and procedures to be applied	
Frequency of monitoring/recording	Record the area and management practice just after the management practice has taken place and report annually
Value applied	Please refer ER sheet *("Project removal_SOC") C11 to 116*
Monitoring equipment	-
QA/QC procedures to be applied	Crosscheck with previous records and satellite images
Purpose of data	Calculation of project emissions
Calculation method	Not calculated
Comments	-

Data / Parameter	$SOC_{mG,s,i,t}$
Data unit	g C/kg soil
Description	SOC stock in the top 30 cm of soil (or greater depth if required) for management practice mG, stratum s (or greater depth if desired), sampling site i
Source of data	Project records (Sampling and testing has been done for 4 strata only)
Description of measurement methods and procedures to be applied	Option 2 is applied to estimate project removals due to changes in SOC, following the procedures for the sampling and measurement of soil properties, including bulk density and organic carbon concentrations, that are outlined in Option 2 in Section 8.2.8 to determine the value of SOC s , The General Guidelines for Sampling and Surveys for SmallScale CDM Project Activities has been followed to determine the sampling procedures and the sample size. The sample Soil Organic Carbon (SOC) was measured using the chromic acid wet-oxidation method (Walkley and Black, 1934). A 30 cm soil depth approach of the identified diagnostic horizons was used on the estimation of SOC stock (SOCs, Mg C/ha) by adding up the SOC content of the soil layers following the respective equation by Qiu et al., (2015)
Frequency of monitoring/recording	At least once every five years
Value applied	Refer ER sheet ("soil analysis data_*Project*") K11-*133*

Monitoring equipment	Laboratory analysis The sample Soil Organic Carbon (SOC) was measured using the chromic acid wet-oxidation method (Walkley and Black, 1934). A 30 cm soil depth approach of the identified diagnostic horizons was used on the estimation of SOC stock (SOCs, Mg C/ha) by adding up the SOC content of the soil layers following the respective equation by Qiu et al., (2015)
QA/QC procedures to be applied	The collection of soil samples for measuring SOC will be carried by suitably trained staff. The measurement of SOC will be carried out by a laboratory that can demonstrate adherence to the principles of good laboratory practices,
Purpose of data	Calculation of project removals
Calculation method	Laboratory analysis
Comments	-

Data / Parameter	$BD_{mG,s,i,t}$
Data unit	g soil/cm^3
Description	Soil bulk density in the top 30 cm of soil (or greater depth if required) for management practice mG, stratum s (or greater depth if desired), sampling site i
Source of data	Project record
Description of measurement methods and procedures to be applied	Laboratory analysis Three replicates of undisturbed core samples were also collected from each identified representative diagnostic horizon in the profiles for the determination of the soil bulk density
Frequency of monitoring/recording	At least once every five years
Value applied	Refer ER sheet Refer ER sheet ("soil analysis data_*Project*") L*11 -133*
Monitoring equipment	Soil auger, electronic scale, rubber hammer, oven and dryer.
QA/QC procedures to be applied	The collection of soil samples for measuring soil bulk density will be carried by suitably trained staff. The measurement of soil bulk density will be carried out by a laboratory that can demonstrate adherence to the principles of good laboratory practices,
Purpose of data	Calculation of project removals
Calculation method	Laboratory method
Comments	-

Data / Parameter	FC $_{mG,s,i,t}$
Data unit	percent
Description	Percentage of rocks with a diameter larger than 2mm, roots, and other dead residues in the top 30 cm of soil (or greater depth if desired), for management practice mG, stratum s, sampling site i
Source of data	Project record
Description of measurement methods and procedures to be applied	Laboratory analysis
Frequency of monitoring/recording	At least once every five years
Value applied	*Refer ER sheet* *Refer ER sheet ("soil analysis data_Project") M11 – M133,*
Monitoring equipment	soil auger, electronic scale, sieve
QA/QC procedures to be applied	The collection of soil samples for measuring $FC_{mG,s,i,t}$ will be carried by suitably trained staff. The measurement of soil bulk density will be carried out by a laboratory that can demonstrate adherence to the principles of good laboratory practices
Purpose of data	Calculation of project removals
Calculation method	Laboratory method
Comments	-

Data / Parameter	Depth
Data unit	cm
Description	Total soil depth, for calculating grassland SOC stock in the top 30 cm of soil (or greater depth if required)
Source of data	Project records
Description of measurement methods and procedures to be applied	The value for soil depth must be consistent with the measurements taken. Soil properties must be measured to the full depth of affected soil layers. Where the full depth of affected soil layers is not known, a minimum depth of 30 cm must be applied.
Frequency of monitoring/recording	Recorded with each measurement taken

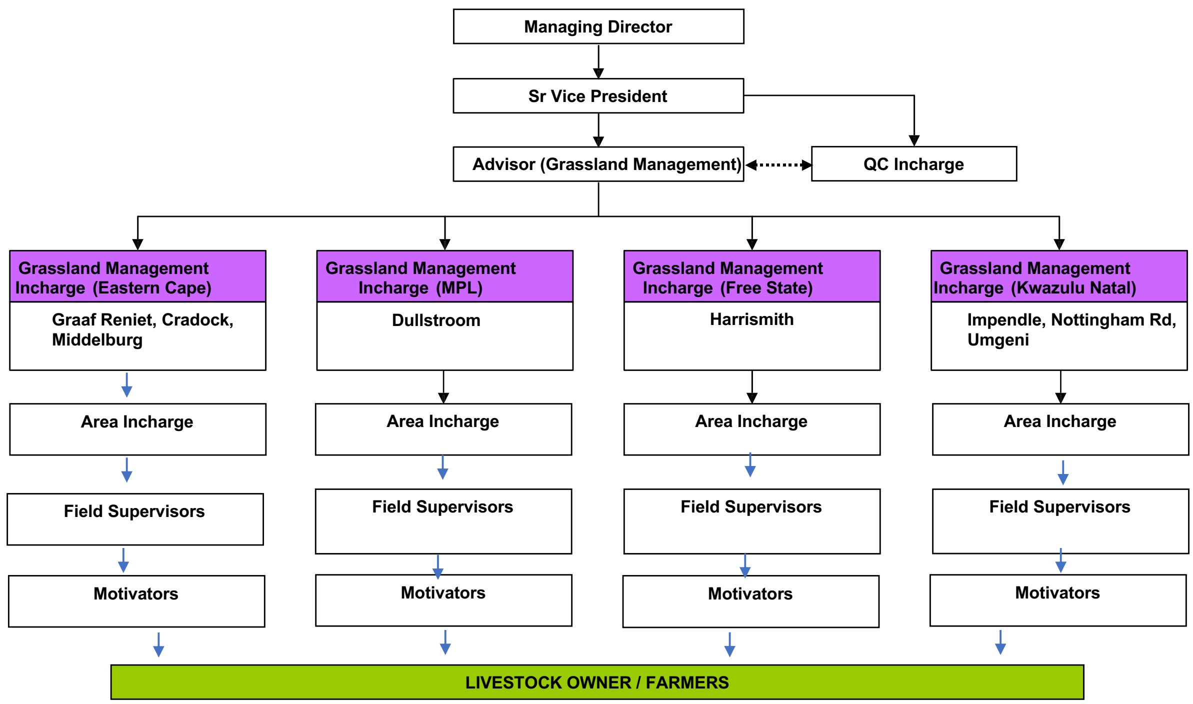
Value applied	Refer ER Sheet Refer ER sheet ("soil analysis data_*Project*") *J11 - 133*
Monitoring equipment	Measuring tape
QA/QC procedures to be applied	
Purpose of data	Calculation of project removals
Calculation method	None
Comments	-

5.3 Monitoring Plan

The purpose of this monitoring plan is to set forth the GHG Information System as the operational and logistical plan to gather, record, analyze, and manage the data and records necessary to quantify and report GHG emissions and removals relevant to the project (including leakage) and baseline scenario. All data from the project will be archived electronically and kept for at least two years after the end of the crediting period in a secure and retrievable manner.

