



Verified Carbon Standard

CHESTNUT CARBON CONSERVATION PROJECT



chestnut



Forest Carbon Works

Document Prepared by Forest Carbon Works, a Public Benefit Corporation

Project Title	Chestnut Carbon Conservation Project
Version	1.9
Date of Issue	28 November 2023
Prepared By	Forest Carbon Works, Public Benefit Corporation (PBC)
Contact	Forest Carbon Works, PBC 807 Broadway St. NE, Suite 280 Minneapolis, Minnesota 55413, United States of America 1 (800) 399- 5246 info@forestcarbonworks.com forestcarbonworks.org

CONTENTS

1	PROJECT DETAILS.....	5
1.1	Summary Description of the Project	5
1.2	Sectoral Scope and Project Type	6
1.3	Project Eligibility	6
1.4	Project Design	7
1.4.1	Eligibility Criteria	8
1.5	Project Proponent	21
1.6	Other Entities Involved in the Project	21
1.7	Ownership.....	22
1.8	Project Start Date	22
1.9	Project Crediting Period	22
1.10	Project Scale and Estimated GHG Emission Reductions or Removals	22
1.11	Description of the Project Activity.....	24
1.12	Project Location	25
1.13	Conditions Prior to Project Initiation	26
1.14	Compliance with Laws, Statutes and Other Regulatory Frameworks.....	27
1.15	Participation under Other GHG Programs	28
1.15.1	Projects Registered (or seeking registration) under Other GHG Program(s).....	28
1.15.2	Projects Rejected by Other GHG Programs	28
1.16	Other Forms of Credit.....	28
1.16.1	Emissions Trading Programs and Other Binding Limits.....	28
1.16.2	Other Forms of Environmental Credit.....	28
1.16.3	Supply Chain (Scope 3) Emissions.....	28
1.17	Sustainable Development Contributions	29
1.17.1	Sustainable Development Contributions Activity Description.....	29
1.17.2	Sustainable Development Contributions Activity Monitoring.....	29
1.18	Additional Information Relevant to the Project	31
1	Leakage Management.....	31
2	Commercially Sensitive Information.....	31
2	SAFEGUARDS	31

2.1	No Net Harm	31
2.2	Local Stakeholder Consultation	32
2.3	Environmental Impact	34
2.4	Public Comments	36
2.5	AFOLU-Specific Safeguards	36
3	APPLICATION OF METHODOLOGY.....	37
3.1	Title and Reference of Methodology	37
3.2	Applicability of Methodology	38
3.3	Project Boundary	42
3.4	Baseline Scenario	51
3.5	Additionality	53
3.6	Methodology Deviations	55
	Uncredited Reserve Stock	55
	Maintenance of Accuracy	56
	Conservativeness of Quantification	56
4	IMPLEMENTATION STATUS	57
4.1	Implementation Status of the Project Activity	57
5	ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS.....	58
5.1	Baseline Emissions	66
5.2	Project Emissions	80
5.3	Leakage.....	88
5.4	Estimated Net GHG Emission Reductions and Removals.....	91
5.5	Quantification of Uncertainty	94
6	MONITORING	95
6.1	Data and Parameters Available at Validation	95
6.2	Data and Parameters Monitored.....	104
6.3	Monitoring Plan.....	114
7	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	118
7.1	Data and Parameters Monitored.....	118
7.2	Baseline Emissions	127
7.3	Project Emissions	130

7.4	Leakage.....	131
7.5	Net GHG Emission Reductions and Removals.....	132
APPENDIX A: IMPLEMENTATION PARTNER ROLES AND RESPONSIBILITIES.....		138
APPENDIX B: ATTESTATION		139
APPENDIX C: ANNEXES		140

1 PROJECT DETAILS

1.1 Summary Description of the Project

The United States is home to over 280 million hectares of forestland; this is nearly 7.5% of the world's forests, providing clean water, recreation, and other life sustaining resources to Americans. The importance of American forests to the global ecosystem and climate is central to the work of Chestnut Carbon, LLC, a US-based company that seeks to conserve and restore functional forestland throughout the United States for the primary purpose of increasing carbon sequestration. By the year 2030, Chestnut Carbon anticipates acquiring or leasing 200,000 hectares of land to be locked into durable agreements for 60 - 125 years of permanent carbon storage. This ambitious plan contrasts with regional common practice among the sellers of these lands prior to project implementation: extractive timber harvesting to compensate for decreasing revenues from adjacent agricultural and ranching operations over time due to soil compaction and degradation. By extending rotation ages through the implementation of uneven-aged silviculture of these at-risk forests, the project increases carbon storage relative to the baseline case, as well as increases biodiversity and diversity in forest structure. Diverse forest age classes and heterogeneity across landscapes are proven to increase forest resiliency to disturbances such as wildfire, landslides, and insect or disease outbreak (Annex AW).

To reduce GHG emissions across the project area, the project technologies and measures include transitioning the management of forestland to silvicultural systems that include group selection, patch cuts and continuous thinning, where appropriate (IFM-1, see section 1.11). In these transition activities, practices include the application of special silvicultural treatments that accelerate the recruitment of trees into standing dead wood, among other treatments. Sponsored by Chestnut Carbon in relation to this project, university research indicates that the promotion of standing deadwood through these treatments significantly increases total carbon storage over time, as compared to no treatment or extractive timber harvesting (Annex B). The application of these treatments to promote enhanced carbon storage is novel and underscores the true additionality of the project compared to common practice.

Currently, this grouped project includes seven instances in the United States state of Arkansas, and one in Alabama. Estimated average GHG emission reductions are 278,187 tons CO₂ equivalent per year, with total reductions over the first 25-year project crediting period of 6,954,685 tCO₂e. As a requirement for participation in the project, all instances must ensure permanence of emissions reductions according to eligibility criterion 2e, which states that carbon stocks shall be protected for at least 60 years from the date of enrollment of the instance to the grouped project (see Section 1.4.1). Thus, the project longevity period is at least 60 years. At document submission, the project area is 648.8 hectares (1603 acres). The first monitoring period began on 5 July 2022 to end on 31 January 2023. Net GHG emission reductions and removals for this monitoring period are 2,192 tCO₂e, with 1,864 VCU's eligible for issuance. The non-permanence risk rating of the project at time of writing is 15%.

The geographic area of the entire project shall encompass the contiguous United States and southern Alaska. To ensure sustainability in management, Forest Carbon Works requires enrolled forestland to be certified by the Forest Stewardship Council® (FSC®) under the group certificate managed by Forest Carbon Works (SCS-FM/COC-009247) prior to the commencement of any harvesting activities.

Approved management plans shall meet both FSC requirements and the requirements specified by the management policies of Forest Carbon Works related to the promotion of uneven-aged management, biodiversity, water quality and wildlife habitat.

Audit Type	Period	Program	VVB Name	Number of years
Validation	Crediting Period: 5 July 2022 – 4 July 2047	Verified Carbon Standard	AENOR	25-year crediting period
Verification	1st Monitoring Period: 5 July 2022 – 31 January 2023	Verified Carbon Standard	AENOR	0.5-year monitoring period
Total				0.5 of 25 years complete

1.2 Sectoral Scope and Project Type

The Chestnut Conservation Project falls under the sectoral scope 14; Agriculture, Forestry and Other Land Use (AFOLU). Within the AFOLU sectoral scope, the project category is Improved Forest Management, activity is Extended Rotation Age (IFM ERA) and the methodology applied is VM0003 v1.3. Definitions for terms used throughout this document can be found in Annex K. This is a grouped project.

1.3 Project Eligibility

The Chestnut Carbon Conservation Project will meet all applicable rules and requirements laid out in the VCS Standard and abide by all regional laws, per Eligibility Criterion 2g (see Section 1.4.1). The project uses the approved VCS methodology VM0003- Methodology for Improved Forest Management Through Extension of Rotation Age (IFM ERA). This methodology was selected as most appropriate because the project area was previously managed using even-aged harvesting techniques such as clear cuts with no extension of rotation age, as per Eligibility Criterion 6. The project technologies and measures include extension of rotation age using group selection, patch cuts and continuous thinning to promote uneven-aged management (IFM-1, see section 1.11).

All instances in the grouped project shall be FSC certified prior to the first verification event OR shall be subject to an easement, or equivalent instrument, recorded against the deed of property that prohibits Commercial Harvesting for the duration of the crediting period, unless later certified to FSC per Eligibility Criterion 7 (see Section 1.4.1). The project proponent is FSC certified (Annex BA).

A project method will be used to quantify GHG emission reductions per Annex F. This method was selected as most appropriate for the development of the baseline model. The project baseline will be

reassessed every ten years and the project proponent will ensure that the project activities that lead to the intended GHG benefit will be implemented during the verification period.

The project is not located in a jurisdiction covered by the REDD+ program as the geographic area of the project is limited to the United States. Additionally, the project shall not drain, convert, or degrade native ecosystems for the purpose of generating GHG credits as prohibited by the requirements of FSC in Annex BC. The project proponent, Forest Carbon Works, maintains a harvest policy that prohibits activities that could change the proportion of wetlands in the project area, refer to Annex D. Per the Eligibility Criterion 1 (see Section 1.4.1), the project area shall not encompass any peat forests. There shall be no activity-shifting leakage as a result of the project, per Eligibility Criteria 2d (see Section 1.4.1); all forested lands will be enrolled in the project. Eligibility Criterion 5 prohibits harvesting on any forested lands without the consent of the project proponent, with the exception of harvesting techniques that promote uneven-aged silviculture, while Eligibility Criterion 2d ultimately requires all forested lands to be enrolled in the project.

1.4 Project Design

Initial project activity instances

This project is a grouped project that will consist of multiple Project Activity Instances (PAIs) within the geographic area of the contiguous United States and southern Alaska. The initial project activity instances are called the *Chestnut Properties* and are described in the table below.

Table 2: Project Activity Instance Names

Instance Number	Instance Name	Instance State	Instance Area (hectares)	Effective Date of License Agreement
1	Saline Bluff	AR	98.7	5 July 2022
2	Fourche La Fave	AR	62.8	6 September 2022
3	Hickls	AR	99.0	30 September 2022
4	Rooks Ranch	AL	74.2	20 September 2022
5	Black River	AR	127.4	31 August 2022
6	Harding/Freed	AR	58.5	16 September 2022
7	Dickson	AR	3.8	30 September 2022

8	El Ranchos	AR	124.4	30 September 2022
----------	-------------------	-----------	--------------	--------------------------

Addition of new PAIs shall meet all eligibility criteria defined in Section 1.4.1. Carbon sequestration will be increased through the extension of forest rotation age using group selection, patch cuts and continuous thinning including the retention of standing dead trees as described in Section 1.11.

1.4.1 Eligibility Criteria

The Chestnut Carbon Conservation Project initial Chestnut Properties and all new PAIs will meet all applicability conditions for and abide by all federal, state, and regional laws per Eligibility Criterion 2g. Descriptions for how eligibility criteria ensure that new project activity instances meet all applicability conditions of VM0003 are given in Table 10, Section 3.2.

Harvesting techniques used in the baseline scenario (see Section 3.4) include even-aged management such as clear cuts, as well as seed-tree and shelterwood harvests (CLR 1) per Eligibility Criterion 6. Rotation ages used within the baseline scenario will be determined through consultation with local experts and will be designated in a forester attestation. The baseline rotation ages for each management stratum (modeling unit) are also provided in section 5. Furthermore, exact rotations ages of each management stratum (modeling unit) will be visible in the FVS files provided with the baseline model. See section 3.4 for details on baseline scenario.

Harvest techniques used within the project scenario shall include uneven-aged management such as continuous thinning, group selection, and patch cuts, per Eligibility Criterion 5 (IFM-1, see section 1.11). The listed silvicultural treatments for both the baseline and project scenarios conform to VM0003 v1.3 applicability condition #1, found in Section 4 of the methodology.

As treatments in the project scenario will be uneven-aged, lands enrolled in the project will not have a specific 'rotation age' in the project scenario as intermediate treatments serve to delay the rotation age indefinitely. Uneven-age treatments inherently extend the rotation age beyond the lifetime of the project because they are not even-aged rotations. See section 1.11 for details on project scenario management.

Harvest Technique	Baseline Scenario	Project Scenario	Silvicultural System
Clear cuts	CLR 1		Even aged
Seed-tree	CLR 1		Even aged
Shelterwood	CLR 1		Even aged

Other Even aged techniques	CLR 1		Even aged
Continuous Thinning		IFM 1	Uneven-aged
Group Selection		IFM 1	Uneven-aged
Patch Cuts		IFM 1	Uneven-aged
Other Uneven-aged techniques		IFM 2	Uneven-aged

The following eligibility criteria shall apply to for all PAIs added to the project:

Table 3: PAI Eligibility Criteria

1	The PAI shall not encompass managed peat forests as demonstrated by consultation with local, regional, or national databases.
---	---

<p>2</p>	<p>The landowner of the PAI shall execute an agreement providing for the following:</p> <ul style="list-style-type: none"> a. require that the landowner hold all timber and carbon sequestration rights; b. convey the right to claim all GHG emissions reductions or removals for the project activity to the project proponent; c. vest legal title to the forest, rights of access to the sequestered carbon (or avoided carbon emissions), current land tenure, and forest management to the project proponent; d. require that the landowner enroll all forested areas in the project, resulting in no activity shifting leakage; e. require that the landowner continue management practices that protect the credited carbon stocks over at least 60 years; f. ensure that the ownership and resource access/use rights are held by the same entity; g. require that the project proponent shall abide by all federal, state, and local regulations; h. be enforceable by law; i. prohibit any action in forest management that causes any emissions, including the use of fire; and j. representation that landowner is the sole owner to the effect that ownership is not disputed.
<p>3</p>	<p>The PAI shall have FVS modeled projections of management practices in the baseline and project scenarios. In both scenarios, actual and modeled harvests shall follow maximum recommended water quality protection measures and all applicable laws. In all cases, the models shall demonstrate higher levels of harvesting in the baseline scenario compared to the project scenario. The baseline model shall involve even-aged harvesting techniques such as clear cuts and seed tree, among others. The baseline model shall not be unmanaged or managed by individual tree selection. The project model shall involve uneven-aged harvesting techniques such as patch cuts, group selection and continuous thinning.</p>
<p>4</p>	<p>The PAI shall fall inside the designated geographic area of the contiguous United States including southern Alaska, and each discrete area of land shall have a unique geographic identifier.</p>

5	The landowner of the PAI shall execute an agreement prohibiting harvesting without the prior consent of the project proponent where the project proponent maintains a policy that limits approval of harvesting to approved techniques that promote the extension of rotation age such as patch cuts, continuous thinning, or group selection practices and prohibits changing the proportion of wetland.
6	The PAI shall have a baseline scenario demonstrating that common practice is even-aged management, without the extension of rotation age, as demonstrated by the provision of a timber harvest plan (THP) from sites comparable to the baseline model, and in the same geographic/regulatory region, to the PAI. The requirements of the California Air Resource Board Compliance Offset Protocol U.S. Forest Projects Section 5.2.1(e)(2)(B) shall be used to define a comparable.
7	Prior to the first verification event, the project area shall meet one of the following conditions: Certified to Forest Stewardship Council (FSC); OR Subject to an easement, or equivalent instrument, recorded against the deed of property that prohibits Commercial Harvesting for the duration of the crediting period, unless later certified to FSC.

Any new PAIs shall be validated, based on the information reported in the monitoring report, against the applicable set of eligibility criteria.

Table 4: Supporting evidence for achievement of eligibility criteria for each PAI.

