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Contact:
Equitable Earth
info@eq-earth.com

Core Document

Methodology for Terrestrial Forest Restoration

Draft for Consultation

Summary

This methodology sets out the criteria, requirements, and procedures for certifying terrestrial forest restoration projects. It includes the principles and methods for establishing baselines, demonstrating additionality, quantifying net GHG removals, as well as monitoring and reporting requirements.

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1 Introduction

1.1 Normative References

1.1.1 This document must be read in conjunction with the following documents:

- AGB Benchmark
- Equitable Earth Standard
- Programme Manual
- Protocol for Carbon Curve Modelling
- Protocol for Field Data Calibration
- Standard Setting and Methodology Development Procedure
- Terms & Definitions

1.2 Reading Notes

1.2.1 This document is divided into *Principles* and *Methods*:

1.2.1.1 Principles set out the requirements applying to each of the three pillars.

1.2.1.2 Methods elaborate on how developers and Equitable Earth must apply these requirements.

1.3 Effective Dates

1.3.1 This version of the methodology becomes applicable on [TBD]. All projects submitting their Feasibility Study Report on or after this date must conform to this version of the methodology.

1.3.1.1 Note that Equitable Earth will not process requests in relation to the requirements set out in Section 6.4 and the Protocol for Field Data Calibration until [TBD].

1.3.2 Projects that submitted a Feasibility Study Report before the effective date may continue under the version applicable at the time of submission, unless developers choose to adopt the current version.

1.3.3 Equitable Earth reserves the right to require conformance with some or all updated requirements at any time. Equitable Earth will define clear grace periods within which conformance must be demonstrated.

Part I - Criteria and Procedures for Developers

2 Eligibility Criteria

This section outlines the eligibility criteria and requirements for projects.

2.1 Scope

2.1.1 The scope of this methodology includes:

1) **Restoration of degraded lands:** projects that aim to restore forest ecosystems on degraded lands[1] using a variety of restoration techniques that combine both active and passive strategies, enabling flexible and context-specific approaches.[2]

2) **Promotion of secondary forest growth:** projects fostering the recovery of degraded forests through conservation efforts or assisted natural regeneration techniques.

2.2 Eligibility Criteria

2.2.1 Projects must be located on degraded lands.

2.2.2 Projects must restore degraded lands to one of the following biomes according to the IUCN Global Ecosystem Typology: 'Tropical-subtropical forests' (T1), 'Temperate-boreal forests' (T2) or 'Temperate woodlands' (T4.4).[3]

💡 Future methodologies will cover other ecosystem categories.

[1] Under this version of the methodology, 'degraded lands' refers to forest and non-forest areas that have been subject to degradation before the project start date.

[2] Afforestation activities are not eligible under this version of the methodology.

[3] Projects already registered with the Equitable Earth Programme that restore degraded lands to biomes not included in this version of the methodology are eligible to generate ECUs for the remainder of their crediting periods.

2.2.3 Equitable Earth assesses the historical evolution of carbon stock within the project crediting area in the ten years prior to the project start date. If Equitable Earth observes unusual patterns, including but not limited to deviation from expected trends, or a sudden decrease in carbon stock, developers must provide evidence that such degradation did not occur with the intent to develop a project and benefit from additional carbon revenues.

2.2.4 Projects of any size are eligible to apply this methodology. No minimum or maximum land area or net GHG removal capacity is required.

2.3 Project Design

2.3.1 Projects must be designed to:

2.3.1.1 Restore previously degraded terrestrial forests by reestablishing ecosystem composition, structure, function, and adaptivity, in alignment with a defined reference ecosystem.

2.3.1.2 Increase available habitat capacity for native, or rare, endangered, or threatened species as defined under the project's local, regional, or national jurisdiction, or any international scheme or database such as the IUCN.

2.3.1.3 Foster sustainable livelihoods by ensuring that project activities generate tangible benefits to IPs & LCs identified as core project stakeholders, ensuring their active participation and engagement throughout the project lifetime.

2.3.2 Projects must strive to increase ecological connectivity where activities within the project's scope can remove or reduce barriers.

2.3.3 Developers should strive to protect the project area through a conservation easement or equivalent legal mechanism under a nationally and/or internationally recognised status.

3 Ecological Condition

3.1 Principles

Reference Ecosystem

3.1.1 Projects must strive to restore the project crediting area by reestablishing ecosystem extent, services, and function, and minimising threats, in alignment with a defined reference ecosystem.

3.1.2 Developers must identify a reference site that represents the ecological state the project is trying to achieve in the restoration site(s). This site must inform both the project design and the estimation of the project's net GHG removal capacity.

3.1.3 The reference site must present the following attributes:[4]

Ecosystem extent

1) External changes: the flows between sites and the ecosystem's surrounding environments are appropriately integrated and connected to allow for abiotic and biotic flows and exchanges.

Ecosystem function

2) Physical conditions: the properties required to sustain the ecosystem, such as soils, water, and topography, are present, and their physical and chemical conditions are appropriate.

3) Species composition: the array and relative proportions of organisms. Native species characteristic of the appropriate ecosystem are present, whereas invasive species are minimal or effectively absent.

4) Structural diversity: the physical organisation of living and non-living elements (e.g., forest layers and food webs). The appropriate diversity of key structural components, including demographic stages, faunal trophic levels, vegetation strata, and spatial diversity, is present.

[4] The Reference Ecosystem guiding principles, including the key attributes, the scoring systems, and the Recovery Wheel were drawn from Gann, G. D., et al. (2019). International Principles and Standards for the Practice of Ecological Restoration and adapted to Equitable Earth's needs by Equitable Earth.

5) Ecosystem function: when assessing the roles and processes arising from interactions among living and non-living elements, the appropriate levels of growth and productivity, nutrient cycling, decomposition, habitat, species interactions, and types and disturbance rates are present.

Ecosystem threats

6) **Absence of threats:** direct degradation drivers impacting the ecosystem's health, such as over-utilisation, contamination, and invasive species, are minimal or effectively absent.

3.1.4 These attributes must be used to characterise the reference site, evaluate baseline conditions at the reference site(s), and inform the intervention plan.

3.1.5 If a reference site that meets the six attributes above cannot be found, the developer must select one that meets as many as is feasible, and describe and justify, with supporting evidence, why the remaining attributes cannot be met.

3.1.6 Developers must use multiple sources of information to select the reference site, including feedback from engagement with relevant stakeholders, archives, sites with different recovery levels, literature, and any other relevant sources.

3.1.7 The reference site must be physically accessible by the developer from the beginning of the feasibility phase through to the project registration date in order to:

1) Collect reference data to inform baseline calculations

2) Undergo assessment during validation, if deemed necessary by the VVB

3.1.8 The reference site must not have undergone significant anthropogenic disturbance in the ten years before the project start date. Equitable Earth assesses the conformance through the following:

3.1.8.1 Equitable Earth assesses the historical evolution of carbon stock within the reference site in the ten years prior to the project start date. If Equitable Earth observes unusual patterns, including but not limited to deviation from expected trends, or a sudden increase in carbon stock, developers must provide evidence to explain such anomalies.

3.1.8.2 Developers must describe any disturbances identified during the field assessment of the reference site and provide a rationale for their occurrence.

3.1.8.3 Where the justification is deemed insufficient, Equitable Earth may reject the reference site. In such cases, developers must identify an alternative reference site for assessment by Equitable Earth.

3.1.9 The reference site must be at least 40 years old.

3.1.9.1 If the developer is unable to locate a site of this age within the region, a younger reference site may be selected, provided it meets the other attributes defined in this section. In such cases, developers must follow the project deviation procedures outlined in the Programme Manual.

3.1.10 In cases where a different reference site was used for pre-submission activities compared to the new restoration site(s), developers must clearly specify and differentiate between the reference site(s) in the zonation.

Project Activities

3.1.11 Developers must plan and implement project activities to achieve positive ecological outcomes, minimise risks, and mitigate negative socio-environmental impacts in line with the requirements in the Equitable Earth Standard and this methodology.

3.1.12 Developers should demonstrate how the selected activities were chosen to favour better ecological outcomes over less-beneficial alternatives.

3.1.13 Developers must design and implement a mitigation plan to address existing threats to increase the success rate of restoration efforts.

3.1.14 Projects must not harvest timber for commercial purposes. Exceptions are made only for the required removal of remnants of a commercially-managed forest or exotic and invasive species that must be removed as part of site preparation activities.

Planned Biomass Removal

Biomass Removal Practices

3.1.15 Developers may undertake planned biomass removal in the restoration site(s) in the following cases:

1) Removal of biomass from non-native or invasive vegetation as part of site preparation activities.

2) Removal of transitory non-native species. Refer to the *Site Preparation* section for more details.

3) Thinning practices

3.1.16 All activities related to species removal must follow the requirements set out in the *Planned Biomass Removal* section.

Biomass Removal Management Plan

3.1.17 Where biomass removal is planned within any restoration site(s), developers must design and implement a biomass removal management plan. The plan must include:

1) A demonstration of the ecological rationale for the activity

2) The targeted species and delimited area(s) where they will be present

3) The methods to be used and their expected results

4) The estimated percentage vegetation to be removed and where the activity is recurring, the estimated rate of removal

5) Measures to mitigate potential environmental impacts, such as erosion or biodiversity loss

6) Plans for the utilisation or disposal of removed biomass (e.g., decomposed on-site, used for local sustainable projects, commercialised). Developers must strive to minimise carbon emissions linked to their disposal

3.1.18 Equitable Earth reviews the biomass removal management plan and may reject it if the provided information is inadequate or lacks sufficient detail.

3.1.19 When a biomass removal activity spans over one or more monitoring periods, no ECUs are issued for the affected area(s) from the beginning of the activity until its completion.

Site Preparation

3.1.20 All site preparation techniques used as part of a project must be planned and implemented to minimise risks, and mitigate negative socio-environmental impacts in line with the requirements in the Equitable Earth Standard and this methodology.

3.1.21 Developers implementing site preparation techniques must:

3.1.21.1 Describe the technique and justify its selection, including a detailed monitoring protocol, including, at minimum, relevant indicator(s), method of collection, and monitoring frequency.

3.1.21.2 Describe where site preparation technique(s) will be carried out and at what frequency.

3.1.21.3 Identify and monitor potential negative social and environmental impacts of the selected methods both within and beyond the project area. Refer to the *Ecological Condition Safeguards & Requirements* section of the Equitable Earth Standard for more details.

3.1.21.4 Provide a clear delimitation of the areas in which the methods will be implemented.

3.1.21.5 Demonstrate that the site preparation techniques comply with local, regional, and/or national regulations, where applicable.

3.1.21.6 End site preparation activities in a given implementation area when planting of target species or other regeneration activities begin within that same area.

3.1.22 Projects utilising intensive site preparation techniques (e.g., involving the use of chemicals, transitory non-native species, mechanical techniques, and prescribed burning) must:

3.1.22.1 Meet the technique-specific requirements, set out in *Appendix C*, in addition to the requirements in this section.

3.1.22.2 Justify that the implementation of the project would not be feasible using non-invasive and non-detrimental methods. Valid justification may include, but is not limited to, inaccessibility of certain areas, financial limitations, and unavailability of alternative sustainable practices. Such justification must be substantiated with evidence and will be evaluated by Equitable Earth and the VVB on a case-by-case basis.

3.1.22.3 Identify the applicable GHG parameters that will be used to quantify GHG emissions associated with the implementation of the techniques, where applicable.

Species Diversity

3.1.23 Developers must describe how the species selection was influenced by the ecology of the project area, including:

3.1.23.1 the diversity patterns of the restoration site(s).

3.1.23.2 successional and population dynamics.

3.1.23.3 mutualistic interactions between selected species.

3.1.24 Projects must exclude the use of exotic species, except where such species:

3.1.24.1 are non-invasive, and while historically exotic or non-native, they are considered part of the ecosystem, or perform ecosystem functions that support long-term restoration efforts. In such cases, developers must provide peer-reviewed scientific literature corroborating its use.

3.1.24.2 provide structural elements that favour restoration activities in the early stages of a project (e.g., fast-growing species that regenerate the soil or provide shade for other species). In this case, the exotic species must be removed within the first ten years of the crediting period.

Threats and Drivers of Deforestation and Degradation

3.1.25 Developers must strive to remove degradation drivers affecting the project area, such as browsing, overgrazing, illegal or unsustainable harvesting or hunting practices, nutrients and chemical runoffs, and proliferation of invasive species. Developers should implement targeted activities to address the root causes of both unplanned and planned degradation, including:

3.1.25.1 **Exclusion of degrading practices:** prohibition of activities such as harvesting and logging within the project area to promote secondary forest growth, and implementation of controls to reduce access, where feasible.

3.1.25.2 **Community-based sustainable practices:** collaboration with communities to encourage sustainable resource use and alternative livelihoods.

3.1.26 Developers must strive to eliminate emergent and recurring barriers to regeneration and forest regrowth, such as, but not limited to, invasive species, grazing, uncontrolled fire, soil erosion, flooding, pests, disease, and smothering.

3.1.26.1 If invasive species and/or other aggressive woody and non-woody vegetation are present and interfere with natural forest recovery, developers must remove them to lay the ground for restoration. All site preparation techniques must conform to the requirements set out in the *Site Preparation* and *Planned Biomass Removal* sections and *Appendix C*, where applicable.

💡 In this version of the methodology, Equitable Earth will not explicitly factor the emissions resulting from the removal of invasive species in carbon calculations.

Adaptation & Resilience

3.1.27 Developers must strive to select species considering the long-term context of a changing climate and its future effects on landscapes and ecosystems.

💡 Equitable Earth acknowledges that this practice is not trivial and recommends that developers look for science-based recommendations to support the selection of plant species and varieties.

Non-Timber Forest Products (NTFPs)

Planning

3.1.28 Before introducing NTFP species to the project area, developers must:

3.1.28.1 Determine species according to requirements set out in the *Species Diversity* section of the methodology and the *Genetic Diversity* and *Indicator Species* sections of the Equitable Earth Standard.

3.1.28.2 Consult relevant communities via community consultation to understand their traditional practices, the cultural and/or spiritual value attributed to NTFPs, and their subsistence reliance on them. Feedback must be integrated into NTFP planning.

3.1.28.3 Demonstrate the balanced introduction of NTFP species, ensuring that they do not excessively compete with other species for resources. The developer must propose and justify the proportion of NTFP species within the overall species composition based on site-specific ecological conditions. The justification must be supported by relevant peer-reviewed literature, ecological data, or other credible sources demonstrating alignment with the characteristics of the reference site.

Harvesting Protocols

3.1.29 Developers must design species-specific harvesting protocols that ensure the sustainable collection of NTFPs. The protocols must include:

1) The delimitation of collection sites in the project area where harvesting can occur

2) Safeguards to ensure that the NTFP regeneration rate surpasses its extraction rate

3) The frequency, quantity, and parts of the plant that can be harvested

Capacity Building and Training

3.1.30 Developers should organise regular training sessions for IPs & LCs on the sustainable harvesting protocols and the ecological role of NTFPs.

3.1.31 Developers should promote local ownership by involving IPs & LCs in monitoring the use of NTFPs and participating in data collection processes.

3.1.32 Developers should encourage IPs & LCs to report any unethical or illegal harvesting activities.

Adaptive Management

3.1.33 Developers must review the NTFP protocol every five years to account for changes in the ecosystem, IP & LC needs, the latest science, and global best practices.

Equity and Fair Benefit Sharing

3.1.34 Developers must ensure that access to NTFPs and their derived benefits is fair and equitable. Particular attention should be paid to vulnerable stakeholders and IPs & LCs who depend on these resources for their livelihoods.

3.2 Methods

Reference Ecosystem

3.2.1 Developers must select the reference site and submit a shapefile to Equitable Earth for review.

3.2.2 When developers identify multiple biomes or ecosystem types in the project crediting area, they may select one reference site for each and indicate the link between restoration sites and corresponding reference sites in the project zonation.

3.2.3 Equitable Earth assesses whether the reference site meets the required ecological attributes, age, and absence of disturbance. Equitable Earth may request additional evidence if the justification is deemed insufficient.

Field Assessment

3.2.4 Developers must complete a field assessment at the reference site and the restoration site(s). This includes assessments of groups subject to pre-submission activities, where applicable.

3.2.5 Equitable Earth assigns developers random plots for the assessment of each restoration site indicated during the zonation. Refer to *Appendix D* for more details on the random plot procedure.

3.2.5.1 For each plot, developers must establish the ecological condition baseline by completing specific diagnostic questions outlined for the relevant categories in the *Baseline Assessment* section of the Equitable Earth Standard.

Baseline Assessment

3.2.6 Developers must conduct a comprehensive baseline assessment to inform the design of project activities. This includes the:

1) Field assessment. Refer to the *Field Assessment* section for more details.

2) Engagement with relevant stakeholders, including IPs and LCs identified as core and direct project stakeholders, to integrate their insights and priorities

Interventions

3.2.7 Developers must design interventions in line with the *Theory of Change* section of the Equitable Earth Standard.

3.2.8 The interventions must be based on the ecological condition of the project area. This plan must adhere to the specific requirements set out in the *Interventions* section of the Equitable Earth Standard.

3.2.9 Each indicator should be monitored at least annually and must be monitored and reported on at each verification. Monitoring approaches may include remote satellite imagery, field inventories, community-based monitoring, and sensors for continuous monitoring.

3.2.10 Developers must provide details of the monitoring and methods used, such as remote sensing, field assessment, and surveys, in addition to the number, distribution, and location of samples.

3.2.11 The monitoring plan should strive to control for seasonality.

3.2.12 During the first five years of each plantation cycle, developers must include seedling survival rates as an indicator for plantation-related interventions.

Measurement and Reporting

For more details, refer to the *Monitoring, Reporting, and Verification (MRV)* section of the methodology, and the *Monitoring, Reporting, and Verification (MRV)* and *Theory of Change* sections of the Equitable Earth Standard.

4 Carbon

4.1 Principles

Additionality

4.1.1 Developers must demonstrate additionality following the three-step process below:

1) **Regulatory surplus.** Developers must demonstrate that there is no enforced legal obligation to restore the restoration site(s).

2) **Barrier analysis.** Developers must identify existing barriers that would prevent the implementation of project activities, and demonstrate that ECU revenues are the decisive element in overcoming the barrier(s). Developers must, at a minimum, include a financial barrier in the analysis, and may also include other relevant barriers from, but not limited to, those in the list below:

   a) **Financial barriers:** challenges related to, for example, insufficient funding, high upfront costs, and difficulty accessing finance, and the lack of a clear monetary value for standing forests and sustainable forest products. This includes existing policies and requirements other than legal obligations to lower GHG emissions (e.g., non-mandatory policy incentives and enablers).

   b) **Technical barriers:** challenges related to the application of technology, methodologies and technical expertise. Barriers may include difficulties in applying established methodologies, managing complex technical tasks, and ensuring accurate measurement and monitoring of key outcomes such as carbon sequestration.

   c) **Capacity barriers:** challenges related to education, technical training, and human resources. Barriers may include a lack of skilled personnel or insufficient training in restoration techniques, monitoring protocols, and carbon accounting.

   d) **Logistical barriers:** challenges related to the infrastructure, operational aspects of a project, and labour shortages. Barriers can include poor accessibility to key sites, limited transportation options, inadequate facilities, and the unavailability of necessary materials.

e) **Cultural and social barriers:** challenges in the collective movement of communities towards implementing, maintaining and monitoring restoration projects due to, for example, lack of information, threats to the safety of community members, and existing social structures and norms.

f) **Regulatory and institutional barriers:** limitations within the regulatory framework and its relevant institutions, such as limited staff capacity, lack of necessary skills, local regulations, complex permitting processes, ineffective bureaucratic processes or challenges in meeting specific compliance standards.

3) **Common practice assessment.** Developers must demonstrate that activities similar to the project activity are not common practice in the project's jurisdiction, following the steps set out in the *Methods* section below.

Permanence

Safeguards

4.1.2 Developers must ensure the permanence of carbon sequestration by implementing mitigation strategies to minimise reversal risks inherent to the project. Refer to the *Risk Management* section of the Equitable Earth Standard for more details.

4.1.3 Developers must mitigate the risk of unintended fires by preparing a fire prevention and management strategy for the project area. Refer to the *Ecosystem Threats* section of the Equitable Earth Standard for more details.

4.1.4 Developers must demonstrate that projects can secure access to irrigation needs and will not increase pressure on water resources by identifying:

1) Infrastructure for water access in the project area

2) Any potential tensions regarding access to water resources around the project area

4.1.5 Developers must assess any dangerous activities occurring in the neighbouring areas of the project and implement safeguards to prevent negative impacts on the project area, if applicable.

4.1.5.1 Dangerous activities include, but are not limited to, chemical processing/treatment, non-organic industrial agriculture or animal farming, waste treatment facilities, and any other activity generating classified dangerous residues.

Reversals

4.1.6 All reversal risks must be assessed, monitored, and, when applicable, mitigated. Refer to the *Compensation of Reversals* section in the Programme Manual and the *Risk Management* section in the Equitable Earth Standard for more details.

💡 Corporate buyers are encouraged to use an Emissions Liability Management[5] approach to carbon accounting. Corporate buyers are encouraged to replace any cancelled credits to ensure the validity of their claims.

Leakage

4.1.7 Developers must assess leakage risks, and where applicable, implement mitigation measures, and monitor displacement effects.

4.1.8 Developers must strive to limit leakage risks.

4.1.9 Equitable Earth quantifies leakage emissions as part of net GHG removal calculations.

1) Activity-shifting leakage is quantified using the procedure detailed in the *Adjustment Factors* section.