1. Operation and management structure

The project proponent along with EWT and conservation Outcomes, hired local communities (monitoring staff and auditing staff) for daily supervision and data management during the project implementation while office manager oversees the whole working group. The structure of the monitoring group is as follows:



Responsibilities :

S. No	Designation	Responsibility & Authorities
1	Advisor (Grassland Management)	He is overall responsible for grassland management activities Providing technical guidance and training
2	Grassland Management	Ensure implementation of guidelines and processes in grassland management and to visit sites periodically.

3.	Area Incharge	• Counselling the farmers regarding implementation of integrated grassland management • Joint verification of land and papers with EWT representative and to obtain evidence that the land is degraded.
4	Field Supervisor	• Keeping the record of grazing pattern, • Maintaining and updating the project database (fertilizer, burning, woody perennials) register regularly • Reporting veld under rest etc
5	Motivator	• Identifying and motivating the farmers for integrated grassland management • Collecting Title deed from farmers for documentation / financing purpose • Ensuring proper rotational grazing activity by farmers/ herder

2. Monitoring process

If there is a change to the project boundary, the applicability conditions should be re-assessed for the changed project area. Therefore, the overall monitoring process is as follows:

i) Monitor the applicability conditions listed in methodology

As mentioned in Section 3.2, the methodology VM0026/Version 1.1 "Sustainable Grassland Management" is applicable under the following conditions:

- The project area is grassland at the start of the project. The project area is land that is degraded at the start of the project and degradation will continue in the baseline scenario on the basis that degradation drivers or pressures are still present in the baseline scenario. The procedures outlined the latest version of the CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities must be used to determine both that the land is degraded at the start of the project and that in the baseline scenario the land will continue to degrade.
- The project area is subject to livestock grazing, burning, and/or nitrogen fertilization in the baseline scenario.
- In the baseline scenario, more than 95 percent of animal dung from grazing animals deposited on grassland is allowed to lie as is, and is not managed, and in the project

scenario no more than 5 percent of the animal dung from grazing animals within the project area is managed with alternative manure management systems.

According to the analysis in Section 3.2, all the conditions are applicable at the start of the project activity as per the baseline survey / PRA. During the following verification, the project proponent should monitor the possible change of the project boundary, if there is a change to the project boundary, the applicability conditions should be re-assessed for the changed project area.

Step 1: Monitoring of boundary

The coordinate of the project boundary should be measured and managed strictly in accordance with regulations and saved in GIS files. Boundary information such as original records, needs to store in both electronic and printed archive with the project owner, and participants should keep a backup. Files need to be saved at least two years after the end of the crediting period.

In order to obtain valid and reliable boundary information, monitoring team need to use the GPS or other verifiable methods to verify the project boundary. Determine the actual boundaries of grassland/ veld. If the actual boundary is larger than the boundary in the project design, excess section is not included in project boundary; instead, if the actual border boundary is smaller than the boundary in the project design, project boundary should be based on the actual boundary. Any change in the boundary must be located by GPS or appropriate spatial data (e.g., satellite imagery).

Step 2: Monitor the applicability conditions

The procedures outlined the latest version of the CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities (See 3.1.2) will be used to prove that the project area is grassland at the start of the project, which has been classified as "degraded", such as local, regional, national or international land classification system or peer-review study, participatory rural appraisal, satellite imagery and/or photographic evidence will be collected in the project scenario.

Through questionnaire surveys and interviews confirmed that animal manure treatment both in baseline and project scenario.

Step 3: Go through applicability checklist

If there is any change in the boundary happened, the monitoring team will go through a specific checklist of the applicability conditions, records all relevant results for each monitoring period.

In case any non-conformance of the applicability conditions, the expert group should evaluate the situation and submit the deviation or change to the methodology to Verra for approval.

ii) Monitoring of Project Implementation

A record of the grazing agents (e.g., herder households) involved the project.

- The project proponent should record each ranch involved in the sustainable grassland management project. Including the current situation of Grassland: area, type, grassland degradation area and degree, existing livestock species and quantity.
- Each ranch should be Identified through their name, location of their land, and date of entering into the agreement and leaving the agreement should be recorded.

A record of the geographic location of the project area for all areas of grassland.

- The geodetic coordinates of the project area (and any stratification inside the area) must be established, recorded and archived. This can be achieved by field survey (e.g., using GPS), or by using geo-referenced spatial data (e.g., maps, GIS datasets).

A record of grassland management

- The grassland management plan, together with a record of the plan as actually implemented during the project crediting period must be available for validation and verification.
- Subsidies received by each ranch in the project area due to sustainable management measures.

iii) Recording of Data and Parameters Monitored

The following parameters must be record and monitored during the project. When applying the equations provided in this methodology (VM0026/Version 1.1) for the ex-ante calculation of net anthropogenic GHG removals by sinks, the project proponent must provide transparent estimations for the parameters that are monitored during the project crediting period. These estimates must be based on measured or existing published data where possible and the project proponent must apply a conservative approach: that is, if different values for a parameter are equally plausible, a value that does not lead to over-estimation of net anthropogenic GHG removals by sinks must be selected.

The project will maintain a record tracking the list of,

➢ Grazing agents involved with the project

- Each veld will maintain the record with their name, location of their land, and date of entering into the agreement and term of the agreement.

➢ Geographic location of the project area for all areas of grassland

- The geodetic coordinates of all grazing agent participating land are provided at validation for existing project instances

- Records of grassland management
  - Prior to signing agreement with project proponent and acceptance into the project, each participant submits a sustainable grazing plan. Upon approval of the plan, agreements are signed. At validation, the first project instances have available sustainable grazing plans.
  - Annually each grazing agent submits a grazing plan
- For the estimate of annual emissions from the use of synthetic fertilizers, the following parameters must be recorded at each application during the project crediting period:
  - Mass and type of synthetic N fertilizer applied;
  - Nitrogen content of synthetic N fertilizer applied.
- For the estimate of annual CH4 emissions from enteric fermentation,
  - Population of livestock type I and
  - grazing days of livestock type I must be recorded annually during the project crediting period.
- For the estimate of annual CH_4 and N_2O emissions due to possible burning of biomass for SGM, the following parameters should be recorded and reported annually at each time during the project crediting period:
  - Area burned;
  - Aboveground biomass burned, excluding litter and dead wood.
- To estimate project removals due to changes in SOC, the following parameters must be monitored at least once every five years during the project crediting period. The soil sampling, handling and storage, processing and measurement, and quality control procedures implemented in soil organic carbon analysis that follow a scientific peer-reviewed or nationally approved standard.
  - SOC content;
  - Soil bulk density;
  - Percentage of rocks with a diameter larger than 2mm, roots and other dead residues;

As mentioned in Section 4.2, the project uses direct measurement approach (Option 2) to determine the project removals due to changes in SOC, and the sampling procedures were designed such that the statistical significance of soil carbon stock changes between the baseline carbon stock and the carbon stock in year t can be determined with a 95 percent confidence interval. The Guidelines for sampling and surveys for CDM project activities and programmes of activities was followed to determine the sampling procedure and sample size.

- To estimate project removals due to changes in woody perennials, the following parameters must be monitored at least once in every year during the project crediting period.
  - Area of species
  - Number of trees
  - DBH of each species

Methods for measuring, recording, storing, aggregating, collating, and reporting data and parameters.

The data acquisition, recording, compiling, and analyzing responsibilities is summarized above. Soil sampling data will be provided by Soils Analysis Laboratory following the nationally accepted methodology at same sampling points. Soil sample and data analysis will be compiled by Bahori Consulting Pty Ltd. and provided to VVB during relevant years.

