Offset Issuance report for The Martello Advisory

RGE00017

Scope

Re-generation Earth (the project developer) and the UK Carbon Code of Conduct (UKCCC) (the code owner and issuance body) have been tasked to design a methodology and project to enable the issuance of carbon credits from the adoption of hemp production as a new crop for green acre farmers in Manitoba Canada.

The scope includes the production of hemp and transport to the processing site and does not consider the emissions of the processing system. Those emissions should be considered when assessing the life cycle emissions of the processed, added value products. The resultant methodology can be used on projects with a similar scope.

Much of the hemp produced by Change Agriculture is used in further products, such as packaging, car parts etc, where this is the case there is an opportunity to issue further credits where a life cycle analysis has been carried out and the hemp has displaced the use of exhaustible and or fossil fuel resources.

Hemp is grown in one year in 4 and offers an opportunity to introduce a new and novel crop species adding diversity to the traditional rotation and all the soil health benefits that entails.

Introduction

Howard Gunstock (Martello Advisory) and Douglas Wanstall (UKCCC) visited the facilities of Change Agronomy from the 23rd to the 28th October 2022. The visit included a tour of fields, the processing site and offices of Change Agronomy. Most information was gathered from Tayler and Darren Franks who were both fully cooperative and open with information albeit they had time limitations because harvest was ongoing and there was a race against time to complete it before the weather broke. There was a distinct lack of focus and engagement with board level management.

The business is clearly going through a period of growth and as such some systems are incomplete and gathering some cropping, input and harvest data proved difficult with the team exposed to such understandable pressure.

In order to satisfy the requirements of the code, a constant cross check of information was undertaken to establish the actual cropping areas.

Hemp is a promising crop for many reasons, not least its ability to host biodiversity and to sequester atmospheric carbon dioxide into soil organic matter. There have been some incredible claims for the crops ability to sequester CO2, the process to establish the

framework and the issuance of credits for this project, ignores such claims and sets out to establish the real, measurable outcomes of growing hemp.

There is an opportunity to grow significant areas of hemp globally, fulfilling a seemingly insatiable demand for natural fibres and CBD oils. The Change Agronomy model is to produce both oils and fibres from the same crop (up to recently there was a choice to be made between oil and fibre production) and they have been instrumental in the development and uptake of novel harvesting machinery. This again was not without its problems and one of the new machines suffered a catastrophic fire during our visit.

One key consideration is to look at harvesting just the flower and or seed and use the resultant straw purely as a biomass crop that is incorporated into the soils to rapidly increase soil organic matter, this could increase the carbon credit issuance by a factor of 2. This would significantly reduce the complexity of the operation and its associated emissions.

The project boundary is shown on a series of maps of land within Manitoba and within a 30-mile radius of Portage La Prairie.

Biochar production from hemp offers a significant opportunity for Change Agronomy in the future but did not form part of this original framework and project development.

Outcome

The total issuance of carbon credits equates to 3.73 credits per acre per year of hemp production, giving a total of 58,934. A buffer value of 30% has been applied due to reversal risk factors and a further 22% due to uncertainty over areas of hemp grown. The latter was reversed at issuance in 2025 due to guarantees given by Martello Advisory. This leaves a total issuance for sale of 45,144. Both buffers can be released (less 5% permanent UKCCC buffer) once areas have been clarified and verification soil tests confirm the actual results.

The carbon sequestration per acre is a lower figure than has been established on other hemp projects and the UKCCC has strong confidence in the carbon credits released for sale by this project.

Eligibility Criteria

The project has been deemed eligible for approval by the UKCCC due to meeting the 4 pillars of the code.

- **Additionality**. The project represents additionality as hemp is being introduced as a new crop. Growing hemp is a risky financial proposition and it would not have happened without the issuance of carbon credits and their sale into the future. The crop leaves behind significant additional unharvested biomass in the stalks, roots and fallen leaves. The mass of foliage growth through the growing season leads to

carbon exchange from the atmosphere into the soils and biomass left behind once the crop has been harvested.