2) Market leakage is accounted for via the dynamic baseline because ECUs are only issued for net GHG removals that surpass the dynamic baseline. As the vast majority of displaced activities resulting from this methodology tend to lead to localised impacts near the project boundary, market leakage is considered *de minimis*.[6] This net GHG quantification approach ensures an exclusive focus on forest recovery, with ECUs reflecting only measurable forest regrowth from the current degraded condition, without claiming avoided emissions from halted deforestation.[7]

[5] Marc Roston, Alicia Seiger, Thomas Heller, 2023. What's next after carbon accounting? Emissions liability management. [online] Oxford Open Climate Change, Volume 3, Issue 1. Available at: URL

[6] Murray, B. C., McCarl, B. A., & Lee, H.-C. (2004). Estimating leakage from forest carbon sequestration programs. Land Economics, 80(1), 109–124.

[7] Aukland, L., Costa, P. M., & Brown, S. (2003). A conceptual framework and its application for addressing leakage: The case of avoided deforestation. Climate Policy, 3(2), 123–136.

3) Equitable Earth may assess, on a case-by-case basis, whether the project context presents a substantial risk of market leakage. Where necessary, additional adjustments may be required to ensure conservativeness.

4.2 Methods

Additionality

4.2.1 Both Equitable Earth and the VVB will assess the demonstration of additionality and all supporting evidence provided.

4.2.2 Developers must demonstrate additionality following the steps set out below.

Regulatory Surplus

4.2.3 Developers must identify all applicable local, regional, or national legislation, policies, or agreements in force in the project's jurisdiction.

4.2.3.1 For high-income countries,[8] all legal requirements are deemed enforceable.

4.2.3.2 For countries other than high-income countries, legal requirements are only deemed non-enforceable based on legal and verifiable sources relevant to the mitigation activity.

4.2.3.3 Where a legal obligation to undertake restoration or conservation work applies to the project area but not to the restoration site(s), developers must indicate and prove exactly where it applies.

4.2.3.4 Where a legal obligation to restore applies to the restoration site(s) but cannot be fulfilled without the project's funds or technology, the developer must prove that said barriers exist to establish additionality.

Barrier Analysis

4.2.4 Developers must provide verifiable supporting evidence to identify and demonstrate the presence of existing barriers to the implementation of project activities. Evidence may include, but is not limited to the examples outlined below:

[8] Refer to the Terms & Definitions document for a full list of high-income countries.

4.2.4.1 **Financial barriers:** statements of account, notice of refusal of subsidies, and evidence that alternative land uses are more profitable without carbon credits.

4.2.4.2 **Technical barriers:** lack of tools, records of failed pilot trials, and limited availability of species adapted to local conditions.

4.2.4.3 **Capacity barriers:** list of staff, job descriptions, expertise & relevant knowledge, access to training and capacity-building resources, training records (or lack thereof).

4.2.4.4 **Logistical barriers:** maps showing remoteness or poor access, transport cost estimates or invoices, and photos of terrain and access routes.

4.2.4.5 **Cultural and social barriers:** stakeholder engagement reports, evidence of past opposition or failed restoration attempts, and records of traditional land use patterns.

4.2.4.6 **Regulatory and institutional barriers:** unclear or restrictive legal frameworks for land use or carbon rights, evidence of policy gaps or lack of institutional support, land tenure records or land registry status, legal reviews of land or forestry laws, and correspondence with authorities showing regulatory delays.

4.2.5 Developers must demonstrate and provide verifiable evidence that ECU revenue is the decisive element enabling the project to overcome the financial barrier. This means developers must show that ECU revenue is sufficient to cover the difference between the project's financial performance without ECU revenue and the threshold needed to overcome the barrier. To do this, developers must conduct either a simple cost analysis, benchmark analysis, investment comparison analysis, or another comparable test suited to the type, scale, and context of the project.[9]

The financial analysis must:

1) Cover project operations for at least 10 years from the project start date, but should preferably cover the entire crediting period, where feasible.

2) Include all relevant costs, revenues, and cost savings (e.g., subsidies) other than ECU revenue.

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[9] Developers must name the financial indicator (e.g., return on investment, discounted cash flow value, cost-benefit ratio) when applying a benchmark or investment comparison analysis, and apply it consistently to the scenarios both with and without ECU revenue. If a cost-benefit ratio is used, benefits must be limited to monetisable revenue and cost savings, excluding non-market, social, or environmental values. Developers may only use a simple cost analysis when there is no reasonably available alternative land use (e.g., grazing, agriculture, or timber production) capable of generating revenue or cost savings.

3) Include the source, rationale, and any assumptions associated with input data and values. Developers should use data from records of the decision to implement the project (e.g., business plan, feasibility study, loan or grant application, board approval), or, where no such records exist, the earliest documented project planning step.

Developers must provide the entire analysis and supporting evidence for assessment by Equitable Earth and the VVB. Refer to the *Financing and Project Budget* section in the Equitable Earth Standard for more information about reporting commercially sensitive and/or confidential information.

4.2.6 Developers must demonstrate that at least one alternative to the project (e.g., business-as-usual scenario) does not face the same identified barrier(s) as the project.[10]

Common Practice Assessment

4.2.7 Developers must demonstrate that the project would not be common practice using the following steps:

4.2.7.1 Define the project activity types in accordance with the *Scope* section of this methodology.[11]

4.2.7.2 Define the geographic region for the assessment. The geographic region should have a similar policy environment as the project area, and should, at most, align with the national jurisdiction. Where there are sub-national (e.g., regional, local) programmes providing incentives for restoration activities, then the geographic region for assessment should align with them.

4.2.7.3 Identify in the defined geographic region any activities of the same project activity type that are currently active or underway at the time of the assessment, or that were active at any time during the ten years prior to the project start date, excluding any projects that are under certification or registered with a carbon crediting programme.

[10] For the purposes of this requirement, an alternative to the project is a land-use or management practice that would plausibly continue in the absence of the project (e.g., continued grazing, continued degradation). The identified alternative is used to assess whether the same barrier(s) identified for the project apply to that scenario, and is independent of the baseline used to quantify removals, which is established using the dynamic baseline approach described in the *Baseline Adjustments* section.

[11] For the common practice assessment under this methodology, 'project activity type' is an adaptation of the programme-level definition of 'project activity' set out in the Terms & Definitions, and refers to the activity type(s) permitted under the *Scope* section of this methodology, rather than the individual project activities implemented by the project. Under this version of the methodology, there is a single project activity type: restoration of terrestrial forest.

4.2.7.4 Compare the project activity type to the identified activities by selecting relevant comparison attributes, and assessing whether the activities are similar and whether any similar activities present distinctions:

1) Comparison attributes are conditions or circumstances used to assess whether activities are similar or present distinctions, and may include, but are not limited to, scale, land use, ecological characteristics, degradation status, land tenure, policy environment, funding or access to resources, and economic or socioeconomic conditions.

2) Developers must justify the relevance of the comparison attributes selected, define the qualitative or quantitative criteria used to assess comparability (e.g., the same land-use category or a defined quantitative range for scale), and apply the criteria consistently to all identified activities. The classifications or values used for each comparison attribute must be supported by documented evidence. Quantitative information should be used where available and relevant.

3) Similar activities are those that share comparable conditions or circumstances that affect the implementation of the project activity type, as demonstrated using the selected comparison attributes and criteria.

4) A distinction must represent a verifiable difference in circumstances that affects whether the project activity type would be implemented under business-as-usual conditions (e.g., similar activities had access to non-carbon funding or subsidies that are unavailable to the project, benefited from a policy that has since ended, or did not face a material site-specific constraint faced by the project). Minor operational changes that do not fundamentally affect the implementation of the project activity type under business-as-usual conditions do not constitute distinctions.

4.2.7.5 For each of the project types, calculate the adoption rate (%) of any similar activities identified using the following equation (E.1):

$$A_i = [1 - (\frac{Ndist,i}{Nsim,i})] \times 100 \qquad \textbf{(E.1)}$$

Where:

- A_i = Adoption rate for each project activity type *i*; percentage (%)
- $N_{sim,i}$ = number of activities identified in the defined geographic region similar to project activity type *i*
- $N_{dist,i}$ = number of similar activities with distinctions from the project activity type *i*; $N_{dist,i}$ must not exceed $N_{sim,i}$

4.2.7.6 Using the calculation results, determine whether or not each of the project activity types is common practice, based on the following:

1) Where the adoption rate A_i is below 20%, the project activity type is not common practice and is therefore additional.[12]
2) Where the adoption rate A_i is equal to or above 20%, the project activity type is common practice and is not additional.
3) Where no similar activities exist in the defined geographic region (i.e., $N_{sim,i}$ = 0) for project activity type *i*, the adoption rate A_i must be set to 0%, and the project activity type is deemed not common practice.

4.2.8 Project activity types determined to be common practice are not additional and are not eligible for crediting.

Permanence

4.2.9 Developers must conform to all permanence requirements set out in the *Permanence* section of the Equitable Earth Standard, including the monitoring, reporting, quantification, and compensation of loss events and reversals.

Risk Assessment

4.2.10 Equitable Earth identifies delivery and reversal risks and assesses their likelihood and the severity of their consequences. Refer to the *Risk Assessment* section of the Programme Manual for more details.

[12] Equitable Earth established a 20% adoption rate threshold in alignment with the CDM tool to assess common practice.

Loss Events

4.2.11 Loss events must be monitored, reported, quantified, and compensated in accordance with the requirements set out in the Equitable Earth Standard.

4.2.12 Equitable Earth quantifies the impact of loss events before each verification. Refer to the *Quantification of Loss Events* section for more details.

Reversals

4.2.13 If reversals occur during the project lifetime, ECUs must be compensated through the buffer pool mechanism. Refer to the *Compensation of Reversals* section in the Programme Manual for more details.

Leakage

Activity Displacement Mapping

4.2.14 **Stakeholder Engagement.** Developers must adequately engage with relevant stakeholders to identify land-use activities that will be displaced due to project interventions.

4.2.15 Equitable Earth uses satellite imagery and spatial analysis to assess current and recent land-use (e.g., agriculture, settlements, extraction, or industrial logging) within the project area. Where Equitable Earth identifies activities not captured during stakeholder engagement, developers must provide a rationale for why the specific activities were missed and add them to the activity displacement mapping.

4.2.16 **Zonation.** For each activity identified, developers must delimit the boundaries of the displaced activity area(s) and, if available, the hosting area(s) by supplying geospatial file(s) (in GeoJSON or KML file formats with geodetic polygons). The displacement magnitude is determined by:

4.2.16.1 Informing the precise location and size of the hosting area(s); OR

4.2.16.2 Informing the percentage of the activity that will be displaced during the crediting period and the precise location and size of the displaced activity area(s)

Rationale and Mitigation

4.2.17 **Activity Displacement.** Developers must provide details regarding the activity displacement, including the justification of the percentage of displacement, where applicable.

4.2.18 **Mitigation Plan.** Developers must establish a mitigation plan to minimise the impact of activity-shifting leakage. The mitigation plan must include:

1) planned mitigation interventions with corresponding monitoring plans, including indicators, frequency and methods
2) stakeholders involved
3) corresponding timeline

4.2.19 These interventions must be detailed in the Project Design Document and reported on annually.

Leakage Emissions Accounting

4.2.20 **Initial Leakage Estimation.** Refer to the *Initial Leakage Estimation* section for more details.

4.2.21 **Leakage Quantification.** The initial leakage estimation may be corrected before each verification.

4.2.22 Developers must revise the information on the displaced activities by:

1) updating the project's zonation
2) providing details, where available, regarding the reinstatement of the activity

4.2.23 Equitable Earth recalculates leakage using the updated information submitted by the developer. Please refer to the *Leakage Quantification* section for more details.

Monitoring

4.2.24 Equitable Earth monitors the following:

1) the leakage belt, annually
2) the hosting area(s) and the displaced activity area(s) prior to each verification

4.2.25 Equitable Earth reports monitored leakage emissions at each verification.

4.2.26 Equitable Earth must notify developers of AGB loss in the leakage belt that exceeds the average loss observed over the past five years in any contiguous area greater than 1 hectare.

4.2.26.1 Developers must demonstrate that AGB loss does not result from the project activities[13]. The eligible causes and corresponding evidence may include, but are not limited to:

1) Natural disturbance (e.g., fire, storm, pest, or disease outbreak), evidenced through cross-reference with official records, including satellite-derived detection image, meteorological records, or national forestry authority records, confirming the AGB loss pattern is consistent with the documented disturbance event.

2) Pre-existing activity unrelated to the project, evidenced through temporal analysis confirming the activity predates the AGB loss event, supported by historical land cover change data and/or stakeholder engagement records.

3) Newly established activity unrelated to the project (e.g., illegal logging, wood collection by communities not associated with the project activities), evidenced through stakeholder engagement documenting the nature, origin, and scope of the activity, confirming it cannot result from core and direct project stakeholders resettled or activities displaced by the project.

4.2.26.2 Where the justification provided by the developer does not demonstrate the absence of a causal connection to project activities, Equitable Earth reserves the right to take additional measures, including but not limited to:

1) Investigative measures (e.g., third-party audits, field visits).

2) Corrective measures (e.g., mandatory leakage deductions, project suspension)'

Measurement and Reporting

Refer to the *Monitoring, Reporting, and Verification (MRV)* section for more details.

[13] For the purpose of this requirement, an AGB loss is not considered resulting from the project activities where evidence demonstrates the AGB loss was caused by a factor independent of, and with no causal connection to, activities previously or currently occurring within the project area, including but not limited to agricultural practices, wood collection, livestock grazing, or other land uses that the project has restricted or discontinued.

5 Monitoring, Reporting, and Verification (MRV)

5.1 Monitoring

Monitoring Applicable to Equitable Earth

5.1.1 Prior to each verification, Equitable Earth quantifies the net GHG removals of the project using the specified GHG parameters. Refer to *Part II - Criteria and Procedures for Equitable Earth* for more details.

5.1.2 Equitable Earth monitors loss events as described in the Equitable Earth Standard and leakage as described in the *Leakage* section.

Monitoring Applicable to the Developer

5.1.3 Developers must establish a monitoring plan and are responsible for monitoring applicable parameters defined in *Appendix B* of this methodology and in conformance to requirements established in the Equitable Earth Standard and the Programme Manual.

5.1.4 Developers must annually and/or periodically monitor all relevant metrics, parameters, and indicators related to project activities and interventions, as set out in the sections *Ecological Condition* and *Livelihoods* of this methodology, and adhering to the *Theory of Change* requirements defined in the Equitable Earth Standard.

5.2 Reporting

Reporting Applicable to Equitable Earth

5.2.1 Using the parameters described in the *Appendix B*, Equitable Earth compiles a GHG Monitoring Report that consolidates the results of the net GHG removals achieved during the monitoring period. Refer to the *MRV* section of the Equitable Earth Standard for more details.

Reporting Applicable to the Developer

5.2.2 Developers must complete the Annual Report, reporting on indicators monitored and consolidating the activities undertaken over the last 12 months.

5.2.3 Developers must complete the Monitoring Report, reporting on all relevant metrics, parameters, and indicators and the implementation status of activities, before each verification. Refer to the Equitable Earth Standard and the Programme Manual for more details.

Adaptive Management

5.2.4 Developers must update the Project Design Document every five years after the registration date. Refer to the *Adaptive Management* section in the Programme Manual for more details.

Part II - Criteria and Procedures for Equitable Earth

6 Introduction

6.1 Project Boundary

6.1.1 The GHG accounting boundary delimits all carbon pools, emission sinks, and emission sources considered in this methodology.

6.1.2 The GHG accounting boundary and the geographic boundary must include the:

1) restoration site(s)

2) reference site(s)

3) leakage belt

4) hosting area(s)

6.2 Emission Sinks & Sources

List of Relevant GHG Sinks

6.2.1 Relevant carbon pools included as emission sinks in this methodology are listed below. Carbon pools are considered emission sinks if they absorb GHGs from the atmosphere as a result of project activities.

Carbon Pool	Type	Inclusion	Justification
Woody biomass	**Above-ground**	Yes	Significant carbon pool
	Below-ground	Yes	Significant carbon pool

Non-woody biomass	**Above-ground**	Yes	Significant carbon pool
	Below-ground	Yes	Significant carbon pool
Soil organic carbon (SOC)		No	Measurement uncertainties, conservative to exclude
Soil inorganic carbon (SIC)		No	Measurement uncertainties, conservative to exclude
Dead wood		No	Conservative to exclude
Litter		No	Conservative to exclude
Harvested wood products		No	Conservative to exclude

List of Relevant GHG Sources

6.2.2 Relevant carbon pools included as emission sources in this methodology are listed below. Carbon pools are considered emission sources in the event of reversals, leakage, or relevant intensive site preparation techniques.

Carbon Pools	Type	Leakage	Reversal	Site Preparation	Justification
Woody biomass	**Above-ground**	Yes	Yes	Yes	Significant carbon pool
	Below-ground	Yes	Yes	Yes	Significant carbon pool
Non-woody biomass	**Above-ground**	Yes	Yes	Yes	Significant carbon pool
	Below-ground	Yes	Yes	Yes	Significant carbon pool
Soil organic carbon (SOC)		No	No	No	Measurement uncertainties & not relevant to M001 (soil inversion >25 cm not

				allowed)
Soil inorganic carbon (SIC)	No	No	No	Measurement uncertainties
Dead wood	No	N/A	No	Measurement uncertainties
Litter	No	N/A	No	Measurement uncertainties
Harvested wood products	No	N/A	N/A	Not relevant to M001 (commercial harvesting not allowed)
Burning of biomass	No	N/A	Yes	GHG source accounted for specific intensive site preparation techniques. Refer to the *Site Preparation Emissions Quantification* section for more details.
Emissions from nitrogen fertilisers	No	N/A	Yes	GHG source accounted for specific intensive site preparation techniques. Refer to the *Site Preparation Emissions Quantification* section for more details.
Burning of fossil fuels	No	N/A	No	Materiality assessment to test the significance of the GHG source. Other GHGs from combustion are treated as de minimis relative to CO_2.

6.3 Monte Carlo Simulation

6.3.1 Equitable Earth uses a Monte Carlo simulation to aggregate pixel-level carbon estimates and uncertainty to project-level net GHG removal estimation and quantification. This method propagates uncertainties from each component and reflects their interactions accurately, providing a robust and comprehensive probabilistic representation of carbon sequestration and its corresponding uncertainty.

6.3.2 The Monte Carlo approach used by Equitable Earth involves sampling AGB values at the pixel level from a log-normal probability density function. These sampled values are then aggregated to calculate the overall AGB for the designated plot.

Methods

6.3.3 Through iterative sampling, the method constructs a comprehensive probability density function, capturing site-level uncertainty with precision. The key steps are outlined below.

6.3.4 For each pixel, the AGB estimate generated by the AGB provider is adjusted based on its associated uncertainty, following the procedure below.

6.3.4.1 The log-space mean μ_{log} and standard deviation σ_{log} are derived from the pixel's AGB estimate and standard error $\mathbf{SE}_{pixel}$.

6.3.4.2 Spatial correlation is incorporated by introducing a perturbation field defined by equation (E.2):

$$\mathbf{Z}_{total,\,i} = \mathbf{Z}_{global,\,i} \times \sqrt{\varrho} + \mathbf{Z}_{noise,\,i} \times \sqrt{1 - \varrho} \qquad \textbf{(E.2)}$$

Where:

- $\mathbf{Z}_{total,\,i}$ = Perturbation field across the area of interest at iteration i; dimensionless
- $\mathbf{Z}_{global,\,i}$ = Global shock across the area of interest at iteration i, identical for all pixels and randomly drawn from a normal distribution with a mean of 0 and a variance of 1; dimensionless
- $\mathbf{Z}_{noise,\,i}$ = Pixel-level independent noise at iteration i, independently drawn for each pixel from a normal distribution with a mean of 0 and a variance of 1; dimensionless
- ϱ = Correlation factor between the pixels, fixed at 0.01 as determined by the AGB provider; dimensionless

6.3.4.3 The perturbation field created is used to compute the pixel-level AGB value at iteration *i*, using equation (E.3):

$$\mathbf{AGB}_{mc,\,i} = exp(\mu_{log} + \sigma_{log} \times \mathbf{Z}_{total,\,i}) \qquad \textbf{(E.3)}$$

Where:

- $\mathbf{AGB}_{mc,\,i}$ = Perturbated above-ground biomass across the area of interest at iteration i; tDM
- μ_{log} = Mean of the log-normal distribution; dimensionless
- σ_{log} = Standard deviation of the log-normal distribution; dimensionless
- $\mathbf{Z}_{total,\,i}$ = Perturbation field across the area of interest at iteration i; dimensionless

6.3.4.4 AGB values are expanded to include BGB estimates. Both AGB and BGB are converted into their CO_2 equivalent (CO_2e) values.

6.3.4.5 The determined pixel-level GHG removals obtained are aggregated to estimate the total GHG removals for the plot in the specific iteration.

6.3.4.6 These steps are iterated to build a comprehensive probability distribution of net GHG removal at the plot level. During the iterations, the mean net GHG removal estimate stabilises as the simulation progresses. A minimum of 500 iterations must be performed to ensure robust and reliable results. More iterations may be conducted based on empirical observations.

6.3.4.7 The resulting distribution represents the range of potential net GHG removal values.

6.3.5 The Monte Carlo simulation is used at multiple stages of this methodology to estimate the project potential and quantify net GHG removals.

6.4 Field Calibration

6.4.1 Developers may calibrate any carbon stock calculations using field data collection methods.

6.4.2 To calibrate carbon potential accounting, developers must submit a calibration request to Equitable Earth no later than 30 calendar days after receiving the GHG Baseline Report.

6.4.3 To calibrate ECU accounting, developers must submit a calibration request no later than 60 calendar days before the publication of the GHG Monitoring Report.