Project Activity Instance (PAI) Number	EC #1	EC #2	EC #3	EC #4	EC #5	EC #6	EC #7
1	Annex BH does not include mapped soil that meets the minimum organic matter composition (75%) present as defined in Annex BM to comprise peat soils.	Annex D contains signed agreements by landowners of each PAI that meet all points of eligibility criterion 2: 2a is met by Section 1.1.3 and 1.4 which defines owner of timber and carbon rights; 2b is met by Section 1.4 which conveys carbon rights to project proponent; 2c is met by Section 1 which grants legal title to the forest, right of access, land tenure, and forest management to the project proponent; 2d is met by Section 6.5, 8.3, and 8.4 that all eligible land is enrolled and described in Exhibit A of Annex D; 2e is met with Section 2.3 & 2.4 which requires PAI to maintain carbon stocks until expiration of project lifetime, at minimum 60 years; 2f is met by Section 6.1 which defines ownership of the forest and resources contained therein; 2g is met by Section 7.2 that project proponent shall comply with valid laws of any applicable agency; 2h is met by Sections 5.1 and 6.1 stating that the agreement is enforceable both against owner and project proponent; 2i is met by Section 8.6 that prevents any intentional reversal, i.e. any action that causes emissions; 2j is met by Section 6.1 of Annex D.	See Sections 3.4: Baseline Scenario, 7.2: Baseline Emissions of Joint PD-MIR, Annex AL, and Annex AZ. This Section outlines the even-aged baseline model used and that it describes even-aged management. It also describes how both project and baseline scenarios take into account all regulations and recommended BMPs relevant to the PAI. The project scenario shall model uneven-aged management.	See Section 1.12: Project Location of Joint PD-MIR. Map shows that each PAI is in the contiguous United States and that the names of PAIs given in the legend show that each discrete area has a unique geographic identifier.	With signature of the legally binding agreement required by EC 2 (Annex D, Saline Bluff signed MLA), all harvesting is limited to techniques that promote uneven-aged management and extension of rotation age.	Section 3.4 of this document defines the baseline scenario and determines that it would have been even-aged rotation silviculture. Annex A contains examples of these management regimes for the region.	PAI is subject to a protective easement signed by the property owner(s) prior to the first verification event which prohibits commercial harvesting without Forest Stewardship Council certification and conditional on approval by the project proponent. See Section 3.5.1 within the Memorandum of Agreement (Annex D).

2	<p>Annex BH does not include mapped soil that meets the minimum organic matter composition (75%) present as defined in Annex BM to comprise peat soils.</p>	<p>Annex D contains signed agreements by landowners of each PAI that meet all points of eligibility criterion 2: 2a is met by Section 1.1.3 and 1.4 which defines owner of timber and carbon rights; 2b is met by Section 1.4 which conveys carbon rights to project proponent; 2c is met by Section 1 which grants legal title to the forest, right of access, land tenure, and forest management to the project proponent; 2d is met by Section 6.5, 8.3, and 8.4 that all eligible land is enrolled and described in Exhibit A of Annex D; 2e is met with Section 2.3 & 2.4 which requires PAI to maintain carbon stocks until expiration of project lifetime, at minimum 60 years; 2f is met by Section 6.1 which defines ownership of the forest and resources contained therein; 2g is met by Section 7.2 that project proponent shall comply with valid laws of any applicable agency; 2h is met by Sections 5.1 and 6.1 stating that the agreement is enforceable both against owner and project proponent; 2i is met by Section 8.6 that prevents any intentional reversal, i.e. any action that causes emissions; 2j is met by Section 6.1 of Annex D.</p>	<p>See Sections 3.4: Baseline Scenario, 7.2: Baseline Emissions of Joint PD-MIR, Annex AL, and Annex AZ. This Section outlines the even-aged baseline model used and that it describes even-aged management. It also describes how both project and baseline scenarios take into account all regulations and recommended BMPs relevant to the PAI. The project scenario shall model uneven-aged management.</p>	<p>See Section 1.12: Project Location of Joint PD-MIR. Map shows that each PAI is in the contiguous United States and that the names of PAIs given in the legend show that each discrete area has a unique geographic identifier.</p>	<p>With signature of the legally binding agreement required by EC 2 (Annex D, Fourche La Fave MLA), all harvesting is limited to techniques that promote uneven-aged management and extension of rotation age.</p>	<p>Section 3.4 of this document defines the baseline scenario and determines that it would have been even-aged rotation silviculture. Annex A contains examples of these management regimes for the region.</p>	<p>PAI is subject to a protective easement signed by the property owner(s) prior to the first verification event which prohibits commercial harvesting without Forest Stewardship Council certification and conditional on approval by the project proponent. See Section 3.5.1 within the Memorandum of Agreement (Annex D).</p>
---	---	--	---	---	--	---	---

3	<p>Annex BH does not include mapped soil that meets the minimum organic matter composition (75%) present as defined in Annex BM to comprise peat soils.</p>	<p>Annex D contains signed agreements by landowners of each PAI that meet all points of eligibility criterion 2: 2a is met by Section 1.1.3 and 1.4 which defines owner of timber and carbon rights; 2b is met by Section 1.4 which conveys carbon rights to project proponent; 2c is met by Section 1 which grants legal title to the forest, right of access, land tenure, and forest management to the project proponent; 2d is met by Section 6.5, 8.3, and 8.4 that all eligible land is enrolled and described in Exhibit A of Annex D; 2e is met with Section 2.3 & 2.4 which requires PAI to maintain carbon stocks until expiration of project lifetime, at minimum 60 years; 2f is met by Section 6.1 which defines ownership of the forest and resources contained therein; 2g is met by Section 7.2 that project proponent shall comply with valid laws of any applicable agency; 2h is met by Sections 5.1 and 6.1 stating that the agreement is enforceable both against owner and project proponent; 2i is met by Section 8.6 that prevents any intentional reversal, i.e. any action that causes emissions; 2j is met by Section 6.1 of Annex D.</p>	<p>See Sections 3.4: Baseline Scenario, 7.2: Baseline Emissions of Joint PD-MIR, Annex AL, and Annex AZ. This Section outlines the even-aged baseline model used and that it describes even-aged management. It also describes how both project and baseline scenarios take into account all regulations and recommended BMPs relevant to the PAI. The project scenario shall model uneven-aged management.</p>	<p>See Section 1.12: Project Location of Joint PD-MIR. Map shows that each PAI is in the contiguous United States and that the names of PAIs given in the legend show that each discrete area has a unique geographic identifier.</p>	<p>With signature of the legally binding agreement required by EC 2 (Annex D, Hickls MLA), all harvesting is limited to techniques that promote uneven-aged management and extension of rotation age.</p>	<p>Section 3.4 of this document defines the baseline scenario and determines that it would have been even-aged rotation silviculture. Annex A contains examples of these management regimes for the region.</p>	<p>PAI is subject to a protective easement signed by the property owner(s) prior to the first verification event which prohibits commercial harvesting without Forest Stewardship Council certification and conditional on approval by the project proponent. See Section 3.5.1 within the Memorandum of Agreement (Annex D).</p>
---	---	--	---	---	---	---	---

4	<p>Annex BH does not include mapped soil that meets the minimum organic matter composition (75%) present as defined in Annex BM to comprise peat soils.</p>	<p>Annex D contains signed agreements by landowners of each PAI that meet all points of eligibility criterion 2: 2a is met by Section 1.1.3 and 1.4 which defines owner of timber and carbon rights; 2b is met by Section 1.4 which conveys carbon rights to project proponent; 2c is met by Section 1 which grants legal title to the forest, right of access, land tenure, and forest management to the project proponent; 2d is met by Section 6.5, 8.3, and 8.4 that all eligible land is enrolled and described in Exhibit A of Annex D; 2e is met with Section 2.3 & 2.4 which requires PAI to maintain carbon stocks until expiration of project lifetime, at minimum 60 years; 2f is met by Section 6.1 which defines ownership of the forest and resources contained therein; 2g is met by Section 7.2 that project proponent shall comply with valid laws of any applicable agency; 2h is met by Sections 5.1 and 6.1 stating that the agreement is enforceable both against owner and project proponent; 2i is met by Section 8.6 that prevents any intentional reversal, i.e. any action that causes emissions; 2j is met by Section 6.1 of Annex D.</p>	<p>See sections 3.4: Baseline Scenario, 7.2: Baseline Emissions of Joint PD-MIR, Annex AL, and Annex AZ. This Section outlines the even-aged baseline model used and that it describes even-aged management. It also describes how both project and baseline scenarios take into account all regulations and recommended BMPs relevant to the PAI. The project scenario shall model uneven-aged management.</p>	<p>See Section 1.12: Project Location of Joint PD-MIR. Map shows that each PAI is in the contiguous United States and that the names of PAIs given in the legend show that each discrete area has a unique geographic identifier.</p>	<p>With signature of the legally binding agreement required by EC 2 (Annex D, Rooks Ranch MLA), all harvesting is limited to techniques that promote uneven-aged management and extension of rotation age.</p>	<p>Section 3.4 of this document defines the baseline scenario and determines that it would have been even-aged rotation silviculture. Annex A contains examples of these management regimes for the region.</p>	<p>PAI is subject to a protective easement signed by the property owner(s) prior to the first verification event which prohibits commercial harvesting without Forest Stewardship Council certification and conditional on approval by the project proponent. See Section 3.5.1 within the Memorandum of Agreement (Annex D).</p>
---	---	--	---	---	--	---	---

5	<p>Annex BH does not include mapped soil that meets the minimum organic matter composition (75%) present as defined in Annex BM to comprise peat soils.</p>	<p>Annex D contains signed agreements by landowners of each PAI that meet all points of eligibility criterion 2: 2a is met by Section 1.1.3 and 1.4 which defines owner of timber and carbon rights; 2b is met by Section 1.4 which conveys carbon rights to project proponent; 2c is met by Section 1 which grants legal title to the forest, right of access, land tenure, and forest management to the project proponent; 2d is met by Section 6.5, 8.3, and 8.4 that all eligible land is enrolled and described in Exhibit A of Annex D; 2e is met with Section 2.3 & 2.4 which requires PAI to maintain carbon stocks until expiration of project lifetime, at minimum 60 years; 2f is met by Section 6.1 which defines ownership of the forest and resources contained therein; 2g is met by Section 7.2 that project proponent shall comply with valid laws of any applicable agency; 2h is met by Sections 5.1 and 6.1 stating that the agreement is enforceable both against owner and project proponent; 2i is met by Section 8.6 that prevents any intentional reversal, i.e. any action that causes emissions; 2j is met by Section 6.1 of Annex D.</p>	<p>See Sections 3.4: Baseline Scenario, 7.2: Baseline Emissions of Joint PD-MIR, Annex AL, and Annex AZ. This Section outlines the even-aged baseline model used and that it describes even-aged management. It also describes how both project and baseline scenarios take into account all regulations and recommended BMPs relevant to the PAI. The project scenario shall model uneven-aged management.</p>	<p>See Section 1.12: Project Location of Joint PD-MIR. Map shows that each PAI is in the contiguous United States and that the names of PAIs given in the legend show that each discrete geographic area has a unique identifier.</p>	<p>With signature of the legally binding agreement required by EC 2 (Annex D, Black River MLA), all harvesting is limited to techniques that promote uneven-aged management and extension of rotation age.</p>	<p>Section 3.4 of this document defines the baseline scenario and determines that it would have been even-aged rotation silviculture. Annex A contains examples of these management regimes for the region.</p>	<p>PAI is subject to a protective easement signed by the property owner(s) prior to the first verification event which prohibits commercial harvesting without Forest Stewardship Council certification and conditional on approval by the project proponent. See Section 3.5.1 within the Memorandum of Agreement (Annex D).</p>
---	---	--	---	---	--	---	---

6	<p>Annex BH does not include mapped soil that meets the minimum organic matter composition (75%) present as defined in Annex BM to comprise peat soils.</p>	<p>Annex D contains signed agreements by landowners of each PAI that meet all points of eligibility criterion 2: 2a is met by Section 1.1.3 and 1.4 which defines owner of timber and carbon rights; 2b is met by Section 1.4 which conveys carbon rights to project proponent; 2c is met by Section 1 which grants legal title to the forest, right of access, land tenure, and forest management to the project proponent; 2d is met by Section 6.5, 8.3, and 8.4 that all eligible land is enrolled and described in Exhibit A of Annex D; 2e is met with Section 2.3 & 2.4 which requires PAI to maintain carbon stocks until expiration of project lifetime, at minimum 60 years; 2f is met by Section 6.1 which defines ownership of the forest and resources contained therein; 2g is met by Section 7.2 that project proponent shall comply with valid laws of any applicable agency; 2h is met by Sections 5.1 and 6.1 stating that the agreement is enforceable both against owner and project proponent; 2i is met by Section 8.6 that prevents any intentional reversal, i.e. any action that causes emissions; 2j is met by Section 6.1 of Annex D.</p>	<p>See Sections 3.4: Baseline Scenario, 7.2: Baseline Emissions of Joint PD-MIR, Annex AL, and Annex AZ. This Section outlines the even-aged baseline model used and that it describes even-aged management. It also describes how both project and baseline scenarios take into account all regulations and recommended BMPs relevant to the PAI. The project scenario shall model uneven-aged management.</p>	<p>See Section 1.12: Project Location of Joint PD-MIR. Map shows that each PAI is in the contiguous United States and that the names of PAIs given in the legend show that each discrete area has a unique geographic identifier.</p>	<p>With signature of the legally binding agreement required by EC 2 (Annex D, Harding/Freed MLA), all harvesting is limited to techniques that promote uneven-aged management and extension of rotation age.</p>	<p>Section 3.4 of this document defines the baseline scenario and determines that it would have been even-aged rotation silviculture. Annex A contains examples of these management regimes for the region.</p>	<p>PAI is subject to a protective easement signed by the property owner(s) prior to the first verification event which prohibits commercial harvesting without Forest Stewardship Council certification and conditional on approval by the project proponent. See Section 3.5.1 within the Memorandum of Agreement (Annex D).</p>
---	---	--	---	---	--	---	---

7	<p>Annex BH does not include mapped soil that meets the minimum organic matter composition (75%) present as defined in Annex BM to comprise peat soils.</p>	<p>Annex D contains signed agreements by landowners of each PAI that meet all points of eligibility criterion 2: 2a is met by Section 1.1.3 and 1.4 which defines owner of timber and carbon rights; 2b is met by Section 1.4 which conveys carbon rights to project proponent; 2c is met by Section 1 which grants legal title to the forest, right of access, land tenure, and forest management to the project proponent; 2d is met by Section 6.5, 8.3, and 8.4 that all eligible land is enrolled and described in Exhibit A of Annex D; 2e is met with Section 2.3 & 2.4 which requires PAI to maintain carbon stocks until expiration of project lifetime, at minimum 60 years; 2f is met by Section 6.1 which defines ownership of the forest and resources contained therein; 2g is met by Section 7.2 that project proponent shall comply with valid laws of any applicable agency; 2h is met by Sections 5.1 and 6.1 stating that the agreement is enforceable both against owner and project proponent; 2i is met by Section 8.6 that prevents any intentional reversal, i.e. any action that causes emissions; 2j is met by Section 6.1 of Annex D.</p>	<p>See Sections 3.4: Baseline Scenario, 7.2: Baseline Emissions of Joint PD-MIR, Annex AL, and Annex AZ. This Section outlines the even-aged baseline model used and that it describes even-aged management. It also describes how both project and baseline scenarios take into account all regulations and recommended BMPs relevant to the PAI. The project scenario shall model uneven-aged management.</p>	<p>See Section 1.12: Project Location of Joint PD-MIR. Map shows that each PAI is in the contiguous United States and that the names of PAIs given in the legend show that each discrete area has a unique geographic identifier.</p>	<p>With signature of the legally binding agreement required by EC 2 (Annex D, Dickson Farms MLA), all harvesting is limited to techniques that promote uneven-aged management and extension of rotation age.</p>	<p>Section 3.4 of this document defines the baseline scenario and determines that it would have been even-aged rotation silviculture. Annex A contains examples of these management regimes for the region.</p>	<p>PAI is subject to a protective easement signed by the property owner(s) prior to the first verification event which prohibits commercial harvesting without Forest Stewardship Council certification and conditional on approval by the project proponent. See Section 3.5.1 within the Memorandum of Agreement (Annex D).</p>
---	---	--	---	---	--	---	---

8	<p>Annex BH does not include mapped soil that meets the minimum organic matter composition (75%) present as defined in Annex BM to comprise peat soils.</p>	<p>Annex D contains signed agreements by landowners of each PAI that meet all points of eligibility criterion 2: 2a is met by Section 1.1.3 and 1.4 which defines owner of timber and carbon rights; 2b is met by Section 1.4 which conveys carbon rights to project proponent; 2c is met by Section 1 which grants legal title to the forest, right of access, land tenure, and forest management to the project proponent; 2d is met by Section 6.5, 8.3, and 8.4 that all eligible land is enrolled and described in Exhibit A of Annex D; 2e is met with Section 2.3 & 2.4 which requires PAI to maintain carbon stocks until expiration of project lifetime, at minimum 60 years; 2f is met by Section 6.1 which defines ownership of the forest and resources contained therein; 2g is met by Section 7.2 that project proponent shall comply with valid laws of any applicable agency; 2h is met by Sections 5.1 and 6.1 stating that the agreement is enforceable both against owner and project proponent; 2i is met by Section 8.6 that prevents any intentional reversal, i.e. any action that causes emissions; 2j is met by Section 6.1 of Annex D.</p>	<p>See Sections 3.4: Baseline Scenario, 7.2: Baseline Emissions of Joint PD-MIR, Annex AL, and Annex AZ. This Section outlines the even-aged baseline model used and that it describes even-aged management. It also describes how both project and baseline scenarios take into account all regulations and recommended BMPs relevant to the PAI. The project scenario shall model uneven-aged management.</p>	<p>See Section 1.12: Project Location of Joint PD-MIR. Map shows that each PAI is in the contiguous United States and that the names of PAIs given in the legend show that each discrete area has a unique geographic identifier.</p>	<p>With signature of the legally binding agreement required by EC 2 (Annex D, El Ranchos), all harvesting is limited to techniques that promote uneven-aged management and extension of rotation age.</p>	<p>Section 3.4 of this document defines the baseline scenario and determines that it would have been even-aged rotation silviculture. Annex A contains examples of these management regimes for the region.</p>	<p>PAI is subject to a protective easement signed by the property owner(s) prior to the first verification event which prohibits commercial harvesting without Forest Stewardship Council certification and conditional on approval by the project proponent. See Section 3.5.1 within the Memorandum of Agreement (Annex D).</p>
---	---	--	---	---	---	---	---

1.5 Project Proponent

Table 5: Project Proponent

Organization name	Forest Carbon Works, PBC
Contact person	Julian Bauer
Title	Director, Conserve
Address	Highlight Center 807 Broadway St. NE, Suite 280 Minneapolis, Minnesota 55413
Telephone	1 (800) 399-5246
Email	julian@forestcarbonworks.com

1.6 Other Entities Involved in the Project

Table 6: Other Project Entities

Organization name	Chestnut Carbon, LLC c/o Kimmeridge
Role in the project	Property owner
Contact person	Joseph Byrnes
Title	Vice President
Address	15 Little West 12 th Street, 5 th Floor New York, New York 10014
Telephone	1 (646) 517-7259
Email	Joe.byrnes@kimmeridge.com

Per VCS Standard 3.2.3, the implementation partner’s roles and responsibilities are defined in Appendix A.