Livestock owner/ farmers are provided an Excel spreadsheet template to track relevant information like fertilizer uses, burning events, woody biomass data for project emission and removal accounting. This data includes size of pastures, number of days grazed, and herd numbers, fertilizer uses, burning events, woody biomass data. Bahori Consulting Pty Ltd will compile data and stores all raw documentation digitally. Baseline and project emissions (nitrogen fertilizer use, and all grazing animal methane emissions) are also tracked through a data form template provided to livestock owner/ farmers that is then collated into spreadsheets.

iv) Sampling Design and Stratification

As mentioned above, the project removals due to changes in SOC will be determined by direct measurement approach (Option 2) by using soil sampling procedures according to nationally approved standard.

According to the methodology (VM0026/Version 1.1), four main requirements was met before the stratified sampling is chosen:

- Population must be stratified in advance of the sampling.

  The project area was stratified before sampling.

- Classes must be exhaustive and mutually exclusive (i.e., all elements of the population must fall into exactly one class).

  The ex-ante stratification of this project considered based on each ranch, as a unique stratum, yielding twenty two strata for the initial grouping of ranches which are exhaustive and mutually exclusive and all elements of the population fell into exay one class. Ranch-level stratification works well.

- Classes must differ in the attribute or property under study, otherwise there is no gain in precision over simple random sampling.

  The growth status of grassland vegetation is different in each ranches, which has a certain impact on the accumulation of soil carbon. For the project, the stratification is based on the ranch management practice i.e. ranch level.

- Selection of items to represent each class (i.e., the sample drawn from each class) must be random.

  To avoid subjective choice of plot locations, the sample plots will be located systematically with a random start. This will be accomplished with the help of a GPS in the field. The geographical position (GPS coordinate) of each plot will be recorded and archived. It is to be ensured that the sampling plots are distributed randomly, and as evenly spread as possible.

Sampling framework

Sampling procedures were designed such that the statistical significance of soil carbon stock changes between the baseline carbon stock and the carbon stock in time t can be determined with a 95 percent confidence interval. The minimum necessary sample size for each stratum was evaluated using the 'CDM Tool for the Calculation of the number of sample plots for measurements within A/R CDM project ac tivities' as prescribed by VM0026.

Number of sample plots required for estimation of biomass stocks within the project boundary is calculated iteratively (please refer section 4.2.8 above).

The mean SOC and the standard deviation of SOC was estimated from a preliminary sample, and calculated the mean value and standard deviation of the SOC stock in each strata which were used to calculate the final number of sample sites based on the sample.

The calculated sample size is 41 by using a precision of 15 percent at the 95 percent confidence level, considering the large area of the project boundary, the actual sample size has been increased into 123 by tripling the individual sample size of each stratum with a minimum number of 3. For some regions, the sample size is 18. Please refer to Sample Size Calculation Table for details.

Monitoring frequency

The monitoring of the project implementation will take place at least every five years after the project registration in order to ensure the continuity of the benefits. Periodic verification and quantitative monitoring of the project will take place at least every five years.

Data management

All data collected as part of monitoring is archived electronically. All information should be stored by the technology department of the project owner and all the material has a physical copy for backup. And all data collected shall be archived for a period of at least two years after the end of the last crediting period of the project activity.

QA/QC procedures

The following QA/QC procedures will be adopted:

1) Training will be provided to the livestock owner / farmer to guarantee the implementation of the monitoring plan, all the relevant staff is obliged to take the training course before the operation starts;

2) The monitoring team will check the monitoring equipment regularly to make sure their normal operation before each monitoring activities;

3) If the validated monitoring plan cannot be conducted during the following monitoring process due to some reason, an updated monitoring plan should be submitted to VVB during the corresponding verifications by indicating the relevant deviation of the original plan and the reason for the deviation.

4) All soil samples need to be backed up. If there is a problem with the testing equipment or the data is abnormal, retest the corresponding soil sample.

1. Identification of land & farmers. Farmers also approach directly

Company's officials educate and motivate the farmers for improved grassland management

2. Collection of application and relevant documents

• Application
• Land document
• Farmers Identity Card
• Photograph

3. Joint Verification of land & documents through interview and visit by EWT, CO & WeAct's representative. Short listing applicants based on verification.

• Land is degraded / barren,
• Authenticity of Title Deed
• Credibility of farmer etc.

4. Technical guidance to the farmers to execute improvement grassland management activity

Free service to the farmers by company

Farmers' activities ;

- Fencing
- Rotational grazing practice
- Controlled burning
- Maintain forage availability record
- Application of fertilizers & insecticides if required
- Protection of livestock from theft and/or other damages

5. Improved grassland management practice by farmers

Services by company

- Technical guidance and assistance relating to IGM & maintenance.
- Regular monitoring and supervision
- Maintain record of forage availability
- Maintain record of fertilizer usages in master IGM register
- Assign ID no to the sample plot
- Maintain record of area of the plot, Date of IGM practiced, soil carbon measurement, woody perennials volume, above ground biomass volume etc.

QA

Identification of sample plots selected randomly from each stratum,

Sampling, monitoring & recording soil carbon change, livestock number, burning, woody perennials etc. for computing carbon stock changes in the plot

Area of the plot, livestock number, date to rotational grazing and controlled burning started, woody perennials, fertilizer application, burning area year wise etc

Procedure for addressing non-conformities :

Applicability condition

In case any non-conformance of the applicability conditions, the expert group will evaluate the situation and submit the deviation or change to the methodology to Verra for approval.

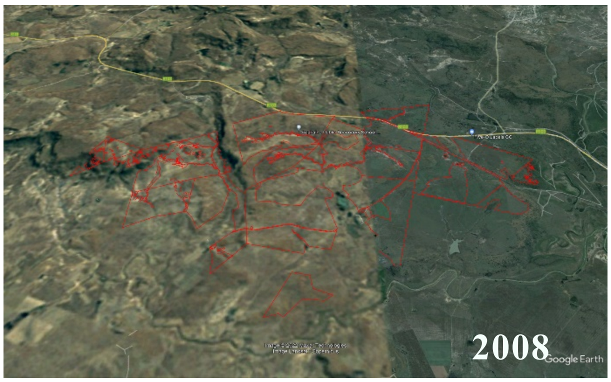
Monitoring

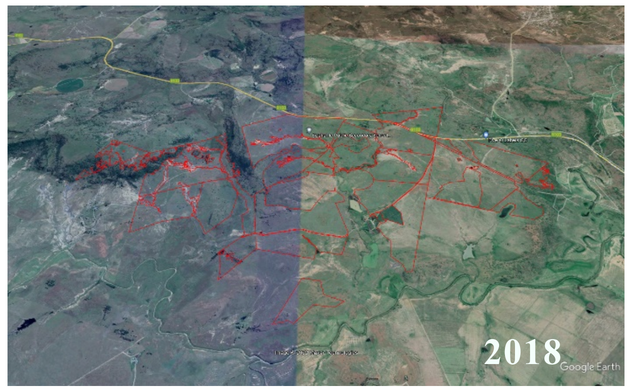
If there are non-conformances founded , expert group will ask the monitoring team to take necessary compensation measures (redo some of the monitoring activities or calculation) until all the non-conformances been corrected. If the registered monitoring plan is unable to be implemented, or the monitoring would permanently deviate from the applied methodologies, or the other applied methodological regulatory documents, the project participants shall describe the nature and extent of the non-conforming monitoring in a revised monitoring plan and will submit to Verra to request a change of the monitoring plan.

APPENDIX A

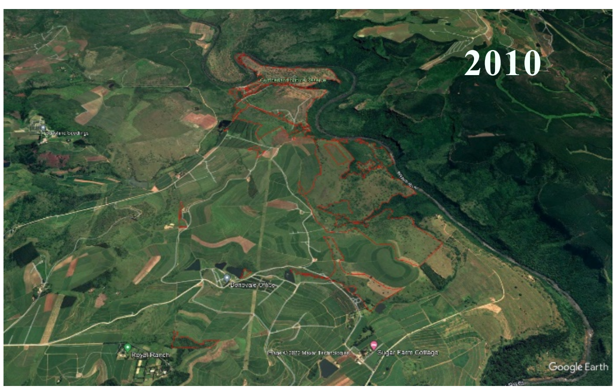
Satellite images[88] for each of the twenty two initial project veld/ ranches showing no land use changes between 2008 and 2018 (2 year earlier or later images used when 2008 or 2018 images were not available).