6.4.4 Requests submitted outside of these deadlines may not be accepted if they risk delaying the certification process.

Refer to the Protocol for Field Data Calibration for more details on the field calibration procedure.

7 Carbon Stock and Baseline Estimation

7.1 Baseline Carbon Stock

7.1.1 The project's baseline carbon stock is determined at the pixel-level by the distribution of carbon stock $\mathbf{C}^{[0]}_{rest,i}$ and is expressed in tonnes of CO_2e.

Biomass Quantification of the Restoration Site

7.1.2 **Above-Ground Biomass (AGB)**. The AGB provider generates an AGB map that estimates values of mean AGB density and corresponding standard error at the pixel-level in raster format for the restoration site(s). These values are referenced collectively as $\mathbf{AGB}^{[0]}_{rest,i}$.

7.1.2.1 If requested by the developer, the AGB value provided may be calibrated using field data. This calibration must conform to the requirements set out in the Protocol for Field Data Calibration.

7.1.3 **Below-Ground Biomass (BGB).** The BGB is estimated to be a proportion of its AGB. The relationship between BGB and AGB is represented by equation (E.4):

$$\mathbf{BGB}^{[0]}_{rest,i} = \mathbf{AGB}^{[0]}_{rest,i} \times \mathbf{RS} \tag{E.4}$$

Where:

- $\mathbf{BGB}^{[0]}_{rest,i}$ = BGB density of the pixel i in the restoration site at baseline[14]; tDM/ha
- $\mathbf{AGB}^{[0]}_{rest,i}$ = AGB density of the pixel i in the restoration site at baseline; tDM/ha
- **RS** = Root-to-shoot ratio of biomass; dimensionless

[14] For the purpose of this section, the baseline date for quantification is defined as the date on which the first intervention begins within a given restoration site that results in GHG emissions or removals within the project's GHG accounting boundary.

7.1.4 **Total Biomass of the Restoration Site.** The aggregated biomass comprises the above and below-ground biomass within the restoration site(s), and is obtained using equation (E.5):

$$\mathbf{B}^{[0]}_{rest,i} = \mathbf{AGB}^{[0]}_{rest,i} + \mathbf{BGB}^{[0]}_{rest,i} \quad \textbf{(E.5)}$$

Where:

- $\mathbf{B}^{[0]}_{rest}$ = Biomass density of the pixel i in the restoration site at baseline; tDM/ha
- $\mathbf{AGB}^{[0]}_{rest}$ = AGB density of the pixel i in the restoration site at baseline; tDM/ha
- $\mathbf{BGB}^{[0]}_{rest}$ = BGB density of the pixel i in the restoration site at baseline; tDM/ha

Biomass Conversion to CO_2 Equivalents

7.1.5 Equitable Earth applies equations from the AR-TOOL14 A/R Methodological tool[15] to translate biomass into carbon content and subsequently into CO_2e.

7.1.6 The relation between carbon stock and tree biomass is obtained using equation (E.6).

$$\mathbf{C}^{[0]}_{rest,i} = \frac{44}{12} \times \mathbf{CF} \times \mathbf{B}^{[0]}_{rest,i} \quad \textbf{(E.6)}$$

Where:

- $\mathbf{C}^{[0]}_{rest,i}$ = Carbon stock density of the pixel i in the restoration site at baseline; tCO_2e/ha
- $\frac{44}{12}$ = Molecular weight ratio of CO_2 to carbon; dimensionless
- **CF** = Carbon fraction of tree biomass; tC/tDM. A default value of 0.47 is adopted[16].

[15] UNFCCC. (2013). 'AR-TOOL14 A/R Methodological tool: Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities Version 04.1'. Available at: URL (Accessed 25/01/2023)

[16] Eggleston, H S, Buendia, L, Miwa, K, Ngara, T, and Tanabe, K. (2006) 'IPCC Guidelines for National Greenhouse Gas Inventories. Japan.' Volume 4, Chapter 4 , Table 4.3, p 4.48. Available at: URL (Accessed 03/11/2023).

- $\mathbf{B}^{[0]}_{rest,i}$ = Biomass density of the pixel i in the restoration site at baseline; tDM/ha

7.2 Reference Site Carbon Stock

Selection of a Reference Site

7.2.1 Equitable Earth requests the selection and adoption of a reference ecosystem and the geographical coordinates of a physical reference site from the developer. Refer to the *Reference Ecosystem* section for more details.

7.2.2 Equitable Earth uses the reference site to quantify the GHG removal capacity of the project.

Assessment of the Reference Site

7.2.3 Upon receipt of the reference site shapefile, Equitable Earth assesses the conformance of the reference site to the requirements set out in the *Reference Ecosystem* section.

7.2.3.1 If the reference site conforms to all requirements, Equitable Earth determines the carbon stock following the methods outlined in the *Carbon Stock at Reference Site* section below.

7.2.3.2 If the reference site meets all ecological criteria but is younger than 40 years, Equitable Earth assesses the situation and determines an alternative method on a case-by-case basis. Alternative datasets (e.g., the Harvard dataset[17]) may be used to ensure more representative estimation of the carbon stock value.

Carbon Stock at Reference Site

7.2.4 Using the reference site shapefile submitted, Equitable Earth generates an AGB map via its AGB provider to estimate the AGB density and its corresponding standard error at the pixel level within the reference site, in a raster format. These AGB values are referred to as $\mathbf{AGB}_{ref,i}$.

[17] Walker, W., Gorelik, S., Baccini, A., Farina, M., Solvik, K., Cook-Patton, S., Ellis, P., Sanderman, J., Houghton, R., Leavitt, S., Schwalm, C., & Griscom, B. (2022). Global Potential Carbon (Version V6) [dataset]. Harvard Dataverse. https://doi.org/doi:10.7910/DVN/DSDDQK

7.2.4.1 If requested by the developer, Equitable Earth may calibrate the AGB value using field data provided by the developer. This calibration must conform to the requirements set out in the Protocol for Field Data Calibration.

7.2.5 The associated BGB is obtained, using equation (E.7):

$$\mathbf{BGB}_{ref,i} = \mathbf{AGB}_{ref,i} \times \mathbf{RS} \tag{E.7}$$

Where:

- $\mathbf{BGB}_{ref,i}$ = BGB density of the pixel i in the reference site; tDM/ha
- $\mathbf{AGB}_{ref,i}$ = AGB density of the pixel i in the reference site; tDM/ha
- **RS** = Root-to-shoot ratio; dimensionless

7.2.6 The total biomass of the reference site is obtained using equation (E.8):

$$\mathbf{B}_{ref,i} = \mathbf{AGB}_{ref,i} + \mathbf{BGB}_{ref,i} \tag{E.8}$$

Where:

- $\mathbf{B}_{ref,i}$ = Biomass density of the pixel i in the reference site; tDM/ha
- $\mathbf{AGB}_{ref,i}$ = AGB density of the pixel i in the reference site; tDM/ha
- $\mathbf{BGB}_{ref,i}$ = BGB density of the pixel i in the reference site; tDM/ha

7.2.7 The conversion to CO_2e is obtained using equation (E.9):

$$\mathbf{C}_{ref,i} = \frac{44}{12} \times \mathbf{CF} \times \mathbf{B}_{ref,i} \tag{E.9}$$

Where:

- $\mathbf{C}_{ref,i}$ = Carbon stock density of the pixel i in the reference site; tCO_2e/ha
- $\frac{44}{12}$ = Molecular weight ratio of CO_2 to carbon; dimensionless

- **CF** = Carbon fraction of tree biomass; tC/tDM. A default value of 0.47 is used.
- $\mathbf{B}_{ref,i}$ = Biomass density of the pixel i in the reference site; tDM/ha

7.2.8 Equitable Earth calculates the average carbon stock in the reference site as an estimate of the carbon stock by size (in hectares). This process enables the utilisation of this data for further processing in the calculation of the project's GHG removal capacity. The average carbon stock per hectare in the reference site is obtained using equation (E.10):

$$\overline{\mathbf{C}_{ref}} = \sum_{i \in S_{ref}} \mathbf{C}_{ref,i} \times \frac{\mathbf{A}_{ref-pixel,i}}{\mathbf{A}_{ref}} \qquad \textbf{(E.10)}$$

Where:

- $\overline{\mathbf{C}_{ref}}$ = Mean carbon stock of the reference site; tCO_2e/ha
- $\mathbf{C}_{ref,i}$ = Carbon stock density of the pixel i in the reference site; tCO_2e/ha
- S_{ref} = Subset of pixels in the reference site; dimensionless
- $\mathbf{A}_{ref-pixel,i}$ = Area of pixel i within the reference site boundaries; ha

7.3 Adjustment Factors

Initial Leakage Estimation

This section outlines the approach used to estimate potential leakage emissions as part of the overall estimation of the project's carbon potential.

7.3.1 For each identified leakage source, the developer must provide specific data to Equitable Earth for estimation using one of the two methods described below.

Hosting Areas

7.3.2 If the developer knows where activity *i* will be displaced to, they must identify and delimit the hosting area(s) and the displaced activity area(s).

7.3.3 Equitable Earth estimates the resulting leakage emissions by determining the carbon stock in the hosting area(s) at baseline[18] using the same calculation process as for the restoration site(s).

7.3.4 Equitable Earth conservatively assumes that leakage emissions for activity *i*, referred to as $\mathbf{L}_i^{ha}$, is set equal to the total carbon stock in the hosting area(s) at baseline (i.e., it is assumed that all carbon stock originally in the hosting area will be lost).

Displaced Activity Areas

7.3.5 If the developer cannot provide the hosting area(s), they must identify and delimit the displaced activity area(s) within the project area. It is assumed that activities within this area will be displaced outside of the project area. The developer must provide an estimate of the percentage of the activities that will be displaced and result in leakage. This percentage should reflect changes in land use practices, including, but not limited to, the introduction of more efficient processes or elimination of activities due to retirement or job changes.[19]

7.3.6 To estimate the potential impact of the displacement(s), at each iteration of the Monte Carlo simulation, Equitable Earth draws for each pixel of the leakage belt a random value of AGB and estimates the conservative per-hectare carbon stock at baseline[20] by identifying the 95th percentile of the carbon stock distribution, as detailed in equation (E.11):

$$\mathbf{C}_{max-lb,\,s}^{[0]} = \mathbf{P}_{95}(\mathbf{C}_{lb-pixel,\,s}^{[0]}) \quad \textbf{(E.11)}$$

Where:

- $\mathbf{C}_{max-lb,\,s}^{[0]}$ = Conservative estimate of the carbon stock density of the pixel s in the leakage belt at baseline; tCO2e/ha
- $\mathbf{P}_{95}$ = indicates the 95th percentile (i.e., the value that exceeds 95% of the observation in the distribution)

[18] Where the project start date precedes the registration date and the developer has chosen to conduct validation and verification jointly at registration, the estimation must be performed as of the registration date.
[19] Pi = 1 indicates no improvements in practices, and Pi = 0.5 indicates the displaced activity is 50% less intensive as a result of practice improvements.
[20] Where the project start date precedes the registration date and the developer has chosen to conduct validation and verification jointly at registration, the estimation must be performed as of the registration date.

- $\mathbf{C}^{[0]}_{lb-pixel,\,s}$ = Distribution of carbon stock density of the pixel s in the leakage belt at baseline; tCO2e/ha

7.3.7 The corresponding estimated leakage emissions are obtained using equation (E.12):

$$\mathbf{L}_i^{da} = \mathbf{A}_i^{da} \times \mathbf{C}^{[0]}_{max-lb,\,s} \times \mathbf{P}_i \qquad \textbf{(E.12)}$$

Where:

- $\mathbf{L}_i^{da}$ = Estimated leakage of the displaced activity area i at baseline; tCO_2e
- $\mathbf{A}_i^{da}$ = Size of the displaced activity area i; ha
- $\mathbf{C}^{[0]}_{max-lb,\,s}$ = Conservative estimate of the carbon stock density of the pixel s in the leakage belt at baseline; tCO_2e/ha
- $\mathbf{P}_i$ = Declared % of activity displacement in the displaced activity area i at baseline; dimensionless

Total leakage

7.3.8 The estimated total leakage emissions for the project are obtained by aggregating all leakage emissions derived from identified hosting area(s) and displaced activity area(s), using equation (E.13):

$$\mathbf{L} = \sum_i \mathbf{L}_i^{ha} + \sum_j \mathbf{L}_j^{da} \qquad \textbf{(E.13)}$$

Where:

- $\mathbf{L}$ = Total declared leakage of the project, estimated at baseline; tCO_2e
- $\mathbf{L}_i^{ha}$ = Estimated leakage of the hosting area i; tCO_2e
- $\mathbf{L}_j^{da}$ = Estimated leakage of the displaced activity area j; tCO_2e

Site Preparation Emissions Estimation

This section describes how GHG emissions related to intensive site preparation techniques are estimated.

7.3.9 Intensive site preparation techniques may include the use of chemicals, prescribed burns, transitory non-native species, and mechanical intervention. Refer to the *Site Preparation* section and *Appendix C* for more details. The table below indicates which techniques require to estimate GHG emissions and the corresponding methods applied.

Site Preparation Technique	Emission(s) accounted for?	Methodology/Justification
Prescribed burn	Yes	Refer to Section 7.3.5 to 7.3.7 below.
Use of nitrogen fertilisers	Yes	Refer to Section 7.3.8 below.
Use of herbicides	No	The emissions related to the use of herbicides are considered *de minimis*.
Transitory non-native species	Yes	The AGB change related to the planting and subsequent removal of transitory non-native species is already accounted for via the procedure described in the *Carbon Stock and Baseline Estimation* section.
Mechanical Intervention	No	The burning of fossil fuels related to the use of heavy machinery are accounted for if deemed material. See the *Fossil Fuel Use Emissions Estimation* section. Since the current methodology does not allow for soil inversion deeper than 25 cm, there are no implications for SOC.

Prescribed Burn

7.3.10 Equitable Earth follows a Tier 1 approach to estimate GHG emissions from prescribed burning, according to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.[21]

[21] Per the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, a tier defines a methodological complexity level for estimating greenhouse gas (GHG) emissions. Three tiers are outlined, with Tier 1 representing the least

7.3.11 Under the Tier 1 Approach, the mass of fuel available for combustion only includes biomass (AGB and BGB). Tier 1 assumes that carbon stocks in dead wood and litter pools in non-forest land are zero.

7.3.12 Estimation of CO_2 emissions and non-CO_2 GHG emissions, including methane (CH_4) and nitrous oxide (N_2O), resulting from prescribed burning as a site preparation technique, is obtained using equation (E.14) and derived from equations (E.15) and (E.16):

$$\mathbf{E}_{total-burn} = \mathbf{E}_{burn} + \mathbf{E}_{burn}' \tag{E.14}$$

Where:

- $\mathbf{E}_{total-burn}$ = Total estimated emissions from prescribed burning; tCO_2e
- $\mathbf{E}_{burn}$ = Total estimated CO_2 emissions from prescribed burning; tCO_2
- $\mathbf{E}_{burn}$' = Total estimated non-CO_2 emissions (CH_4 and N_2O) from prescribed burning; tCO_2e

$$\mathbf{E}_{burn} = \sum_{i \in \mathbf{S}_{fire}} \mathbf{A}_{burn,i} \times \mathbf{AGB}_{site,i} \times (1 + \mathbf{RS}) \times \mathbf{CF} \times \mathbf{fd} \times \frac{44}{12} \tag{E.15}$$

Where:

- $\mathbf{E}_{burn}$ = Total estimated CO_2 emissions from prescribed burning; tCO_2
- $\mathbf{S}_{fire}$ = Set of planned interventions that consist of prescribed burn activities during the crediting period; dimensionless
- $\mathbf{A}_{burn,i}$ = Area burnt for fire event *i*; ha
- $\mathbf{AGB}_{site,i}$ = Above-ground biomass density available for combustion for fire event *i* at baseline; tDM/ha

complex approach. Due to scaling constraints arising from the impracticality of collecting field data for every Equitable Earth-certified Project, Equitable Earth employs a Tier 1 methodology under M001. This approach may be revised in future iterations of the methodology.

- **RS** = Ratio of below-ground biomass to above-ground biomass; tDM BGB/tDM AGB. Since Equitable Earth considers a Tier 1 approach, no changes to BGB are assumed, so RS is considered to be zero.
- **CF** = Carbon fraction of dry biomass; tC/tDM
- **fd** = Fraction of biomass lost in disturbance; dimensionless[22]
- $\frac{44}{12}$ = Molecular weight ratio of CO_2 to carbon; dimensionless

$$\mathbf{E}_{burn}{}' = \sum_{i \in \mathbf{S}_{fire}} \sum_{g \in \{CH_4, N_2O\}} \mathbf{A}_{burn,i} \times \mathbf{AGB}_{site,i} \times \mathbf{C}_f \times \mathbf{G}_{ef,g} \times \mathbf{GWP}_g \qquad \text{(E.16)}$$

Where:

- $\mathbf{E}_{burn}{}'$ = Total estimated non-CO_2 emissions (CH_4 and N_2O) from prescribed burning; tCO_2e
- $\mathbf{S}_{fire}$ = Set of planned interventions that consist of prescribed burn activities during the crediting period; dimensionless
- $\mathbf{A}_{burn,i}$ = Area burnt for fire event *i*; ha
- $\mathbf{AGB}_{site,i}$ = Above-ground biomass density available for combustion for fire event *i* at baseline; tDM/ha
- $\mathbf{C}_f$ = Combustion factor; dimensionless
- $\mathbf{G}_{ef,g}$ = Emission factor of dry matter burnt per gas *g*; tGHG/tDM
- $\mathbf{GWP}_g$ = Global warming potential per gas *g*; dimensionless

[22] The parameter **fd** defines the proportion of biomass that is lost from the biomass pool. It is assumed that a fire disturbance will 'kill all' and therefore fd = 1 in all cases. Equation (14) does not specify the fate of the carbon removed from the biomass carbon stock. The Tier 1 assumption is that all of $\mathbf{E}_{burn}$ is emitted in the year of disturbance. Higher Tier methods assume that some of this carbon is emitted immediately and some is added to the dead organic matter pools (dead wood, litter) or harvested wood products (HWP).

Use of Nitrogen Fertilisers

7.3.13 Estimation of N_2O emissions resulting from the use of fertilisers as a site preparation technique is obtained using equation (E.17), derived from equations (E.18) to (E.23):

$$\mathbf{E}_{chem} = \mathbf{E}_{Ndirect} + \mathbf{E}_{Nindirect} \tag{E.17}$$

Where:

- $\mathbf{E}_{chem}$ = Total estimated CO_2e emissions stemming from N_2O emissions from the use of nitrogen fertiliser; tCO_2e
- $\mathbf{E}_{Ndirect}$ = Total estimated direct CO_2e emissions stemming from N_2O emissions from the use of nitrogen fertiliser; tCO_2e
- $\mathbf{E}_{Nindirect}$ = Total estimated indirect CO_2e emissions stemming from N_2O emissions from the use of nitrogen fertiliser; tCO_2e

$$\mathbf{E}_{Ndirect} = \sum_{(i,j,c)} [(\mathbf{SF}_{i,c} + \mathbf{OF}_{j,c}) \times \mathbf{EF}_{Ndirect,c} \times \frac{44}{28} \times \mathbf{GWP}_{N_2O}] \tag{E.18}$$

Where:

- $\mathbf{E}_{Ndirect}$ = Total estimated direct CO_2e emissions stemming from N_2O emissions from the use of nitrogen fertiliser; tCO_2e
- $\mathbf{SF}_{i,c}$ = Amount of synthetic nitrogen fertiliser *i* applied under condition c; tN
- $\mathbf{OF}_{j,c}$ = Amount of organic nitrogen fertiliser *j* applied under condition c; tN
- $\mathbf{EF}_{Ndirect,c}$ = Emission factor for nitrous oxide emissions from N additions due to fertilisers under condition c; tN_2O-N/tN applied
- $\frac{44}{28}$ = Molecular weight ratio of N_2O to nitrogen; dimensionless

- **GWP**$_{N_2O}$ = Global Warming Potential for nitrous oxide; dimensionless

$$\mathbf{SF}_{i,c} = \mathbf{M}_{SF,i,c} \times \mathbf{C}_{SF,i} \qquad \textbf{(E.19)}$$

Where:

- **SF**$_{i,c}$ = Amount of synthetic nitrogen fertiliser i applied under condition c; tN
- **M**$_{SF,i,c}$ = Estimated mass of N-containing synthetic fertiliser *i* applied under condition c during the crediting period[23]; t fertiliser
- **C**$_{SF,\,i}$ = N content of synthetic fertiliser *i*; tN/t fertiliser

$$\mathbf{OF}_{j,c} = \mathbf{M}_{OF,j,c} \times \mathbf{C}_{OF,j} \qquad \textbf{(E.20)}$$

Where:

- **OF**$_{j,c}$ = Amount of organic nitrogen fertiliser *j* applied under condition c; tN
- **M**$_{OF,\,j,c}$ = Estimated mass of N-containing organic fertiliser *j* applied under condition c during the crediting period[24]; t fertiliser
- **C**$_{OF,j}$ = N content of organic fertiliser *j*; tN/t fertiliser

$$\mathbf{E}_{Nindirect} = \sum_{(i,c)} (\mathbf{V}_{N,i,c} + \mathbf{L}_{N,i,c}) \qquad \textbf{(E.21)}$$

Where:

[23] Where the variable is provided as liquid volume, Equitable Earth converts the reported volume to mass using either a product-specific density value reported by the developer, or standardised conservative conversion factors if no such value is available.