1.7 Ownership

Timber and carbon sequestration rights shall be owned in fee and the right to claim GHG emissions reductions or removals shall be assigned to the project proponent as required by Eligibility Criterion 2b (see Section 1.4.1). For each of the Chestnut Properties, conformance with Eligibility Criterion 2b is demonstrated in Table 4, Section 1.4.1. Individual agreements between the project proponent and property owner are provided in the Forest Management Lease Agreements, available in Annex D. The Membership Lease Agreements comply with Section 3.7.1 of the VCS Standard by providing “an enforceable and irrevocable agreement with the holder of the statutory, property or contractual right in the land, vegetation or conservational or management process that generates GHG emission reductions or removals which vests project ownership in the project proponent.”

1.8 Project Start Date

The project start date is 5 July 2022, the effective date the first PAI license agreement by the landowner and the date on which emissions reduction and removals first occurred, per Eligibility Criterion 5 (see Section 1.4.1), and as described in Section 1.11, refer to Annex BB. The license agreement is legally enforceable and demonstrates divergence from the common practice baseline (see section 3.4) to the ERA project activity (see section 1.11) as of its effective date. Proceeding the effective date of the license agreement is the execution of the membership lease agreement. Per the requirements of Eligibility Criterion 5 (see Section 1.4.1), the membership lease agreement is legally enforceable, requiring the application of ERA for the duration of the crediting period according to the policies of Forest Carbon Works (see in Annex BC).

1.9 Project Crediting Period

The crediting period for the project is 25 years. The start of the project crediting period coincides with the start date for the project, 5 July 2022, and the end date of the Project Crediting period is therefore 4 July 2047. The crediting period can be renewed as may be allowed under VCS.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Table 7: Project Scale

Project Scale	
Project	X
Large project	

Table 8: Ex-ante Estimated GHG Emission Reductions or Removals

Year	Estimated GHG emission reductions or removals (tCO _{2e})
2022	2,560
2023	45,492
2024	85,747
2025	126,003
2026	166,258
2027	206,514
2028	246,769
2029	287,025
2030	327,280
2031	327,280
2032	327,280
2033	327,280
2034	327,280
2035	327,280
2036	327,280
2037	327,280
2038	327,280

2039	327,280
2040	327,280
2041	327,280
2042	327,280
2043	327,280
2044	327,280
2045	327,280
2046	327,280
2047	224,551
Total estimated ERs	6,954,685
Total number of crediting years	25
Average annual ERs	278,187

1.11 Description of the Project Activity

The Chestnut Carbon Conservation Project will achieve GHG emission reductions and removals through Improved Forest Management (IFM), Extension of Rotation Age (ERA) which includes adopting group selection, patch cuts, and continuous thinning techniques (IFM-1). In addition to the extension of rotation age, the project proponent plans to utilize special silvicultural treatments that accelerate the recruitment of trees into standing dead wood during continuous thinning treatments. To determine treatments, the project proponent, in conjunction with researchers at the University of Minnesota, will be assessing the recruitment, longevity, management, and carbon storage associated with management activities that add snags to forested landscapes (Annex N).

Per Eligibility Criterion 5 (see Section 1.4.1), harvesting in PAIs is prohibited without the consent of the project proponent, Forest Carbon Works. Forest Carbon Works maintains a policy that limits the application of harvesting to techniques that promote ERA, as demonstrated in Annexes BC and BU. Harvesting associated with the project activity shall not meet nor exceed the definition of *Harvest*

activity described for the VCS program meaning that the harvesting of trees or vegetation within each project activity instance shall not reduce carbon stocks by 20% or more during any 5-year period.

As past management records for the PAIs were not available, the rotation age is assumed based on common practice in the region (CLR 1, see Section 3.4). Unlike common practice, all future harvesting conducted within the project will be designed to maximize carbon storage and/or improve forest health, and to transition forests to uneven-aged structure, see IFM1 and IFM2 below. This shift from even-aged to uneven-aged forest management will also involve an increase in the average age of standing trees within the forest since the goal of the project is to sequester more carbon than currently exists with the project activity instances. Since only uneven-aged silviculture will be practiced, lands enrolled in the project will not have a specific ‘rotation age’ as intermediate treatments serve to delay the rotation age indefinitely. As described in Eligibility Criterion 5, future harvesting may include patch cuts, continuous thinning, or group selection (IFM-1).

Management systems applied in the project scenario are described in the table below.

Project Management System	Description
IFM 1	No harvesting of project area except when an intermediate treatment such as thinning, group selection or patch cut is necessary to promote uneven-aged forest structure
IFM 2	No harvesting

Refer to the management stratification table in Section 5 for more detail on the application of the project management systems.

The project is not located in a REDD+ jurisdictional area.

1.12 Project Location

As described in Section 1.4.1, Eligibility Criterion 4, the geographic area for the grouped project is the contiguous United States and southern Alaska. Centroid of this geography is approximately 44°58'2.07622"N 103°46'17.60283"W. As defined in Section 1.4.1, a KML file of the initial Chestnut Properties (see Section 1.4.1) has been provided to the Verra Registry (Annex BT). The KML file will be maintained with the Verra Registry upon the addition of PAIs to the grouped project. All geospatial boundaries have been verified under the QA/QC procedure outlined in Annex BG.

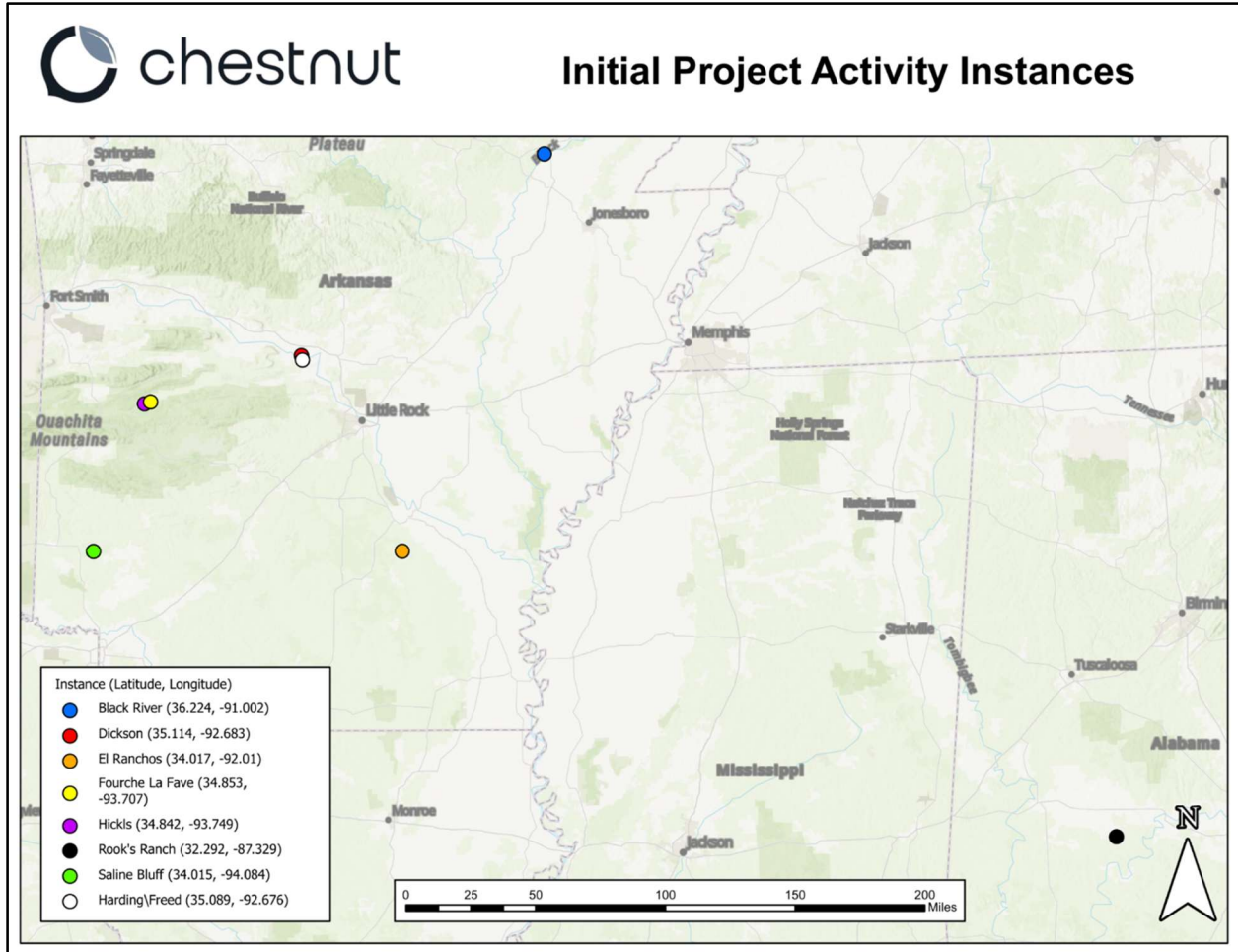


Figure 1: Initial Project Activity Instances

1.13 Conditions Prior to Project Initiation

The baseline scenario as described in Section 3.4 reflects conditions prior to project implementation, conditions that are required by Eligibility Criterion 6 (see Section 1.4.1). Prior to the project start date, the project area was timber production under the common practice baseline of even-aged management. The baseline scenario reflects the emissions that would have ultimately occurred without the implementation of the project technologies and measures (see section 3.4). The project area is presently located in Arkansas and western Alabama. It encompasses a region with a variety of land use histories, climates, hydrologies, topographies, soils, ecosystem types, and vegetation types.

Climate: Average high and low temperature range from 75 degrees Fahrenheit to 53 degrees, respectively, with an overall daily mean temperature of 64 degrees Fahrenheit on average. (NOAA 2020). The average precipitation across the project area was 133.12 centimeters annually, with rainfall distributed fairly evenly throughout each month (NOAA 2020).

Hydrology: Rainfall ranges throughout the year, with the most rain on average falling in May and November. On average, the project area receives 133.12 centimeters of rainfall per year and 5.33 centimeters of snowfall, occurring in January and February (NOAA 2020).

Topography: The instance is generally flat with no significant elevation changes and is confirmed using the USGS National Elevation Dataset.

Historic Conditions: All the instances making up the project area have previously been actively managed and had timber harvests performed. There are a variety of other past land uses as well, including agriculture, grazing, and a brownfield. Evidence of agricultural use and timber harvests were verified using Google Earth historical aerial imagery.

Soils: The project area contains many different soil types but is primarily composed of Eylau very sandy loam and Sawyer silt loam (USDA WSS). There are both high and low site conditions present in the project area.

Vegetation: While the species present differ, all the instances occur on forested or previously forested land. Common genera present in the project area include Pines, Firs, Maples, Oaks, Ash, and Spruces. There is a mix of both soft and hardwood species as outlined within the FVS variant overview of the southern region, Annex H.

Ecosystems: The project area is located in a terrestrial forested ecosystem as verified through analysis of National Agriculture Imagery Program (NAIP) imagery.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

Forest Carbon Works has policies and procedures in place to maintain compliance with all laws listed below, refer to Annex D. Additionally, project Eligibility Criterion 2g (see Section 1.4.1) mandates all PAIs to comply with all relevant local and state laws not listed.

Among others, compliance with the following laws and regulations is required for business operation in the United States:

- Occupational Health and Safety Act (29 U.S.C. § 651 *et seq.*) establishes health standards for the workplace (Annex AS).
- Fair Labor Standards Act (29 U.S.C. § 201 *et seq.*) establishes labor standards, including minimum wage and overtime (Annex AR).
- Civil Rights Act of 1964 (Public Law 88-352, 78 Statute 241) prohibits discrimination based on race, color, religion, sex, or national origin (Annex AN).
- Americans with Disabilities Act (42 U.S.C. § 12101 *et seq.*) prohibits discrimination based on disability (Annex AQ).

Models of both the baseline and project scenarios reflect all relevant regulations and laws, per Eligibility Criteria 3 (see sections 1.11 and 3.4). The following laws and regulations shall be followed as part of the project's forest management activities:

- Federal Water Pollution Control Act (33 U.S.C § 1251 *et seq.*) establishes objectives for improving water quality and regulates pollution into waterways. Project activities encourage the ongoing improvement of stream water quality, and forest management plans intend to follow maximum state forestry recommendations for watershed quality protection, as required per Eligibility Criteria 3 (see Section 1.4.1) (Annex AT).
- National Environmental Policy Act (42 U.S.C. § 4321 *et seq.*) establishes national goals for protection and enhancement of the environment (Annex AV).
- Endangered Species Act (16 U.S.C. § 1531 *et seq.*) protects threatened and endangered species and regulates management of their habitats. The project proponent shall check the sensitive species database prior to harvest, if occurring (Annex AU).

The objectives in the application of ERA are to increase carbon storage on the landscape while improving the health, diversity, productivity, and ecological functions of the forests under management.

States where current PAIs are located do not have specific harvesting restriction laws, but the project shall comply with all written forestry best management practices (BMPs) for each state, even though compliance with these BMPs is not required by law.

1.15 Participation under Other GHG Programs

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

The project is not registered, and will not seek registration, 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 an emissions trading program, nor does it have any intention to.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received any other forms of GHG-related credit, including renewable energy certificates. If, under the Verra regulatory framework, other programs arise that the project is eligible to participate in, FCW will communicate to Verra immediately to comply with any rules and regulations forthwith. Other programs or carbon registries in which the Project may be eligible to participate include, among others, the California Air Resources Board Program, American Carbon Registry, and the Climate Action Reserve.

1.16.3 Supply Chain (Scope 3) Emissions

This analysis is not applicable because the Chestnut Carbon Conservation Project is enrolled under sectoral scope 14; Agriculture, Forestry and Other Land Use (AFOLU). Inventory emissions are not considered under sectoral scope 14.

1.17 Sustainable Development Contributions

1.17.1 Sustainable Development Contributions Activity Description

The Chestnut Carbon Conservation Project will contribute to sustainable development in the United States as defined by and monitored against the United Nations Sustainable Development Goals (SDGs). Project activities will work to conserve forest ecosystems through improved forest management by extending rotation age. The project shall place all acreage included in the project into legally-binding, long-term agreements in order to protect watersheds and water quality and certify approved harvests with the Forest Stewardship Council, as well as quantify all carbon emissions reductions and removals over the lifetime of the project.