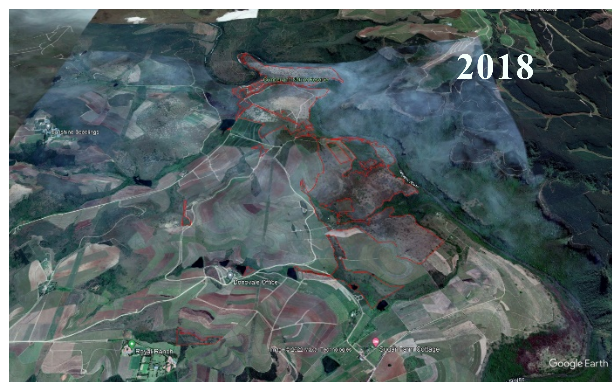
Strata 18, KZN



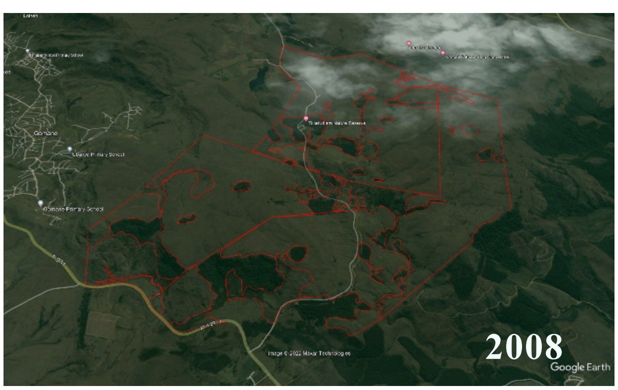


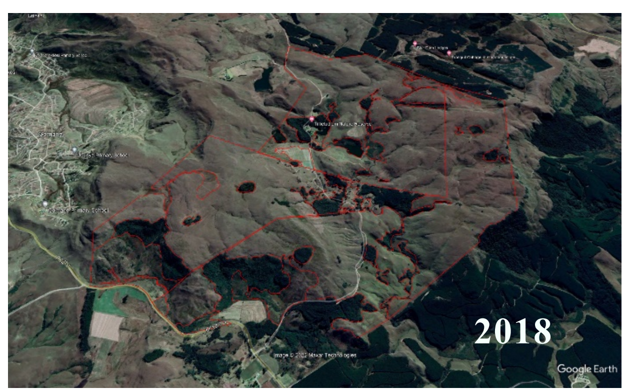
Strata 15





Strata 4

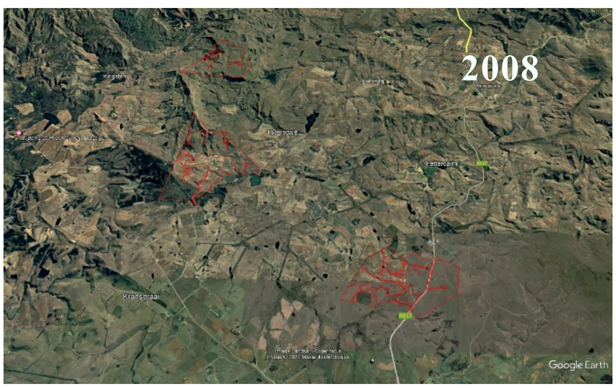


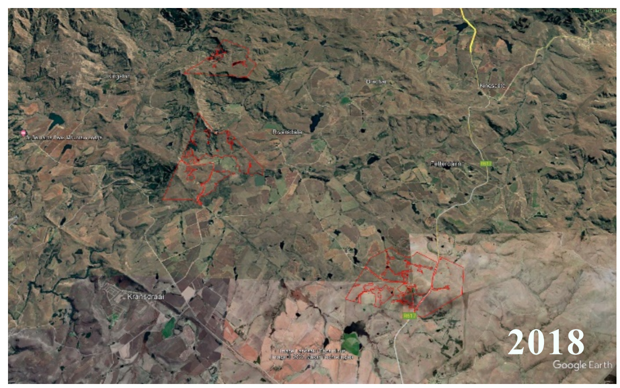


[88] Google earth pro

Strata 5

Strata 7

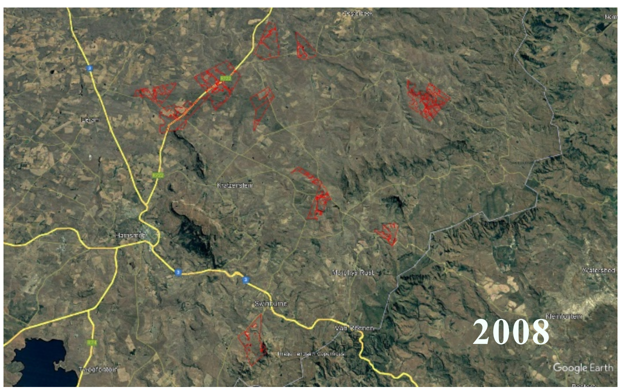


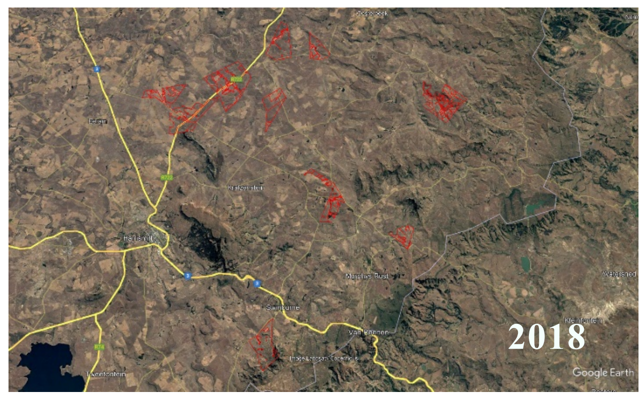


Strata 1

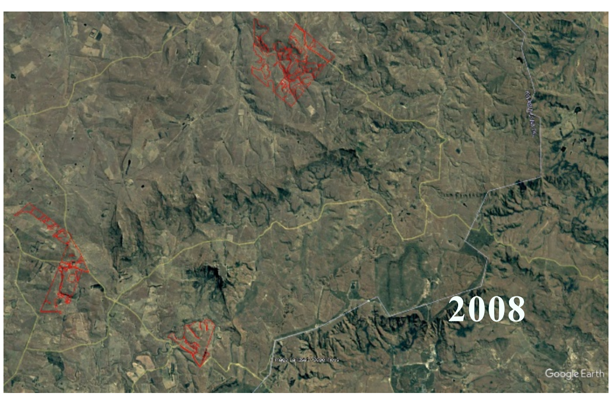
Strata 21