- $\mathbf{E}_{Nindirect}$ = Total estimated indirect CO_2e emissions stemming from N_2O emissions from the use of nitrogen fertiliser; tCO_2e
- $\mathbf{V}_{N,i,c}$ = CO_2e emissions stemming from indirect N_2O emissions produced from atmospheric deposition of N volatilised due to the use of nitrogen fertiliser *i* under condition c; tCO_2e
- $\mathbf{L}_{N,i,c}$ = CO_2e emissions stemming from indirect N_2O emissions produced from leaching and runoff of N, in regions where leaching and runoff occur, due to the use of nitrogen fertiliser *i* under condition c; tCO_2e

$$\mathbf{V}_{N,i,c} = [(\mathbf{SF}_{i,c} \times \mathbf{F}_{SFvol,\,c}) + (\mathbf{OF}_{i,c} \times \mathbf{F}_{OFvol})] \times \mathbf{EF}_{Nv,\,c} \times \frac{44}{28} \times \mathbf{GWP}_{N_2O} \qquad \textbf{(E.22)}$$

Where:

- $\mathbf{V}_{N,i,c}$ = CO_2e emissions stemming from indirect N_2O emissions produced from atmospheric deposition of N volatilised due to the use of nitrogen fertiliser *i* under condition c; tCO_2e
- $\mathbf{SF}_{i,c}$ = Amount of synthetic nitrogen fertiliser *i* applied under condition c; tN
- $\mathbf{F}_{SFvol,c}$ = Fraction of all synthetic nitrogen added to soils, volatilising as NH_3 and NO_x under condition c; (kg NH_3–N + NO_x–N)/(kgN applied)
- $\mathbf{OF}_{i,c}$ = Amount of organic nitrogen fertiliser *i* applied under condition c; tN
- $\mathbf{F}_{OFvol}$ = Fraction of all organic nitrogen added to soils, volatilising as NH_3 and NO_x; (kg NH_3–N + NO_x–N)/(kg N applied or deposited)
- $\mathbf{EF}_{Nv,c}$ = Emission factor for nitrous oxide emissions from atmospheric deposition of N on soils and water surfaces under condition c; kg N_2O–N/(kg NH_3–N + NO_x–N volatilised)
- $\frac{44}{28}$ = Molecular weight ratio of N_2O to Nitrogen, which is 44/28; dimensionless
- $\mathbf{GWP}_{N_2O}$ = Global Warming Potential for nitrous oxide; dimensionless. This factor is used to convert the N_2O-related units into CO_2e.

$$\mathbf{L}_{N,i,c} = (\mathbf{SF}_{i,c} + \mathbf{OF}_{i,c}) \times \mathbf{F}_{Fleach} \times \mathbf{EF}_{Nl} \times \frac{44}{28} \times \mathbf{GWP}_{N_2O} \quad \textbf{(E.23)}$$

Where:

- $\mathbf{L}_{N,i,c}$ = CO_2e emissions stemming from indirect N_2O emissions produced from leaching and runoff of N, in regions where leaching and runoff occur, due to the use of nitrogen fertiliser *i* under condition c; tCO_2e
- $\mathbf{SF}_{i,c}$ = Amount of synthetic nitrogen fertiliser *i* applied under condition c; tN
- $\mathbf{OF}_{i,c}$ = Amount of organic nitrogen fertiliser *i* applied under condition c; tN
- $\mathbf{F}_{Fleach}$ = Fraction of synthetic or organic nitrogen added to soil lost through leaching and/or runoff, where applicable; kgN/(kg of N additions)
- $\mathbf{EF}_{Nl}$ = Emission factor for nitrous oxide emissions from N leaching and/or runoff; kg N_2O–N/(kg N leaching/runoff)
- $\frac{44}{28}$ = Molecular weight ratio of N_2O to nitrogen; dimensionless
- $\mathbf{GWP}_{N_2O}$ = Global Warming Potential for nitrous oxide; dimensionless

Total Site Preparation Emissions

7.3.14 Estimation of total emissions resulting from site preparation techniques (i.e., prescribed burns and use of fertilisers) is obtained using equation (E.24):

$$\mathbf{E}_{sp} = \mathbf{E}_{total-burn} + \mathbf{E}_{chem} \quad \textbf{(E.24)}$$

Where:

- $\mathbf{E}_{sp}$ = Total estimated emissions from site preparation techniques; tCO_2e
- $\mathbf{E}_{total-burn}$ = Total estimated emissions from prescribed burning; tCO_2e

- **E**$_{chem}$ = Total estimated CO_2e emissions stemming from N_2O emissions from the use of nitrogen fertiliser; tCO_2e

Projected Baseline

7.3.15 Equitable Earth estimates the carbon potential of the project using a projected baseline (i.e., projecting the baseline's evolution over the crediting period). The projected baseline is established at the pixel-level, through the historical rate of AGB change observed in the project crediting area. Equitable Earth determines a 3- or 5-year historical period before the project start date by selecting the one with the most conservative mean change. For each pixel:

1) If a positive trend is identified, the projected baseline for this pixel is calculated based on the identified slope.

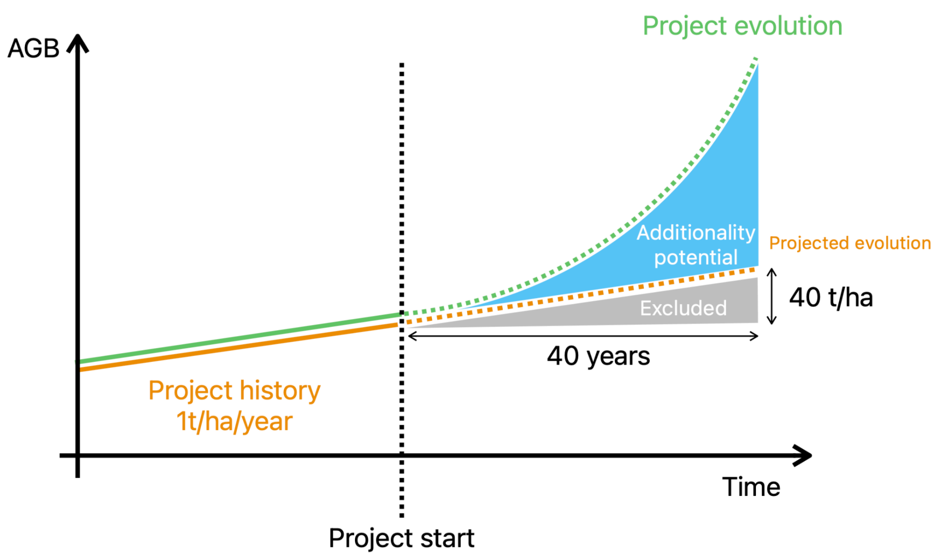


Figure 1: Projected baseline with historical data showing a positive trend

2) If the trend is neutral or negative, the projected baseline will be assumed constant over the project lifetime in the corresponding pixel.

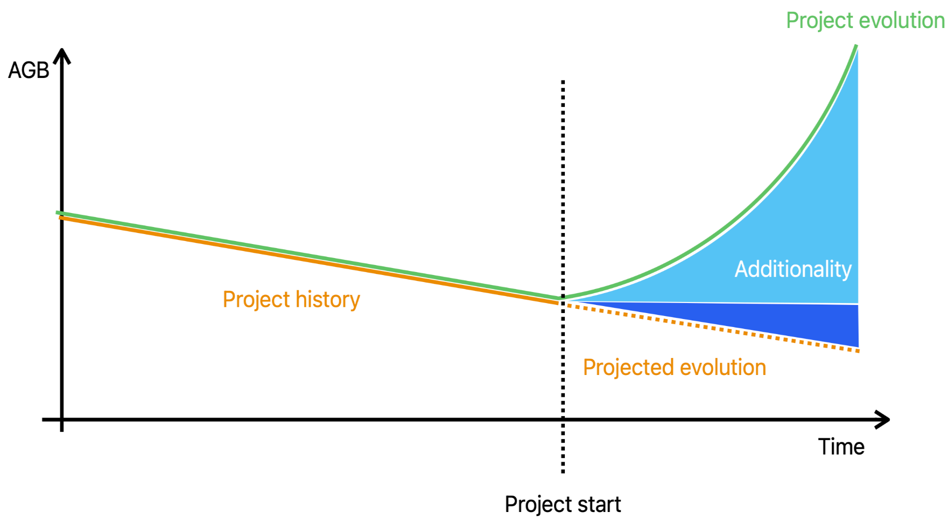


Figure 2: Projected baseline with historical data showing a negative trend

7.3.16 The projected baseline is determined by equation (E.25):

$$\mathbf{DB}_{projected} = \sum_{i \in S_{rest}} max(0, \left[\frac{(\mathbf{C}_{pixel-gain\ i,0} - \mathbf{C}_{pixel-gain\ i,\ historical}) \times \mathbf{A}_{pixel\ i}}{\Delta t_{historical}}\right] \times t_{cp}) \quad \textbf{(E.25)}$$

Where:

- $\mathbf{DB}_{projected}$ = Projected baseline; tCO_2e
- S_{rest} = Set of all pixels *i* within the the restoration site(s); dimensionless
- $\mathbf{C}_{pixel-gain\ i,\ historical}$ = Per-hectare carbon stock of the pixel i in the restoration site(s), based on historical AGB data; tCO_2e/ha
- $\mathbf{C}_{pixel-gain\ i,\ 0}$ = Per-hectare carbon stock of the pixel i in the restoration site(s) at baseline; tCO_2e/ha
- $\mathbf{A}_{pixel\ i}$ = Size of the pixel i, ha
- $\Delta t_{historical}$ = Time interval between the date of the historical AGB dataset selected and baseline; years
- t_{cp} = Duration of the crediting period; years

Fossil Fuel Use Emissions Estimation

This section describes how Equitable Earth assesses the materiality of and estimates GHG emissions from the combustion of fossil fuels by machinery and vehicles used for project activities.

Materiality Assessment

7.3.17 Equitable Earth applies a materiality threshold of 5% of the total estimated carbon potential of the project for the entire crediting period and establishes the following requirements based on the materiality of emissions:

7.3.17.1 **Material emissions**: if the estimated emissions from fossil fuel and machinery use equal or exceed the materiality threshold, developers must monitor and report data inputs periodically in the Monitoring Report. As a result, Equitable Earth accounts for these emission sources and makes the corresponding deductions from the ECUs issued at each verification. Refer to the *Carbon Quantification for ECU Accounting* and *Monitoring, Reporting, and Verification (MRV)* sections for more details on deductions and reporting requirements.

7.3.17.2 **Non-material emissions**: if the estimated emissions from fossil fuel and machinery use fall below the materiality threshold, such emissions are considered de minimis and are excluded from ongoing quantification and reporting.

7.3.18 Equitable Earth conducts the materiality assessment during the design stages and reassesses it every five years from the project start date, aligning with the adaptive management frequency requirements. Each reassessment is based on the project's carbon potential, compared to an updated estimate of fossil fuel emissions for the crediting period.

7.3.19 If developers deviate from planned project activities during the crediting period in a manner that impacts fossil fuel and machinery emissions (e.g., an increase in the use of heavy machinery), developers must notify Equitable Earth following the procedures for design deviations set out in the Programme Manual. In such cases, Equitable Earth may reassess materiality and/or require developers to monitor and report on emissions throughout the remainder of the crediting period.

Estimation of Fossil Fuel Emissions

7.3.20 Developers must identify equipment and vehicles that are planned to be used for the implementation of project activities over the entire crediting period, specifying for each the equipment/vehicle type (e.g., light vehicle, heavy machinery, generator, boat) and the fuel source.

7.3.21 To estimate emissions related to fossil fuel use, developers must provide, for each type of equipment or vehicle, an estimate of either:

7.3.21.1 the total distance expected to be travelled by that equipment or vehicle; or

7.3.21.2 the total operating time expected to be required from that equipment or vehicle.

7.3.22 For each type of equipment or vehicle to be used, developers may provide:

7.3.22.1 A fuel consumption rate (e.g., L/km or L/h) to calculate total fuel consumed. This rate must be sourced from manufacturer specifications. Where unavailable, Equitable Earth uses default factors established in peer-reviewed literature, national inventory reports, or other scientific sources.

7.3.22.2 An emission factor (e.g., tCO_2e per litre) to convert fuel consumption into total GHG emissions. Equitable Earth applies a standardised conservative emission factor by default. Developers may submit, for each type of fossil fuel used, an alternative emission factor and corresponding uncertainty, provided that the emission factor is sourced from peer-reviewed literature, national inventory reports, or other scientific sources, and must be accompanied by a justification of its applicability to the fuel type and context. Equitable Earth reserves the right to accept or reject the proposed value based on the demonstration provided by the developer.

7.3.23 The estimation of total emissions resulting from fossil fuel use is obtained using either equation (E.26) or (E.27):

$$\mathbf{E}_{fuel} = \sum_{i} \mathbf{D}_{i} \times \mathbf{FCR}_{i} \times \mathbf{EF}_{i} \qquad \textbf{(E.26)}$$

$$\mathbf{E}_{fuel} = \sum_{i} \mathbf{T}_{i} \times \mathbf{FCR}_{i} \times \mathbf{EF}_{i} \qquad \textbf{(E.27)}$$

Where:

- $\mathbf{E}_{fuel}$ = Estimated GHG emissions resulting from fossil fuel combustion over the crediting period; tCO_2e
- $\mathbf{D}_{i}$ = Estimated distance to be travelled by equipment or vehicle *i* over the crediting period; km
- $\mathbf{T}_{i}$ = Estimated operating time of equipment or vehicle *i* over the crediting period; hours
- $\mathbf{FCR}_{i}$ = Fuel consumption rate of equipment or vehicle *i*; L/km or L/h
- $\mathbf{EF}_{i}$ = Emission factor for the fuel type used by equipment or vehicle *i*; tCO_2e/L

7.4 GHG Removal Capacity and Carbon Potential

GHG Removal Capacity of the Restoration Site

7.4.1 The GHG removal capacity corresponds to the estimated maximum carbon stock increase the project is capable of achieving if it reaches $\mathbf{C}_{ref}$.

7.4.2 Equitable Earth determines a distribution of the project GHG removal capacity by using a Monte Carlo approach. At each iteration, $\mathbf{C}_{capacity}$ is determined using equation (E.28):

$$\mathbf{C}_{capacity} = \sum_{i \in S_i} max(0; \overline{\mathbf{C}_{ref}} - \mathbf{C}_{rest,i}) \times \mathbf{A}_{rest-pixel,i} \qquad \textbf{(E.28)}$$

Where:

- $\mathbf{C}_{capacity}$ = GHG removal capacity of the project; tCO_2e
- S_i = Set of all pixels *i* within the the restoration site(s); dimensionless
- $\mathbf{A}_{rest-pixel,i}$ = Area of the pixel i within the restoration site boundaries; ha
- $\overline{\mathbf{C}}_{ref}$ = Mean carbon stock of the reference site; tCO_2e/ha
- $\mathbf{C}_{rest,i}$ = Per-hectare carbon stock of the pixel i in the restoration site(s) at baseline; tCO_2e/ha

Net GHG Removal Capacity of the Project

7.4.3 Total estimation of net GHG removal capacity is obtained using equation (E.29):

$$\mathbf{C}_{net-capacity} = \mathbf{P}_{15}(\mathbf{C}_{capacity} - \mathbf{DB}_{projected} - \mathbf{L} - \mathbf{E}_{sp} - \mathbf{E}_{fuel}) \qquad \textbf{(E.29)}$$

Where:

- $\mathbf{C}_{net-capacity}$ = Net GHG removal capacity of the project; tCO_2e
- $\mathbf{P}_{15}$ = indicates the 15th percentile (i.e., the value that is surpassed by 85% of the observation in the distribution)
- $\mathbf{C}_{capacity}$ = GHG removal capacity of the project; tCO_2e
- $\mathbf{DB}_{projected}$ = Projected baseline; tCO_2e
- $\mathbf{L}$ = Total declared leakage of the project, estimated at baseline; tCO_2e
- $\mathbf{E}_{sp}$ = Total emissions from site preparation techniques; tCO_2e
- $\mathbf{E}_{fuel}$ = Estimated GHG emissions resulting from fossil fuel combustion over the crediting period; tCO_2e[24]

[24] If emissions are not deemed material $\mathbf{E}_{fuel}$ = 0. Refer to the *Fossil Fuel Use Emissions Estimation* section for more details.

7.4.4 Equitable Earth reports the net GHG removal capacity in the GHG Baseline Report.

Carbon Curve Modelling

7.4.5 Equitable Earth provides a carbon curve to developers. For a detailed explanation of the carbon curve calculation methods, including a comprehensive explanation of the calculation process, the assumptions made, and factors influencing the accuracy of projections, refer to the Protocol for Carbon Curve Modelling.

Carbon Potential of the Project

7.4.6 The carbon potential of the project is the estimated maximum carbon stock the project may achieve at the end of the initial crediting period.

7.4.7 Equitable Earth estimates the carbon potential by assessing whether the project is expected to reach its full $\mathbf{C}_{net-capacity}$ by the end of the crediting period.

7.4.8 To do so, Equitable Earth uses the carbon curve to model the project's expected unit issuance trajectory over time.

7.4.8.1 If the carbon curve indicates that the project reaches full net capacity within the crediting period, the carbon potential $\mathbf{C}_{potential}$ is set to equal the $\mathbf{C}_{net-capacity}$.

7.4.8.2 If the carbon curve indicates that the project will not reach full net capacity within the crediting period, the carbon potential $\mathbf{C}_{potential}$ is set to the projected net GHG removals achieved by the end of the crediting period, as determined by the carbon curve.

7.4.9 Equitable Earth reports the carbon potential in the GHG Baseline Report.

8 Carbon Quantification for ECU Accounting

8.1 Carbon Stock Evolution in the Restoration Site

8.1.1 Prior to each verification, Equitable Earth quantifies the carbon stock within the restoration site(s) to assess biomass evolution from the previous monitoring period. To do so, Equitable Earth uses a similar methodology as used for carbon potential to determine the current biomass of the restoration site(s):

8.1.2 The AGB provider generates an AGB map that estimates the mean AGB and corresponding standard error at the pixel level in raster format for the restoration site(s) at the end of the monitoring period.

8.1.2.1 If requested by the developer, Equitable Earth may calibrate the AGB value using field data provided by the developer. This calibration must conform to the specifications set out in the Protocol for Field Data Calibration.

8.1.3 The BGB is estimated to be a proportion of its AGB as dictated by the root-to-shoot ratio (RS). The relationship between BGB and AGB is represented by the equation (E.30):

$$\mathbf{BGB}^{[m]}_{rest,i} = \mathbf{AGB}^{[m]}_{rest,i} \times \mathbf{RS} \tag{E.30}$$

Where:

- $\mathbf{BGB}^{[m]}_{rest,i}$ = BGB density of the pixel i in the restoration site at the end of the monitoring period [m]; tDM/ha
- $\mathbf{AGB}^{[m]}_{rest,i}$ = AGB density of the pixel i in the restoration site at the end of the monitoring period [m]; tDM/ha
- **RS** = Root-to-shoot ratio; dimensionless

8.1.4 The total biomass of the reference site is obtained using equation (E.31):

$$\mathbf{B}_{rest,i}^{[m]} = \mathbf{AGB}_{rest,i}^{[m]} + \mathbf{BGB}_{rest,i}^{[m]} \qquad \textbf{(E.31)}$$

Where:

- $\mathbf{B}_{rest,i}^{[m]}$ = Biomass density of the pixel i in the restoration site at the end of the monitoring period [m]; tDM/ha
- $\mathbf{BGB}_{rest,i}^{[m]}$ = BGB density of the pixel i in the restoration site at the end of the monitoring period [m]; tDM/ha
- $\mathbf{AGB}_{rest,i}^{[m]}$ = AGB density of the pixel i in the restoration site at the end of the monitoring period [m]; tDM/ha

8.1.5 The conversion to CO_2e is obtained using equation (E.32):

$$\mathbf{C}_{rest,i}^{[m]} = \frac{44}{12} \times \mathbf{CF} \times \mathbf{B}_{rest,i}^{[m]} \qquad \textbf{(E.32)}$$

Where:

- $\mathbf{C}_{rest,i}^{[m]}$ = Carbon stock density of the pixel i in the restoration site at the end of the monitoring period [m]; tCO_2e/ha
- $\frac{44}{12}$ = Molecular weight ratio of CO_2 to carbon; dimensionless
- **CF** = Carbon fraction of tree biomass; tC/tDM
- $\mathbf{B}_{rest,i}^{[m]}$ = Biomass density of the pixel i in the restoration site at the end of the monitoring period [m]; tDM/ha

8.2 Adjustment Factors

Leakage Quantification

This section describes how activity-shifting leakage is quantified throughout the project's crediting period when the activity starts being displaced.

Hosting Areas

8.2.1 If the developer is able to provide the hosting area(s), Equitable Earth assesses carbon stock changes at the pixel level within each hosting area.

8.2.1.1 Only pixels that demonstrate a net decrease in carbon stock relative to the baseline year are included in the leakage calculation. Pixels with zero or positive net change compared to baseline are excluded.

8.2.1.2 The sum of the net carbon stock losses across all included pixels represents the total leakage in the hosting area.

$$\mathbf{L}^{[m]}_{ha,\,i} = \sum_{s \in \mathbf{S}_i} max(0; \mathbf{C}^{[m]}_{ha,s} - \mathbf{C}^{[0]}_{ha,s}) \times \mathbf{A}_{pixel\ s} \quad \textbf{(E.33)}$$

Where:

- $\mathbf{L}^{[m]}_{ha,\,i}$= Leakage emissions in the hosting area i at the end of the monitoring period [m]; tCO_2e
- $\mathbf{C}^{[m]}_{ha,s}$= Carbon stock density in the pixel s, at the end of the monitoring period [m]; tCO_2e/ha
- $\mathbf{C}^{[0]}_{ha,s}$= Carbon stock density in the pixel s at baseline; tCO_2e/ha
- $\mathbf{A}_{pixel\ s}$ = Size of the pixel s, ha
- $\mathbf{S}_i$ = Subset of pixels in hosting area i; dimensionless

8.2.2 To monitor the evolution of leakage emissions throughout the crediting period, Equitable Earth compares the carbon stock of the hosting area(s) from one verification to another. However, leakage quantification is discontinued once the cumulative leakage emissions equal the full carbon stock capacity of the hosting area(s) as measured at baseline.