1.17.2 Sustainable Development Contributions Activity Monitoring

Project activities will work to conserve forest ecosystems through improved forest management by extending rotation age on 648.8 hectares (1,603 acres) of forestland in the United States southern region. Improved forest management contributes to SDG 6: Clean Water & Sanitation, SDG 13: Climate Action, and SDG 15: Life on Land. The project shall extend the rotation age of trees to remove carbon emissions from the atmosphere; protect the integrity of water bodies, streams, and wetlands; and protect forestland in FSC-compliant agreements. Total protected acreage, quantity of emissions reductions, and number of protected streams and wetlands shall be monitored over the project lifetime. See Section 6.3 for evidence of contribution to SDG 13. Evidence of contributions to SDGs 6 and 15 shall be provided in signed legal agreements designating lands as protected for the lifetime of the project.

Table 9: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
------------	------------	---------------	-----------------------------	-------------------------------	-------------------------------------

1)	6.6	6.6.1 Change in the extent of water-related ecosystems over time	Implemented activities to increase	Protected 648.8 hectares (1,603 acres) of forest and all watersheds contained therein in binding long-term agreements, implemented no-touch forestry practices in all stream buffer zones.	Protected 648.8 hectares (1,603 acres) of forest and all watersheds contained therein in binding long-term agreements, implemented no-touch forestry practices in all stream buffer zones.
2)	13.0	Tonnes of GHG emissions avoided or removed	Implemented activities to increase	Reduced or removed 2,192 tons of CO2e from the project area	Reduced or removed 2,192 tons of CO2e from the project area
3)	15.1	15.1.1 Forest area as a proportion of total land area	Implemented activities to increase	Placed 648.8 hectares (1,603 acres) of forest in legally binding agreements.	Placed 648.8 hectares (1,603 acres) of forest in legally binding agreements.
4)	15.2	15.2.1 Progress towards sustainable forest management	Implemented activities to increase	Registered 648.8 hectares (1,603 acres) of forest under FSC-compliant forest management plans.	Registered 648.8 hectares (1,603 acres) of forest under FSC-compliant forest management plans.

1.18 Additional Information Relevant to the Project

1. Leakage Management

No activity-shifting leakage will occur in the project per Eligibility Criteria 2d (see Section 1.4.1); all forested lands will be enrolled in the project. Eligibility Criterion 5 prohibits harvesting on any forested lands, whether or not enrolled in the project, while Eligibility Criterion 2d requires all forested lands to be enrolled in the project. Market effects leakage will be monitored per Section 5.3.

2. Commercially Sensitive Information

Per the VCS Standard, qualifying sensitive information may be protected from public review.

Annex AD includes proprietary financial information related to the project proponent's internal project development costs. Annex M includes financial information from the project proponent as supporting evidence for the Financial Viability section of the Non-Permanence Risk Report.

Both Annex AD and M qualify as commercially sensitive as they contain financial information, which by the definition of “sensitive information” in the VCS Program Definitions v4.3, may be omitted from the public documentation if their “disclosure could reasonably be expected to result in a material financial loss or gain, prejudice the outcome of contractual or other negotiations or otherwise damage or enrich the person or entity to which the information relates.”

2 SAFEGUARDS

2.1 No Net Harm

The project is not expected to cause any negative environmental impacts. Because the project activity limits commercial harvesting and any commercial harvesting requires FSC certification, the project will have positive outcomes for both climate change mitigation. These include increased carbon storage and sequestration, as well as biodiversity impacts through the preservation of key habitats.

The project proponent also does not expect any negative socio-economic impacts. Community-focused project activities are aimed at increasing economic growth in the area while keeping a specific focus on improving the lives of the community members.

Forest Carbon Works has developed a robust grievance structure should community members have complaints or comments (see Section 2.5), which will help ensure community satisfaction with the project and mitigate any unforeseen negative impacts. Community input is highly valued in the project,

as can be seen in community meetings and opportunities for community members to express opinions about the project and its benefits (see Section 2.2).

2.2 Local Stakeholder Consultation

On 2 December 2022, the project proponent invited all relevant (local, affected and interested) stakeholders in Annex AK for consultations and comments in Little Rock, Arkansas, including, but not limited to, the categories mentioned below:

- a. Local people, communities and/or representatives who are expected to be directly or indirectly affected (adversely affected or beneficiaries) by the project or may have an interest in the project.
- b. Stakeholders with land-tenure rights within or adjacent to the project and marginalized individuals and groups.
- c. Local policymakers and representatives of local authorities.
- d. National government officials or National Focal Point.
- e. Local non-governmental organizations (NGOs), Women Groups working on topics relevant to the project or working with communities who are likely to be affected by the project.

The stakeholders invited under these criteria represent a range of social, economic, and cultural backgrounds within areas impacted by the project. They include individual adjacent landowners national organizations, and federal agencies. Additionally, given their backgrounds, invited stakeholders have diverse financial resources. There are no significant changes expected in the makeup of local stakeholders over time.

The stakeholders in general viewed the project favorably. Negative comments were centered around two possible issues associated with the project; the potential of the project to increase property prices and rents, and the continued limitation of public land use. Methods for addressing these issues are provided in Section 2.5.

It was essential to systematically represent all pre-identified categories of stakeholders and note which groups engaged and which did not. Accurately identifying relevant stakeholders and ensuring broad participation was critical to achieving an effective and efficient consultation, not to mention achieving the outcomes and outputs of the entire process, as explained by Jared Talley, Jen Schneider, and Eric Lindquist in their 2016 journal article published in *Ecology and Society* (Annex AP).

Stakeholders invited to the 2022 meeting were identified by answering the following questions:

- Who has the best knowledge to inform the outputs of the project?
- Who has the power to enable the project to achieve its aimed impacts/outcomes?
- Who has the power to block these impacts/outcomes?
- Who might be disadvantaged or lose out because of this project?

New stakeholders shall be identified and communicated with over the lifetime of the project as determined by the questions outlined above, and the list of stakeholders is expected to constantly

evolve. Updating the stakeholder list regularly is important to avoid missing key potential contributors. Special attention is given to include stakeholders from diverse backgrounds: economically, socially, and gender-specific and marginalized groups. If low engagement occurs in any group, these stakeholders shall be engaged in a more targeted issue-specific way. The stakeholder list tracks responses to stakeholder events and when new stakeholders are added to the list. Attendance sheets at the events ask for information that allow for the project proponent to monitor gender and stakeholder type (landowner, state agency, organization affiliation, etc).

As per VCS Standard 3.18.18, the project proponent shall take all appropriate measures to communicate and consult with local stakeholders in an ongoing process for the life of the project. The Forest Carbon Works website allows for comments to be submitted at any time and for stakeholders to indicate if they wish to be contacted. This website also includes a formal grievance process. To comply with VCS Standard 3.18.18 the project proponent shall communicate information by posting the following material on the stakeholders' page of the project proponent's website, <https://forestcarbonworks.org/stakeholders/>:

1. The project design and implementation, including the results of monitoring.
2. The risks, costs and benefits the project may bring to local stakeholders.
3. All relevant laws and regulations covering workers' rights in the host country.
4. The process of VCS Program validation and verification and the validation/verification body's site visit

Additionally, as per VCS Standard 3.18.20, all communication and consultation will be performed in a culturally appropriate manner, including language and gender sensitivity, directly with local stakeholders or their legitimate representatives when appropriate. The results of project implementation shall be provided in a timely manner and consultation shall be performed prior to design decisions or implementation to allow stakeholders adequate time to respond to the proposed design or action.

The project proponent has taken due account of all input received during the local stakeholder consultation and through ongoing communications by website updates, mailers, and a second, virtual stakeholder consultation meeting on 2 February 2023 to present feedback received to date and announce updates to the project design or justify why updates are not appropriate (VCS Standard 3.18.9). Some of these updates include potentially insensitive language changes, improving relationships with stakeholders, answering questions and providing more information to stakeholders. Further feedback from the Feb 2 meeting was incorporated into the project design accordingly.

A total of 15 people attended the 2 December 2022 meeting in-person in Little Rock, Arkansas, while 13 people attended the online consultation on 2 February 2023. A listing of all attendees, as well as all who were invited, is provided in Annex AK.

Community input is highly valued in the project, as can be seen in community meetings and opportunities for community members to express opinions about the project and its benefits. Project proponent maintains mailing lists and considers direct feedback from stakeholders through multiple

channels, including comments submitted through the project proponent's website. Periodically, the project proponent will send mail updates and surveys to registered stakeholders; future stakeholder meetings are planned to occur at least annually, with different key locations in mind as well as virtual and in-person formats in order to maximize participation (VCS Standard 3.18.4).

The project has developed a robust grievance structure should community members have complaints or comments (see Section 2.5), which will help ensure community satisfaction with the project and mitigate any unforeseen negative impacts. In the event there are any ongoing or unresolved conflicts over property rights, usage or resources, the project shall undertake no activity that could exacerbate the conflict or influence the outcome of an unresolved dispute (VCS Standard 3.18.17). Additionally, local stakeholders have been made aware of the validation/verification process during the engagement meetings and during communications with the project developer.

Current identified risks, costs, and benefits are communicated to stakeholders on the project website: <https://chestnutcarbon.com/chestnut-sustainable-restoration-project/>. These risks include potential for loss of cultural identity due to land use change from industrial silvicultural systems to conservation forests, increased risk of wildfire, limited public land use, and property price increase potential. To mitigate these risks, Chestnut Carbon plans to spread project activities over the entire United States to avoid concentrating risk to a single community, create diversified planting plans to increase forest resilience to wildfire, leverage public access programs, and limit land purchase to degraded lands only and pay no more than market price for these acquisitions. Benefits include ecological resilience, environmental protection, public use, and public education. Further benefits and contributions to the UN Sustainable Development goals are outlined in Section 1.17.

The project plans to abide by all United States laws and regulations related to workers' rights, as per Annex AQ, Annex AR, and Annex AS.

2.3 Environmental Impact

Project proponent plans to assess the environmental impact according to small and low intensity managed forest guidance required by the FSC Forest Management Standard v1.0 Indicator 6.1.a (Annex AO). These include an evaluation of water resources and riparian habitats, state and federally listed threatened and endangered species, natural heritage database consultation, and soil resources. In principle, FCW plans to enhance biodiversity and improve forest health with the goal of increased species diversity, age-class heterogeneity, spatial arrangement heterogeneity, and standing deadwood recruitment. These hallmarks of a healthy forest inherently promote wildlife diversity, soil, and water quality improvements due to variation in forage availability, improved habitat, and reduced erosion potential.

If sensitive species or habitats are found during these assessments, FCW will prepare a strategy to reduce or avoid net harm per FSC requirements.

If harvesting is approved for specific PAIs, forest management plans will ensure that all recommended state erosion control measures are followed when implementing harvest activities, as required by FSC

certification per Eligibility Criterion 7 (see Section 1.4.1). Forest Carbon Works plans to follow maximum no-touch measures in riparian areas, going above and beyond all state recommendations to ensure quality management in conformance with FSC requirements.

2.4 Public Comments

The 30-day public comment period was led by Verra with comments received at secretariat@verra.org and ended on 6 January 2023. <mailto:secretariat@verra.org> No public comments were submitted during this period.

A comment form is available on the Forest Carbon Works website, <https://chestnutcarbon.com/stakeholder-consultation-feedback-forest-carbon-works/#submit-a-comment>, in addition to hardcopy mail-in comments and voicemails directly to the FCW office. All comments will be assessed for addition to project design, recorded and addressed per VCS Standard v4.4.

2.5 AFOLU-Specific Safeguards

Impacts from the project on local stakeholders and necessary safeguards were assessed. The stakeholder identification process and a description of the results can be seen in Section 2.2 of the PD/MR.

The first potential risk to local stakeholders is an increase in property prices and rents for the general public. This risk arises from competition for land, scarcity of land, and value creation by the project. To address this risk the project proponent plans to pay no more than market price for land as informed by comparable sales data and avoid concentrating acquisitions in a single area. The second potential risk to local stakeholders is a continued limitation of public land use. To mitigate this risk the project proponent is committed to working with public agencies to transfer ownership of lands for permanent public benefit by leveraging Clear Water State Revolving Funds (CWSRF) and public conservation easement programs. Protective and/or conservation easements placed on Chestnut Properties in future monitoring periods following inclusion to the grouped project will be considered a component of the project scenario (section 1.11) rather than the baseline scenario (section 3.4).

Risks to local stakeholder resources due to project implementation were deemed negligible. If anything, implementation of the project will lessen the risks to stakeholder resources because the project reduces forest harvesting levels and requires FSC certification prior to any commercial harvesting events.

To ensure ongoing communication and consultation with local stakeholders, the project proponent will continue an open dialogue with stakeholders by maintaining an easily accessible website with a section for stakeholders to provide comments and ask questions.

Grievance Redress Procedure

The project proponent maintains a grievance redress procedure to address disputes with local stakeholders that may arise during project planning and implementation. The project proponent will have multiple culturally appropriate methods for submitting a grievance: self-identified, confidential, or anonymous procedures that all stakeholders will be made aware of in advance of project implementation. The project proponent will have a form to submit grievances available on their website, which can be submitted with or without the complainant's identity attached. Additionally, the project proponent will accept grievances submitted by mail to their office, the address of which is publicly available, and will designate a central point of contact to compile all the letters received. All grievances received will be publicly available on the project proponent's website after submission and the complainant will receive confirmation of receipt if contact information is available. During the monitoring period no conflicts arose, and no grievances needed to be resolved between local stakeholders and the project proponent. Once a grievance has been received, the project proponent will attempt to resolve the grievance following a three-stage approach:

1. The project proponent will attempt to amicably resolve the grievance and provide a written response to the grievance in a manner that is culturally appropriate.
2. If there are any grievances received that cannot be resolved internally or via amicable negotiation, then the grievance shall be referred to the Consensus Building Institute for third-party mediation (<https://www.cbi.org/>).
3. Finally, if mediation does not resolve the grievance, it shall be referred to the appropriate, competent jurisdiction within the United States of America Court System without prejudice to a party's ability to submit the grievance to a competent supranational adjudicatory body, if any.

The grievance redress procedure is made publicly available on the stakeholders' page of the project proponent's website, directed to: <https://forestcarbonworks.org/grievance-procedure/>.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Title: Methodology for IFM through Extension of Rotation Age

Reference: VM0003

Version: 1.3

The following tools were utilized for the development of this project:

Title: UNFCCC CDM Tool for the demonstration and assessment of additionality

Version: 7.0.0 (Annex R)

Title: AFOLU Non-Permanence Risk Tool

Version: 4.0

Title: Calculation of the number of sample plots for measurements within A/R CDM project activities

Version: 02.1.0

Title: Tool for testing significance of GHG emissions in A/R CDM project activities

Version: 01

3.2 Applicability of Methodology

The following table demonstrates and justifies how all project activity meets the applicability conditions of the VM0003 Methodology. All tools used as listed above in Section 3.1 are listed in the methodology and their applicability conditions are as follows:

The CDM Tool for the demonstration and assessment of additionality v7.0.0 and the AFOLU Non-Permanence Risk tool have no applicability conditions relevant to this project. The A/R Methodological Tool Calculation of the number of sample plots for measurements within A/R CDM project activities has “no internal applicability conditions.” The applicability of the Tool for testing significance of GHG emissions in A/R CDM project activities” (Version 01) states that it shall be used in the application of a CDM approved A/R methodology, thus this condition is met.