- **Permanence.** The project poses a medium risk to permanence as Change Agronomy do not have rotational control over the land. Due to a general low tillage regime adopted by all farmers in the region the project can, with confidence claim permanence with a discount factor of 30% applied. This factor can be reduced should the project scope be widened to the adoption of rotation wide regenerative farming to protect the carbon sequestered from the hemp crop but also extended to other crops grown under regenerative agriculture. A regenerative agriculture toolkit has been completed and issued to Change Agronomy farmers as there are some easy and simple interventions that can be adopted across the farmed area.
- **Avoidance of leakage**. There is little perceived risk of leakage with this project as the farmers continue to grow their more traditional crops across their remaining acreage and hemp production represents circa 10% of their total farms. As already discussed, widening the project to include the whole rotation, adopting regenerative agricultural practices would further avoid the possibility of leakage.
- **Avoidance of negative outcomes**. The project should not lead to any negative outcomes. Although there is an argument that food crops should not be displaced by fibre production. The UKCCC position however is that fibre production that displaces products made by fossil fuels or that reduce fossil fuel use elsewhere does contribute to the reversal of climate change and therefore not judged to be a negative outcome. It was obvious that the crop had significant benefits to local biodiversity with large numbers of small bird species benefitting from the cover and food sources within. In addition, it is thought that the crop can be grown with reduced nitrogen input which will bring further benefits of the crop through lowering nitrous oxide emissions.

Literature review

A literature review was conducted and included the following papers:

1. Hon, D.N.S. (1996) A new dimensional creativity in lignocellulosic chemistry. Chemical modification of lignocellulosic materials. Marcel Dekker. Inc. New York.(5)
2. Puls,J., J. Schuseil (1993). Chemistry of hemicelluloses: Relationship between hemicellulose structure and enzymes required for hydrolysis. In: Coughlan M.P., Hazlewood G.P. editors. Hemicellulose and Hemicellulases. Portland Press Research Monograph, 1993. (5)
3. Bjerre, A.B., A.S. Schmidt (1997). Development of chemical and biological processes for production of bioethanol: Optimization of the wet oxidation process and characterization of products, Riso-R-967(EN), Riso National Laboratory, Roskilde, Denmark.
4. Anne Belinda Thomsen, Soren Rasmussen, Vibeke Bohn, Kristina Vad Nielsen and

Anders Thygese (2005) Hemp raw materials: The effect of cultivar, growth conditions and pretreatment on the chemical composition of the fibres. Riso National Laboratory Roskilde Denmark March 2005. ISBN 87-550-3419-5.
5. Roger M Gifford (2000) Carbon Content of Woody Roots, Technical Report N.7