Displaced Activity Areas

8.2.3 If the developer cannot provide the hosting area(s), Equitable Earth uses the leakage belt to conservatively quantify leakage emissions.

8.2.3.1 To quantify the carbon stock loss associated with the unknown hosting area(s), Equitable Earth analyses the leakage belt and identifies all pixels with a net AGB decrease compared to baseline.

8.2.3.2 A conservative estimate of carbon loss is then calculated by determining the 95th percentile of the distribution of carbon stock loss across these pixels. This value is used to represent the mean carbon stock loss for leakage accounting purposes.

$$\mathbf{C}^{[m]}_{max-loss,\, s} = \mathbf{P}_{95}(\mathbf{C}^{[m]}_{loss-lb,\, s}) \quad \textbf{(E.34)}$$

Where:

- $\mathbf{C}^{[m]}_{max-loss,s}$ = Conservative estimate of carbon loss density of the pixel s in the leakage belt at the end of the monitoring period [m]; tCO2e/ha
- $\mathbf{P}_{95}$ = indicates the 95th percentile (i.e., the value that exceeds 95% of the observation in the distribution)
- $\mathbf{C}^{[m]}_{loss-lb}$ = Distribution of carbon loss density of the pixel s in the leakage belt at the end of the monitoring period [m]; tCO2e/ha

8.2.3.3 The resulting leakage from the activity is determined using equation (E.35):

$$\mathbf{L}^{[m]}_{da,i} = \mathbf{A}^{da}_{i} \times \mathbf{C}^{[m]}_{max-loss,\, s} \times \mathbf{P}_{i} \quad \textbf{(E.35)}$$

Where:

- $\mathbf{L}_{da,i}^{[m]}$ = Leakage emissions in the displaced activity area i at the end of the monitoring period [m]; tCO_2e
- $\mathbf{A}_{i}^{da}$ = Size of the displaced activity area i; ha
- $\mathbf{C}_{max-loss,t}$ = Conservative estimate of per-hectare carbon loss compared to baseline of the pixel s in the leakage belt; tCO2e/ha
- $\mathbf{P}_{i}$ = Declared % of activity displacement of the activity in the displaced activity area i at baseline; dimensionless

Total leakage

8.2.4 Total leakage emissions at the end of the monitoring period [m] is quantified by aggregating leakage emissions derived from the hosting area(s) and displaced activity area(s), using equation (E.36):

$$\mathbf{L}^{[m]} = \sum_{i} \mathbf{L}_{ha,i}^{[m]} + \sum_{i} \mathbf{L}_{da,j}^{[m]} \qquad \textbf{(E.36)}$$

Where:

- $\mathbf{L}^{[m]}$ = Total leakage emissions at the end of the monitoring period [m]; tCO_2e
- $\mathbf{L}_{ha,i}^{[m]}$ = Leakage emissions in the hosting area i at the end of the monitoring period [m]; tCO_2e
- $\mathbf{L}_{da,j}^{[m]}$ = Leakage emissions in the displaced activity area j at the end of the monitoring period [m]; tCO_2e

8.2.5 Equitable Earth reserves the right to apply a more suitable leakage quantification method on a case-by-case basis if the developer provides additional data that yields a more accurate or conservative result. In such cases, Equitable Earth clearly and thoroughly documents the applied methods in the corresponding GHG Monitoring Report.

Quantification of Loss Events

8.2.6 In case of a loss event, Equitable Earth quantifies the GHG emissions associated with the area that experienced the loss event.

8.2.7 The total impact is determined by comparing the GHG balance of the area preceding and following the loss event.

8.2.8 The total emissions from a loss event are calculated using equation (E.37):

$$\mathbf{GHG}_{loss-event} = \mathbf{GHG}_{post-event} - \mathbf{GHG}_{pre-event} \quad \textbf{(E.37)}$$

Where:

- $\mathbf{GHG}_{loss-event}$ = Total net GHG emissions attributable to the loss event; tCO_2e
- $\mathbf{GHG}_{post-event}$ = Total GHG equivalents remaining in the affected area after the loss event; tCO_2e
- $\mathbf{GHG}_{pre-event}$ = Total GHG equivalents existing in the affected area before the loss event; tCO_2e

Site Preparation Emissions

8.2.9 If site preparation activities, as described in the *Site Preparation Emissions Quantification* section, have been undertaken by the developer, the related emissions must be accounted for at the next verification.

Prescribed Burn

8.2.10 Quantification of CO_2 emissions and non-CO_2 GHG emissions, including methane (CH_4) and nitrous oxide (N_2O), resulting from prescribed burning as a site preparation technique, is obtained using equation (E.38) and derived from equations (E.39) and (E.40):

$$\mathbf{E}^{[m]}_{total-burn} = \mathbf{E}^{[m]}_{burn} + \mathbf{E}^{'[m]}_{burn} \quad \textbf{(E.38)}$$

Where:

- $\mathbf{E}_{total-burn}^{[m]}$ = Total emissions from prescribed burning in the monitoring period [m]; tCO_2e
- $\mathbf{E}_{burn}^{[m]}$ = Total CO_2 emissions from prescribed burning in the monitoring period [m]; tCO_2
- $\mathbf{E}_{burn}^{'\,[m]}$ = Total non-CO_2 emissions (CH_4 and N_2O) from prescribed burning in the monitoring period [m]; tCO_2e

$$\mathbf{E}_{burn}^{[m]} = \sum_{i \in \mathbf{S}_i^{[m]}} (\mathbf{A}_{burn,i} \times \mathbf{AGB}_{site,i} \times (1 + \mathbf{RS}) \times \mathbf{CF} \times \mathbf{fd} \times \frac{44}{12}) \quad \textbf{(E.39)}$$

Where:

- $\mathbf{E}_{burn}^{[m]}$ = Total CO_2 emissions from prescribed burning in the monitoring period [m]; tCO_2
- $\mathbf{S}_i^{[m]}$ = Subset of interventions that consist of prescribed burn activities implemented in monitoring period [m]; dimensionless
- $\mathbf{A}_{burn,i}$ = Area burnt for fire event *i*; ha
- $\mathbf{AGB}_{site,i}$ = Above-ground biomass stock available for combustion for fire event *i*; tDM/ha
- **RS** = Ratio of below-ground biomass to above-ground biomass; tDM BGB/tDM AGB. Since Equitable Earth considers a Tier 1 approach, no changes to BGB are assumed, so RS is considered to be zero.
- **CF** = Carbon fraction of dry biomass; tC/tDM
- **fd** = Fraction of biomass lost in disturbance; dimensionless[25]
- $\frac{44}{12}$ = Molecular weight ratio of CO_2 to carbon; dimensionless

[25] The parameter fd defines the proportion of biomass that is lost from the biomass pool. It is assumed that a fire disturbance will 'kill all' and therefore fd = 1 in all cases. Equation (14) does not specify the fate of the carbon removed from the biomass carbon stock. The Tier 1 assumption is that all of **E**burn[m] is emitted in the year of disturbance. Higher Tier methods assume that some of this carbon is emitted immediately and some is added to the dead organic matter pools (dead wood, litter) or HWP.

$$\mathbf{E}'^{[m]}_{burn} = \sum_{i \in \mathbf{S}^{[m]}_{fire}} \sum_{g \in \{CH_4, N_2O\}} (\mathbf{A}_{burn,i} \times \mathbf{AGB}_{site,i} \times \mathbf{C}_f \times \mathbf{G}_{ef,g} \times \mathbf{GWP}_g) \quad \textbf{(E.40)}$$

Where:

- $\mathbf{E}'^{[m]}_{burn}$ = Total non-CO_2 emissions (CH_4 and N_2O) from prescribed burning in the monitoring period [m]; tCO_2e
- $\mathbf{S}^{[m]}_{fire}$ = Subset of interventions that consist of prescribed burn activities implemented in monitoring period [m]; dimensionless
- $\mathbf{A}_{burn,i}$ = Area burnt for fire event *i*; ha
- $\mathbf{AGB}_{site,i}$ = Above-ground biomass stock available for combustion for fire event *i*; tDM/ha
- $\mathbf{C}_f$ = Combustion factor; dimensionless
- $\mathbf{G}_{ef,g}$ = Emission factor of dry matter burnt per gas *g*; tGHG/tDM
- $\mathbf{GWP}_g$ = Global warming potential per gas *g*; dimensionless

Use of Nitrogen Fertilisers

8.2.11 Quantification of N_2O emissions resulting from the use of fertilisers as a site preparation technique is obtained using equation (E.41), derived from equations (E.42) to (E.47):

$$\mathbf{E}^{[m]}_{chem} = \mathbf{E}^{[m]}_{Ndirect} + \mathbf{E}^{[m]}_{Nindirect} \quad \textbf{(E.41)}$$

Where:

- $\mathbf{E}^{[m]}_{chem}$ = Total CO_2e emissions stemming from N_2O emissions from the use of nitrogen fertiliser in the monitoring period [m]; tCO_2e

- $\mathbf{E}_{Ndirect}^{[m]}$ = Total direct CO_2e emissions stemming from N_2O emissions from the use of nitrogen fertiliser in the monitoring period [m]; tCO_2e
- $\mathbf{E}_{Nindirect}^{[m]}$ = Total indirect CO_2e emissions stemming from N_2O emissions from the use of nitrogen fertiliser in the monitoring period [m]; tCO_2e

$$\mathbf{E}_{Ndirect}^{[m]} = \sum_{(i,j,c)} (\mathbf{SF}_{i,c}^{[m]} + \mathbf{OF}_{j,c}^{[m]}) \times \mathbf{EF}_{Ndirect,c} \times \frac{44}{28} \times \mathbf{GWP}_{N_2O}] \qquad \textbf{(E.42)}$$

Where:

- $\mathbf{E}_{Ndirect}^{[m]}$ = Total direct CO_2e emissions stemming from N_2O emissions from the use of nitrogen fertiliser during the monitoring period [m]; tCO_2e
- $\mathbf{SF}_{i,c}^{[m]}$ = Amount of synthetic nitrogen fertiliser *i* applied under condition c in the monitoring period [m] ; tN
- $\mathbf{OF}_{j,c}^{[m]}$ = Amount of organic nitrogen fertiliser *j* applied under condition c in the monitoring period [m]; tN
- $\mathbf{EF}_{Ndirect,c}$ = Emission factor for nitrous oxide emissions from N additions due to fertilisers under condition c; tN_2O-N/tN applied
- $\frac{44}{28}$ = Molecular weight ratio of N_2O to nitrogen; dimensionless
- $\mathbf{GWP}_{N_2O}$ = Global Warming Potential for nitrous oxide; dimensionless

$$\mathbf{SF}_{i,c}^{[m]} = \mathbf{M}_{SF,i,c}^{[m]} \times \mathbf{C}_{SF,i} \qquad \textbf{(E.43)}$$

Where:

- $\mathbf{SF}_{i,c}^{[m]}$ = Amount of synthetic nitrogen fertiliser *i* applied under condition c in the monitoring period [m]; tN

- $\mathbf{M}^{[m]}_{SF,i,c}$ = Mass of N-containing synthetic fertiliser *i* applied under condition c in the monitoring period [m][26]; t fertiliser
- $\mathbf{C}_{SF,i}$ = N content of synthetic fertiliser *i*; tN/t fertiliser

$$\mathbf{OF}^{[m]}_{j,c} = \mathbf{M}^{[m]}_{OF,j,c} \times \mathbf{C}_{OF,j} \qquad \textbf{(E.44)}$$

Where:

- $\mathbf{OF}^{[m]}_{j,c}$ = Amount of organic nitrogen fertiliser *j* applied under condition c in the monitoring period [m]; tN
- $\mathbf{M}^{[m]}_{OF,j,c}$ = Mass of N-containing organic fertiliser *j* applied under condition c in the monitoring period [m][21]; t fertiliser
- $\mathbf{C}_{OF,j}$ = N content of organic fertiliser *j*; tN/t fertiliser

$$\mathbf{E}^{[m]}_{Nindirect} = \sum_{(i,c)} \mathbf{V}^{[m]}_{N,i,c} + \mathbf{L}^{[m]}_{N,i,c}) \qquad \textbf{(E.45)}$$

Where:

- $\mathbf{E}^{[m]}_{Nindirect}$ = Total indirect CO_2e emissions stemming from N_2O emissions from the use of nitrogen fertiliser in the monitoring period [m]; tCO_2e
- $\mathbf{V}^{[m]}_{N,i,c}$ = CO_2e emissions stemming from indirect N_2O emissions produced from atmospheric deposition of N volatilised due to nitrogen fertiliser *i* under condition c in the monitoring period [m]; tCO_2e
- $\mathbf{L}^{[m]}_{N,i,c}$ = CO_2e emissions stemming from indirect N_2O emissions produced from leaching and runoff of N, in regions where leaching and runoff occur, due to nitrogen fertiliser *i* under condition c in the monitoring period [m]; tCO_2e

[26] Where the variable is provided as liquid volume, Equitable Earth converts the reported volume to mass using either a product-specific density value reported by the developer, or standardised conservative conversion factors if no such value is available.

$$\mathbf{V}_{N,i,c}^{[m]} = \left[(\mathbf{SF}_{i,c}^{[m]} \times \mathbf{F}_{SFvol,c}) + \mathbf{OF}_{i,c}^{[m]} \times \mathbf{F}_{OFvol}) \right] \times \mathbf{EF}_{Nv,c} \times \frac{44}{28} \times \mathbf{GWP}_{N_2O} \qquad \textbf{(E.46)}$$

Where:

- $\mathbf{V}_{N,i,c}^{[m]}$ = CO_2e emissions stemming from indirect N_2O emissions produced from atmospheric deposition of N volatilised due to nitrogen fertiliser *i* under condition c in the monitoring period [m]; tCO_2e
- $\mathbf{SF}_{i,c}^{[m]}$ = Amount of synthetic nitrogen fertiliser *i* applied under condition c in the monitoring period [m]; tN
- $\mathbf{F}_{SFvol,c}$ = Fraction of all synthetic nitrogen added to soils, volatilising as NH_3 and NO_x under condition c; (kg NH_3–N + NO_x–N)/(kgN applied)
- $\mathbf{OF}_{i,c}^{[m]}$ = Amount of organic nitrogen fertiliser *i* applied under condition c in the monitoring period [m]; tN
- $\mathbf{F}_{OFvol}$ = Fraction of all organic nitrogen added to soils, volatilising as NH_3 and NO_x; (kg NH_3–N + NO_x–N)/(kg N applied or deposited)
- $\mathbf{EF}_{Nv,c}$ = Emission factor for nitrous oxide emissions from atmospheric deposition of N on soils and water surfaces under condition c; kg N_2O–N/(kg NH_3–N + NO_x–N volatilised)
- $\frac{44}{28}$ = Molecular weight ratio of N_2O to nitrogen, which is 44/28; dimensionless
- $\mathbf{GWP}_{N_2O}$ = Global Warming Potential for nitrous oxide; dimensionless. This factor is used to convert the N_2O-related units into CO_2e.

$$\mathbf{L}_{N,i,c}^{[m]} = (\mathbf{SF}_{i,c}^{[m]} + \mathbf{OF}_{i,c}^{[m]}) \times \mathbf{F}_{Fleach} \times \mathbf{EF}_{Nl} \times \frac{44}{28} \times \mathbf{GWP}_{N_2O} \qquad \textbf{(E.47)}$$

Where:

- $\mathbf{L}_{N,i,c}^{[m]}$ = CO_2e emissions stemming from indirect N_2O emissions produced from leaching and runoff of N, in regions where leaching and runoff occur, due to nitrogen fertiliser use in intervention *i* in the monitoring period [m]; tCO_2e

- $\mathbf{SF}_{i,c}^{[m]}$ = Amount of synthetic nitrogen fertiliser *i* applied under condition c during the monitoring period [m]; tN
- $\mathbf{OF}_{i,c}^{[m]}$ = Amount of organic nitrogen fertiliser *i* applied under condition c in the monitoring period [m]; tN
- $\mathbf{F}_{Fleach}$ = Fraction of synthetic or organic nitrogen added to soil lost through leaching and/or runoff, where applicable; kgN/(kg of N additions)
- $\mathbf{EF}_{Nl}$ = Emission factor for nitrous oxide emissions from N leaching and/or runoff; kg N_2O–N/(kg N leaching/runoff)
- $\frac{44}{28}$ = Molecular weight ratio of N_2O to nitrogen; dimensionless
- $\mathbf{GWP}_{N_2O}$ = Global Warming Potential for nitrous oxide; dimensionless

Total Site Preparation Emissions

8.2.12 The total cumulative emissions from site preparation techniques at the end of the monitoring period [m] are obtained using equation (E.48):

$$\mathbf{E}_{total-sp}^{[m]} = \mathbf{E}_{total-burn}^{[m]} + \mathbf{E}_{chem}^{[m]} + \mathbf{E}_{total-sp}^{[m-1]} \quad \textbf{(E.48)}$$

Where:

- $\mathbf{E}_{total-sp}^{[m]}$ = Total emissions from site preparation techniques at the end of the monitoring period [m]; tCO_2e
- $\mathbf{E}_{total-burn}^{[m]}$ = Total emissions from prescribed burning in the monitoring period [m]; tCO_2e
- $\mathbf{E}_{chem}^{[m]}$ = Total CO_2e emissions stemming from N_2O emissions from the use of nitrogen fertiliser in the monitoring period [m]; tCO_2e

Baseline Adjustments

General Principles

8.2.13 Equitable Earth uses a dynamic baseline approach, where the baseline carbon stock established at the start date is reassessed and adjusted throughout the crediting period to reflect observed landscape dynamics.

8.2.14 The reassessment is performed before each verification and is used to calculate net GHG removals.

8.2.15 The dynamic baseline is established by selecting control plots located outside both the project area and the leakage belt, with similar ecological and socioeconomic characteristics, including degradation levels. The study area extends from 5 km to 30 km beyond the project boundary, with the exact distance determined on a case-by-case basis depending on the landscape characteristics and data availability. These control plots provide a reference, enabling comparison of the project's outcomes against what would have occurred in a similar area without the project's interventions (i.e., in the baseline scenario).

8.2.16 Equitable Earth publishes a random 10% subset of control plots in KML format on the Equitable Earth Registry to prevent perverse incentives to interfere with control plots. The remaining plots are kept confidential and made available solely to the VVB for assessment.

8.2.17 Equitable Earth includes shapefiles of the control plots in the GHG Baseline Report and on the Equitable Earth Registry.

Identification of Control Plots

8.2.18 **Exclusion of Unsuitable Areas.**[27] The first step in selecting suitable control plots is to reduce the study area by excluding areas that are unsuitable for representing a valid business-as-usual scenario. This ensures the comparability of land-use and degradation dynamics. The following areas are systematically excluded:

8.2.18.1 **Areas located in different biomes:** Any area falling outside the biome(s) present within the project crediting area is excluded, as ecological characteristics and natural dynamics vary significantly between biomes.

[27] IUCN and UNEP-WCMC (2022), The World Database on Protected Areas (WDPA), Cambridge, UK: UNEP-WCMC. Available at: www.protectedplanet.net. Accessed through Global Forest Watch in (10/2023). Available at: URL.

8.2.18.2 **Active carbon projects:** these areas are unsuitable for comparison, as both the project and control plots are subject to the same treatment.

8.2.18.3 **Commercial plantations:** these areas are excluded due to different management practices and incentives (e.g., economic incentives for planting and harvesting), which make them incomparable to ecosystem restoration projects.

8.2.18.4 **Geopolitical indicators.** Areas are excluded if located outside either the project's country or the same jurisdictional boundaries to ensure alignment with the geopolitical context and regulatory frameworks.

8.2.18.5 **Non-vegetated areas.** Built-up infrastructure (e.g., roads, buildings) and permanent water bodies (e.g., lakes, reservoirs) are excluded as they do not support biomass growth or reflect relevant land-use dynamics.

