Verified Carbon Standard

SILVADOR CLIMATE ACTION

GreenRaise

Document Prepared by GreenRaise Consulting GmbH

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CONTENTS

1 PROJECT DETAILS

1.1 Summary Description of the Project

Silvador Company SRL and Forest Capital SRL (here on in Silvador) own private forestlands in Romania and are developing a forest carbon credit project to achieve greenhouse gas (GHG) emission reductions and removals through the conservation of logged to protected (LtPF) privately owned forests. The project will be implemented following the Verified Carbon Standard (VCS) VM0012 – Improved Forest Management in Temperate and Boreal Forests (LtPF), v1.2 methodology. The project area encompasses properties owned by Silvador and they have the authority to implement project activities on the properties, such as a carbon crediting project by directing forest planning. The project currently consists of a single Project Activity Instance (PAI).

The current geographic area is composed of 11 private forest parcels located in the counties of, Buzău, Dâmbovița, with future instances to be located in Argeș, Prahova, and Teleorman. The PAI occupies 1,538 hectares (ha). The PAI areas are non-contiguous and are comprised of properties privately owned and operated by Silvador. All properties were managed for timber harvest prior to the implementation of the carbon crediting project and forest operations occurred under existing forest management plans.

Carbon emission offsets were calculated by comparing the project scenario which ceases all timber harvesting, to a baseline scenario which represents regular forest harvesting operations. Carbon pools will be estimated with the Operational-Scale Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3) – Version 1.2, allowing for the calculation of carbon emission offsets. The baseline scenario for the project will be the continuation of allowable commercial harvesting for the next 30 years. The harvest schedule is implemented under the baseline scenario using the regional harvesting practices of thinning, sanitary, and hygienic cuttings.

The project scenario converts harvestable, managed forests to conserved forests by discontinuing timber cuttings within the PAIs. The project will undertake ongoing low levels of management activities for forest maintenance, ecological enhancement, and/or risk mitigation. An estimated 374,552 tonnes of carbon dioxide equivalent (tCO_2e) are anticipated to be reduced from the atmosphere over the 30-year project period.

No historic crediting period data is applicable at this time as the project is currently seeking initial validation and verification.

1.2 Sectoral Scope and Project Type

Sectoral Scope 14

Improved Forest Management (IFM)

Logged to Protected Forest (LtPF)

The Silvador Climate Action (SCA) is a Grouped Project, allowing for the addition of PAIs following project validation.

1.3 Project Eligibility

The SCA will reduce net GHG emissions through the elimination of harvesting in the project area, thereby converting logged forests to protected forests. The SCA (and specifically the current PAI) satisfies the criteria for the VCS Improved Forest Management – Logged to Protected Forests (IFM-LtPF), as defined in the VCS Standard v4.4 and the applicability condition as described within the VCS-VM0012 methodology:

1. The project (and specifically the current PAI) meets the most recent approved criteria for VCS IMF-LtPF eligible projects.
2. The project (and specifically the current PAI) is within the Temperate Global Ecological Zone (as defined by Food and Agriculture Organization of the United Nations (FAO) (FAO, 2001), are forest lands remaining forest lands (as defined by IPCC (IPCC, 2003)), and which meet IPCC GPG LULUCF Tier III inventory and data requirements (IPCC, 2003).
3. The project (and specifically the current PAI) meets the most current approved VCS Standard requirements for ownership, by being able to demonstrate Proof of Right of Right of Use ownership of carbon rights in accordance with VCS requirements:
4. The SCA implementation does not violate any applicable laws in Romania, whether enforceable or not.
5. There are de minims (less than 5%) amounts of illegal, unplanned or fuelwood removals from the PAI in the baseline scenario.
6. The project (and specifically the current PAI) area does not encompass peatland forests as defined by IPCC GPG LULUCF. See Appendix 6 – Peatland Map
7. The project (and specifically the current PAI) area does not include wetlands.
8. There is no planned compensatory harvesting on other lands held by the owners of the PAI. Activity shifting leakage will be monitored and reported annually as required by VCS standards.
9. The owner of the PAI will not apply organic or inorganic fertilizer in the project scenario.

Future (new) PAI(s) will only be included in the project when the above (and those noted in Section 1.4.1) noted eligibility criteria are met.

1.4 Project Design

The SCA is a grouped project to allow multiple PAIs to be established within the project area (See Section 1.4.1 below). Conditions within the project area at the time of validation have been used to create the baseline scenario and determine project additionality. The baseline scenario and additionality assessments have been completed within one clearly defined geographic area for The SCA (Figure 2. Overview of the Silvador Climate Action). The current project will only include one project activity, and initially one PAI, implemented under the VM0012 methodology. Additional PAIs may be implemented following initial project validation.

1.4.1 Eligibility Criteria for the Inclusion of New Project Activity Instances

Inclusion of additional PAI(s) in the SCA must adhere to the following eligibility criteria:

1. The PAI must meet the applicability conditions defined in the most recent version of the VCS methodology VM0012 – Improved Forest Management in Temperate and Boreal Forests (LtPF), or conditions specified in the applicable methodology selected.
2. The new PAI must utilize all technologies or measures used in this document and must satisfy conditions of the selected methodology. Any novel technologies utilized shall be clearly identified and defined.
3. Technologies or measures shall be applied in a similar fashion as outlined in this project description document.
4. The PAI will utilize the same baseline scenario as described in Section 3.4 or a baseline scenario appropriate to the specified methodology for the geographic area defined in Section 3.3 (Project Boundary).
5. The PAIs will have characteristics with respect to additionality that are consistent with the initial instance of the project and geographic area. Such characteristics include financial and technical parameters or barriers.
6. Additional activity instances must also satisfy inclusion requirements as outlined in the VCS Standard v4.4, Section 3.6 (Project Design).
7. The PAI must use the GHG information systems and controls (or equivalent) in use by the Project Proponent, Project Developer and/or the Implementation Partner.

For clarity, the current PAI meets the eligibility criteria noted above.

1.4.2 GHG Information Systems and Controls

GHG Information systems include but may not be limited to the following:

1. Carbon Budget Model of the Canadian Forest Service (CBM-CFS3)
2. Harvested Wood Products model from GreenRaise (GreenRaise)
3. Emission model from GreenRaise
4. Uncertainty model from GreenRaise

GHG controls include but may not be limited to the following:

1. Standard Operating Procedure – Monitoring; from GreenRaise
2. Standard Operating Procedure – Stakeholder Consultation + Engagement; from GreenRaise

1.5 Project Proponent

Table 1: Project Proponents Information

Organization name	Silvador Company SRL
Contact person	Vlad Chitulescu
Title	Director
Address	Bld, Libertatii nr.1 Targoviste, Dambovita, Romania, 130009
Telephone	+40 0740 208 268
Email	v.chitulescu@silvador.ro

Organization name	Forest Capital SRL
Contact person	Vlad Chitulescu
Title	Director
Address	Viforata, Silozului Nr.2 Aninoasa, Dambovita, Romania 130007
Telephone	+40 0740 208 268
Email	v.chitulescu@silvador.ro

1.6 Other Entities Involved in the Project

Table 2: Information of Other Involved Entities

Organization name	GreenRaise Consulting GmbH
Role in the project	Authorized Representative, Implementation Partner, Project Developer
Contact person	Jason Zimmerman, RPF
Title	Director
Address	1010 Vienna, Rudolfsplatz 9/8, Austria
Telephone	+1 604 619 1585
Email	jason@green-raise.com

Organization name	Global Forest Support GmbH.
Role in the project	Listing Representor, Authorized Representative
Contact person	Jason Zimmermann, RPF
Title	Director
Address	1010 Vienna, Rudolfsplatz 9/8, Austria
Telephone	+1 604 619 1585
Email	jason@globalforestsupport.com
Organization name	Zimmfor Management Services Ltd.
Role in the project	Implementation Partner, Project Developer
Contact person	Jason Zimmermann
Title	President
Address	2218-D Airport Drive, Campbell River, BC V9H 0E2, Canada
Telephone	+1 604 619 1585
Email	jason@zimmfor.com

1.6.1 Roles and Responsibilities

Listing Representor (Global Forest Support GmbH)

- Authorized by the Project Proponent to list the Project on the VCS Project Pipeline.

Authorized Representative (GreenRaise Consulting GmbH)

- Communicate with and provide instructions to the Verra Registry on behalf of the Project Proponent(s).
- Designate the account into which VCU's may be deposited

Implementation Partner (GreenRaise Consulting GmbH; Zimmfor Management Services Ltd.)

- Work in partnership with the Project Proponent(s) to obtain project validation
- Assist with obtaining verified carbon units through verification audits
- Perform project monitoring requirements (including field work and follow-up required reporting)

Project Developer (GreenRaise Consulting GmbH; Zimmfor Management Services Ltd.)

- Develop and provide all required deliverables for project validation/verification including but not limited to:
    - Project Description Document

- Project Monitoring Report
- AFOLU Non-permanence Risk Assessment
- Completed VCS Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities
- Baseline and project carbon modelling
- Stakeholder and Community Engagement reference materials
- Standard Operating Procedures for project implementation and validation

1.7 Ownership

Forest Lands within The SCA are legally owned by the Project Proponents. The management of forest resources and implementation of forest operations and plans fall under the directives of Silvador management representatives in accordance with the Forestry Code (Law 26/1996) and the regulations of the forestry regime and administration of the national forest fund. Silvador consents to the implementation of the carbon crediting project on their privately owned lands.

The SCA area is part of a much larger privately owned land base. Land deed documents verifying ownership of the Silvador properties included in the project area were provided through the National Agency for Cadastre and Real Estate Advertising Institution[1]. Activities carried out by the agency include but are not limited to, the coordination and control of land and building registries for all of Romania. Implementation of land ownership registry, documentation, taxes, record keeping as such, and are governed under Law No.7 Of March 13, 1996 (Republished) Cadastre and Real Estate Advertising[2]. Samples of specific properties included in the project are provided below. The notarized Extract of Land Deed for property information will be provided to the validation body for each land district parcel upon request (*Silvador_ForestCapital_Ownership(Mar'23).xlsx*) spreadsheet.

Table 3: Supporting Property Ownership Information (Sample)[3]

Cadastre Office	No.	Cadastral No	Land Section	Parcel No.	Ownership
Buzau	A1	25902	35, 36	1486, 1491	Forest Capital
Buzau	A1	22473	11	346	Silvador

[1] For Further Information, see The National Agency for Cadastre and Real Estate Advertising Institution: epay.ancpi.ro

[2] Law No.7 of 13 March 1996: https://www.global-regulation.com/translation/romania/3748442/law-no.-7-of-13-march-1996-%2528republished%2529-cadastre-and-real-estate-advertising-nr.-7-1996%2529.html

[3] Refer to Appendix for a complete list of polygons.

1.8 Start Date

The SCA start date is August 1, 2020. As of that date, all harvesting activities within the PAI of the project area have been curtailed.

1.9 Project Crediting Period

Project activities were initiated on 01 of August of 2020 and will be completed on the 31 of July of 2050. The project period will be 30 years.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

The SCA estimates emission reductions/removals at 12,082 tonnes of CO2e annually.

Table 4: Project Scale

Project Scale	
Project	X
Large project	

Table 5: Estimated GHG Emission Reductions and Removals

Year	Estimated GHG emission reductions or removals (tCO_2e)
01-August-2020 - 31-December-2020	14,069
01-January-2021 - 31-December-2021	20,739
01-January-2022 - 31-December-2022	55,869
01-January-2023 - 31-December-2023	8,354
01-January-2024 - 31-December-2024	9,595
01-January-2025 - 31-December-2025	10,536
01-January-2026 - 31-December-2026	10,265
01-January-2027 - 31-December-2027	12,132

Year	Estimated GHG emission reductions or removals (tCO_2e)
01-January-2028 - 31-December-2028	9,364
01-January-2029 - 31-December-2029	12,566
01-January-2030 - 31-December-2030	10,685
01-January-2031 - 31-December-2031	12,688
01-January-2032 - 31-December-2032	14,618
01-January-2033 - 31-December-2033	17,794
01-January-2034 - 31-December-2034	12,579
01-January-2035 - 31-December-2035	7,759
01-January-2036 - 31-December-2036	11,876
01-January-2037 - 31-December-2037	11,493
01-January-2038 - 31-December-2038	7,660
01-January-2039 - 31-December-2039	4,750
01-January-2040 - 31-December-2040	-17,168
01-January-2041 - 31-December-2041	14,488
01-January-2042 - 31-December-2042	11,474
01-January-2043 - 31-December-2043	8,682
01-January-2044 - 31-December-2044	12,280
01-January-2045 - 31-December-2045	14,803
01-January-2046 - 31-December-2046	11,384
01-January-2047 - 31-December-2047	13,169

Year	Estimated GHG emission reductions or removals (tCO_2e)
01-January-2048 - 31-December-2048	13,693
01-January-2049 - 31-December-2049	18,979
01-January-2050 - 31-July-2050	-2,621
Total estimated ERs	374,552
Total number of crediting years	30
Average annual ERs	12,082

1.11 Description of the Project Activity

The SCA emphasizes the protection of forests that are culturally and ecologically significant on private lands located in the counties of Argeș, Buzău, Dâmbovița, Prahova, and Teleorman, Romania. The Project Proponent will implement the IFM project by reducing GHG emissions through deferral of timber harvest and other forestry related operations. Ecosystem protection is achieved through the conversion of industrial forests to protected forest, increasing carbon retention, and avoiding future GHG emissions from felling operations.

Novel technologies, products or services will not be required for project implementation. The SCA will be implemented following logged to protected forest conservation principles, which include forest health monitoring, and property supervision. Low levels of timber harvest may be required for forest health maintenance, as deemed necessary. Emissions from forest health management shall be tracked and accounted for in carbon flow projections.

As the Project Proponent, Silvador will oversee the implementation of the project, including all maintenance activities such as monitoring and subsequent verification events. Currently, no other entities (i.e., communities, other organizations) are directly involved in the implementation of the project, however, other entities could be included in the future as an additional proponent(s) as part of the grouped project.

The project is not located within a jurisdiction covered by a jurisdictional *REDD+* program.

1.12 Project Location

The PAI is located within Silvador/Forest Capital privately owned forest lands. The geographic project area includes the counties of Argeș, Buzău, Dâmbovița, Prahova, and Teleorman. Areas bordering the project area include a mixture of private forest and state lands. The current extent of the PAI is described by the geodetic coordinates within

Table 6: Project Geographic Boundary below, map(s) within Section 3.3 (Project Boundary) and in the associated KML file located within the Verra Registry.

Table 6: Project Geographic Boundary

	Extent Coordinates			
Coordinate System	North	South	East	West
GCS_WGS_84	45.274769	44.641421	26.700656	24.957056

1.13 Conditions Prior to Project Initiation

Ecosystem type: The SCA area covers a large geographical area across multiple counties and is composed of a diverse mix of forest ecosystems, topography, and climatic conditions, which vary with elevations.

The forest lands in Buzău county is typically composed of Oak, Hornbeam, and Beech forests, located on mid slopes ranging between 140m-430m in elevation. Climatic designation according to the Köppen Geiger climate classification[4] is *Dfb*, or Hemiboreal. Summers here are warm but not hot, with average temperatures below 22'c. Annual rainfall amounts usually vary between 500-600mm. The predominant soil type is Luvisols.

Dâmbovița county forest lands contains species compositions composed primarily of Beech, Hornbeam, Oak, Acacia, and Pine. Slopes here are described as slight to moderate and terraced in some areas. Elevations range from 110m to 620m. The climatic conditions on average are Hemiboreal with precipitation averaging 650mm annually. The predominant soil types are Luvisols and Alluvial Protosols.

[4] https://en.wikipedia.org/wiki/K%C3%B6ppen_climate_classification

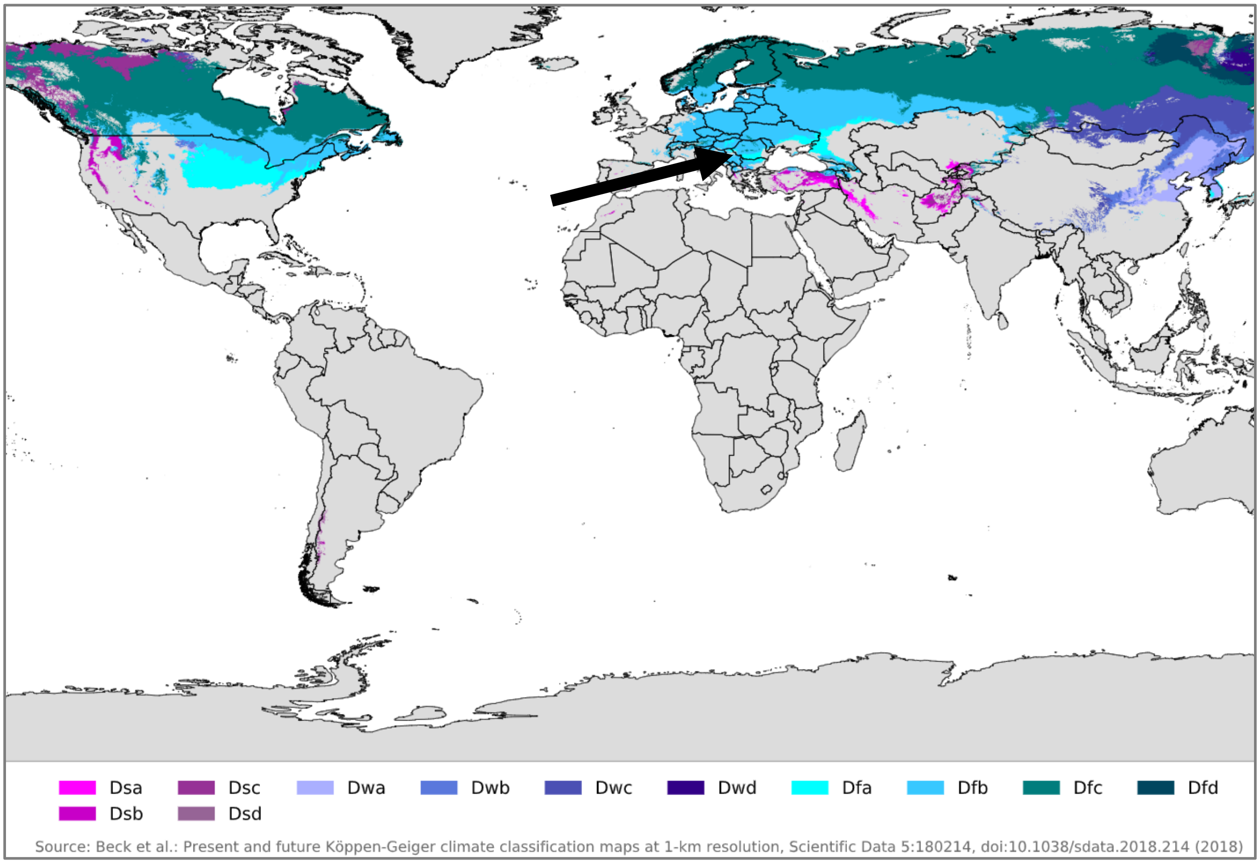

Figure 1: Koppen-Geiger classification Map, Humid continental climate, Romania

Current and historical land-use: The conditions existing prior to the initiation of The SCA are the same as the baseline scenario. Refer to Section 3.4 for a full description of the baseline scenario.

The geographical extent of the project instances contributes to a wide range of pre-project site conditions. The selected areas are within Silvador's operational timber harvest land base and were previously managed for timber harvest activities.

Historical land use surrounding the project area is primarily related to timber harvest operations. Silvador has maintained timber harvest operations in Romania for more than 10 years. The Project Proponent manages the harvesting operations of both entities on private lands.

The land within the project area has not been cleared of native ecosystems within 10-years of the project start date.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

In Romania the legal right to manage and harvest forest fund properties falls under Law 46/2008, (The Forestry Code). Under this law, its regulations, and ministerial orders, all forest property owners (public or private), must adhere to the following forestry regime obligations:

- Forested lands are to be placed under special administration
- Under special administration all forested lands greater than 10 hectares must have a management plan which is required to be followed. This includes forest stand regenerative efforts, harvest volume extraction availability, forest pest and disease control measures, protection from illegal harvesting, weather events, and fire prevention and extinguishing measures.
- Forest roads located on the property must be maintained and repaired.
- Owners must ensure harvest operations are conducted lawfully and in a sustainable manner after forest inventory valuations.
- Property boundaries are physically identified as per ownership deeds.
- Central public authorities responsible for forestry are notified within 60 days of ownership transfers of forest lands.

Prior to any timber harvesting, the contractor or landowner, is required to obtain legal harvest permits, certificates, and environmental approvals. The guidelines for timber harvesting are further outlined in the Forestry Code and the Ministerial Order 1540/2011 on harvesting rules. Proper forest management establishes the economic objectives of productive forest fund stands, while maintaining the biodiversity of natural ecosystems.

Project activities do not disobey any applicable laws and ordinances as outlined under the Romanian Forestry Code. All legal requirements have been fulfilled and described as part of the Silvador Forest Management Plan development. A more extensive list of legislation governs forest activities in Romania, which includes, but is not limited to, the laws and orders listed below:

Table 7: Legislation Governing Forest Lands

Legislation	Description
Law 46/2008 (Forestry Code)	Legislation applicable to all forest fund properties in Romania, in particular the ownership rights, management processes and harvest stipulations required for sustainable forest management and environmental practices. Includes mandated Forest Management Plans on forested areas greater than 10 hectares and outlines specifications of plan developments and ownership obligations.
Law No. 18 on Land Fund	This law establishes the land tenure system in Romania. Lands are classified by categories and ownership rights and must be registered in accordance with law. Provisions that are relevant include Procedural provisions IV and V; Use of land for agricultural and silvicultural production, and Land use for agricultural and forestry production.

Legislation	Description
Ministerial Order Nr. 23/2009	This regulation describes the security structures, organizations, and legal obligations of forestry personnel within the framework of forest management and service contracts for the protection of forest funds from illegal activities.
Ministerial Order Nr. 460/2010	The general provision of this order is to establish the certification methodologies for forest management plan development, and the requirements of legal persons applying for the certification of management activities
Ministerial Order Nr. 1039/2010	This order outlines approved methodologies for the technical experts approving and reviewing the quality of forest management planning activities and establishes the conditions of certification for those tasked with creating the management plans.
Ministerial Order Nr. 1540/2011	The required terms, approvals, documents, permits, and collection methods for the harvesting and transportation of timber are outlined in this particular order.
Water Law No. 107/1996	Law providing legal requirements regarding the provisions of water resource use, water management and associated activities, as well as penalties. Forestry aspects include water conservation, soil protection, pollution control, and protected zones around natural waterbodies.
Environmental Protection Law No. 137/1995	Legal framework for the protection and regulations of activities affecting natural resources (water and land environments). Under this law, enforcement is carried out under the authority of the Ministry of Waters, Forests, and Environmental Protection.
Law no. 319/2006, on Work Health and Safety	Law requiring any forest activities concerning health and safety to be monitored by a Labor Inspectorate. The legislation ensures that work environments are safe and outlines challenge procedures for violations of safety requirements.
NATURA 2000	Natura 2000 is a series of ecologically sensitive networks protected throughout the European Union (EU). Its directives recognize and develop sustainable management strategies for birds, animals, and natural habitats via the Bird and Habitat Directives. It is a main driver for biodiversity and nature policies for countries in the EU but does not replace any legally required existing laws. Natura 2000 management plans created for forest lands and wildlife fauna are considered guidelines, not legal obligations.

1.15 Participation under Other GHG Programs

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

The project has not been registered, nor seeking to register under any other GHG programs.

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related credit, including renewable energy certificates,

1.16.3 Supply Chain (Scope 3) Emissions

Silvador/Forest Capital are individual domestic suppliers of raw log materials within the counties of Buzău and Dâmbovița and is not a wholesaler, distributor, or retailer of manufactured wood products.

Supply Chain Scope 3 Emissions are considered the largest source of GHG emissions for companies and indirectly affect both upstream and downstream business activities throughout a supply chain. These activities are generally more complex to measure and track, as companies do not have direct control of other businesses, suppliers or organizations that are involved within the same supply chain.

The following below is a list of Scope 3 emission categories as defined by the Greenhouse Gas (GHG) Protocol[5]. The GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard was referenced to select the upstream and downstream categories that may potentially affect reporting companies with the implementation of the SCA.

[5] The Greenhouse Gas Protocol is the globally recognized standard for measuring and mitigating GHG emissions in both private and public business sectors. For more information see: https://ghgprotocol.org/about-us

Table 8 : Upstream and Downstream Supply Chain Catagorized Activities

Upstream Activities (Indirect Supply Chain Emissions)	Applicability	Downstream Activities (Indirect Supply Chain Emissions)	Applicability
1) Purchased Goods and Services	Applicable	9.) Transportation & Distribution	N/A
2.) Capital Goods	Applicable	10.) Processing of Sold Products	N/A
3.) Fuel and Energy Related	N/A	11.) Use of Sold Products	N/A
4.) Transportation and Distribution	Applicable	12.) End of Life Treatment of Sold Products	N/A
5.) Waste Generated in Operations	N/A	13.) Leased Assets	N/A
6.) Business Travel	Applicable	14.) Franchises	N/A
7.) Employee Commuting	Applicable	15.) Investments	N/A
8.) Leased Assets	Applicable		

*Scope 3 emission reporting is not a legal requirement for Silvador/Forest Capital

At this time Silvador/Forest Capital supplies roundwood to six manufacturing and sawmill companies and is involved in all activities related to maintaining forest stand health and maintenance. A public statement regarding Scope 3 emissions has been demonstrated by Silvador/Forest Capital via the company website as well as emails sent to current retailers regarding the project and the potential risk of double claiming. See Appendix 8 and website link[6] for substantiation.

1.17 Sustainable Development Contributions

1.17.1 Sustainable Development Contributions Activity Description

The Project Proponent will contribute to sustainable development as defined by and tracked against the United Nations Sustainable Development Goals (SDGs). The Project Proponent's contribution to (at minimum) SDGs 12 (Responsible Consumption and Production), 13 (Climate Action), and 15 (Life on Land) is illustrated through the following initiatives:

1. Group Activity 1 - Sustainable Forest Management:
   This relates to on-going implementation, maintenance, and certification to a recognized third-party forest certification standard on privately owned forestlands. The certification requires measures to be implemented to protect water quality, biodiversity, wildlife habitat, species at

[6] Silvador website: http://www.silvador.ro/

risk and forests with exceptional conservation value. This sustainable forest management certification requires on-going monitoring, reporting and annual external audits (registration and surveillance) by accredited third parties.

2. Group Activity 2 - Climate Action Initiative:
   As outlined in this Project Description Document, the Project Proponent intends to implement a carbon offset project to create greenhouse gas (GHG) emission reductions and removals by converting privately owned operational forest lands to protected forest lands. By stopping timber harvest within the PAI, an estimated 374,552 tonnes of carbon dioxide equivalent (tCO2e) will be reduced from the atmosphere during the life of the project. This project requires on-going monitoring, as well as validation/verification audits by accredited third parties.

Nationally stated sustainable development priorities have been communicated by the Government of Romania via the United Nations website and specifically within the Sustainable Development Strategy 2030, adapted by the Romanian Government through Government Decision 877/2018[7]. While this strategy intends to outline targets and measures with a focus on the economic, social, and environmental dimensions of the 17 SDGs, it is considered a shared responsibility between the international and national government members, inter-ministerial committees, and state institutions.

As the Project Proponent is not a member of government, ministry, or state institution, no monitoring or reporting provisions relating to The SCA potential contributions to achieving nationally stated sustainable development properties apply.

1.17.2 Sustainable Development Contributions Activity Monitoring

The SCA during this monitoring period results in contributions and benefits by providing climate improvement through the reduction and removal of GHGs with the implementation of a LtPF, sustainable forest management practices, and by providing plant and wildlife biodiversity through ecosystem management and conservation.

[7] For more detailed information visit: (2018). Transformation Towards a Sustainable and Resilient Romania-Romania's Voluntary National Review 2018. https://sustainabledevelopment.un.org/content/documents/19952Voluntary_National_Review_ROMANIA_with_Cover.pdf

Table 9: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	12.2	Responsible Consumption + Production: Increase in hectares of land certified to sustainable forest management standard	Implemented activities to increase	62% of project lands owned by Silvador are certified to the FSC Forest Management Standard	100% of forestlands owned by Silvador is certified to a recognized third-party sustainable management standard
2)	13.0	Climate Action: Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By conserving 1,538 ha of temperate boreal forest, The SCA has prevented the release of 56,752 tonnes of carbon into the atmosphere during the monitoring period	Prevent the release of an estimated 374,552 tonnes of carbon into the atmosphere
3)	15.2	15.2.1 Life on Land: Progress towards sustainable forest management.	Implemented activities to increase	Project has increased implementation of sustainable management of forest types by halting harvesting on 1,538 ha of land (~9,603 m^3 of avoided harvest during the monitoring period)	Continuation of halted deforestation on 1,538 ha of forested lands spanning project lifetime 30 yrs (~63,085 m^3 of avoided harvest throughout the lifetime of the project).

1.18 Additional Information Relevant to the Project

1.18.1 Leakage Management

The Project Proponent will provide evidence that no compensatory harvesting has been initiated to account for lost timber volumes incurred during the carbon project. Supporting evidence will show that no additional land acquisition will be made with the sole intention of replacing harvest which has been deferred through the creation of the SCA.
Further information regarding a leakage monitoring plan will be provided within the Section 5.3 (Leakage).

1.18.2 Commercially Sensitive Information

Commercially sensitive information may have been excluded from the public version of the project description. This information pertains to the following:

a) Section 2.4; Due to confidentiality concerns, comments associated with the Local Stakeholder Consultation process will not be made publicly available, however will be provided to the VVB at the time of validation and will be made available at subsequent verification events.
b) Section 5.1.4; commentary relating to Analysis Units and inventory process
c) Sections 5.1.6 to 5.1.9; various values/parameters
d) Section 6.3.2; Table 20: Project Plot Geographic Locations

1.18.3 Further Information

No further information beyond what has been provided within the sections of this project description document have bearing on the eligibility of the project, the net GHG emission reductions or removals.

2 SAFEGUARDS

2.1 No Net Harm

There are no known or anticipated potential negative and socio-economic impacts related to The SCA specifically due to the nature of the initiative being the retention of natural forests. Following the procedures described within the GreenRaise, Greenhouse Gas – Stakeholder Consultation + Engagement (SOP) a Life Cycle and Aspects analysis was conducted. Refer to Section 2.5 (AFOLU – Specific Safeguards) below for a full description of this process.

2.2 Local Stakeholder Consultation

Local stakeholder consultation was conducted on November 28th and 29th, 2022. Consultation was conducted both via electronic documents delivered by email, as well as in-person "Town Hall" meetings in Romania held on:

- November 28th, 2022, within county of Dambovita at Aninoasa,Viforata, street Silozului nr.2
- November 29th, 2022, within county of Prahova at Ploiesti street Buzaului nr.1

The meeting was organized and chaired by the Project Proponent and attended by the Project Developer and Implementation Partner. Attendance was taken at local Town Hall meetings and is kept on file. Stakeholder Information relating to the project design and implementation, results of monitoring, any risks, costs or benefits to local stakeholders, all relevant law and regulations covering workers' rights in Romania, and the validation and verification process was provided via the GreenRaise website (https://green-raise.com/projects/). Links to the Verra Project Registry will also be provided on the GreenRaise website at time of project listing document submission. If required throughout the life of the project, any additional information that is required to be communicated to local stakeholders will follow the same process of electronic correspondence via email and information provided via the GreenRaise website.

Online forms were made available on the GreenRaise website and were used to collect stakeholder comments and feedback. All responses from this form were automatically entered into a Consultation Database managed by GreenRaise. The feedback forms will remain accessible to the public throughout the lifetime of the project, allowing for continual stakeholder engagement.

All public comments received through the online comment form were recorded within the Consultation Database. Response, and any required project design updates to the project design relating to comments received from Stakeholders were also tracked within the Consultation Database. The Consultation Database will be made available to the VVB during project Validation and Verification. Refer to the GreenRaise GHG -Safeguards SOP for additional details relating to Stakeholder consultation processes.

Response, and any required project design updates to the project design relating to comments received from Stakeholders from Verra will also be tracked. All consultation information will be made available to the VVB during project Validation and Verification. Refer to the GreenRaise GHG –Stakeholder Consultation + Engagement SOP for additional details relating to Stakeholder consultation processes.

To date, no comments have been received through the local stakeholder consultation process. If comments are received in the future, they will be summarized, along with the Project Proponent's response and made available to the VVB during validation audits. For privacy reasons, public comment information will not be shared publicly.

2.3 Environmental Impact

An environmental impact assessment was not required for the SCA.

2.4 Public Comments

The SCA Description Document and Monitoring Report will be listed on the Verra Project Registry for public comment.

Due account of all public comments received will be completed by GreenRaise. As stated above, all comments, and responses, are kept on file. Due to confidentiality concerns, comments and responses will not be made publicly available, however will be provided to the VVB at the time of validation and at subsequent verification events.

2.5 AFOLU-Specific Safeguards

Refer to the GreenRaise GHG – Stakeholder Consultation + Engagement SOP for details relating to the process used to determine local stakeholder identification. Additionally, the SOP outlines the Life Cycle and Aspect Analyses used to determine risks to local stakeholders and their resources.

Table 10: Aspect Analysis Results below outlines the identified aspects, impacts, potential risks, risk category (based on Table 1 within the GreenRaise SOP), risk ranking (based on the Risk Ranking Matrix within the GreenRaise SOP) and mitigation measures applied (if any).

Table 10: Aspect Analysis Results

Activity	Aspect	Impact	Potential Risk to local Stakeholders (Stakeholder Category)	Risk Category	Risk Rating and Justification	Mitigation Measures (Implemented by project proponent)
Halting/ reduction of harvesting activities: Logged to Protected Forest (LtPF),	Reduced/ no requirement for harvesting labour	Loss of income/ livelihood	Loss of income to local communities could result in the degradation of local communities (i.e., reduction in community resources, loss of community members due to moving, etc.). (Social, Economic)	Social/ Socio economic	**Low** – Project Proponent will not be halting all operations, only a portion of operations within the project area.	Project Proponent will continue to offer employment opportunities on the remainder of their forest lands.
	Reduction/ no requirement for energy (fuel) consumption	Loss of income/ livelihood	Loss of income to local economy due to reduced need for fuel. (Social, Economic)	Social/ Socio economic	**Low** – Project Proponent will not be halting all operations, only a portion of operations within the project area	

Activity	Aspect	Impact	Potential Risk to local Stakeholders (Stakeholder Category)	Risk Category	Risk Rating and Justification	Mitigation Measures (Implemented by project proponent)
	Reduction of fuelwood produced	Loss of wood for heating/ fuel purposes	Loss of access to fuel source for home heating. (Social)	Social/ Socio economic	**Low** – Continued harvests in areas outside of the project areas are intended to produce fuelwood for local communities.	
	Public Access reduced or denied	Public recreation opportunities reduced or denied	Increase in illegal trespass instances. Reduced public health (mental and physical) due to reduced access to recreation. (Social, Economic)	Social/ Socio economic Traditional/ Human Rights	**Low** – Public access will not be reduced in project scenario.	
		Public access for foraging/ hunting purposes reduced or denied	Increase in illegal trespass instances. Reduced access to food sources. (Social, Economic)	Social	**Low** – Public access will not be reduced in project scenario	

Activity	Aspect	Impact	Potential Risk to local Stakeholders (Stakeholder Category)	Risk Category	Risk Rating and Justification	Mitigation Measures (Implemented by project proponent)
	Reduction in harvesting/ controlled burns for purposes of fire prevention	Increase risk of forest fire	Local communities exposed to higher risk of forest fire. Adjacent forest owners at risk of commodity loss due to forest fire spread. (Social, Economic, Environmental, Forest Agencies).	Environmental	**Low** – Project Proponent does not utilize controlled burns. Fire hazard assessments will continue to be conducted in areas where annual monitoring is conducted	
	Complete termination of project area maintenance	Road failure	Increased landslide risk to local communities. Watershed/ water quality degradation due to landslides and lack of sediment control. Loss of access to adjacent forest lands due to road failure. (Social, Economic, Environmental, Forest Agencies)	Environmental	**Low** – Project Proponent will continue maintenance of the project area, including roads (i.e., project area is included within Project Proponent's managed forest lands.	

Activity	Aspect	Impact	Potential Risk to local Stakeholders (Stakeholder Category)	Risk Category	Risk Rating and Justification	Mitigation Measures (Implemented by project proponent)
		Pest or Disease Outbreak	Spread of disease to local community forests/ adjacent forest lands. Watershed/ water quality degradation due to transition to low productivity stands. (Social, Economic, Environmental, Forest Agencies)	Environmental	**Low** – annual monitoring along with continual pest management within project area will continue to occur.	
		Public safety	Increase in accident or injury within project area accessible to public. (Social)	Social/ Socio - economic	**Low** – public access will not change due to the project scenario	
	Property rights are undefined/ disputed	Loss of property rights	Project encroaches on private property. Project encroaches on government property. Project relocates people off their lands. (Social, Economic)	Legal Social/ Socio economic	**N/A** – Project Proponent property rights have been verified and are not legally disputed	Additional measures: refer to *Respect for Local Stakeholder Resources: Property Rights (GHG Safeguards SOP)*

Activity	Aspect	Impact	Potential Risk to local Stakeholders (Stakeholder Category)	Risk Category	Risk Rating and Justification	Mitigation Measures (Implemented by project proponent)
	Participation in project design, implementation, and/or consultation	Safety of local stakeholders	Increased risk to stakeholder safety due to opposing opinions, cultural/ religious differences, land holder grievances or disputes, government, or local oppression of freedom of expression. (Social, Research Institutes and Universities)	Social/ Socio economic	**Low** – Refer to Universal Control; There is no evidence of the suppression of freedom of speech within Romania.	Universal Control = All stakeholder contact information (Name, Address, etc.) will be kept confidential. Stakeholder responses will be number coded as to keep public record of responses anonymous.

2.5.1 Grievance Redress Procedure

GreenRaise has developed a Grievance Redress procedure which is outlined within the GHG – Stakeholder Consultation + Engagement SOP. Similar to the process for Stakeholder Consultation, the Grievance Procedures as well as a Grievance Submission Form are posted on the GreenRaise website (https://green-raise.com/projects/). All grievances submitted to GreenRaise will be tracked utilizing the Grievance Record Database.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The VM0012 Improved Forest Management in Temperate and Boreal forests (LtPF) v1.2 methodology has been selected for project implementation. Additional tools utilized include:

- AFOLU Non-Permanence Risk Tool: VCS Version 4.0 (Procedural Document, 19 September 2019)

  No additional application conditions are required through the use of this tool.

- VT0001 – Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry, and Other Land Use (AFOLU) Project Activities – Version 3.0, Sectoral Scope 14. This tool is applicable under the following conditions:

  - AFOLU activities are the same or similar to the proposed project activity on the land within the proposed project boundary performed with or without being registered as the VCS AFOLU project shall not lead to violation of any applicable law even if the law is not enforced. The project activities do not violate and legislation.

  - The use of this tool to determine additionality requires the baseline methodology to provide for a stepwise approach justifying the determination of the most plausible baseline scenario. Project proponent(s) proposing new baseline methodologies shall ensure consistency between the determination of a baseline scenario and the determination of additionality of a project activity. Section 3.5 provided the stepwise approach and eligibility requirements.

- VCS Module VMD0033 - Estimation of Emissions from Market Leakage. Using the Module, no additional applicability conditions are required (refer to Section 5).

3.2 Applicability of Methodology

Table 11: Compliance with VM0012 Methodology Criteria

	Summarized Methodology Applicability Criteria	Silvador Climate Action
1.	Project meets criteria for IFM-LtPF projects	The SCA meets specified criteria through the voluntary protection of privately owned forest lands within the project area.
2.	Project is located in Temperate or Boreal Domain Global Ecological Zones and meet Tier III inventory and data requirements	The SCA is located in the Temperate Ecological Zone. (see Appendix 5 Map) Silvador utilizes detailed site level inventory meeting Tier III criteria.
3.	Project meets VCS Standard requirements for ownership	Silvador can demonstrate Proof of Right and Right of Use.
4.	Annual illegal, unplanned and fuelwood removals are <5% of total annual harvest levels	The SCA has no illegal or unplanned harvesting and, de-minimis fuelwood removals.
5.	No managed peatland forests in project	The SCA areas do not contain managed peatland forests.
6.	Total percentage of wetlands in project area not expected to change due to project activities	Silvador will not materially alter the percentage of wetlands on the project area.
7.	No activity shifting leakage to other Silvador lands at the start of the project	Silvador can demonstrate that baseline activities are not being shifted to other conservation land holdings.
8.	Project does not include non-de minimis application of fertilizer in the project scenario	Silvador will not include any application of fertilizer in the project area.

3.3 Project Boundary

Table 12: Project Sources, Sinks, and Reservoirs

Source		Gas	Included?	Justification/Explanation
Baseline	Fuel Combustion by Vehicles/Equipment	CO_2	Yes	Source – Carbon emissions from harvesting equipment, log transport, and primary forest product manufacturing are listed as being an optional inclusion within VM0012 and will be included in The SCA.

Source		Gas	Included?	Justification/Explanation
	Above Ground Biomass (Live)	CO_2	Yes	Sink – Biomass re-growth after harvest disturbance. Source – Carbon flows resulting from timber harvest removals and adjacent biomass impacts during operations (shifted to other carbon pools). Source – Emissions from mortality and decay in remaining forests.
	Below Ground Biomass Pool (Live and Dead)	CO_2	Yes	Sink – Biomass re-growth after forest management activities. Source – Carbon flows resulting from forest management harvesting removals (shifting to other carbon pools). Source – Emissions from mortality and decay in remaining forests (shifted to other carbon pools).
	Dead Wood Pool	CO_2	Yes	Sink – Dead snags, coarse branches, and stems before and after forest management activities. Source – Decay of deadwood pool.
	Wood Products Pool	CO_2	Yes	Sink – Carbon in permanent storage in harvested wood products. Source – Emissions from decaying wood products.
Project	Fuel Combustion by Vehicles/Equipment	CO_2	Yes	Source – Carbon emissions from industrial equipment are expected to be minimal due to low levels of conservation harvesting for forest health maintenance.
	Above Ground Biomass (Live)	CO_2	Yes	Sink – Biomass re-growth after harvest disturbance. Source – Carbon flows resulting from timber harvest removals and adjacent biomass impacts during operations (shifted to other carbon pools). Source – Emissions from mortality and decay in remaining forests.
	Below Ground Biomass Pool (Live and Dead)	CO_2	Yes	Sink – Biomass re-growth after forest management activities. Source – Carbon flows resulting from forest management harvesting. removals (shifting to other carbon pools).

Source		Gas	Included?	Justification/Explanation
				Source – Emissions from mortality and decay in remaining forests (shifted to other carbon pools).
	Dead Wood Pool	CO_2	Yes	Sink – Dead snags, coarse branches, and stems before and after forest management activities. Source – Decay of deadwood pool.
	Wood Products Pool	CO_2	Yes	Sink – Carbon in permanent storage in harvested wood products. Source – Emissions from decaying wood products.
Sources Excluded from the Baseline and Project Scenarios				
Excluded	Above-ground Non-Tree Biomass (Live)	CO_2	No	Sources and sinks are *de minimus.*
Excluded	Litter Pool	CO_2	No	Litter is a short-lived transition pool, and differences between the project and baseline are *de minimus* over time.
Excluded	Soil Carbon Pool	CO_2	No	Soil carbon is a reservoir of long-lived carbon storage which is likely unaffected by timber harvesting.