6. The role of industrial hemp in Carbon Farming James Vosper BSC Hons FRGS

7. The future of hemp Catherine Wilson Board Advisor European Industrial Hemp Association

8. VCS Canadian Rockies Hemp project 2022

Sustainable Development Goal Contribution

Hemp contributes to at least 3 UN SDG's

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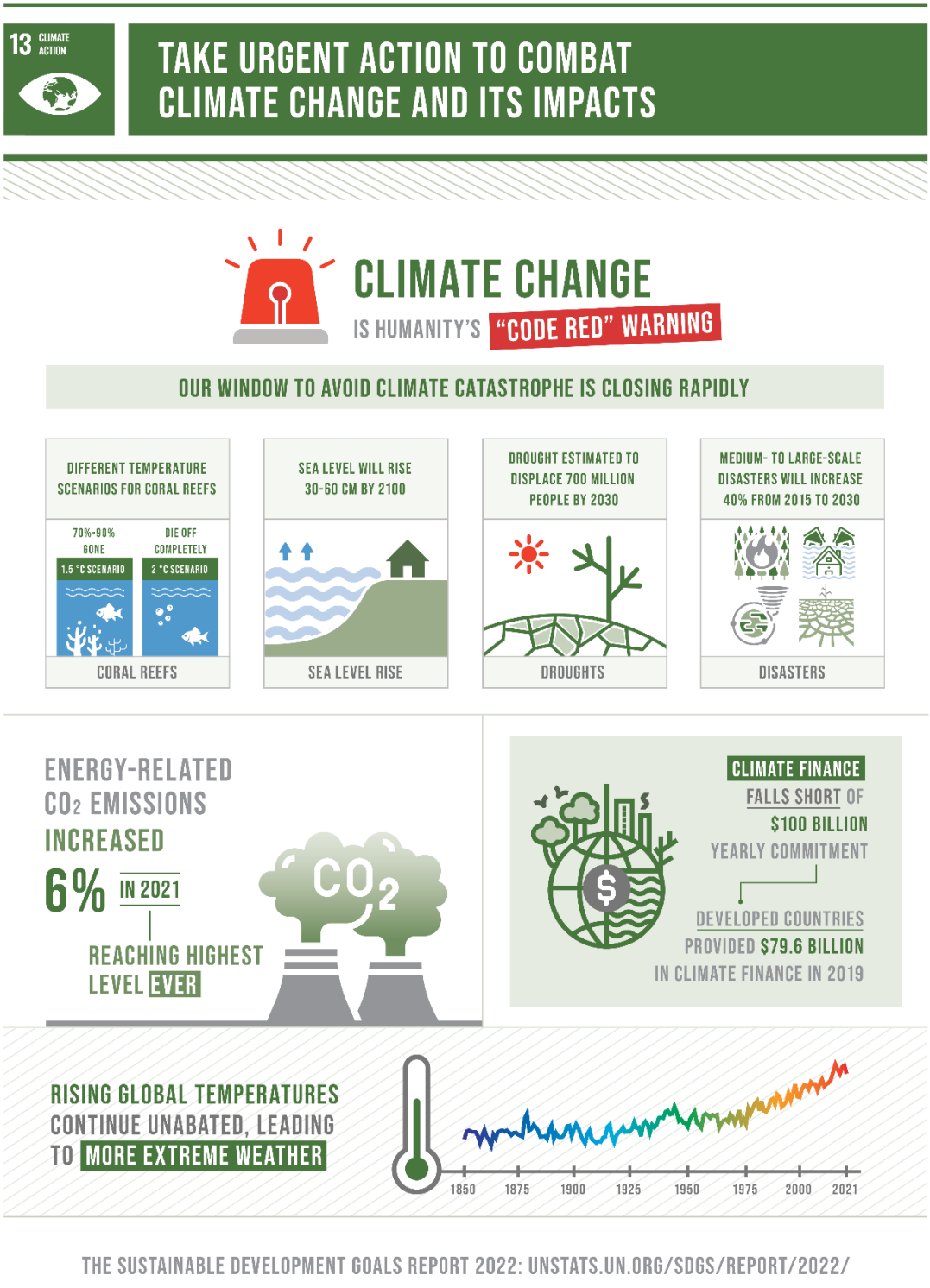
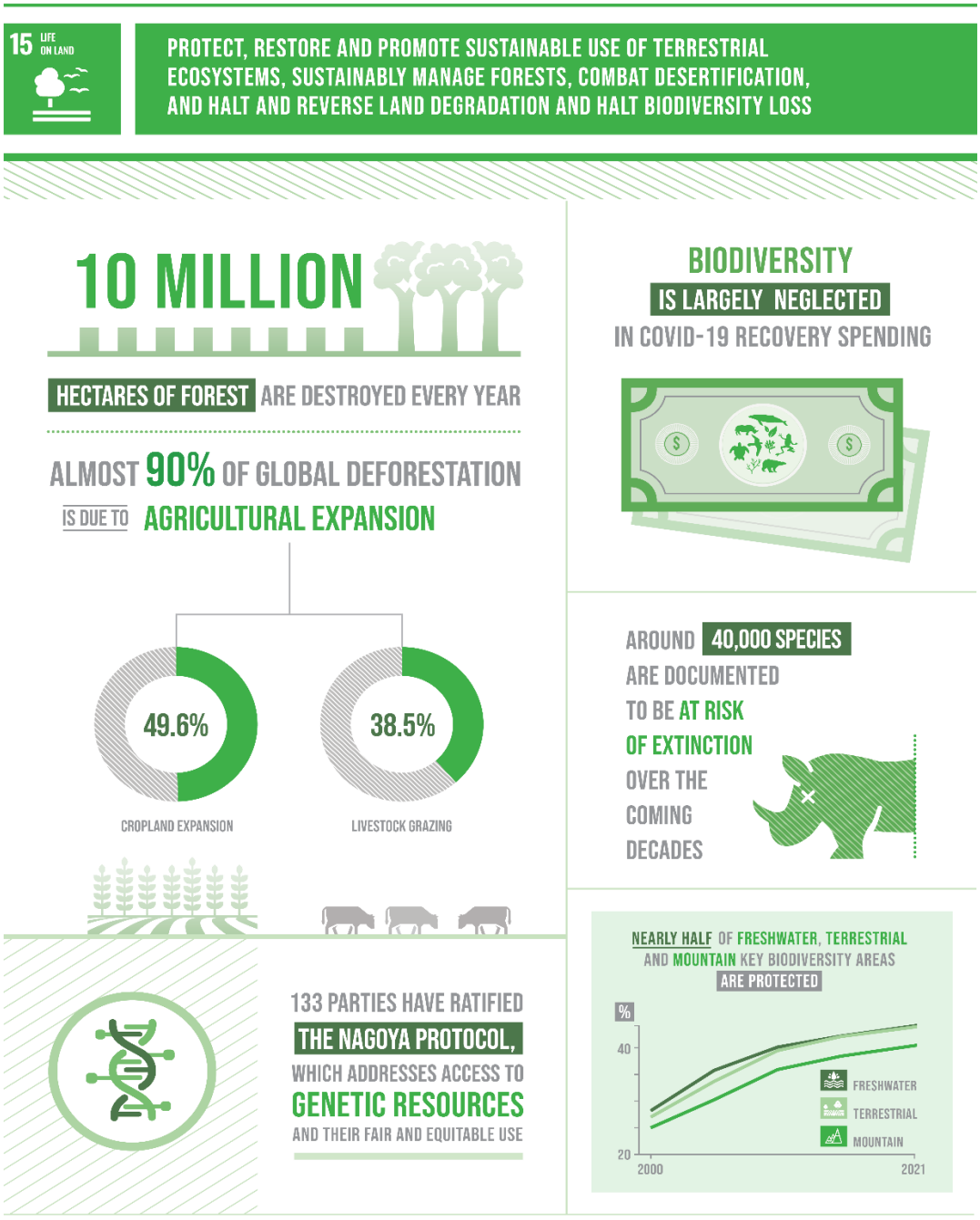