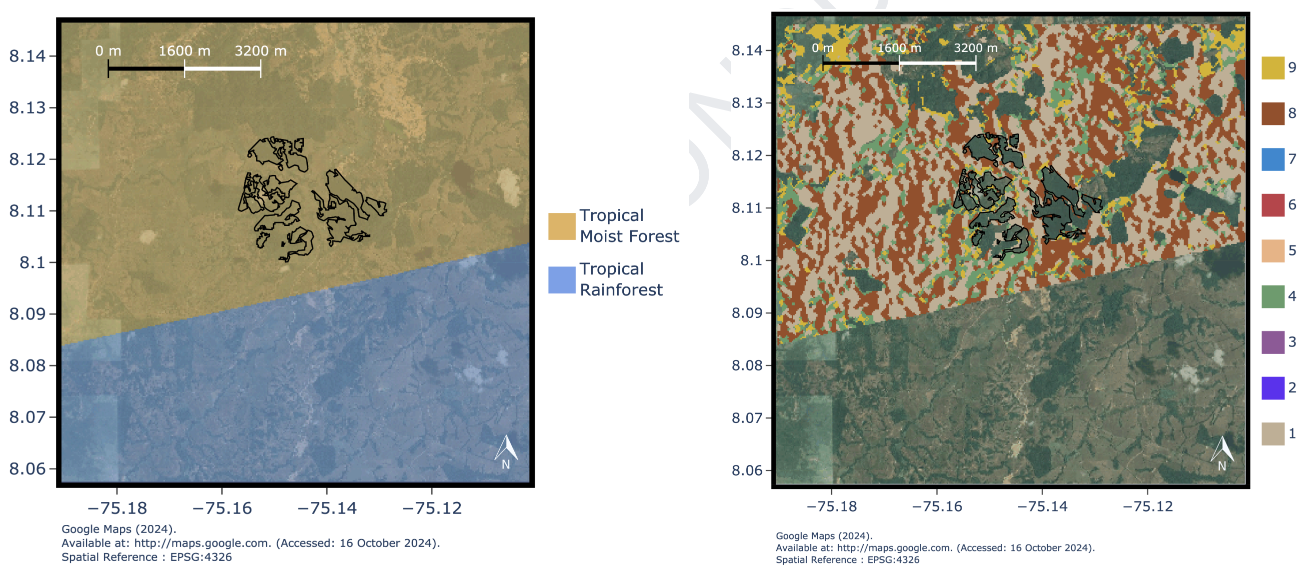


Figure 4: Before and after the exclusion of the area outside the project biomes

8.2.19 **Indicators.** The selection of control plots is based on the following indicators, which encompass ecological, climatic, and land use indicators:

1) elevation[28]

2) slope (derived from elevation)

[28] Farr, T. G., et al. (2007). 'The Shuttle Radar Topography Mission'. Rev. Geophys., 45, RG2004. Available at: URL (Accessed 03/11/2023)

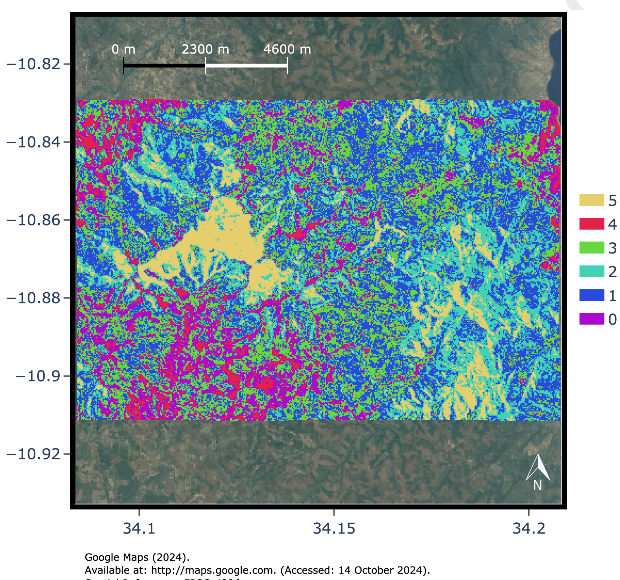
3) aspect (derived from elevation)[29]

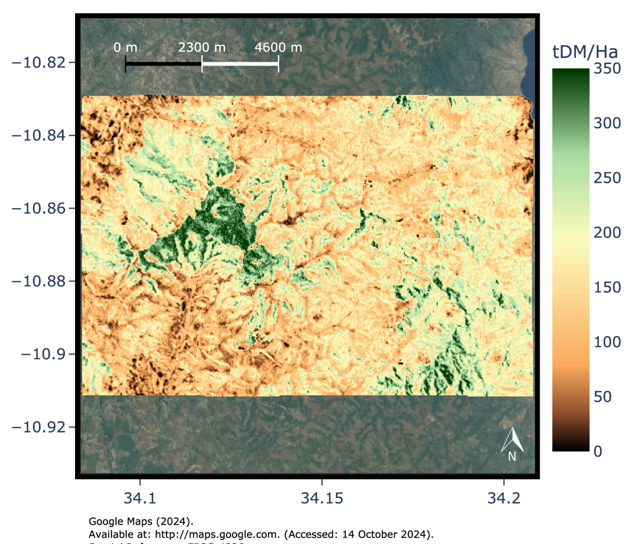
4) distance to roads[30]

5) AGB trends since 2000, using data from Chloris Geospatial.

💡 While Equitable Earth recognises the critical role of land tenure in ensuring both the longevity and equity of projects, M001 does not currently incorporate land tenure and ownership as indicators to select control plots due to the absence of comprehensive, publicly accessible global or national land tenure registries. However, Equitable Earth is actively exploring ways to integrate these considerations into future versions of M001.

8.2.20 **Clustering**. Based on the indicators mentioned above, the selected area for clustering is stratified using the K-means clustering algorithm. This statistical method identifies natural patterns within the dataset and enables the classification of the area into distinct subdivisions based on the chosen indicators. Each 'class' represents a grouping of areas with similar characteristics.





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[29] Aspect identifies the direction of the maximum downward gradient for each specific point on a surface. It indicates the slope's orientation and helps in understanding factors such as sunlight exposure, wind patterns, and moisture retention on the Project Area.

[30] OpenStreetMap contributors. (2017). Available at: URL

Figure 5: Clustering and AGB stock

8.2.21 **Cluster Integration**. Equitable Earth utilises cohesive spatial units instead of individual, isolated pixels. To achieve this, neighbouring pixels are grouped to create larger, cohesive areas that better represent the overall landscape characteristics. During this grouping process, any pixel that belongs to multiple classes will be assigned to the most dominant class in its immediate surroundings. Similarly, pixels not assigned to any class will be allocated to the dominant surrounding class.

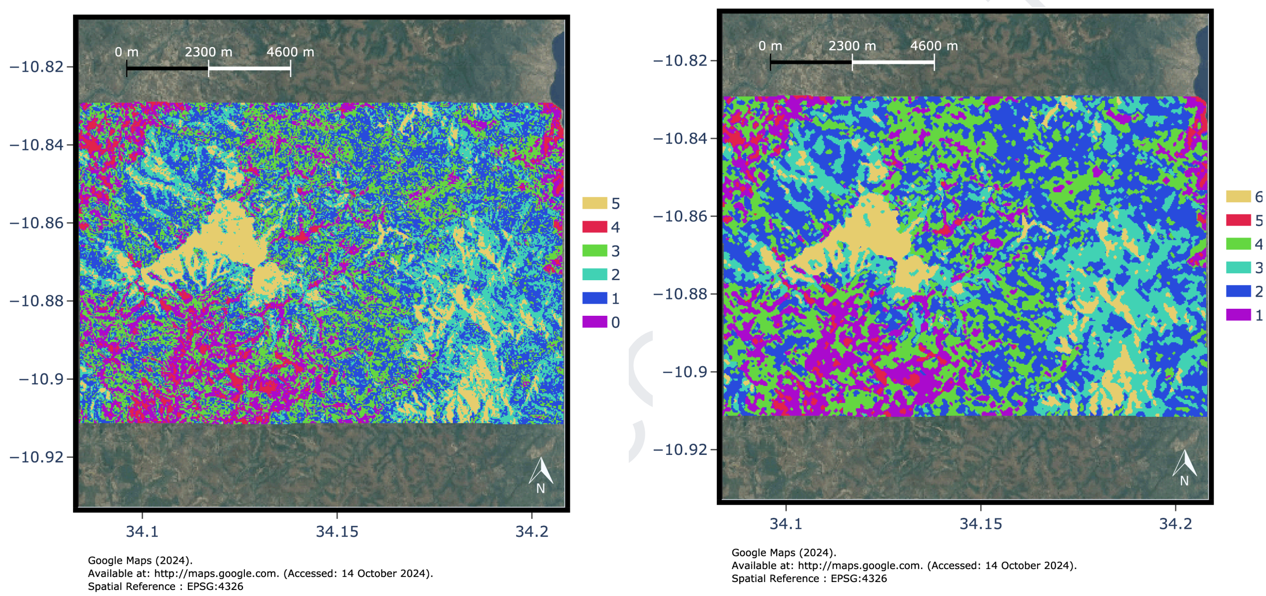

Figure 6: Grouping of clusters

8.2.22 **Matching**. Once clustering and grouping are complete, only classes that correspond to those present within the restoration site(s) are retained for further analysis.

Dynamic Evaluation

Equitable Earth performs a dynamic evaluation of the baseline before verification.

8.2.23 **Refinement of Control Plots**. Equitable Earth reviews the relevance of control plots by screening for AGB trend anomalies (e.g., abrupt AGB loss, unexpected growth spikes, or significant stagnation compared to regional averages).

8.2.23.1 When anomalies are detected, Equitable Earth performs systematic checks to ensure the counterfactual remains intact. A control plot may only be excluded where evidence suggests its relevance has been fundamentally undermined. Grounds for exclusion may include:

1) **Overlapping interventions:** The formal establishment of a protected area, or an independent carbon project within the control plot's boundaries.

2) **Localised extreme events:** Extreme, site-specific events that physically destroy the plot's capacity to support the original vegetation type.

8.2.24 **Assessment of Control Plots.** Equitable Earth performs a Monte-Carlo simulation to assess the change in carbon stock and corresponding uncertainty between the end of monitoring period [m] and the baseline year, following the procedure outlined below:

1) For each cluster, Equitable Earth delineates spatial patches by sub-clustering the pixels within the cluster according to their temporal evolution between the project start date and the end of the current monitoring period, and grouping contiguous pixels exhibiting the same temporal behaviour into discrete patches. Each patch constitutes a single, equally-weighted draw candidate irrespective of its area, such that recurring event types are represented in proportion to their frequency of occurrence rather than their spatial extent.

2) At each iteration, Equitable Earth randomly draws one patch from the set of spatial patches identified within that cluster, and calculates the mean carbon stock change density of that patch. This value is used as the representative carbon stock change density of the cluster for that iteration.

    a) If the mean carbon stock change density is negative (i.e., indicating a net AGB loss across the cluster) the carbon stock change is conservatively assumed to be 0.

    b) If the mean carbon stock change density is positive (i.e., indicating a positive growth across the cluster), it is used to determine the carbon stock change of cluster i, using equation (E.49):

$$\Delta \mathbf{C}^{[m]}_{cluster\ i} = max(0; \Delta \mathbf{C}^{[m]}_{random,i} \times \mathbf{A}^{cluster}_{i}) \qquad \textbf{(E.49)}$$

Where:

- $\Delta \mathbf{C}^{[m]}_{cluster\ i}$ = Carbon stock change of the control plots classified under the cluster i at the end of monitoring period [m]; tCO_2e
- $\Delta \mathbf{C}^{[m]}_{random,i}$ = Mean carbon stock change density of the spatial patch randomly drawn from the cluster i at the end of monitoring period [m]; tCO_2e/ha
- $\mathbf{A}^{cluster}_{i}$ = Size of the project area classified under cluster i; ha

8.2.25 The final adjustments due to the dynamic baseline is determined by equation (E.50)

$$\mathbf{DB}^{[m]} = \sum_{i \in cluster} \Delta \mathbf{C}^{[m]}_{cluster\ i} \qquad \textbf{(E.50)}$$

Where:

- $\mathbf{DB}^{[m]}$ = Baseline adjustment at the end of monitoring period [m]; tCO_2e
- $\Delta \mathbf{C}^{[m]}_{cluster\ i}$ = Carbon stock change of the control plots classified under the cluster i at the end of monitoring period [m]; tCO_2e

Fossil Fuel Use Emissions Quantification

8.2.26 Where emissions related to fossil fuel use are deemed material, as set out in the *Fossil Fuel Use Emissions Estimation* section, developers must monitor and report, for each type of fuel used, the quantity of fuel consumed during each monitoring period, in accordance with the *Monitoring, Reporting, and Verification (MRV)* section.

8.2.27 Equitable Earth applies a standardised conservative emission factor by default to convert fuel consumption into total GHG emissions.

8.2.27.1 Developers may submit, for each type of fuel used, an alternative emission factor, provided that the emission factor is sourced from peer-reviewed literature, national inventory reports, or other publicly available, scientifically credible sources, and is accompanied by a justification of its applicability to the fuel type and context.

8.2.27.2 Equitable Earth reserves the right to accept or reject the proposed value based on the demonstration provided by the developer.

8.2.28 Equitable Earth calculates the total GHG emissions from fossil fuel combustion for a given monitoring period as follows:

$$\mathbf{E}_{fuel}^{[m]} = \sum_{i} \mathbf{FC}_{i}^{[m]} \times \mathbf{EF}_{i} \qquad \textbf{(E.51)}$$

Where:

- $\mathbf{E}_{fuel}^{[m]}$ = GHG emissions resulting from fossil fuel combustion in the monitoring period [m]; tCO2e
- $\mathbf{FC}_{i}^{[m]}$ = Volume of fuel type *i* consumed in the monitoring period [m]; L
- $\mathbf{EF}_{i}$= Emission factor for the fuel type *i*; tCO2e/L

8.3 ECU Accounting

8.3.1 ECUs are issued after verification and throughout the project crediting period.

8.3.2 Total ECUs for the last verification period are calculated following equation (E.52):

$$\mathbf{ECU}^{[m]} = \mathbf{P}_{15}(\mathbf{C}^{[m]}_{rest} - \mathbf{C}^{[0]}_{rest} - \mathbf{L}^{[m]} - \mathbf{DB}^{[m]} - \mathbf{E}^{[m]}_{total-sp} - \mathbf{E}_{fuel}) - \sum_{k=1}^{m-1} \mathbf{ECU}^{[k]} - \mathbf{GHG}_{loss-event} \quad \text{(E.52)}$$

Where:

- $\mathbf{ECU}^{[m]}$= Equitable Carbon Unit issued for the monitoring period [m]; tCO_2e
- $\mathbf{P}_{15}$ = indicates the 15th percentile (i.e., the value that is surpassed by 85% of the observation in the distribution)
- $\mathbf{C}^{[m]}_{rest}$ = Carbon stock of the restoration site at the end of the monitoring period [m]; tCO_2e
- $\mathbf{C}^{[0]}_{rest}$ = Carbon stock of the restoration site at baseline; tCO_2e
- $\mathbf{L}^{[m]}$= Total leakage emissions at the end of the monitoring period [m]; tCO_2e
- $\mathbf{DB}^{[m]}$ = Baseline adjustment at the end of monitoring period [m]; tCO_2e
- $\mathbf{E}^{[m]}_{total-sp}$ = Total emissions from site preparation techniques at the end of the monitoring period [m]; tCO_2e
- $\mathbf{GHG}_{loss-event}$ = Impact of the loss event[31], if applicable; tCO_2e
- $\mathbf{E}_{fuel}$ = Estimated GHG emissions resulting from fossil fuel combustion over the crediting period; tCO_2e[32]

8.3.3 If $\mathbf{ECU}^{[m]}$ is negative, this indicates a reversal. In such cases, the project must follow the procedures outlined in the *Compensation for Reversals* section of the Programme Manual.

[31] In this equation, all carbon stock changes are excluded from $\mathbf{GHG}_{loss\text{-}event}$ as they are already captured through the carbon stock variables in the equation

[32] If emissions are not deemed material $\mathbf{E}_{fuel}$ = 0. Refer to the *Fossil Fuel Use Emissions Estimation* section for more details.

9 Uncertainty & Conservativeness

This section describes how Equitable Earth accounts for uncertainty and the rules enforced to ensure conservative carbon estimations.

9.1 Uncertainty

9.1.1 Equitable Earth accounts for uncertainty in carbon estimation by incorporating standard errors at multiple stages of the biomass quantification process. Two primary sources of uncertainty are explicitly included in the estimation of total carbon stock:

1) AGB uncertainty
2) IPCC parameter uncertainty, affecting the calculation of derived carbon pools such as root-to-shoot (RS) ratio

9.1.2 These uncertainties are integrated at the pixel level and extended to the project through the Monte Carlo simulation. Refer to the *Monte Carlo Simulation* section for more details.

AGB Model Uncertainty

9.1.3 **Pixel-Level Uncertainty.** Equitable Earth uses a model from the AGB provider to generate AGB maps, including a pixel-level standard error for AGB density (AGBD) change estimates at the 95% confidence level. This uncertainty is derived from a map of standard error, based on error propagation analysis across all layers in the time series.

9.1.3.1 The standard error is calculated by considering geolocation, allometric, and model-based errors for AGBD predictions at each time point. The confidence interval for each pixel trajectory is then used to determine the standard error of the AGBD change. Reported AGBD change statistics are based on the sum of significant pixel-level changes (p-value ≤ 0.05).

9.1.4 **Site-Level Uncertainty.** To estimate AGB uncertainty at the site level, Equitable Earth applies Monte Carlo simulations[33]. This approach accounts for variability in pixel-level uncertainties, ensuring robust estimates for large datasets and

[33] Galbally, I. E. (2000). Good practice guidance and uncertainty management in national greenhouse gas inventories: Recent developments.

when spatial correlations are present. Refer to the *Monte Carlo Simulation* section for more details.

Parameter Uncertainty

9.1.5 Equitable Earth creates a probability distribution for each IPCC-derived parameter used in carbon pool estimation.

9.1.6 For each pixel, the best-fitting probability density distribution is defined for the parameter of interest, based on the available data and the statistical properties of the parameter. This approach allows for the propagation of uncertainty stemming from parameter variability into the estimation of derived carbon pools.

9.1.7 **Site-Level Uncertainty.** Equitable Earth incorporates the parameter of interest uncertainty into the broader carbon estimation process through Monte Carlo simulations. In each iteration, a value is randomly drawn from its respective probability distribution for each pixel. This value is then applied to the corresponding equation to generate a pixel-level estimate of the relevant carbon pool.

9.1.8 This uncertainty treatment ensures that all carbon estimates produced by Equitable Earth reflect pixel-level measurement error of all relevant parameters.

9.1.9 The final carbon estimates are always expressed as distributions and used conservatively for unit issuance to determine the overall project uncertainty.

9.2 Conservativeness

The conservative approach applied by Equitable Earth consistently and systematically selects the uncertainty boundary to maintain the most conservative estimates. This prevents any potential overestimation of GHG removals. This section provides details about the conservative approach taken at each step.

9.2.1 **GHG Removal Capacity.** The methods applied by Equitable Earth ensure reliability through a conservative approach. Monte Carlo simulations are used to model uncertainty distribution in biomass estimates. Refer to the *Uncertainty* section for more details.

9.2.2 **Carbon Potential Accounting.** For the quantification of the project's carbon potential, the lower bound of the 70% confidence interval is chosen from the distribution generated by Monte Carlo simulations.

9.2.3 **ECU Accounting.** For the quantification of ECUs, the lower bound of the 70% confidence interval is chosen from the distribution generated by Monte Carlo simulations.

9.2.4 **Leakage.** Equitable Earth applies a conservative approach to account for leakage estimation and quantification. For carbon potential estimations, the biomass within the hosting area is conservatively assumed to be reduced to zero, reflecting a complete displacement of activities. At each verification, the leakage quantification is based on a conservative quantification, using the upper bound of the 90% confidence interval in the distribution of carbon loss in the leakage belt.

9.2.5 **Loss Events.** Equitable Earth conservatively considers a complete loss of BGB and consequently deducts both AGB and BGB from the carbon stock quantification.

Appendix A: AGB Provider

A1.1 Benchmark Process

The selection of a reliable AGB provider is crucial to achieving accurate carbon stock estimations. A benchmarking exercise was conducted to identify the most suitable AGB provider for Equitable Earth. The process overview is described below. Refer to the AGB Benchmark document for more details.

Initial Provider Contact

A1.1.1 Multiple AGB providers were invited to participate in the benchmarking process. Each received a shapefile document with geographic information of a forested area, to apply their AGB models and determine the corresponding values.

Model Output Comparison

A1.1.2 Equitable Earth uses the AGB model outputs from each provider to gather key statistical information, compared across providers. Additionally, a detailed comparison is conducted within selected sub-areas against a designated reference model.

Selection Criteria

A1.1.3 **Precision:** the accuracy of the AGB model in predicting biomass values.

A1.1.4 **Uncertainty analysis:** the methodology for calculating uncertainty and how it is propagated from field measurements to the final AGB model.

A1.1.5 **Coverage:** the extent of the area the model could cover and its flexibility in application.

A1.1.6 **Integration feasibility:** the practicality and efficiency of integrating the model into the Equitable Earth certification process.

Conclusion

A1.1.7 Based on the established criteria, the AGB provider best suited to deliver rigorous, conservative, and accurate data was selected for integration into

Equitable Earth methodologies. For this version of the methodology, Chloris Geospatial has been selected as the primary AGB provider. In cases where Chloris Geospatial is unable to provide timely AGB maps for required areas, Equitable Earth has appointed Kanop as an alternative provider to maintain continuous data availability.

Iteration

A1.1.8 The benchmarking process may be repeated at any time and will occur at a minimum every two years, following the Standard Setting and Methodology Development Procedure. Equitable Earth is committed to using data providers that uphold the principles and level of rigour outlined in this methodology. Regular updates to the benchmarking process enable Equitable Earth to ensure the continued suitability and reliability of its selected AGB provider.

A1.1.9 Equitable Earth may revise its choice of AGB provider following future benchmarking exercises. If such a change is made, it will be communicated through official updates and publicly available documentation.

Appendix B: GHG Parameters

B1.1 Parameters Available at Validation

Data/Parameter	$\mathbf{AGB}^{[0]}_{rest,i}$
Data unit	tDM/ha
Description	Above-ground biomass density of the pixel *i* in the restoration site at baseline
Equation(s)	(E.4), (E.5)
Source of data	AGB provider
Value(s) applied	Since the AGB provider publishes yearly data for AGB density around mid-year for the previous year, Equitable Earth uses: ● The y-2 data as the baseline for projects undergoing certification from January 1st to June 30th (included) of year y. ● The y-1 data as the baseline for projects undergoing certification (or expected to start) from July 1st to December 31st (included) of year y. ● The y-1 data as the baseline for projects having a start date in year y when pre-submission activities have been declared. The chosen baseline year (e.g., y-1 or y-2) will be used throughout the project's crediting period.
Quality Assurance and Quality Control (QA/QC)	Equitable Earth conducted a detailed analysis of the Chloris methodology for AGB calculations, available here. Their model is accessed automatically via a secure API. Equitable Earth performs a series of automated tests within the pipeline that detect anomalies (e.g., impossible values). The system will also produce quality statistics.