For project instance, refer to the location maps below:

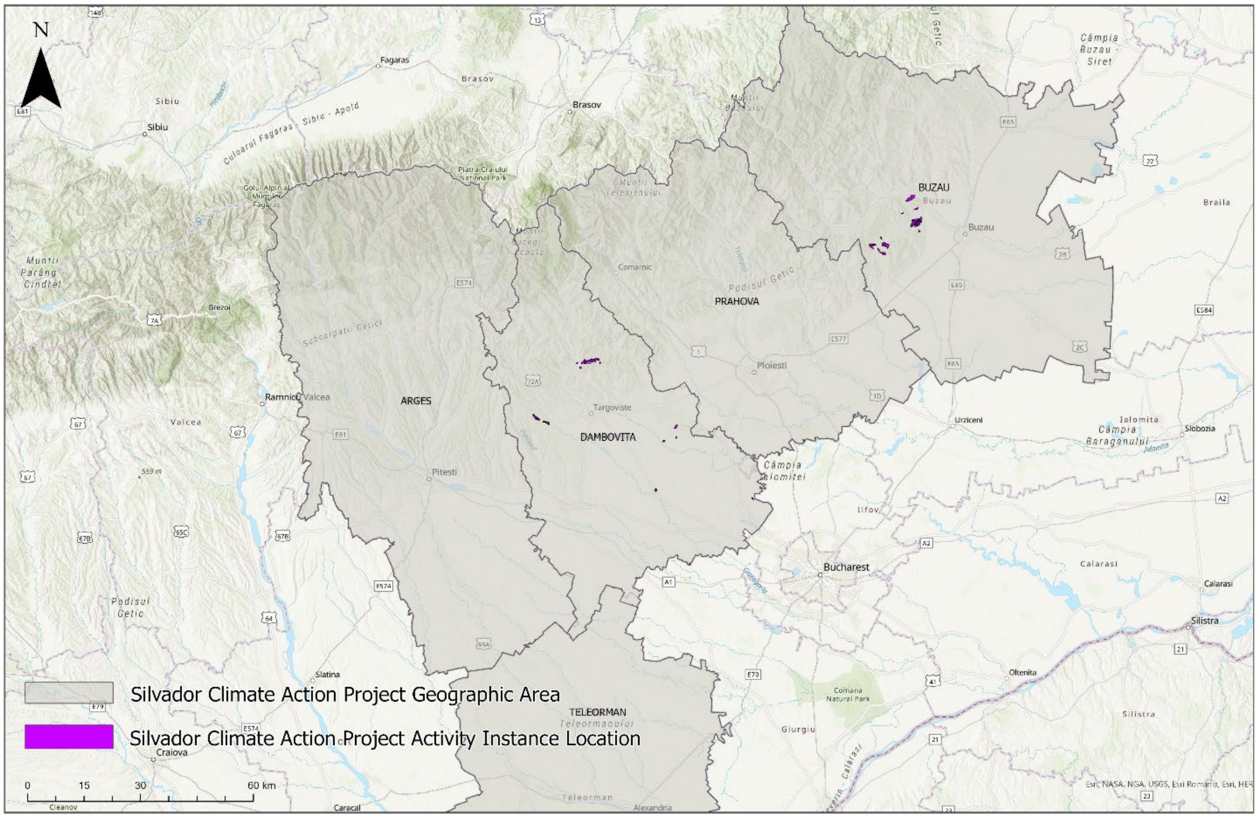

Figure 2: Overview of the Silvador Climate Action Project

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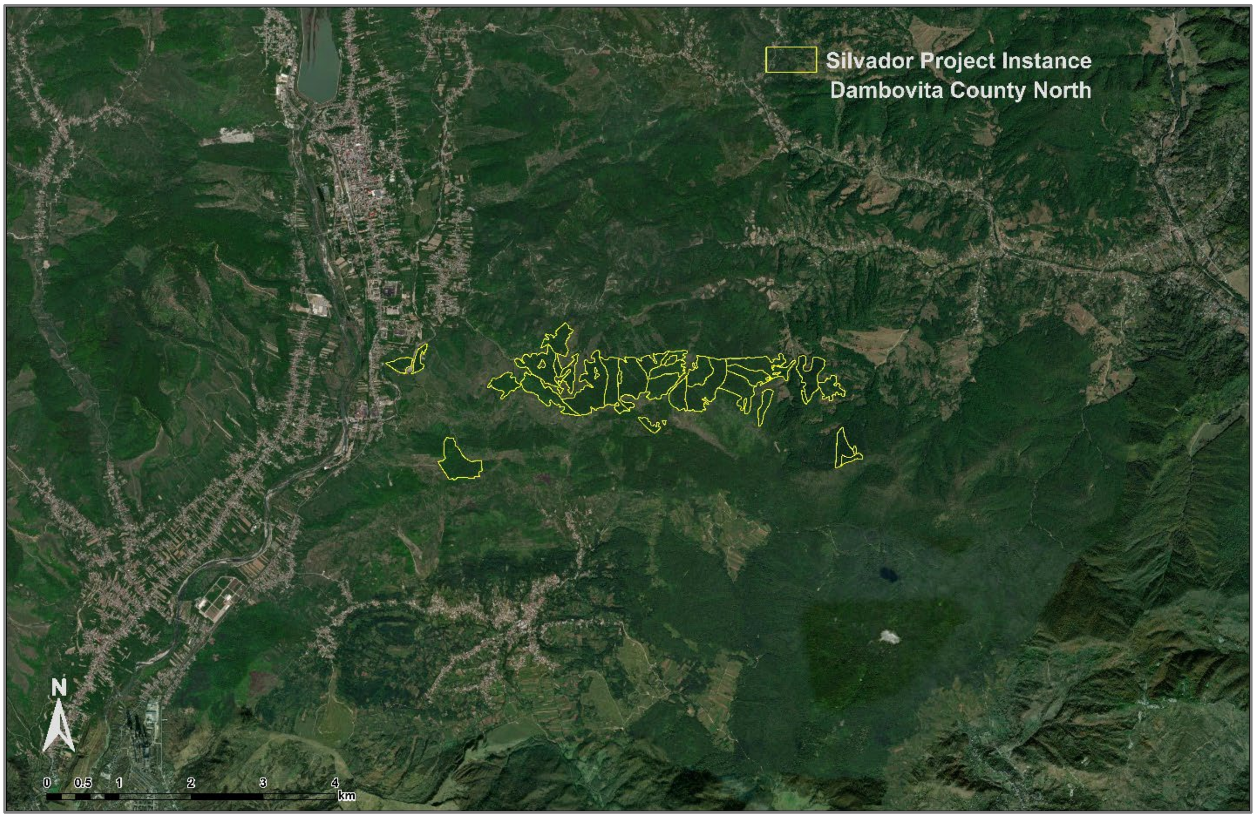

Figure 3: Dâmbovița County (North) Project Forest Lands

Figure 4: Dâmbovița County (East) Project Forest Lands

Figure 5: Dâmbovița County (S Central) Project Forest Lands

Figure 6: Dâmbovița County (S East) Project Forest Lands

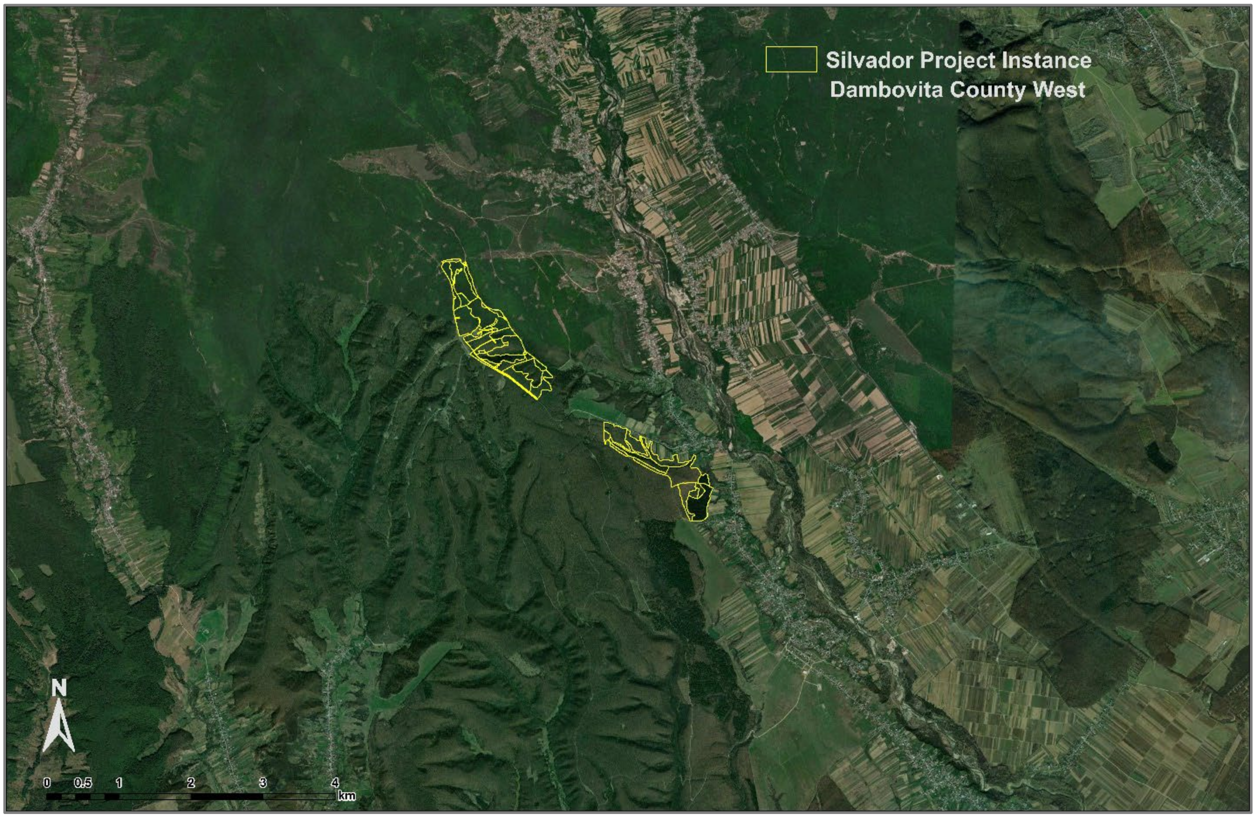

Figure 7: Dâmbovița County West Project Forest Lands

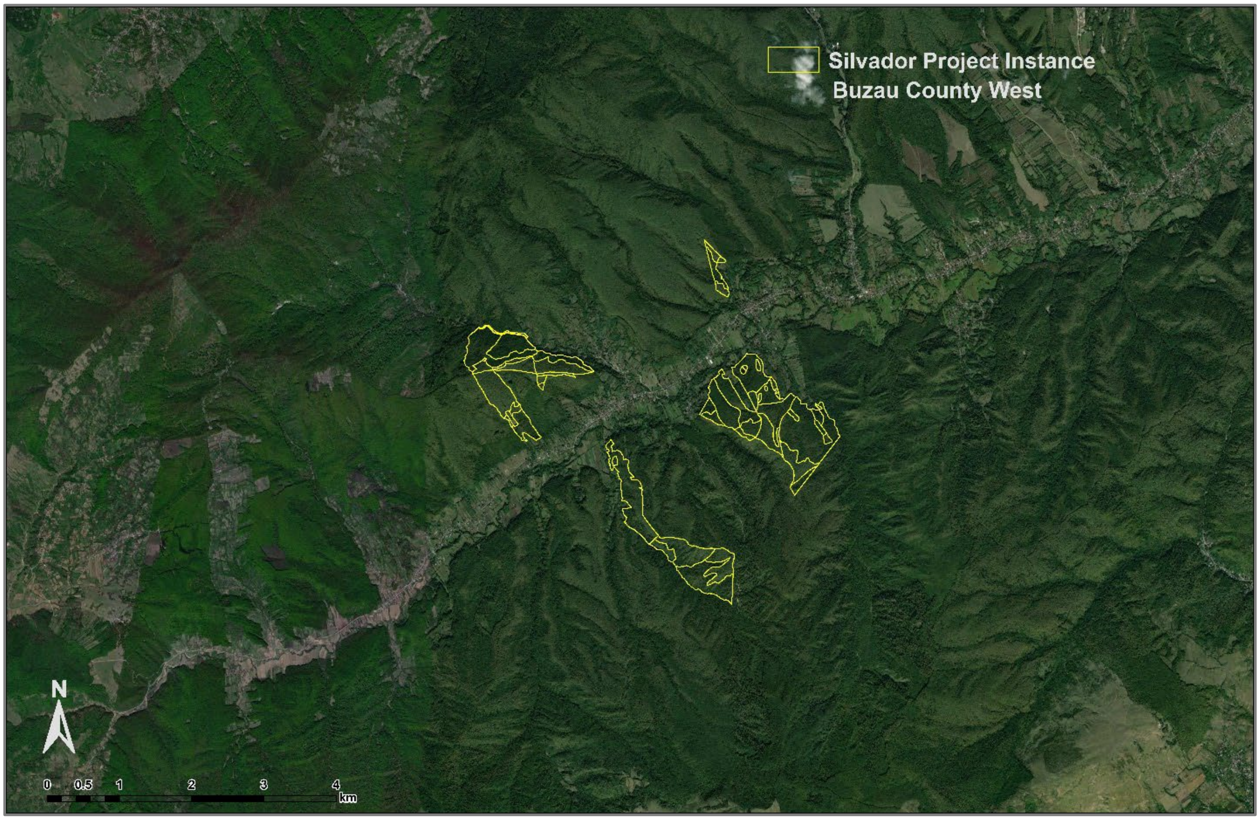

Figure 8: Buzău County West Project Forest Lands

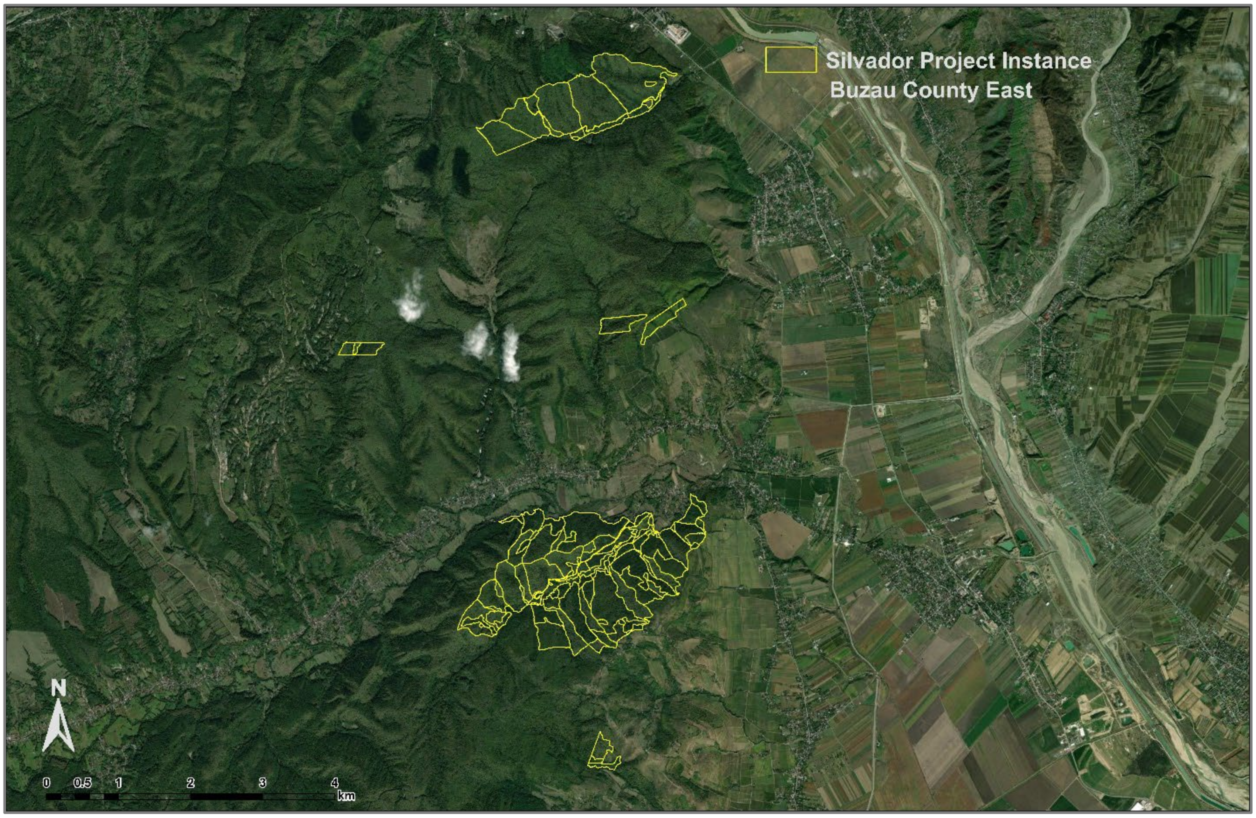

Figure 9: Buzău County East Project Forest Lands

3.4 Baseline Scenario

3.4.1 Step 1 Identify Plausible Alternative Baseline Scenarios to the VCS Activity

The SCA identified four potential baseline scenarios which were evaluated in the baseline selection process.

1. Historical Practice
   The VCS standard and VM0012 methodology require that the project proponent assess historical practice as a baseline scenario in Step 2a. The most recent forest management plans (FMP) have been created for the Silvador forested areas and developed for a ten-year period. Each area has an objective of sustainable harvest volume associated with it as well as a total planned annual timber harvest categorized. The current harvest plan created for the project area is further described in Step 2a.
2. Common Practices
   The common practice and applicable scenario maximize the allowable timber harvest from the forest fund property as outlined in the FMP document. Romanian forest management plans must be completed every 10 years (Romanian Forest Code, technical regulation no. 5/2005)., The common practice is to harvest the annual volume objectives detailed in the forest management plan (i.e. harvest quota). This can be done at a yearly set rate, or all in year X of

the plan, however, must remain within the quota. This common practice follows guidelines outlined in the Forestry Code/1996.

3. Land acquisition for conversion to real estate development
   An alternative baseline scenario would be to sell the lands within the project area to gain financial returns from the development and sale of these properties. Some portions of the project area are adjacent to residential areas, making them suitable for primary and secondary residences or industrial developments. This scenario emphasizes maximizing real estate opportunities within best use areas. These areas include properties adjacent to villages, towns, and cities.
4. Acquisition for conversion to conservation lands
   The last suggested baseline scenario is the acquisition of the forest for conservation purposes. This scenario represents or is comparable to the project scenario without carbon crediting benefits. There is no credible market-based business model for this baseline scenario to provide financial returns for private investment capital as there are no material revenue returns from conservation activities like the project scenario. The inclusion of this scenario meets element 2.1.1 a), item ii) in the VCS Additionality Tool VT0001.

The italicized text below indicates VM0012 methodology or VCS requirements in the baseline scenario selection. Each prospective baseline scenario meets the following selection scenario eligibility criteria, except where noted and excluded:

1. *Including activities and areas where forests remaining as forests* – this criterion eliminated the potential Baseline Scenario 3 “Acquisition for conversion to real estate development lands”.
2. *Comply with legal requirements for forest management and land use in the area* – all remaining baseline scenarios meet the minimum practice requirements of either the Forestry Code/1996.
3. *Demonstrate that the “projected baseline scenario environmental practices equal or exceed those commonly considered a minimum standard among landowners in the area” (Voluntary Carbon Standard, 2008a)* – all the prospective baseline scenarios comply with or exceed minimum environmental requirements and performance of landowners in the area.

3.4.2 Step 2 – Selection of a single plausible Baseline Scenario for the Project

Project proponents shall select a single plausible baseline scenario for the project using the following steps:

3.4.3 Step 2a – The Historical Baseline Scenario – based on historical operating practices on the property:

2a.1 The project proponent has at least 5 years historical harvest level data history.

Timber harvest projections for the project area were determined through forest management plans annually since 2012. The VM0012 methodology states that “projects may use a forward-looking forest management plan as the historical baseline data”. The annual harvest volume has been determined by averaging forward looking harvest volumes. The project area is 1,538 ha, with an annual harvest reduction over the 30-year project period.

The baseline scenario established on actual property harvest history has been selected as the project proponent has at least 5 years historical harvest level data history. Step 2b and 2c will be omitted due to the acceptance of the historical baseline scenario in Step 2a.

3.4.4 Step 3 – Additionality Test

The project is additional as per Section 3.5 in a manner consistent with the baseline selection method.

3.5 Additionality

The project uses the Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities:

The SCA meets the eligibility requirements of this tool as:

1. The project activities are not in violation of any applicable law;
2. The project employs a stepwise method to determine the most plausible baseline scenario, which is consistent with the application of this tool.

3.5.1 Step 1a – Identification of plausible baseline scenarios

1. Historical Practice (selected baseline scenario)
2. Common Practice
3. Acquisition for conversion to real estate development lands
4. Acquisition for conversion to conservation lands

3.5.2 Step 1b – Legal tests

All plausible baseline scenarios could be undertaken within the legal requirements of private forestland or private rural residential land in Romania (refer to Section Baseline Scenario 3.4).

3.5.3 Step 1c – Selection of Most Plausible Baseline Scenario

See Section 3.4 for a description of the baseline selection process.

The outcome of the selection process is to select the “Historical Practice” using the forward-looking ten-year forest management plans.

3.5.4 Step 2 – Investment Analysis

Sub-step 2a&b: Determine appropriate analysis method

As a Logged to Protected Forest conservation project, the project scenario of the SCA will generate no material financial or economic benefits other than VCS related income. However, low levels of timber harvesting occurred in the project scenario during the first three years. Some revenues from timber sales were generated from this timber harvesting.

The Net Present Value (NPV) investment comparison analysis has been selected as the analysis method for additionality. The NPV of the project scenario is compared to the NPV of the selected baseline scenario. The NPV method works well when comparing projects with varying cash flows over time and is a commonly used method for analyzing forestry investments.

Sub-step 2c – Calculation and comparison of financial indicators

The 30-year period of the SCA was used to calculate the NPV of the carbon project scenario without the financial benefits from the VCS. Cash inflows are only realized during the first three years of the project from the sale of timber that was harvested. The cash outflows relate to the anticipated project costs, and the costs of the limited timber harvesting. The anticipated project costs include project implementation, registration, validation/verification, and issuance for the initial verification period, and project maintenance and verification fees for subsequent periods.

A 30-year period was used to calculate the NPV of the baseline ("Historical Practice") scenario. The cash inflows and cash outflows used in the analysis were provided by management and are reflective of the actual average revenues and costs that have been incurred while conducting timber harvesting operations in the project area. Historically, operations have been profitable and so for the purposes of the NPV analysis a consistent profit margin is realized.

The outcome of the NPV analysis is that the NPV for the baseline scenario is significantly positive, whereas the NPV for the project scenario is minimal. The difference is driven by consistent profit margins over the 30-year period of the baseline scenario, whereas lower profit margins in the project scenario only during the first three years, with all subsequent years having no profits and only costs associated with the project.

A discount rate of 7.5% was utilized in the analysis. This discount rate is reflective of average Romanian Bank Lending rate over the past 20 years, as well as customary rates used for forestry in Romania.

A detailed financial assessment is contained in the Excel document entitled 'Silvador – Investment Analysis for Additionality Assessment'. This Excel document has been provided to the validation/ verification body for review. This detailed financial assessment contains confidential information, and for this reason is not included in this section.

The results of the NPV comparison analysis illustrate that the proposed carbon project, without the financial benefits from the sale of VCU's, is a financially unattractive alternative when compared to standard historical practice.

Sub-step 2d – Sensitivity analysis

A sensitivity analysis was performed by reducing both the amount and the frequency of the fixed costs of the carbon project scenario.

Despite these cost assumption changes, the NPV of the carbon project scenario was always much lower than the NPV of the baseline scenario.

The sensitivity analysis is included in the Excel document '*Silvador – Investment Analysis for Additionality Assessment*'. This Excel document has been provided to the validation/verification body for review.

For all reasonable variations in the cost assumptions for the carbon project scenario, it is concluded that the proposed VCS AFOLU project without the financial benefits from the VCS is unlikely to be financially attractive.

3.5.1 Step 3: Barrier Analysis (Supporting Information Only)

Additional barriers existing with those described in the Investment Analysis are described below.

Step 3a – Identify barriers that would prevent the implementation of the type of proposed project activity

There are barriers for AFOLU project activities undertaken and operated by private entities:

Similar conservation activities have only been implemented with grants, other non-commercial finance terms (FCC 2009), or with the financial incentives created by carbon credits. In this context similar activities are defined as activities of a similar scale that take place in a comparable environment with respect to regulatory framework and are undertaken in the relevant geographical area. The project activity will be the second VCS project to be implemented in Romania. No similar project activities are currently operational in Eastern Europe with the Gold Standard or the Clean Development Mechanism.

Step 3b – Show that the identified barriers would not prevent the implementation of at least one of the alternative land use scenarios (except the proposed project activity)

The scenarios related to historical practice and common practice are not affected by funding barriers associated with landscape conservation. The historical and common practice scenarios generate income from timber harvest. The real estate development scenario would receive financial benefits from both the sale of the property and standing timber on the property. The project scenario is the only scenario which does not receive financial benefits from either property or timber sales. Therefore, the project scenario is unlikely to produce economic benefits or be financially attractive without the sale of carbon credits from the VCS AFOLU project.

3.5.2 Step 4: Common Practice Analysis

Silvador is the second IFM-LtPF carbon project proposed (by the project developer) in Romania and the second forest carbon project considered in Romania to date[8]. Conservation projects in Romania have been completed in the past with private and public money. An example of this is Foundation Conservation Carpathia, founded in 2009 by philanthropists and conservationists to protect privatized forest lands in the Făgăraș Mountains (FCC 2009). Some maintenance costs of Carpathia are offset by leasing hunting rights and donations with the goal to return the landholdings to the public domain for permanent protection as a national park.

[8] VCS Project Database

There are no comparable projects that could be considered common practice, and which achieve similar scale or employ similar project activities. Similar acquisitions are only achieved with non-commercial funding and capital sources.

Based on the application of this VCS tool, The SCA is clearly additional based on Investment Analysis.

3.6 Methodology Deviations

No deviations were required in the implementation of the VM0012 methodology.

4 IMPLEMENTATION STATUS

4.1 Implementation Status of the Project Activity

The SCA is currently seeking initial validation and verification from August 1, 2020, to January 1, 2022. Project activities during this time period incorporated ongoing low levels of management activities for forest maintenance, ecological enhancement, and/or risk mitigations. No events occurred during this monitoring period that have any impact on the GHG emission reductions or removals, as the ex-ante stocks are also the ex-post carbon stocks, due to the project start date commencing prior to validation.

Description of leakage monitoring and management can be found in Section 7.4. Non-permanence risk factors will be assessed at each monitoring period. The VCS non-permanence risk tool will be fully evaluated prior to each project verification.

5 REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

5.1.1 Validating Inventory Requirements

The SCA meets the Valid Starting Inventory Requirements from the methodology (methodology criteria in italics):

1. *Pertaining directly to the entire project area; the inventory data (updated for each Forest Management of the Forestry Fund Property document) covers the entire project area and meets this criteria.*
2. *Created, updated, or validated <10 years ago; and,*
3. *Documentation is available describing the methods used to create, update, or otherwise validate the starting inventory, including statistical analysis, field data, and/or other evidence.*

The Project Proponents inventory methods and related inventory updates are documented in the forest management documents that define the timber harvesting activities and allowable cuts; which therefore meets the criteria. Further to the above, the Project Proponent is currently in the process of updating the forest inventory of forest fund properties. Current work includes plot establishment and measurement protocols with the goal to validate/ refine forest stock parameters using LiDAR data and technologies.

5.1.2 Baseline Scenario Area Stratification

STEP 1 - Stratify to create homogeneous units.

The Project Proponent's forest inventory is encompassed in both a Geographic Information System (GIS), and forest management plan documentation. The forest inventory consists of multi storied structurally diverse stands and forest inventory units are based on the leading species, productivity class, and other stand attributes including operability etc. The Carbon modeling is specific to the forest lands intended for regulated harvesting.

For modelling purposes, inventory polygons were further refined into Analysis Units (AUs) based on leading species (Beech, Oak, other softwood), site class (grouped 0 to 2, 3, and 4 & 5 where 0 being highest growth and 5 being the lowest), and harvest regimes (Managed vs. Unmanaged (i.e. planned cutting (thinning and primary cutting vs. conservation or hygiene cutting)). Analysis units are grouped by leading species, yield classes, and forest management type.

Table 13: Description of Forest Analysis Units Defined in the Project Area

AU	Name	Description
B2M	-Beech 2M	Leading Species Beech, Site Class Group 0, 1, 2, Managed
B2U	-Beech 2U	Leading Species Beech, Site Class Group 0, 1, 2, Unmanaged
B3M	-Beech 3M	Leading Species Beech, Site Class Group 3, Managed
B3U	-Beech 3U	Leading Species Beech, Site Class Group 3, Unmanaged
B4M	-Beech 4M	Leading Species Beech, Site Class Group 4, 5, Managed
B4U	-Beech 4U	Leading Species Beech, Site Class Group 4, 5, Unmanaged
O2M	-Oak 2M	Leading Species Oak, Site Class Group 0, 1, 2, Managed
O2U	-Oak 2U	Leading Species Oak, Site Class Group 0, 1, 2, Unmanaged
O3M	-Oak 3M	Leading Species Oak, Site Class Group 3<, Managed

AU	Name	Description
O3U	-Oak 3U	Leading Species Oak, Site Class Group 3<, Unmanaged
O4M	Oak 4M	Leading Species Oak, Site Class Group 4, 5, Managed
O4U	Oak 4U	Leading Species Oak, Site Class Group 4, 5, Unmanaged
S3	Softwood 3M	Leading Species Softwoods, Site Class Group 1, 2, 3, 4, 5, Managed
S3U	Softwoods 3U	Leading Species Softwoods, Site Class Group 1, 2, 3, 4, 5, Unmanaged

STEP 2 – Identify areas eligible for specific management activities.

The SCA area is subject to the Romanian Governments Forest Code framework as well as the implementation of numerous other ordinances. The overall forest management objective is to employ close to nature forest management practices throughout Romania's forest fund properties. To ensure baseline eligibility, the anticipated area should contribute to future diverse mixed stands, implement sustainable timber volume rates of cut in a harvest plan, and meet the following requirements:

1. Defined as forested areas (vs non-forested areas)
2. Considered merchantable and economically feasible to harvest
3. Not within a legally restricted or protected area

The areas contributing to the baseline projection scenario is consistent with the common forest practices in Romania.

5.1.3 Model Selection and Use

The Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3) is an inventory-based, yield-curve-driven model that simulates the stand- and landscape-level C dynamics of above- and belowground biomass, dead organic matter (DOM; litter and dead wood) and mineral soil (Kurz et al., 2009). The CBM-CFS3 is a stand- and landscape-level modeling framework that can be used to simulate the dynamics of all forest carbon stocks required under the United Nations Framework Convention on Climate Change. It is compliant with the carbon estimation methods outlined in the guidelines of the Intergovernmental Panel on Climate Change. The model uses much of the same information that is required for forest management planning activities (e.g., forest inventory, growth and yield curves, natural and human-induced disturbance information, forest management schedule, and land-use). The Archive Index Database (AIDB) is the Microsoft Access database behind the CBM-CFS3 that stores default ecological information and parameters pertaining to the forest ecosystems of a country, among other functions.

The (CBM-CFS3) has been adapted, tested, and applied to forests around the world over the last 7 years in support of policy making and scientific research.

The appropriateness of the selected model was determined via the methodology requirements listed in VM0012-Improved Forest Management Projects in Temperate and Boreal Forests LtPF v1.2, Section 8.1.1 Model Selection and Use:

1. Well Established:
    - CBM-CFS3 was developed for carbon modelling purposes in 2001 by the Carbon Accounting Team of the Canadian Forest Service.
2. Generates values on an annual basis, or at intervals not exceeding 10 years:
    - CBM-CFS3 can generate values in annual time-steps.
3. Include a reasonable representation of mortality from stand-self thinning and natural disturbance agents that are regionally appropriate.
    - From the CB3-CFS3 User Guide: "The CBM-CFS3 allows users to explore a range of situations, including the effects of different levels of natural disturbances and management actions, and changes to growth and yield on forest ecosystem carbon stocks."
4. Output units expressed in carbon units (tC/ha) or as biomass (t/ha) and are calculated for each of the required carbon pools.
    - Output units of tC/ha are generated from CBM-CFS3 (refer to CMB outputs).
5. Well Documented and expert reviewed:
    - Google Search results in ~39,000 articles referencing "Carbon Budget Model Canadian Forest Sector" with the most recent publication occurring in January of 2022.
6. Parameterized, calibrated, and tested for the specific conditions in the project.
    - Spatial Units and Boundaries within CBM-CFS3 model for Silvador are as follows:
        - Administrative Boundary: Romania
        - Ecological Boundary: CLU35 (default ecological boundary)
        - Spatial Unit Group: SPU Group 1
    - Recently National Forest Inventories (NFI) input data for 26 European Union (EU) countries was used to estimate the EU forest Carbon dynamics from 2000 to 2012, and updated in 2017, including the effects of natural disturbances and land-use change (Pilli et al., 2018). The overall purpose of this exercise was to increase the transparency of how the EU Archive Index Database (EU-AIDB) was parameterized while supporting both the policy making and research communities interested in applying the CBM-CFS3 with ecological parameters specific to the EU context. Currently the EU-AIDB incorporates 1034 spatial units representing the intersection of 204 European administrative regions, 35 ecological climatic units, and 192 main tree species parameters.

5.1.4 Preparation of Stand-level Carbon Curves in CBM

Growth and yield curves were developed for the purposes of carbon modelling. Data from Silvador's forest stand inventory, obtained from existing Forest Management Plans (FMPs), included mean annual increments (MAI) and site class were used to develop a representative yield curve for all forest polygons within Analysis Units (AUs). [*]

The CBM model was used to create a series of stand attribute curves for each analysis unit to predict/ simulate forest development, merchantable timber volume, and carbon storage and dynamics by carbon pool over time.

The objective was to calibrate the CBM forest type for each Analysis Unit to generally match the dominant species (mix) found in the carbon monitoring plots which are then being represented by the simplified AU groupings with forest types based on species composition, site productivity and management disturbance regime/ harvest history.

Theme groupings were used in combination with polygon area to match up the modeled inventory polygon to the correct carbon yield curve data. The CBM-CFS3 derived stand and carbon curves are modeled on an assumed fully stocked representative stand in each AU and applies carbon and merchantable volume outcomes for each polygon based on the applicable allometric formulas. The model includes discrete 'Runs' that represent the project (PRJ - deferred harvest) and specific baseline disturbances/ harvest activities (BSL – harvest).

The AIDB spatial units (SPU 1) Romania were used for all analysis units.

The CBM 'MAKELIST' is a preprocessing program that is used to format the inventory information for input into the CBM-CFS3 and to initialize the DOM carbon pools. These pools include carbon from aboveground and belowground dead tree biomass (e.g., coarse woody debris; litter, fibric, and humic layers; and mineral soil). MAKELIST uses the same algorithms and parameters as the CBM-CFS3 and simulates each stand record through a number of natural disturbance cycles (grow, burn, grow, burn, etc.) until the slow DOM carbon pool at the end of two successive rotations meets a user-defined criterion (for which the default tolerance is 0.1%). By default, the MAKELIST assumes that the historical natural disturbance regime is stand-replacing fire, and it therefore grows stands for 300 years for the particular disturbance period for the ecoregion.

5.1.5 Biomass Carbon Modeling

Total biomass flows for each analysis unit were calculated using equations embedded in the CBM-CFS3 and output by representative carbon curves and tracked by carbon pool (see Table 2 below – extracted from 2019 CBM-CFS3 users manual). The model simulates detailed forest growth and development over time and links this forest development to detailed biomass accumulation and decay functions to track carbon biomass by pool through time. The CBM converts the merchantable volume per ha reported by the growth curves (i.e., yield tables) to tonnes of Carbon (tC) through species-specific allometric equations[9] (used as Biomass Expansion and Conversion Factors, without any additional value of wood density). All model outputs are in tonnes of Carbon (tC). Effectively CBM modelling manages the carbon pools addressed in VM0012 Equations 1 through to 17b.

The CBM-CFS3 then simulates and tracks the fate of carbon in all applicable carbon pools over time by polygon, including for Wood Products pool after any scheduled event. Carbon calculations can then be summarized for the project and baseline scenarios for each project year across the project area.

Baseline emissions are calculated by applying a Baseline 'disturbances' to each polygon, and then modeling the baseline activities and the related carbon flows using CBM-CFS3. The methods described are equivalent to the equations and processes outlined in VM0012.

[9] Boudewyn, P.A.; Song, X.; Magnussen, S.; Gillis, M.D. 2007. Model-based, volume-to-biomass conversion for forested and vegetated land in Canada. Nat. Resourc. Can., Can. For. Serv., Pac.For Cent., Victoria, BC. Inf. Rep. BC-X-411.

Data from the CBM-CFS3 output 'Delta Ecosystem Reports' were exported into excel spreadsheets for further analysis consistent with the VM0012 methodology. The reports consist of tables that contain the applicable carbon pools and include reference equations as presented in the methodology. Modelling covers all analysis units in both the project and baseline scenarios.

Equations used may be referenced within this section or noted in Appendix 7 – VM0012 Equations of this document.

Table 14: CBM Carbon Pool Allocation as Detailed within Kurtz et al., 2009 (Table 2)

Table 2 – Correspondence between pools in the Carbon Budget Model of the Canadian Forest Sector 3—version 1.1 (CBM-CFS3) and recommended pools by the Intergovernmental Panel on Climate Change Good Practice Guidance (GPG) (IPCC, 2003). SW = softwood, HW = hardwood, DOM = dead organic matter.

CBM-CFS3 pool	Description	GPG pool
Merchantable + bark (SW or HW)	Live stemwood of merchantable size[a] plus bark	Aboveground biomass
Other wood + bark (SW or HW)	Live branches, stumps and small trees including bark	Aboveground biomass
Foliage (SW or HW)	Live foliage	Aboveground biomass
Fine roots (SW or HW)	Live roots, approximately <5 mm diameter	Belowground biomass
Coarse roots (SW or HW)	Live roots, approximately ≥5 mm diameter	Belowground biomass
Snag stems DOM (SW or HW)	Dead standing stemwood of merchantable size including bark	Dead wood
Snag branches DOM (SW or HW)	Dead branches, stumps and small trees including bark	Dead wood
Medium DOM	Coarse woody debris on the ground	Dead wood
Aboveground fast DOM	Fine and small woody debris plus dead coarse roots in the forest floor, approximately ≥5 and <75 mm diameter	Litter
Aboveground very fast DOM	The L horizon[b] comprised of foliar litter plus dead fine roots, approximately <5 mm diameter	Litter
Aboveground slow DOM	F, H and O horizons[b]	Litter
Belowground fast DOM	Dead coarse roots in the mineral soil, approximately ≥5 diameter	Dead wood
Belowground very fast DOM	Dead fine roots in the mineral soil, approximately <5 mm diameter	Soil organic matter
Belowground slow DOM	Humified organic matter in the mineral soil	Soil organic matter

[a] Definition of merchantable size dimensions are model parameters, see Table 3.
[b] Soil Classification Working Group (1998).

In regard to model outputs the Stock Change resultant 'Delta Total Ecosystem' (ΔtC yr^{-1}) represents Total change in Ecosystem carbon stocks (all pools) as required in Equation 1 and 29 for the baseline and project respectively. The Stock Changes category of output variables contains information about changes in carbon stocks, reported in tonnes of carbon for each year, for the area selected by the user. A positive value (+) for annual change in carbon stock indicates a net gain in carbon stocks, a negative value (-) indicates a net loss, and a zero value indicates neither a gain nor a loss. For analyses of Total Delta Ecosystem, annual values greater than zero indicate that the ecosystem is functioning as a carbon sink, annual values below zero indicate that it is functioning as a carbon source, and an annual value of exactly zero indicates that the ecosystem is carbon-neutral (i.e., neither a source nor a sink).

5.1.6 Calculating Baseline Scenario Live Biomass Gain

For the Historic Baseline Scenario (as described in Section 3.4), a set of historic baseline activities (disturbances) was based on harvest details reported within existing FMPs. The annual harvest volume has been determined by forward looking harvest volumes within the same FMPs. All baseline management activities are assumed to occur/ begin at year 1 (2018).

Live biomass gain ($\Delta C_{BSL,G,t}$, Eqn 4, 5a-b) is calculated by CBM-CFS3 based on the project area and stratifications into analysis units. Regionally specific forest dynamics (Romania), and the related carbon curves discussed above, are tracked, and reported by carbon pool (e.g. Aboveground Live, Belowground Live), and reported in the Delta Ecosystem Reports. Additional details about related model default values, functionality, and parameters are found in Kull *et al.* (2019) & Kurz *et. al.* (2009).

$\Delta C_{BSL,G,t} = \Sigma(A_{BSL,i} \bullet G_{BSL,i,t}) \bullet CF$, where; (4)

$A_{BSL,i}$, = area (ha) of forest land in polygon, i – Values generated based on Project Proponent FMPs.

$G_{BSL,i,t}$ = annual increment rate in tree biomass (t d.m. ha^{-1} yr^{-1}), in polygon, i, - based on regionally specific forest dynamics (embedded within the CBM-CFS3 model)

CF = carbon fraction of dry matter t C t^{-1} d.m. - IPCC default value = 0.5

$G_{BSL,i,t} = G_{BSL,AG,i,t} + G_{BSL,BG,i,t}$, where; (5a)

$G_{BSL,AG,i,t}$ and $G_{BSL,BG,i,t}$ = annual above and belowground biomass increment rates (t d.m. ha^{-1} yr^{-1}) - based on regionally specific forest dynamics (embedded within the CBM-CFS3 model)

$G_{BSL,BG,i,t} = G_{BSL,AG,i,t} \bullet R_i$, where; (5b)

R_i = Root to shoot ratio - based on regionally specific forest dynamics (embedded within the CBM-CFS3 model)

Equations embedded within the CBM-CFS3 model cannot be altered by the user.

5.1.7 Calculating Baseline Scenario Live Biomass Loss

Live biomass loss ($\Delta C_{BSL,L,t}$, Eqn 6, 7, 8, 9) is calculated by CBM-CFS3 based on the project area stratifications, regionally specific forest dynamics and the related carbon curves discussed above. Default parameters and algorithms within CBM-CFS3 model and track all stand dynamics, including natural tree mortality, harvesting scenario felling/ removals, blowdown, and any other biomass loss. Generally, mortality related live biomass is shifted into dead biomass pools by CBM-CFS3 (Aboveground Standing Dead (snags), Aboveground Downed and Dead Wood (DOM), Belowground DOM), which are reported in the Delta Ecosystem Reports. Additional details about related model default values, functionality, and parameters are found in Kull *et al.* (2019) & Kurz *et. al.* (2009).

$\Delta C_{BSL,L,t} = \Sigma(LBL_{BSL,NATURALi,t} + LBL_{BSL,FELLINGS,i,t} + LBL_{BSL,OTHER,i,t}) \bullet CF$, where; (6)

$LBL_{BSL,NATURALi,t}$ = annual loss of live tree biomass due to natural mortality in polygon, i; t d.m. yr^{-1}

$LBL_{BSL,FELLINGS,i,t}$ = annual loss of live tree biomass due to commercial felling in polygon, i; t d.m. yr^{-1}

$LBL_{BSL,OTHER,i,t}$ = annual loss of live tree biomass from incidental sources in polygon, i; t d.m. yr^{-1}

CF = carbon fraction of dry matter; t C t^{-1} d.m. (IPCC default value = 0.5).