Table 10: Applicability of Methodology

VM0003 Applicability Conditions	Project Conditions
<p>Forest management in both the baseline and project scenario involves harvesting techniques such as clear cuts, patch cuts, seed tree, continuous thinning or group selection practices.</p>	<p>Per Eligibility Criterion 3 (see Section 1.4.1), the baseline model must be even-aged management which requires harvesting techniques such as clear cuts, patch cuts and seed tree. Per Eligibility Criterion 6, the baseline model must match the baseline scenario as demonstrated by the provision of a THP. Therefore, the baseline scenario must involve harvesting techniques such as clear cuts, patch cuts and seed tree. See section 3.4 for baseline scenario management.</p> <p>Per Eligibility Criterion 5, the project scenario must include techniques such as patch cuts, continuous thinning or group selection practices according to a policy maintained by the project proponent (see Annex BC). See section 1.11 for project scenario management.</p>
<p>Forests which are not subject to timber harvesting or managed without an objective for earning revenue through timber harvesting in the baseline scenario are not eligible under this methodology.</p>	<p>Per Eligibility Criterion 6 (see Section 1.4.1), the baseline scenario shall be timber harvesting as common practice to the region. Per Eligibility Criterion 3, the baseline model shall not be unmanaged and therefore must be subject to timber harvesting to be comparable to the baseline scenario as required by Eligibility Criterion 6. See section 3.4 for baseline scenario.</p>

<p>Prior to the first verification event, the project area must meet one of the following conditions: Certified to Forest Stewardship Council (FSC); OR Subject to an easement, or equivalent instrument, recorded against the deed of property that prohibits Commercial Harvesting for the duration of the crediting period, unless later certified to FSC.</p>	<p>Per Eligibility Criterion 7 (see Section 1.4.1), all PAIs will be certified by the FSC prior to the first verification event OR will be subject to an easement, or equivalent instrument, recorded against the deed of property that prohibits Commercial Harvesting for the duration of the crediting period, unless later certified to FSC.</p>
<p>Project proponents must define the minimum project length in their project description document.</p>	<p>The minimum project crediting period length is 25 years, as stated in Section 1.9. Project activity shall occur for at least 60 years, defined by Eligibility Criterion 2e and demonstrated in Annex D.</p>
<p>The project does not encompass managed peat forests and the proportion of wetlands are not expected to change as part of the project.</p>	<p>Per Eligibility Criterion 1 (see Section 1.4.1), no peat forests will be included in the project, nor will the proportion of wetlands change as part of project activity per Eligibility Criterion 5.</p>
<p>Project proponents must have a projection of management practices in both with and without project scenarios.</p>	<p>Per Eligibility Criterion 3 (see Section 1.4.1), a projection of project scenario (section 1.11) and baseline scenario (section 3.4) shall be modeled.</p>
<p>If fire is used as part of forest management then fire control measures, such as installation of fire-breaks or back-burning, must be taken to ensure fire does not spread outside the project area—that is, no biomass burning must be permitted to occur beyond the project area due to forest management activities.</p>	<p>Per Eligibility Criterion 2i, no fire management that causes any emissions can be used as part of management. Further, the project proponent maintains a policy (Annex Q) that if fire is used as part of forest management then fire control measures, such as installation of fire-breaks or back-burning, must be taken to ensure fire does not spread outside the project area, refer to Annex D.</p>
<p>There may be no leakage through activity shifting to other lands owned or managed by</p>	<p>Per Eligibility Criterion 2d and 5 (see Section 1.4.1), the project does not allow for activity shifting leakage due to all forested lands of</p>

project proponents outside the bounds of the project area.

every project activity instance being enrolled in the project.

3.3 Project Boundary

Table 11: Project Boundary in the Baseline and Project Scenarios

Source	Gas	Included?	Justification/Explanation	
Baseline	Burning of Biomass	CO ₂	No	Excluded per Section 5.1 of the VM0003 Methodology
		CH ₄	Yes	Included per Section 5.1 of the VM0003 Methodology
		N ₂ O	No	Excluded per Section 5.1 of the VM0003 Methodology
		Other	N/A	N/A
Project	Burning of Biomass	CO ₂	No	Excluded per Section 5.1 of the VM0003 Methodology
		CH ₄	Yes	Included per Section 5.1 of the VM0003 Methodology
		N ₂ O	No	Excluded per Section 5.1 of the VM0003 Methodology
		Other	N/A	N/A

Table 12: Carbon Pools Included and Excluded in the Project Boundary

Carbon pools	Selected	Justification / Explanation of choice
Above ground biomass, credited	Yes	Major carbon pool subjected to the project activity, eligible for VCU accounting and issuance
Above ground biomass, uncredited reserve stock (URS)	No, however subject to verification	Portion of the major carbon pool which will be subject to the project activity but will conservatively not contribute towards VCU accounting and issuance (see Section 3.6).
Below ground biomass	Yes	Below ground biomass stock is expected to increase due to the implementation of the VCS IFM project activity. Below ground biomass subsequent to harvest is not assessed with the conservative assumption of immediate emission.

Dead wood, Standing, credited	Yes	Included per Section 5.1 of the VM0003 Methodology; project proponent may elect to include dead wood as long as it represents less than 50% of the total carbon volume on site in any given year
Dead wood, Standing, uncredited reserve stock (URS)	No, however subject to verification	Included per Section 5.1 of the VM0003 Methodology; project proponent may elect to include dead wood as long as it represents less than 50% of the total carbon volume on site in any given year. Portion of the standing dead wood pool that will be subject to the project activity but will conservatively not contribute towards VCU accounting and issuance (see Section 3.6).
Dead wood, Lying	Yes	Included per Section 5.1 of the VM0003 Methodology; project proponent may elect to include dead wood as long as it represents less than 50% of the total carbon volume on site in any given year.
Litter	No	Changes in the litter pool will be <i>de minimis</i> as a result of rotation extension.
Soil organic carbon	No	Changes in the soil organic carbon pool will be <i>de minimis</i> as a result of rotation extension.
Wood products	Yes	This stock may increase or decrease (relative to the baseline due to implementation of the project activity). Section 5.1 of VM0003 methodology allows for inclusion of this pool and contains an accounting approach if evidence cannot “be provided that carbon stocks in wood products are rising faster in the project case than in the baseline or are decreasing faster in the baseline than in the project case.”

A map of the initial project area is provided in Section 1.12. Refer to Annex B0.