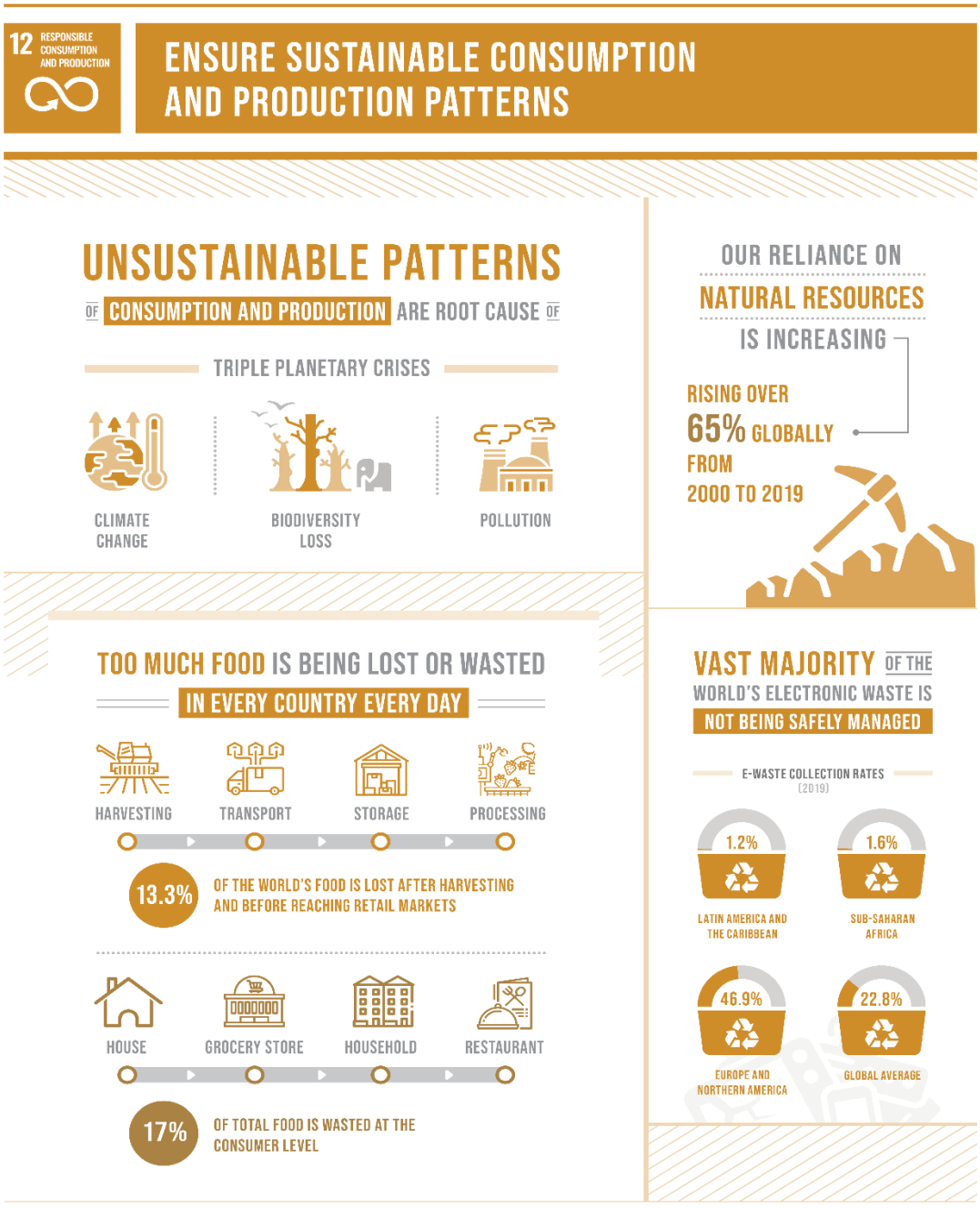
The production of hemp increases soil organic matter ensuring that it meets the goal of Climate Action.