$LBL_{BSL,NATURALi,t} = A_{BSL,i} \bullet LB_{BSL,i,t} \bullet f_{BSL,NATURAL,i,t}$, where; (7)

$A_{BSL,i}$ = area (ha) of forest land in polygon, i – values generated based on Project Proponent FMP data.

$LB_{BSL,i,t}$ = average live tree biomass (t d.m. ha^{-1}) in polygon, i, for year, t – values generated based on regionally specific forest dynamics within CBM-CFS3.

$LB_{BSL,I,t}$ is calculated for year, t, beginning with biomass estimates in year t=1 (the project start year) and with annual biomass increments ($G_{BSL,I,t}$) added as per calculations in equation 5a.

$f_{BSL,NATURAL,i,t}$ = the annual proportion of biomass that dies from natural mortality in polygon , i (unitless; 0 < $f_{BSL,NATURALi}$ < 1), year, t. – based on regionally specific forest dynamics (embedded within the CBM-CFS3 model), where;

$LBL_{FELLINGS,i,t} = A_{BSL,i} \bullet LB_{BSL,i,t} \bullet f_{BSL,HARVEST,i,t}$, where; (8)

$A_{BSL,i}$ = area (ha) of forest land in polygon, i – values generated based on Project Proponent FMP data

LBBSL,i,t = average live tree biomass (t d.m. ha-1) in polygon, i, for year, t (see equation 7 for its calculation).

fBSL,HARVEST,i,t = the proportion of biomass removed by harvesting from polygon, i, (unitless; 0 < fBSL,HARVESTIi < 1), in year, t. Data for this variable is obtained through Project Proponent FMP data and historic harvest records.

Incidental loss (LBLBSL,OTHER,i,t; t d.m. yr-1) is the additional live tree biomass removed for road and landing construction in the polygon, i, and is calculated as a proportion of biomass removed by harvesting:

$LBL_{BSL,OTHER,i,t} = A_{BSL,i} \bullet LB_{BSL,i,t} \bullet f_{BSL,DAMAGE,i,t}$, where; (9)

$A_{BSL,i}$ = area (ha) of forest land in polygon, i;

$LB_{BSL,i,t}$ = average live tree biomass (t d.m. ha^{-1}) in polygon, i, for year, t

$f_{BSL,DAMAGE,i,t}$ = the proportion of additional biomass removed for road and landing construction in polygon, i, year, t (unitless; 0 < $f_{BSL,DAMAGE,i,t}$ < 1). Values for this variable are based on regionally specific forest dynamics embedded within CBM-CFS3.

5.1.8 Calculating Baseline Scenario Dead Organic Matter Dynamics

Dead organic matter dynamics ($\Delta C_{BSLDOM,t}$, Eqn 10, 11a-b, 12, 13, 14a-b, 15, 16, 17a-d) are calculated by CBM-CFS3 based on the project area stratifications, regionally specific forest dynamics and the related carbon curves discussed above. Default parameters and algorithms within CBM-CFS3 model track all stand dead wood dynamics, including standing dead, downed dead, and below ground dead organic matter. CBM-CFS3 uses the regionally specific variant data and related parameters to model and track dead organic matter between carbon pools (Aboveground Dead (i.e. Stem Snags), Belowground Dead, Aboveground Slow DOM (VM0012 calls this Lying Dead Wood)), and temperate related decay within each pool.

Additionally, CBM-CFS3 tracks dead organic matter dynamics related to harvesting (slash) or other events when applied. The project uses the default decay factors and dead matter dynamics that are set within the CBM-CFS3 model and specific to the variant dataset. The results of dead organic matter dynamics are reported in Delta Ecosystem Reports. Additional details about related model default values, functionality, and parameters are found in Kull *et al.* (2019) & Kurz *et. al.* (2009). Generally, carbon stocks are transitioned between dead biomass pools, and emitted as they decay.

Equations were applied as follows:

$$\Delta C_{BSL,DOM,t} = \Delta C_{BSL,LDW,t} + \Delta C_{BSL,SNAG,t} + \Delta C_{BSL,DBG,t}, \text{ where;} \quad (10)$$

$\Delta C_{BSL,LDW,t}$ = change in lying dead wood (LDW) carbon stocks in year, t; t C yr^{-1}

$\Delta C_{BSL,SNAG,t}$ = change in snag carbon stock in year, t; t C yr^{-1}

$\Delta C_{BSL,DBG,t}$ = change in dead belowground biomass carbon stock in year, t; t C yr^{-1}

$$\Delta C_{BSL,LDW,t} = \Sigma(LDW_{BSL,IN,i,t} - LDW_{BSL,OUT,i,t}) \bullet CF \quad (11a)$$

$$LDW_{BSL,i,t+1} = LDW_{BSL,i,t} + (LDW_{BSL,IN,i,t} - LDW_{BSL,OUT,i,t}) \text{ where;} \quad (11b)$$

$LDW_{BSL,,i,t}$ = The total mass of lying dead wood accumulated in polygon i , at time, t (t d.m.).

$LDW_{BSL,IN,i,t}$ = annual increase in LDW biomass for polygon i, year, t (t d.m yr^{-1}).

$LDW_{BSL,OUT,i,t}$ = annual loss in LDW biomass through decay, for polygon i, year, t, (t d.m yr^{-1})

$LDW_{BSL,IN,i,t}$ and $LDW_{BSL,OUT,i,t}$ are summed across polygons.

CF = carbon fraction of dry matter - *(IPCC default value = 0.5)*

$$LDW_{BSL,IN,i,t} = (LBL_{BSL,NATURALi,t} - LBL_{BSL,NATURALi,t} \bullet R_i) \bullet f_{BSL,BLOWDOWN,i,t} + ((LBL_{BSL,FELLINGS,i,t} - LBL_{BSL,FELLINGS,i,t} \bullet R_i) + (LBL_{BSL,OTHER,i,t} - LBL_{BSL,OTHER,i,t} \bullet R_i)) \bullet f_{BSL,BRANCH,i,t} + ((LBL_{BSL,FELLINGS,i,t} - LBL_{BSL,FELLINGS,i,t} \bullet Ri) + (LBL_{BSL,OTHER,i,t} - LBL_{BSL,OTHER,i,t} \bullet Ri)) \bullet (1 - f_{BSL,BRANCH,i,t}) \bullet f_{BSL,BUCKINGLOSS,i,t} + SNAG_{BSL,,i,t} \bullet f_{BSL,SNAGFALLDOWN,i,t}, \text{ where;} \quad (12)$$

LBLBSL,NATURALi,t, LBLBSL,FELLINGS,i,t, and LBLBSL,OTHER,i,t are as calculated in equations 7, 8, and 9, respectively.

Ri is the root:shoot ratio in polygon, i (see equation 5b). fBSL,BLOWDOWN,i,t = the annual proportion of live aboveground tree biomass subject to blowdown in polygon, i, year, t (unitless; 0 < fBSL,BLOWDOWN,i,t < 1) – values generated based on regionally specific forest dynamics within CBM-CFS3.

fBSL,BRANCH,i,t = the annual proportion of aboveground tree biomass comprised of branches > 5 cm diameter in polygon, i (unitless; 0 < fBSL,BRANCH,i,t < 1) – values generated based on regionally specific forest dynamics within CBM-CFS3.

fBSL,BUCKINGLOSS,i,t = the annual proportion of the log bole biomass left on site after assessing and/or merchandizing the log bole for quality, in polygon, i (unitless; 0 < fBSL,BUCKINGLOSS,i,t < 1) – values generated based on regionally specific forest dynamics within CBM-CFS3

SNAGBSL,,i,t = the total mass of the snag pool in polygon, i, year, t (see equation 14b).

fBSL,SNAGFALLDOWN,i,t = the annual proportion of snag biomass in polygon, i, year, t, that falls over and thus is transferred to the LDW pool (unitless; 0 < fSNAGFALLDOWN,i,t < 1) – values generated based on regionally specific forest dynamics within CBM-CFS3

$\mathbf{LDW_{BSL,OUT,i,t} = LDW_{BSL,,i,t} \bullet f_{BSL,lwDECAY,i,t}}$, where; **(13)**

$LDW_{BSL,,i,t}$ = the total amount of lying deadwood mass in polygon i, year, t (see equation 11b).

$f_{BSL,lwDECAY,i,t}$ = the annual proportional loss of lying dead biomass due to decay, in polygon i, year, t (unitless; ; 0 < fBSL,lwDECAY,i,t < 1) – values generated based on regionally specific forest dynamics within CBM-CFS3

$$\Delta C_{BSL,SNAG,t} = \Sigma(SNAG_{BSL,IN,i,t} - SNAG_{BSL,OUT,i,t}) \bullet CF \quad (14a)$$

$$SNAG_{BSL,i,t+1} = SNAG_{BSL,i,t} + (SNAG_{BSL,IN,i,t} - SNAG_{BSL,OUT,i,t}), \text{ where;} \quad (14b)$$

$SNAG_{BSL,i,t}$ = The total mass of snags accumulated in polygon i, at time t (t d.m.).

$SNAG_{BSL,IN,i,t}$ = annual gain in snag biomass for polygon i, year, t (t d.m yr^{-1}).

$SNAG_{BSL,OUT,i,t}$ = annual loss in snag biomass through decay, or falldown (i.e, transfer to the LDW pool)(t d.m yr^{-1})

CF = carbon fraction of dry matter *(IPCC default value = 0.5)*

$\mathbf{SNAG_{BSL,IN,i,t} = (LBL_{BSL,NATURALi,t} - LBL_{BSL,NATURALi,t} \bullet R_i) \bullet (1 - f_{BSL,BLOWDOWN,i,t})}$, where; **(15)**

$LBL_{BSL,NATURALi,t}$ is as calculated in equation 7

$1 - f_{BSL,BLOWDOWN,i,t}$ is the proportion of live tree aboveground biomass that dies in polygon, i, year, t, but remains as standing dead organic matter (i.e., snags) (unitless; $0 < f_{BSL,BLOWDOWN,i,t} < 1$) – values generated based on regionally specific forest dynamics within CBM-CFS3.

$$\Delta C_{BSL,DBG,t} = \Sigma(DBG_{BSL,IN,i,t} - DBG_{BSL,OUT,i,t}) \bullet CF \quad (17a)$$

$$DBG_{BSL,i,t+1} = DBG_{BSL,i,t} + (DBG_{BSL,IN,i,t} - DBG_{BSL,OUT,i,t}), \text{ where;} \quad (17b)$$

$DGB_{BSL,i,t}$ = The total quantity of dead belowground biomass accumulated in polygon i, at time, t (t d.m.).

$DBG_{BSL,IN,i,t}$ = annual gain in dead belowground biomass for polygon i, year, t (t d.m yr^{-1}). Dead belowground biomass develops as a result of mortality through natural causes or through harvesting activities.

$DBG_{BSL,OUT,i,t}$ = annual loss in dead belowground biomass through decay, (t d.m yr^{-1})

CF = carbon fraction of dry matter (IPCC default value = 0.5)

$\mathbf{DBG_{BSL,IN,i,t} = [(A_{BSL,i} \bullet LB_{BSL,i,t} \bullet R_i) \bullet (f_{BSL,NATURAL,i,t} + f_{BSL,HARVEST,i,t} + f_{BSL,DAMAGE,i,t})]}$, where; **(17c)**

$A_{BSL,i}$ = area (ha) of forest land in polygon, i; - values generated based on Project Proponent FMP data.

$LB_{BSL,i,t}$ = average live tree biomass (t d.m. ha^{-1}) in polygon, i, for year, t. $LB_{BSL,i,t}$ is calculated for year, t, beginning with biomass estimates in year t=1 (the project start year) and with annual biomass increments ($G_{BSL,i,t}$) added as per calculations in equation 5 a, b. This value is then multiplied by $A_{BSL,i}$, the area (ha) of forest land in polygon, i.

R_i is the root:shoot ratio in polygon, i (see equation 5b).

$f_{BSL,NATURAL,i,t}$ = the annual proportion of biomass that dies from natural mortality in polygon, i (unitless; 0 < fNATURALi < 1), year, t (see equation 7),

$f_{BSL,HARVEST,i,t}$ = the proportion of biomass removed by harvesting from polygon, i, (unitless; 0 < fHARVESTIi < 1), year, t (see equation 8),

$f_{BSL,DAMAGE,i,t}$ = the proportion of additional biomass removed or road and landing construction in polygon, i (unitless; 0 < fDAMAGE,i,t < 1), year, t (see equation 9)

$DBG_{BSL,OUT,i,t} = DBG_{BSL,i,t} \bullet f_{BSL,dgbDECAY,i,t}$, where; **(17d)**

$DBG_{BSL,i,t}$ = the total quantity of dead belowground in polygon i, year, t (see equation 17b).

$f_{BSL,dgbDECAY,i,t}$ = the annual proportional loss of dead belowground biomass due to decay, in polygon i, year, t (unitless; 0 < $f_{BSL,lwDECAY,i,t}$ < 1) – values generated based on regionally specific forest dynamics within CBM-CFS3

5.1.9 Harvest Wood Product Modeling

Step 1 utilizes CBM output reports that forecast species, product groups (e.g., Fuel Wood, Sawlogs) and related harvest volumes (m^3) for each planning period. These are then converted to Merchantable Carbon/ Wood Product pools using species specific wood densities in Tonnes of Carbon (tC) and satisfies the requirements of Step 1 of the methodology.

The following product groups and percentages were provides by the Project Proponents based on historical harvest and sales records and are assigned to the following product type (k) categories:

1. Sawlogs
2. Fuelwood
3. Pulpwood

For the purposes of Step 2 (Carbon contained in harvested timber after milling, ($C_{BSL,MILL,h}$; tC, Equation 21) Forest Product Conversion Factors for the UNECE Region published by the United Nations Economic Commission for Europe (UNECE/FAO. 2010) ($f_{RND,k}$, $r_{RND,k}$) was used to determine the total carbon in harvested timber that will enter the wood products pool by product type accounting for mill efficiencies and estimated product disposition percentages. The gross quantity of carbon contained in harvested timber for each of the four product types (k) described in Step 1 must be decremented (process of decreasing or becoming gradually less) to account for losses during processing. This loss is calculated within *Silvador - BSL HWP* excel spread sheet specifically tab 'Step 2 (Mill)'.

VM0012 requires calculation of 3 harvested wood pools:

1. Short-lived wood products (SLF), which are defined as wood products in use for <3 years; and assumed to be emitted immediately.
2. Medium-lived wood products (MLF), which are defined as wood products in use for 3-100 years; and assumed to be emitted on a 20-year straight line decay curve.
3. Long-lived wood products (LLF), which are wood products in use for 100+ years.

Note: products in landfill are assumed to be “in use” and treated as per these 3 HWP pools.

For the final step 3 (Carbon storage in medium-term and long-term wood products, $C_{BSL,STORHWP,t}$, Equation 23) the total carbon lost in short-lived products (SLF – $P_{BSL,SLF,k}$, Equation 22a) and stored in medium-term (MLF - $P_{BSL,MLF,k}$, Equation 22c) and long-term (LLF - $P_{BSL,LLF,k}$, Equation 22b) products used Smith, et al (2006) reference tables and factors to calculate the result is a fraction of the Wood Products pool being emitted or stored annually based on each ‘In-Use’ category based on product, decay and storage factors. These values are summed for every year (t) utilizing a cohort approach.

The annual change in carbon storage in harvested wood products (ΔCBSL,STORHWP,t; t C yr-1, Equation 19) is calculated from the annual results of Equation 23.

These HWP modelling calculations are applied equally to any timber harvesting in either the Baseline or Project Scenario as follows:

$\Delta C_{BSL,STORHWP,t} = (C_{BSL,STORHWP,t2} - C_{BSL,STORHWP,t1}) / T$, where; **(19)**

$C_{BSL,STORHWP,t2}$ = carbon storage in harvested wood products at t=2; t C

$C_{BSL,STORHWP,t1}$ = carbon storage in harvested wood products at t=1; t C

T = number of years between monitoring t1 and t2

t : 1,2,3…t years elapsed since the project start date

$C_{BSL,TIMBER,h} = \Sigma[(LBL_{BSL,FELLINGS,i,h} - LBL_{BSL,FELLINGS,i,h} \bullet R_i + LBL_{BSL,OTHER,i,h} - LBL_{BSL,OTHER,i,h} \bullet R_i) \bullet (1 - f_{BSL,BRANCH,i,h}) \bullet (1 - f_{BSL,BUCKINGLOSS,i,h})] \bullet CF$, where; **(20)**

$C_{BSL,TIMBER,h}$= carbon contained in timber harvested in period h (summed for all harvested polygons, i); t

$LBL_{BSL,FELLINGS,i,h}$ = annual removal of live tree biomass due to commercial felling in polygon, i; t d.m. (equation 8)

$LBL_{BSL,OTHER,i,h}$ = annual removal of live tree biomass from incidental sources in polygon, i; t d.m. (equation 9)

R_i is the root:shoot ratio in polygon, i (see equation 5b)

1 - $f_{BSL,BRANCH,i,h}$ the proportion of live tree biomass remaining after netting out branch biomass, in polygon i (unitless; $0 < f_{BRANCH,i,t} < 1$) (see equation 12)

1 - $f_{BSL,BUCKINGLOSS,i,h}$ = the proportion of the log bole remaining after in-woods log processing/bucking for quality, length, etc., in polygon, i (unitless; $0 < f_{BUCKINGLOSS,i,t} < 1$) (equation 12)

h = harvest period ; yr

$C_{BSL,MILL,h,k} = (C_{BSL,TIMBER,h,k} \bullet f_{RND,k} \bullet r_{RND,k})$, where; (21)

$C_{BSL,MILL,h,k}$ = carbon contained in harvested timber after milling in period h, for product type k; t C

$C_{BSL,TIMBER,h,k}$ = carbon contained in timber harvested in period h, for product type k; t C – values generated from CBM-CFS3 outputs (total Softwood Merch, Softwood “other”, Hardwood Merch, Hardwood “other”).

k = wood product type – (softwood saw log, softwood pulpwood, hardwood saw log, or hardwood pulpwood); - *proportions determined by project proponent via FMP data and historic harvest records.*

$f_{RND,k}$ = fraction of growing stock volume removed as roundwood for product type k.

$r_{RND,k}$ = ratio of industrial roundwood to growing stock volume removed as roundwood for product type k.

$P_{BSL,SLF,k} = 1\text{-}P_{3\text{-}year}$ (22a)

$P_{BSL,LLF,k} = P_{100\text{-}year}$ (22b)

$P_{BSL,MLF,k} = P_{3\text{-}year} - P_{100\text{-}year}$ (22c)

$C_{BSL,STORHWP,t,} = \Sigma\,\Sigma\,((C_{BSL,MILL,h,k} \bullet P_{LLF,k}) + [(C_{BSL,MILL,h,k} \bullet P_{MLF,k}) \bullet ((20\text{-}h) / 20)])$ (23)

$C_{BSL,STORHWP,t,}$ = carbon stored in harvested wood products in year t summed for all product types k and then over all harvest periods h; t C

k = wood product type – *(softwood saw log, softwood pulpwood, hardwood saw log, or hardwood pulpwood); proportions determined via FMP data*

h = year of harvest (the term (20-h) should not be allowed to drop below 0)

5.1.10 Fossil Fuel Emissions Associated with Logging, Transport, and Manufacture

The SCA has chosen to include the ‘optional’ pool of fossil fuel emissions (VM0012 Table 2). The annual change in fossil fuel emissions ($\Delta C_{BSL,\ EMITFOSSIL,t}$, Eqn. 24,25,26,27) from harvesting and processing of the various wood products applies to fuel emissions associated with harvesting of raw material (i.e., clear felling), transport of raw material (trucking and haul distance) and manufacturing of raw material (into product groups).

Default values in VM0012 Table 4 have been used. All calculations in support of this is within: *Emissions_BSL_Estimate* spreadsheet (proprietary).

Existing FMPs that forecast species, product groups (e.g., CNS - Chip ‘n Saw) and related harvest volumes (m^3) for each planning period were used for the following calculations. Results are then converted to Merchantable Carbon pool using species specific wood densities along with a Carbon Fraction (CF = 0.5) providing Tonnes of Carbon (tC) harvested for each planning period. This is equivalent to $C_{BSL,TIMBER,h}$ as represented by Eq. 20 being the carbon contained in timber harvested in period h.

The annual change in fossil fuel emissions from harvesting and processing of the various wood products ($\Delta C_{BSL,EMITFOSSIL,t}$) are calculated as:

$C_{BSL,EMITFOSSIL,t} = C_{BSL,EMITHARVEST,t} + C_{BSL,EMITMANUFACTURE,t} + C_{BSL,EMITTRANSPORT,t}$ where: (24)

$C_{BSL,EMITHARVEST,t}$ is the annual fossil fuel emissions associated with harvesting of raw material (t C yr^{-1})

$C_{BSL,EMITMANUFACTURE,t}$ is the annual fossil fuel emissions associated with the manufacturing of raw material (t C yr^{-1})

$C_{BSL,EMITTRANSPORT,t}$ is the annual fossil fuel emissions associated with the transport of raw material (t C yr^{-1})

$$C_{BSL,EMITHARVEST,t} = \Sigma[(LBL_{BSL,FELLINGS,i,t} - LBL_{BSL,FELLINGS,i,t} \bullet Ri + LBL_{BSL,OTHER,i,t} - LBL_{BSL,OTHER,i,t} \bullet Ri) \bullet (1 - f_{BSL,BRANCH,i,t}) \bullet (1 - f_{BSL,BUCKINGLOSS,i,t})] \bullet CF \bullet c_{HARVEST}$$ where; **(25)**

$c_{HARVEST}$ is the carbon emission intensity factor (t C emitted/t C raw material) associated with harvesting (*VM0012 Table 4 default value for Truck (7.0 * 10^{-5}) utilized*) all other terms are as defined in equation 20.

$C_{BSL,EMITTRANSPORT,t}$ –

All timber in the SCA is harvest via clearcutting and the default value for $c_{HARVEST}$ is used.

$$C_{BSL,EMITTRANSPORT,t} = \Sigma[(LBL_{BSL,FELLINGS,i,t} - LBL_{BSL,FELLINGS,i,t} \bullet Ri + LBL_{BSL,OTHER,i,t} - LBL_{BSL,OTHER,i,t} \bullet Ri) \bullet (1 - f_{BSL,BRANCH,i,t}) \bullet (1 - f_{BSL,BUCKINGLOSS,i,t})] \bullet CF \bullet \Sigma(f_{BSL,TRANSPORTk} \bullet d_{TRANSPORTk} \bullet c_{TRANSPORTk}),$$
where; **(26)**

$f_{BSL,TRANSPORTk}$ = the fraction of raw material transported by transportation type, k. (unitless; $0 < f_{BSL,TRANSPORTk} < 1$).

$d_{TRANSPORTk}$ = the distance transported by transportation type, k. (km); these values were generated via proponent historic harvest levels as average distances from the forest fund property to the customer location – this estimate is conservative in nature. The average speed is travelled by logging trucks is 60 km/hr.

$c_{TRANSPORTk}$ is the carbon emission intensity factor (kg C emitted/t C raw material) associated with transportation type, k - *VM0012 Table 4 default value for Truck (7.0 * 10^{-5}) utilized.*

$$C_{BSL,EMITMANUFACTURE,t} = \Sigma[(LBL_{BSL,FELLINGS,i,t} - LBL_{BSL,FELLINGS,i,t} \bullet Ri + LBL_{BSL,OTHER,i,t} - LBL_{BSL,OTHER,i,t} \bullet Ri) \bullet (1 - f_{BSL,BRANCH,i,t}) \bullet (1 - f_{BSL,BUCKINGLOSS,i,t})] \bullet \Sigma(f_{BSL,PRODUCTk} \bullet c_{MANUFACTUREk}) \bullet CF,$$ where; **(27)**

$c_{MANUFACTUREk}$ is the carbon emission intensity factor (t C emitted/t C raw material) associated with manufacture of product type, k; - *VM0012 Table 4 default value for Sawnwood (0.04), chemical pulp (0.13) and veneer (0.06) were utilized.*

All other terms are as defined in equation 19.

5.2 Project Emissions

In regard to model outputs the Stock Change resultant 'Delta Total Ecosystem' (ΔtC yr-1) represents Total change in Ecosystem carbon stocks as required in Equation 1: annual change in living tree biomass ($\Delta C_{BSL,LB,t}$) (Refer to Sections 0 & 5.1.7) and annual change in dead organic matter ($\Delta C_{BSL,DOM,t}$) (Refer to Section 5.1.8). CBM also provides the required output for the annual change in carbon stocks associated with harvested wood products ($\Delta C_{BSL,HWP,t}$) (Refer to Section 5.1.9).

The Stock Changes category of output variables contains information about changes in carbon stocks, reported in tonnes of carbon for each year, for the area selected by the user. A positive value (+) for annual change in carbon stock indicates a net gain in carbon stocks, a negative value (-) indicates a net loss, and a zero value indicates neither a gain nor a loss. For analyses of Total Delta Ecosystem, annual values greater than zero indicate that the ecosystem is functioning as a carbon sink, annual values below zero indicate that it is functioning as a carbon source, and an annual value of exactly zero indicates that the ecosystem is carbon-neutral (i.e., neither a source nor a sink). Refer to the *GHG Estimate calculation* spreadsheet provided.

Project activities affecting GHG emissions were carried out during the initial project period (2020-2022) however, no project scenario activities were projected on an *ex-ante* basis. Future years may include various project forest management activities that affect *ex-post* carbon stocks which will be monitored and reported on in future verifications (e.g., salvage due to significant fire or forest health loss). Project activities will be based on actual monitoring results (see Monitoring Section 6) and any resulting emissions netted against emission reductions.

The methods described are equivalent to the equations and processes outlined in VM0012.

5.2.1 Development of Project Scenarios and Assumptions

The project scenario is modeled as conservation, LtPF, with a focus on maintaining forest health if required. No other activities affecting carbon stocks are scheduled on an *ex-ante* basis, aside from normal forest growth and development as modeled by CBM-CFS3 EUAID (SPU 1).

5.2.2 Determination of Actual Onsite Carbon Stocks

Ex-ante Project Scenario carbon stocks are calculated in the same manner as the baseline emissions discussed in Section 5.1 (Baseline Emissions). Calculations are completed using the same forest inventory data, analysis units and polygons, and modeling tools under the Project Scenario activities.

5.2.3 *Ex-Post* Calculations of Carbon Stocks

Ex-post carbon stocks in the Project Scenario are determined at each verification following the steps outlined in VM0012. Each monitoring report will detail the data and calculations for *ex-post* onsite carbon stocks at the time of verification. However, as the project start date (2020) is prior to validation, the initial period (2020-2022) *ex-ante* carbon stocks are also the *ex-post* carbon stocks.

Project carbon stocks from 2023 forward are on an estimated *ex-ante* basis.

The *ex-post* carbon Quantifications are made for the Baseline and Project Scenarios as outlined in Section 7.2.7 and 7.3.6 respectively, with updates to carbon inventory, spatial data, project instances, and other data for each verification period.

For the 2020-2022 period, the carbon stocks are calculated from the latest set of inventory and spatial data, which inherently include *ex-post* monitoring for that period.

31 permanent carbon plots were established in 2022 (See Section 6.3.2) with representation across all analysis units to monitor inventory and model accuracy. Additional permanent sample plots may be installed to improve inventory accuracy, spatial coverage, and Analysis Unit representation as deemed

necessary. The initial *ex-post* carbon stock spatial forest inventory and analysis is using the latest available ortho-imagery, and other GIS datasets, in conjunction with site visits from Project Proponent staff to confirm the status of project activities and disturbances. The modeling related to these data has been applied across both the Project Scenario and Baseline Scenarios. The uncertainty calculations in the first verification period are up to date for the latest inventory plot data and modeling results.

In future verification periods, the project will calculate *ex-post* carbon stocks by addressing any spatial changes to the project area, then updating the forest inventory and carbon modeling results, including for any other monitoring results or updates.

Additional carbon plots may be installed to improve inventory accuracy, spatial coverage, and/or Analysis Unit representation. *Ex-post* carbon calculations will be undertaken using the latest imagery, LiDAR, and GIS datasets for the project area. Project activities and disturbances will be monitored by remote sensing or field visits and updated into the forest inventory prior to the following verification period. All modeling and inventory updates and calibrations will be applied equally across the Project and Baseline Scenarios. The uncertainty factor, leakage assessments, and non-permanence risk factors will be recalculated using the latest forest inventory, plot data, and project information.

5.3 Leakage

5.3.1 Activity Shifting Leakage

VM0012 does not provide specific equations nor methods for calculating net emissions related to activity shifting leakage. VCS requires that "IFM project developers must demonstrate that there is no leakage within their operations – i.e., on other lands they manage/ operate outside the bounds of the VCS carbon project". The methodology requires monitoring and reporting on evidence demonstrating no activity shifting is occurring in order to demonstrate compliance with VCS.

STEP 1 - the locations and descriptions of all forestlands within the project over which the Project Proponent has ownership is available. Silvador owns 3,403 hectares of forest lands including project instances. Of this 1,865 ha is potentially subject to Activity Shifting.

STEP 2 –demonstrate that there is no activity shifting leakage to areas that are outside the project instances and that have not materially changed as a result of the project activity (e.g., harvest rates have not been increased).

Due to the project lands being managed under private forest land legal requirements, approved harvest management plan volume levels are non-transferrable to other properties as per Law 46/2008 Forestry Code. For monitoring areas outside of the PAI, cumulative volume comparisons that are above the legal FMP volume will be considered activity shifting leakage.

5.3.2 Market Leakage

The VM0012 LtPF methodology provides three options for determining market leakage values. The SCA utilizes the most current VCS market leakage tool (VCS AFLOU Requirements v3.6, Section 4.6.14). The market leakage value identified in Table 3: Market Leakage Discount Factors, is applied to the project action and its effect on reduced timber harvest volumes.

Romania, a member of the European Union (EU), has 6,5 million hectares of forest that cover 28% of its land base, and an annual allowable cut of 22.0 million m^3 [10]. According to the Food and Agriculture Organization of the United Nations (FAO)[11], Romanian wood exports in 2020 were valued at $1.6 billion USD and made up less than 3% of the world market export share. The top two EU producing members by comparison were Germany, with wood exports valued at $31.9 billion, and Sweden at $22.8 billion.

The Silvador properties (1,538 ha) are located within the counties of Argeș, Buzău, and Dâmbovița. Each county falls under the legal authority of Regia Națională a Pădurilor, or The National Forest Administration - Romsilva[12]. Each Romsilva forest department is responsible for the sustainable management, development, and protection of state forests in its jurisdiction. Respectively Romsilva currently manages 110,301 ha of forests in Argeș, 84,880 ha in Buzău, and 117,376 ha in Dâmbovița. The total annual allowable cut combined for production of National Forests to date in Argeș, Buzău, and Dâmbovița is 485,864 m3.

5.3.3 Market Leakage Determination

The VM0012 LtPF methodology provides three options for market leakage. The SCA utilizes 'Option 1' and the most current VCS market leakage tool. Specifically, VCS Module VMD0033 - Estimation of Emissions from Market Leakage is used. The VCS module utilizes a stepwise procedure as outlined below.

Step 1: Identification of commodities and services

Timber harvested in the SCA is linked to the domestic market (roundwood, fuelwood, industrial wood). According to the Food and Agriculture Organization of the United Nations (FAO)[13], Romanian wood exports in 2021 were valued at $2.5 billion USD and made up less than 3% of the world market export share. Wood product exports represent about 2.4% of the country's exports in total. In comparison to the EU's top timber resource producers, Germany's wood exports were valued at $40.1 billion USD, and Sweden's at $27.5 billion USD.

The commodities (logs) that could be reduced as part of the project implementation meet the following criteria:

1. Commodity was produced within the project area prior to the project commencement.

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[10] Forest-Based Sector Technology Platform. 2022, *The Forest Based Sector in Romania*: https://www.forestplatform.org/forest-based-sector-in-romania/

[11] For further details see The Food and Agriculture Organization of the United Nations website: https://www.fao.org/forestry/statistics/84922/en/

[12] Romsilva - National Forest Administration (rosilva.ro)

[13] For further details see The Food and Agriculture Organization of the United Nations website: https://www.fao.org/forestry/statistics/84922/en/.

- Silvador has sustainably managed their lands since 2016. To date, Silvador has been carrying out forestry and harvest operations within Romania since 1999.

2. The commodity is not produced solely for the producer's use as it was sold to others.
    - Silvador does not own any manufacturing sites or sawmills, therefore fibre produced on the forest lands is sold to others.
3. The commodity provides more than 5% of the total cash and barter income earned by residents within the project area.

- This criterion does not apply to the SCA as the fibre produced on the Silvador property does not provide direct income to residents (i.e., the sale of logs does not provide income to residents in the project area).

Table 15: Project Proponent's Market and Product Table

Market	Logs* (%)	Market Scale* (m3/yr) – Logs
Local (within Romanian local communities)	100	12,296
National (within Romanian Counties)		
International (worldwide)		
Total:	100%	12,296

* Values presented above are accurate but approximate based on client report Silvador FC Carbon Project Volumes for CBM(Jan27'23).xls

As represented by the table above, the Silvador market for logs caters to the domestic market. Although the project area represents less than half of Silvador's land base, the make up of the project area is representative of the products and market distribution as described above.

Step 2: Barrier Analysis

Forestry is a foundational industry within Romania and of the 6.5 million hectares of forest lands, 35 percent is privately owned[14]. Revenue earned from exported manufactured wood products over the last decade has averaged $2.1 billion USD and expected to reach $2.9 billion USD in 2023, Due to the forest industry markets supporting to both the Romanian and European Union economies, any barriers surrounding the log market can be considered low (i.e., readily substituted, no significant barriers exist to bringing the product or service into the local market from the regional market).

Distribution costs, tariffs, and regulatory barriers were considerations for each of the market levels in the analysis. Only those that were applicable for barrier grading are discussed below.

[14] For further details see The Food and Agriculture Organization of the United Nations website: https://www.fao.org/forestry/statistics/84922/en/

Table 16: Barrier Grades

Market (Logs)	Barrier	Grade
Local (within Romanian local communities)	Distribution (cost of transportation)	Low
National (within Romanian Counties)	Distribution (cost of transportation)	Low
International (worldwide)	Distribution (cost of transportation)	Low

1. Local Market Barrier: Distribution (cost of transportation) Grade: Low
   - The common mode of transportation in the local market is by truck.
   - The road networks within Romania are extensive and provide approximately 86,200 kms[15] of transportation infrastructure (national ~17, 500 km, county roads ~33,100 km, local roads ~33,600 km). Ranges in transport costs of local distribution are largely dependent on the mode of transportation (truck, railroad), load weight, length of wood product, and the destination, therefore, this cost would not significantly increase (<5%) for market participants sourcing locally.
2. Regional/National Market Barrier: Distribution (cost of transportation) Grade: Low
   - The common mode of transportation in the regional/national market is by truck or by railroad (~22,300 km of railway infrastructure).
   - Both the local and regional markets are dependent on supplier and customers, therefore costs for regional distribution could be considered compounded (i.e., logs are distributed from the forest areas to the sawmills or manufacturing plants, (local market distribution costs) and from there onto rail containers or truck containers and transported regionally (distribution costs). The transportation cost would not significantly increase (<5%) for market participants sourcing from the regional market.
3. International Market Barrier: Grade Low
   - The common mode of transportation in the international market is by railroad or shipping container (marine transport 52% import exports).
   - The international markets are dependent on product supply chains, shipping methods and costs, like the previous markets. Transportation cost would not significantly increase but would be affected by shipping bottlenecks and supply chain issues, (<5%) for market participants sourcing from the national market.

Step 3: Re-assessment of markets

Due to the lack of barriers within, and between all identified markets, the recalculation of markets results in 100% of the log market at the national scale.

[15] https://en.wikipedia.org/wiki/Transport_in_Romania

Table 17: Re-assessment of Markets

Market	Logs* (%)	Market Scale* (m3/yr) – Logs	Barrier Grade	Re-calculation (%)
Local	100	12,296	Low	
National	0		Low	100
International	0		Low	
Total:	100%	12,296		

Step 4: Percentage of Market Supplied

When comparing the cubic meters of logs impacted by project implementation , to the average cubic meters harvested within Romania, Silvador's log market resulting from the project area represents less than 1%. Note: this valuation is conservative by using volumes of the next market scale.

Table 18: Percentage of Market Supplied by Project Implementation

Market	Logs (%) – Re-calc	Market Scale (m3/yr) – Logs (re-calculated)	% of total market
Local			
National	100	12,296	<1%
International			
Total Romania Harvest (average)		10,436,000	

*National export quantity of roundwood products supplied for year 2018. Source: Eurostat, Agriculture, forestry, and fishery statistic-2020 edition, pg. 211.

Step 5: Market Significance

Less that 3% of total market in each market (international market) - continue to Step 10.

Step 10: Market Flexibility

The timber export market in Romania in 2021 accounted for approximately 2.4% of the total gross revenues earned.[16]. According to the National Institute of Statistics, the actual harvested volumes between 2005-2017 has never reached the National allowed maximum cut.

[16] Romania Exports of wood and articles of wood, wood charcoal - 2023 Data 2024 Forecast 1989-2021 Historical (tradingeconomics.com)

The forest industry in Romania is robust and able to adapt to market adjustments when necessary. It is supported by both national forestry legislation and policies, as well as EU biodiversity and forest strategies which all focus on long term harvest sustainability and management goals. Market demands causing intensification would not result in the over harvesting of forest lands.

Market Leakage Determination

In conclusion, due to the SCA's small market share (<3%) as well as the flexibility of the international market, it can be determined that no market leakage due to the SCA is anticipated.

5.4 Estimated Net GHG Emission Reductions and Removals

Estimated net GHG emission reductions and removals are calculated based on estimated baseline and project emissions, calculated as described in Sections **Error! Reference source not found.** (Baseline Emissions) and Section 5.2 (Project Emissions).

5.4.1 Calculation of Emissions Reductions

Gross carbon emissions reductions ($ER_{y,GROSS}$; t CO_2e yr^{-1}) created by the SCA were calculated annually as the difference between the baseline and project scenario emission reductions/emissions:

$$ER_{y,GROSS} = (\Delta C_{BSL,t} - \Delta C_{PRJ,t}) \bullet 44/12 \qquad (57)$$

Where,

$\Delta C_{BSL,t}$ = total baseline scenario emissions calculated from equation 1 (t C yr^{-1}).

$\Delta C_{PRJ,t}$ = total project scenario emissions calculated from equation 29 (t C yr^{-1}).

44/12 = factor to convert C to CO_2e

The annual net GHG emissions reductions are calculated each year using Equation 58.

$$ER_y = ER_{y,GROSS} - LE_y \qquad (58)$$

where:

ER_y = the net GHG emissions reductions and/or removals in year y (the overall annual carbon change between the baseline and project scenarios, net all discount factors except the permanence buffer) (t CO_2e yr^{-1}).

$ER_{y,GROSS}$ = the difference in the overall annual carbon change between the baseline and project scenarios (t CO_2e yr^{-1}).

LE_y = Leakage in year y (t CO_2e yr^{-1}), as calculated in equation 56b below.

$$LE_y = MLF_y \bullet ER_{yGROSS} \qquad (56b)$$

Ex-ante net GHG emissions are calculated below:

Table 19: Net GHG Emissions

Year	Estimated baseline emissions or removals (tCO2e)	Estimated project emissions or removals (tCO2e)	Estimated leakage emissions (tCO2e)	Estimated net GHG emission reductions or removals (tCO2e)
01-August-2020 - 31-December-2020	-9,625	4,444	-	14,069
01-January-2021 - 31-December-2021	-2,180	18,559	-	20,739
01-January-2022 - 31-December-2022	-53,490	2,379	-	55,869
01-January-2023 - 31-December-2023	-4,854	3,501	-	8,354
01-January-2024 - 31-December-2024	-5,532	4,063	-	9,595
01-January-2025 - 31-December-2025	-6,660	3,876	-	10,536
01-January-2026 - 31-December-2026	-6,766	3,499	-	10,265
01-January-2027 - 31-December-2027	-8,881	3,251	-	12,132
01-January-2028 - 31-December-2028	-6,124	3,240	-	9,364
01-January-2029 - 31-December-2029	-9,478	3,088	-	12,566
01-January-2030 - 31-December-2030	-7,797	2,887	-	10,685
01-January-2031 - 31-December-2031	-10,112	2,576	-	12,688
01-January-2032 - 31-December-2032	-12,295	2,323	-	14,618
01-January-2033 - 31-December-2033	-15,488	2,307	-	17,794
01-January-2034 - 31-December-2034	-10,369	2,210	-	12,579
01-January-2035 - 31-December-2035	-5,715	2,044	-	7,759
01-January-2036 - 31-December-2036	-10,037	1,840	-	11,876
01-January-2037 - 31-December-2037	-9,751	1,742	-	11,493

Year	Estimated baseline emissions or removals (tCO2e)	Estimated project emissions or removals (tCO2e)	Estimated leakage emissions (tCO2e)	Estimated net GHG emission reductions or removals (tCO2e)
01-January-2038 - 31-December-2038	-5,937	1,722	-	7,660
01-January-2039 - 31-December-2039	-3,098	1,652	-	4,750
01-January-2040 - 31-December-2040	18,756	1,588	-	(17,168)
01-January-2041 - 31-December-2041	-13,060	1,428	-	14,488
01-January-2042 - 31-December-2042	-10,114	1,359	-	11,474
01-January-2043 - 31-December-2043	-7,337	1,345	-	8,682
01-January-2044 - 31-December-2044	-10,991	1,288	-	12,280
01-January-2045 - 31-December-2045	-13,565	1,237	-	14,803
01-January-2046 - 31-December-2046	-10,185	1,200	-	11,384
01-January-2047 - 31-December-2047	-12,016	1,153	-	13,169
01-January-2048 - 31-December-2048	-12,550	1,144	-	13,693
01-January-2049 - 31-December-2049	-17,883	1,096	-	18,979
01-January-2050 - 31-July-2050	3,684	1,063	-	(2,621)
Total	**-289,449**	**85,104**	-	**374,552**

6 MONITORING

6.1 Data and Parameters Available at Validation

Data / Parameter	Spatial Inventory data ($A_{BSL,i}$, $A_{PRJ,i}$),i
Data unit	Hectares (Ha)
Description	Respective areas of baseline and project polygon, i for all project instances
Source of data	GPS Coordinates, inventory records, spatial data using a Geographic Information System (GIS)
Value applied:	Each polygon has an area
Justification of choice of data or description of measurement methods and procedures applied	GIS spatial delineation of project areas and tabular forest inventory classes. An ESRI GIS software program is used to integrate data from various sources. and its derivatives (areas, perimeters etc.)
Purpose of Data	Required for baseline and project calculations
Comments	Includes delineation of project areas and polygons

Data/Parameter	CF
Data unit	t C t^{-1} d.m
Description	Carbon fraction of dry matter
Source of data	As per CBM CFS3 EU-AIDB
Value applied:	0.50
Justification of choice of data or description of measurement methods and procedures applied	Best available data
Purpose of Data	Required for baseline carbon and project calculations

Comments	Embedded in CBM CFS3 EU-AIDB SPU 1

Data / Parameter	BEF
Data unit	Unitless
Description	Biomass expansion factors for conversion of productivity metrics to biomass
Source of data	CBM-CFS3 default values.
Value applied:	CBM-CFS3 calculates the Biomass Expansion Factor as a function of jurisdiction, ecozone and tree species.
Justification of choice of data or description of measurement methods and procedures applied	CBM-CFS3 data is widely reviewed and accepted. Value determined using approach described in the VM0012 Methodology
Purpose of Data	Calculation of baseline and project emissions
Comments	

Data / Parameter	R_i
Data unit	Unitless
Description	Root to shoot ratio in polygon, i
Source of data	CBM-CFS3 default values.
Value applied:	CBM-CFS3 variants calculates belowground biomass as a function of tree species and tree size.
Justification of choice of data or description of measurement methods and procedures applied	CBM-CFS3 data is widely reviewed and accepted.
Purpose of Data	Required for calculation of baseline and project emissions.
Comments	Root allocation can vary by site productivity.