**Instance Map:
Saline Bluff, Arkansas**

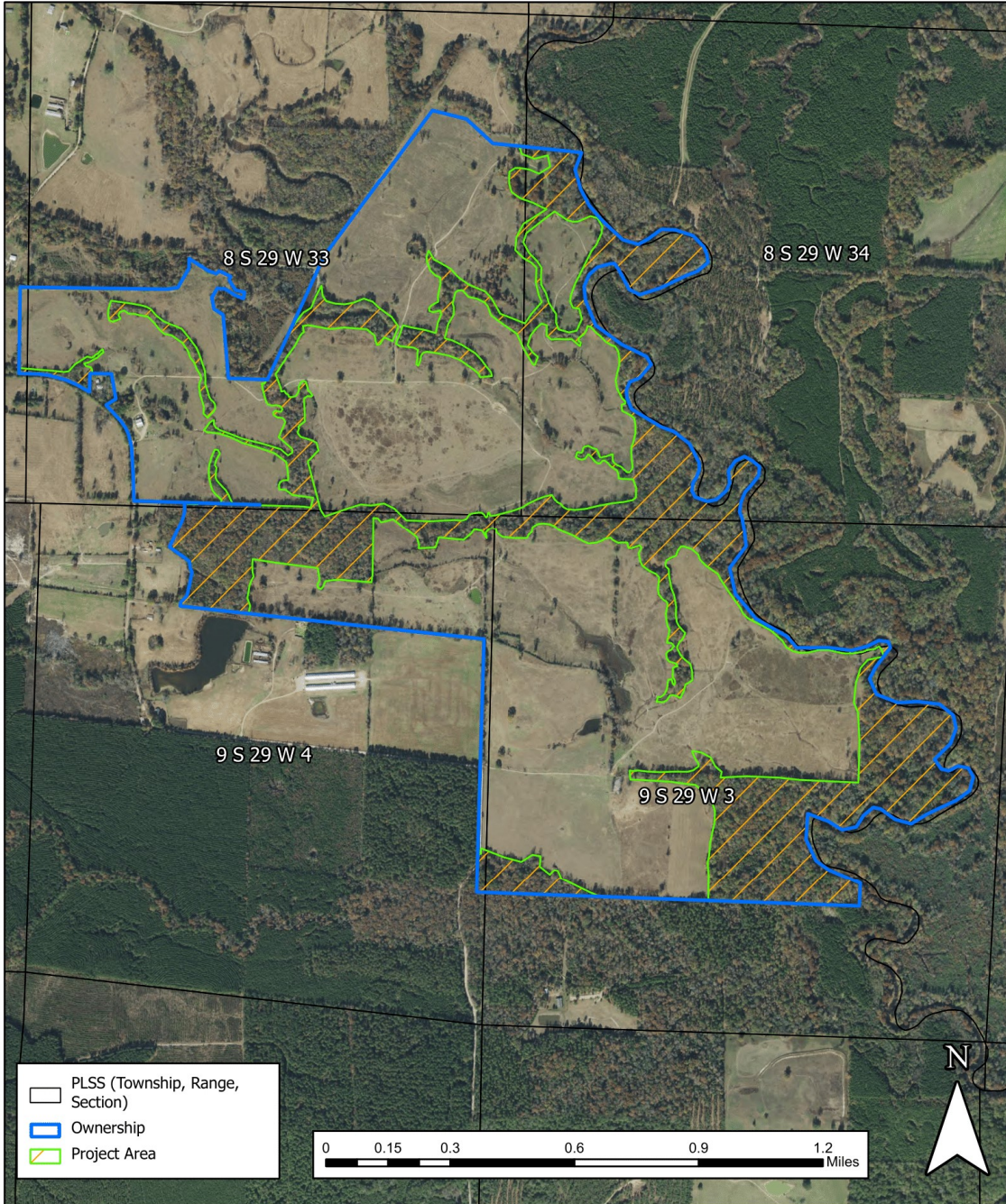


Figure 2: Boundaries and project location of the Saline Bluff instance



**Instance Map:
Fourche La Fave, Arkansas**

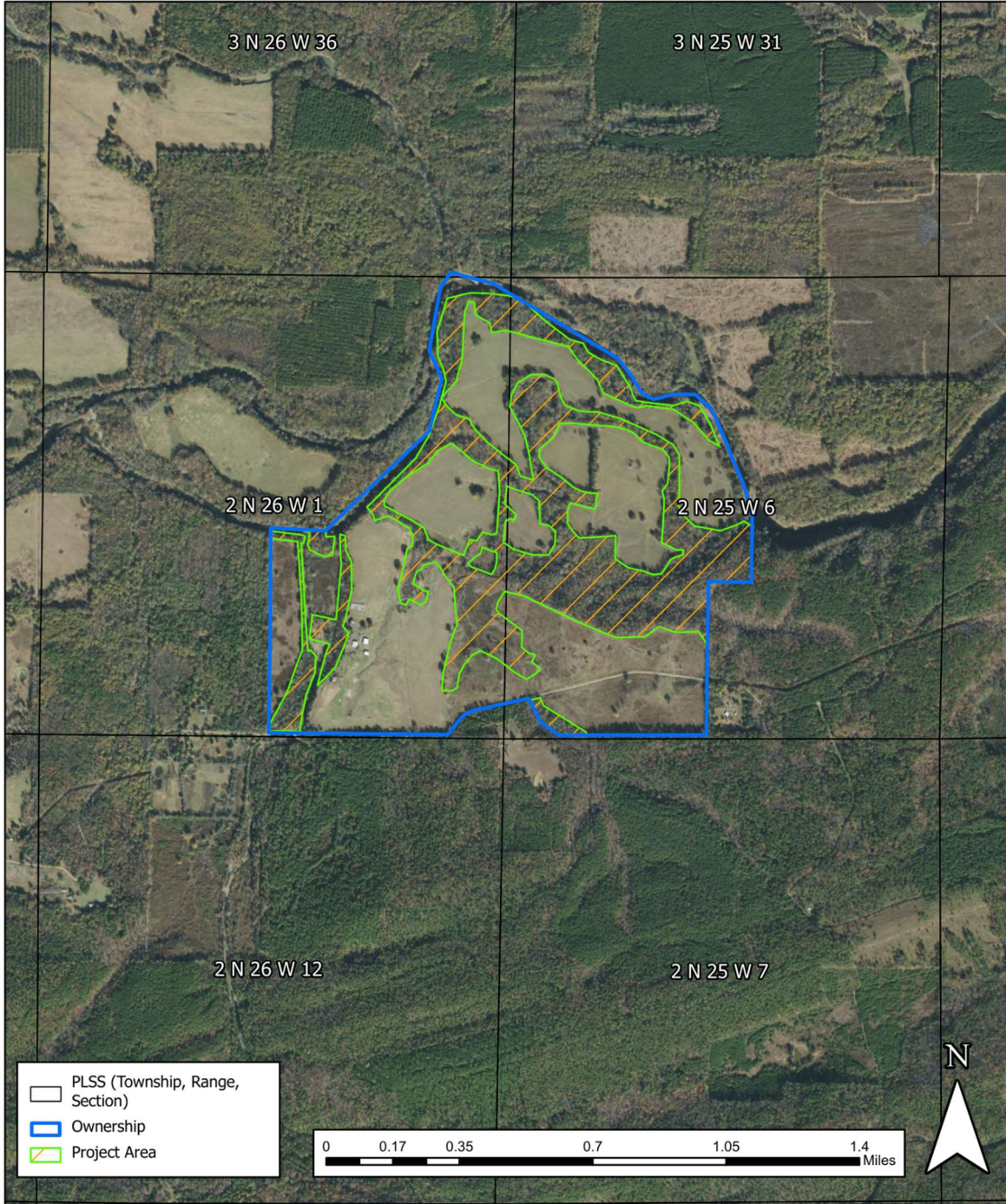


Figure 3: Boundaries and project location of the Fourche La Fave instance



**Instance Map:
Hickls, Arkansas**

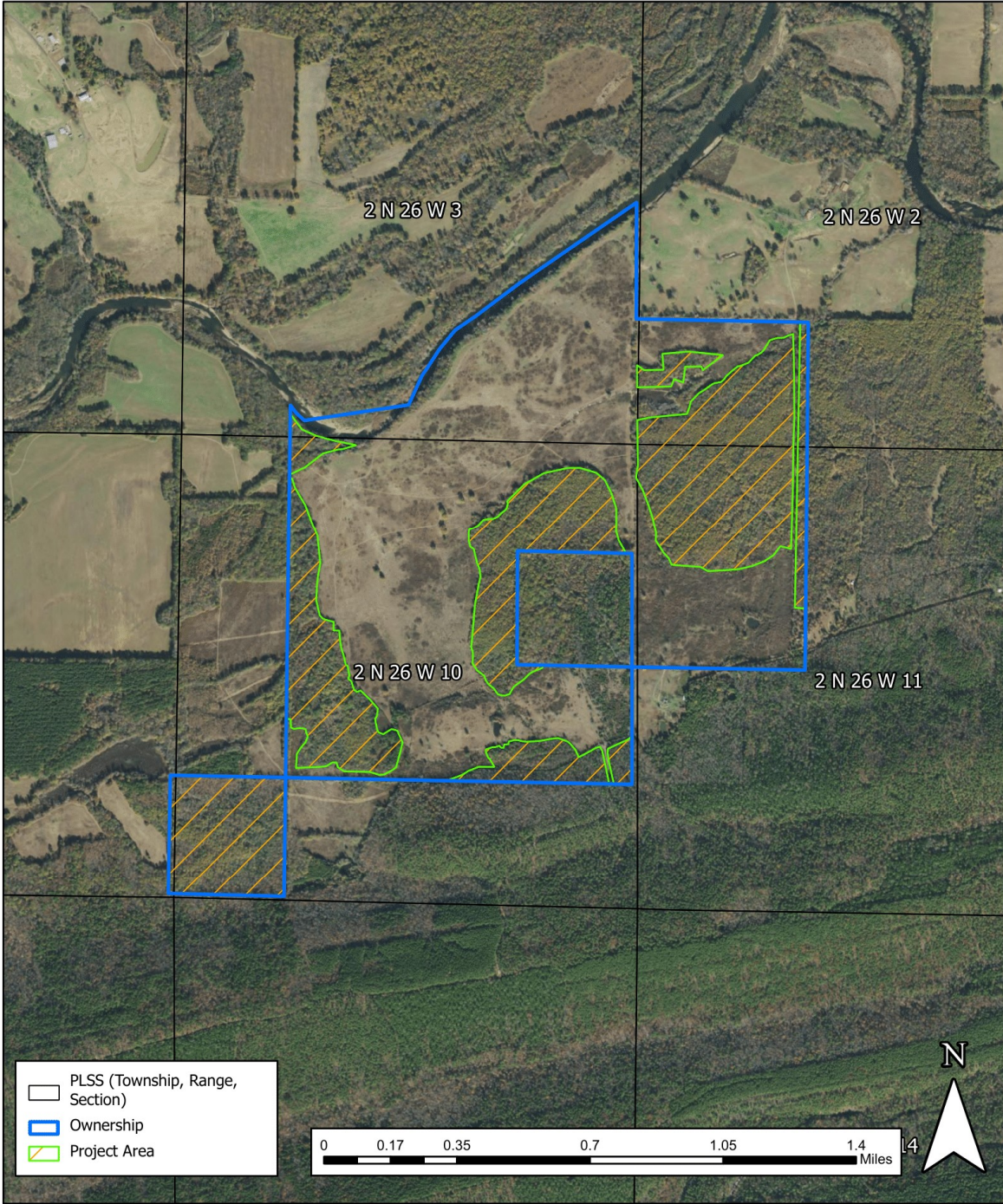


Figure 4: Boundaries and project location of the Hickls instance



**Instance Map:
Rooks Ranch, Alabama**

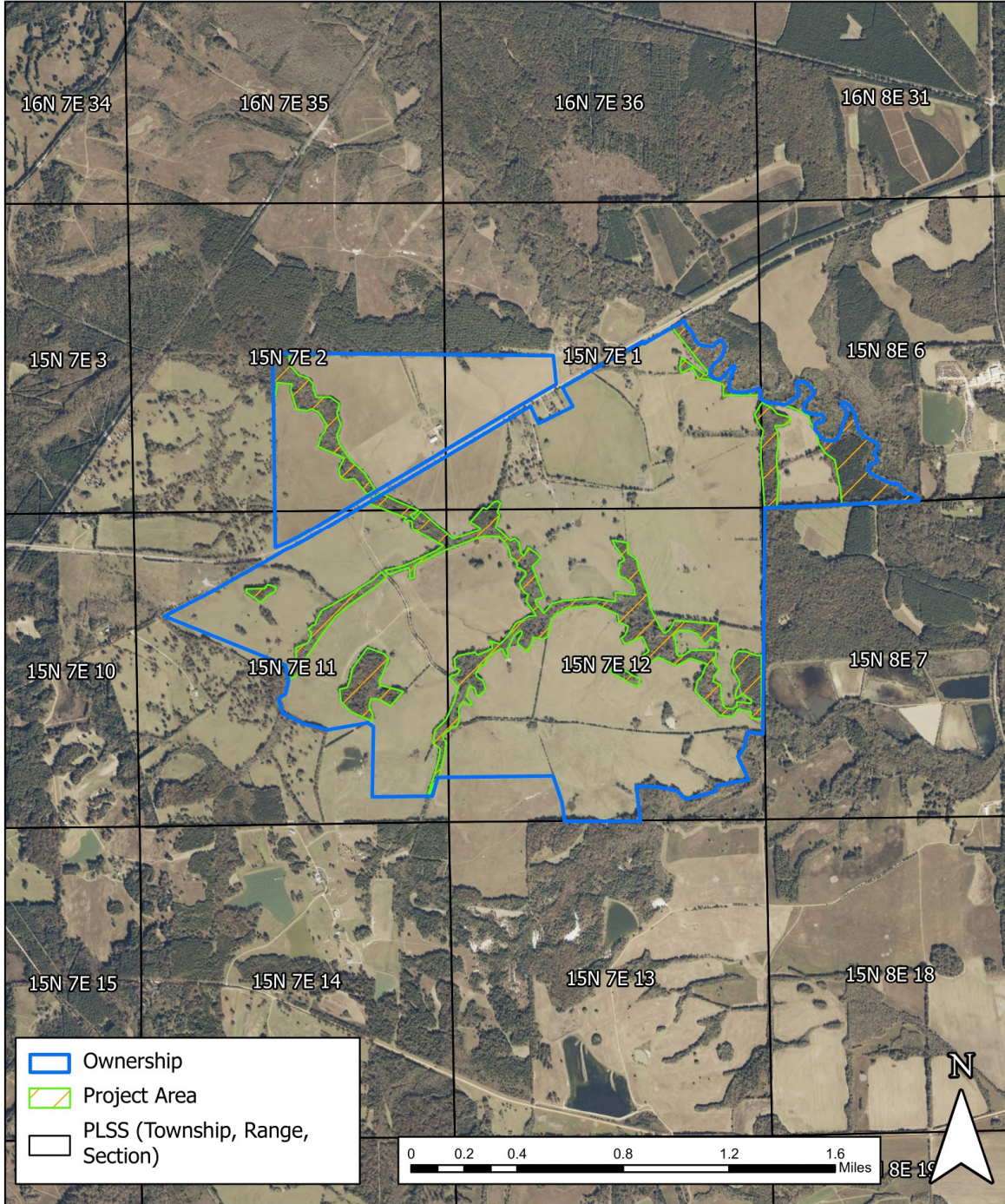


Figure 5: Boundaries and project location of the Rooks Ranch instances



**Instance Map:
Black River, Arkansas**

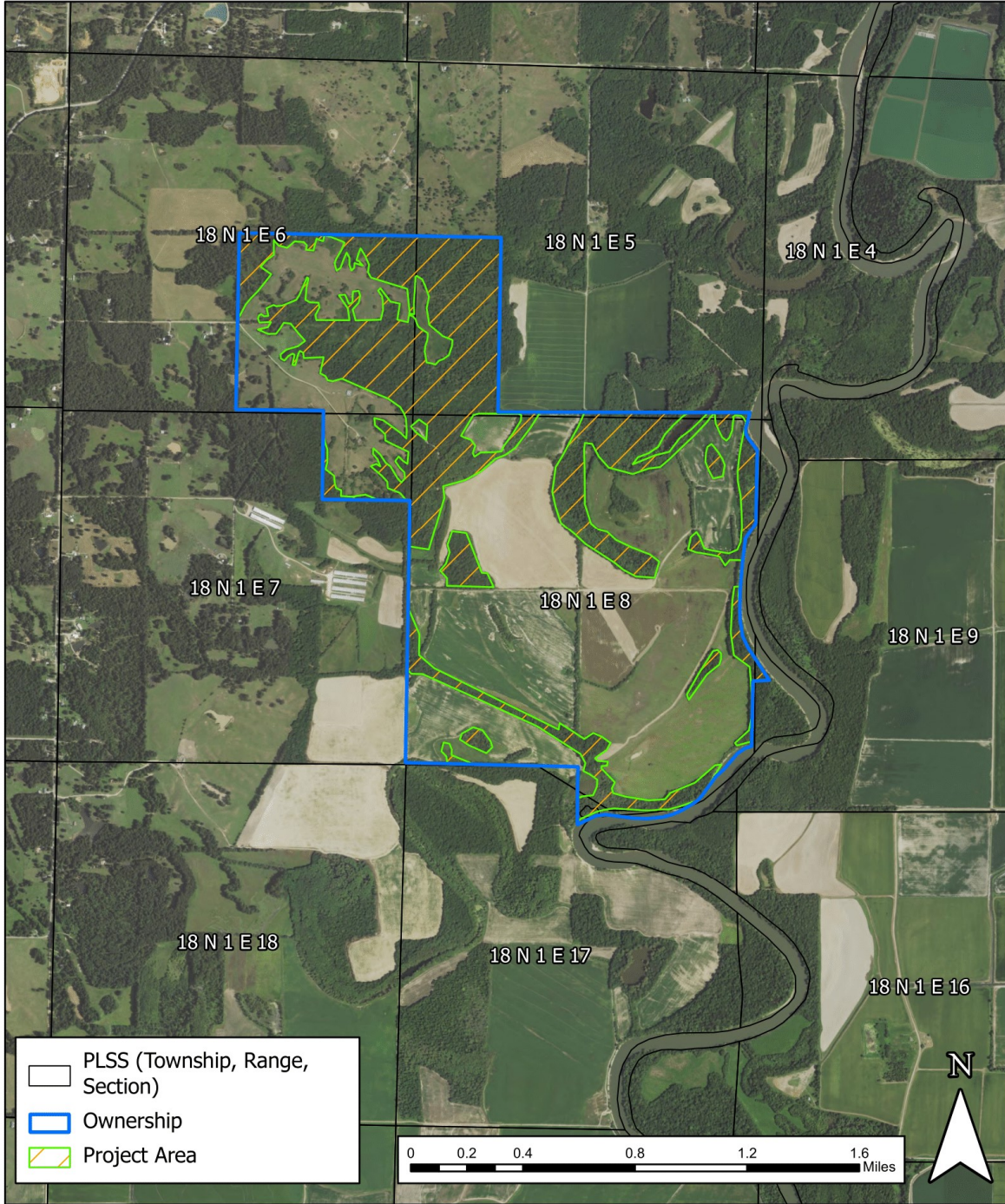


Figure 6: Boundaries and project location of the Black River instance



Instance Map:
Harding/Freed & Dickson, Arkansas

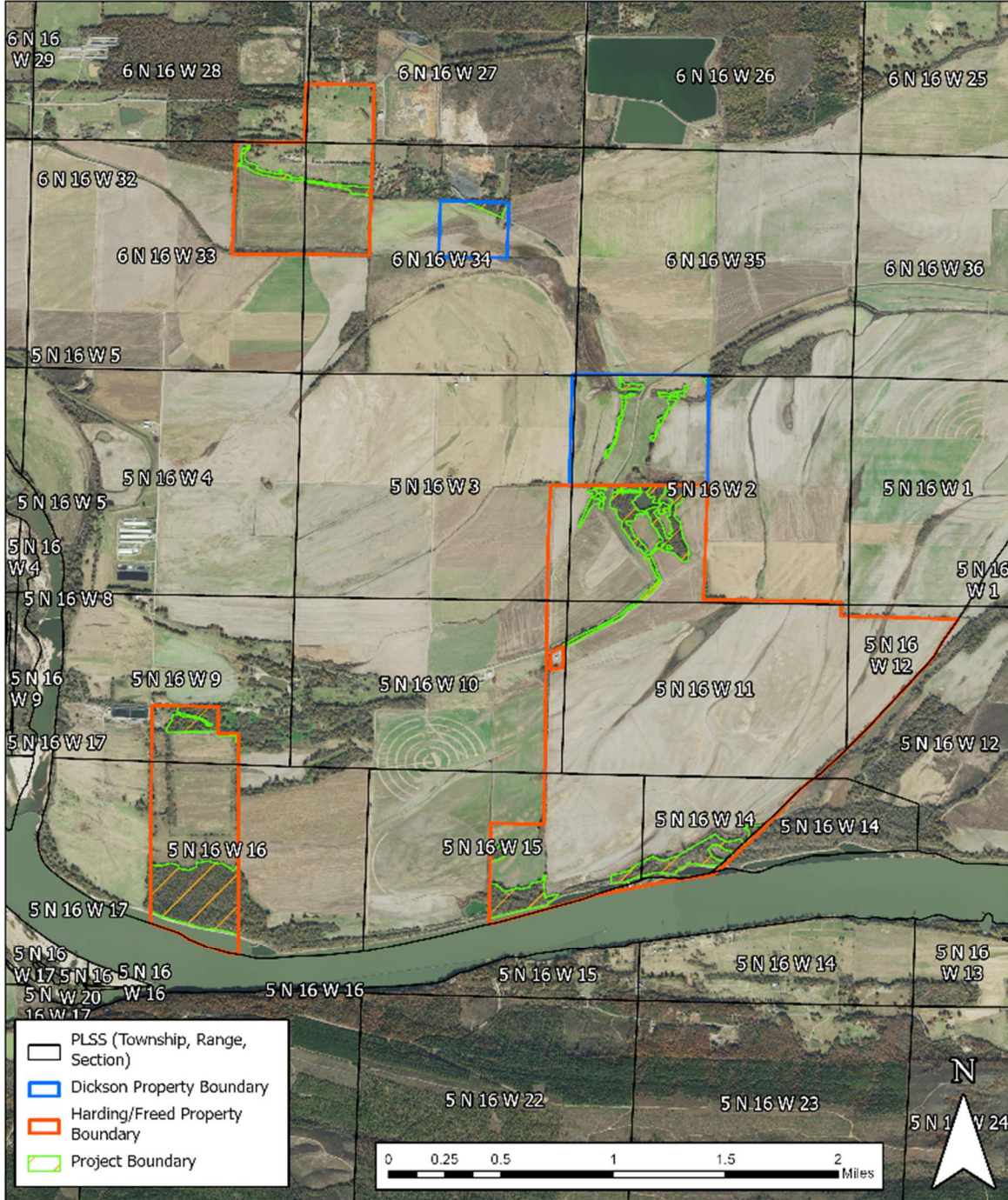


Figure 7: Boundaries and project location of the Harding/Freed & Dickson instances



Instance Map:
EI Ranchos, Arkansas

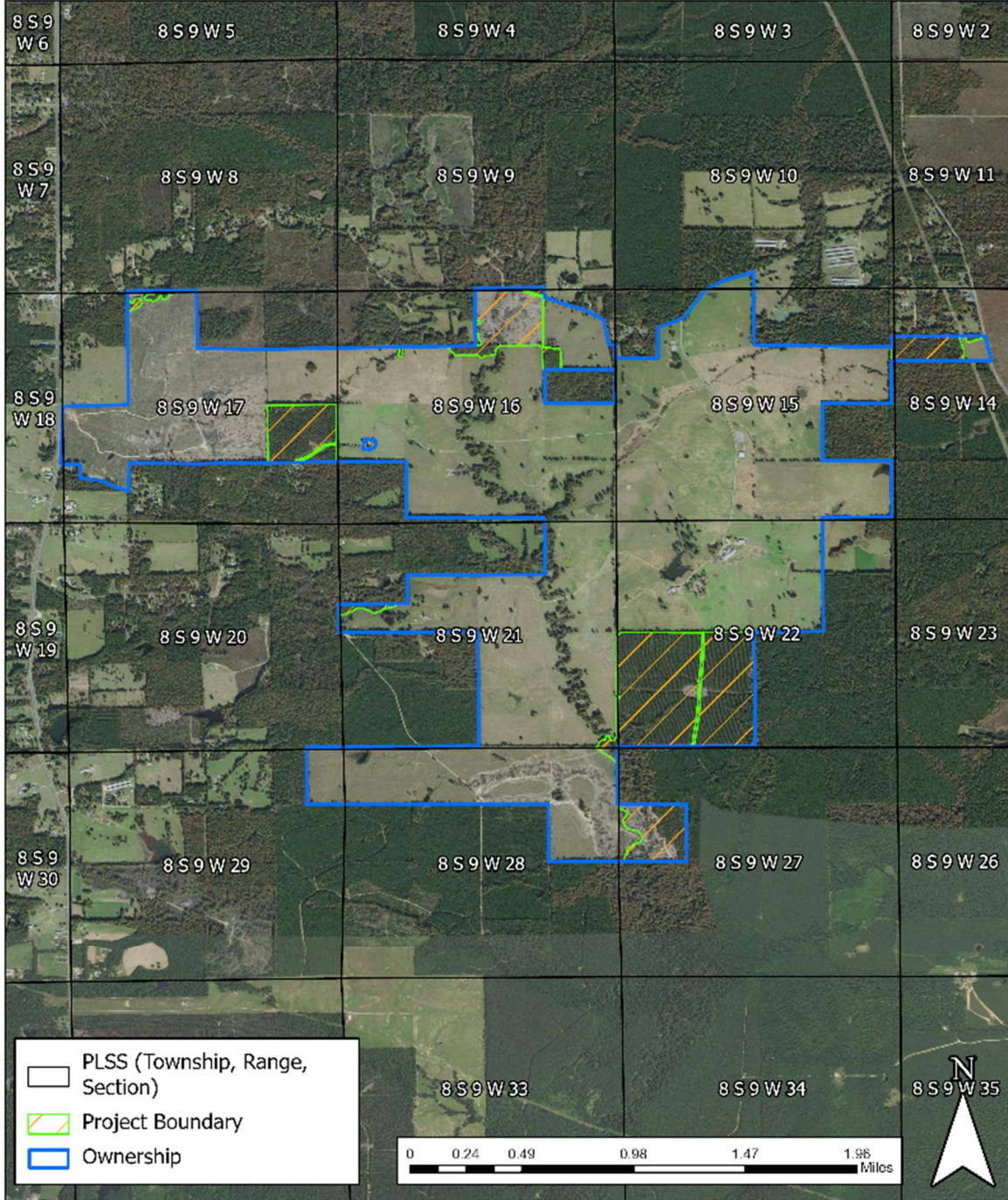


Figure 8: Boundaries and project location of the EI Ranchos instance

3.4 Baseline Scenario

According to the VM003 methodology Section 6.3 “Determination of Baseline Scenario”, four credible alternative forest management scenarios must be evaluated to determine the Baseline Scenario. These scenarios are as follows:

- Continuation of the pre-project forest management (Historical Baseline),
- Legal requirements for forest management in the region (Legal Baseline),
- Common practice forest management in the region (Common Practice Baseline), and
- Forest management as modeled under the project but in the absence of registration as an IFM project activity.

Per VCS Standard 3.6.13, all factors relevant to the determination of the baseline scenario have been assessed across the entire grouped project geographic area.