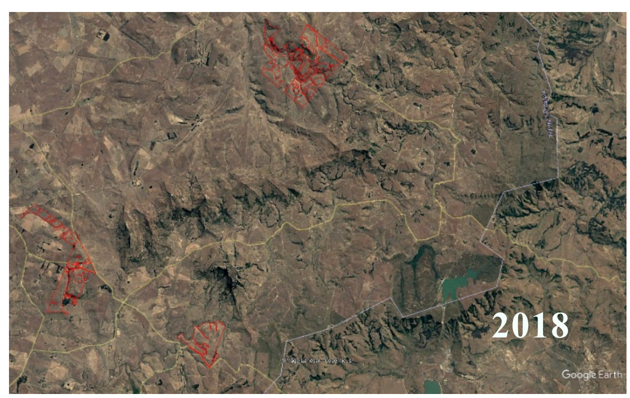
Strata 19, FS



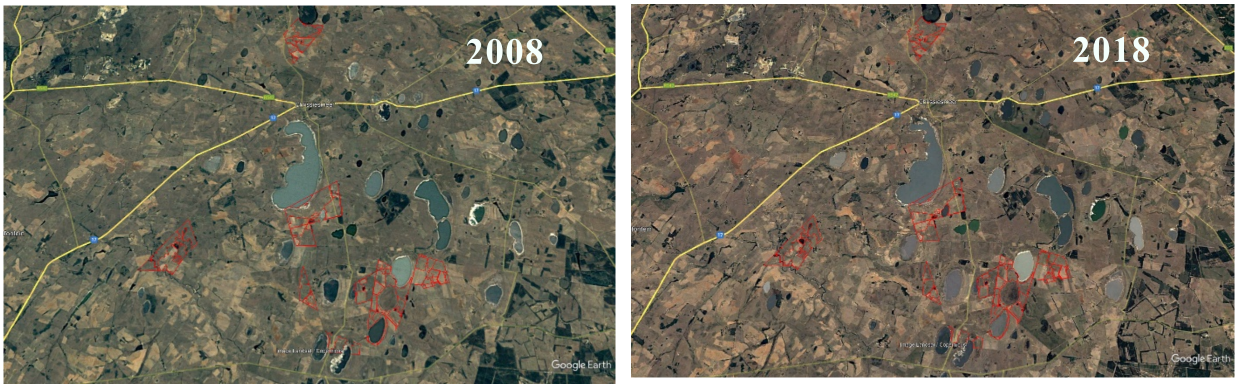


Strata 12, FS

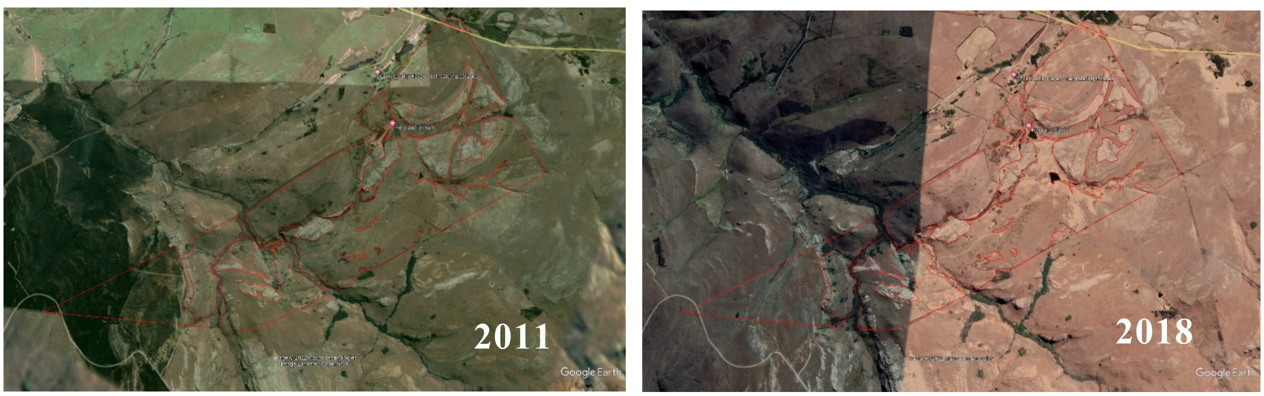




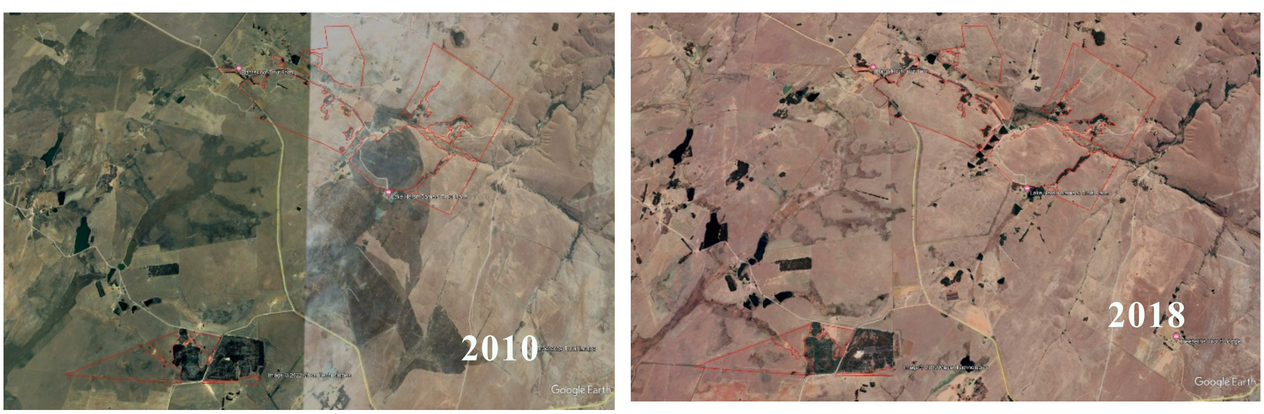
Strata 20, MPL



Strata 8, MPL

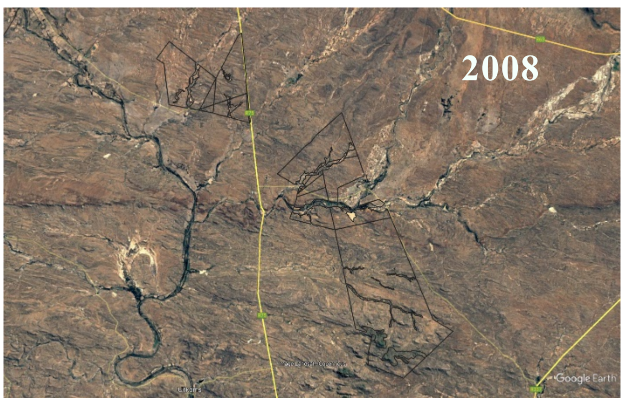


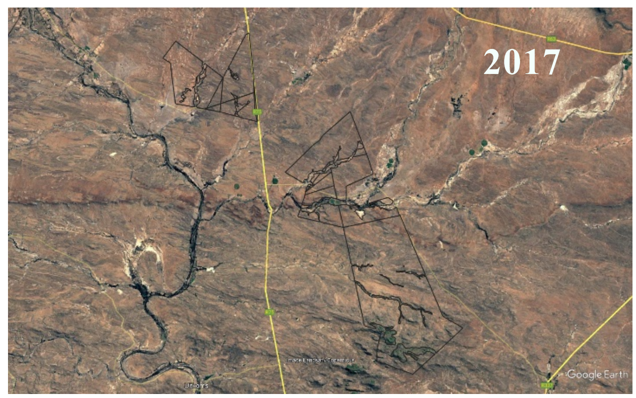
Strata 17, MPL



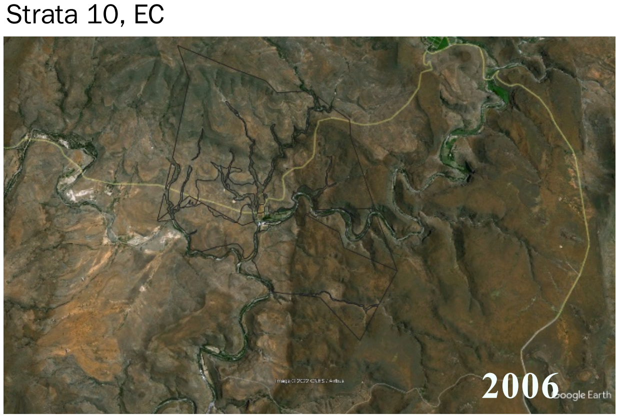
Strata 13, EC

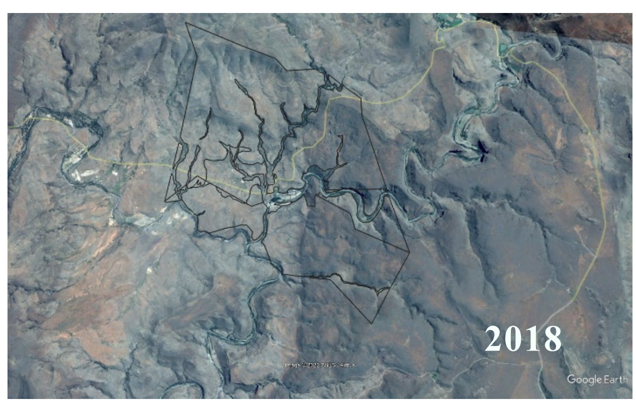
Strata 11, EC