Data / Parameter	$f_{BSL,NATURAL,i,t}$, $f_{PRJ,NATURAL,i,t}$
Data unit	unitless (0 < $f_{BSL,NATURALi}$, $f_{PRJ,NATURAL,i,t}$ < 1)
Description	The proportion of biomass that dies from natural mortality in polygon, i, year, t, in the baseline and project cases, respectively.
Source of data	Modeled by CBM-CFS3.
Value applied:	Default settings in CBM-CFS3.
Justification of choice of data or description of measurement methods and procedures applied	CBM-CFS3 is widely accepted.
Purpose of Data	Required for baseline and project calculations.
Comments	

Data / Parameter	$f_{BSL,DAMAGE,i,t}$, $f_{PRJ,DAMAGE,i,t}$
Data unit	unitless (0 < $f_{BSL,DAMAGEi,t}$ $f_{PRJ,DAMAGE,i,t}$ < 1)
Description	The proportion of additional biomass removed by for road and landing construction in polygon, i, year, t, in the baseline and project cases, respectively.
Source of data	As described in the management plan for road development. Monitoring data on an *ex-post* basis in the project scenario.
Value applied:	Variable on an *ex-post* basis in the project scenario - digitized in the project scenario on an *ex-post* basis if visible in remote sensing or captured by standing stocking estimates. Captured within the clearing component of the baseline scenarios.
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on expert opinion based on regional experience.
Purpose of Data	Required for calculation of baseline and project emissions.

Comments	

Data / Parameter	$f_{BSL,BLOWDOWN,i,t}$, $f_{PRJ,BLOWDOWN,i,t}$
Data unit	unitless (0 < $f_{BSL,BLOWDOWNi,t}$, $f_{PRJ,BLOWDOWN,i,t}$ < 1)
Description	The proportion of live aboveground tree biomass subject to blowdown in polygon, i, year, t, in the baseline and project cases, respectively.
Source of data	Included within the natural mortality factors calculated in $f_{BSL,NATURAL,i,t}$, $f_{PRJ,NATURAL,i,t}$ by CBM-CFS3. Also captured by spatial monitoring if >4ha, which would be incorporated as a new polygon on an *ex-post* basis.
Value applied:	Zero for the baseline and project *ex-ante* calculations (part of the natural mortality modeling in CBM-CFS3).
Justification of choice of data or description of measurement methods and procedures applied	CBM-CFS3 is widely accepted.
Purpose of Data	Required for calculation of baseline and project emissions.
Comments	

Data / Parameter	$f_{BSL,BRANCH,i,t}$, $f_{PRJ,BRANCH,i,t}$
Data unit	unitless (0 < $f_{BSL,BRANCHi,t}$, $f_{PRJ,BRANCH,i,t}$ < 1)
Description	The proportion of aboveground tree biomass comprised of branches > 2 in diameter in polygon, i, year, t, in the baseline and project cases, respectively.
Source of data	Calculated within CBM-CFS3.
Value applied:	Variable, see source data.

Justification of choice of data or description of measurement methods and procedures applied	CBM-CFS3 is widely accepted.
Purpose of Data	Required for calculation of baseline and project emissions.
Comments	

Data / Parameter	$f_{BSL,BUCKINGLOSS,i,t}$, $f_{PRJ,BUCKINGLOSS,i,t}$
Data unit	unitless (0 < $f_{BSL,BUCKINGLOSSi,t}$ $f_{PRJ,BUCKINGLOSS,i,t}$ < 1)
Description	The proportion of the log bole biomass left on site after assessing and/or merchandizing the log bole for quality, in polygon, i, year, t, in the baseline and project cases, respectively.
Source of data	CBM-CFS3 EU-AIDB default values for SPU 1
Value applied:	CBM-CFS3 EU-AIDB default values for SPU 1
Justification of choice of data or description of measurement methods and procedures applied	CBM-CFS3 is widely accepted.
Purpose of Data	Required for calculation of baseline and project emissions.
Comments	

Data / Parameter	$f_{BSL,SNAGFALLDOWN,i,t}$, $f_{PRJ,SNAGFALLDOWN,i,t}$
Data unit	unitless (0 < $f_{BSL,SNAGFALLDOWNi,t}$ $f_{PRJ,SNAGFALLDOWN,i,t}$ < 1)
Description	The proportion of snag biomass in polygon, i, year, t, that falls over, in the baseline and project cases, respectively.
Source of data	Modeled by CBM-CFS3-EU-AIDB.
Value applied:	Variable, depending on species and dbh. Modeled by species and age class within CBM-CFS3 EU-AIDB.

Justification of choice of data or description of measurement methods and procedures applied	CBM-CFS3 is widely accepted.
Purpose of Data	Required for calculation of baseline and project emissions.
Comments	

Data / Parameter	$f_{BSL,LWDECAY,i,t}$, $f_{PRJ,LWDECAY,i,t}$
Data unit	unitless ($0 < f_{BSL,LWDECAYi,t}$ $f_{PRJ,LWDECAY,i,t} < 1$)
Description	The annual proportional loss of lying dead biomass due to decay, in polygon i, year, t in the baseline and project cases, respectively.
Source of data	Modeled by CBM-CFS3-EU-AIDB.
Value applied:	CBM-CFS3 default values for SPU 1
Justification of choice of data or description of measurement methods and procedures applied	CBM-CFS3 is widely accepted.
Purpose of Data	Required for calculation of baseline and project emissions.
Comments	

Data / Parameter	$f_{BSL,SWDECAY,i,t}$, $f_{PRJ,SWDECAY,i,t}$
Data unit	unitless ($0 < f_{BSL,SWDECAYi,t}$ $f_{PRJ,SWDECAY,i,t} < 1$)
Description	The proportional loss of snag biomass due to decay, in polygon, i, year, t, in the baseline and project cases, respectively.
Source of data	Modeled by CBM-CFS3-EU-AIDB.
Value applied:	CBM-CFS3 default values for SPU 1

Justification of choice of data or description of measurement methods and procedures applied	CBM-CFS3 is widely accepted.
Purpose of Data	Required for calculation of baseline and project emissions.
Comments	

Data / Parameter	$f_{BSL,DBGDECAY,i,t}$, $f_{PRJ,DBGDECAY,i,t}$
Data unit	unitless (0 < $f_{BSL,DGBDECAYi,t}$ $f_{PRJ,DBGDECAY,i,t}$ < 1)
Description	The proportional loss of dead belowground biomass due to decay, in polygon i, year, t, in the baseline and project cases, respectively.
Source of data	Modeled by CBM-CFS3-EU-AIDB.
Value applied:	CBM-CFS3 default values SPU 1
Justification of choice of data or description of measurement methods and procedures applied	CBM-CFS3 is widely accepted.
Purpose of Data	Required for calculation of baseline and project emissions.
Comments	

Data / Parameter	E_M
Data unit	%
Description	An estimate of model error based on the relative area-weighted difference between model-predicted values of carbon storage and those values measured in field plots.
Source of data	Model output and field data (see Equation 60a).
Value applied:	Percent Calculated

Justification of choice of data or description of measurement methods and procedures applied	Value determined using approach described in the VM0012 Methodology.
Purpose of Data	Calculation of Uncertainty.
Comments	

Data / Parameter	E_I
Data unit	%
Description	An estimate of Inventory sampling error calculated as the 90% confidence limit of the area-weighted differences between the model-predicted values of carbon storage and those values measured in field plots.
Source of data	Model output and field data (see Equation 60c).
Value applied:	Percent Calculated
Justification of choice of data or description of measurement methods and procedures applied	Value determined using approach described in the VM0012 Methodology.
Purpose of Data	Calculation of Uncertainty.
Comments	

Data / Parameter	E_P
Data unit	%
Description	An estimate of total project error used to determine the uncertainty factor.
Source of data	Model output and field data (see Equation 60f).
Value applied:	Percent Calculated

Justification of choice of data or description of measurement methods and procedures applied	Value determined using approach described in the VM0012 Methodology.
Purpose of Data	Calculation of Uncertainty.
Comments	

Data / Parameter	$E_{Ry,ERR}$,
Data unit	%
Description	The uncertainty factor calculated for year 'y' (See Section 6.5).
Source of data	Model output and field data (see Equation 60f).
Value applied:	%
Justification of choice of data or description of measurement methods and procedures applied	Value determined using approach described in the VM0012 Methodology.
Purpose of Data	Calculation of baseline and project emissions and calculations of VCUy.
Comments	

Data / Parameter	MLF_y
Data unit	%
Description	The market leakage factor determined for year 'y'
Source of data	Determined based upon the approach defined in Section 5.3
Value applied:	Percent Calculated
Justification of choice of data or description of measurement methods and procedures applied	Value determined using the latest version of the VCS Market Leakage Tool as defined in Agriculture, Forestry and Other Land

	Use (AFOLU) Requirements v3.6 and specified in the VM0012 Methodology (VMD0033).
Purpose of Data	Calculation of leakage.
Comments	

6.2 Data and Parameters Monitored

Data / Parameter	$A_{PRJ,i}$
Data unit	Hectares (ha)
Description	Area of forest land in polygon, i
Source of data	Latest version of the spatial inventory data.
Description of measurement methods and procedures applied	GIS inventory data updated annually from Remote Sensing data, GPS data, combined with Silvador forest inventory spreadsheets and management plans. Updated yearly by Project Proponent, monitored by the Project Developer.
Frequency of monitoring/recording	Prior to every verification period. Yearly for spatial change monitoring.
Value applied:	Inventory data, hectares.
Monitoring equipment	Visual, satellite, aerial photos, GPS survey data.
QA/QC procedures applied	Standard GIS QA/QC procedures. GreenRaise. – Greenhouse Gas Monitoring Standard Operating Procedures (SOP).
Purpose of data	Calculation of project emissions in project area instances.
Calculation method	GIS software processes calculate areas.
Comments	Includes delineation of project areas and polygons

Data / Parameter	$APSP_{,i}$,

Data unit	Hectares (ha)
Description	Area of permanent sample plot in polygon, i
Source of data	Field measurement.
Description of measurement methods and procedures applied	Fixed radius permanent sample plot design. See GreenRaise Greenhouse Gas Monitoring SOP for procedures applied for plot sampling procedures. Completed by Project Developer.
Frequency of monitoring/recording	Plot measurements are repeated on 5-year intervals.
Value applied:	See compiled plot data MS Excel File. Plot is recorded in m^2 and converted to hectares.
Monitoring equipment	GPS, measuring tape. ZEB GeoSLAM Horizon LiDAR Scanner
QA/QC procedures applied	GPS of plot center. GreenRaise. Standard Operating Procedures (SOP) followed, including QC/QA plot check processes.
Purpose of data	Required for calculations of mean aboveground biomass and in determination of Uncertainty Factor.
Calculation method	x m^3 * 1000 = x ha
Comments	

Data / Parameter	$DBH_{i,t}$
Data unit	Centimeters (cm)
Description	Diameter at breast height measured for each tree in the sample plot at time, t
Source of data	Field measurements in sample plots.
Description of measurement methods and procedures applied	Field measurements in permanent sample plots. Measurement with ZEB GeoSLAM Horizon LiDAR Scanner all trees ≥ 5cm in DBH at 1.3m height above ground. Completed by Project Developer.

Frequency of monitoring/recording	Individual plot tree re-measurements are repeated on 5-year intervals.
Value applied:	See compiled plot data MS Excel File.
Monitoring equipment	ZEB GeoSLAM Horizon LiDAR Scanner, DBH tape, data logger
QA/QC procedures applied	GreenRaise Greenhouse Gas – Monitoring Standard Operating Procedures (SOP).
Purpose of data	Required for calculations in aboveground biomass and in determination of Uncertainty Factor.
Calculation method	n/a - Measured.
Comments	

Data / Parameter	$Height_{i,t}$
Data unit	Meters (m)
Description	Tree height measured for each tree in the sample plots at time, t
Source of data	Field measure in sample plots.
Description of measurement methods and procedures applied	Field measurements in permanent sample plots. Measurement with ZEB GeoSLAM Horizon LiDAR Scanner to for trees ≥ 5cm DBH. Completed by Project Developer.
Frequency of monitoring/recording	Individual plot tree re-measurements are repeated on 5-year intervals.
Value applied:	See compiled plot data MS Excel File.
Monitoring equipment	ZEB GeoSLAM Horizon LiDAR Scanner, or other instrument designed for the measuring height.
QA/QC procedures applied	GreenRaise Greenhouse Gas – Monitoring Standard Operating Procedures (SOP).

Purpose of data	Required for calculations of mean aboveground biomass and in determination of Uncertainty Factor.
Calculation method	n/a - Measured
Comments	

Data / Parameter	$B_{AG\ i,t}$
Data unit	t d.m. ha^{-1} (d.m. = dry matter)
Description	Aboveground live tree biomass in polygon, i, year, t, in the project.
Source of data	Permanent sample plots (PSP) data.
Description of measurement methods and procedures applied	Calculated from $Height_{i,t}$, $DBH_{i,t}$, and $APSP_i$, Completed by Project Developer.
Frequency of monitoring/recording	Upon establishment of PSP. Every 5 years, thereafter.
Value applied:	See compiled plot data MS Excel File.
Monitoring equipment	n/a – calculated value
QA/QC procedures applied	GreenRaise Greenhouse Gas – Monitoring Standard Operating Procedures (SOP).
Purpose of data	Required for determination of Uncertainty Factor.
Calculation method	Above ground biomass for each permanent sample plot will be calculated using m^3/ha and supporting CBM-CFS3 data (Boudwyn 2007 equations).
Comments	

Data / Parameter	$B_{BG\ i,t}$
Data unit	t d.m. ha^{-1} (d.m. = dry matter)
Description	Average belowground live tree biomass in polygon, i, year, t, in the project.
Source of data	Estimated using info from above ground biomass calculations within permanent sample plots from $B_{AGi,t}$.
Description of measurement methods and procedures applied	Calculated using plot data in CBM-CFS3 EU-AIDB. Completed by Project Developer.
Frequency of monitoring/recording	Upon establishment of PSP. Every 5 years, thereafter.
Value applied:	See compiled plot data MS Excel File.
Monitoring equipment	n/a – calculated value
QA/QC procedures applied	GreenRaise Greenhouse Gas – Monitoring Standard Operating Procedures (SOP).
Purpose of data	Required for determination of Uncertainty Factor.
Calculation method	Below ground biomass for each permanent sample plot will be calculated using m^3/ha and supporting CBM-CFS3 data (Boudwyn 2007 equations).
Comments	

Data / Parameter	$B_{TOTAL\ i,t}$
Data unit	t d.m. ha^{-1} (d.m. = dry matter)
Description	Average total live biomass in polygon, i, for year, t.
Source of data	Derived from average above and below ground biomass calculations within permanent sample plots.

Description of measurement methods and procedures applied	Sum of $B_{AGi,t}$ and $B_{BGi,t}$. Completed by Project Developer.
Frequency of monitoring/recording	Upon establishment of PSP. Every 5 years, thereafter.
Value applied:	Calculated using plot data and supporting CBM-CFS3 data (Boudwyn 2007 equations).
Monitoring equipment	n/a – calculated value
QA/QC procedures applied	GreenRaise Greenhouse Gas – Monitoring Standard Operating Procedures (SOP).
Purpose of data	Required for above and below ground living tree biomass and in the determination of Uncertainty Factor.
Calculation method	Sum of $B_{AGi,t}$ and $B_{BGi,t}$ values.
Comments	Calculated

Data / Parameter	$CLB_{i,t}$
Data unit	t d.m. ha-^{1} (d.m. = dry matter)
Description	Total carbon storage in live tree biomass in polygon, i, year, t, tC in the project case.
Source of data	Permanent sample plots.
Description of measurement methods and procedures applied	Calculated from $B_{TOTALi,t}$ and CF, sum of $B_{AG\ i,t}$ and $B_{BG,\ i,\ t}$. Completed by Project Developer.
Frequency of monitoring/recording	Upon establishment of PSP. Every 5 years, thereafter.
Value applied:	See compiled plot data MS Excel File.
Monitoring equipment	n/a – calculated value

QA/QC procedures applied	GreenRaise Greenhouse Gas – Monitoring Standard Operating Procedures (SOP).
Purpose of data	Required for determination of Uncertainty Factor.
Calculation method	As calculated by supporting CBM-CFS3 data (Boudwyn 2007 equations). and plot data, or $B_{TOTALi,t}$ * CF
Comments	

Data / Parameter	$CDOM_{i,t}$
Data unit	t d.m. ha^{-1} (d.m. = dry matter)
Description	Total carbon storage in dead organic matter in polygon, i, year, t,
Source of data	Permanent sample plots.
Description of measurement methods and procedures applied	Calculated from $DOM_{SNAGi,t}$ and $DOM_{LDWi,t}$ and CF. Completed by Project Developer.
Frequency of monitoring/recording	Upon establishment of PSP. Every 5 years, thereafter.
Value applied:	See compiled plot data MS Excel File.
Monitoring equipment	n/a – calculated value
QA/QC procedures applied	GreenRaise Greenhouse Gas – Monitoring Standard Operating Procedures (SOP).
Purpose of data	Required for determination of Uncertainty Factor.
Calculation method	As calculated from plot data, decay rate constraints and supporting CBM-CFS3 data (Boudwyn 2007 equations). Or ($DOM_{SNAGi,t}$ + $DOM_{LDWi,t}$)* CF
Comments	Calculated

Data / Parameter	$f_{PRJ,NATURAL,i,t}$
Data unit	unitless ($0 < f_{PRJ,NATURAL,i,t} < 1$)
Description	The proportion of biomass that dies from natural mortality in polygon, i, year, t, in the project scenario.
Source of data	Permanent sample plots, remote sensing.
Description of measurement methods and procedures applied	Height and dbh of dead trees in permanent sample plots will be recorded. Areas of stand replacing natural disturbance events will be delineated if >1.0 hectares. Completed by Project Developer.
Frequency of monitoring/recording	Annually in the case of natural disturbance events, every 5 years in the case of individual plot trees
Value applied:	See compiled plot data MS Excel File.
Monitoring equipment	n/a - measured
QA/QC procedures applied	GreenRaise Gas – Monitoring Standard Operating Procedures (SOP).
Purpose of data	Required for project calculations
Calculation method	Observation in plot, and/or calculated by supporting CBM-CFS3 data (Boudwyn 2007 equations) and/or GIS/GPS delineation.
Comments	

Data / Parameter	$f_{PRJ,HARVEST,i,t}$
Data unit	unitless ($0 < f_{PRJ,HARVEST,i,t} < 1$)
Description	The proportion of biomass removed by harvesting from polygon, i, in year, t, in the project scenario.
Source of data	Project Proponent harvesting records, inventory data.

Description of measurement methods and procedures applied	Volume derived from harvesting records. Modeled estimates of total biomass in polygon, i, used to derive parameter. Completed by Project Proponent.
Frequency of monitoring/recording	Annually
Value applied:	See harvest area.
Monitoring equipment	GPS, remote sensing
QA/QC procedures applied	Data will be verified by ground-truthing and comparison with remote sensing information.
Purpose of data	Required for project calculations.
Calculation method	Modeled by CBM-CFS3 based on actual removals.
Comments	

Data / Parameter	$f_{PRJ,DAMAGE,i,t}$
Data unit	unitless ($0 < f_{PRJ,DAMAGE,i,t} < 1$)
Description	The proportion of additional biomass removed for road and landing construction in polygon, i, year, t, in the project case.
Source of data	Remote sensing, inventory data.
Description of measurement methods and procedures applied	Removals derived from remote sensing data and construction records. Completed by Project Proponent yearly.
Frequency of monitoring/recording	Annually
Value applied:	See GIS delineations construction records.
Monitoring equipment	GPS, satellite imagery, aerial photos,
QA/QC procedures applied	Data will be verified by ground-truthing and comparison with remote sensing information.

Purpose of data	Required for project calculations.
Calculation method	Areal estimate of removals is multiplied by average carbon density within a polygon.
Comments	

Data / Parameter	$DOM_{SNAG,i,t}$
Data unit	t d.m. ha^{-1} (d.m. = dry matter)
Description	Total mass of dead organic matter contained in standing dead wood in polygon, i, year, t in the project case.
Source of data	Permanent sample plots.
Description of measurement methods and procedures applied	Calculated from $Height_{i,t}$, $DBH_{i,t}$, and $APSP_{,i}$ of dead trees measured in permanent sample plots. Completed by Project Developer.
Frequency of monitoring/recording	Every 5 years.
Value applied:	See compiled plot data MS Excel File.
Monitoring equipment	n/a - measured
QA/QC procedures applied	GreenRaise. Greenhouse Gas – Monitoring Standard Operating Procedures (SOP).
Purpose of data	Required for determination of Uncertainty Factor.
Calculation method	Calculated by supporting CBM-CFS3 data (Boudwyn 2007 equations) from plot data.
Comments	Calculated

Data / Parameter	$DOM_{LDW,i,t}$
Data unit	t d.m. ha^{-1} (d.m. = dry matter)

Description	Total mass of dead organic matter contained in lying dead wood in polygon, i, year, t in the project case.
Source of data	Permanent sample plots.
Description of measurement methods and procedures applied	Calculated from the line intersect method (GreenRaise-Greenhouse Gas – Monitoring Standard Operating Procedures (SOP)). Completed by Project Developer.
Frequency of monitoring/recording	Every 5 years.
Value applied:	See compiled plot data MS Excel File.
Monitoring equipment	n/a - measured
QA/QC procedures applied	GreenRaise Greenhouse Gas – Monitoring Standard Operating Procedures (SOP).
Purpose of data	Required for determination of Uncertainty Factor.
Calculation method	Calculated using the following field- measured parameters Li,t, dni,t, DLDWc,i,t , and N,t
Comments	Calculated

Data / Parameter	VLDW,i,t
Data unit	m3 ha-1
Description	Total volume of dead organic matter contained in lying dead wood in polygon, i, year, t in the project case.
Source of data	Permanent sample plots.
Description of measurement methods and procedures applied	Calculated from the line intersect method (GreenRaise-Greenhouse Gas – Monitoring SOP). Completed by the Project Developer.
Frequency of monitoring/recording	Every 5 years.

Value applied:	See compiled plot data MS Excel File.
Monitoring equipment	Tape and visual inspection.
QA/QC procedures applied	GreenRaise Greenhouse Gas – Monitoring SOP.
Purpose of data	Required for determination of Uncertainty Factor.
Calculation method	Calculated using the following field- measured parameters $L_{i,t}$, $d_{ni,t}$, $D_{LDWc,i,t}$, and N_t
Comments	

Data / Parameter	$L_{i,t}$
Data unit	Meters (m)
Description	Calculation of lying dead wood: Length of the transect used to determine volume of lying dead wood in the sample plot, at time, t (4*25m=100m). Completed by Project Developer.
Source of data	Permanent sample plots.
Description of measurement methods and procedures applied	Field measurements
Frequency of monitoring/recording	Every 5 years.
Value applied:	100meter transect
Monitoring equipment	Metric measuring tape.
QA/QC procedures applied	GreenRaise Greenhouse Gas – Monitoring Standard Operating Procedures (SOP).
Purpose of data	Required for determination of carbon stocks and Uncertainty Factor.
Calculation method	n/a - measured

Comments	

Data / Parameter	$D_{n,i,t}$
Data unit	Centimeters (cm)
Description	Calculation of lying dead wood: Diameter of each piece n of dead wood inside the sample plot at time, t).
Source of data	Permanent sample plots.
Description of measurement methods and procedures applied	Lying dead wood to be sampled as described in the GreenRaise Monitoring (allometric Romanian equation applied to all lying dead wood scanned pieces within plot). Minimum measurement, diameter of pieces must not be less than 5 cm. Completed by Project Developer.
Frequency of monitoring/recording	Every 5 years.
Value applied:	See compiled plot data MS Excel File.
Monitoring equipment	ZEB GeoSLAM Horizon LiDAR Scanner
QA/QC procedures applied	GreenRaise Greenhouse Gas – Monitoring Standard Operating Procedures (SOP).
Purpose of data	Required for determination of Uncertainty Factor.
Calculation method	n/a - measured
Comments	

Data / Parameter	$N_{,t}$
Data unit	unitless
Description	Calculation of lying dead wood: Diameter of each piece n of dead wood along the in the sample plot at time, t).

Source of data	Permanent sample plots field measurement.
Description of measurement methods and procedures applied	Total number of wood pieces in the sample plot, in time t, Completed by Project Developer.
Frequency of monitoring/recording	Every 5 years.
Value applied:	See compiled plot data MS Excel File.
Monitoring equipment	Visual observation.
QA/QC procedures applied	GreenRaise Greenhouse Gas – Monitoring Standard Operating Procedures (SOP).
Purpose of data	Required for determination of Uncertainty Factor.
Calculation method	n/a - measured
Comments	

Data / Parameter	E_M / Mean model error for the project
Data unit	%
Description	An estimate of model error.
Source of data	Model output and field data.
Description of measurement methods and procedures applied	Calculated value determined difference between of model-predicted values of carbon storage and those values measured in field plots (see Equation 60a). Completed by Project Developer.
Frequency of monitoring/recording	At each verification.
Value applied:	-0.373%
Monitoring equipment	n/a – calculated value
QA/QC procedures applied	n/a

Purpose of data	Required for determination of Uncertainty Factor.
Calculation method	Equation (60a).
Comments	

Data / Parameter	E_I / Inventory error for the project
Data unit	%
Description	An estimate of inventory sampling error.
Source of data	Model output and field data.
Description of measurement methods and procedures applied	Calculated as the 90% confidence limit of the area-weighted differences between the model-predicted values of carbon storage and those values measured in field plots. Completed by Project Developer.
Frequency of monitoring/recording	At each verification.
Value applied:	0.335%
Monitoring equipment	n/a – calculated value
QA/QC procedures applied	n/a
Purpose of data	Required for determination of Uncertainty Factor.
Calculation method	Equation (60c).
Comments	

Data / Parameter	E_P / Estimated project error
Data unit	%

Description	An estimate of total project error calculated as the sum of the model and inventory error terms.
Source of data	Model output and field data.
Description of measurement methods and procedures applied	Calculated as the sum of EM and EI (Equation 60e). Completed by Project Developer.
Frequency of monitoring/recording	At each verification.
Value applied:	-0.038%
Monitoring equipment	n/a – calculated value
QA/QC procedures applied	n/a
Purpose of data	Required for determination of Uncertainty Factor.
Calculation method	Equation (60f).
Comments	

Data / Parameter	$ER_{y,ERR}$ / Uncertainty Factor
Data unit	%
Description	The uncertainty factor calculated for year 'y'
Source of data	Model output and field data.
Description of measurement methods and procedures applied	Calculated value. Completed by Project Developer.
Frequency of monitoring/recording	At each verification and applied annually until the next verification.
Value applied:	1.5%
Monitoring equipment	n/a – calculated value

QA/QC procedures applied	n/a
Purpose of data	Required for project calculations.
Calculation method	Section 8.5.3 of the VM0012 methodology (Table 6)
Comments	

Data / Parameter	MLF_y
Data unit	Unitless
Description	The market leakage factor determined for year 'y'
Source of data	Model output and field data.
Description of measurement methods and procedures applied	Determined based upon the approach defined in Section 3. Completed by Project Developer.
Frequency of monitoring/recording	At each verification
Value applied:	0%
Monitoring equipment	n/a – calculated value
QA/QC procedures applied	n/a
Purpose of data	Required for calculation of leakage.
Calculation method	Value determined using the latest version of the VCS Market Leakage Tool as defined in Agriculture, Forestry and Other Land Use (AFOLU) Requirements v3.6 and specified in the VM0012.
Comments	

6.3 Monitoring Plan

The objective of The SCA monitoring plan is to reliably monitor changes in carbon stocks related to the calculation of VCU's prior to each verification. In particular, the program will reliably monitor changes in spatial forest inventory conditions and collect field data on carbon stocks (as per GreenRaise Monitoring SOP) to compare against modeled carbon stocks and to calculate the uncertainty factor.

Ongoing monitoring is the primary operational task for the project, which will be completed by the Project Proponent and supported by the Project Developer and Implementation Partner. Additional field monitoring may require the hiring of external field crews, all of which will be experienced in forest mensuration. The Project Proponent's onsite supervisor, Project Developer and Implementation Partner will be responsible for the adequate training of these external contractors, ensuring that all individuals involved are familiar with the sampling standard operating procedures.

At each verification, reported on an annualized basis, the project will make the following inventory updates, as applicable:

1. Collect geo-referenced information on new project activities, including any forest management or silvicultural activities on any project instance that materially affects GHG emissions.
2. Annually monitor for forest disturbances through remote sensing, field observation, and/ or aerial observation and incorporate into GIS systems.

The inventory will be updated at a minimum, for:

- Natural disturbance events > 4 hectares (for example, fires, high mortality pest and disease areas, blowdown areas, slides, etc.).
- Project activities (e.g., timber harvesting/ thinning, road construction/ reclamation, reforestation/restoration, etc.). A minimum polygon size of 1 hectare can be used but is not a mandatory minimum.
- Unplanned anthropogenic disturbances (for example, non-de minimis illegal or unplanned harvests) affecting a non-de minimis amount of carbon stocks.

These monitored spatial elements will be updated in the Project Proponent's GIS inventory database (or equivalent) annually, or at minimum at each verification on an annualized basis.

6.3.1 Other Monitoring Requirements:

The Project Proponent will also document the following:

1. Activity shifting leakage (monitored annually, reported at each verification) – the project will report and assess the activity shifting leakage risks based on the timber harvest levels on lands owned or controlled by the Project Proponent that are outside the project area.
2. Market leakage calculations (at each verification, applied annually) - market leakage calculations will be confirmed at each verification using the latest plot inventory data and best available regional leakage area analysis.
3. Loss events (monitored annually as per GreenRaise SOP, reported as per VCS Standard v4.4)- the project will monitor and report any deficits in carbon stock pools >5% of previously verified emissions, reductions, and removals.

At verification, the project will update the inventory, uncertainty calculations, and carbon calculations from field plot measurement data as outlined in Sections 6.2 and 6.3.2. The project may also undertake the following monitoring related tasks as appropriate:

1. Refine the project analysis units based on new forest inventory data or to meet the needs of future project instances.
2. Refine or calibrate carbon models based on updated inventory data, as appropriate.
3. Update or modify inventory polygons base on updated remote sensing, forest inventory data, or field truthing, or as a result of project activities or disturbances.

All inventory, data, and modeling changes must be applied equally to the baseline and project carbon calculations, as applicable.

6.3.2 Carbon Stock Field plot Monitoring

The SCA was initiated in 2020 with inventory work completed in November of 2022. Plot data was collected using a ZEB Horizon 3D Point LiDAR unit and a geo-located plot network for monitoring changes in stand-level forest volume and merchantable timber. A total of 31 field plots have been established within 14 analysis units. See Table 20: Project Plots Geographic Location below for locations:

Table 20: Project Plots Geographic Location [*]

All historical Silvador and Forest Capital Forest Carbon Project monitoring has been incorporated into the property inventory and GIS data updates used in this project design document.

The new plot monitoring program for carbon stocks established permanent sample plots within the analysis units. At each plot over story tree, dead standing tree, and lying deadwood data were collected. As part of ongoing project monitoring, the project will periodically review the need for additional permanent sample plots or incorporation of other forest and carbon inventory updates or improvements over time. The methodology does not specify a number of plots, rather an error over the target (10% @ 90%CI) being accounted for in the uncertainty factor deduction (Section 7.5).

6.3.3 Monitoring Carbon Plot Sampling Design Overview

The establishment of permanent monitoring sample plots was initiated in 2022 by the Project Proponent. A total of 31 PSPs were planned for establishment distributed among 14 analysis units within the project area. Plot monitoring and measuring techniques were completed as per the GreenRaise Greenhouse Gas Monitoring SOP.

Plot Layout - Permanent plot locations were located using geographic coordinates randomly selected via GIS analysis tools. A minimum buffer distance of 50m was also implemented between plots to ensure an appropriate distribution.

Size and Shape of Sample Plots – Permanent sample plots will be circular with a fixed radius of 11.28m (400m^2).

Plot measurements – plots are installed, measured, and re-measured following the latest version of the GreenRaise – Greenhouse Gas Monitoring SOP as well as sampled for Coarse Woody Debris (CWD) for carbon accounting in specific portions of Silvador's managed lands. Plot measurements include live trees (aboveground live biomass); standing dead trees (aboveground dead biomass); and lying dead wood (aboveground dead biomass).

Given the dynamics of forest processes, the permanent plots will be re-measured at intervals not exceeding 5 field season years, beginning at the year of installation. As noted, permanent plots may be established over multiple years, and such re-measurement schedules will be tracked for each plot based on its establishment year.

7 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

7.1 Data and Parameters Monitored

Data / Parameter	$A_{PRJ,i}$
Data unit	Hectares (ha)
Description	Area of forest land in polygon, i
Value applied:	1,538 ha
Comments	Total area of project instances for this monitoring period.

Data / Parameter	$A_{PSP,i}$,
Data unit	Hectares (ha)
Description	Area of permanent sample plot (PSP) in polygon, i
Value applied:	0.04 ha. With use of the plot multiplier the hectares are used for calculation in Uncertainty Factor.
Comments	Calculated statistical uncertainty in forest carbon inventories compared to CBM CFS3 EU AIDB model outputs.

Data / Parameter	$DBH_{i,t}$
Data unit	Centimeters (cm)
Description	Diameter at breast height measured for each tree in the sample plot at time, t
Value applied:	See compiled plot data MS Excel File *tree_data_carbon_final(Jan'23)*

Comments	Diameters measured in each permanent sample plots contribute to factors used to calculate above ground carbon stores measured in analysis unit plot observations.

Data / Parameter	Height $_{i,t}$
Data unit	Meters (m)
Description	Tree height measured for each tree in the sample plots at time, t
Value applied:	See compiled plot data MS Excel File.
Comments	Tree heights measured in each permanent sample plot contribute to parameters used to calculate above ground carbon stores measured in analysis unit plot observations. Captured via LiDAR.

Data / Parameter	BAG i,t
Data unit	t d.m. ha-1 (d.m. = dry matter)
Description	Aboveground live tree biomass in polygon, i, year, t, in the project case.
Value applied:	See compiled plot data MS Excel File.
Comments	Volume is initially calculated to merchantable volume as per published Romania allometric formulas. Then the calculation of above ground live tree biomass carbon stocks (Height, DBH, APSP,i) is carried out. Parameters used for uncertainty calculations.

Data / Parameter	BBG i,t
Data unit	t d.m. ha-1 (d.m. = dry matter)
Description	Average belowground live tree biomass in polygon, i, year, t, in the project.

Value applied:	See compiled plot data MS Excel File.
Comments	Calculation of below ground tree biomass carbon stocks, Parameters used for uncertainty calculations.

Data / Parameter	$B_{TOTAL\ i,t}$
Data unit	t d.m. ha-1 (d.m. = dry matter)
Description	Average total above and below ground live biomass in polygon, i, for year, t.
Value applied:	Calculated using plot data and applicable Boudewyn values
Comments	Calculation of above and below ground tree biomass carbon stocks, Parameters used for uncertainty calculations. Sum of BAGi,t and BBGi,t.

Data / Parameter	$CLB_{i,t}$
Data unit	t d.m. ha-1 (d.m. = dry matter)
Description	Total carbon storage in live tree biomass in polygon, i, year, t, tC in the project case.
Value applied:	See compiled plot data MS Excel File.
Comments	Calculation of live tree biomass carbon stocks, pparameters used for Uncertainty calculation.

Data / Parameter	$CDOM_{i,t}$
Data unit	t d.m. ha-1 (d.m. = dry matter)
Description	Total carbon storage in dead organic matter in polygon, i, year, t,
Value applied:	See compiled plot data MS Excel File.

Comments	Annual change in dead organic matter carbon stocks. Parameters used in Uncertainty calculation.

Data / Parameter	$f_{PRJ,NATURAL,i,t}$
Data unit	unitless ($0 < f_{PRJ,NATURAL,i,t} < 1$)
Description	The proportion of biomass that dies from natural mortality in polygon, i, year, t, in the project case.
Value applied:	See compiled plot data MS Excel File
Comments	Annual change in natural mortality in carbon stocks. Factor in uncertainty calculation.

Data / Parameter	$f_{PRJ,HARVEST,i,t}$
Data unit	unitless ($0 < f_{PRJ,HARVEST,i,t} < 1$)
Description	The proportion of biomass removed by harvesting from polygon, i, in year, t, in the project scenario.
Value applied:	Volumes, modeled by CBM-CFS3 based on actual removals.
Comments	Parameters used for project emission calculations

Data / Parameter	$f_{PRJ,DAMAGE,i,t}$
Data unit	unitless ($0 < f_{PRJ,DAMAGE,i,t} < 1$)
Description	The proportion of biomass removed for road and landing construction in polygon, i, year, t, in the project case.
Value applied:	Volumes, based on monitored removals. Change in carbon stocks annually.
Comments	Parameters used for project emission calculations

Data / Parameter	$DOM_{SNAG,i,t}$
Data unit	t d.m. ha^{-1} (d.m. = dry matter)
Description	Total biomass of dead organic matter in standing dead wood in polygon, i, year, t in the project scenario.
Value applied:	Change in carbon stock annually
Comments	Parameters used for uncertainty calculations.

Data / Parameter	$DOM_{LDW,i,t}$
Data unit	t d.m. ha^{-1} (d.m. = dry matter)
Description	Total mass of dead organic matter contained in lying dead wood in polygon, i, year, t in the project case.
Value applied:	See compiled plot data MS Excel File.
Comments	Parameters used for uncertainty calculations.

Data / Parameter	VLDW,i,t
Data unit	m3 ha-1
Description	Total volume of dead organic matter contained in lying dead wood in polygon, i, year, t in the project case.
Value applied:	See complied plot data MS Excel File
Comments	Parameters used in uncertainty calculation.

Data / Parameter	$L_{i,t}$
Data unit	m

Description	Used in calculation of mean mass of dead organic material, lying dead wood: Length of the transect used to determine volume of lying dead wood in the sample plot, at time, t (4*25m=100m)
Value applied:	100m transect
Comments	Parameters used in uncertainty calculations.

Data / Parameter	$D_{n,i,t}$
Data unit	cm
Description	Diameter of each piece n of dead wood along the transects in the sample plot at time, t). Used in calculation of lying dead wood
Value applied:	See compiled plot data MS Excel File.
Comments	Parameters used in uncertainty calculations.

Data / Parameter	$N_{,t}$
Data unit	unitless
Description	Calculation of dead organic material. Diameter of each piece n of dead wood along the transects in the sample plot at time, t).
Value applied:	See compiled plot data MS Excel File.
Comments	Parameters used in uncertainty calculations.

Data / Parameter	E_M / Mean model error for the project
Data unit	%
Description	An estimate of model error.

Value applied:	-0.373%
Comments	Equation (60a).

Data / Parameter	E_I / Inventory error for the project
Data unit	%
Description	An estimate of inventory sampling error.
Value applied:	0.335%
Comments	Equation (60f).

Data / Parameter	E_P / Estimated project error
Data unit	%
Description	An estimate of total project error calculated as the sum of the model and inventory error terms.
Value applied:	0.038%
Comments	Equation (60f).

Data / Parameter	$ER_{y,ERR}$ / Uncertainty Factor
Data unit	%
Description	The uncertainty factor calculated for year ‘y’
Value applied:	1.5%
Comments	Parameters used in project emission calculations

Data / Parameter	MLF_y
Data unit	Percentage
Description	The uncertainty factor calculated for year ‘y’
Value applied:	0%
Comments	Parameters used in leakage calculations

7.2 Baseline Emissions

7.2.1 Overview of Baseline and Project Scenarios using Inventory, CBM-CFS3 outputs and Microsoft Excel Applications

The SCA meet the Valid Starting Inventory Requirements from the methodology (methodology criteria in italics):

1. *Pertaining directly to the entire project area; the Silvador inventory data covers the entire project area, and meets this criteria.*
2. *Created, updated, or validated <10 years ago; and,*

The latest base inventory (2022 field season) was created and received approval under the Romania Forest Fund in 2022. The inventory meets these criteria.

3. *Documentation is available describing the methods used to create, update, or otherwise validate the starting inventory, including statistical analysis, field data, and/or other evidence.*

The inventory methods and related inventory updates are regulated by the provisions of the Forestry Code (Law 46/2008 with subsequent completions and modifications, respectively Law 175/2017).; which therefore meets the criteria.

STEP 1 - Stratify to create homogeneous units.

The Silvador forest inventory is contained within a Geographic Information System dataset and the social and economic forest functions are outlined in the FMP documents. Each property is associated within their own forest management requirements of the Forestry Code (Law 26/1996) and in total covers an area of 1,538 ha. The Inventory covers the properties of the following:

- UP I Constantinescu
- UP I Forest Capital (Hodoba, Popescu, Barbu)
- UP I Manesti
- UP I Nitescu
- UP I Valea Tisei
- UP V Barbu

The polygons are homogeneous based on forest cover species, productivity class, and other stand attributes including operability. The Carbon modeling is specific to the forest lands intended for regulated harvesting. Romanian forestry law regulates minimum harvest age and harvest intensity. Regulation of primary forest products an additional harvest opportunities are feasible on constrained sites and forests under the special conservation regime and covers and thinning and conservation cutting.

For modelling purposes, inventory polygons were further refined into Analysis Units (AUs) based on leading species, site class and intended legal harvest regime. Or more specifically, leading species (Beech, Oak, other softwood), site class (groupings 0 - 2, 3, and 4 & 5) where 0 being highest growth and 5 being the lowest, and harvest regimes (Managed vs. Unmanaged (i.e. planned cutting (thinning and primary cutting vs. conservation or hygiene cutting)).

Carbon curves were then developed for and assigned to each of the analysis units.

Theme groupings were used in combination with polygon area to match up the modeled inventory polygon to the correct carbon yield curve data. The CBM-CFS3 derived stand and carbon curves are modeled on an assumed fully stocked representative stand in each AU and applies carbon and merchantable volume outcomes for each polygon based on the applicable allometric formulas within the model. The model includes discrete 'Runs' that represent the project (PRJ - deferred harvest) and specific baseline disturbances/ harvest activities (BSL – harvest).

The CBM-CFS3 then simulates and tracks the portion of carbon in all applicable carbon pools over time by polygon, including for Wood Products pool after any scheduled even. Carbon calculations can then be summarized for the project and baseline scenarios for each project year across all project instances.

Baseline emissions are calculated by applying a Baseline 'disturbances' to each AU, and then modeling the baseline activities and the related carbon flows using CBM-CFS3. The methods described are equivalent to the equations and processes outlined in VM0012.