Historical Baseline: Some Chestnut Properties (defined in Section 1.4) have been subject to moderate forest management in the past from previous landowners. However, historical records of forest management for the 20 years proceeding project start date are unavailable. Per the VM0003 Methodology, if these records are not available “the project must be developed using the Legal or Common Practice Baselines.”

Legal and Common Practice Baseline: The common practice within geographic regions in which the Chestnut Properties are located is to maximize net present value to the landowner by utilizing even-aged harvesting while complying with all relevant laws and regulations applicable to the baseline scenario. As this is the same scenario as the Legal Baseline, Common Practice and Legal Baselines are considered to be identical.

To validate the baseline scenario, a comparable timber harvesting plan (THP) (Annex A) is required for each PAI as demonstration of common practice per Eligibility Criterion 6 (see Section 1.4.1). The timber harvest plan provided is comparable to a typical forest management regime for the region in which the Chestnut Properties are located. As forest management in the US South is dominated by growing pines and utilizing even-aged harvesting to maximize net present value, this was chosen as the baseline scenario and is reflected in the baseline model.

Prior to the subsequent addition and verification of any new PAIs to the grouped project, the legality and plausibility of the baseline scenario for each added PAIs shall be confirmed by an independent forest consulting entity in order to comply with the guidance for defining the legal baseline in Section 6.3 of VM0003. The independent forest consulting entity shall render an attestation of substantive form, see Appendix B and Annex BD. Per Section 6.3 of the VM0003 Methodology, the independent forest consulting entity reviewed and approved as common practice elements of the baseline scenario related to a) harvest rotations, b) harvest methods, c) species harvested and planted, d) no harvest zones, e) riparian management areas, f) areas of steep slopes or unstable soils, and g) maximum patch cut areas. The consultant reached their determination of the plausibility of the baseline scenario by examining management practices used within the baseline model and comparing them to what they have seen throughout their career practicing forestry in the US South. A determination of the baseline

scenario’s plausibility can consider local operational and/or economic dynamics, such as contractor availability and rates. An independent forest consulting entity is any person not directly involved with the project and is qualified to practice forestry in the United States. Independent forest consulting entities may include those qualified individuals working for industry, university, non-profit, federal, state, county, or local government, or that identify as a forestry consultant.

With respect to the Chestnut Properties (see Section 1.4), it is common practice to apply even-aged rotation forestry, as demonstrated by conformance with Eligibility Criterion 6. Following harvest, site prep typically involves chemical herbicide treatment prior to the replanting of seedlings.

Description of baseline management systems used in carbon stock quantification for the Chestnut Properties.

Baseline Management System	Description
CLR 1	Commercial thin from below down to 6.503 sq m (70 sq ft) BA/ac in year 15. Commercial thin from below down to 6.503 sq m (70 sq ft) BA/ac in year 25. Rotation harvest in year 33. Plant with loblolly pine at 400 trees/acre following rotation harvest
SMZ – AR	Only relevant if PAI is in the state of Arkansas. Commercial thin from above down to 4.645 sq m (50 sq ft) BA/ac every 10-20 years
SMZ – AL	Only relevant in the state of Alabama. Commercial thin from above down to 50% canopy cover every 10-20 years
SMZ / GAP 2	Same as SMZ per state, with some overlap of US protected areas shapefile (no effect on harvesting)
SMZ / RFM	Same as SMZ per state but with awareness of potential invasive species (no effect on harvesting)

Refer to the management stratification table in Section 5 for more detail on the application of the baseline management systems.

Forest management modeled under project in absence of registration as IFM project : As per Eligibility Criterion 3 (see Section 1.4.1), forest management of the baseline and project scenarios shall be modeled over a 100-year period using the US Forest Service Forest Vegetation Simulator (FVS) software. FVS is a forest growth and yield model that allows for region-specific parameterization across the United States.

Assuming a fixed stumpage price across scenarios, then comparison of revenues between the baseline and project scenarios is equivalent to the comparison of harvest volumes across scenarios. To demonstrate that revenue generated from ERA selective harvest is lower than the common practice baseline scenario, it is sufficient to demonstrate that harvest volumes in the project scenario are lower than the baseline scenario.

For the Chestnut Properties, the expected harvest volume in the project scenario is lower than the baseline scenario, and therefore the expected revenue from harvesting in the project scenario is lower

than the baseline scenario as demonstrated by conformance with Eligibility Criterion 3. For harvest volumes in the baseline scenario see Annex AG. Harvest volumes in the project scenario are assumed to be less than the baseline scenario because forests in the project scenario will be managed as patch cuts, continuous thinning or group selection for the goal of long-term carbon storage, rather than maximizing net present value through timber harvests (IFM-1, see section 1.11).

To comply with VCS Standard V4.4 Section 3.2.8, the baseline will be reassessed every 10 years. The baseline model will be rerun using the best available inventory data to reflect operational constraints present prior to the project start date. Protective easements enacted as a result of the project, such as Annex D, or similar conservation easements that may prohibit or limit harvesting will be relevant to the project scenario and not the baseline scenario for the purposes of baseline reassessment. The modeling horizon will be through 2122, which is 100 years from the project start date.

3.5 Additionality

Additionality was determined using version 7.0.0 of the UNFCCC CDM Tool, Annex R, for the demonstration and assessment of additionality.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

As determined in Section 1.4 above, all Chestnut Properties shall meet listed eligibility criteria to demonstrate additionality. All properties shall meet Eligibility Criterion 6, that the baseline scenario (see section 3.4) is common practice for the region which excludes extension of rotation age (IFM ERA).

Sub-step 1a: Define alternatives to the project activity

Alternative scenarios include:

- a. The proposed activity is undertaken without being registered as a CDM project activity. Without carbon revenue from the sale of certified emissions reductions, there is no financial incentive for the project proponent to participate in forest management.
- b. Other alternative scenarios to the project activity that deliver outputs with comparable quality. Activities similar to the project activity occur on at least part of the land within the project area resulting from legal requirements.
 - i. It is possible, although unlikely, that local or federal governments could enact laws banning the common practice scenario.
- c. Continuation of pre-project land use. This alternative scenario reflects the baseline scenario (section 3.4), where the Project Area continues to be used for common practice even-aged forest management.

Sub-step 1b: Consistency with mandatory laws and regulations

All scenarios above will be in compliance with applicable state and federal legal requirements. Per Eligibility Criterion 2g, the project proponent will abide by all federal, state, and local regulations. See Section 1.14 for a comprehensive list of all laws relevant to the project activity and project proponent.

Step 2: Investment Analysis

Sub-step 2a: Determine appropriate analysis method

Per Eligibility Criterion 6, the baseline scenario (section 3.4) is common practice, so by methodology definition of common practice, the goal was to “maximize net present value to the landowner by utilizing even-aged harvesting while complying with all relevant laws and regulations.” The chosen analysis method is an investment comparison approach using Net Present Value (NPV) to be outlined in subsequent steps 2b through 2d. Reference workbooks with calculations will be provided at verification.

Sub-step 2b & 2c: Application & calculation and comparison of financial indicators

Standard market parameters are based on regional data provided by foresters familiar with local data. Project proponents estimated costs based on previous project estimates. Real discount rate was estimated to be 7%.

The timeline for analysis reflects the 25-year crediting period, which roughly equates to two cycles of thinning in the baseline scenario, one at 15 years as recommended by a regional forester. The NPV for the baseline scenario was \$522,803 while the NPV for the project scenario was (\$667,610), as shown in Annex AD. The difference in NPV between the two scenarios was driven largely by the carbon project development costs and reduced harvest volumes in the project scenario. According to regional foresters listed in Annex BD, uneven-aged management as described in the project scenario in the Southeast is uncommon. In the project scenario, harvest removals were modeled at 1-ton green fiber per acre, once during the 25-year period, conservatively at Year 1. Current stumpage prices for pulp and sawlogs were provided by the University of Arkansas agriculture extension, see Annex C. Road and gravel prices are estimated by regional foresters familiar with the costs for the area.

The NPV difference between the project and baseline scenarios is significant, indicating that the project activity is not the most financially attractive option compared to the baseline scenario (see section 3.4).

Sub-step 2d: Sensitivity analysis

Sensitivity analysis for the above NPV indicator was calculated with a range of 10% change in costs and revenues for each scenario. The optimistic scenario used an assumption of an additional 10% revenue in harvested products, and 10% less upfront costs. The pessimistic scenario assumed a negative 10% change in harvest revenue, and an additional 10% initial cost. The real discount rate stayed constant at 7%.

Table 13: Sensitivity Analysis

	Pessimistic	Assumed	Optimistic
Harvest Volume	-10%	0%	+10%

Costs	+10%	0%	-10%
Discount Rate	7%	7%	7%
Project Scenario	(\$768,529)	(\$667,610)	(\$628,796)
Alternative Scenario	\$444,494	\$522,802	\$601,110

The results of the sensitivity analysis show that the proposed project activity is less financially attractive than the baseline scenario of common practice management (see section 3.4). Workbooks with all financial calculations shall be provided at verification.

Step 3: Barrier Analysis

Optional, skipped to step 4.

Step 4: Common practice analysis

Sub-step 4a: The proposed CDM project activity applies measures that are listed in the definitions section above

Per Eligibility Criterion 5, the project activity cannot apply any of the measures that are listed in the definitions section above as the only permitted measure is IFM ERA. Does not apply, skipped to Sub-step 4b.

Sub-step 4b: The proposed CDM project activity does not apply any of the measures that are listed in the definitions section above

According to a regional forester listed in Annex BD, there are no other project activities in the region similar to the project scenario due to the common practice of uneven-aged forest management (see section 1.11). Since this activity is unique to the region, the project is considered additional.

3.6 Methodology Deviations

The project deviates from the procedures set out in VM0003 by applying an alternative method for related to the criteria and procedures for monitoring that is more efficient for project-specific circumstance, achieves the same level of accuracy and results and is more conservative than what is set out in the methodology. The deviation does not have an impact on the applicability conditions, additionality, or the appropriateness of the baseline scenario (section 3.4). The relevant parameter has been defined in both Section 6.1, Data and Parameters Available at Validation, and Section 7.1, Data and Parameters Monitored. The consequences of the deviation are reported in Section 7.5, Table 25.

Uncredited Reserve Stock

The uncredited reserve stock (URS) is a division of the above ground biomass and standing dead wood carbon pools (see Section 3.1). The uncredited reserve stock (URS) represents a small portion of

project carbon stocks that are subject to the project activity but will conservatively not count towards VCU accounting or issuance. The URS is calculated as nine percent (9%) of the initial carbon stock of all PAIs as quantified at the time of addition of each PAI to the grouped project.

Contributions to, and depletions from, the URS shall be tracked at the PAI level. A PAI's contribution to the uncredited reserve stock will occur once upon enrollment into the grouped project. The balance of the uncredited reserve stock must be included in all future monitoring reports and the balance shall be within the scope of verification however not a selected pool.

Upon first enrollment to the grouped project, the PAI's contribution to the URS shall be quantified as nine percent (9%) of total carbon in the AGBG Living and AG Standing Dead pools. This procedure is further described in Section 5.1. For Chestnut Properties' contributions to the URS, see Table 25.

The purpose of the URS is to establish a dedicated carbon pool that can be depleted to account for carbon removed from the project boundary due to limited harvesting activities to promote forest health according to the policies of Forest Carbon Works, such as limited continuous thinning, which aim to maintain forest vigor and improve structural characteristics to the benefit of added carbon removal by residual trees over time.

Maintenance of Accuracy

The URS does not negatively impact the accuracy of quantified emissions reductions and removals as there is no change in the calculation of uncertainty (Annex O). The calculation of uncertainty includes the URS (Annex BE).

Conservativeness of Quantification

The deduction of URS from the initial carbon stock is conservative because it reduces crediting of emissions in the baseline scenario relative to the outcome where it had not been deducted. The tables below provide a comparison of the VCU's eligible for issuance between the *with* and *without* URS accounting scenarios, including relevant intermediate calculations. These tables show that the quantity of VCUs eligible for issuance are 1,864 with the URS compared to 1,919 without the URS. Analysis workbooks containing the underlying calculations for URS accounting scenarios have been provided to the validation/verification body (Annex P and Annex AY). This evidence demonstrates that the methodology deviation does not result in an overestimation of net GHG emissions reductions or removals and is therefore conservative.

With Uncredited Reserve Stock

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Uncertainty Deduction (%)	Net GHG emission reductions or removals (tCO ₂ e)	Buffer pool allocation	VCU's eligible for insurance
2022	-167	2,167	466	7.8%	1,722	258	1,464
2023	-45	592	127	7.8%	470	70	400
Total	-212	2,759	593	7.8%	2,192	328	1,864

Without Uncredited Reserve Stock

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Uncertainty Deduction (%)	Net GHG emission reductions or removals (tCO ₂ e)	Buffer pool allocation	VCU's eligible for insurance
2022	-238	2,167	481	7.8%	1,775	266	1,508
2023	-62	592	131	7.8%	483	72	411
Total	-300	2,759	612	7.8%	2,258	338	1,919

4 IMPLEMENTATION STATUS

4.1 Implementation Status of the Project Activity

The proposed project activities are transitioning forestland into sustainable, uneven-aged silvicultural systems using group selection, patch cuts and continuous thinning, where appropriate (IFM-1, see section 1.11), to generate GHG emissions reductions across the project area. These silvicultural systems differ from typical forest management in the region of the activity instances, as shown in Annex BD. These transition activities also include the application of special silvicultural treatments that accelerate the recruitment of trees into standing dead wood, among others. The project proponent is currently in the early stages of implementing the project activities in the project area and plans to continue implementation throughout the current monitoring period. Project activities leading to the intended GHG benefit commenced for the eight Project Activity Instances during this monitoring period. No project activities commenced prior to this monitoring period, so there are no project activities that will continue to be implemented during the current monitoring period. Additionally, there are no harvest

activities or other events that may impact the quantification of project emissions occurring in the project area during the current monitoring period. Per Annex BB, forest management in the project area is limited to activities that are positive from a carbon sequestration standpoint.

Non-permanence risk factors are monitored and assessed each monitoring period. Natural risk factors are evaluated on a regional basis, and internal and external risks are evaluated on a project basis, with some filtering of PAIs by the addition of eligibility criteria for joining the project. Risk scores are reduced through the use of mitigation strategies as detailed in the Non-Permanence Risk Report. The parameters A_i , A_p , and T are required to assess non-permanence risk. These parameters are used to calculate the internal, external, and natural risks to the project's permanence. The monitoring and management procedure for these parameters is described in Section 6.2.

Leakage is calculated and assessed each monitoring period. The parameters PMP_i , PML_{FT} , DBH , and H are required to assess leakage. These parameters are used to calculate LF_{ME} , the leakage factor for market effects calculations, which can be used to determine $LK_{MarketEffects}$, the total GHG emissions due to market-effects leakage through decreased timber harvest. The monitoring and management procedure for these parameters is described in Section 6.2. There are no parameters required to assess activity-shifting leakage because the only associated landowner at the time of validation, Chestnut, has enrolled all forested lands in their ownership per the MLA located in Annex D. Landowners of future project activity instances will be required to enroll all forested lands per Eligibility Criterion 2d. This will prevent any activity shifting leakage because the project proponent and associated landowners will not have any unenrolled forested lands to shift harvesting onto.

5 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

To comply with VM0003 Sections 9.3 and 8.1, the project proponent has elected to stratify the project area twice over. The first type of stratification complies with Section 9.3, to increase measuring precision by stratifying the project area into relatively homogeneous units, called measurement strata. The second type of stratification complies with Section 8.1 of the methodology, "with further division where differences exist in site index, species and/or age class," in addition to acknowledging differences in forest management systems. The second type of stratification is called management strata. Both types of stratification are used to estimate GHG emissions reductions and removals by the project.

Measurement Strata

Per VM0003 9.3, the project area was initially stratified ex-ante to increase measurement precision of carbon stock where the carbon stock of the project area is not homogeneous. The project proponent uses the National Agriculture Imagery Program (NAIP) and other aerial imagery datasets to determine differences in forest structure and species composition for sampling purposes. This first process delineates the project into areas of homogeneous forest types to determine measurement strata. Each

PAI was determined to be homogeneous, excepting the El Ranchos property, which contains two distinct forest types distinguishable using aerial imagery. Thus, the El Ranchos property was stratified ex-ante into 2 measurement strata: one mixed hardwood and one even-aged pine plantation, while the other PAIs contain one mixed hardwood measurement stratum each, equaling a total of nine measurement strata this monitoring period.