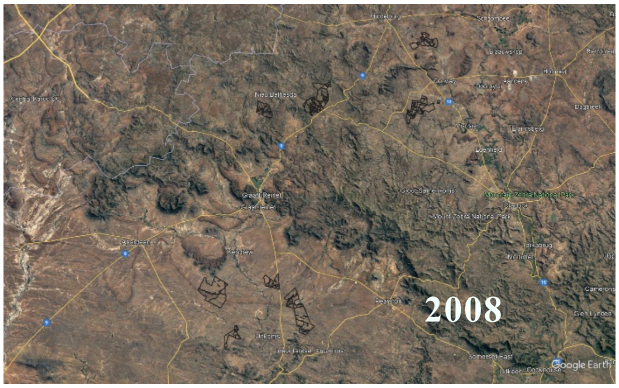


Strata 10, EC



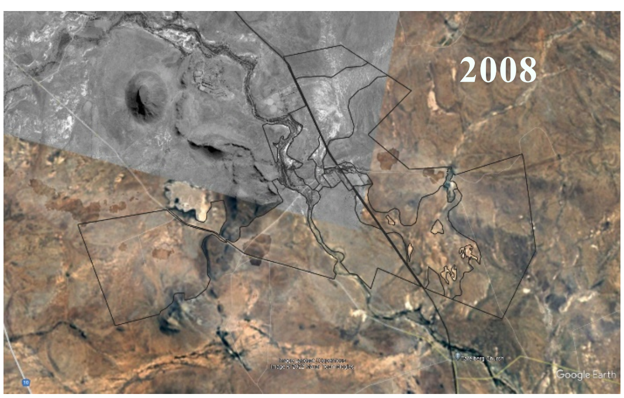


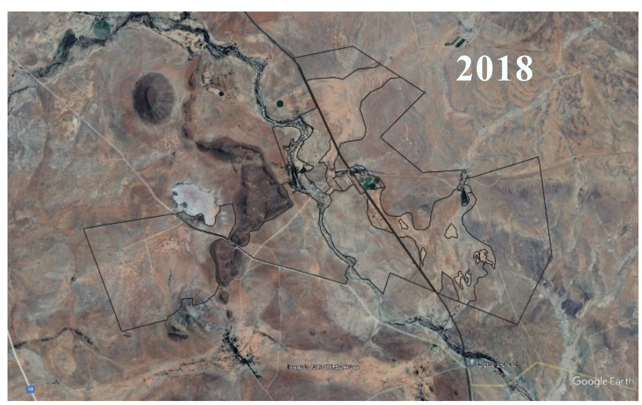
Strata 22, EC



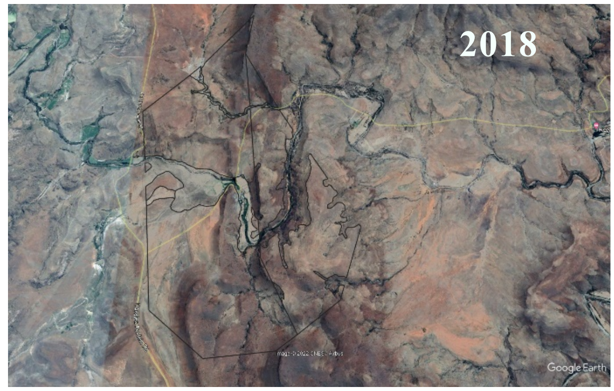
Strata 9, EC

Strata 14, EC

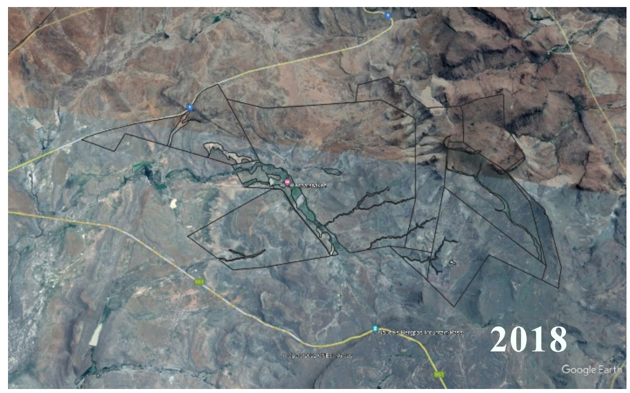




Strata 2, EC

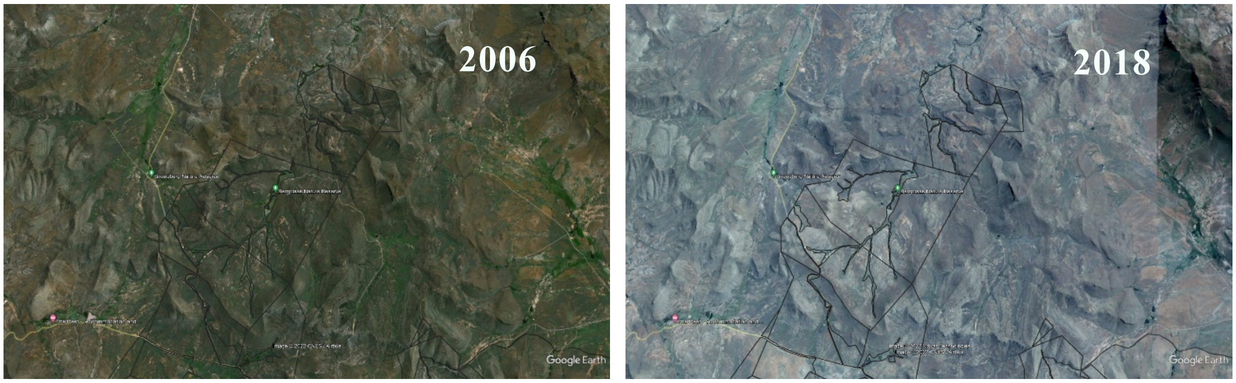


Strata 3, EC



Strata 16, EC

Strata 6, EC



APPENDIX B

Samples of Stakeholders Communication and Consultations:

Details for the year 2021:

Date	Name (full)	Method (Meeting, e-mail, virtual call)	Comment	Response	Accompanying Documentation (Attendance Register, Agenda, Minutes, Maps)
04 February 2021	parag@weact.com.au; kerrynm@ewt.org.za; vivek@weact.com.au; mandyp@ewt.org.za; tanyas@ewt.org.za; yolanf@ewt.org.za	Zoom meeting with EWT to discuss landowner feedback project agreement	Feedback on project agreement for approval		Calendar invite, follow up emails
10 February 2021	Dr Ian Little <ianl@ewt.org.za>; Catherine Vise <catherinev@ewt.org.za>; Oldrich van Schalkwyk <oldrichvs@ewt.org.za>	Zoom meeting with EWT for Soutpansberg Area	Feedback on project agreement for approval		Calendar invite, follow up emails
04 March 2021	Tanya Smith <tanyas@ewt.org.za>	Zoom call with EWT to discuss marketing and engagement	Feedback on project agreement for approval		Calendar invite, follow up emails
18 March 2021	EWT CME - Tanya Smith <TanyaS@ewt.org.za>; Dr Lara Jordan <LaraJ@ewt.org.za>; Bradley Gibbons <bradleyg@ewt.org.za>; Dr Ian Little <ianl@ewt.org.za>; Catherine Vise <catherinev@ewt.org.za>; Kerryn Morrison <kerrynm@ewt.org.za>	Zoom engagement and education call with EWT	Engagement and capacity building	Bi weekly	Calendar invite, follow up emails
01 April 2021	EWT CME - Tanya Smith <TanyaS@ewt.org.za>; Dr Lara Jordan <LaraJ@ewt.org.za>; Bradley Gibbons <bradleyg@ewt.org.za>; Dr Ian Little <ianl@ewt.org.za>; Catherine Vise <catherinev@ewt.org.za>; Kerryn Morrison <kerrynm@ewt.org.za>	Zoom engagement and education call with EWT	Engagement and capacity building	Bi weekly	Calendar invite, follow up emails
12 April 2021	Vivek Dugar <vivek@weact.com.au>; Mark Gerrard <mark@wildlifeact.com>; Rachel Kramer <RachelK@wildtrust.co.za>; Jean Harris <jeanh@wildtrust.co.za>	Zoom engagement and education call with Wild Trust	information sharing	Collaboration opportunity	Calendar invite, follow up emails
14 April 2021	Johan Pienaar(SKSS) <johan@skss.co.za>	MS Teams meeting to discuss	information sharing - Swartkops	Scalability needs to be reached	Calendar invite, follow up emails

Date	Name (full)	Method (Meeting, e-mail, virtual call)	Comment	Response	Accompanying Documentation (Attendance Register, Agenda, Minutes, Maps)
		possible project opportunity	Sustainable Systems		
15 April 2021	EWT CME - Tanya Smith <TanyaS@ewt.org.za>; Dr Lara Jordan <LaraJ@ewt.org.za>; Bradley Gibbons <bradleyg@ewt.org.za>; Dr Ian Little <ianl@ewt.org.za>; Catherine Vise <catherinev@ewt.org.za>; Kerryn Morrison <kerrynm@ewt.org.za>	Zoom engagement and education call with EWT	Engagement and capacity building	Bi weekly	Calendar invite, follow up emails
28 May 2021	rick.dillon@structuredgrowth.co.za; rick@vjdillon.co.za; Vivek Dugar <vivek@weact.com.au>; Hylton@bahori.com	MS Teams meeting	Information sharing	Contract signed	Calendar invite, follow up emails
09 June 2021	Vivek Dugar <vivek@weact.com.au>; Hylton@bahori.com; Avi from madeonearthhikingtrails@gmail.com	MS Teams meeting	Information sharing, collaboration opportunity	Capacity and resource requirement	Calendar invite, follow up emails
10 June 2021	Melissa Whitecross <melissa.whitecross@birdlife.org.za>; Carina Pienaar <carina.pienaar@birdlife.org.za>; Kyle Lloyd <kyle.lloyd@birdlife.org.za>; Hanneline Smit-Robinson <hanneline.smit-robinson@birdlife.org.za>; Hylton@bahori.com; Vivek Dugar <vivek@weact.com.au>; Fanie Du Plessis <accounts@birdlife.org.za>	MS Teams meeting	Information sharing and CME engagement	Capacity building	Calendar invite, follow up emails
23 June 2021	Kerryn Morrison <kerrynm@ewt.org.za>; Tanya Smith <TanyaS@ewt.org.za>; Yolan Friedmann <yolanf@ewt.org.za>	Zoom meeting	Discussion on open points	non-exclusivity of CMEs	Calendar invite, follow up emails
21 July 2021	Carina Pienaar <carina.pienaar@birdlife.org.za>; Hylton@bahori.com	MS Teams Meeting	Sneeuwberg Protected Environment	Project potential discussion with BLSA	Calendar invite, follow up emails
21 July 2021	Hylton@bahori.com; hyltallison@gmail.com; Dr Lara Jordan <LaraJ@ewt.org.za>; Bradley Gibbons <bradleyg@ewt.org.za>; Dr Damian Walters <DamianW@ewt.org.za>; Pieter Botha <PieterB@ewt.org.za>	Zoom meeting	EWT capacity building	Information sharing platform	Calendar invite, follow up emails
24 July 2021	Cecilia (farmer meeting) Chrissiesmeer	Informal check-in	Returning farm management file	Cecelia unavailable, informal meeting with Desiree (Farm manager)	Petrol and toll slips

Date	**Name** (full)	**Method** (Meeting, e-mail, virtual call)	**Comment**	**Response**	**Accompanying Documentation** (Attendance Register, Agenda, Minutes, Maps)
26 July 2021	Kerryn Morrison <kerrynm@ewt.org.za>; Yolan Friedmann <yolanf@ewt.org.za>	MS Teams meeting	Addressing EWT concerns		Calendar invite
28 July 2021	Francois du Plessis; Dr Lara Jordan <LaraJ@ewt.org.za>; Hylton@bahori.com	Zoom call with EWT and landowner	Carbon Project Development progress - Francois du Plessis, EWT & WeAct	Information sharing platform	calendar invite
24 August 2021	Hylton@bahori.com; Kyle Lloyd <kyle.lloyd@birdlife.org.za>; Carina Pienaar <carina.pienaar@birdlife.org.za>; Melissa Whitecross <melissa.whitecross@birdlife.org.za>; Vivek Dugar <vivek@weact.com.au>	BLSA CME partnership	Capacity building	Information sharing platform	Calendar invite, follow up emails
25 August 2021	Hylton@bahori.com; Pieter Botha <PieterB@ewt.org.za>	in person meeting	EWT Contract and strategy review	landowner engagement strategy, capacity building	Calendar invite, follow up emails
26 August 2021	Hylton@bahori.com; Pieter Botha <PieterB@ewt.org.za>	in person meeting	EWT Contract and strategy review	landowner engagement strategy, capacity building	Calendar invite, follow up emails
08 September 2021	Hylton@bahori.com; Vivek Dugar <vivek@weact.com.au>; Melissa Whitecross <melissa.whitecross@birdlife.org.za>; Steve McKean <steve@conservation-outcomes.org>	MS Teams meeting	Conservation Outcomes introduction	Information sharing, CME expansion	Calendar invite, follow up emails
09 September 2021	Carina Pienaar, Neil Pienaar, Louis (?) Pienaar	MS Teams meeting	Landowner engagement	Clarification questions on landowner agreement	Calendar invite, follow up emails
09 September 2021	BLSA Staff	MS Teams Meeting	Capacity building	Information sharing platform	Calendar invite, follow up emails
13 September 2021	Steve McKean <steve@conservation-outcomes.org>; Hylton@bahori.com; Kevin McCann <kevin@conservation-outcomes.org>	MS Teams Meeting	Capacity building	Information sharing platform	Calendar invite, follow up emails
15 September 2021	Herman - Retreat - Dullstroom - Mpumalanga Province	In person discussion with BLSA (CME-EWT)	Introductory meeting & Information sharing	Requested a site visit & agreement from Management	Methodologies & Landowner presentation
15 September 2021	Kyle - BLSA - Dullstroom - Mpumalanga Province	In person discussion with BLSA (CME-EWT)	Introductory meeting & Information sharing	Requested a site visit & agreement from Management	Methodologies & Landowner presentation
16 September 2021	Frith - Trustee Bird Of Prey Centre - Dullstroom - Mpumalanga Province	In person discussion with landowner (CME- EWT & BLSA)	Introductory meeting & Information sharing	Requested a site visit & agreement from Management	Methodologies & Landowner presentation