7.2.2 Calculating Baseline Scenario Live Biomass Gain

For the Historic Baseline Scenario (as described in Section 3.4), a set of historic baseline activities (disturbances) was based on harvest details within the Forest Fund documents. The annual harvest volume has been determined by forward looking harvest volumes and are driven by site productivity and market demand. All baseline management activities are assumed to occur/ begin at year 1 (2020).

Live biomass gain ($\Delta C_{BSL,G,t}$, Eqn 4, 5a-b) is calculated by CBM-CFS3 based on the project area (instances) & stratifications into analysis units. Regionally specific forest dynamics within the The EU Archive Index Database and the related carbon curves discussed above, are tracked, and reported by carbon pool (Aboveground Live, Belowground Live), and reported in the Delta Ecosystem Reports. Additional details about related model default values, functionality, and parameters are found in Kull *et al.* (2019) & Kurz *et. al.* (2009).

7.2.3 Calculating Baseline Scenario Live Biomass Loss

Live biomass loss ($\Delta C_{BSL,L,t}$, Eqn 6, 7, 8, 9) is calculated by CBM-CFS3 based on the project area stratifications, regionally specific forest dynamics and the related carbon curves discussed above. Default parameters and algorithms within CBM-CFS3 model and track all stand dynamics, including natural tree mortality, harvesting scenario felling/ removals, blowdown, and any other biomass loss including decay. Generally, mortality related live biomass is shifted into dead biomass pools by CBM-CFS3 (Aboveground Standing Dead (snags), Aboveground Downed and Dead Wood (DOM), Belowground DOM), which are reported in the Delta Ecosystem Reports. Additional details about related model default values, functionality, and parameters are found in Kull *et al.* (2019) & Kurz *et. al.* (2009).

7.2.4 Calculating Baseline Scenario Dead Organic Matter Dynamics

Dead organic matter dynamics ($\Delta C_{BSLDOM,t}$, Eqn 10, 11a-b, 12, 13, 14a-b, 15, 16, 17a-d) are calculated by CBM-CFS3 based on the project area stratifications, regionally specific forest dynamics and the related carbon curves discussed above. Default parameters and algorithms within CBM-CFS3 model and track all stand dead wood dynamics, including standing dead, downed dead, and below ground dead organic matter. CBM-CFS3 uses the regionally specific variant data and related parameters to model and track dead organic matter between carbon pools (Aboveground Dead (i.e. Stem Snags), Belowground Dead, Aboveground Slow DOM (VM0012 calls this Lying Dead Wood)), and decay temperate related decay within each pool.

Additionally, CBM-CFS3 tracks dead organic matter dynamics related to harvesting (slash) or other events when applied. The project uses the default decay factors and dead matter dynamics that are set within the CBM-CFS3 model and specific to the variant dataset. The results of dead organic matter dynamics are reported in the Delta Ecosystem Reports. Additional details about related model default values, functionality, and parameters are found in Kull *et al.* (2019) & Kurz *et. al.* (2009). Generally, carbon stocks are transitioned between dead biomass pools, and emitted as they decayed.

7.2.5 Calculating Baseline Scenario Harvested Wood Products

Harvested Wood Product dynamics ($\Delta C_{BSLHWP,t,}$ Eqn. 18, 19, 20 (not used), 21, 22a-c, 23) are calculated with a derivative pivot table based on forecast harvest volumes from CBM (i.e. merchantable volume generated during the harvest period (m^3) converted using species-specific wood densities along with a Carbon Fraction (CF = 0.5)).

For the purposes of Step 2 (carbon contained in harvested timber after milling) Forest Product Conversion Factors for the UNECE Region published by the United Nations Economic Commission for Europe (ECE/TIM/DP/49) was used to determine the total carbon in harvested timber that will enter the wood products pool by product type accounting for mill efficiencies and estimated product disposition percentages ($C_{BSL,MILL,h}$; t C). The gross quantity of carbon contained in harvested timber for each of the four product types (k) described in Step 1 must be decremented to account for losses during processing. This loss is calculated within *Silvador - BSL HWP (20230526)* excel spread sheet specifically tab 'Step 2 (Mill)'. Refer to the Appendices for additional information.

Step 3 calculates (carbon storage in medium-term and long-term wood products) the total carbon lost in short-lived products and stored in medium-term and long-term products was using reference tables and factors from Smith, et al (2006). The result is a fraction of the Wood Products pool being emitted or stored annually for each In-Use category based on product, decay, and storage factors.

Constants from Smith, et al (2006) Table 6 – the Northwest Softwoods, Saw Logs and Pulpwood; along with the Northwest Hardwood tables were applied. The respective volumes were calculated by species and product type. Constants were used from the relevant "In Use" column to finalize calculations for the following HWP categories:

Short-lived HWP – multiplied (Year 1 – 3 look-up factor) for each of the tables against the respective remaining In-Use carbon volumes. This calculates the fraction of net Merch Carbon Removed that is In-Use as Short-lived HWP. Following VM0012, the sum of all Short-lived HWP is assumed to be emitted immediately.
Long-lived HWP – applied the look-up factor for Year 100 for each of the tables against the respective remaining In-Use carbon volumes. This calculates the fraction of net Merch Carbon Removed that is In-Use as Short-lived HWP. Following VM0012, the sum of all Long-lived HWP is assumed to be permanently stored.
Medium-Lived HWP – the difference between the carbon remaining In-Use at Year 3 and at Year 100 is then calculated using each table look-up factors and carbon volumes, respectively to calculate the Medium-Lived HWP. The sum of all Medium-Lived HWP is then modelled to emit on a straight line 20-year decay curve, starting in year 0 and being fully emitted in year 20.

Note that the remaining Merch Carbon Removed after accounting for Short-, Medium-, and Long-lived HWP is emitted immediately as a combination of emissions due to waste carbon being used for Energy and Emitted w/o Energy.

7.2.6 Fossil Fuel Emissions Associated With Logging, Transport, and Manufacture

Silvador has chosen to include the 'optional' pool of fossil fuel emissions (VM0012 Table 2). The annual change in fossil fuel emissions ($\Delta C_{BSL,\ EMITFOSSIL,t}$, Eqn. 24,25,26,27) from harvesting and processing of the various wood products applies to fuel emissions associated with harvesting of raw material (i.e., clear felling), transport of raw material (trucking and haul distance) and manufacturing of raw material (into product groups).

Default values in VM0012 Table 4 have been used. All calculations in support of this is within: *Emissions_BSL_Estimate (20230526)* spreadsheet. See Appendix

Silvador's output reports that forecast species, product groups (e.g., roundwood sawlog) and related harvest volumes (m^3) for each planning period were used for the following calculations. Results are then converted to Merchantable Carbon pool using species specific wood densities along with a Carbon Fraction (CF = 0.5) providing Tonnes of Carbon (tC) harvested for each planning period. This is equivalent to $C_{BSL,TIMBER,h}$ as represented by Eq. 20 being the carbon contained in timber harvested in period h.

The annual change in fossil fuel emissions from harvesting and processing of the various wood products ($\Delta C_{BSL,EMITFOSSIL,t}$) are calculated as:

$C_{BSL,EMITFOSSIL,t} = C_{BSL,EMITHARVEST,t} + C_{BSL,EMITMANUFACTURE,t} + C_{BSL,EMITTRANSPORT,t}$ (Eq. 24)

Each of the carbon components are calculated as noted below:

Equation 25:

$C_{BSL,EMITHARVEST,t}$ is the annual fossil fuel emissions associated with harvesting of raw material (t C yr-1).

$C_{BSL,EMITHARVEST,t} = \Sigma[C_{BSL,TIMBER,h}] \bullet c_{HARVEST}$

All timber in the SCA is harvested via thinning and fellings, and the default value from table 4 of VM0012 for $c_{HARVEST}$ is used.

Equation 26:

$C_{BSL,EMITTRANSPORT,t}$ is the annual fossil fuel emissions associated with the transport of raw material (t C yr-1). It should be noted that fuelwood was not transported as the material was used locally.

$C_{BSL,EMITTRANSPORT,t} = \Sigma[C_{BSL,TIMBER,h}] \bullet \Sigma(f_{BSL,TRANSPORTk} \bullet d_{TRANSPORTk} \bullet c_{TRANSPORTk})$

$f_{BSL,TRANSPORTk}$ = the fraction of raw material transported by transportation type, k. (unitless; 0 < 1). All timber in The SCA is transported by truck.

$d_{TRANSPORTk}$ = the distance transported by transportation type, k. (km); The reports contain information on the Haul distance from the harvest area (FMP) to the direct delivery customers. The boundaries of this emission calculation are from harvest operation areas to direct delivery customers in Romania and do not include any other type of log transportation (trans-national log export). This is conservative in nature.

$c_{TRANSPORTk}$ is the carbon emission intensity factor (kg C emitted/t C raw material) associated with transportation type, k. The table 4 for default values are used.

Equation 27

$C_{BSL,EMITMANUFACTURE,t}$ is the annual fossil fuel emissions associated with the manufacturing of raw material (t C yr-1).

$C_{BSL,EMITMANUFACTURE,t} = \Sigma[C_{BSL,TIMBER,h}] \bullet \Sigma(f_{BSL,PRODUCTk} \bullet c_{MANUFACTUREk})$

$c_{MANUFACTUREk}$ is the carbon emission intensity factor (t C emitted/t C raw material) associated with manufacture of product type, *k*;

The following product groups from the FMP areas are assigned to the following product type (k) categories:

1. Sawlogs
2. Fuelwood
3. Pulpwood

For each product type (k) the table 4 for default values are used.

7.2.7 Baseline Scenario GHG Emissions Calculation Summary

The CBM-CFS3 model and the supporting spreadsheets were used based on spatial forest inventory data to calculate and track all annual changes in both the live biomass ($\Delta C_{BSL,LB,t}$) and dead organic matter pools (($\Delta C_{BSL,DOM,t}$) for the baseline scenario in a method consistent with the formulas in VM0012. Carbon storage changes in harvested wood products ($\Delta C_{BSI,HWP,t}$) and fossil fuel emissions ($\Delta C_{BSL,EMITFOSSIL,t}$) summarized net carbon balances, and other deductions and buffer discounts were determined in the supporting spreadsheets.

The total annual carbon balance in year, t, for the baseline scenario (ΔCBSL,t, in t C yr-1) was calculated as:

$$\Delta C_{BSL,t} = \Delta C_{BSL,P,t} \qquad (1)$$

where:

$\Delta C_{BSL,P,t}$ is the annual change in carbon stocks in all pools in the baseline across the project activity area (including all project instances); t C yr-1.

The annual change in carbon stocks in all pools in the baseline across the project activity area ($\Delta C_{BSL,P,t}$; t C yr^{-1}) was calculated as:

$$\Delta C_{BSL,P,t} = \Delta C_{BSL,LB,t} + \Delta C_{BSL,DOM,t} + \Delta C_{BSI,HWP,t} \qquad (2)$$

where:

$\Delta C_{BSL,LB,t}$ = annual change in carbon stocks in living tree biomass (above- and belowground); t C yr^{-1}

$\Delta C_{BSL,DOM,t}$ = annual change in carbon stocks in dead organic matter; t C yr^{-1}

$\Delta C_{BSI,HWP,t}$ is the annual change in carbon stocks associated with harvested wood products, t C yr^{-1}.

The annual change in carbon stocks in living tree biomass (above- and belowground) in the baseline scenario ($\Delta C_{BSL,LB,t}$; t C yr^{-1}) was calculated as:

$$\Delta C_{BSL,LB,t} = \Delta C_{BSL,G,t} - \Delta C_{BSL,i,t} \qquad (3)$$

where:

$\Delta C_{BSL,G,t}$ = annual increase in tree carbon stock from growth; t C yr^{-1}

$\Delta C_{BSL,L,t}$ = annual decrease in tree carbon stock from a reduction in live biomass; t C yr^{-1}.

The annual change in carbon stocks in dead organic matter (DOM) ($\Delta C_{BSL,DOM}$; t C yr^{-1}) in the baseline scenario was calculated as:

$$\Delta C_{BSL,DOM,t} = \Delta C_{BSL,LDW,t} + \Delta C_{BSL,SNAG,t} + \Delta C_{BSL,DBG,t} \qquad (10)$$

where:

$\Delta C_{BSL,LDW,t}$ = change in lying dead wood (LDW) carbon stocks in year, t; t C yr^{-1}

$\Delta C_{BSL,SNAG,t}$ = change in snag carbon stock in year, t; t C yr^{-1}

$\Delta C_{BSL,DBG,t}$ = change in dead below-ground biomass carbon stock in year, t; t C yr^{-1}.

The annual change in emissions associated with the production of harvested wood products (HWP), $\Delta C_{BSl,HWP,t}$, is calculated as:

$$\Delta C_{BSl,HWP,t} = \Delta C_{BSL,STORHWP,t} - \Delta C_{BSL,EMITFOSSIL,t,} \qquad (18)$$

$\Delta C_{BSL,STORHWP,t}$ = the annual change in harvested carbon that remains in storage after conversion to wood products (t C yr^{-1})

$\Delta C_{BSL,EMITFOSSIL,t}$ = the annual change in fossil fuel emissions from harvesting (logging and log transport) and processing of the various wood products.

7.3 Project Emissions

Project emissions and carbon flows are calculated in the same manner as the baseline emissions discussed in the Section 7.2 Baseline Emissions. Calculations use the same forest inventory data, analysis units and polygons, and modeling tools under the Project Scenario activities. Project and Baseline Scenarios and polygon versions of each are tracked and calculated simultaneously in the supporting spreadsheets using the same parameters, outputs, and analysis under each scenario. In the project scenario, carbon flows are modeled using project activities which includes the focus on maintaining forest health throughout the term of the project.

Project activities affecting GHG emissions were carried out during the initial project period (2020-2022) however, no project scenario activities were projected on an *ex-ante* basis. Future years may include various project forest management activities that affect *ex-post* carbon stocks which will be monitored and reported on in future verifications (e.g. salvage due to significant fire or forest health loss). Project activities will be based on actual monitoring results (see Section 6) and any resulting emissions netted against emission reductions.

The methods described are equivalent to the equations and processes outlined in VM0012.

7.3.1 Calculating Project Scenario Live Biomass Gain

Live biomass gain ($\Delta C_{PRJ,G,t}$, Eqn 32, 33a-b) is calculated the same as in the Baseline Scenario (CBM-CFS3), Section 7.2.2 using project area (instances), and analysis unit information.

7.3.2 Calculating Project Scenario Live Biomass Loss

Live biomass loss (Δ CPRJ,L,t, Eqn 34, 35, 36, 37) is calculated the same as in the Baseline Scenario (CBM-CFS3), Section 0 using project area stratifications, regionally specific forest dynamics and the related carbon curves data.

7.3.3 Calculating Project Scenario Dead Organic Matter Dynamics

Dead organic matter dynamics (Δ CPRJ,DOM,t, Eqn 38, 39a-b, 40, 41, 42a-b, 43, 44, 45a-d) are calculated the same as in the Baseline Scenario, Section 7.2.4 using project scenario polygons and data.

7.3.4 Calculating Project Scenario Harvested Wood Products (HWP)

Harvested Wood Product dynamics (Δ CPRJ,HWP,t, Eqn 46, 47, 48, 49, 50a-c, 51, 52, 53, 54, 55) are calculated the same as in the Baseline Scenario, Section 7.2.5 with respect to any timber harvesting in the project scenario. Currently there is incidental harvesting in the project scenario and may occur in the future for forest health reasons (forest fire, health salvage operations).

7.3.5 Fossil Fuel Emissions associated with logging, transport, and manufacturing

Silvador has chosen to include the 'optional' pool of fossil fuel emissions (VM0012 Table 2). The annual change in fossil fuel emissions ($\Delta C_{PRJ, EMITFOSSIL,t}$, Eqn. 52,53,54,55) from harvesting and processing of the various wood products applies to fuel emissions associated with harvesting of raw material (i.e., clear felling), transport of raw material (trucking and haul distance) and manufacturing of raw material (into product groups). Emissions are calculated the same as in the Baseline Scenario, Section 7.2.6 with respect to any timber harvesting in the project scenario. Currently there is no timber harvesting in the project scenario, although it may occur in the future (forest fire, health salvage operations).

7.3.6 Project Scenario GHG Emissions Calculation Summary

The CBM-CFS3 and supporting spreadsheets were used in combination with the spatial forest inventory data to calculate and track annual changes in both the biomass ($\Delta C_{PRJ,LB,t}$) and dead organic matter pools ($\Delta C_{PRJ,DOM,t}$) for the project scenario. Changes in carbon storage in harvested wood products ($\Delta C_{PRJ,HWP,t}$) and fossil fuel emissions ($\Delta_{PRJ,EMITFOSSIL,t}$) and summarized net carbon balances and buffer discounts were determined within the applicable spreadsheets.

The total annual carbon balance in year, t, for the project scenario ($\Delta C_{PRJ,t}$, in t C yr^{-1}) was calculated as:

$$\Delta C_{PRJ,t} = \Delta C_{PRJ,P,t} \quad (29)$$

where:

$\Delta C_{PRJ,P,t}$ is the annual change in carbon stocks in all pools in the baseline across the project activity area; t C yr^{-1}.

The annual change in carbon stocks in all pools in the project scenario across the project activity area ($\Delta C_{PRJ,P,t}$; t C yr^{-1}) was calculated as:

$$\Delta C_{PRJ,P,t} = \Delta C_{PRJ,LB,t} + \Delta C_{PRJ,DOM,t} + \Delta C_{PRJ,HWP,t} \quad (30)$$

where:

$\Delta C_{PRJ,LB,t}$ = annual change in carbon stocks in living tree biomass (above- and belowground); t C yr^{1}

$\Delta C_{PRJ,DOM,t}$ = annual change in carbon stocks in dead organic matter; t C yr^{-1}

$\Delta C_{PRJ,HWP,t}$ is the annual change in carbon stocks associated with harvested wood products, t C yr^{1}.

The annual change in carbon stocks in living tree biomass (above- and belowground) in the project scenario ($\Delta C_{PRJ,LB,t}$; t C yr^{-1}) was calculated as:

$$\Delta C_{PRJ,LB,t} = \Delta C_{PRJ,G,t} - \Delta C_{PRJ,L,t} \quad (31)$$

where:

$\Delta C_{PRJ,G,t}$ = annual increase in tree carbon stock from growth; t C yr^{-1}

$\Delta C_{PRJ,L,t}$ = annual decrease in tree carbon stock from a reduction in live biomass; t C yr^{-1}.

The annual change in carbon stocks in dead organic matter (DOM) ($\Delta C_{PRJ,DOM}$; t C yr^{-1}) in the project scenario was calculated as:

$$\Delta C_{PRJ,DOM,t} = \Delta C_{PRJ,LDW,t} + \Delta C_{PRJ,SNAG,t} + \Delta C_{PRJ,DBG,t} \quad (38)$$

where:

$\Delta C_{PRJ,LDW,t}$ = change in lying dead wood (LDW) carbon stocks in year, t; t C yr^{-1}

$\Delta C_{PRJ,SNAG,t}$ = change in snag carbon stock in year, t; t C yr^{-1}

$\Delta C_{PRJ,DBG,t}$ = change in below-ground carbon stock in year, t; t C yr^{-1}.

The annual change in the carbon stored in harvested wood products (HWP), ($\Delta C_{PRJ,HWP,t}$; t C yr^{-1}) in the project scenario was calculated as:

$$\Delta C_{PRJ,HWP,t} = \Delta C_{PRJ,STORHWP,t} - \Delta C_{PRJ,EMITFOSSIL,t,} \quad (46)$$

$\Delta C_{PRJ,STORHWP,t}$ = the annual change in harvested carbon that remains in storage after conversion to wood products (t C yr^{-1})

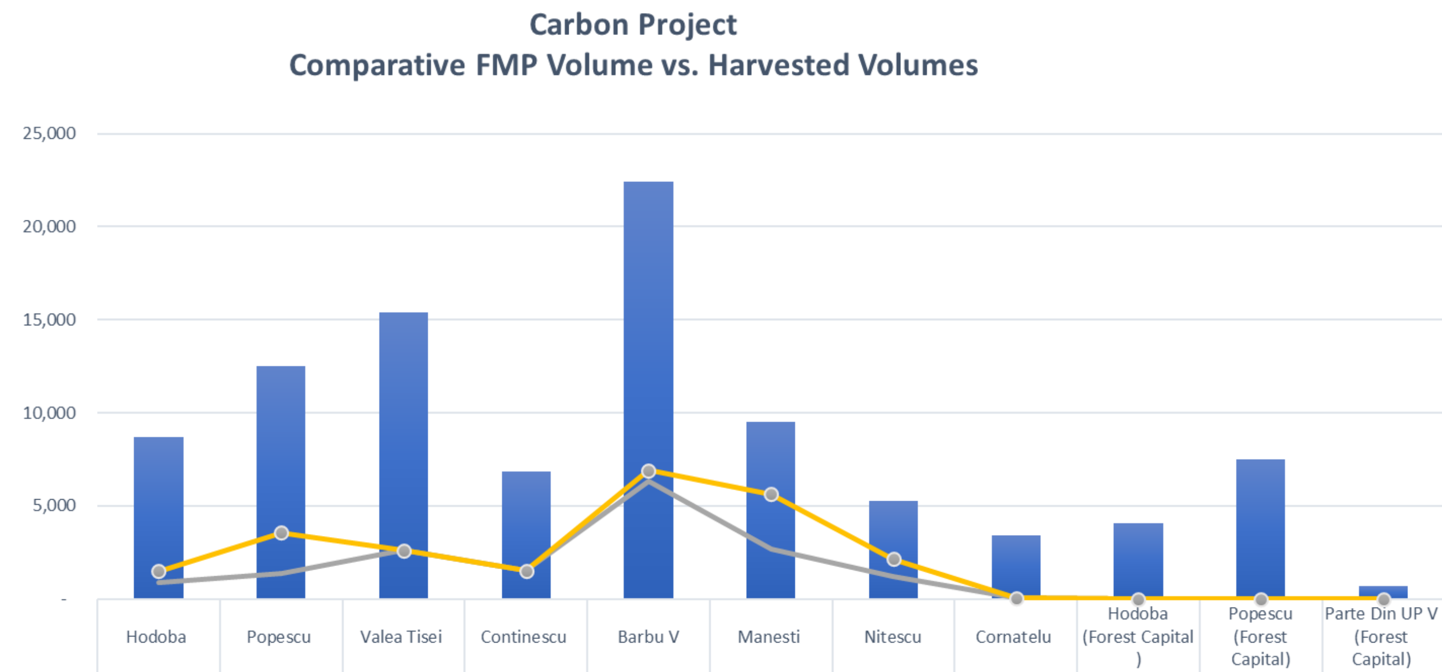
$\Delta C_{PRJ,EMITFOSSIL,t}$ = the annual change in fossil fuel emissions from harvesting (logging and log transport) and processing of the various wood products.

7.4 Leakage

7.4.1 Activity Shifting Leakage

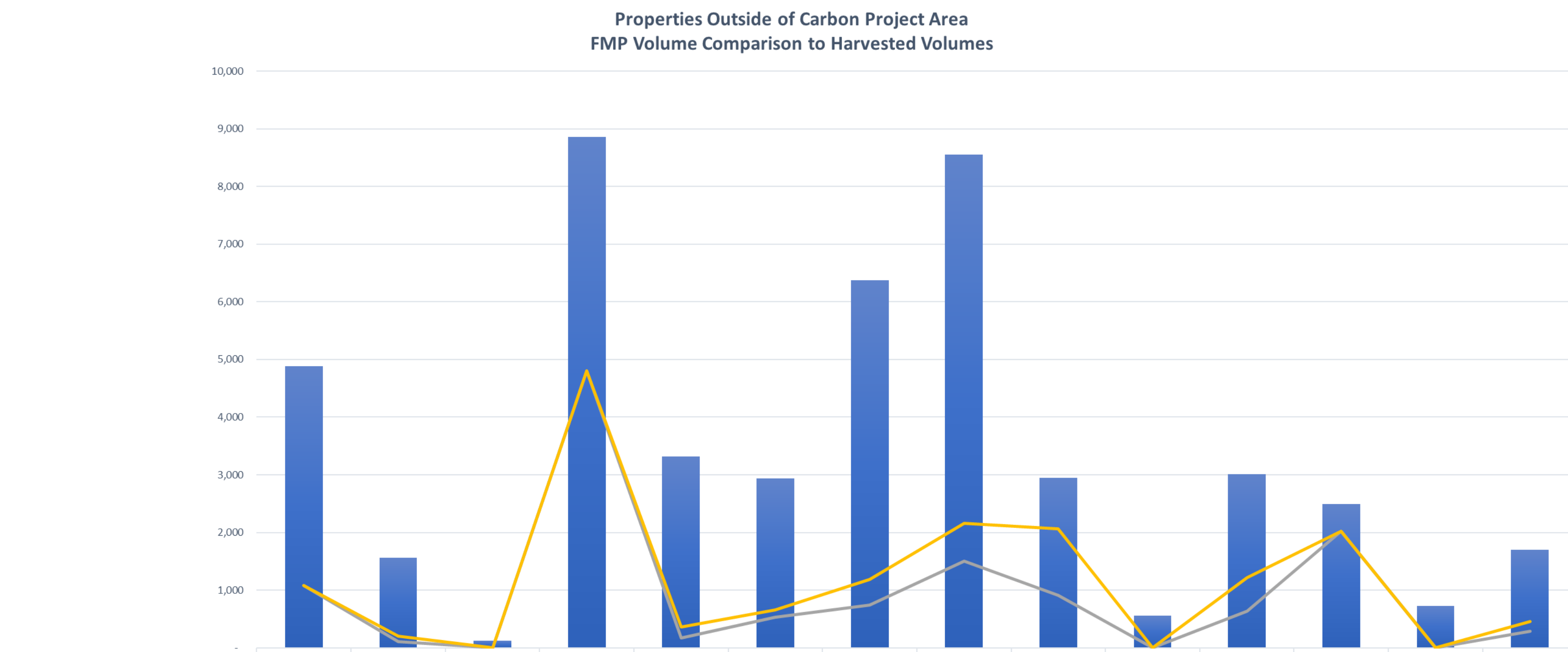
As mentioned in 5.3.1, Activity Shifting Leakage, the analysis of activity shifting leakage for the monitoring period was completed by comparing the cumulative harvested volumes of each forest fund property and FMP volumes. This was completed for all properties within the carbon area, as well as for other properties owned by Silvador.

Previous harvest amounts compared to FMP allocated volume amounts all remained below the acceptable benchmark (as determined from each forest fund forest management plan allocated 10-year harvest objectives). Figures below displays the analysis completed.



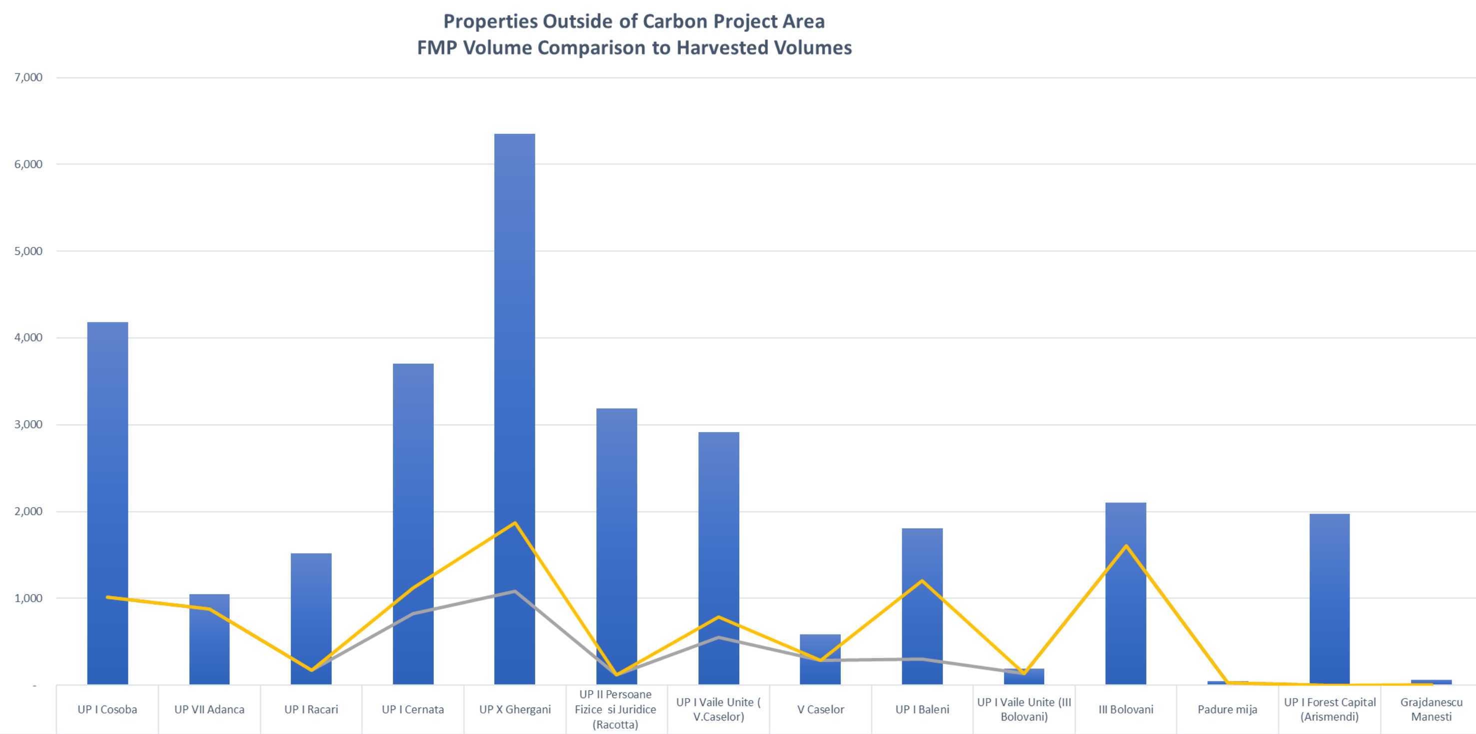
	Hodoba	Popescu	Valea Tisei	Continescu	Barbu V	Manesti	Nitescu	Cornatelu	Hodoba (Forest Capital)	Popescu (Forest Capital)	Parte Din UP V (Forest Capital)
10 Year FMP Plan Vol m3	8,709	12,514	15,418	6,831	22,394	9,522	5,255	3,436	4,071	7,504	675
Vol Harvested Between 2019-2022	901	1,395	2,599	1,521	6,338	2,660	1,184	41	0	0	0
Total Cumulative Harvest to Date	1497	3,565	2,599	1,521	6,900	5,637	2,136	41	0	0	0

Figure 10: Comparison of Project Harvest Volumes During Monitoring Period (values in m3)



	UP I Dragomir	UP I Balilesti	UP Balilesti	UP I Bobu	UP I Calinescu	UP I Hulubesti	UP I Marcesti	UP I Prahova	UP I Valea Lunga	UP V Obarsia Ialomitei	UP VIII Drumul Vinului	UP VIII Dumbravesti	UP I Valea Dambovitei	UP II Didesti
10 Year FMP Plan Vol m3	4,886	1,557	120	8,859	3,319	2,932	6,376	8,556	2,943	559	3,007	2,488	727	1,699
Volume Harvested Between 2020-2022	1,083	112	0	4,805	171	527	747	1,502	910	0	641	2,024	0	285
Total Harvested Volume Between 2019-2022	1083	202	0	4805	361	652	1187	2161	2067	0	1222	2024	0	456

Figure 11: Comparison of Other Properties During Monitoring Period (values in m3) – Part 1



	UP I Cosoba	UP VII Adanca	UP I Racari	UP I Cernata	UP X Ghergani	UP II Persoane Fizice si Juridice (Racotta)	UP I Vaile Unite (V.Caselor)	V Caselor	UP I Baleni	UP I Vaile Unite (III Bolovani)	III Bolovani	Padure mija	UP I Forest Capital (Arismendi)	Grajdanescu Manesti
10 Year FMP Plan Vol m3	4,178	1,047	1,515	3,703	6,348	3,191	2,913	583	1,808	188	2,103	45	1,977	60
Volume Harvested Between 2020-2022	1,013	880	173	824	1,083	117	552	282	303	131	1,608	30	0	0
Total Harvested Volume Between 2019-2022	1013	880	173	1117	1868	117	788	282	1201	131	1608	30	0	3

Figure 12: Comparison of Other Properties During Monitoring Period (values in m3) – Part II

For the verification period, volumes of actual harvest for areas outside the carbon project were analyzed and compared to the pre-determined benchmark (FMP volumes). The harvest volumes were below the benchmark level, therefore representing no activity shifting leakage within the monitoring period.

7.4.2 Market Shifting Leakage

The market leakage assessment described within Section 5.3.2 was completed for the verification period. The resulting market leakage factor (MLF_y) of zero is applied within the net GHG Emission Reductions and Removals calculations.

7.5 Net GHG Emission Reductions and Removals

7.5.1 Calculation of the Uncertainty Factor

As per the methodology monitoring section specification, the project has installed field plots in each analysis unit as per statistical requirements (UNFCCC[17]). The project has installed 31 permanent carbon plots in 2022.

The project-level uncertainty factor is calculated by a function within the *Silvador_VM0012_Uncertainty Calculator (20230313)* excel spreadsheet, following the formulas below:

Step 1 – the project calculated the average percent model error (E_M) for the project based on the average area-weighted difference between measured values in monitored plot observations and model-predicted values using Equations 60a, b.

$$E_M = 100 \bullet (\sum y_{d,h,i} / \sum(A_{PRJ,h} \bullet y_{m,h,i})) \quad (60a)$$

where:

The summation is across all plot observations, i, and across all analysis units, h;

$$y_{d,h,i} = A_{PRJ,h} \bullet (y_{p,h,I} - y_{m,h,i}) \quad (60b)$$

E_M = Mean model error for the project (%)

$y_{d,h,i}$ = the area-weighted difference between measured and predicted carbon storage in analysis unit, h, plot observation, i (t C)

$y_{m,h,i}$ = carbon storage measured in analysis unit, h, plot observation, i (t C ac^{-1})

$y_{p,h,i}$ = carbon storage predicted by model for analysis unit , h, plot observation, i (t C ac^{-1}) $A_{PRJ,h}$ = area of project analysis unit, h (ac)

Step 2 – The project calculated the inventory error (E_I) at a 90 percent confidence interval expressed as a percentage of the mean area-weighted inventory estimate from the measured plots. Inventory error is

[17] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-03-v2.1.0.pdf

estimated based upon the difference between modeled and measured values for monitoring plots established in polygons grouped within analysis units.

Inventory error, E_I, is estimated by first calculating the standard error of the area-weighted differences between the plot observation measurement and the associated model-predicted carbon storage (both on a per acre basis) for analysis units. The standard error is then multiplied by the *t-* value for the 90 percent confidence interval. Finally, E_I is expressed in relative terms (in Equation 60c) by dividing the 90% confidence interval of the area-weighted differences between predicted and measured values in all plots by the area-weighted average of the measured values in all monitoring plots.

$$E_I = 100 \bullet [SE * 1.654 / ((1/N) \bullet \sum(A_{PRJ,h} \bullet y_{m,h,i}))] \qquad (60c)$$

where:

E_I = Inventory error for the project (%)

SE = the project level standard error of the area weighted differences between measured plot observation and predicted values of carbon storage.

N = total number of plot observations in all analysis units

1.654 = the 90% confidence interval t-value

All other terms as defined in equation 60a.

$$SE = S/ \sqrt{N} \qquad (60d)$$

where:

N = total number of plot observations in all analysis units

S = the standard deviation of the area weighted differences between measured and predicted values of carbon storage across all analysis units.

$$S = \sqrt{[(1/ N-1) \bullet \sum(y_{d,h,i} - \bar{y}bar_d)^2]} \qquad (60e)$$

where:

$ybar_d$ = the project-level mean of the area weighted differences between measured plot observation and predicted values of carbon storage. See equation 60b for the calculation of $y_{d,h,i}$

All other terms as defined in equation 60b and 60c.

Step 3 - The total error for the project (E_P; %) is calculated by adding the model and inventory error terms, as calculated in Steps 1 and 2.

$$E_P = E_M + E_I \qquad (60f)$$

Step 4 – Compare the result of Step 3 against Table 21**Error! Reference source not found.** to determine the uncertainty factor.

Table 21: Uncertainty Factor Calculation

Estimated Project Error, E_P (%)	Uncertainty Factor (= $ER_{Y,ERR}$)
0 – 10%	= 1.5%
>10%	= 1.5% + E_P – 10%

7.5.2 Initial Estimate of Uncertainty

Carbon plot volumes were compiled using CBM-CFS3 EU AIDB. The inventory error term (E_I) was calculated to be 0.335 while the model error term (E_M) was -0.373%. As shown in Equation 60f, the project error term (E_P) was calculated as the sum of E_M and E_I (-0.038%). Thus, the uncertainty factor ($ER_{Y,ERR}$) was calculated (based upon Table 21) to be 1.5%.

This uncertainty factor will be re-assessed at verification and adjusted annually to reflect improved field data from the project monitoring plot network.

7.5.3 Calculation Net Emissions Reductions

Net carbon emissions reductions (ER_y) created by The SCA were calculated annually utilizing equation 58:

$$ER_y = ER_{y,GROSS} - LE_y \qquad (58)$$

where:

ER_y = the net GHG emissions reductions and/or removals in year y (the overall annual carbon change between the baseline and project scenarios, net all discount factors except the permanence buffer) (t CO_2e yr^{-1}).

$ER_{y,GROSS}$ =the difference in the overall annual carbon change between the baseline and project scenarios (t CO_2e yr^{-1}), as calculated within Section 4.4

LE_y = Leakage in year y (t CO_2e yr^{-1}), as described in Section 5.3 (Leakage).**Error! Reference source not found.**

7.5.4 Calculation of Voluntary Credit Units (VCUs)

The number of VCU's The SCA generates as available for issuance and sale in year, *y* (VCU_y; t CO_2e yr^{-1}), is calculated as:

$$VCU_y = ER_y \bullet (1 - ER_{y,ERR}) - BR_y \qquad (59)$$

where:

ER_y = the net GHG emissions reductions and/or removals in year (t CO_2e yr^{-1}), as calculated in equation 58.

$ER_{y,ERR}$ = the uncertainty factor for year, y, (calculated in Section 7.5.1), expressed as a proportion.

BR_y = estimated VCU-equivalent tCO_2e issued to the VCS Buffer Pool in year, *y*, calculated using the latest version of the VCS Tool for AFOLU Non-Permanence Risk Analysis and Buffer (Voluntary Carbon Standard, 2008).

BRy is calculated by multiplying the most current verified permanence risk Buffer Withholding Percentage for the project by the change in carbon stocks (difference between baseline and project scenario) for the project area.

The project VCS Buffer Discount Factor (BR_Y) was calculated as 11%, as per the non-permanence risk assessment. The BR factor will be re-assessed at each verification, as necessary.

The uncertainty factor was determined to be 1.5%, as calculated above. The uncertainty factor will be re-calculated from field plot data at each verification.

The annual VCUs projected for The SCA for the verification period of 2020 – 2022 are calculated in Table 22: Net GHG Emissions Reductions and Removals.

Table 22: Net GHG Emissions Reductions and Removals

Year	Baseline emissions or removals (tCO2e)	Project emissions or removals (tCO2e)	Leakage emissions (tCO2e)	Net GHG emission reductions or removals (tCO2e)	Buffer pool allocation	VCUs eligible for Issuance
01-August-2020 - 31-December-2020	-9,625	4,444	-	14,069	1,548	12,310
01-January-2021 - 31-December-2021	-2,180	18,559	-	20,739	2,281	18,146
01-January-2022 - 31-December-2022	-53,490	2,379	-	55,869	6,146	48,886
Total	-65,295	25,382	-	90,677	9,974	79,342

Table 23: Monitoring Period Estimated and Achieved Emission Reductions and Removals

Ex-ante emissions reductions/removals	Achieved emissions reductions/removals	Percent difference	Justification for the difference
14,069	14,069	0	As this is a validation and verification there is no difference in the Ex-Ante and Ex-Post estimates.
20,739	20,739	0	As this is a validation and verification there is no difference in the Ex-Ante and Ex-Post estimates.
55,869	55,869	0	As this is a validation and verification there is no difference in the Ex-Ante and Ex-Post estimates.

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APPENDIX 1 - NON-PERMANENCE RISK REPORT

SILVADOR CLIMATE ACTION NON-PERMANENCE RISK REPORT

Document Prepared by GreenRaise Consulting GmbH

Project Title	Silvador Climate Action
Version	1.0
Date of Issue	26-May-2023
Project ID	
Monitoring Period	01-August-2020 to 31-December-2022
Prepared By	GreenRaise Consulting GmbH
Contact	1010 Vienna, Rudolfsplatz 9/8, Austria Tel: +1 604 619 1585 Email: admin@green-raise.com Website: www.green-raise.com

CONTENTS

1 INTERNAL RISK

1.1 Project Management

a) Silvador utilizes 100% native species in reforestation using seed stock sourced locally and following typical forest regeneration practices in Romania. Multiple species may be planted in a manner consistent with local forest types.

b) The project area is within privately owned forest lands. Illegal timber harvest on these properties is minimal.

c) The project implementation and management team has extensive experience in forest management including, certification systems, audits and inspections, due diligence and legality, and project management. The team is comprised of Registered Professional Foresters (RPFs), Registered Professional Biologists (RPBio), and other resource professionals. Silvador project lands are locally managed by experienced Romanian foresters (Forest Management Companies).

d) The management team resides within the country. The most widespread project instances are within a day's travel from the corporate office.

e) The management team does not specifically include members with significant experience in AFOLU project design and implementation, however, is working directly with Implementation Partner and Project Developer, GreenRaise Consulting GmbH. who have successfully managed projects through validation, verification, and issuance of GHG credits.

f) Forest management plans created by Silvador are detailed and dynamic and are updated on a regular basis to incorporate monitoring and other new information as it is collected. These plans are created on a 10-year basis but offer flexibility in harvest implementation over this period. Monitoring requirements ensure that Silvador foresters are aware of stand level changes and can adapt to changing conditions accordingly.

1.2 Financial Viability

d) The project cashflow breakeven point is less than 4 years from the current risk assessment.

h) The project has secured 80% of funding needed to cover the total cash out before the project reaches is breakeven point.

i) The project has available as callable financial resources at least 50% of the total cash out before the project reaches breakeven.

1.3 Opportunity Cost

f) The NPV from project activities is expected to be at least 50% more profitable than the most profitable alternative land use activity.

During project development significant work was done at the project instance level (i.e. stand level polygons) to assess the internal rate of return (IRR). An initial assessment of the project scenario under similar carbon pricing scenarios found on similar VCS Registry was used to determine a price of approximately $50.00 EUR (±20%).

The Silvador Climate Action is not protected by a legally binding commitment to continue management practices that protect the credited carbon stocks over the length of the project crediting period or 100 years.

1.4 Project Longevity

a) Silvador is without legal agreement or requirement via conservation easement or protected area to continue the management practice (i.e., avoid emissions for the entire project longevity). The project period is for a 30-year duration.

2 EXTERNAL RISKS

2.1 Land Tenure and Resource Access Impacts

a) The entire project area and the resources encompassed within are owned by Silvador Company SRL and Forest Capital SLR. Refer to the Project Description Document for an example of land ownership evidence.

c) There are no title disputes or other ownership disputes on the Silvador property.

d) There are no access or use right disputes.

e) The project is not defined as a Wetlands Restoration and Conservation (WRC) project category.