Data/Parameter	$\mathbf{SE}_{pixel,0}$
Data unit	tDM/ha
Description	Standard error of the AGB density for each pixel at baseline
Source of data	AGB provider
Value applied	Project-specific

QA/QC	Refer to QA/QC of $\mathbf{AGB}^{[0]}_{rest,i}$

Data/Parameter	ϱ
Data unit	Dimensionless
Description	Correlation factor between the pixels
Equations	(E.2)
Source of data	AGB provider
Value applied	0.01
QA/QC	The correlation factor is provided as part of the AGB provider's model. A detailed analysis of the AGB provider methodology for AGB calculations is available here. Their model is accessed automatically via a secure API. Equitable Earth retains documentation of the AGB provider's methodological specifications, including the correlation factor, and conducts regular check-ins to verify whether updates or methodological improvements have occurred.

Data/Parameter	**RS**
Data unit	Dimensionless
Description	Root-to-shoot ratio. The root-to-shoot ratios applied are based on the 2019 updated values from the IPCC, which provides root-to-shoot (RS) values for each ecological zone across continents (Asia, Africa, North and South America), distinguishing between above-ground biomass values less than and greater than 125 tDM/ha. Equitable Earth uses values specific to natural origins. [34] When no data is available, a conservative value of 0.25 is applied.
Equations	(E.4), (E.7), (E.15), (E.30), (E.39)
Source of data	IPCC 2019 Refinement to the 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	Region-specific and AGB-dependent
QA/QC	IPCC is a reputable source approved under the Equitable Earth

[34] Calvo Buendia, E., Tanabe, K., Kranjc, A., Baasansuren, J., Fukuda, M., Ngarize, S., Osako, A., Pyrozhenko, Y., Shermanau, P. and Federici, S. (2019). 'IPCC 2019, 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories'. Published: IPCC, Switzerland. Volume 4, Chapter 4, Table 4.4, p 4.18. Available at: URL (Accessed 27/05/2024)

	Programme. Equitable Earth performs an automated check at each iteration of the Monte-Carlo to ensure all RS values fall within [0,1]. Any value outside this range is automatically flagged and must be corrected before proceeding.

Data/Parameter	**CF**
Data unit	tC/tDM
Description	Carbon fraction of dry biomass
Equation(s)	(E.6), (E.9), (E.15), (E.32)
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.47
QA/QC	IPCC is a reputable source approved under the Equitable Earth Programme. Equitable Earth regularly checks for IPCC updates and strives to integrate any changes in new versions of the Equitable Earth Programme and/or relevant methodologies.

Data/Parameter	$\mathbf{AGB}_{ref,i}$
Data unit	tDM/ha
Description	Above-ground biomass density of the pixel i in the reference site
Equations	(E.7), (E.8)
Source of data	AGB provider
Value applied	Similarly to baseline, since the AGB provider publishes yearly data for AGB density around mid-year for the previous year, Equitable Earth uses: ● The y-2 data as the baseline for Projects undergoing certification from January 1st to June 30th (included) of year y. ● The y-1 data as the baseline for Projects undergoing certification (or expected to start) from July 1st to December 31st (included) of year y. ● The y-1 data as the baseline for Projects having a Start date in year y when pre-submission activities have been declared.
QA/QC	Refer to QA/QC of $\mathbf{AGB}^{[0]}_{rest,i}$.

Data/Parameter	**A** $_{pixel,i}$ *This parameter encompasses all AGB-related variables, including, but not limited to:* - **A** $_{ref-pixel,i}$ - **A** $_{rest-pixel,i}$
Data unit	ha
Description	Area of pixel i
Equation(s)	(E.10), (E.25), (E.28)
Source of data	AGB Provider
Value(s) applied	Project-specific
QA/QC	N/A

Data/Parameter	**A** $_{ref}$
Data unit	ha
Description	Reference site area
Source of data	Developer with GIS data
Value(s) applied	Project-specific
QA/QC	Equitable Earth checks all relevant references provided by the developer and used to determine the area of the reference site.

Data/Parameter	**P** $_{i}$
Data unit	Dimensionless
Description	Declared % of displacement of the activity
Equations	(E.12), (E.35)
Source of data	Developer in the PDD
Value(s) applied	Project-specific
QA/QC	Developers identify and assess relevant local activities to determine potential sources of leakage and the need for their displacement or

	partial displacement. Equitable Earth cross-checks data with the livelihoods interventions to verify that the leakage mitigation plan corresponds to the percentage informed.

Data/Parameter	$\mathbf{A}_i^{da}$
Data unit	ha
Description	Declared area of a leakage activity i located in the project area
Equation(s)	(E.12), (E.35)
Source of data	Developer with GIS data
Value(s) applied	Project-specific
QA/QC	Developers provide all relevant references and supporting documentation used to determine displaced activity areas, as specified in the methodology.

Data/Parameter	$\mathbf{A}_i^{cluster}$
Data unit	ha
Description	Area of the project classified under cluster i
Equation(s)	(E.49)
Source of data	Equitable Earth with GIS Data
Value(s) applied	Project-specific
QA/QC	The method for identifying clusters is explained under the *Dynamic Baseline* section and has been tested across multiple projects to demonstrate its consistency and robustness. Equitable Earth calculates the Silhouette Score and Davies-Bouldin Index to assess the quality of clustering. The thresholds for these indicators vary depending on the project and are defined on a case-by-case basis.

Data/Parameter	**fd**
Data unit	Dimensionless (%)
Description	Fraction of biomass lost in the disturbance event (i.e. prescribed

	burn in this case)
Equation(s)	(E.15), (E.39)
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 2 (page 18)
Value(s) applied	1
QA/QC	IPCC is a reputable source approved under the Equitable Earth Programme. Equitable Earth regularly checks for IPCC updates and strives to integrate any changes in new versions of the Equitable Earth Programme and/or relevant methodologies.

Data/Parameter	C_f
Data unit	Dimensionless
Description	Combustion factor (proportion of pre-fire fuel biomass consumed)
Equation(s)	(E.16), (E.40)
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 2, Table 2.6
Value(s) applied	Ecosystem dependent (see table in the IPCC document)
QA/QC	IPCC is a reputable source approved under the Equitable Earth Programme. Equitable Earth regularly checks for IPCC updates and strives to integrate any changes in new versions of the Equitable Earth Standard and/or relevant methodologies.

Data/Parameter	$G_{ef,g}$
Data unit	gGHG/kgDM
Description	Emission factor of dry matter burnt per gas g
Equation(s)	(E.16), (E.40)
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 2, Table 2.5
Value(s) applied	GHG dependent (see table in the IPCC document)
QA/QC	IPCC is a reputable source approved under the Equitable Earth

	Programme. Equitable Earth regularly checks for IPCC updates and strives to integrate any changes in new versions of the Equitable Earth Standard and/or relevant methodologies.

Data/Parameter	$\mathbf{GWP}_{g}$
Data unit	Dimensionless
Description	Global warming potential per gas *g*
Equation(s)	(E.16), (E.18), (E.22), (E.23), (E.40), (E.42), (E.46), (E.47)
Source of data	IPCC's Sixth Assessment Report (AR6)
Value(s) applied	GHG dependent. Default values applied by Equitable Earth are defined under the *General Principles* section of the Equitable Earth Standard.
QA/QC	IPCC is a reputable source approved under the Equitable Earth Programme. Equitable Earth regularly checks for IPCC updates and strives to integrate any changes in new versions of the Equitable Earth Standard and/or relevant methodologies.

Data/Parameter	$\mathbf{EF}_{Ndirect,c}$
Data unit	tN2O-N/tN applied
Description	Emission factor for nitrous oxide emissions from N additions due to fertilisers under condition *c*
Equation(s)	(E.18), (E.42)
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, Table 11.1
Value(s) applied	Ecosystem dependent (see table in the IPCC document) Uncertainty ranges are based on the 2.5th to 97.5th percentile interval, from which the standard deviation of the parameter is derived to construct the probability distribution of parameter values.
QA/QC	IPCC is a reputable source approved under the Equitable Earth Programme. Equitable Earth regularly checks for IPCC updates and strives to

	integrate any changes in new versions of the Equitable Earth Standard and/or relevant methodologies.

Data/Parameter	$C_{SF,i}$
Data unit	tN/t fertiliser
Description	N content of synthetic fertiliser *i*
Equation(s)	(E.19), (E.43)
Source of data	N content is determined following the fertiliser manufacturer's specifications.
Value(s) applied	Product-dependent
QA/QC	The developer indicates the N-content of the mass of chemical/fertiliser applied, which is cross referenced with the name, brand, and content of said chemical/fertiliser.

Data/Parameter	$C_{OF,i}$
Data unit	tN/t fertiliser
Description	N content of organic fertiliser *i*
Equation(s)	(E.20), (E.44)
Source of data	N content is determined following the fertiliser manufacturer's specifications.
Value(s) applied	Product-dependent
QA/QC	The developer indicates the N-content of the mass of chemical/fertiliser applied, which is cross referenced with the name, brand, and content of said chemical/fertiliser.

Data/Parameter	$F_{SFvol,c}$
Data unit	(kgNH3–N + NOx–N)/(kgN applied)
Description	Fraction of all synthetic nitrogen added to soils, volatilising as NH3 and NOx under condition c.
Equation(s)	(E.22), (E.46)
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, Table 11.3 (page

	24).
Value(s) applied	Product dependent (see table in the IPCC document) Uncertainty ranges are based on the 2.5th to 97.5th percentile interval, from which the standard deviation of the parameter is derived to construct the probability distribution of parameter values.
QA/QC	IPCC is a reputable source approved under the Equitable Earth Programme. Equitable Earth regularly checks for IPCC updates and strives to integrate any changes in new versions of the Equitable Earth Standard and/or relevant methodologies.

Data/Parameter	F_{OFvol}
Data unit	(kgNH3–N + NOx–N)/(kg N applied or deposited)
Description	Fraction of all organic nitrogen added to soils, volatilising as NH3 and NOx
Equation(s)	(E.22), (E.46)
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, Table 11.3 (page 24)
Value(s) applied	0.21 Uncertainty ranges are based on the 2.5th to 97.5th percentile interval, from which the standard deviation of the parameter is derived to construct the probability distribution of parameter values.
QA/QC	IPCC is a reputable source approved under the Equitable Earth Programme. Equitable Earth regularly checks for IPCC updates and strives to integrate any changes in new versions of the Equitable Earth Standard and/or relevant methodologies.

Data/Parameter	$EF_{Nv,c}$
Data unit	kgN2O–N/(kgNH3–N + NOX–N volatilised)
Description	Emission factor for nitrous oxide emissions from atmospheric deposition of N on soils and water surfaces under condition c
Equation(s)	(E.22), (E.46)
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, Table 11.3 (page

	24).
Value(s) applied	Ecosystem dependent (see table in the IPCC document) Uncertainty ranges are based on the 2.5th to 97.5th percentile interval, from which the standard deviation of the parameter is derived to construct the probability distribution of parameter values.
QA/QC	IPCC is a reputable source approved under the Equitable Earth Programme. Equitable Earth regularly checks for IPCC updates and strives to integrate any changes in new versions of the Equitable Earth Standard and/or relevant methodologies.

Data/Parameter	**F**$_{Fleach}$
Data unit	kgN/(kg of N additions)
Description	Fraction of synthetic or organic nitrogen added to soil lost through leaching and/or runoff, where applicable
Equation(s)	(E.23), (E.47)
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, Table 11.3 (page 24).
Value(s) applied	0.24 Uncertainty ranges are based on the 2.5th to 97.5th percentile interval, from which the standard deviation of the parameter is derived to construct the probability distribution of parameter values.
QA/QC	IPCC is a reputable source approved under the Equitable Earth Programme. Equitable Earth regularly checks for IPCC updates and strives to integrate any changes in new versions of the Equitable Earth Standard and/or relevant methodologies.

Data/Parameter	**EF**$_{Nl}$
Data unit	tN2O-N/(tN leached and/or runoff)
Description	Emission factor for nitrous oxide emissions from N leaching and/or runoff
Equation(s)	(E.23), (E.47)
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National

	Greenhouse Gas Inventories, Volume 4, Chapter 11, Table 11.3 (page 24).
Value(s) applied	0.11 Uncertainty ranges are based on the 2.5th to 97.5th percentile interval, from which the standard deviation of the parameter is derived to construct the probability distribution of parameter values.
QA/QC	IPCC is a reputable source approved under the Equitable Earth Programme. Equitable Earth regularly checks for IPCC updates and strives to integrate any changes in new versions of the Equitable Earth Standard and/or relevant methodologies.

Data/Parameter	A_{rest}
Data unit	ha
Description	Restoration site(s) area
Source of data	Developer with GIS data
Value(s) applied	Project-specific
QA/QC	Developers provide all relevant references used to determine the area of the restoration site(s), as specified in the methodology.

Data/Parameter	Hosting area i
Data unit	ha
Description	The known area where activity shifting leakage of activity i occurs
Source of data	Developer with GIS data
Value(s) applied	Project-specific
QA/QC	Developers provide all relevant references and supporting documentation used to determine hosting areas, as specified in the methodology.

Data/Parameter	Growth rate
Data unit	tCO_2/(ha*year)
Description	Annual increase in above-ground biomass for the relevant biome and location

Source of data	IPCC Guidelines for National Greenhouse Gas Inventories – Volume 4: Agriculture, Forestry and Other Land Use. Chapter 4: Forest Land. Table 4.10.
Value(s) applied	Region-specific
QA/QC	IPCC is a reputable source approved under the Equitable Earth Programme. Equitable Earth performs an automated check to ensure that all growth rates correspond to one of the permissible IPCC values. Any value falling outside this list is automatically flagged and must be corrected before proceeding.

Data/Parameter	$\mathbf{M}_{SF,i,c}$
Data unit	t fertiliser
Description	Estimated mass of N-containing synthetic fertiliser *i* applied under condition c during the crediting period
Equation(s)	(E.19)
Source of data	Estimated mass of synthetic fertiliser applied in the project, as indicated by the developer in the PDD
Value(s) applied	Project-specific
QA/QC	Equitable Earth checks that the mass of fertiliser matches the planned application rate across the size of the intervention area i.

Data/Parameter	$\mathbf{M}_{OF,i,c}$
Data unit	t fertiliser
Description	Estimated mass of N-containing organic fertiliser *i* applied under condition c during the crediting period
Equation(s)	(E.20)
Source of data	Estimated mass of organic fertiliser applied in the project, as indicated by the developer in the PDD.
Value(s) applied	Project-specific
QA/QC	Equitable Earth checks that the mass of fertiliser matches the planned application rate across the size of the intervention area i.

Data/Parameter	$\mathbf{D}_{i}$

Data unit	kilometers
Description	Estimated total distance to be travelled by equipment or vehicle i over the entire crediting period
Equation(s)	(E.26)
Source of data	Developer
Value(s) applied	Project-specific
QA/QC	Cross-checked against the project activities.

Data/Parameter	$\mathbf{T}_i$
Data unit	hours
Description	Estimated total operating time required from equipment or vehicle i over the entire crediting period
Equation(s)	(E.27)
Source of data	Developer
Value(s) applied	Project-specific
QA/QC	Cross-checked against the project activities.

Data/Parameter	$\mathbf{FCR}_i$
Data unit	L/km or L/h
Description	Fuel consumption rate of equipment or vehicle i
Equation(s)	(E.26), (E.27)
Source of data	Developer or a standardised conversion factor, derived from peer-reviewed scientific literature, national inventory reports, or other recognised scientific sources and selected to reflect conservative estimates applicable across project contexts.
Value(s) applied	Equipment or vehicle-specific
QA/QC	N/A

Data/Parameter	$\mathbf{EF}_i$
Data unit	tCO_2e/L

Description	Emission factor for the fuel type used by equipment or vehicle i
Equation(s)	(E.26), (E.27), (E.51)
Source of data	Equitable Earth's standardised conservative conversion factors or Developer
Value(s) applied	Fuel-specific
QA/QC	N/A

B1.2 Monitored Parameters

Data/Parameter	Forest cover$_t$
Data unit	ha
Description	Forest cover surface of the project area in year t
Source of data	Global Forest Watch (GFW)
Monitoring procedure	Forest cover loss is estimated by GFW using satellite imagery. Their model will be accessed and computed to generate alerts and/or detailed reports.
Monitoring frequency	Monthly
QA/QC	GFW is a reputable source approved under the Equitable Earth Programme. The model is accessed automatically via a secure API. Equitable Earth performs checks on data to assess if they have the correct format, are up to date, and correspond to the relevant year.

Data/Parameter	Forest cover leakage belt$_t$
Data unit	ha
Description	Forest cover surface in the leakage belt in year t
Source of data	Global Forest Watch (GFW)
Monitoring procedure	Forest cover loss is estimated by GFW using satellite imagery. Their model will be accessed and computed to generate alerts and/or detailed reports.
Monitoring frequency	Prior to verification, at least every five years

QA/QC	GFW is a reputable source approved under the Equitable Earth Programme. The model is accessed automatically via a secure API. Equitable Earth performs checks on data to assess if they have the correct format, are up to date, and correspond to the relevant year.

Data/Parameter	**AGB**$^{[m]}$ *This parameter encompasses all AGB-related variables, including, but not limited to:* • **AGB**$^{[m]}_{rest}$ • *AGB for loss event(s)* • *AGB in control plots* • *AGB in hosting areas*
Data unit	tDM/ha
Description	Above-ground biomass at the end of the monitoring period [m]
Source of data	AGB provider
Monitoring procedures	Above-ground woody biomass is measured by Chloris using their models based on satellite imagery. Their results will be accessed and computed to generate detailed reports.
Monitoring frequency	Prior to verification, at least every five years, unless a significant loss event is identified.
QA/QC	A detailed analysis of the Chloris methodology for AGB calculations is available here. Their results are accessed automatically via a secure API. A series of automated tests are performed within the pipeline to detect anomalies (e.g. impossible values). The system also produces quality statistics.

Data/Parameter	**SE**$^{[m]}_{pixel}$
Data unit	tDM/ha
Description	Standard error of the AGB density for each pixel at the end of the monitoring period [m]
Source of data	AGB provider
Monitoring procedures	Standard error is provided by the AGB Provider from their models based on satellite imagery. Their results will be accessed and

	computed to generate detailed reports.
Monitoring frequency	Prior to verification, at least every five years
QA/QC	Refer to QA/QC of $\mathbf{AGB}^{[m]}$.

Data/Parameter	$\mathbf{A}_{burn,i}$
Data unit	ha
Description	Intervention area *i* burnt due to prescribed burning as a site preparation technique
Equation(s)	(E.15), (E.16), (E.39), (E.40)
Source of data	Calculated from GIS data
Monitoring Procedure	Equitable Earth monitors the intervention area (delineated by the developers via the certification platform) via satellite imagery and GIS data to ensure the fire remains within the designated boundaries.
Monitoring Frequency	Once in the year of intervention, and once in the subsequent year
QA/QC	The prescribed burn intervention area is validated visually using GIS tools and satellite data. There must be ≥95% alignment between planned vs. actual burn area. Equitable Earth validates the polygon geometry and cross-references it with the fire management plan, allocated permits (if applicable). Equitable Earth ensures the submitted burn date matches the fire management plan for any seasonal restrictions.

Data/Parameter	$\mathbf{AGB}_{site,i}$
Data unit	tDM/ha
Description	Above-ground biomass density at site *i*
Equation(s)	(E.15), (E.16), (E.39), (E.40)
Source of data	AGB provider (Chloris)
Monitoring Procedure	Above-ground woody biomass is measured using satellite imagery.
Monitoring Frequency	Prior to the next following verification, at least every five years

QA/QC	Refer to QA/QC of $\mathbf{AGB}^{[m]}$.

Data/Parameter	$\mathbf{M}^{[m]}_{SF,i,c}$
Data unit	t fertiliser
Description	Mass of N-containing synthetic fertiliser *i* applied under condition c in the monitoring period [m]
Equation(s)	(E.43)
Source of data	Mass of synthetic fertiliser applied in the project, as indicated by the developer.
Monitoring Procedure	Equitable Earth monitors the mass of synthetic fertiliser applied in the project area by reviewing the Monitoring Report.
Monitoring Frequency	Prior to verification, at least every five years
QA/QC	The developer provides invoices for the purchase of chemicals or fertilisers.

Data/Parameter	$\mathbf{M}^{[m]}_{OF,i,c}$
Data unit	t fertiliser
Description	Mass of N-containing organic fertiliser *i* applied under condition c in the monitoring period [m]
Equation(s)	(E.44)
Source of data	Mass of organic fertiliser applied in the project, as indicated by the developer.
Monitoring Procedure	Equitable Earth monitors the mass of organic fertiliser applied in the project area by reviewing the Monitoring Report.
Monitoring Frequency	Prior to verification, at least every five years
QA/QC	The developer provides invoices for the purchase of chemicals or fertilisers.