Offset issuance report Change Agronomy V 0.3



Hemp production provides food and shelter for a range of wildlife species.

Offset issuance report Change Agronomy V 0.3



THE SUSTAINABLE DEVELOPMENT GOALS REPORT 2022: UNSTATS.UN.ORG/SDGS/REPORT/2022/

Growing hemp requires less artificial crop inputs than many field crops, therefore reducing potential pollution from fertilizer and agrochemicals. Hemp is an important crop to help farms become more climatically resilient.

Local Interested party consultation

Due to this project being a continuation of farming activities and simply introducing a new crop there was no external interested party consultation carried out for this project.

Baseline Scenario

The baseline was established in 2019 when the first hemp crops were grown, soil samples were taken and held for testing and comparing with verification tests in 2024. The issuance of credits is based on biomass volume calculations carried out in the field during the time of the visit. The soil sampling and testing carried out was in accordance with the UKCCC MRV protocol V1.0

The UKCCC focuses on measuring and not modelling outcomes. In time remote soil sensing or satellite imagery equipment may improve to a degree that satisfies the requirements for accuracy.

Typical cropping prior to hemp being introduced into the rotation was wheat, canola, edible beans, corn and soya. Hemp helps to widen and diversify the rotation.

Each field cropped in 2022 has been identified on a series of maps attached to this document. Previous field position records were not possible to obtain but a cross check against yield data would suggest that the areas declared were close to those cropped with hemp.

Framework development

Once the exact process had been seen and understood by the project team the framework was able to take shape.

It was quickly identified that there was a significant opportunity to expand the scope of the project to include all the farmers that grow hemp land but the decision was taken to focus on hemp production from the first 4 years as first identified in the additionality test. This made the framework simpler but led to a greater uncertainty factor being required due to the lack of control over the land in the rest of the rotation.

The framework was required to achieve the following:

- Calculate the emissions of the hemp growing and harvesting system.
- Calculate the likely carbon sequestration from the crop
- Establish the required discount factor to ensure permanence
- Establish the net CO2 sequestration per acre
- Issue credits

The UKCCC Technical Advisory Panel met on 3 occasions to discuss the framework, project development process and final approval.

Emissions Calculation of the hemp growing and harvesting system

By reducing the scope to the rotational crop of hemp the framework design was simplified. The identification of emissions was restricted to those for establishing, caring for and harvesting the crop. The information was gathered with mixed success with missing information identified by a gap analysis and through consultation with the Technical Advisory Panel (TAP)

The emissions were calculated via the UK Carbon Code of Conduct (UKCCC) standard operating procedure and then compared against various sources:

- Standard practice for hemp production in the UK
- The Canadian HOLOS 4 system

All emissions, CO2, CH4 and N2O were calculated and reported as CO2e. The total project emissions were deducted from the total measured and calculated sequestration to establish the issuance of credits.