2.2 Community Engagement

a) There are no communities living directly within the project area instances (private land) that are reliant on the project lands for essential food, fuel, fodder, medicines or building materials.

b) There are no communities living within 20 km of the project area that are reliant on the project lands for essential food, fuel, fodder, medicines or building materials.

As the local populations are not reliant on the project area the risk is not relevant to the project and the risk rating for community engagement (CE) shall be zero. Community engagement was conducted prior to project validation (refer to Local Stakeholder Consultation, Section 2.2 of the joint Project Description and Monitoring Report) and no comments were received relating to project design.

2.3 Political Risk

d) The 5-year average governance score for Romania is 0.24

Table 1: World Bank Governance Indicators for Romania 2017-2021 (Source: http://info.worldbank.org/governance/wgi/Home/Reports)

World Bank Governance Indicators - Romania 2017-2021				
Indicator	Country	Year	Governance (-2.5 to +2.5)	5-Year Average
Voice and Accountability	Romania	2017	0.6	
		2018	0.52	
		2019	0.52	
		2020	0.59	
		2021	0.6	0.566
Political Stability and Absence of Violence/Terrorism	Romania	2017	0.06	
		2018	0.05	
		2019	0.56	
		2020	0.53	
		2021	0.53	0.346
Government Effectiveness	Romania	2017	-0.06	
		2018	-0.15	
		2019	-0.19	
		2020	-0.26	
		2021	-0.13	-0.158
Regulatory Quality	Romania	2017	0.45	
		2018	0.42	
		2019	0.46	
		2020	0.36	
		2021	0.31	0.4
Rule of Law	Romania	2017	0.46	
		2018	0.39	
		2019	0.44	
		2020	0.39	
		2021	0.41	0.418
Control of Corruption	Romania	2017	-0.12	
		2018	-0.2	
		2019	-0.21	
		2020	-0.07	
		2021	-0.04	-0.128

f) Romania has an established national FSC and PEFC standards body.

3 NATURAL RISKS

Forests in Romania are impacted natural, stand replacing disturbances however the severity of these disturbance impacts varies (Knorn, et al., 2012). Common forest disturbances include wildfire, pest and disease outbreaks, severe weather, and geological risks. Stand replacing disturbances are either rare or only affect small areas (Knorn, et al., 2012).

3.1 Significance and Likelihood

a) Fire

Forest fires are not widespread throughout Romania and cause a negligible number of disturbances annually (Anfodillo, et al., 2008). The National Inventory Report of Romania (NIRR) indicates that wildfires do not affect more than 1,000 ha annually (https://unfccc.int/documents/194916). The NIRR indicates that only 0.042% of the total forested area are impacted by wildfires, therefore making an insignificant impact on forest carbon stocks.

Rating: Insignificant (less than 5% loss of carbon stocks)

Data from the NIRR indicate that the significant fire return interval for Romania is 200-300 years. To be conservative, the 50–100-year likelihood was applied

Rating: Every 50 to less than 100 years

b) Pest and Disease Outbreaks

Insects are a common forest disturbance in Romania. Damaging insect species include defoliating caterpillars, bark and wood attacking beetles, defoliating beetles, xylophage insects, and insects which target the root, shoot, and stem of seedlings (Anfodillo, et al., 2008). Several large-scale insect outbreaks have occurred in Romania, targeting both deciduous and coniferous dominated stands. Coniferous forests in Romania are prone to bark beetle infestations. Specifically, monocultures of Norway spruce stands are highly susceptible to the impacts caused by *Ips typographus* (Anfodillo, et al., 2008; Turbe, et al., 2012). These impacts are heightened following abiotic stand stressing events, such as heavy snowfall, frost damage, and windthrow (Turbe, et al., 2012).

Lands which are included in the project area are dominated by deciduous species which are susceptible to infestations of *Anoplophora chinensis, Lumantria dispar* and *Tortix viridana* (Anfodillo, et al., 2008; Turbe, et al., 2012). Impacts of these insect pests on deciduous stands are lessened when early eradication efforts are utilized (Turbe, et al., 2012). Disturbance impacts of species targeting deciduous stands is far lesser than those which target coniferous dominated forests (Anfodillo, et al., 2008; Turbe, et al., 2012). Stands within the project area are dominated by deciduous species, therefore reducing the risk of significant stand disturbances by insect damages.

Forest diseases impact stands to a lesser extent compared to insects. Beech stands are susceptible to secondary attacks by bark fungus (*Nectria ditissima*) following damage caused by frost, hail, or heavy rains (Anfodillo, et al., 2008).

Rating: Minor (5% to less than 25% loss of carbon stocks)

No significant damaging events caused by insects or diseases have been reported in the last 10-years. Forest management practices such as sanitation harvests are utilized to remove dead, dying and downed timber.

Rating: Every 10 to less than 25-years

c) Extreme Weather

As noted above, abiotic disturbances from extreme or severe weather are common in Romania (Anfodillo, et al., 2008; Turbe, et al., 2012). A meta-analysis of natural disturbances in the Carpathian Mountains region indicates that extreme weather disturbances are either rare or impact a small area of the landscape (Knorn, et al., 2012). Windthrow disturbances are the most common weather-related disturbance and can cause severe damages to forests (Anfodillo, et al., 2008). Forests most susceptible are those with altered stand structures (Mihai, Savulescu, & Sandric, 2007). A supplementary study indicates that climate conditions causing severe weather disturbances are becoming rarer in Romania (Popa, 2008).

Rating: Insignificant (less than 5% loss of carbon stocks)

Significant weather impacts such as wind events have been shown to impact Romanian forests in 3–4-year cycles (Anfodillo, et al., 2008). This same study indicates that significant wind events are more common in the northwestern regions of the Carpathian mountains. The project instances are located in the southeastern region of Romania. Additionally, wind disturbances in Romania have greater impacts on forests with altered stand structures from their primary structure (Knorn, et al., 2012), meaning secondary forests with altered species composition are more susceptible to windthrow events. The project specifically targets primary forest stands, further reducing the likelihood of significant impact from wind throw, therefore the return interval of every 10 to less than 25 years was utilized.

Rating: Every 10 to less than 25 years

d) Geological Risk

Geological risks exist in Romania due to mountainous terrain and the convergence of tectonic plates. The Vrancea Seismic zone on the southeastern portion of the Carpathian mountains is relatively active as the seismic fault generates 2-3 large magnitude seismic events each century (Pavel, Vacareanu, Arion, Aldea, & Scupin, 2021). The most recent seismic event occurred in 1977 when a 7.4 magnitude earthquake occurred east of the Carpathian Mountain range (Pavel, Vacareanu, Arion, Aldea, & Scupin, 2021).

Timber harvest operations can lead to the destabilization of sensitive slopes, contributing to landslides. The carbon project area lies within the Buzau Subcarpathian region, a landslide prone region in Romania (Malek, Boerboom, & Glad, 2015). The risk of landslides increases where deforestation is occurring and is considered less likely in areas where forest cover is being retained (Malek, Boerboom, & Glad, 2015), like in the carbon project area.

The potential impact of significant geological events impacting the project area is low. The project area is composed on non-contiguous parcels which reduces the risk of significant loss of carbon stocks from a geological event, such as a landslide or earthquake. Additionally, the conservation focused nature of the project scenario reduces slope instability risks by maintaining forest cover.

Risk: Insignificant (less than 5% loss of carbon stocks)

There have been no recorded surface erosion events within the Silvador properties within the last 10 years.

Rating: Every 10 to less than 25 years

e) Other Natural Risk

Silvador's properties are subject to animal browse, especially in younger forest stands. This disturbance is considered a nuisance but does not have a significant impact on carbon stocks.

Risk: No loss

Frequency: Less than every 10 years

3.2 Score (LS)

The Score is assigned through a matrix based on significance and likelihood:

a) Fire = 0

b) Pest and Disease Outbreaks = 0.5

c) Extreme Weather = 1

d) Geological Risk = 0

e) Other Natural Risk = 0

3.3 Mitigation

a) Fire

Silvador employs forestry staff who are responsible for monitoring their privately owned forest lands. Forestry staff are able to action fires utilizing protection plans and appropriate equipment. Additional passive monitoring by adjacent communities and property owners allows Silvador employees to quickly respond to forest fires and mitigate risks.

Rating Multiplier: 0.25

*Total Rating: 0*0.25=0*

b) Pests and Disease Outbreaks

Silvador's forestry staff conduct field monitoring where instances of forest pests and disease can be identified. Remote sensing technologies and tools, such as drones are used to monitor stand conditions and identify forest health concerns early on. Preventative measures may be utilized on a case by case basis. Examples of preventative measures include maintaining natural stand conditions, reforestation using native tree species, sanitary timber harvests, and timely removal of timber harvests.

Rating Multiplier: 0.25

*Total Rating: 2*0.25=0.5*

c) Extreme Weather

Forest management practices implemented by Silvador to mitigate extreme weather risks include: managing forest stand density, opening sizes, and maintaining diverse species stands (avoidance of monoculture forests)

Rating Multiplier: 0.25

*Total Rating: 1*0.25=0.25*

d) Geological Risk

There are no mitigation practices appliable to geological risks.

Rating Multiplier: 1

*Total Rating: 0*1=0*

e) Other Natural Risk

Silvador is not subject to any other significant natural risks.

Total Rating = N/A

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STEP 1: RISK ANALYSIS

1 INTERNAL RISK

Project Management		
a)	Species planted (where applicable) associated with more than 25% of the stocks on which GHG credits have previously been issued are not native or proven to be adapted to the same or similar agro-ecological zone(s) in which the project is located.	0
b)	Ongoing enforcement to prevent encroachment by outside actors is required to protect more than 50% of stocks on which GHG credits have previously been issued.	0
c)	Management team does not include individuals with significant experience in all skills necessary to successfully undertake all project activities (ie, any area of required experience is not covered by at least one individual with at least 5 years experience in the area).	0
d)	Management team does not maintain a presence in the country or is located more than a day of travel from the project site, considering all parcels or polygons in the project area.	0
e)	**Mitigation:** Management team includes individuals with significant experience Management team includes individuals with significant experience in AFOLU project design and implementation, carbon accounting and reporting (eg, individuals who have successfully managed projects through validation, verification and issuance of GHG credits) under the VCS Program or other approved GHG programs.	-2
f)	**Mitigation:** Adaptive management plan in place	-2
Total Project Management [a + b + c + d + e + f]		-4
Note: When a risk factor does not apply to the project, the score shall be zero for such factor		

Financial Viability		
Q	How many years does it take for the cumulative cashflow to break even?	d)
Q	What percentage of funding is needed to cover the total cash out before the project breaks even has been secured?	h)
a)	Project cash flow breakeven point is greater than 10 years from the current risk assessment	0
b)	Project cash flow breakeven point is between 7 and up to less than 10 years from the current risk assessment	0
c)	Project cash flow breakeven point between 4 and up to less than 7 years from the current risk assessment	0
d)	Project cash flow breakeven point is less than 4 years from the current risk assessment	0
e)	Project has secured less than 15% of funding needed to cover the total cash out before the project reaches breakeven	0
f)	Project has secured 15% to less than 40% of funding needed to cover the total cash out required before the project reaches breakeven	0
g)	Project has secured 40% to less than 80% of funding needed to cover the total cash out required before the project reaches breakeven	0
h)	Project has secured 80% or more of funding needed to cover the total cash out before the project reaches breakeven	0
i)	**Mitigation:** Project has available as callable financial resources at least 50% of total cash out before project reaches breakeven	-2
Total Financial Viability [(a, b, c or d) + (e, f, g or h) + i]		0
Note: When a risk factor does not apply to the project, the score shall be zero for such factor		

Opportunity Cost		
Q	What is the NPV from the most profitable alternative land use activity compared to NPV of project activity?	f)
a)	NPV from the most profitable alternative land use activity is expected to be at least 100% more than that associated with project activities; or where baseline activities are subsistence-driven, net positive community impacts are not demonstrated	0
b)	NPV from the most profitable alternative land use activity is expected to be between 50% and up to100% more than from project activities	0
c)	NPV from the most profitable alternative land use activity is expected to be between 20% and up to 50% more than from project activities	0
d)	NPV from the most profitable alternative land use activity is expected to be between 20% more than and up to 20% less than from project activities; or where baseline activities are subsistence-driven, net positive community impacts are demonstrated	0
e)	NPV from project activities is expected to be between 20% and up to 50% more profitable than the most profitable alternative land use activity	0
f)	NPV from project activities is expected to be at least 50% more profitable than the most profitable alternative land use activity	-4
g)	**Mitigation:** Project proponent is a non-profit organization	0
h)	**Mitigation:** Project is protected by legally binding commitment to continue management practices that protect the credited carbon stocks over the length of the project crediting period (see project longevity)	0
i)	**Mitigation:** Project is protected by legally binding commitment to continue management practices that protect the credited carbon stocks over at least 100 years (see project longevity)	0
Total Opportunity Cost [(a, b, c, d, e or f) + (g + h or i)]		-4
Note: When a risk factor does not apply to the project, the score shall be zero for such factor		
Total may be less than zero		

Project Longevity		
Q	Does the project have a legally binding agreement that covers at least a 100 year period from the project start date?	No
Q	What is the project Longevity in years?	30
Q	Legal Agreement or requirement to continue management practice?	No
a)	Without legal agreement or requirement to continue the management practice	18
b)	With legal agreement or requirement to continue the management practice	0
Total Project Longevity		18
Note: Total may not be less than zero. Any project with a legally binding agreement that covers at least a 100 year period from the project start date will be assigned a score of zero. Any project with a project longevity of less than 30 years fails the risk assessment		

Total Internal Risk (PM + FV + OC + PL)	**10**
Note: Total may not be less than zero	

2 EXTERNAL RISK

Q	Are the ownership and resource access/use rights held by the same of different entities?	Same
a)	Ownership and resource access/use rights are held by same entity(s)	0
b)	Ownership and resource access/use rights are held by different entity(s) (eg, land is government owned and the project proponent holds a lease or concession)	0
c)	In more than 5% of the project area, there exist disputes over land tenure or ownership	0
d)	There exist disputes over access/use rights (or overlapping rights)	0
e)	WRC projects unable to demonstrate that potential upstream and sea impacts that could undermine issued credits in the next 10 years are irrelevant or expected to be insignificant, or that there is a plan in place for effectively mitigating such impacts	0
f)	**Mitigation:** Project area is protected by legally binding commitment (eg, a conservation easement or protected area) to continue management practices that protect carbon stocks over the length of the project crediting period	0
g)	**Mitigation:** Where disputes over land tenure, ownership or access/use rights exist, documented evidence is provided that projects have implemented activities to resolve the disputes or clarify overlapping claims	0
Total Land Tenure [(a or b) + c + d + e + f +g)]		**0**
Note: When a risk factor does not apply to the project, the score shall be zero for such factor		
Total may not be less than zero		

a)	Less than 50 percent of households living within the project area who are reliant on the project area, have been consulted	0
b)	Less than 20 percent of households living within 20 km of the project boundary outside the project area, and who are reliant on the project area, have been consulted	0
c)	**Mitigation:** The project generates net positive impacts on the social and economic well- being of the local communities who derive livelihoods from the project area	0
Total Community Engagement [a + b + c]		**0**
Note: When a risk factor does not apply to the project, the score shall be zero for such factor		
Total may be less than zero		

Q	What is the country's calculated Governance score?	0.24
a)	Governance score of less than -0.79	0
b)	Governance score of -0.79 to less than -0.32	0
c)	Governance score of -0.32 to less than 0.19	0
d)	Governance score of 0.19 to less than 0.82	1
e)	Governance score of 0.82 or higher	
f)	**Mitigation:** Country implementing REDD+ Readiness or other activities such as: a) The country is receiving REDD+ Readiness funding from the FCPF, UN-REDD or other bilateral or multilateral donors b) The country is participating in the CCBA/CARE REDD+ Social and Environmental Standards Initiative c) The jurisdiction in which the project is located is participating in the Governors' Climate and Forest Taskforce d) The country has an established national FSC or PEFC standards body e) The country has an established DNA under the CDM and has at least one registered CDM A/R project	-2
Total Political [(a, b, c, d or e) + f)]		**0**
Note: When a risk factor does not apply to the project, the score shall be zero for such factor		
Total may not be less than zero		

Total External Risk (LT + CE +PC)	**0**
Note: Total may not be less than zero	

3 NATURAL RISK

Risk Category Factors				Risk Rating
a)	Fire (F)	0	0.25	0.00
b)	Pest and Disease Outbreaks (PD)	2	0.25	0.50
c)	Extreme Weather (W)	1	0.25	0.25
d)	Geological Risk (G)	0	1.00	0.00
e)	Other natural risk (ON1)	0	0.25	0.00
f)	Other natural risk (ON2)	0	0.25	0.00
g)	Other natural risk (ON3)	0	0.25	0.00

Total Natural Risk [F + PD + W + G + ON]	0.75
Note: When a risk factor does not apply to the project, the score shall be zero for such factor	
Risk rating is determined by [LS x M]	

Total Natural Risk (F + PD + W + G + ON)	**0.75**
Note: Total may not be less than zero	
If the Total Natural Risk is above 35 then the project fails the entire risk analysis	

STEP 2: OVERALL NON-PERMANENCE RISK RATING AND BUFFER DETERMINATION

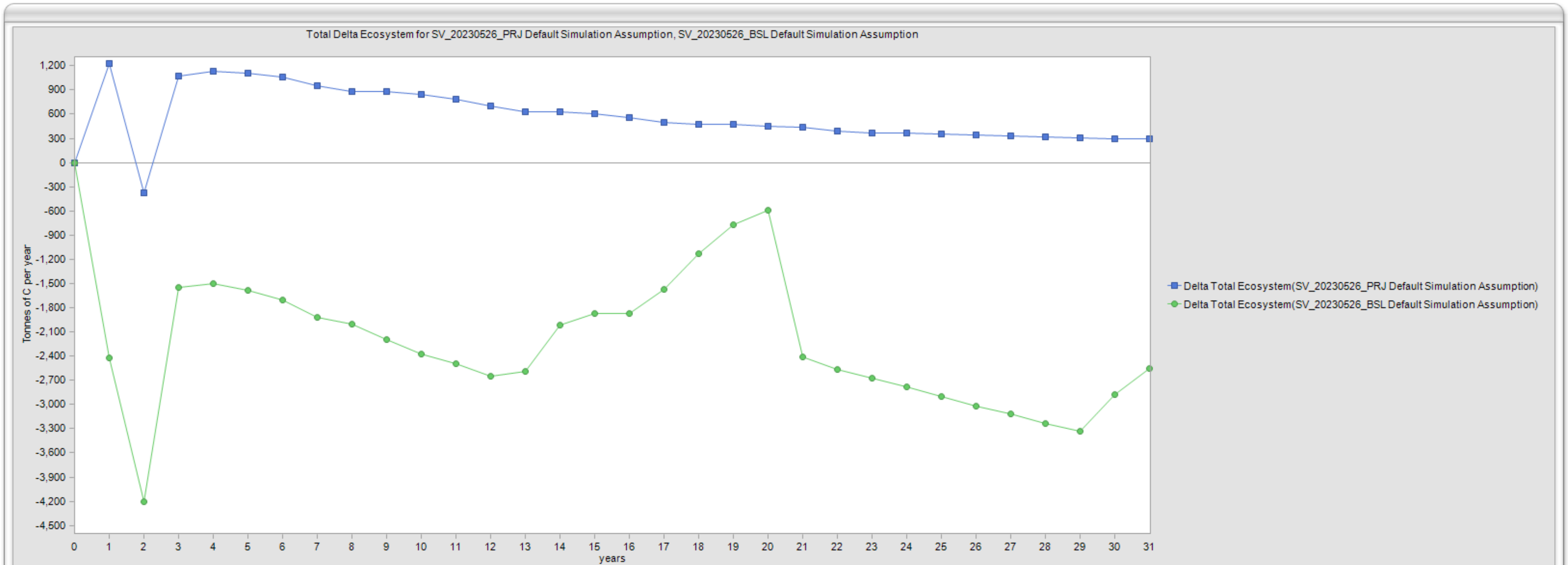
Risk Category		**Rating**
a)	Internal risk	10.00
b)	External risk	0.00
c)	Natural Risk	0.75
Overall risk rating (a + b + c)		**11**
Note: Overall risk rating shall be rounded up to the nearest whole percentage		
The minimum risk rating shall be 10, regardless of the risk rating calculated		
If the overall risk rating is over 60 then the project fails the entire risk analysis		
Total Risk Assessment		**11%**
Net change in the project's carbon stocks		374552
TOTAL NUMBER OF CREDITS TO BE DEPOSITED IN THE AFOLU POOLED BUFFER ACCOUNT		**41201**

APPENDIX 2 - OUTPUTS FROM CBM CFS3 MODEL RUNS

Time Step	Delta Total Ecosystem* (BSL)	Delta Total Ecosystem (PRJ)
01-August-2020 - 31-December-2020	-2,424.59	1,230.73
01-January-2021 - 31-December-2021	-4,208.80	-371.44
01-January-2022 - 31-December-2022	-1,543.62	1,072.70
01-January-2023 - 31-December-2023	-1,496.42	1,136.61
01-January-2024 - 31-December-2024	-1,585.88	1,108.15
01-January-2025 - 31-December-2025	-1,699.57	1,057.15
01-January-2026 - 31-December-2026	-1,918.16	954.36
01-January-2027 - 31-December-2027	-1,999.54	886.65
01-January-2028 - 31-December-2028	-2,196.53	883.57
01-January-2029 - 31-December-2029	-2,370.20	842.12
01-January-2030 - 31-December-2030	-2,491.79	787.43
01-January-2031 - 31-December-2031	-2,649.83	702.54
01-January-2032 - 31-December-2032	-2,588.33	633.66
01-January-2033 - 31-December-2033	-2,013.06	629.09
01-January-2034 - 31-December-2034	-1,871.98	602.72
01-January-2035 - 31-December-2035	-1,872.64	557.41
01-January-2036 - 31-December-2036	-1,577.09	501.70
01-January-2037 - 31-December-2037	-1,124.24	475.08
01-January-2038 - 31-December-2038	-776.27	469.69
01-January-2039 - 31-December-2039	-590.81	450.53
01-January-2040 - 31-December-2040	-2,411.13	433.06

Time Step	Delta Total Ecosystem* (BSL)	Delta Total Ecosystem (PRJ)
01-January-2041 - 31-December-2041	-2,571.31	389.41
01-January-2042 - 31-December-2042	-2,673.97	370.69
01-January-2043 - 31-December-2043	-2,779.87	366.78
01-January-2044 - 31-December-2044	-2,899.19	351.38
01-January-2045 - 31-December-2045	-3,023.01	337.41
01-January-2046 - 31-December-2046	-3,116.06	327.21
01-January-2047 - 31-December-2047	-3,237.75	314.52
01-January-2048 - 31-December-2048	-3,326.46	311.87
01-January-2049 - 31-December-2049	-2,874.63	298.95
01-January-2050 - 31-July-2050	-2,548.59	289.85

* For analyses of Total Delta Ecosystem, annual values greater than zero indicate that the ecosystem is functioning as a carbon sink, annual values below zero indicate that it is functioning as a carbon source, and an annual value of exactly zero indicates that the ecosystem is carbon-neutral (i.e., neither a source nor a sink).



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Delta Total Ecosystem(SV_20230526_PRJ Default Simulation Assumption)	0	1,231	-371	1,073	1,137	1,108	1,057	954	887	884	842	787	703	634	629	603
Delta Total Ecosystem(SV_20230526_BSL Default Simulation Assumption)	0	-2,425	-4,209	-1,544	-1,496	-1,586	-1,700	-1,918	-2,000	-2,197	-2,370	-2,492	-2,650	-2,588	-2,013	-1,872

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Delta Total Ecosystem(SV_20230526_PRJ Default Simulation Assumption)	557	502	475	470	451	433	389	371	367	351	337	327	315	312	299	290
Delta Total Ecosystem(SV_20230526_BSL Default Simulation Assumption)	-1,873	-1,577	-1,124	-776	-591	-2,411	-2,571	-2,674	-2,780	-2,899	-3,023	-3,116	-3,238	-3,326	-2,875	-2,549

Figure 13: CBM-CFS graphical output of Delta Total Ecosystem between Baseline (blue) and Project (green) scenario (tC).

APPENDIX 3 - SUPPORTING DATA FILES

The following table identifies the key data files used for calculating all aspects of the Project Development Document. All additional files not submitted here will be provided to the Auditors upon request.

Table 24: List of reporting document files used in the formation of The SCA Development Document

Description	Filename	Format	Date
Spatial Inventory data for The SCA Instances	Silvador_Project_Instance_2023	kml	2023-02-15
Spatial Monitor Plot data for The SCA	SilvadorMonitoringPlots_11302022	kml	2023-01-11
Tabular Ownership data for The SCA	Silvador_ForestCapital_Ownership(Mar'23)	Excel	2023-03-08
Spatial Ownership data for The SCA	Silvador_Ownership	kml	2023-03-08
Extract of Land Deed for Information	Extras CF (Property UP)	PDF	2022-09-30
Project inventory dataset	Silvador_Forest_Inv_GC's_Jan24'23	Excel	2023-03-02
CBM-CFS Stores result and run assumptions along with all carbon pools and fluxes related to the BSL model run	SV_20230526_BSL	Access Datafile (large)	2023-05-26
CBM-CFS Stores result and run assumptions along with all carbon pools and fluxes related to the PRJ model run	SV_20230526_PRJ	Access Datafile (large)	2023-05-26
CBM-CFS Delta Ecosystem Results (BSL and PRJ)	delta_eco_May26'23	Excel	2023-05-26
Annual Change in carbon storage for wood products in the baseline	Emissions_BSL_Estimate (20230526)	Excel	2023-05-26

Fossil Fuel emissions related to logging, transport and manufacturing (optional pool)	Emissions_PRJ_Estimate (20230526)	Excel	2023-05-26
VCU determination worksheet	GHG Estimate_20230526	Excel	2023-05-26
Calculation of Uncertainty Factor	Silvador_VM0012_Uncertainty Calculator (20230313)	Excel	2023-03-06
Monitoring plots – compiled merch volume	Silvador_Tree_Data_Carbon_Final	Excel	2023-01-11
Monitoring plots – compiled CWD volume	Silvador_Tree_Data_Carbon_Final	Excel	2023-01-11

APPENDIX 4 – SPATIAL NDVI ANALYSIS

Monitoring – Project Area

The spatial monitoring program was implemented to identify natural disturbance events >4ha, planned project activities such as harvests, road construction and reforestation, and unplanned anthropogenic ("human-caused") disturbances such as illegal or unplanned harvests, as well as any loss events[18].

Changes in vegetation cover were monitored by comparing temporally distinct satellite images and their respective derived Normalized Difference Vegetation Indices (NDVI). The resulting analysis calculates either an increases or decreases in vegetation cover which can be classified and symbolized according to the magnitude of change. Changes are measured at the pixel scale of the imagery (20m x 20m for *Sentinel-2 2LA* imagery).

Losses of at least 0.5ha in area (12 continuous pixels) where assigned a unique Polygon ID, then further examined to categorize the change/ or loss as cloud cover-water reflection, natural disturbance, planned project activities or unplanned harvests.

Data Acquisition

To account for seasonality of vegetation cover, satellite imagery from 2020 and 2022 within a close seasonal range were selected for comparison analysis. Cloud cover was limited to between 0 and 3%, but not entirely avoidable due to the large project area coverage, the variability of timing for satellite flight paths, and days of data availability.

Data Classification

Representative ranges were established for the change in NDVI over the designated time period.

Table 25: Classification Ranges for Changes in NDVI

NDVI change	Qualitative Classification
> 0.2	Significant vegetation gain
0.1 to 0.2	Vegetation gain
0.05 to 0.1	Minor vegetation gain
0 to 0.05	Minimal positive vegetation change
0 to -0.05	Minimal negative vegetation change
-0.05 to -0.1	Minor vegetation loss
-0.1 to -0.2	Vegetation loss
< -0.2	Significant vegetation loss

[18] Any event that results in a loss of more than 5 percent of previously verified emission reductions and removals due to losses in carbon stocks. See VCS Program Definitions v4.2.

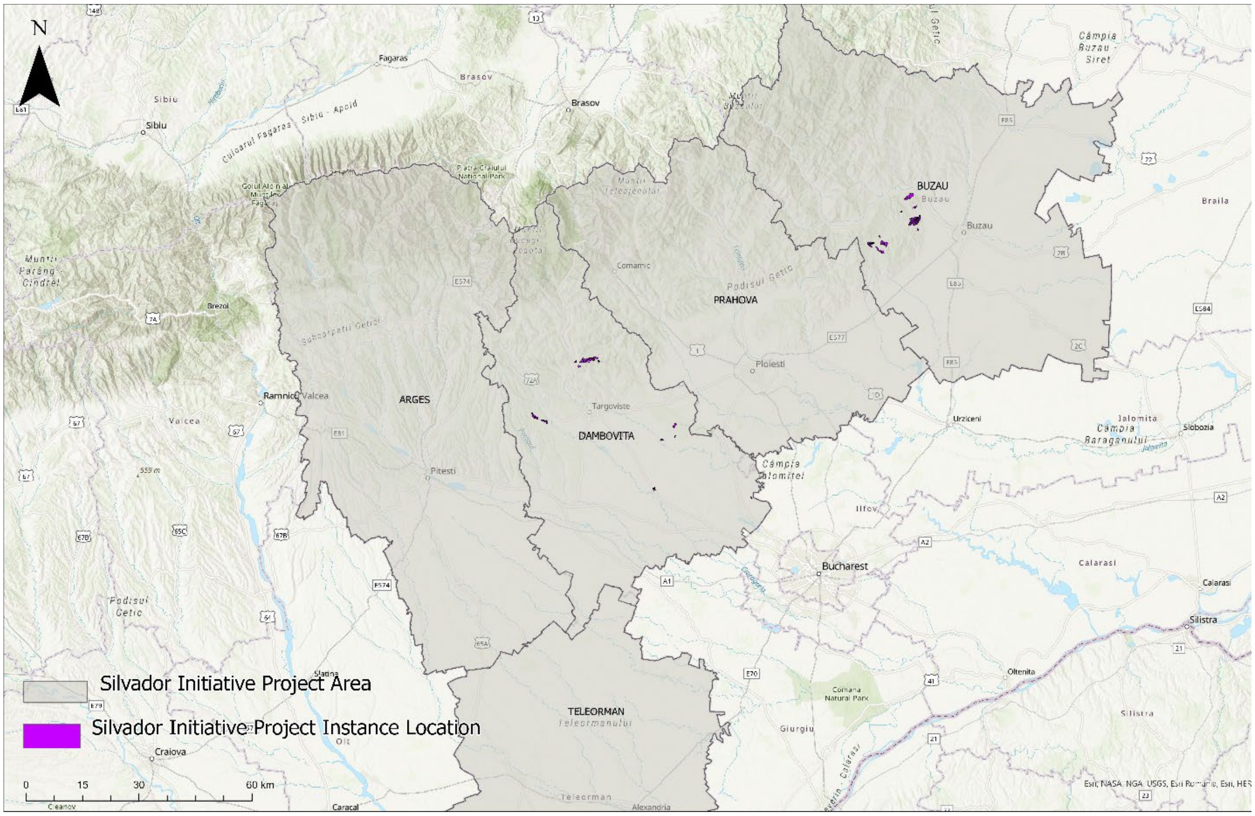


Figure 14: SCA PAI Location

Results/Conclusion

The PAI is non-contiguous and is located throughout Romanian counties of Buzău and Dâmbovița. The total area monitored was 1,538 hectares.

No natural, planned, unplanned or loss disturbance events resulting in vegetation losses >0.5 ha were observed in the project for years 2020-2022. The completion of the NDVI spatial assessment indicates that no additional changes/ updates are required for analysis units utilized in calculating carbon stocks.

APPENDIX 5 – TEMPERATE ZONE MAP

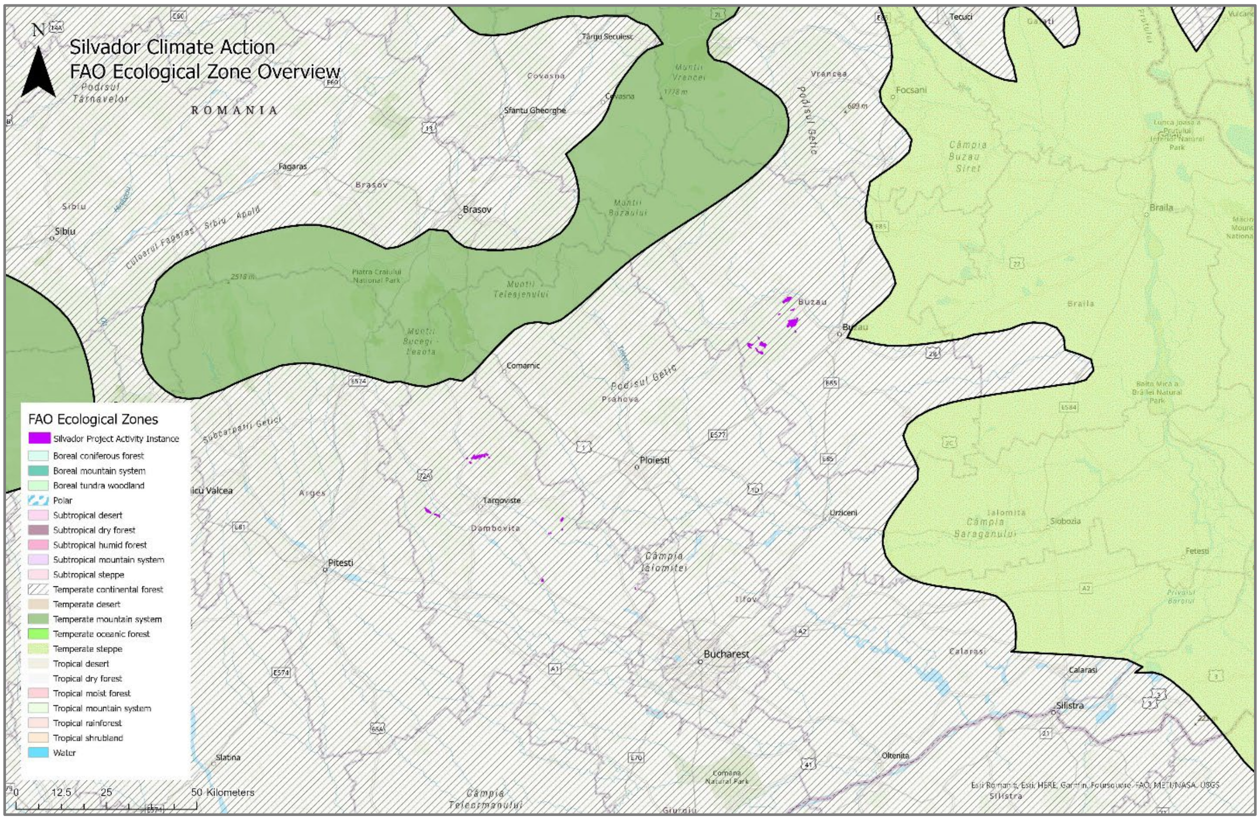


Figure 15: FAO Ecological Zone Overlain with Silvador PAI

APPENDIX 6 – PEATLANDS MAP

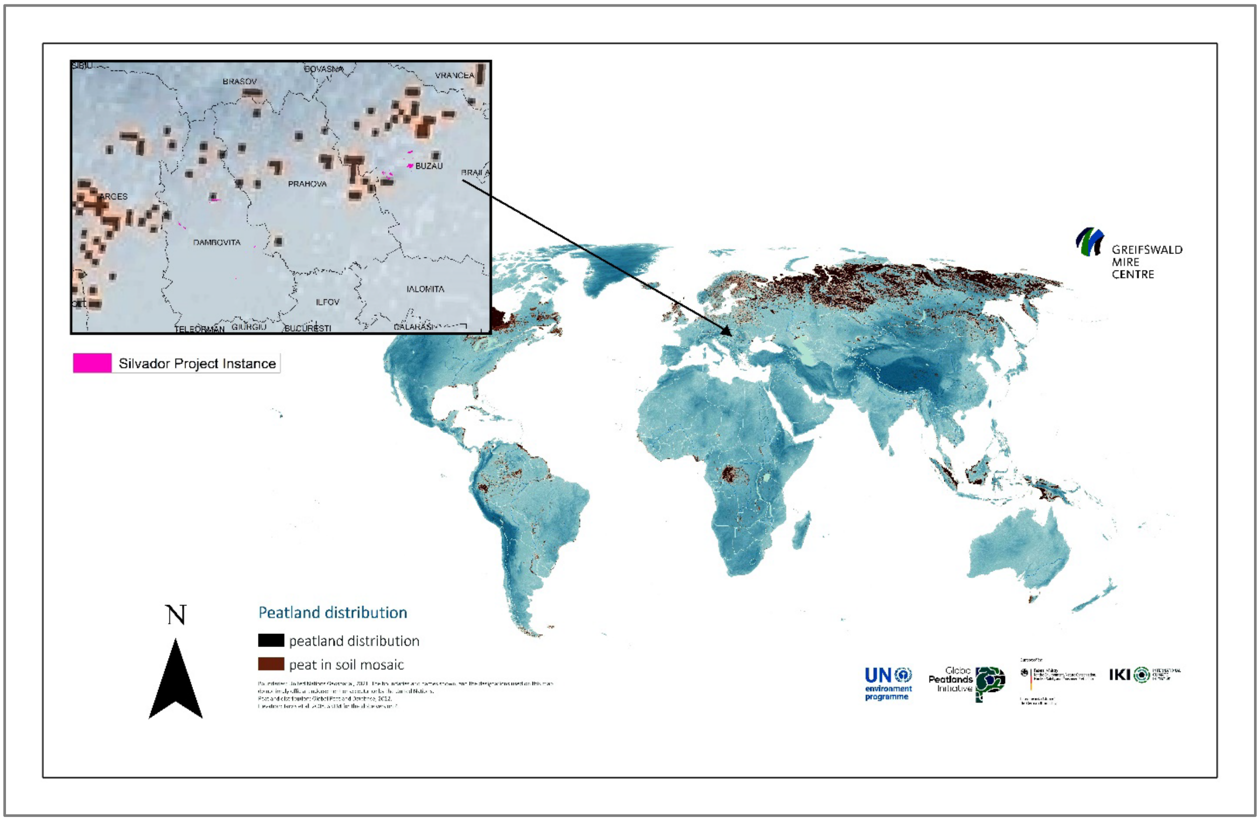


Figure 16: 2021 United Nations Peatlands Map overlain with Silvador PAI[19]

[19] For further information see: https://wedocs.unep.org/handle/20.500.11822/37571, United Nations Environment Programme (2021). The Global Peatland Map 2.0. https://wedocs.unep.org/20.500.11822/37571.