Data/Parameter	$\mathbf{FC}^{[m]}_{i}$
Data unit	L
Description	Quantity of fuel consumed by equipment or vehicle i in the

	monitoring period [m]
Equation(s)	(E.51)
Source of data	Developer, recorded from fuel purchase invoices
Monitoring Procedure	Recorded from fuel purchase invoices, or equivalent fuel tracking records maintained for each item of equipment or vehicle
Monitoring Frequency	Each monitoring period where fossil fuel emissions were considered material
QA/QC	Cross-checked against the equipment/vehicle list provided by the developer and fuel purchase receipts

Appendix C: Criteria and Requirements for Intensive Site Preparation Methods

This appendix provides specific applicability criteria and requirements for projects using intensive site preparation methods. Projects must follow these criteria and requirements in addition to those set out in the *Site Preparation* section.

C1.1 Chemicals

Applicability Criteria

C1.1.1 The use of chemicals as a site preparation activity may include the following:

C1.1.1.1 **Pest Control Chemicals & Herbicides.** The use of pest control chemicals and herbicides is allowed only when the density and impact of invasive species or pests (e.g., *Brachiaria* grass, leaf-cutter ants, weeds) prevent the establishment, growth, and survival of tree species, as well as natural regeneration, and manual removal is not possible.

C1.1.1.2 **Fertilisers.** The use of fertilisers is allowed only in nutrient-poor soils where the establishment, growth, and survival of tree species, as well as natural regeneration, would not be feasible without nutrient supplementation. Developers must provide evidence that soils are nutrient-poor.

C1.1.2 For every requirement in this subsection asking for proof of soil nutrient levels or the level of chemicals, developers must provide evidence based on soil samples and scientific literature on the specific soil conditions of the project biome/ecosystem.[35]

[35] Equitable Earth does not independently verify the technical accuracy of soil sample data or scientific literature submitted under this requirement. Verification of the validity, traceability, and scientific rigour of soil evidence submitted under this requirement is the responsibility of the VVB at validation and/or verification, where applicable.

Requirements

Worker Safety

C1.1.3 Projects must ensure that all field workers handling chemicals receive training that addresses the potential environmental hazards and safety risks associated with this activity. The developer must provide evidence, including, but not limited to, training materials and certificates of completion.

C1.1.4 Projects must ensure that Personal Protective Equipment (PPE) is used at all times during any contact with and handling of chemicals, including during transport, storage, and application, as appropriate.

Choice of Chemicals

C1.1.5 Projects should prioritise organic fertilisers over synthetic fertilisers.

C1.1.6 Projects must provide a detailed list of all chemicals to be used for site preparation, including the following:

C1.1.6.1 Proof that said chemicals meet internationally recognised human safety standards

C1.1.6.2 Legal status for use and proof of rigorous testing of each chemical in the project jurisdiction

Application

C1.1.7 Projects must indicate the mass applied for each chemical, as well as the method and time of application.

C1.1.8 Projects must implement spot spraying or cut-stump treatments to minimise impacts on non-target species.

C1.1.9 Projects must establish buffer zones around water bodies and wetlands in the project area, maintaining at least a 30-meter no-chemical buffer zone.

C1.1.10 Projects must implement erosion control measures (e.g., mulching, contour ploughing) to prevent runoff.

C1.1.11 Fertilisers must be:

C1.1.11.1 Applied only in amounts necessary to meet specific nutrient deficiencies

C1.1.11.2 Localised around planting holes rather than sprayed in blanket distribution

C1.1.11.3 Avoided altogether in areas where native species are adapted to low-nutrient soils to prevent ecosystem imbalance.

Post-Application Safeguards

C1.1.12 Projects must monitor the levels of chemicals on targeted populations to report on the application's effectiveness. Monitoring must be conducted annually for five years following the date of the last application.

C1.1.13 Projects must assess and report on soil nutrient levels, proving that nutrient levels are not reaching potentially detrimental levels. If nutrient levels are considered too high, projects must adjust fertilisation practices accordingly. Monitoring must be conducted annually for five years following the date of the last application.

C1.1.14 Projects must monitor any contamination or signs of chemicals leaching in nearby water bodies using water samples before application, and following the next two rainfall events exceeding 20 millimetres within 24 hours, within 30 days of application. If any contamination or increase in nutrient content (e.g., nitrogen, phosphorus or potassium) has been detected in the samples, the project must immediately halt the use of chemicals, determine whether the project is responsible for the contamination or not, and if confirmed, implement corrective measures to remove the contamination.

C1.1.15 Projects must revegetate the soil with native or transitory regenerative species within 3 days after invasive species removal (i.e., post-herbicide application).

C1.2 Transitory Non-Native Species

Applicability Criteria

C1.2.1 The use of transitional non-native species as a site preparation activity is only allowed if:

C1.2.1.1 Baseline conditions of the restoration site(s) preclude the establishment of native species due to soil infertility, erosion, or microclimate extremes (e.g., lack of shade, temperature fluctuations), and the transitory non-native species provide critical ecosystem services (e.g., erosion control, shade provision, soil stabilisation) necessary for the establishment of native species.

C1.2.1.2 Their phased removal is planned and included in the intervention plan, in line with the requirements in the *Species Diversity* section, and implemented within a defined timeline.

Requirements

Planning

C1.2.2 Projects must list all transitory non-native species to be used and describe the following:

C1.2.2.1 Their environmental benefits and ability to temporarily support the fast recovery of ecological functions and processes of the ecosystem (e.g., better soil, shadow conditions)

C1.2.2.2 Procedures and timelines for their planting and subsequent removal

C1.2.2.3 Areas where species will be planted

Post-Implementation Safeguards

C1.2.3 Projects must monitor the introduction of non-native species to ensure that they are not spreading beyond the dedicated area(s).

C1.2.3.1 Any transitory non-native species located outside of the dedicated area(s) must be eradicated.

C1.2.4 Projects must remove non-native transitory species from the restoration site(s) within a defined timeline.

C1.3 Mechanical Intervention

Applicability Criteria

C1.3.1 Mechanical interventions[36] are permitted only:

[36] The use of any kind of machinery or physical methods as a site preparation method.

C1.3.1.1 In areas where soil conditions (e.g., compaction, poor drainage) require mechanical treatment to enable tree establishment and growth, and where manual methods are not feasible

C1.3.1.2 As long as soil in the intervention area is not inverted to a depth greater than 25 centimetres

C1.3.1.3 As long as the hydrology of the project area is not manipulated or impacted (e.g., by draining wetlands, pumping groundwater, or engaging in other activities that lower the water table).

Requirements

Planning

C1.3.2 Projects must provide a comprehensive description of the machinery to be used, including the intensity and frequency of the planned intervention.

C1.3.3 Projects must ensure that all field workers operating heavy machinery receive training that addresses the potential environmental hazards and safety risks associated with this activity. The developer must provide evidence, including but not limited to training materials and certificates of completion, to Equitable Earth and the VVB for review.

C1.3.4 Projects must obtain any required permits from the project jurisdiction before implementing the corresponding intervention.

C1.3.5 Where fossil fuel and machinery emissions associated with mechanical intervention are determined to be material, projects must monitor and report their fuel consumption for each type of fossil fuel used for the following monitoring period. For more details, refer to the *Fossil Fuel Emissions Estimation* section.

C1.3.6 During the monitoring period, projects must maintain records of fuel consumption used for mechanical intervention and provide the information in the Monitoring Report.

C1.3.7 If developers deviate from planned project activities during the crediting period in a manner that impacts fossil fuel and machinery emissions (e.g., an increase in the use of heavy machinery), developers must notify Equitable Earth following the procedures for design deviations set out in the Programme Manual. In such cases, Equitable Earth may reassess materiality and/or require developers to monitor and report on emissions throughout the remainder of the crediting period.

Application

C1.3.8 Projects must strive to minimise soil disturbance and/or disruption by using the least invasive mechanical removal technique possible. Such techniques include, but are not limited to, the adoption of:

C1.3.8.1 Minimal tillage and strip tilling, or patch treatments, to improve soil quality. These activities should be executed selectively to avoid erosion risks.

C1.3.8.2 Scarification, subsoiling, digging, or mounding techniques that target only localised areas to minimise disturbance.

Post-Preparation Safeguards

C1.3.9 Projects must install physical barriers (e.g., silt fences, fibre rolls) in erosion-prone areas, especially on slopes ≥3%.

C1.3.10 Projects must revegetate within 3 days after the mechanical intervention and do so using appropriate species (i.e., native species or transitory species depending on soil conditions as pre-determined by soil samples), to stabilise the soil.

C1.3.11 Projects must provide a monitoring plan for erosion and compaction post-treatment.

C1.4 Prescribed Burns

Applicability Criteria

C1.4.1 Prescribed burns are allowed only:

C1.4.1.1 When no other site preparation method is suitable for controlling invasive species, or when it is necessary to reduce wildfire risks by managing vegetation loads or creating firebreaks in fire-prone areas

C1.4.1.2 In fire-adapted ecosystems, where it is essential for natural ecological processes, such as nutrient cycling and seed germination, particularly when it aligns with and upholds sustainable community practices, Indigenous knowledge, and traditional forest management

Requirements

Pre-Burn Preparation

C1.4.2 Projects must indicate the total area subject to the prescribed burn, and provide a shapefile delimiting the area(s).

C1.4.3 Projects must obtain fire permits in compliance with laws in the project's jurisdiction, if applicable.

C1.4.4 Projects must perform a detailed site assessment and report on the:

1) Planned fuel load, intensity, and frequency in each of the target sites
2) Historical fire regime of the ecosystem
3) Seasonality and weather conditions for the planned prescribed-fire activities

C1.4.5 Projects must ensure that all staff members involved in planning, executing, and monitoring the prescribed burn are trained. The developer must justify to Equitable Earth and the VVB why the training material used is adequate.

C1.4.6 Projects must register the details of all team members who will plan and execute the prescribed burn, including their contact details and certifications of training completion.

C1.4.7 Projects must provide a comprehensive fire management plan including the following elements:

1) Number of intended fire-management cycles, with justification
2) Availability of PPE for each involved staff member
3) Number of staff members trained on fire management, including the certificate of training.

Implementation

C1.4.8 Projects must not conduct any prescribed burns during the dry season of the project location.

C1.4.9 Projects must ensure at least two trained individuals are present per hectare burned and at least one water unit per five hectares. Water units may include, but are not limited to, fire trucks, pick-up mounted skids, tanker trucks, fire hydrants, and on-site tanks.

C1.4.10 Projects must create firebreaks around the area intended for prescribed burning.

C1.4.11 Projects must create 15-meter-wide buffer zones around the area assigned for prescribed burning.

C1.4.12 Projects must deploy only trained fire brigades with on-site firefighting equipment during prescribed burns.

Post-Burn Safeguards

C1.4.13 Projects must ensure that any prescribed burn is completely extinguished before physically leaving the site.

C1.4.14 Projects must implement erosion control measures (e.g., mulching, fast-growing cover crops) post-burn to stabilise soils.

C1.4.15 Projects must revegetate the soil as soon as fire is completely extinguished and do so using appropriate species (i.e., native species or transitory species depending on soil conditions as pre-determined by soil samples), to stabilise the soil.

C1.4.16 Projects must monitor the site for re-ignition risks daily during the week following the intervention and for invasive species regrowth for the entire crediting period.

Appendix D: Random Plot Procedure

This appendix outlines the procedure used by Equitable Earth to randomly assign field survey plots within the restoration site(s).

D1.1.1 The K-means clustering algorithm[37] is applied to stratify the restoration site(s) into a maximum of five clusters, grouping areas with similar land characteristics (e.g., AGB level, elevation, slope profile). Historical land-cover data is used for clustering, with more recent data given greater weighting where available.

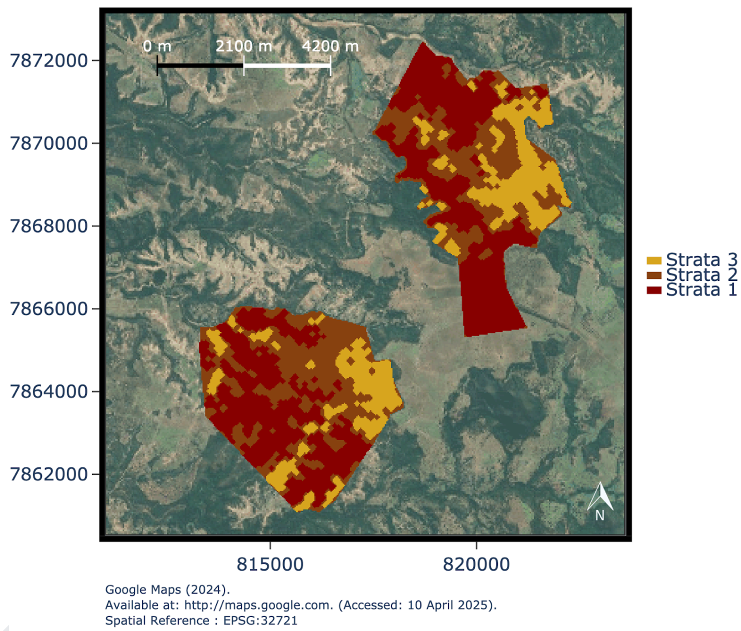

Figure 9. Stratification of the project crediting area.

D1.1.2 The resulting strata are extracted as one or more distinct shapes, which may be spatially disaggregated depending on the area heterogeneity. A 100-meter buffer is applied around each shape to prevent overlap and ensure a minimum distance between survey plots belonging to different clusters.

[37] The K-means clustering algorithm is a common machine learning tool that groups similar data points into K distinct clusters such that points within each cluster are as similar as possible, while clusters themselves are as distinct as possible from each other.

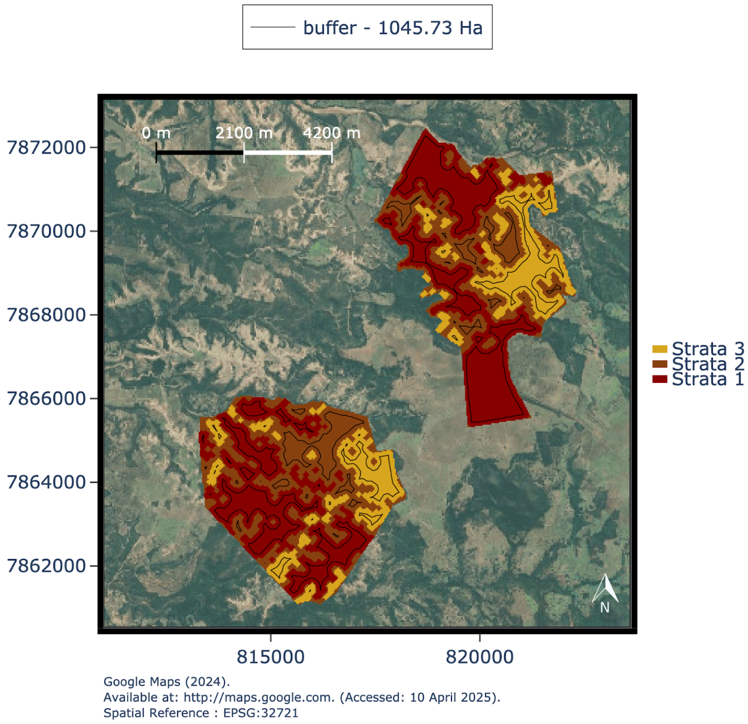

Figure 10. Stratification with a 100m buffer applied.

D1.1.3 Each shape should fall between 5 hectares and 10 hectares with a 100-meter buffer. Shapes exceeding 10 hectares are randomly split into sub-shapes until all comply with the 10-hectare upper size limit. However, if the above constraints result in too few eligible shapes, Equitable Earth may incrementally reduce:

D1.1.3.1 The minimum plot size to 1 hectare (below that threshold, the shape would be removed).

D1.1.3.2 The buffer to 10 meters.

D1.1.4 Therefore, an individual stratum is only produced if it contains at least one shape measuring 1 hectare or more after subtracting a 10 to 100-meter buffer.

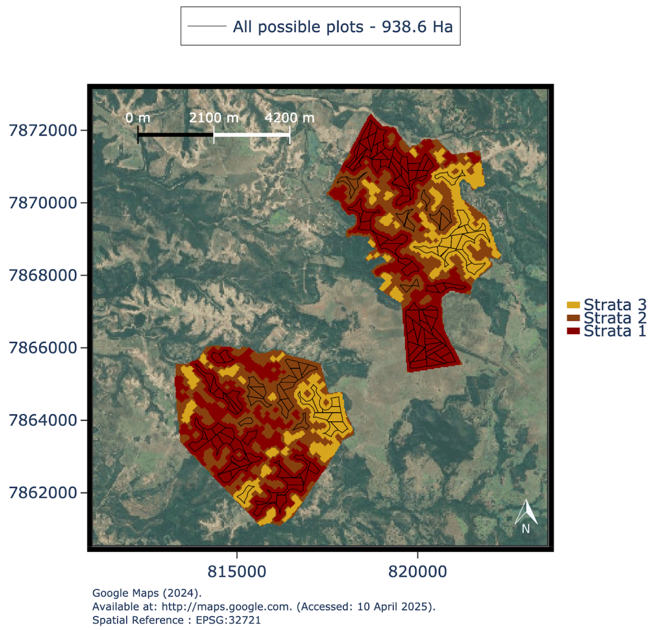

Figure 11. Sub-division into compliant plot sizes.

D1.1.5 A maximum of three survey plots per stratum are selected through a weighted random sampling method, using the following protocol.

D1.1.5.1 **First Plot Selection.** The initial plot is chosen based on probability weighted by area size (i.e., the larger the shapes, the higher the odds).

D1.1.5.2 **Subsequent Plot Selection.** Each additional plot is selected based on a composite probability weighted by both area size and distance from already selected plots, calculated with the following equation (E.53):

$$\mathbf{p}_i = \boldsymbol{\alpha} \times \left(\frac{\mathbf{area}_i}{\sum_{j=1}^{n} \mathbf{area}}\right) + \boldsymbol{\beta} \times \frac{\overline{\mathbf{distance}_i}}{\mathbf{max}_r(\overline{\mathbf{distance}_r})} \quad \textbf{(E.53)}$$

Where:

- $\boldsymbol{\alpha}$ = Area weight score; dimensionless
- $\boldsymbol{\beta}$ = Distance weight score; dimensionless
- $\mathbf{area}_i$ = Size of shape i; ha

- $\overline{\textbf{distance}}_i$ = Average distance of shape i from previously selected shapes; m
- $\sum_{j=1}^{n} \textbf{area}_j$ = Size of all remaining shapes; ha
- $\textbf{max}_r(\overline{\textbf{distance}}_r)$ = Maximum average distance of all remaining shapes r to the previously selected shapes; ha

D1.1.6 **Termination.** The process stops when either three plots are selected per cluster or all eligible shapes have been evaluated.

D1.1.7 Once the survey plots have been selected, they are automatically integrated into the Equitable Earth Mobile App. Developers may then access these predefined locations to conduct their field assessments. Please refer to the *Field Assessment* section for more details.

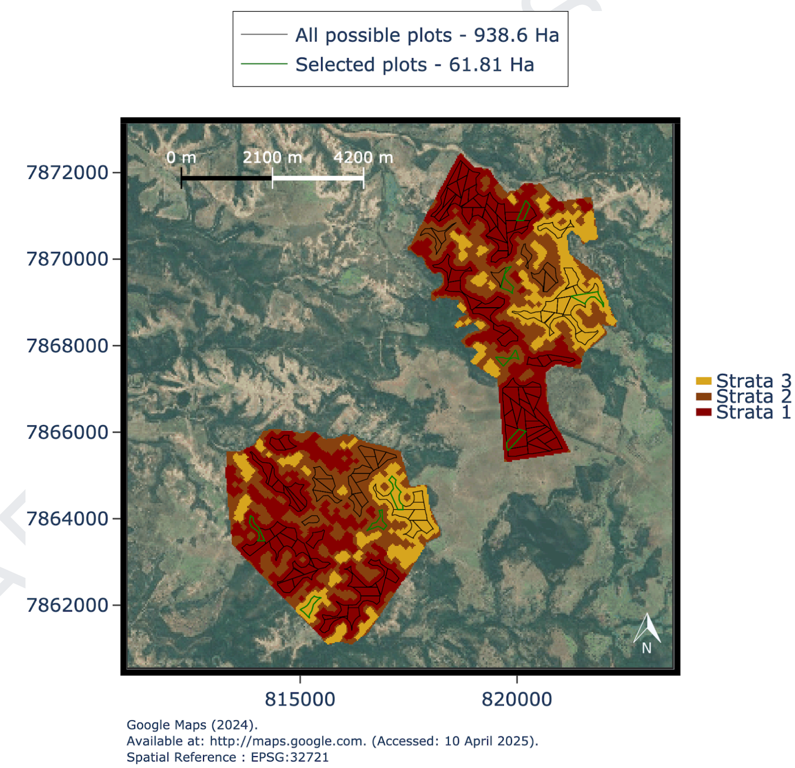

Figure 12. Selection of random plots per strata.

Appendix E: Documentation History

Version	*Date*	*Comment*
1.1	05/07/2024	Public release of version 1.1 of the *M001 - Methodology for Terrestrial Forest Restoration*
1.1	26/07/2024	Update for minor typographical revisions
1.1	28/11/2024	Updates to address the accreditation Clarification Request. Main updates include: Section '*CARBON - Leakage*' (page 26) ● clarified requirements for leakage monitoring and reporting. Section '*CARBON - Additionality*' (page 20) ● clarified principles for every barrier of the barrier analysis. Section '*Adjustment factors - Leakage*' (page 20): ● clarified requirements for leakage monitoring.
1.2	01/08/2025	Public release of version 1.2 of the *M001 - Methodology for Terrestrial Forest Restoration*. The complete list of revisions and updates to the documentation is available at the following link.
1.3	[TBD]	Public release of version 1.3 of the *M001 - Methodology for Terrestrial Forest Restoration*. The complete list of revisions and updates to the documentation is available at the following link.

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