TAP Comments and GAP analysis following briefing by D Wanstall after visit to Change Agronomy

Note	By whom	Purpose	By When
Gap analysis complete	TAP	Assess missing information	22/12/22
Uncertainty factor increased	TAP	To ensure permanence	Offset issuance
Hemp seed rate	Tayler Franks		
Hemp plants established per m2	Tayler Franks	Assess stalk and root mass left behind	
Dry matter of crop when harvested	Tayler Franks	As above	
Field locations of last 4 years harvest	Tayler Franks	To identify the project boundary	Before offsets issued.
Completion of Change Agronomy Regenerative agriculture toolkit	Doug Wanstall	To aid adoption of regen ag within the Change Agronomy grower group	
Completion of project template	Doug Wanstall	To complete project design and approval	Before offsets issued.

Completion of annual monitoring plan	Doug Wanstall	To assess annual offset issuance	Before 2nd year offsets issued.
Technical Panel consultation and approval	TAP	To validate scope and framework	

TAP Comments stage 2 following submission of final framework draft by D Wanstall

Note	By whom	Purpose	By When
Still require maps and accurate harvest area data	Taylor Franks	Validate area to apply offset issuance	Before final project approval
Review net emissions calculation	TAP	To check calculation methodology	Before submission of final project design draft
Literature review extended	TAP and Doug Wanstall	Sense check the calculations and methodology	

TAP Comments stage 3 following submission of final project draft 14/01/23

Note	By whom	Purpose	By When
Accurate field data not obtained. Decision to apply a further 22% discount to the project	TAP Doug Wanstall	To ensure project boundary and area	Applied at offset issuance
TAP Approval given			24/01/23
Final project approval and credit issuance	Doug Wanstall		1st November 2025

Buffer discount rationale

Buffer discount offsets are held in the UKCCC registry until a verification cycle has occurred with proof provided that the full sequestration of carbon has taken place. At this point the buffer offset balance is released for sale, less 5% which is permanently held in the UKCCC registry.

The UKCCC permanent buffer is held and builds over time to act as a code insurance scheme to protect the code from any unavoidable or no fault reversals in sequestration taking place.

Every UKCCC project has a buffer discount applied with the level differing for every project depending on the developer and the UKCCC TAP view on risk or the type of project being designed. For example:

- Regenerative agricultural projects will often have a 20% buffer applied until 5-year verification soil tests having taken place.
- Tree planting projects will often have a 10% buffer applied due to the risk that some trees may die and not be replaced.
- Projects where the developer does not have the ability to monitor on an annual basis shall have a 30% buffer applied.
- If the project boundary or area cannot be verified, a view is taken by the project developer and the TAP as has been the case with this project

In this instance an initial discount of 30% has been applied. Although the developer is content with the methodology and the quantification of additional CO2 sequestered over and above business as usual, there is currently no ability to monitor on an annual basis.

A total of 230 test digs were carried out in various feeds to establish the weight of biomass left in field in leaf, stalk and root matter. Each dig was a pit taken to 30cm depth with the biomass weighed and the carbon calculation carried out as an average across the area.

In future, soil baseline tests, compliant with UKCCC MRV should be taken and repeated every 5 years, this will give greater certainty as to the actual carbon sequestration into soil carbon.

A further discount of 22% has been applied due to the lack of accurate maps and the ability to accurately verify the area. The project is going to use satellite imagery to determine the area, once confirmed the 22% buffer will be released.

The figure of 22% has been used as that is the difference between the reported area and that found on the maps for one cropping year.

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CO2 balance calculation summary

Net calculation		T/ha	T/ac
Fresh yield of biomass left behind			
plants/m2	15		
kg/stalk and root	0.45		
total	67500	67.50	27.32
Dry matter content factor	0.15	10.13	4.10
Carbon factor	0.48	4.86	1.97
CO2 sequestered	3.67	17.84	7.22
Emissions per ha		3.27	1.32
Permanence risk factor	0.3	5.35	2.17
Total Net CO2 sequestration		**9.22**	**3.73**

Declared areas

2022	4000	
2021	1800	
2020	5000	
2019	5000	
Total	15,800	
Total offset issuance	58,934	
Temporary 22% buffer	12,965	reversed 2025
30% UKCCC retained Buffer buffer)	17,680	(5% to remain permanently in the UKCCC
Total issuance on approval	**41,254**	