APPENDIX 7 – VM0012 EQUATIONS

Methodology Section #	Equation #	Screenshot
8.1.2	1	The total annual carbon balance in year, t, for the baseline scenario is calculated as ($\Delta C_{BSL,t}$, in t C yr^{-1} $\Delta \mathbf{C_{BSL,t}} = \Delta \mathbf{C_{BSL,P,t}}$ **(1)** where: $\Delta C_{BSL,P,t}$ = annual change in carbon stocks in all pools in the baseline across the project activity area;
8.1.2	2	$\Delta \mathbf{C_{BSL,P,t}} = \Delta \mathbf{C_{BSL,LB,t}} + \Delta \mathbf{C_{BSL,DOM,t}} + \Delta \mathbf{C_{BSI,HWP,t}}$ **(2)** where: $\Delta C_{BSL,LB,t}$ = annual change in carbon stocks in living tree biomass (above- and belowground); t C yr^{-1} $\Delta C_{BSL,DOM,t}$ = annual change in carbon stocks in dead organic matter; t C yr^{-1} $\Delta C_{BSI,HWP,t}$ = annual change in carbon stocks associated with harvested wood products, t C yr^{-1}.
8.1.2	3	$\Delta \mathbf{C_{BSL,LB,t}} = \Delta \mathbf{C_{BSL,G,t}} - \Delta \mathbf{C_{BSL,i,t}}$ **(3)** where: $\Delta C_{BSL,G,t}$ = annual increase in tree carbon stock from growth; t C yr^{-1} $\Delta C_{BSL,L,t}$ = annual decrease in tree carbon stock from a reduction in live biomass; t C yr^{-1}. *If the project area has been stratified, carbon pools are calculated for each polygon, i, and then summed during given year, t.*
8.1.3	4	Live biomass gain in year, *t*, polygon, *i* ($\Delta C_{BSL,G,i,t}$) is calculated as: $\Delta \mathbf{C_{BSL,G,t}} = \Sigma(\mathbf{A_{BSL,i}} \bullet \mathbf{G_{BSL,i,t}}) \bullet \mathbf{CF}$ **(4)** where: $A_{BSL,i,}$ = area (ha) of forest land in polygon, *i*; $G_{BSL,i,t}$ = annual increment rate in tree biomass (t d.m. ha^{-1} yr^{-1}), in polygon, *i*, and; CF = carbon fraction of dry matter t C t^{-1} d.m. (IPCC default value = 0.5).
8.1.3	5a	$\mathbf{G_{BSL,i,t}} = \mathbf{G_{BSL,AG,i,t}} + \mathbf{G_{BSL,BG,i,t}}$ **(5a)** where: $G_{BSL,AG,i,t}$ and $G_{BSL,BG,i,t}$ = annual above- and belowground biomass increment rates (t d.m. ha^{-1} yr^{-1}

Methodology Section #	Equation #	Screenshot
8.1.3	5b	$G_{BSL,AG,i,t}$ and $G_{BSL,BG,i,t}$ = annual above- and belowground biomass increment rates (t d.m. ha^{-1} yr^{-1}); $G_{BSL,BG,i,t} = G_{BSL,AG,i,t} \bullet R_i$ (5b) where R_i is the root:shoot ratio in polygon, *i*. R_i should ideally be estimated for each polygon, but these data are difficult to derive empirically. Hence, general relationships are acceptable as long as they are appropriate for the species and region associated with the project (Cairns, 1997). Equations 4 and 5 can be used directly to calculate $\Delta C_{BSL,G,t}$ when all tree cover within a polygon is removed by harvesting (i.e., clearfelling) and no residual structure is retained. In cases of partial harvesting and/or multiple entries into a polygon, these equations must be applied separately to each of the resulting sub-polygons (the different age classes that are created). This ensures that growth rates reflect the difference in forest age betwe the sub-polygons. The ex ante calculation of $G_{BSL,i,t}$ (either directly, or from its component parts) will be derived from models that require inputs derived, in part, from forest inventory data. Criteria for model suitability are provided in 8.1.1.1. T exact form of the input data depends on the nature of the model but may include site index, species compositio and volume.
8.1.4	6	$\Delta C_{BSL,L,t} = \Sigma(LBL_{BSL,NATURALi,t} + LBL_{BSL,FELLINGS,i,t} + LBL_{BSL,OTHER,i,t}) \bullet CF$ (6 where: $LBL_{BSL,NATURALi,t}$ = annual loss of live tree biomass due to natural mortality in polygon, *i*; t d.m. yr^{-1} $LBL_{BSL,FELLINGS,i,t}$ = annual loss of live tree biomass due to commercial felling in polygon, *i*; t d.m. y $LBL_{BSL,OTHER,i,t}$ = annual loss of live tree biomass from incidental sources in polygon, *i*; t d.m. yr^{-1} CF = carbon fraction of dry matter; t C t^{-1} d.m. (IPCC default value = 0.5).
8.1.4	7[18]	$LBL_{BSL,NATURALi,t} = A_{BSL,i} \bullet LB_{BSL,i,t} \bullet f_{BSL,NATURAL,i,t}$ (7)[18] where $A_{BSL,i}$ = area (ha) of forest land in polygon, *i*; $LB_{BSL,i,t}$ = average live tree biomass (t d.m. ha^{-1}) in polygon, *i,* for year, *t* $LB_{BSL,i,t}$ is calculated for year, *t*, beginning with biomass estimates in year *t*=1 (the project start year) and with annual biomass increments ($G_{BSL,i,t}$) added as per calculations in equation 5a. $f_{BSL,NATURAL,i,t}$ = the annual proportion of biomass that dies from natural mortality in polygon , *i* (unitless; $0 \leq f_{BSL,NATURALi} \leq 1$), year, *t*. Tree mortality is an ongoing process during stand development. Trees die as a consequence of insect attack, disease, competition, or some combination thereof. Hence, mortality can be hi variable between years. This parameter can be applied uniformly across an analysis unit, or individually to a given polygon. Sources for mortality estimates include permanent sample plots in similar stand types, literature reports, and inventory data.
8.1.4	8	$LBL_{FELLINGS,i,t} = A_{BSL,i} \bullet LB_{BSL,i,t} \bullet f_{BSL,HARVEST,i,t}$ (8) where: $A_{BSL,i}$ = area (ha) of forest land in polygon, *i* $LB_{BSL,i,t}$ = average live tree biomass (t d.m. ha^{-1}) in polygon, *i,* for year, *t* (see equation 7 for its calculation). $f_{BSL,HARVEST,i,t}$ = the proportion of biomass removed by harvesting from polygon, *i,* (unitless; $0 \leq f_{BSL,HARVESTi} \leq 1$), year, *t*. Data for this variable should be obtained from harvest schedule information. Values may be constrained (a) the value of $f_{BSL,NATURAL,i,t}$ (i.e., $f_{BSL,HARVEST,i,t} < 1- f_{BSL,NATURAL,i,t}$), and/or (b) the area of timber available for commercial harvest. Incidental loss ($LBL_{BSL,OTHER,i,t}$; t d.m. yr^{-1}) is the additional live tree biomass removed for road and landing construction in the polygon, *i*, and is calculated as a proportion of biomass removed by harvesting:

Methodology Section #	Equation #	Screenshot
8.1.4	9	$LBL_{BSL,OTHER,i,t} = A_{BSL,i} \bullet LB_{BSL,i,t} \bullet f_{BSL,DAMAGE,i,t}$ (9) where: $A_{BSL,i}$ = area (ha) of forest land in polygon, *i*; $LB_{BSL,i,t}$ = average live tree biomass (t d.m. ha^{-1}) in polygon, *i*, for year, *t* $f_{BSL,DAMAGE,i,t}$ = the proportion of additional biomass removed for road and landing construction in polygon, *i*, year, (unitless; $0 \leq f_{BSL,DAMAGE,i,t} \leq 1$)[19]. Data for this variable should be based on regional and local comparative studies and experiential information derived from the local forest industry[20].
8.1.5	10	The annual change in carbon stocks in DOM ($\Delta C_{BSL,DOM}$; t C yr^{-1}) is calculated as: $\Delta C_{BSL,DOM,t} = \Delta C_{BSL,LDW,t} + \Delta C_{BSL,SNAG,t} + \Delta C_{BSL,DBG,t}$ (10 where: $\Delta C_{BSL,LDW,t}$ = change in lying dead wood (LDW) carbon stocks in year, t; t C yr^{-1} $\Delta C_{BSL,SNAG,t}$ = change in snag carbon stock in year, t; t C yr^{-1} $\Delta C_{BSL,DBG,t}$ = change in dead belowground biomass carbon stock in year, t; t C yr^{-1}.
8.1.5	11a	$\Delta C_{BSL,LDW,t} = \Sigma(LDW_{BSL,IN,i,t} - LDW_{BSL,OUT,i,t}) \bullet CF$ (11a)
8.1.5	11b	$LDW_{BSL,i,t+1} = LDW_{BSL,i,t} + (LDW_{BSL,IN,i,t} - LDW_{BSL,OUT,i,t})$ (11b) where: $LDW_{BSL,,i,t}$ = The total mass of lying dead wood accumulated in polygon *i* , at time, *t* (t d.m.). $LDW_{BSL,IN,i,t}$ = annual increase in LDW biomass for polygon *i*, year, *t* (t d.m yr^{-1}). LDW increases occur as a result natural mortality (typically, blowdown), and as a direct or indirect result of harvesting. $LDW_{BSL,OUT,i,t}$ = annual loss in LDW biomass through decay, for polygon *i*, year, *t*, (t d.m yr^{-1}) $LDW_{BSL,IN,i,t}$ and $LDW_{BSL,OUT,i,t}$ are summed across polygons. CF = carbon fraction of dry matter (IPCC default value = 0.5).
8.1.5	12	$LDW_{BSL,IN,i,t} = (LBL_{BSL,NATURALi,t} - LBL_{BSL,NATURALi,t} \bullet R_i) \bullet f_{BSL,BLOWDOWN,i,t} +$ $((LBL_{BSL,FELLINGS,i,t} - LBL_{BSL,FELLINGS,i,t} \bullet R_i) +$ $(LBL_{BSL,OTHER,i,t} - LBL_{BSL,OTHER,i,t} \bullet R_i)) \bullet f_{BSL,BRANCH,i,t} +$ $((LBL_{BSL,FELLINGS,i,t} - LBL_{BSL,FELLINGS,i,t} \bullet R_i) +$ $(LBL_{BSL,OTHER,i,t} - LBL_{BSL,OTHER,i,t} \bullet R_i)) \bullet$ $(1 - f_{BSL,BRANCH,i,t}) \bullet f_{BSL,BUCKINGLOSS,i,t} + SNAG_{BSL,,i,t} \bullet f_{BSL,SNAGFALLDOWN,i,t}$ (12) where: $LBL_{BSL,NATURALi,t}$, $LBL_{BSL,FELLINGS,i,t,}$ and $LBL_{BSL,OTHER,i,t}$ are as calculated in equations 7, 8, and 9, respectively. R_i is the root:shoot ratio in polygon, *i* (see equation 5b). $f_{BSL,BLOWDOWN,i,t}$ = the annual proportion of live aboveground tree biomass subject to blowdown in polygon, *i*, year, *t* (unitless; $0 \leq f_{BSL,BLOWDOWN,i,t} \leq 1$). Ex ante estimates must be derived preferably from regional reports in similar forest types. $f_{BSL,BRANCH,i,t}$ = the annual proportion of aboveground tree biomass comprised of branches ≥ 5 cm diameter in polygon, *i* (unitless; $0 \leq f_{BSL,BRANCH,i,t} \leq 1$). Ex ante data are available from allometric equations and models (for example, (Kurz & Apps, 2006) for Canada; (Smith, Miles, Vissage, & Pugh, 2004) for the U.S.). In the event slash burning was undertaken as part of regular management activities, this parameter should be reduced accordingly to reflect the proportion of biomass remaining. Estimates should be obtained from expert opinion; as a default, assume 100% consumption if slash burning occurs.

Methodology Section #	Equation #	Screenshot
		$f_{BSL,BUCKINGLOSS,i,t}$ = the annual proportion of the log bole biomass left on site after assessing and/or merchandizing the log bole for quality, in polygon, *i* (unitless; $0 \leq f_{BSL,BUCKINGLOSS,i,t} \leq 1$). Preferably, data for this variable must be based on regional and local comparative studies and experiential information derived from the local forest industry. Otherwise, an average default value of 21% can be used, based on US national summary statistics (Smith, Miles, Vissage, & Pugh, 2004). $SNAG_{BSL,,i,t}$ = the total mass of the snag pool in polygon, *i*, year, *t* (see equation 14b). $f_{BSL,SNAGFALLDOWN,i,t}$ = the annual proportion of snag biomass in polygon, *i*, year, *t*, that falls over and thus is transferred to the LDW pool (unitless; $0 \leq f_{SNAGFALLDOWN,i,t} \leq 1$). Ex ante estimates for this parameter can be derived from peer reviewed literature (for example, (Parish, Antos, Ott, & Di Lucca, 2010) and forest carbon accounting models that track the rates of input and losses from dead organic matter pools (for example, (Kurz & et al, 2009).
8.1.5	13	$$LDW_{BSL,OUT,i,t} = LDW_{BSL,,i,t} \bullet f_{BSL,lwDECAY,i,t} \quad (13)$$ where: $LDW_{BSL,,i,t}$ = the total amount of lying deadwood mass in polygon *i*, year, *t (see equation 11b)*. $f_{BSL,lwDECAY,i,t}$ = th annual proportional loss of lying dead biomass due to decay, in polygon *i*, year, *t* (unitless; ; $0 \leq f_{BSL,lwDECAY,i,t} \leq$ A common approach to ex ante estimation of $f_{BSL,lwDECAY,i,t}$ is to assume mass loss occurs in proportion to the amount of mass remaining in accordance with a single exponential model, of the general form: $Y_t = Y_o\ e^{-kt}$ where Y_o is the initial quantity of material, Y_t the amount left at time t, and k is a decay constant (Harmon, et al. 1986). Other types of exponential models are available (reviewed in (Harmon, et al., 1986)) and may be more appropriate to particular forest types (to be described and justified by the project proponent, if used). Ex ante estimates for the decay parameter appropriate for the project should be derived from peer-reviewed literature (example, (Harmon, et al., 1986); (Laiho & and Prescott, 2004); (Harmon et al, 2008)).
8.1.5	14a	The change in standing dead wood (snag) carbon stock in year, t (t C yr^{-1}) is calculated as: $$\Delta C_{BSL,SNAG,t} = \Sigma(SNAG_{BSL,IN,i,t} - SNAG_{BSL,OUT,i,t}) \bullet CF \quad (14a$$
8.1.5	14b	$$SNAG_{BSL,i,t+1} = SNAG_{BSL,i,t} + (SNAG_{BSL,IN,i,t} - SNAG_{BSL,OUT,i,t}) \quad (14b)$$ where: $SNAG_{BSL,i,t}$ = The total mass of snags accumulated in polygon *i, at time t (t d.m.)*. $SNAG_{BSL,IN,i,t}$ = annual gain in snag biomass for polygon *i*, year, *t* (t d.m yr^{-1}). Snag biomass develops as a result of natural mortality. In cases where snags are created through management activities, these should be accounted for here. $SNAG_{BSL,OUT,i,t}$ = annual loss in snag biomass through decay, or falldown (i.e, transfer to the LDW pool)(t d.m yr^{-1}) CF = carbon fraction of dry matter (IPCC default value = 0.5). Note that $SNAG_{BSL,IN,i,t}$ and $SNAG_{BSL,OUT,i,t}$ are summed across polygons.
8.1.5	15	$$SNAG_{BSL,IN,i,t} = (LBL_{BSL,NATURALi,t} - LBL_{BSL,NATURALi,t} \bullet R_i) \bullet (1 - f_{BSL,BLOWDOWN,i,t}) \quad (15)$$ where: $LBL_{BSL,NATURALi,t}$ is as calculated in equation 7, and 1 - $f_{BSL,BLOWDOWN,i,t}$ is the proportion of live tree aboveground biomass that dies in polygon, *i*, year, *t*, but remains a standing dead organic matter (i.e., snags) (unitless; $0 \leq f_{BSL,BLOWDOWN,i,t} \leq 1$). Ex ante default estimates for this calculation can be derived from literature values (for example (Harmon, et al., 1986); (Runkle, 2000); (Harmon et al, 2008)) and should be matched to the ecosystems that most closely characterize the project area.

Methodology Section #	Equation #	Screenshot
8.1.5	16	$SNAG_{BSL,OUT,i,t} = SNAG_{BSL,i,t} \bullet f_{BSL,SWDECAY,i,t} + SNAG_{BSL,i,t} \bullet f_{BSL,SNAGFALLDOWN,i,t}$ **(16)** where: $SNAG_{BSL,i,t}$ = the total amount of snag mass in polygon *i*, year, *t* (see equation 14b). $f_{BSL,SWDECAY,i,t}$ = the annual proportional loss of snag biomass due to decay, in polygon, *i*, year, *t* (unitless; $0 \leq f_{BSL,SWDECAY,i,t} \leq 1$). As with lying dead wood, a common approach to estimating $f_{BSL,SWDECAY,i,t}$ is to assume mass loss occurs in proportion to the amount of mass remaining in accordance with a single exponential model (see equation 13). Ex ante estimates for this parameter should be derived from peer reviewed literature appropriate for the project site (for example, Vanderwel et al. 2006a) and forest carbon accounting models that track the rates of input and losses from dead organic matter pools for each forest type, productivity, and age-class (see, for example, Vanderwel et al., 2006b; (Kurz & et al, 2009)). $f_{BSL,SNAGFALLDOWN,i,t}$ = the annual proportion of snag biomass in polygon, *i*, that falls over and thus is transferred to the LDW pool (unitless; $0 \leq f_{BSL,SNAGFALLDOWN,i,t} \leq 1$). See equation 12 for parameter estimates. The annual change in DOM derived from dead belowground biomass ($\Delta C_{BSL,DBG,,t}$; t C yr^{-1}) is calculated for each polygon as per equation 17a. Calculation of $\Delta C_{BSL,DBG,t}$ is specific to a given polygon; each polygon must therefore be summed in order to calculate total annual loss across the project activity area.
8.1.5	17a	$\Delta C_{BSL,DBG,t} = \Sigma(DBG_{BSL,IN,i,t} - DBG_{BSL,OUT,i,t}) \bullet CF$ **(17a**
8.1.5	17b	$DBG_{BSL,i,t+1} = DBG_{BSL,i,t} + (DBG_{BSL,IN,i,t} - DBG_{BSL,OUT,i,t})$ **(17b)** where: $DGB_{BSL,i,t}$ = The total quantity of dead belowground biomass accumulated in polygon *i*, at time, *t* (t d.m.). $DBG_{BSL,IN,i,t}$ = annual gain in dead belowground biomass for polygon *i*, year, *t* (t d.m yr^{-1}). Dead belowgrou biomass develops as a result of mortality through natural causes or through harvesting activities. $DBG_{BSL,OUT,i,t}$ = annual loss in dead belowground biomass through decay, (t d.m yr^{-1}) CF = carbon fraction of dry matter (IPCC default value = 0.5).
8.1.5	17c	$DBG_{BSL,IN,i,t} = [(A_{BSL,i} \bullet LB_{BSL,i,t} \bullet R_i) \bullet$ $(f_{BSL,NATURAL,i,t} + f_{BSL,HARVEST,i,t} + f_{BSL,DAMAGE,i,t})]$ **(17c** where: $A_{BSL,i}$ = area (ha) of forest land in polygon, *i*; $LB_{BSL,i,t}$ = average live tree biomass (t d.m. ha^{-1}) in polygon, *i*, for year, *t*. $LB_{BSL,i,t}$ is calculated for year, *t*, beginning with biomass estimates in year *t*=1 (the project start year) and with annual biomass increments ($G_{BSL,i,t}$) added as per calculations in equation 5 a, b. This value is then multiplied by $A_{BSL,i}$, the area (ha) of forest land in polygon, *i*. R_i is the root:shoot ratio in polygon, *i* (see equation 5b). $f_{BSL,NATURAL,i,t}$ = the annual proportion of biomass that dies from natural mortality in polygon, *i* (unitless; $0 \leq f_{NATURALi} \leq 1$), year, *t* (see equation 7), $f_{BSL,HARVEST,i,t}$ = the proportion of biomass removed by harvesting from polygon, *i*, (unitless; $0 \leq f_{HARVESTi} \leq 1$), year, *t* (see equation 8), $f_{BSL,DAMAGE,i,t}$ = the proportion of additional biomass removed or road and landing construction in polygon, *i* (unitless; $0 \leq f_{DAMAGE,i,t} \leq 1$), year, *t* (see equation 9)
8.1.5	17d	$DBG_{BSL,OUT,i,t} = DBG_{BSL,i,t} \bullet f_{BSL,dgbDECAY,i,t}$ **(17d)** where: $DBG_{BSL,i,t}$ = the total quantity of dead belowground in polygon *i*, year, *t* (see equation 17b). $f_{BSL,dgbDECAY,i,t}$ = the annual proportional loss of dead belowground biomass due to decay, in polygon *i*, year, *t* (unitless; ; $0 \leq f_{BSL,lwDECAY,i,t} \leq 1$). The ex ante estimation of the decay of dead belowground biomass should be done using a similar single exponent decay function as that described above for lying deadwood biomass. Estimates for the decay parameter appropriate for specific project should be derived from peer-reviewed literatur (see for example: (Moore, Trofymow, Siltanen, Prescott, & CIDET, 2005)); Melin et al. (2009); (Melin, Petersson, Nordfjell, 2009)).

<table>
<tr><th>Methodology Section #</th><th>Equation #</th><th>Screenshot</th></tr>
<tr><td>8.1.6</td><td>18</td><td>The annual change emissions associated with the production of harvested wood products (HWP), $\Delta C_{BSI,HWP,t}$, is calculated as:

$\Delta C_{BSI,HWP,t} = \Delta C_{BSL,STORHWP,t} - \Delta C_{BSL,EMITFOSSIL,t,}$ (18)

$\Delta C_{BSL,STORHWP,t}$ = the annual change in harvested carbon that remains in storage after conversion to wood products (t C yr^{-1})

$\Delta C_{BSL,EMITFOSSIL,t}$ = the annual change in fossil fuel emissions from harvesting (logging and log transport) and processing of the various wood products.</td></tr>
<tr><td>8.1.7</td><td>19</td><td>The annual change in carbon storage in harvested wood products in year t ($\Delta C_{BSL,STORHWP,t}$; t C yr^{-1}) is determined based upon the following equation:

$\Delta C_{BSL,STORHWP,t} = (C_{BSL,STORHWP,t2} - C_{BSL,STORHWP,t1}) / T$ (19)

where:

$C_{BSL,STORHWP,t2}$ = carbon storage in harvested wood products at t=2; t C
$C_{BSL,STORHWP,t1}$ = carbon storage in harvested wood products at t=1; t C
T = number of years between monitoring t1 and t2
t : 1,2,3…t years elapsed since the project start date</td></tr>
<tr><td>8.1.7</td><td>20</td><td>$C_{BSL,TIMBER,h} = \Sigma[(LBL_{BSL,FELLINGS,i,h} - LBL_{BSL,FELLINGS,i,h} \bullet R_i + LBL_{BSL,OTHER,i,h} - LBL_{BSL,OTHER,i,h} \bullet R_i) \bullet (1 - f_{BSL,BRANCH,i,h}) \bullet (1 - f_{BSL,BUCKINGLOSS,i,h})] \bullet \bullet CF$ (20)

where:

$C_{BSL,TIMBER,h}$= carbon contained in timber harvested in period h (summed for all harvested polygons, i); t C

$LBL_{BSL,FELLINGS,i,h}$ = annual removal of live tree biomass due to commercial felling in polygon, i; t d.m. (equation

$LBL_{BSL,OTHER,i,h}$ = annual removal of live tree biomass from incidental sources in polygon, i; t d.m. (equation 9)

R_i is the root:shoot ratio in polygon, i (see equation 5b).

$1 - f_{BSL,BRANCH,i,h}$ the proportion of live tree biomass remaining after netting out branch biomass, in polygon i (unitless; $0 \leq f_{BRANCH,i,t} \leq 1$)(see equation 12)

$1 - f_{BSL,BUCKINGLOSS,i,h}$ = the proportion of the log bole remaining after in-woods log processing/bucking for quality length, etc., in polygon, i (unitless; $0 \leq f_{BUCKINGLOSS,i,t} \leq 1$) (equation 12)

h = harvest period ; yr</td></tr>
<tr><td>8.1.7</td><td>21</td><td>$C_{BSL,MILL,h,k} = (C_{BSL,TIMBER,h,k} \bullet f_{RND,k} \bullet r_{RND,k})$ (21)

where:

$C_{BSL,MILL,h,k}$ = carbon contained in harvested timber after milling in period h, for product type k; t C

$C_{BSL,TIMBER,h,k}$ = carbon contained in timber harvested in period h, for product type k; t C

k = wood product type – (softwood saw log, softwood pulpwood, hardwood saw log, or hardwood pulpwood; proportions determined from Table 1.4 of 1605(b) document)

$f_{RND,k}$ = fraction of growing stock volume removed as roundwood for product type k (default values by region in Table 1.5 of the 1605(b) document); dimensionless

$r_{RND,k}$ = ratio of industrial roundwood to growing stock volume removed as roundwood for product type k (default values by region in Table 1.5 of the 1605(b) document); dimensionless</td></tr>
</table>

Methodology Section #	Equation #	Screenshot
8.1.7	22a	Three values are then calculated from these data selected from Table 1.6 in the 1605(b) document, for each product type, *k* : the short-lived fraction ($P_{BSL,SLF,k}$), medium-lived fraction ($P_{BSL,MLF,k}$), and long-lived fraction ($P_{BSL,LLF,k}$): $P_{BSL,SLF,k} = 1 - P_{3\text{-}year}$ (22a)
8.1.7	22b	$P_{BSL,LLF,k} = P_{100\text{-}year}$ (22b)
8.1.7	22c	$P_{BSL,MLF,k} = P_{3\text{-}year} - P_{100\text{-}year}$, (22c)
8.1.7	23	$C_{BSL,STORHWP,t,} = \Sigma\,\Sigma\,((C_{BSL,MILL,h,k} \bullet P_{LLF,k}) + [(C_{BSL,MILL,h,k} \bullet P_{MLF,k}) \bullet ((20-h) / 20)])$ (23) where: $C_{BSL,STORHWP,t,}$ = carbon stored in harvested wood products in year *t* summed for all product types *k* and then o all harvest periods *h*; t C k = wood product type – (softwood saw log, softwood pulpwood, hardwood saw log, or hardwood pulpwood; proportions determined from Table 1.4 of 1605(b) document) h = year of harvest (the term (20-h) should not be allowed to drop below 0)
8.1.8	24	The annual change in fossil fuel emissions from harvesting and processing of the various wood products ($\Delta C_{BSL,EMITFOSSIL,t}$) are calculated as: $C_{BSL,EMITFOSSIL,t} = C_{BSL,EMITHARVEST,t} + C_{BSL,EMITMANUFACTURE,t} + C_{BSL,EMITTRANSPORT,t}$ (24) where: $C_{BSL,EMITHARVEST,t}$ is the annual fossil fuel emissions associated with harvesting of raw material (t C yr^{-1}) $C_{BSL,EMITMANUFACTURE,t}$ is the annual fossil fuel emissions associated with the manufacturing of raw material (t C yr $C_{BSL,EMITTRANSPORT,t}$ is the annual fossil fuel emissions associated with the transport of raw material (t C yr^{-1})
8.1.8	25	The simplest approach to calculating $C_{BSL,EMITFOSSIL,t}$ is to use published or derived carbon emission intensity factors. In the case of harvesting, $_{BSL,}C_{EMITHARVEST,t}$; t C yr^{-1}), can be calculated (summed across harvested polygons)as: $C_{BSL,EMITHARVEST,t} = \Sigma[(LBL_{BSL,FELLINGS,i,t} - LBL_{BSL,FELLINGS,i,t} \bullet R_i + LBL_{BSL,OTHER,i,t} -$ $LBL_{BSL,OTHER,i,t} \bullet R_i) \bullet (1 - f_{BSL,BRANCH,i,t}) \bullet (1 - f_{BSL,BUCKINGLOSS,i,t})] \bullet$ $CF \bullet c_{HARVEST}$ (25) where: $c_{HARVEST}$ is the carbon emission intensity factor (t C emitted/t C raw material) associated with harvesting (see Table 4 for default values); all other terms are as defined in equation 20.
8.1.8	26	$C_{BSL,EMITTRANSPORT,t}$ must be calculated after consideration of the transport distance from harvest to processing facility, and the means of transportation. This term can be calculated as follows (after (Heath, et al., 2010)): $C_{BSL,EMITTRANSPORT,t} = \Sigma[(LBL_{BSL,FELLINGS,i,t} - LBL_{BSL,FELLINGS,i,t} \bullet R_i +$ $LBL_{BSL,OTHER,i,t} - LBL_{BSL,OTHER,i,t} \bullet R_i) \bullet (1 - f_{BSL,BRANCH,i,t}) \bullet (1 - f_{BSL,BUCKINGLOSS,i,t})] \bullet$ $CF \bullet \Sigma(f_{BSL,TRANSPORTk} \bullet d_{TRANSPORTk} \bullet c_{TRANSPORTk})$ (26) where: $f_{BSL,TRANSPORTk}$ = the fraction of raw material transported by transportation type, *k*. (unitless; $0 \leq f_{BSL,TRANSPORTk} < 1$) $d_{TRANSPORTk}$ = the distance transported by transportation type, *k*. (km); $c_{TRANSPORTk}$ is the carbon emission intensity factor (kg C emitted/t C raw material) associated with transportation type, k (see Table 4 for default values); all other terms are as defined in equation 20.

Methodology Section #	Equation #	Screenshot
8.1.8	27	$C_{BSL,EMITMANUFACTURE,t} = \Sigma[(LBL_{BSL,FELLINGS,i,t} - LBL_{BSL,FELLINGS,i,t} \bullet R_i + LBL_{BSL,OTHER,i,t} - LBL_{BSL,OTHER,i,t} \bullet R_i) \bullet (1 - f_{BSL,BRANCH,i,t}) \bullet (1 - f_{BSL,BUCKINGLOSS,i,t})] \bullet \Sigma(f_{BSL,PRODUCTk} \bullet c_{MANUFACTUREk}) \bullet CF$ (27) $c_{MANUFACTUREk}$ is the carbon emission intensity factor (t C emitted/t C raw material) associated with manufacture o product type, *k*; all other terms are as defined in equation 19.
8.2.3	28a	Actual (ex post) annual net carbon stocks are calculated using the equations in this section. $C_{ACTUAL,i,t} = C_{LB,i,t} + C_{DOM,i,t}$ (28a) where: $C_{ACTUAL,i,t}$ = carbon stocks in all selected carbon pools in polygon, *i*, year, *t*; t C $C_{LB,i,t}$ = carbon stocks in living tree biomass in polygon, *i*, year, *t*; t C $C_{DOM,i,t}$ = carbon stocks in dead organic matter in year, *t*; t C
8.2.3	28b	$B_{TOTAL,i,t} = (B_{AG,i,t} + B_{BG,i,t})$ (28b
8.2.3	28c	$C_{LB,i,t} = (B_{TOTAL,i,t}) \bullet CF$ (28c where: $B_{AG,i,t}$ = aboveground tree biomass (t d.m. ha^{-1}) measured in polygon, *i*, year, *t* $B_{BG,i,t}$ = belowground tree biomass (t d.m. ha^{-1}) measured in polygon, *i*, year, *t*. $B_{TOTAL,i,t}$ = total tree biomass (t d.m. ha^{-1}) measured in polygon, *i*, year, *t*
8.2.3	28e	$C_{DOM,i,t} = (DOM_{LDW,i,t} + DOM_{SNAG,i,t}) \bullet CF$ (28e) where: $DOM_{LDW,i,t}$ = average mass of dead organic matter contained in lying dead wood (t d.m. ha^{-1}) in measured in polygon, *i*, year, *t* $DOM_{SNAG,i,t}$ = average mass of dead organic matter contained in standing snags (t d.m. ha^{-1}) in measured in polygon, *i*, year, *t* The average quantity of dead organic matter contained in lying dead wood for measured polygon, *i*, in year, *t* ($DOM_{LDW,i,t}$) is calculated according to equations 60a-c in Section 9.3.2. The value of $DOM_{LDW,i,t}$ must be compare to the equivalent calculation of lying dead wood mass ($LDW_{PRJ,i,t}$) in the project scenario (Section 8.2.8) (see comparison method and steps below).
8.2.5	29	The total annual carbon balance in year, t, for the project scenario is calculated as ($\Delta C_{PRJ,t}$, in t C yr^{-1}): $\Delta C_{PRJ,t} = \Delta C_{PRJ,P,t}$ (29) where: $\Delta C_{PRJ,P,t}$ is the annual change in carbon stocks in all pools in the project across the project activity area; t C yr^{-1}
8.2.5	30	$\Delta C_{PRJ,P,t} = \Delta C_{PRJ,LB,t} + \Delta C_{PRJ,DOM,t} + \Delta C_{PRJ,HWP,t}$ (30) $\Delta C_{PRJ,LB,t}$ = annual change in carbon stocks in living tree biomass (above- and belowground); t C yr^{-1} $\Delta C_{PRJ,DOM,t}$ = annual change in carbon stocks in dead organic matter; t C yr^{-1} $\Delta C_{PRJ,HWP,t}$ is the annual change in carbon stocks associated with harvested wood products, t C yr^{-1}.

Methodology Section #	Equation #	Screenshot
8.2.5	31	$\Delta C_{PRJ,LB,t} = \Delta C_{PRJ,G,t} - \Delta C_{PRJ,L,t}$ (3 where: $\Delta C_{PRJ,G,t}$ = annual increase in tree carbon stock from growth; t C yr^{-1} $\Delta C_{PRJ,L,t}$ = annual decrease in tree carbon stock from a reduction in live biomass; t C yr^{-1}.
8.2.6	32	Live biomass gain in year, *t*, polygon, *i* ($\Delta C_{PRJ,G,i,t}$) is calculated as: $\Delta C_{PRJ,G,t} = \Sigma(A_{PRJ,i} \bullet G_{PRJ,i,t}) \bullet CF$ (3 where: $A_{PRJ,i,}$ = area (ha) of forest land in polygon, *i*; $G_{PRJ,i,t}$ = annual increment rate in tree biomass (t d.m. ha^{-1} yr^{-1}), in polygon, *i*, and; CF = carbon fraction of dry matter t C t^{-1} d.m. (IPCC default value = 0.5).
8.2.6	33a	$G_{PRJ,i,t} = G_{PRJ,AG,i,t} + G_{PRJ,BG,i,t}$ (33a) where $G_{PRJ,AG,i,t}$ and $G_{PRJ,BG,i,t}$ are the annual above- and belowground biomass increment rates (t d.m.
8.2.6	33b	$G_{PRJ,BG,i,t} = G_{PRJ,AG,i,t} \bullet R_i$ (33b) where R_i is the root:shoot ratio in polygon, *i*. R_i should ideally be estimated for each polygon, but these difficult to derive empirically. Hence, general relationships are acceptable (Cairns, 1997).
8.2.7	34	$\Delta C_{PRJ,L,t} = \Sigma(LBL_{PRJ,NATURALi,t} + LBL_{PRJ,FELLINGS,i,t} + LBL_{PRJ,OTHERi,t}) \bullet CF$ (3 where: $LBL_{PRJ,NATURALi,t}$ = annual loss of live tree biomass due to natural mortality in polygon, *i*; t d.m. yr $LBL_{PRJ,FELLINGS,i,t}$ = annual loss of live tree biomass due to commercial felling in polygon, *i*; t d.m. yr^{-1} $LBL_{PRJ,OTHER,i,t}$ = annual loss of live tree biomass from incidental sources in polygon, *i*; t d.m. yr^{-1} CF = carbon fraction of dry matter; t C t^{-1} d.m. (IPCC default value = 0.5).
8.2.7	35[24]	$LBL_{PRJ,NATURALi,t} = A_{PRJ,i} \bullet LB_{PRJ,i,t} \bullet f_{PRJ,NATURAL,i,t}$ (35)[24] where $A_{PRJ,i}$ = area (ha) of forest land in polygon, *i*; $LB_{PRJ,i,t}$ = average live tree biomass (t d.m. ha^{-1}) in polygon, *i*, for year, *t* $LB_{PRJ,i,t}$ is calculated for year, *t*, beginning with biomass estimates in year *t*=1 (the project start year) and with annual biomass increments ($G_{PRJ,i,t}$) added as per calculations in equation 33a. $f_{PRJ,NATURAL,i,t}$ = the annual proportion of biomass that dies from natural mortality in forest type , *i* (unitless; $0 \leq f_{PRJ,NATURALi} \leq 1$), year, *t*. Tree mortality is an ongoing process during stand development. Trees die as a consequence of insect attack, disease, competition, or some combination thereof. Hence, mortality can be highly variable between years. This parameter can be applied uniformly across an analysis unit, or individually to a give polygon. Ex post estimates from regional data sources in corresponding stand types are preferred. Sources for mortality estimates include permanent sample plots in similar stand types, literature reports, and inventory data. Some models (the FORECAST model, for example) simulate annual background mortality rates directly and can accommodate variable age structures following partial harvesting.

Methodology Section #	Equation #	Screenshot
8.2.7	36	$LBL_{PRJ,FELLINGS,i,t} = A_{PRJ,i} \bullet LB_{PRJ,i,t} \bullet f_{PRJ,HARVEST,i,t}$ **(36)** where: $A_{PRJ,i}$ = area (ha) of forest land in polygon, *i* $LB_{PRJ,i,t}$ = average live tree biomass (t d.m. ha^{-1}) in polygon, *i*, for year, *t* (see equation 7 for its calculation). $f_{PRJ,HARVEST,i,t}$ = the proportion of biomass removed by harvesting from polygon, *i*, (unitless; $0 \leq f_{PRJ,HARVESTi} \leq 1$), i year, *t*. Data for this variable should be obtained from harvest schedule information. Values may be constrained l (a) the value of $f_{PRJ,NATURAL,i,t}$ (i.e., $f_{PRJ,HARVEST,i,t} < 1 - f_{PRJ,NATURAL,i,t}$), and/or (b) the area of timber available for commercial harvest.
8.2.7	37	Incidental loss ($LBL_{PRJ,OTHER,i,t}$; t d.m. yr^{-1}) is the additional live tree biomass removed for road and l construction in the polygon, *i*, and is calculated as a proportion of biomass removed by harvesting: $LBL_{PRJ,OTHER,i,t} = A_{PRJ,i} \bullet LB_{PRJ,i,t} \bullet f_{PRJ,HARVEST,i,t} \bullet f_{PRJ,DAMAGE,i,t}$ **(37)** where: $A_{PRJ,i}$ = area (ha) of forest land in polygon, *i*; $LB_{PRJ,i,t}$ = average live tree biomass (t d.m. ha^{-1}) in polygon, *i*, for year, *t* $f_{PRJ,HARVEST,i,t}$ = the proportion of biomass removed by harvesting from polygon, *i*, in year, *t* (unitless; $0 \leq f_{PRJ,HARVEST,i,t} \leq 1$). $f_{PRJ,DAMAGE,i,t}$ = the proportion of additional biomass removed for road and landing construction in polygon, *i* (unitless; $0 \leq f_{PRJ,DAMAGE,i,t} \leq 1$)[25]. Data for this variable should be based on regional and local comparative s and experiential information derived from the local forest industry[26].
8.2.8	38	The annual change in carbon stocks in DOM ($\Delta C_{PRJ,DOM}$; t C yr^{-1}) is calculated as: $\Delta C_{PRJ,DOM,t} = \Delta C_{PRJ,LDW,t} + \Delta C_{PRJ,SNAG,t} + \Delta C_{PRJ,DBG,t}$ **(38** where: $\Delta C_{PRJ,LDW,t}$ = change in lying dead wood (LDW) carbon stocks in year, *t*; t C yr^{-1} $\Delta C_{PRJ,SNAG,t}$ = change in snag carbon stock in year, *t*; t C yr^{-1} $\Delta C_{BSL,DBG,t}$ = change in belowground carbon stock in year, *t*; t C yr^{-1}.
8.2.8	39a	$\Delta C_{PRJ,LDW,t} = \Sigma(LDW_{PRJ,IN,i,t} - LDW_{PRJ,OUT,i,t}) \bullet CF$ **(39**
8.2.8	39b	$LDW_{PRJ,i,t+1} = LDW_{PRJ,i,t} + (LDW_{PRJ,IN,i,t} - LDW_{PRJ,OUT,i,t})$ **(39b)** where: $LDW_{PRJ,i,t}$= The total mass of lying dead wood accumulated in polygon *i* at time t (t d.m.). $LDW_{PRJ,IN,i,t}$ = annual increase in LDW biomass for polygon *i*, year, *t* (t d.m ha^{-1} yr^{-1}). LDW increases occur as a result of natural mortality (typically, blowdown), and as a direct or indirect result of harvesting. $LDW_{PRJ,OUT,i,t}$ = annual loss in LDW biomass through decay, for polygon *i*, year, *t*, (t d.m ha^{-1} yr^{-1}) $LDW_{PRJ,IN,i,t}$ and $LDW_{PRJ,OUT,i,t}$ are summed across polygons. CF = carbon fraction of dry matter (IPCC default value = 0.5).
8.2.8	40	$LDW_{PRJ,IN,i,t} = (LBL_{PRJ,NATURALi,t} - LBL_{PRJ,NATURALi,t} \bullet R_i) \bullet f_{PRJ,BLOWDOWN,i,t} +$ $((LBL_{PRJ,FELLINGS,i,t} - LBL_{PRJ,FELLINGS,i,t} \bullet R_i) +$ $(LBL_{PRJ,OTHER,i,t} - LBL_{PRJ,OTHER,i,t} \bullet R_i)) \bullet f_{PRJ,BRANCH,i,t} +$

Methodology Section #	Equation #	Screenshot
		$((LBL_{PRJ,FELLINGS,i,t} - LBL_{PRJ,FELLINGS,i,t} \bullet R_i) +$ $(LBL_{PRJ,OTHER,i,t} - LBL_{PRJ,OTHER,i,t} \bullet R_i)) \bullet$ $(1 - f_{PRJ,BRANCH,i,t}) \bullet f_{PRJ,BUCKINGLOSS,i,t} + SNAG_{PRJ,,i,t} \bullet f_{PRJ,SNAGFALLDOWN,i,t}$ **(40)** where: $LBL_{PRJ,NATURAL,i,t}$, $LBL_{PRJ,FELLINGS,i,t}$ and $LBL_{PRJ,OTHER,i,t}$ are as calculated in equations 35, 36, and 37, respectively. R_i is the root:shoot ratio in polygon, *i* (see equation 33b). $f_{PRJ,BLOWDOWN,i,t}$ = the annual proportion of live aboveground tree biomass subject to blowdown in polygon, *i*, year, *t* (unitless; $0 \leq f_{PRJ,BLOWDOWN,i,t} \leq 1$). Ex ante estimates must be derived from regional reports in similar forest types. $f_{PRJ,BRANCH,i,t}$ = the annual proportion of aboveground tree biomass comprised of branches $\geq$ 5 cm diameter in polygon, *i* (unitless; $0 \leq f_{PRJ,BRANCH,i,t} \leq 1$). Ex ante data are available from allometric equations and models (for example, (Kurz & Apps, 2006) for Canada; (Smith, Miles, Vissage, & Pugh, 2004) for the U.S.). In the event slash burning is undertaken, this parameter should be reduced accordingly to reflect the proportion of biomass remaining. Estimates should be obtained from expert opinion; as a default, assume 100% consumption. $f_{PRJ,BUCKINGLOSS,i,t}$ = the annual proportion of the log bole biomass left on site after assessing and/or merchandizing the log bole for quality, in polygon, *i* (unitless; $0 \leq f_{PRJ,BUCKINGLOSS,i,t} \leq 1$). Preferably, data for this variable must be based on regional and local comparative studies and experiential information derived from the local forest industry Otherwise, an average default value of 21% can be used, based on US national summary statistics (Smith, Miles, Vissage, & Pugh, 2004). $SNAG_{PRJ,i,t}$ = the total mass of the snag pool in polygon, *i*, year, *t* (see equation 42b). $f_{PRJ,SNAGFALLDOWN,i,t}$ = the annual proportion of snag biomass in polygon, *i*, year, *t*, that falls over and thus is transferred to the LDW pool (unitless; $0 \leq f_{PRJ,SNAGFALLDOWN,i,t} \leq 1$). Ex ante estimates for this parameter can be derived from peer reviewed literature (for example, (Parish, Antos, Ott, & Di Lucca, 2010) and forest carbon accounting models that track the rates of input and losses from dead organic matter pools (for example, (Kurz & et al, 2009).
8.2.8	41	$LDW_{PRJ,OUT,i,t} = LDW_{PRJ,i,t} \bullet f_{PRJ,lwDECAY,i,t}$ **(41)** where: $LDW_{PRJ,i,t}$ = the total amount of lying deadwood mass in polygon *i*, year, *t (see equation 39b)*. $f_{PRJ,lwDECAY,i,t}$ = the annual proportional loss of lying dead biomass due to decay, in polygon *i*, year, *t* (unitless; ; $0 \leq f_{PRJ,lwDECAY,i,t} \leq 1$). A common approach to ex ante estimation of $f_{PRJ,lwDECAY,i,t}$ is to assume mass loss occurs in proportion to the amount of mass remaining in accordance with an a single exponential model, of the general form: $Y_t = Y_o e^{-kt}$ where Y_o is the initial quantity of material, Y_t the amount left at time *t*, and k is a decay constant (Harmon, et al., 1986). Other types of exponential models are available (reviewed in (Harmon, et al., 1986)) and may be more appropriate to particular forest types (to be described and justified by the project proponent, if used). Ex ante estimates for the decay parameter appropriate for the project should be derived from peer-reviewed literature (for example, (Harmon, et al., 1986); (Laiho & and Prescott, 2004); (Harmon et al, 2008)).
8.2.8	42a	The change in standing dead wood (snag) carbon stock in year, *t* (t C yr^{-1}) is calculated as: $\Delta C_{PRJ,SNAG,t} = \Sigma(SNAG_{PRJ,IN,i,t} - SNAG_{PRJ,OUT,i,t}) \bullet CF$ **(42a)**

Methodology Section #	Equation #	Screenshot
8.2.8	42b	$SNAG_{PRJ,i,t+1} = SNAG_{PRJ,i,t} + (SNAG_{PRJ,IN,i,t} - SNAG_{PRJ,OUT,i,t})$ **(42b)** where: $SNAG_{PRJ,i,t}$ = The total mass of snags accumulated in polygon *i* at time *t* (t d.m.) $SNAG_{PRJ,IN,i,t}$ = annual gain in snag biomass for polygon *i*, year, *t* (t d.m ha^{-1} yr^{-1}). Snag biomass develops as a result of natural mortality. In cases where snags are created through management activities, these should be accounted for here. $SNAG_{PRJ,OUT,i,t}$ = annual loss in snag biomass through decay, or falldown (i.e, transfer to the LDW pool)(t d.m ha yr^{-1}) CF = carbon fraction of dry matter (IPCC default value = 0.5). Note that $SNAG_{PRJ,IN,i,t}$ and $SNAG_{PRJ,OUT,i,t}$ are summed across polygons.
8.2.8	43	$SNAG_{PRJ,IN,i,t} = (LBL_{PRJ,NATURALi,t} - LBL_{PRJ,NATURALi,t} \bullet R_i) \bullet (1 - f_{PRJ,BLOWDOWN,i,t})$ **(43)** where: $LBL_{PRJ,NATURALi,t}$ is as calculated in equation 35, and $1 - f_{PRJ,BLOWDOWN,i,t}$ is the proportion of live tree aboveground biomass that dies in polygon, *i*, year, *t*, but remains a standing dead organic matter (i.e. snags) (unitless; $0 \leq f_{PRJ,BLOWDOWN,i,t} \leq 1$). Ex ante default estimates for this calculation can be derived from literature values (for example (Harmon, et al., 1986); (Runkle, 2000); (Harmon et al, 2008)) and should be matched to the ecosystems that most closely characterize the project area.
8.2.8	44	$SNAG_{PRJ,OUT,i,t} = SNAG_{PRJ,i,t} \bullet f_{PRJ,SWDECAY,i,t} + SNAG_{PRJ,i,t} \bullet f_{PRJ,SNAGFALLDOWN,i,t}$ **(44)** where: $SNAG_{PRJ,i,t}$ = the total amount of snag mass in polygon *i*, year, *t (see equation 42b)*. $f_{PRJ,SWDECAY,i,t}$ = the annual proportional loss of snag biomass due to decay, in polygon, *i*, year, *t* (unitless; $0 \leq f_{PRJ,SWDECAY,i,t} \leq 1$). As with lyi dead wood, a common approach to estimating $f_{PRJ,SWDECAY,i,t}$ is to assume mass loss occurs in proportion to the amount of mass remaining in accordance with an a single exponential model (see equation 41). Ex ante estima for this parameter can be derived from peer reviewed literature appropriate for the project site (for example, Vanderwel et al. 2006a) and forest carbon accounting models that track the rates of input and losses from dead organic matter pools for each forest type, productivity, and age-class (see, for example, Vanderwel et al., 2006b (Kurz & et al, 2009)). $f_{PRJ,SNAGFALLDOWN,i,t}$ = the annual proportion of snag biomass in polygon, *i*, that falls over and thus is transferred to the LDW pool (unitless; $0 \leq f_{PRJ,SNAGFALLDOWN,i,t} \leq 1$). See equation 40 for parameter estimates.
8.2.8	45a	$\Delta C_{PRJ,DBG,t} = \Sigma(DBG_{PRJ,IN,i,t} - DBG_{PRJ,OUT,i,t}) \bullet CF$ **(4**
8.2.8	45b	$DBG_{PRJ,i,t+1} = DBG_{PRJ,i,t} + (DBG_{PRJ,IN,i,t} - DBG_{PRJ,OUT,i,t})$ **(45b)** where: $DGB_{PRJ,i,t}$ = The total quantity of dead belowground biomass accumulated in polygon *i* at time *t* (t d.m.). $DBG_{PRJ,IN,i,t}$ = annual gain in dead belowground biomass for polygon *i*, year, *t* (t d.m ha^{-1} yr^{-1}). Dead belowgrour biomass develops as a result of mortality through natural causes or through harvesting activities. $DBG_{PRJ,OUT,i,t}$ = annual loss in dead belowground biomass through decay, (t d.m ha^{-1} yr^{-1}) CF = carbon fraction of dry matter (IPCC default value = 0.5).