Date	Name (full)	Method (Meeting, e-mail, virtual call)	Comment	Response	Accompanying Documentation (Attendance Register, Agenda, Minutes, Maps)
16 September 2021	Allan - 7 000Ha landowner - Dullstroom - Mpumalanga Province	In person discussion with landowner (CME- EWT & BLSA)	Introductory meeting & Information sharing	Requested a site visit & agreement from Management	Methodologies & Landowner presentation
16 September 2021	Gerda & Bertus- Landowners - Dullstroom - Mpumalanga Province	In person discussion with landowner (CME- EWT & BLSA)	Introductory meeting & Information sharing	Requested a site visit & agreement from Management	Methodologies & Landowner presentation
17 September 2021	Welgevonden 128 JT 9/128 Abrie Loots Abuti CC - Dullstroom - Mpumalanga Province	In person discussion with landowner (CME- EWT & BLSA)	Introductory meeting & Information sharing	Requested a site visit & agreement from Management	Methodologies & Landowner presentation
23 September 2021	Rick Dillon - Owner Waterfall Farm, Upper Wilge Protected Environment - Free State Province	In person discussion with Conservation Outcomes (CME- BLSA & EWT)	Collecting data for project reporting and presenting the process to be followed and expectations of the landowner and CME	Gathered data and provided the process	Data, e-mails & process
28 September 2021	Graham - Manager at Tillietudlum Nature Reserve, Impendle - KwaZulu Natal Province	In person discussion with Conservation Outcomes (CME- CO)	Project specific discussions	Provided landowner presentation, wetlands & SOC methodologies with managed grazing and fire regimes.	Landowner Presentation, e-mails & agreement
29 September 2021	John Bates - Owner of Fordun Spa & previous chairman of the KZN Crane Foundation, Nottingham Road - KwaZulu Natal Province	In person discussion with Conservation Outcomes (CME- CO)	Project specific discussions	Provided landowner presentation, wetlands & SOC methodologies with managed grazing and fire regimes.	Landowner Presentation, e-mails & agreement
29 September 2021	Ed Ghevers - XXX, Umgeni - KwaZulu Natal Province	In person discussion with Conservation Outcomes (CME- CO)	Project specific discussions	Provided landowner presentation, wetlands & SOC methodologies with managed grazing and fire regimes.	Landowner Presentation, e-mails & agreement
30 September 2021	Cecilia (farmer meeting) Chrissiesmeer	In person discussion with EWT (CME- EWT)	Brief introduction as had to attend to an urgent matter on a neighbours farm.	Please come back and visit when I am back on the farm	Will get details and provide presentation

Date	**Name** (full)	**Method** (Meeting, e-mail, virtual call)	**Comment**	**Response**	**Accompanying Documentation** (Attendance Register, Agenda, Minutes, Maps)
30 September 2021	Andrew & Kelby - Clan Green Ranches (farmer meeting) Ladysmith - KwaZulu Natal Province	In person discussion with EWT (CME-EWT)	Project specific discussions	EWT reviewing agreement, can provide background and SOC methodology with managed grazing and fire regimes.	Landowner Presentation, e-mails & agreement
22 October 2021	Upper Wilge Protected Area (UWPE) - Free State Province	AGM/ Meeting with the endangered wildlife trust & Birdlife South Africa (CME-EWT & BLSA)	Attached Minutes	See Comments & response sheet	Attendance Register, Agenda, Minutes, Map

Stakeholders' meeting detail for the year 2020 :

Date	**Name** (full)	**Method** (Meeting, e-mail, virtual call)	**Comment**	**Response**	**Accompanying Documentation** (Attendance Register, Agenda, Minutes, Maps)
18 September 2020	stalker@iafrica.com; brett@icapafrica.com; tanyas@ewt.org.za; ianl@ewt.org.za; sarah@samara.co.za	Zoom meeting to discuss project specific details	Introductory call & information sharing	Pending EWT Programme agreement	Calender invite
16 September 2020	kerrynm@ewt.org.za; vivek@weact.com.au; tanyas@ewt.org.za; harrietd@ewt.org.za; Mandy Poole <mandyp@ewt.org.za>; Dr Ian Little <ianl@ewt.org.za>; Yolan Friedmann <yolanf@ewt.org.za>	Zoom meeting to discuss CME contract and project strategy	Follow on from previos meetings held with EWT	follow up meeting	Calender invite
10 September 2020	Dr Ian Little <ianl@ewt.org.za>; Tanya Smith <tanyas@ewt.org.za>; Alastair Stalker <stalker@iafrica.com>	Zoom meeting to discuss project oppertuntiy with Samara	Introductory call & information sharing	follow up meeting	Calender invite
31 August 2020	Kerryn Morison	Phone call to discuss project opportunity for Draakensberg	Follow-up call on project discussions		Calender invite
05 August 2020	satish@weact.com.au; natalie.newman@capetown.gov.za; vivek@weact.com.au; lorraine.gerrans@capetown.gov.za; deep@weact.com.au	Zoom call City of Cape Town	Introductory call & information sharing	No specific feedback	Calender invite
04 August 2020	vivek@weact.com.au; deon@vula.biz; deep@weact.com.au; satish@weact.com.au	Zoom Call to discuss Northern & Western Cape Project oppertuntiy	Introductory call & information sharing	follow up meeting	Calendar invite

Date	**Name** (full)	**Method** (Meeting, e-mail, virtual call)	**Comment**	**Response**	**Accompanying Documentation** (Attendance Register, Agenda, Minutes, Maps)
31 July 2020	Deon van Eden	Zoom Call to discuss Northern & Western Cape Project oppertuntiy	Introductory call & information sharing	follow up meeting	Calender invite
26 June 2020	Tanya Smith <tanyas@ewt.org.za>; Dr Lara Jordan <laraj@ewt.org.za>	Zoom Call to discuss Eastern Cape project potential EWT	Introductory call & information sharing	Under progress	Calender invite
25 March 2020	Cobus Theron <cobust@ewt.org.za>; Bonnie Schumann <bonnies@ewt.org.za>; Jean-Pierre Le Roux <jeanpierrel@ewt.org.za>	Zoom Call to discuss Drylands project potential EWT	Introductory call & information sharing	Under progress	Calender invite
24 March 2020	EWT - Tanya	Phone call to discuss project opportunity for Draakensberg	Introductory call & information sharing	follow up meeting	

A sample Copy of attendance register for stakeholders' meeting, for representation purpose:

ATTENDANCE REGISTER

destea
department of economic, small business development, tourism and environmental affairs
FREE STATE PROVINCE

MEETING: Upper Wilge PE Landowner meeting | VENUE: Hound & Hare | DATE: 22/10/2021 | TIME: 10:00

Initial & Surname	Gender		Disablility		Age Group				Department / Institution / Section	Contact Numbers	EMAIL Address	Signature
	F	M	Y	N	<18	18-25	36-59	60+				
Rick Dillon		x		x				x	Farmer	0825649404	rick@rjdillon.co.za	
Maureen Dillon	x			x				x	Byworer	0837935278	gogofarmor@gmail.co.za	
Jenine de Wet	x			x			x		WeAct	0840188025	jenine@weact.com.au	
Hylton Allison		x		x			x		We Act	0827892666	Hylton@weact	
Piet Roets		x		x				x	Farmer	083 4626740	pietroets@mweb.co.za	
BRUCE NEL		x		x				x	FARMER	083 700 7836	BRUCE1.NEL@GMAIL.COM	
GRAHAM HOBBS		x		x				x	FARMER	0725215672	nguni146@gmail.com	
JOHAN VD SCHYFF		x		x			x		CWR	0827756499	LANDCARE@SUPERMAC.CO.ZA	
BRADLEY GIBBONS		x		x			x		EWT	0825665803	bradleyg@ewt.org.za	
Carina Pienaar	x			x			x		BirdLife SA	0786119881	carina.pienaar@birdlife.org.za	
Jason Hobbs		x		x			x		Farmer	071 35 29 268	jasonkylehobbs@gmail.com	
Belinda Hayter	x			x			x		DESTEA	0609683252	belinda.hayter@gmail.com	
Dave Hayter		x		x			x		DESTEA	0795078820	hayterd@destea.gov.za	
G. Galloway		x		x				x	Farmer.	083-7022653	g.galloway@vodamail.co.za	