Methodology Section #	Equation #	Screenshot
8.2.8	45c	$DBG_{PRJ,IN,i,t} = [(A_{PRJ,i} \bullet LB_{PRJ,i,t} \bullet R_i) \bullet (f_{PRJ,NATURAL,i,t} + f_{PRJ,HARVEST,i,t} + f_{PRJ,DAMAGE,i,t})]$ **(45c)** where: $A_{PRJ,i}$ = area (ha) of forest land in polygon, *i*; $LB_{PRJ,i,t}$ = average live tree biomass (t d.m. ha^{-1}) in polygon, *i*, for year, *t*. $LB_{PRJ,i,t}$ is calculated for year, *t*, beginning with biomass estimates in year *t*=1 (the project start year) and with annual biomass increments ($G_{PRJ,i,t}$) added as per calculations in equation 33 a, b. This value is then multiplied by $A_{PRJ,i,}$ the area (ha) of forest land in polygon, *i*. R_i is the root:shoot ratio in polygon, *i* (see equation 33b). $f_{PRJ,NATURAL,i,t}$ = the annual proportion of biomass that dies from natural mortality in polygon, *i* (unitless; $0 \leq f_{NATURALi}$ ≤ 1), year, *t* (see equation 35), $f_{PRJ,HARVEST,i,t}$ = the proportion of biomass removed by harvesting from polygon, *i*, (unitless; $0 \leq f_{PRJ,HARVESTi} \leq 1$), year, *t* (see equation 36), $f_{PRJ,DAMAGE,i,t}$ = the proportion of additional biomass removed by for road and landing construction in polygon, *i* (unitless; $0 \leq f_{PRJ,DAMAGE,i,t} \leq 1$), year, *t* (see equation 37),
8.2.8	45d	$DBG_{PRJ,OUT,i,t} = DBG_{PRJ,i,t} \bullet f_{PRJ,dgbDECAY,i,t}$ **(45d)** where: $DBG_{PRJ,i,t}$ = the total quantity of dead belowground in polygon *i*, year, *t (equation 17b)*. $f_{PRJ,dgbDECAY,i,t}$ = the annual proportional loss of dead belowground biomass due to decay, in polygon *i*, year, *t* (unitless; $0 \leq f_{PRJ,lwDECAY,i,t} \leq 1$). The ex ante estimation of the decay of dead belowground biomass should be done using a similar single exponent decay function as that described above for lying deadwood biomass. Estimates for the decay parameter appropriate for specific project should be derived from peer-reviewed literature (see for example: (Moore, Trofymow, Siltanen, Prescott, & CIDET, 2005); (Melin, Petersson, & Nordfjell, 2009).
8.2.9	46	$\Delta C_{PRJ,HWP,t} = \Delta C_{PRJ,STORHWP,t} - \Delta C_{PRJ,EMITFOSSIL,t,}$ **(46)** $\Delta C_{PRJ,STORHWP,t}$ = the annual change in harvested carbon that remains in storage after conversion to wood produ (t C yr^{-1}) $\Delta C_{PRJ,EMITFOSSIL,t}$ = the annual change in fossil fuel emissions from harvesting (logging and log transport) and processing of the various wood products.
8.2.10	47	The annual change in carbon storage in harvested wood products in year *t* ($\Delta C_{PRJ,STORHWP,t}$; t C yr^{-1}) is determin based upon the following equation: $\Delta C_{PRJ,STORHWP,t} = (C_{PRJ,STORHWP,t2} - C_{PRJ,STORHWP,t1}) / T$ **(47)** where: $C_{PRJ,STORHWP,t2}$ = carbon storage in harvested wood products at t=2; t C $C_{PRJ,STORHWP,t1}$ = carbon storage in harvested wood products at t=1; t C T = number of years between monitoring t1 and t2 t : 1,2,3…t years elapsed since the project start date
8.2.10	48	$C_{PRJ,TIMBER,h} = \Sigma[(LBL_{PRJ,FELLINGS,i,h} - LBL_{PRJ,FELLINGS,i,h} \bullet R_i + LBL_{PRJ,OTHER,i,h} - LBL_{PRJ,OTHER,i,h} \bullet R_i) \bullet (1 - f_{PRJ,BRANCH,i,h}) \bullet (1 - f_{PRJ,BUCKINGLOSS,i,h})] \bullet \bullet CF$ **(48** where:

Methodology Section #	Equation #	Screenshot
		$C_{PRJ,TIMBER,h}$= carbon contained in timber harvested in period *h* (summed for all harvested polygons, *i*); t C $LBL_{PRJ,FELLINGS,i,h}$ = annual removal of live tree biomass due to commercial felling in polygon, *i*; t d.m. (equation 36) $LBL_{PRJ,OTHER,i,h}$ = annual removal of live tree biomass from incidental sources in polygon, *i*; t d.m. (equation 37) R_i is the root:shoot ratio in polygon, *i* (see equation 33b). 1 - $f_{PRJ,BRANCH,i,h}$ the proportion of live tree biomass remaining after netting out branch biomass, in polygon *i* (unitless; $0 \leq f_{BRANCH,i,t} \leq 1$)(see equation 12) 1 - $f_{PRJ,BUCKINGLOSS,i,h}$ = the proportion of the log bole remaining after in-woods log processing/bucking for quality, length, etc., in polygon, *i* (unitless; $0 \leq f_{BUCKINGLOSS,i,t} \leq 1$) (equation 40) h = harvest period ; yr
8.2.10	49	$C_{PRJ,MILL,h,k} = (C_{PRJ,TIMBER,h,k} \bullet f_{RND,k} \bullet r_{RND,k})$ **(49)** where: $C_{PRJ,MILL,h,k}$ = carbon contained in harvested timber after milling in period h, for product type *k*; t C $C_{PRJ,TIMBER,h,k}$ = carbon contained in timber harvested in period h, for product type *k*; t C k = wood product type – (softwood saw log, softwood pulpwood, hardwood saw log, or hardwood pulpwood; proportions determined from Table 1.4 of 1605(b) document) $f_{RND,k}$ = fraction of growing stock volume removed as roundwood for product type *k* (default values by region i Table 1.5 of the 1605(b) document); dimensionless $r_{RND,k}$ = ratio of industrial roundwood to growing stock volume removed as roundwood for product type *k* (defa values by region in Table 1.5 of the 1605(b) document); dimensionless
8.2.10	50a	To determine the proportion of harvested wood products (by type) that fall into each category, refer to the "In Us column for the selected forest region in Table 1.6 in the 1605(b) document. Table 3 provides recommendations analogs for areas within North America but outside of the conterminous US; the project proponent must justify th appropriateness of the selected analog .Three values are then calculated from these data selected from Table 1 in the 1605(b) document, for each product type, *k* : the short-lived fraction ($P_{PRJ,SLF,k}$), medium-lived fraction ($P_{PRJ,MLF,k}$), and long-lived fraction ($P_{PRJ,LLF,k}$): $P_{PRJ,SLF,k} = 1-P_{3\text{-year}}$ **(50a)**
8.2.10	50b	$P_{PRJ,LLF,k} = P_{100\text{-year}}$ **(50b)**
8.2.10	50c	$P_{PRJ,MLF,k} = P_{3\text{-year}} - P_{100\text{-year}}$, **(50c)** Each category of wood products (*k*) stores carbon according to the following rules: iv. Short-lived wood products – immediate emission of all carbon upon harvest v. Medium-lived wood products – no emission of carbon upon harvest, but carbon stored will decrea by 1/20th for the next 20 years after harvest, such that after 20 years the term becomes zero vi. Long-lived wood products – no loss of carbon.
8.2.10	51	$C_{PRJ,STORHWP,t,} = \Sigma\,\Sigma\,((C_{PRJ,MILL,h,k} \bullet P_{LLF,k}) + [(C_{PRJ,MILL,h,k} \bullet P_{MLF,k}) \bullet ((20\text{-h}) / 20)])$ **(51)** where: $C_{PRJ,STORHWP,t,}$ = carbon stored in harvested wood products in year *t* summed for all product types *k* and then o all harvest periods *h*; t C k = wood product type – (softwood saw log, softwood pulpwood, hardwood saw log, or hardwood pulpwood; proportions determined from Table 1.4 of 1605(b) document) h = year of harvest (the term (20-h) should not be allowed to drop below 0)

Methodology Section #	Equation #	Screenshot
8.2.11	52	The annual change in fossil fuel emissions from harvesting and processing of the various wood products ($\Delta C_{PRJ,EMITFOSSIL,t}$) are calculated as: $\Delta C_{PRJ,EMITFOSSIL,t} = C_{PRJ,EMITHARVEST,t} + C_{PRJ,EMITMANUFACTURE,t} + C_{PRJ,EMITTRANSPORT,t}$ **(52)** Where $C_{PRJ,EMITHARVEST,t}$ = the annual fossil fuel emissions associated with harvesting of raw material (t C yr^{-1}) $C_{PRJ,EMITMANUFACTURE,t}$ = the annual fossil fuel emissions associated with the manufacturing of raw material (t C yr^{-1} $C_{PRJ,EMITTRANSPORT,t}$ = the annual fossil fuel emissions associated with the transport of raw material (t C yr^{-1})
8.2.11	53	The simplest approach to calculating $C_{PRJ,EMITFOSSIL,t}$ is to use published or derived carbon emission intensity factors. In the case of harvesting, $_{PRJ,}C_{EMITHARVEST,t}$; t C yr^{-1}), can be calculated as: $C_{PRJ,EMITHARVEST,t} = \Sigma[(LBL_{PRJ,FELLINGS,i,t} - LBL_{PRJ,FELLINGS,i,t} \bullet R_i + LBL_{PRJ,OTHER,i,t} - LBL_{PRJ,OTHER,i,t} \bullet R_i) \bullet (1 - f_{PRJ,BRANCH,i,t}) \bullet (1 - f_{PRJ,BUCKINGLOSS,i,t})] \bullet CF \bullet c_{HARVEST}$ **(53)** where: $c_{HARVEST}$ = carbon emission intensity factor (t C emitted/t C raw material) associated with harvesting (see Table for default values); all other terms are as defined in equation 19.
8.2.11	54	$C_{PRJ,EMITTRANSPORT,t}$ must be calculated after consideration of the transport distance from harvest to processing facility, and the means of transportation. This term can be calculated as follows (after (Heath, et al., 2010)): $C_{PRJ,EMITTRANSPORT,t} = \Sigma[(LBL_{PRJ,FELLINGS,i,t} - LBL_{PRJ,FELLINGS,i,t} \bullet R_i + LBL_{PRJ,OTHER,i,t} - LBL_{PRJ,OTHER,i,t} \bullet R_i) \bullet (1 - f_{PRJ,BRANCH,i,t}) \bullet (1 - f_{PRJ,BUCKINGLOSS,i,t})] \bullet CF \bullet \Sigma(f_{PRJ,TRANSPORTk} \bullet d_{TRANSPORTk} \bullet c_{TRANSPORTk})$ **(54)** where: $f_{PRJ,TRANSPORTk}$ = the fraction of raw material transported by transportation type, *k*. (unitless; $0 \leq f_{PRJ,TRANSPORTk} <$ $d_{TRANSPORTk}$ = the distance transported by transportation type, *k*. (km); $c_{TRANSPORTk}$ = the carbon emission intensity factor (kg C emitted/t C raw material) associated with transportation type, *k* (see Table 4 for default values); all other terms are as defined in equation 48.
8.2.11	55	$C_{PRJ,EMITMANUFACTURE,t} = \Sigma[(LBL_{PRJ,FELLINGS,i,t} - LBL_{PRJ,FELLINGS,i,t} \bullet R_i + LBL_{PRJ,OTHER,i,t} - LBL_{PRJ,OTHER,i,t} \bullet R_i) \bullet (1 - f_{PRJ,BRANCH,i,t}) \bullet (1 - f_{PRJ,BUCKINGLOSS,i,t})] \bullet \Sigma(f_{PRJ,PRODUCTk} \bullet c_{MANUFACTUREk}) \bullet CF$ **(5** $c_{MANUFACTUREk}$ = the carbon emission intensity factor (t C emitted/t C raw material) associated with manufacture product type, k; all other terms are as defined in equation 48.
8.3.3	56a	For project proponents using Market Leakage Option 1: **The outcome of the VCS Leakage Discount Factor determination = the value for MLF_y (56a**
8.3.3	56b	To calculate the project market leakage (LE_Y, t CO2e yr^{-1}): $LE_Y = MLF_y \bullet ER_{y,GROSS}$ **(56b)** Where, MLF_y = Market leakage factor, as calculated above. $ER_{y,GROSS}$ = the gross difference in the overall annual carbon change between the baseline and project scenari in year 'y' (in tonnes CO_2e yr^{-1}). This term is calculated in equation 57.

Methodology Section #	Equation #	Screenshot
8.3.4	56c.1	$\mathbf{BC_{hv,\,n} = \Sigma[(LBL_{BSL,FELLINGS,i,t} - LBL_{BSL,FELLINGS,i,t} \bullet R_i + LBL_{BSL,OTHER,i,t} - LBL_{BSL,Other,i,t} \bullet R_i) \bullet (1 - f_{BSL,BRANCH,i,t}) \bullet (1 - f_{BSL,BUCKINGLOSS,i,t})] \bullet CF \bullet 44/12}$ **(56c.1)** As calculated using the *baseline scenario data*, and where: $LBL_{BSL,FELLINGS,i,t}$ = annual removal of live tree biomass due to commercial felling in polygon, *i*; t d.m. yr^{-1} (equati 6) $LBL_{BSL,OTHER,i,t}$ = annual removal of live tree biomass from incidental sources in polygon, *i*; t d.m. yr^{-1} (equation 6 $1 - f_{BSL,BRANCH,i,t}$ = the proportion of aboveground live tree biomass remaining after netting out branch biomass, i polygon *i* (unitless; $0 \leq f_{BRANCH,i,t} \leq 1$)(see equation 12) $1 - f_{BSL,BUCKINGLOSS,i,t}$ = the proportion of the log bole remaining after processing for quality, in polygon, *i* (unitless $\leq f_{BUCKINGLOSS,i,t} \leq 1$) (equation 12) R_i = the root:shoot ratio in polygon, *i* CF = carbon fraction of dry matter (IPCC default value = 0.5).
8.3.4	56c.2	$\mathbf{AC_{hv,\,n} = \Sigma[(LBL_{PRJ,FELLINGS,i,t} - LBL_{PRJ,FELLINGS,i,t} \bullet R_i + LBL_{PRJ,OTHER,i,t} - LBL_{PRJ,Other,i,t} \bullet R_i) \bullet (1 - f_{PRJ,BRANCH,i,t}) \bullet (1 - f_{PRJ,BUCKINGLOSS,i,t})] \bullet CF \bullet 44/12}$ **(56c.2)** As calculated using the *project scenario data*, and where: $LBL_{PRJ,FELLINGS,i,t}$ = annual removal of live tree biomass due to restoration felling in polygon, *i*; t d.m. yr^{-1} (equatio 6) $LBL_{PRJ,OTHER,i,t}$ = annual removal of live tree biomass from incidental sources in polygon, *i*; t d.m. yr^{-1} (equation 6 $1 - f_{PRJ,BRANCH,i,t}$ = the proportion of aboveground live tree biomass remaining after netting out branch biomass, i polygon *i* (unitless; $0 \leq f_{BRANCH,i,t} \leq 1$)(see equation 12) $1 - f_{PRJ,BUCKINGLOSS,i,t}$ = the proportion of the log bole remaining after processing for quality, in polygon, *i* (unitless $\leq f_{BUCKINGLOSS,i,t} \leq 1$) (equation 12) CF = carbon fraction of dry matter (IPCC default value = 0.5).
8.3.4	56c.3	$\mathbf{SE_y = LE_y}$ **(56c.3)** where: SE_y = Secondary Effects in year 'y' (tCO_2e) calculated using equations in Figure 1 and equations 56c.1, 56c.2 a 56c.3. LE_Y = Leakage in year y (in tonnes CO_2e yr^{-1}) – used in equation 58.
8.3.5	56d	For project proponents utilizing Leakage Option 3, project market leakage (LE_Y; t CO_2e yr^{-1}) is calculated as: $\mathbf{LE_Y = MLF_y \bullet ER_{y,GROSS}}$ **(56d)** Where, MLF_y = the market leakage factor in year, *y* (as calculate per section 8.3.5) $ER_{y,GROSS}$ = the gross difference in the overall carbon balance between the baseline and project scenarios in yea *y* (t CO_2e yr^{-1}). See equation 57 for its calculation.

Methodology Section #	Equation #	Screenshot
8.5	57	*Gross* carbon emissions reductions (ER_y,gross; t CO_2e yr^{-1}) created by the carbon project are calculated annua as the difference between the baseline and project scenario net emission reductions/emissions: $$ER_{y,GROSS} = (\Delta C_{BSL,t} - \Delta C_{PRJ,t}) \bullet 44/12 \quad (57)$$ Where, $\Delta C_{BSL,t}$ = total net baseline scenario emissions calculated from equation 1 (t C yr^{-1}). $\Delta C_{PRJ,t}$ = total net project scenario emissions calculated from equation 29 (t C yr^{-1}). 44/12 = factor to convert C to CO_2e
8.5.1	58	The annual *net* carbon emissions reductions is the actual net GHG removals by sinks from the project scenario minus the net GHG removals by sinks from the baseline scenario, were then calculated by applying the leakage and uncertainty discount factors (but not the VCS permanence buffer), on an annualized basis: $$ER_y = ER_{y,GROSS} - LE_y \quad (58)$$ where: ER_y = the net GHG emissions reductions and/or removals in year *y* (the overall annual carbon change between th baseline and project scenarios, net all discount factors except the permanence buffer) (t CO_2e yr^{-1}). $ER_{y,GROSS}$ = the difference in the overall annual carbon change between the baseline and project scenarios (t CO_2 yr^{-1}). LE_y = Leakage in year y (t CO_2e yr^{-1}), as calculated in equation 56b.
8.5.2	59	The number of VCU's the project available for issuance and sale in year, *y* (VCU_y; t CO_2e yr^{-1}), is calculated $$VCU_y = ER_y \bullet (1 - ER_{y,ERR}) - BR_y \quad (59)$$ where: ER_y = the net GHG emissions reductions and/or removals in year (t CO_2e yr^{-1}), as calculated in equation 58. $ER_{y,ERR}$ = the uncertainty factor for year, y, (calculated in Section 8.5.3), expressed as a proportion. BR_y = estimated VCU-equivalent tCO_2e issued to the VCS Buffer Pool in year, *y*, calculated using the latest version of the VCS AFOLU Non-Permanence Risk Tool. BRy is calculated by multiplying the most current verifie permanence risk Buffer Withholding Percentage for the project by the change in carbon stocks (difference betwe baseline and project scenario) for the project area as per the latest approved VCS AFOLU Requirements (Voluntary Carbon Standard, 2008a).
8.5.3	60a	$$E_M = 100 \bullet (\sum y_{d,h,i} / \sum(A_{PRJ,h} \bullet y_{m,h,i})) \quad (6$$ where: The summation is across all plot observations, *i*, and across all analysis units , *h*;
8.5.3	60b	$$y_{d,h,i} = A_{PRJ,h} \bullet (y_{m,h,i} - y_{p,h,i}) \quad (60b)$$ E_M = Mean model error for the project (%) $y_{d,h,i}$ = the area-weighted difference between measured and predicted carbon storage in analysis unit, *h*, plo observation, *i* (t C) $y_{m,h,i}$ = carbon storage measured in analysis unit, *h*, plot observation, *i* (t C ha^{-1}) $y_{p,h,i}$ = carbon storage predicted by model for analysis unit , *h*, plot observation, *i* (t C ha^{-1}) $A_{PRJ,h}$ = area of project analysis unit, *h* (ha)

Methodology Section #	Equation #	Screenshot
8.5.3	60c	$E_I = 100 \cdot [SE * 1.654 / ((1/N) \cdot \sum(A_{PRJ,h} \cdot y_{m,h,i}))]$ **(60c)** Where, E_I = Inventory error for the project (%) SE = the project level standard error of the area weighted differences between measured plot observation a predicted values of carbon storage. N = total number of plot observations in all analysis units or polygons[37] 1.654 = the 90% confidence interval *t*-value All other terms as defined in equation 60a.
8.5.3	60d	$SE = S / \sqrt{N}$ **(60d)** Where, N = total number of plot observations in all analysis units or polygons (see Footnote 37) S = the standard deviation of the area weighted differences between measured and predicted values of carb storage across all analysis unit or polygons.
8.5.3	60e	$S = \sqrt{[(1/N-1) \cdot \sum(y_{d,h,i} - \bar{y}bar_d)^2]}$ **(60e)** Where, $\bar{y}bar_d$ = the project-level mean of the area weighted differences between measured plot observation and predicte values of carbon storage. See equation 60b for the calculation of $y_{d,h,i}$ All other terms as defined in equation 60b and 60c.
8.5.3	60f	$E_P = E_M + E_I$ **(60f)**
9.3.5	61a	Each piece of dead wood will be assigned to one of three density classes, sound (1), intermediate (2), and rotte (3) (details below). The volume per unit area is calculated for each density class, *c*, as: $V_{LDW,c} = \pi^2 * [(d_1^2 + d_2^2 \dots d_n^2)/8L]$ **(60a)** where: d_1, d_2, d_n = diameter (cm) of each of *n* pieces intersecting the line, and L = the length of the line (100 m default (Harmon, et al., 1986).
9.3.5	61b	The mass of LDW in density class, *c* (t ha^{-1}), is: $M_{LDW,c} = V_{LDW,c} * D_{LDW,c}$ **(6** where: $V_{LDW,c}$ = the volume per unit area calculated for each density class, *c*, as calculated in 60a. $D_{LDW,c}$ = the density of LDW in density class, *c* (t d.m. m^{-3})
9.3.5	61c	The total mass of LDW in each plot summed over all density classes (t ha^{-1}) is: $DOM_{LDW} = \sum M_{LDW,c}$ **(6** where: $M_{LDW,c}$ = the mass of LDW in density class, *c* (t ha^{-1}), is as calculated in 60b.

APPENDIX 8 – SCOPE 3 EMISSIONS NOTIFICATIONS

Supply Chain Scope 3 Emissions email sent to Silvador clients dated 2023-03-14:

Silvador Climate Action

VC Vlad Chitulescu <v.chitulescu@silvador.ro>

To timberrealwood@yahoo.com; Murat HACİBEKTASOGLU; Radulescu Dragos Mihut; razvan.popovici@kastamonu.ro; apromar.forest@yahoo.com; asvady@yahoo.com

Cc Jason Zimmermann; Zoie Richards; Mihai Panturu; Marcel Bercaru

Reply | Reply All | Forward

Tue 2023-03-14 6:05 AM

Dear valued Customer/ Log buyer,

Recently Silvador Company SRL and Forest Capital SRL have partnered on a new business venture and are developing a forest carbon project to help achieve climate greenhouse gas emission reductions and removals through the globally recognized VERRA Verified Carbon Standard (VCS).

This will be accomplished through the reduction of regular timber cuttings on approximately 1,500 ha of our private lands in the Buzau and Dambovita counties. Low levels of forest operational activities will still take place for forest health and risk mitigation measures.

As a log supplier for various business supply chains, we would like to inform you that we are claiming the 'transportation emissions' for logs removed from our forest fund properties in the carbon project, to our customers mill and manufacturing sites. These are known as 'Scope 3 Emissions' and the purpose of this disclosure is to avoid the risk of double-counting emissions along the supply chain.

For more information, please contact Vlad Chitulescu at v.chitulescu@silvador.ro or visit our website www.silvador.ro

If you would like more information regarding VERRA or on Scope 3 Emissions, please use the links below:

VERRA
https://verra.org/about/overview/

Greenhouse Gas Protocol Scope 3
https://ghgprotocol.org/sites/default/files/standards_supporting/FAQ.pdf

Vlad Chitulescu
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APPENDIX 9 – PROJECT AREA POLYGONS

Forest Plan	Ownership.	Latitude	Longitude	GIS_ID
Barbu39	Silvador	45.2375	26.6699	Barbu39119
Barbu39	Silvador	45.2381	26.6775	Barbu39122
Barbu39	Silvador	45.2343	26.6257	Barbu39184D
Barbu39	Silvador	45.2343	26.6220	Barbu39184A
Barbu39	Silvador	45.2344	26.6235	Barbu39184B
Barbu39	Silvador	45.1845	26.6672	Barbu39114A
Barbu39	Silvador	45.1829	26.6661	Barbu39114C
Barbu39	Silvador	45.1824	26.6681	Barbu39114B
BarbuV	Forest Capital	45.1991	26.6479	BarbuV19B
BarbuV	Forest Capital	45.2103	26.6739	BarbuV3D
BarbuV	Forest Capital	45.2002	26.6447	BarbuV19E
BarbuV	Forest Capital	45.2005	26.6453	BarbuV19A
BarbuV	Forest Capital	45.2004	26.6497	BarbuV19F
BarbuV	Forest Capital	45.2019	26.6481	BarbuV20B
BarbuV	Forest Capital	45.2132	26.6739	BarbuV25A
BarbuV	Forest Capital	45.2050	26.6580	BarbuV22G
BarbuV	Forest Capital	45.2037	26.6533	BarbuV22E
BarbuV	Forest Capital	45.2063	26.6616	BarbuV23A
BarbuV	Forest Capital	45.2079	26.6631	BarbuV23D
BarbuV	Forest Capital	45.1995	26.6733	BarbuV6D
BarbuV	Forest Capital	45.2003	26.6672	BarbuV6B
BarbuV	Forest Capital	45.2037	26.6588	BarbuV9E
BarbuV	Forest Capital	45.2034	26.6477	BarbuV20A
BarbuV	Forest Capital	45.2054	26.6641	BarbuV7C
BarbuV	Forest Capital	45.2091	26.6736	BarbuV3G
BarbuV	Forest Capital	45.2073	26.6791	BarbuV3B
BarbuV	Forest Capital	45.2093	26.6711	BarbuV4D
BarbuV	Forest Capital	45.2098	26.6835	BarbuV1B
BarbuV	Forest Capital	45.2115	26.6729	BarbuV24E
BarbuV	Forest Capital	45.2125	26.6845	BarbuV1F
BarbuV	Forest Capital	45.2123	26.6587	BarbuV26A
BarbuV	Forest Capital	45.2131	26.6515	BarbuV28
BarbuV	Forest Capital	45.2150	26.6843	BarbuV1G
BarbuV	Forest Capital	45.1998	26.6458	BarbuV19D
BarbuV	Forest Capital	45.2075	26.6667	BarbuV24H
BarbuV	Forest Capital	45.2137	26.6830	BarbuV1C

Forest Plan	Ownership.	Latitude	Longitude	GIS_ID
BarbuV	Forest Capital	45.1985	26.6583	BarbuV10B
BarbuV	Forest Capital	45.2008	26.6483	BarbuV19C
BarbuV	Forest Capital	45.2040	26.6648	BarbuV7B
BarbuV	Forest Capital	45.2096	26.6649	BarbuV24G
BarbuV	Forest Capital	45.2111	26.6551	BarbuV27B
BarbuV	Forest Capital	45.2108	26.6837	BarbuV1D
BarbuV	Forest Capital	45.2093	26.6763	BarbuV3A
BarbuV	Forest Capital	45.2077	26.6607	BarbuV23C
BarbuV	Forest Capital	45.2121	26.6797	BarbuV1E
BarbuV	Forest Capital	45.2124	26.6742	BarbuV24B
BarbuV	Forest Capital	45.2011	26.6571	BarbuV10A
BarbuV	Forest Capital	45.2067	26.6737	BarbuV4A
BarbuV	Forest Capital	45.2098	26.6801	BarbuV2
BarbuV	Forest Capital	45.2100	26.6681	BarbuV24D
BarbuV	Forest Capital	45.2118	26.6648	BarbuV25B
BarbuV	Forest Capital	45.2128	26.6549	BarbuV27C
BarbuV	Forest Capital	45.2026	26.6684	BarbuV6A
BarbuV	Forest Capital	45.2042	26.6489	BarbuV20C
BarbuV	Forest Capital	45.2053	26.6533	BarbuV22A
BarbuV	Forest Capital	45.2047	26.6509	BarbuV21
BarbuV	Forest Capital	45.2041	26.6576	BarbuV22D
BarbuV	Forest Capital	45.2036	26.6558	BarbuV22C
BarbuV	Forest Capital	45.2061	26.6564	BarbuV22F
BarbuV	Forest Capital	45.2093	26.6524	BarbuV27A
BarbuV	Forest Capital	45.2098	26.6562	BarbuV26B
BarbuV	Forest Capital	45.2098	26.6533	BarbuV27D
BarbuV	Forest Capital	45.2108	26.6617	BarbuV25D
BarbuV	Forest Capital	45.2104	26.6595	BarbuV25C
BarbuV	Forest Capital	45.2066	26.6620	BarbuV23B
BarbuV	Forest Capital	45.2055	26.6598	BarbuV22B
BarbuV	Forest Capital	45.2043	26.6603	BarbuV8C
BarbuV	Forest Capital	45.2026	26.6582	BarbuV9D
BarbuV	Forest Capital	45.1989	26.6616	BarbuV9A
BarbuV	Forest Capital	45.2070	26.6637	BarbuV24A
BarbuV	Forest Capital	45.2013	26.6627	BarbuV8B
BarbuV	Forest Capital	45.2013	26.6648	BarbuV7A
BarbuV	Forest Capital	45.2034	26.6720	BarbuV5A
BarbuV	Forest Capital	45.2000	26.6723	BarbuV6H
BarbuV	Forest Capital	45.1989	26.6699	BarbuV6F
BarbuV	Forest Capital	45.2003	26.6707	BarbuV6C
BarbuV	Forest Capital	45.1982	26.6677	BarbuV7D

Forest Plan	Ownership.	Latitude	Longitude	GIS_ID
BarbuV	Forest Capital	45.1973	26.6664	BarbuV8A
BarbuV	Forest Capital	45.2080	26.6662	BarbuV24C
BarbuV	Forest Capital	45.2065	26.6667	BarbuV6G
BarbuV	Forest Capital	45.2114	26.6749	BarbuV3E
BarbuV	Forest Capital	45.2094	26.6704	BarbuV4E
BarbuV	Forest Capital	45.2073	26.6681	BarbuV5B
BarbuV	Forest Capital	45.2129	26.6757	BarbuV24F
BarbuV	Forest Capital	45.2118	26.6821	BarbuV1A
BarbuV	Forest Capital	45.2062	26.6778	BarbuV3C
BarbuV	Forest Capital	45.2047	26.6764	BarbuV4B
BarbuV	Forest Capital	45.2045	26.6736	BarbuV4C
BarbuV	Forest Capital	45.2115	26.6754	BarbuV3F
Const	Forest Capital	45.1709	26.5349	Const110D
Const	Forest Capital	45.1641	26.5504	Const107C
Const	Forest Capital	45.1720	26.5428	Const108E
Const	Forest Capital	45.1719	26.5395	Const109A
Const	Forest Capital	45.1676	26.5455	Const108J
Const	Forest Capital	45.1751	26.5423	Const108K
Const	Forest Capital	45.1721	26.5439	Const108F
Const	Forest Capital	45.1700	26.5498	Const107E
Const	Forest Capital	45.1702	26.5468	Const108D
Const	Forest Capital	45.1676	26.5412	Const110C
Const	Forest Capital	45.1696	26.5357	Const110B
Const	Forest Capital	45.1684	26.5424	Const109B
Const	Forest Capital	45.1709	26.5376	Const110A
Const	Forest Capital	45.1725	26.5454	Const108M
Const	Forest Capital	45.1725	26.5471	Const108L
Const	Forest Capital	45.1730	26.5468	Const108B
Const	Forest Capital	45.1739	26.5463	Const108A
Const	Forest Capital	45.1710	26.5544	Const107A
Const	Forest Capital	45.1699	26.5542	Const107G
Const	Forest Capital	45.1678	26.5523	Const107B
Const	Forest Capital	45.1670	26.5557	Const107D
Const	Forest Capital	45.1685	26.5545	Const107F
Const	Forest Capital	45.1617	26.5513	Const106A
Const	Forest Capital	45.1762	26.5435	Const108C
Const	Forest Capital	45.1755	26.5409	Const108H
Const	Forest Capital	45.1759	26.5413	Const108G
Const	Forest Capital	45.1733	26.5450	Const108I
Corna	Forest Capital	44.8289	25.7229	Corna10
Corna	Forest Capital	44.8521	25.7268	Corna8A

Forest Plan	Ownership.	Latitude	Longitude	GIS_ID
Corna	Forest Capital	44.8273	25.6800	Corna7G
Corna	Forest Capital	44.8555	25.7317	Corna9A
Corna	Forest Capital	44.8494	25.7260	Corna8D
Corna	Forest Capital	44.8513	25.7227	Corna8B
Corna	Forest Capital	44.8264	25.6745	Corna7A
Corna	Forest Capital	44.8272	25.6788	Corna7E
Corna	Forest Capital	44.8264	25.6803	Corna7F
Corna	Forest Capital	44.8261	25.6772	Corna7C
Corna	Forest Capital	44.8255	25.6802	Corna7B
Corna	Forest Capital	44.8249	25.6813	Corna7D
Corna	Forest Capital	44.7167	25.6156	Corna2B
Corna	Forest Capital	44.7122	25.6179	Corna1B
Corna	Forest Capital	44.7131	25.6173	Corna1C
Corna	Forest Capital	44.7190	25.6210	Corna3B
Corna	Forest Capital	44.7174	25.6217	Corna3A
Corna	Forest Capital	44.7181	25.6190	Corna2F
Corna	Forest Capital	44.7139	25.6201	Corna1A
Corna	Forest Capital	44.7166	25.6197	Corna2D
Corna	Forest Capital	44.7168	25.6172	Corna2C
Corna	Forest Capital	44.7160	25.6180	Corna2E
Hodoba	Forest Capital	45.2608	26.6494	Hodoba136B
Hodoba	Forest Capital	45.2649	26.6657	Hodoba139
Hodoba	Forest Capital	45.2678	26.6717	Hodoba140A
Hodoba	Forest Capital	45.2643	26.6593	Hodoba138A
Hodoba	Forest Capital	45.2607	26.6622	Hodoba135B
Hodoba	Forest Capital	45.2631	26.6538	Hodoba137A
Hodoba	Forest Capital	45.2675	26.6753	Hodoba140C
Manesti	Forest Capital	44.6490	25.9317	Manesti65B
Manesti	Forest Capital	44.6462	25.9319	Manesti64
Manesti	Forest Capital	44.6492	25.9321	Manesti65C
Manesti	Forest Capital	44.9401	25.2812	Manesti38A
Manesti	Forest Capital	44.9480	25.2662	Manesti41D
Manesti	Forest Capital	44.9480	25.2675	Manesti41F
Manesti	Forest Capital	44.9454	25.2680	Manesti40D
Manesti	Forest Capital	44.9393	25.2795	Manesti38B
Manesti	Forest Capital	44.9411	25.2792	Manesti39D
Manesti	Forest Capital	44.9376	25.2774	Manesti38D
Manesti	Forest Capital	44.9405	25.2711	Manesti39G
Manesti	Forest Capital	44.9409	25.2743	Manesti39A
Manesti	Forest Capital	44.9376	25.2816	Manesti38C
Manesti	Forest Capital	44.9401	25.2749	Manesti39B

Forest Plan	Ownership.	Latitude	Longitude	GIS_ID
Manesti	Forest	44.9423	25.2757	Manesti39E
Manesti	Capital Forest	44.9426	25.2715	Manesti39F
Manesti	Capital	44.9439	25.2745	Manesti39C
Manesti	Forest	44.9466	25.2735	Manesti40A
Manesti	Capital	44.9504	25.2671	Manesti41B
Manesti	Forest Capital	44.9506	25.2686	Manesti41A
Manesti	Forest	44.9516	25.2646	Manesti41C
Manesti	Capital	44.9436	25.2699	Manesti40C
Manesti	Forest	44.9446	25.2720	Manesti40E
Manesti	Capital Forest	44.9529	25.2653	Manesti41E
Manesti	Capital	44.9385	25.2776	Manesti38E
Manesti	Forest	44.9461	25.2717	Manesti40B
Manesti	Capital Forest	44.9231	25.3098	Manesti129A
Manesti	Capital	44.9243	25.3075	Manesti129D
Manesti	Forest	44.9245	25.3088	Manesti129C
Manesti	Capital	44.9249	25.3098	Manesti129B
Manesti	Forest Capital	44.9289	25.3032	Manesti131
Manesti	Forest	44.9262	25.3105	Manesti128B
Manesti	Capital	44.9305	25.2983	Manesti130B
Manesti	Silvador	44.9317	25.2950	Manesti130C
Manesti	Silvador	44.9298	25.2953	Manesti127C
Manesti	Silvador	44.9314	25.2932	Manesti127D
Manesti	Silvador	44.9269	25.3069	Manesti128A
Manesti	Silvador	44.9287	25.2996	Manesti127A
Manesti	Silvador	44.9277	25.3007	Manesti127B
Manesti	Silvador	44.9298	25.2984	Manesti130A
Manesti	Silvador	44.6484	25.9313	Manesti65A
Popescu	Silvador	45.1880	26.5360	Popescu84A
Popescu	Silvador	45.1785	26.4998	Popescu40A
Popescu	Silvador	45.1597	26.5214	Popescu98
Popescu	Silvador	45.1494	26.5349	Popescu100B
Popescu	Silvador	45.1857	26.5371	Popescu84D
Popescu	Silvador	45.1892	26.5370	Popescu84C
Popescu	Silvador	45.1902	26.5355	Popescu84B
Popescu	Silvador	45.1758	26.5083	Popescu39C
Popescu	Silvador	45.1727	26.4975	Popescu36C
Popescu	Silvador	45.1758	26.4949	Popescu40E
Popescu	Silvador	45.1766	26.5009	Popescu40B
Popescu	Silvador	45.1759	26.5018	Popescu39B
Popescu	Silvador	45.1768	26.5087	Popescu39A
Popescu	Silvador	45.1749	26.5078	Popescu38C

Forest Plan	Ownership.	Latitude	Longitude	GIS_ID
Popescu	Silvador	45.1780	26.4960	Popescu40D
Popescu	Silvador	45.1685	26.5023	Popescu36A
Popescu	Silvador	45.1529	26.5310	Popescu99A
Popescu	Silvador	45.1531	26.5272	Popescu99B
Popescu	Silvador	45.1512	26.5371	Popescu100A
Popescu	Silvador	45.1706	26.5008	Popescu36B
Popescu	Silvador	45.1759	26.4981	Popescu40C
Popescu	Silvador	45.1743	26.5054	Popescu38B
Popescu	Silvador	45.1735	26.5054	Popescu38A
Valea Tisei	Silvador	45.0496	25.4831	ValeaTisei27B
Valea Tisei	Silvador	45.0519	25.4865	ValeaTisei27A
Valea Tisei	Silvador	45.0444	25.4890	ValeaTisei21
Valea Tisei	Silvador	45.0511	25.4672	ValeaTisei6C
Valea Tisei	Silvador	45.0488	25.4607	ValeaTisei5C
Valea Tisei	Silvador	45.0389	25.4528	ValeaTisei2C
Valea Tisei	Silvador	45.0487	25.5021	ValeaTisei17A
Valea Tisei	Silvador	45.0416	25.5205	ValeaTisei14A
Valea Tisei	Silvador	45.0507	25.5146	ValeaTisei16D
Valea Tisei	Silvador	45.0491	25.5182	ValeaTisei15B
Valea Tisei	Silvador	45.0469	25.5066	ValeaTisei17B
Valea Tisei	Silvador	45.0490	25.4963	ValeaTisei19A
Valea Tisei	Silvador	45.0491	25.4883	ValeaTisei26A
Valea Tisei	Silvador	45.0441	25.4865	ValeaTisei23
Valea Tisei	Silvador	45.0502	25.4722	ValeaTisei30
Valea Tisei	Silvador	45.0517	25.4456	ValeaTisei1C
Valea Tisei	Silvador	45.0518	25.5062	ValeaTisei18A
Valea Tisei	Silvador	45.0478	25.4678	ValeaTisei6A
Valea Tisei	Silvador	45.0511	25.4700	ValeaTisei6B
Valea Tisei	Silvador	45.0544	25.4702	ValeaTisei7B
Valea Tisei	Silvador	45.0485	25.4759	ValeaTisei29
Valea Tisei	Silvador	45.0491	25.4798	ValeaTisei28
Valea Tisei	Silvador	45.0510	25.4895	ValeaTisei26B
Valea Tisei	Silvador	45.0527	25.4906	ValeaTisei26C
Valea Tisei	Silvador	45.0478	25.4915	ValeaTisei20
Valea Tisei	Silvador	45.0508	25.4951	ValeaTisei19B
Valea Tisei	Silvador	45.0506	25.5039	ValeaTisei18B
Valea Tisei	Silvador	45.0479	25.5136	ValeaTisei16A
Valea Tisei	Silvador	45.0403	25.5220	ValeaTisei14B
Valea Tisei	Silvador	45.0414	25.5227	ValeaTisei13D
Valea Tisei	Silvador	45.0510	25.4424	ValeaTisea1B