All references to variable *I* in the VM0003 equations refer to measurement strata, and all references to “Stratum” in all Annex documents refer to measurement strata.

The table below lists each measurement strata and their respective areas in hectares.

Property Name	Measurement Stratum ID	Area (hectares)
Saline Bluff	1	98.7
Fourche La Fave	2	62.8
Hickls	3	99.0
Rooks Ranch	4	74.2
Black River	5	127.4
Harding/Freed	6	58.5
Dickson	7	3.8
El Ranchos	8	60.5
El Ranchos	9	63.9

Management Strata

Following the requirements of VM0003 Section 8.1, where measurement strata have differences in site index, species, management system, or age class, the measurement stratum are further divided into management strata, also referred to as modeling units. The purpose of the secondary delineation of management strata is to ensure that all areas subject to management within a given year or within years between monitoring events comprise whole, discrete management strata. Management strata were defined using relevant factors such as site index, site species, and management regime, then used as the basis to model both the baseline (section 3.4) and project (section 1.11) scenarios. Annexes X, Y, and Z contain harvest constraints used in this management stratification.

For the purposes of emission reduction and removal accounting, following VM0003, calculations were carried out at the management strata level then aggregated into the relevant measurement stratum, as detailed in Section 7.2.

All references to variable *I* in the VM0003 equations refer to measurement strata, and all references to “Stratum” in the Annex documents shall refer to measurement strata.

The table below describes each management stratum and associated parameters used to delineate each. See section 3.4 for definitions of baseline management systems and 1.11 for project management systems.

Dominant age class is the age of dominant trees in each management stratum. The management of dominant trees is the objective of the management systems in the baseline scenario. Each management stratum may contain trees younger than or older than the dominant age class. While the dominant age class may be less than the baseline rotation age for some management strata, all age classes present at project initiation are subject to harvest in the baseline scenario. Per CLR-1 (section 3.4), management strata are subject to a first thinning at age 15 in the baseline system (Annex BD). For example, management stratum 11 would be immediately eligible for the first CLR-1 thin at age 15 as it has a dominant age class of 10-20 years.

Management strata	Measurement strata	Site Species	Site Index	Species Composition	Dominant Age Class	Baseline Management System	Project Management System	Baseline Rotation Age	Project Rotation Age	Area (hectares)
1	1	white oak	70	white oak, southern red oak, sweetgum, hickory spp., red maple, American sycamore, hackberry spp., ash spp., blackgum, water oak, overcup oak	40-60 years	CLR 1	IFM 1	+/- 33 years, intermediate entries at years 15 and 25	Infinity	51.50
2	1	white oak	70	white oak, southern red oak, sweetgum, hickory spp., red maple, American sycamore, hackberry spp., ash spp.,	40-60 years	SMZ_AR	IFM 2	Periodic entries every +/- 10 years	Infinity	47.22

				blackgum, water oak, overcup oak						
3	4	Shumard oak	85	sweetgum, hickory spp., hackberry spp., eastern redcedar, black walnut, willow oak, eastern redbud, Shumard oak, shagbark hickory, loblolly pine	60-80 years	SMZ_AL	IFM 2	Periodic entries every +/- 10 years	Infinity	35.24
4	4	Shumard oak	85	sweetgum, hickory spp., hackberry spp., eastern redcedar, black walnut, willow oak, eastern redbud, Shumard oak, shagbark hickory, loblolly pine	60-80 years	CLR 1	IFM 1	+/- 33 years, intermediate entries at years 15 and 25	Infinity	38.82
5	3	willow oak	80	white oak, sweetgum, hickory spp., red maple, water oak, eastern redcedar, post oak, American	20-40 years	CLR 1	IFM 1	Periodic entries every +/- 10 years	Infinity	0.70

				hornbeam, black oak, willow oak, eastern hophornbeam						
6	3	willow oak	80	white oak, sweetgum, hickory spp., red maple, water oak, eastern redcedar, post oak, American hornbeam, black oak, willow oak, eastern hophornbeam	20-40 years	SMZ_AR	IFM 2	Periodic entries every +/- 10 years	Infinity	0.40
7	3	willow oak	80	white oak, sweetgum, hickory spp., red maple, water oak, eastern redcedar, post oak, American hornbeam, black oak, willow oak, eastern hophornbeam	20-40 years	CLR 1	IFM 1	+/- 33 years, intermediate entries at years 15 and 25	Infinity	90.57
8	3	willow oak	80	white oak, sweetgum, hickory spp., red maple, water oak, eastern redcedar, post oak, American hornbeam, black oak,	20-40 years	SMZ_AR	IFM 2	Periodic entries every +/- 10 years	Infinity	7.48

				willow oak, eastern hophornbeam						
9	6	white oak	70	hickory spp., hackberry spp., boxelder, black walnut, Osage-orange	40-60 years	SMZ_AR	IFM 2	Periodic entries every +/- 10 years	Infinity	15.69
10	6	white oak	70	hickory spp., hackberry spp., boxelder, black walnut, Osage-orange	40-60 years	CLR 1	IFM 1	+/- 33 years, intermediate entries at years 15 and 25	Infinity	66.41
11	2	American sycamore	80	white oak, sweetgum, hickory spp., red maple, American sycamore, eastern redcedar, post oak, common persimmon, northern red oak, American beech, boxelder, pecan, black walnut, elm spp., basswood spp., American hornbeam, birch spp.	10-20 years	CLR 1	IFM 1	+/- 33 years, intermediate entries at years 15 and 25	Infinity	32.62

12	2	American sycamore	80	white oak, sweetgum, hickory spp., red maple, American sycamore, eastern redcedar, post oak, common persimmon, northern red oak, American beech, boxelder, pecan, black walnut, elm spp., basswood spp., American hornbeam, birch spp.	10-20years	SMZ_AR	IFM 2	Periodic entries every +/- 10 years	Infinity	30.23
13	9	loblolly pine	87.29	sweetgum, hickory spp., elm spp., loblolly pine	20-40 years	SMZ_AR	IFM 2	Periodic entries every +/- 10 years	Infinity	0.25
14	9	loblolly pine	87.29	sweetgum, hickory spp., elm spp., loblolly pine	20-40 years	CLR 1	IFM 1	+/- 33 years, intermediate entries at years 15 and 25	Infinity	63.66
15	8	loblolly pine	87.29	sweetgum, elm spp., American hornbeam, loblolly pine, black cherry	20-40 years	CLR 1	IFM 1	+/- 33 years, intermediate entries at years 15 and 25	Infinity	65.71

16	8	loblolly pine	87.29	sweetgum, elm spp., American hornbeam, loblolly pine, black cherry	20-40 years	SMZ_AR	IFM 2	Periodic entries every +/- 10 years	Infinity	27.26
17	7	cottonwood	107	southern red oak, hickory spp., hackberry spp., ash spp., eastern redcedar, American beech, elm spp., cottonwood and poplar spp., bur oak	20-40 years	CLR 1	IFM 1	+/- 33 years, intermediate entries at years 15 and 25	Infinity	3.08
18	7	cottonwood	107	southern red oak, hickory spp., hackberry spp., ash spp., eastern redcedar, American beech, elm spp., cottonwood and poplar spp., bur oak	20-40 years	SMZ_AR	IFM 2	Periodic entries every +/- 10 years	Infinity	0.67

19	5	cherry bark oak	89.57	white oak, sweetgum, hickory spp., red maple, hackberry spp., eastern redcedar, cherrybark oak, water tupelo, baldcypres s	20-40 years	CLR 1	IFM 1	+/- 33 years, intermediate entries at years 15 and 25	Infinity	92.79
20	5	cherry bark oak	89.57	white oak, sweetgum, hickory spp., red maple, hackberry spp., eastern redcedar, cherrybark oak, water tupelo, baldcypres s	20-40 years	SMZ_AR/RFM	IFM 2	Periodic entries every +/- 10 years	Infinity	5.61
21	5	cherry bark oak	89.57	white oak, sweetgum, hickory spp., red maple, hackberry spp., eastern redcedar, cherrybark oak, water tupelo, baldcypres s	20-40 years	SMZ_AR	IFM 2	Periodic entries every +/- 10 years	Infinity	29.02

5.1 Baseline Emissions

Procedures for the quantification of baseline emissions and/or removals were taken from Sections 8.2, 8.4, and 8.5 of the VM0003 Methodology. The following equations were utilized:

To calculate baseline net greenhouse gas removals Equation 1 was used:

$$\Delta C_{BSL} = \Delta C_{BSLP} - GHG_{BSLE}$$

where:

ΔC_{BSL} Baseline net greenhouse gas removals by sinks (t CO2e)	
ΔC_{BSLP}	Carbon stock changes in all pools in the baseline scenario (t CO2e)
GHG_{BSLE}	Greenhouse gas emissions as a result of forest management activities within the project area in the baseline scenario (t CO2e)

To calculate carbon stock changes in all pools in the baseline Equation 2 was used:

$$\Delta C_{BSLP} = \Delta C_{BSLtree} + \Delta C_{BSLDW} + \Delta C_{BSLWP}$$

where:

ΔC_{BSLP}	Carbon stock changes in all pools in the baseline scenario (t CO2e)
$\Delta C_{BSLtree}$	Carbon stock changes in above-ground and below-ground biomass of trees in the baseline scenario (t CO2e)
ΔC_{BSLDW}	Carbon stock changes in dead wood in the baseline scenario (t CO2e)
ΔC_{BSLWP}	Carbon stock changes in wood products in the baseline scenario (t CO2e)

To calculate carbon stock changes in above- and below-ground biomass of trees in the baseline Equation 3 was used:

$$\Delta C_{BSL_{tree}} = \frac{\left(\sum_{i=1}^{M_B} \Delta C_{BSLAG|BG,i,100} \times \frac{44}{12} \right)}{100} \times t^*$$

where:

$\Delta C_{BSL_{tree}}$	Carbon stock changes in above-ground and below-ground biomass of trees in the baseline scenario (t CO ₂ e)
$\Delta C_{BSLAG BG,i,100}$	Summed annual net carbon stock change in above-ground and below-ground biomass for measurement stratum <i>i</i> summed over the 100-year modeled baseline (t C)
<i>i</i>	1, 2, 3, ..., <i>M_B</i> measurement strata in the baseline scenario
<i>t</i>	1, 2, 3, ..., <i>t</i> [*] years elapsed since the start of the IFM project activity
$\frac{44}{12}$	Ratio of molecular weight of CO ₂ to carbon (t CO ₂ e t C ⁻¹)

To calculate carbon stock changes in dead wood in the baseline Equation 4 was used:

$$\Delta C_{BSLDW} = \frac{\left(\sum_{i=1}^{M_B} \Delta C_{BSLDW,i,100} \times \frac{44}{12} \right)}{100} \times t^*$$

where:

ΔC_{BSLDW}	Carbon stock changes in dead wood in the baseline scenario (t CO ₂ e)
--------------------	--

$\Delta C_{BSDLW,i,100}$	Summed annual net carbon stock change in dead wood for measurement stratum i summed over the 100-year modeled baseline (t C)
i	1, 2, 3, ..., MB measurement strata in the baseline scenario
t	1, 2, 3, ..., t^* years elapsed since the start of the IFM project activity
$\frac{44}{12}$	Ratio of molecular weight of CO ₂ to carbon (t CO ₂ e t C ⁻¹)

Under the VM0003 Methodology, the dead wood pool is broken into two components: standing dead wood and lying dead wood. Below-ground dead wood is conservatively omitted. The following equations were used to calculate dead wood:

To calculate the annual carbon stock change in dead wood Equation 24 was used:

$$\Delta C_{DW,i,t} = \frac{C_{DW,i,t_2} - C_{DW,i,t_1}}{T}$$

where:

$\Delta C_{DW,i,t}$	Annual carbon stock change in dead wood for measurement stratum i averaged over the monitoring period (t C yr ⁻¹)
C_{DW,i,t_2}	Carbon stock of dead wood in measurement stratum i at time $t = 2$ (t C)
C_{DW,i,t_1}	Carbon stock of dead wood in measurement stratum i at time $t = 1$ (t C)

T	Number of years between monitoring time t_2 and t_1 ($T = t_2 - t_1$) (yr)
i	1, 2, 3, ..., MPS measurement strata in the project scenario
t	1, 2, 3, ... t^* years elapsed since the start of the IFM project activity

To calculate the carbon stocks of dead wood Equation 25 was used:

$$C_{DW,i,t} = (B_{SDW,i,t} + B_{LDW,i,t}) \times CF_{DW}$$

where:

$C_{DW,i,t}$	Carbon stock of dead wood in measurement stratum i at time t (t C)
$B_{SDW,i,t}$	Biomass of standing dead wood in measurement stratum i at time t (t d.m.)
$B_{LDW,i,t}$	Biomass of lying dead wood in measurement stratum i at time t (t d.m.)
CF_{DW}	Carbon fraction of dry matter in dead wood [0.5] (t C t ⁻¹ d.m.)
i	1, 2, 3, ..., MPS measurement strata in the project scenario

<i>t</i>	1, 2, 3, ... <i>t</i> * years elapsed since the start of the IFM project activity
----------	---

As required by the VM0003 Methodology, a 10-year linear decay function was applied to standing dead within the FVS baseline model. After 10 years standing dead is assumed to fall and transition into the lying dead wood pool.

To determine lying dead wood values for the baseline model the following steps were taken:

- The supersection, as defined in Annex BL, from the California Air Resource Board, of each PAI was established and the forest type was determined based on the occurrence and dominance of tree species present.
- These forest types were then matched with FIA forest types listed in USGS, Forest Management Service Center, and *The Fire and Fuels Extension to the Forest Vegetation Simulator: Updated Model Documentation*, Table 4.16.10, pp.295-296 (2015), see Annex BJ.
- Within the *The Fire and Fuels Extension to the Forest Vegetation Simulator: Updated Model Documentation* the lying dead wood default biomass values for size classes 3-6, 6-12, and >12 were summed for each forest type associated with a PAI.
- These default lying dead biomass values were then used as lying dead values for the initial year of the baseline model.
- Following the initial year, lying dead wood was assumed to be equal to the difference between current above ground carbon contained within standing dead and the standing wood values reported in the previous 10-year cycle.

Since lying dead was calculated directly from changes in the standing dead wood pool, the same 10-year linear decay function was applied.

Default lying dead wood biomass values that were used for each PAI are provided below:

<i>PAI</i>	<i>CARB Supersection</i>	<i>CARB Forest Type</i>	<i>FIA Forest Type</i>	<i>Lying Dead Biomass Tons/ac</i>
Saline Bluff	SE Middle Mixed Forest Western Mid Coastal Plains	SE Middle Mixed Forest Western Mid Coastal Plains Riverine Hardwood	Oak Hickory	2.45
FourcheLaFave	Ozark Broadleaf Forest-Meadow Boston Mountains	Ozark Broadleaf Forest-Meadow Boston Mountains Oak-Hickory	Oak Hickory	2.45

Hickls	Ozark Broadleaf Forest-Meadow Boston Mountains	Ozark Broadleaf Forest-Meadow Boston Mountains Lowland Hardwoods	Oak Hickory	2.45
Rooks Ranch	SE Middle Mixed Forest Piedmont	SE Middle Mixed Forest Piedmont Loblolly-Shortleaf-Oak	Loblolly – shortleaf pine	1.02
Black River	MS River Delta	MS River Delta Hardwood	Oak-gum-cypress	1.52
Harding	SE Middle Mixed Forest Arkansas Valley	SE Middle Mixed Forest Arkansas Valley Oak-Hickory	Oak Hickory	2.45
Dickson Farm	SE Middle Mixed Forest Arkansas Valley	SE Middle Mixed Forest Arkansas Valley Oak-Hickory	Oak Hickory	2.45
El Ranchos	SE Middle Mixed Forest Western Mid Coastal Plains	SE Middle Mixed Forest Western Mid Coastal Plains Oak-Pine	Pine-hardwood	1.95

To calculate carbon stock changes in wood products in the baseline Equation 5 was used:

$$\Delta C_{BSLWP} = \frac{\left(\sum_{i=1}^{M_B} \Delta C_{BSLWP,i,t} \times \frac{44}{12} \right)}{100} \times t^*$$

where:

ΔC_{BSLWP}	Carbon stock changes in wood products in the baseline (t CO2e)
$\Delta C_{BSLWP,i,t}$	Baseline annual net carbon stock change in wood products for measurement stratum i at time t (t C yr-1)

i	1, 2, 3, ..., MB measurement strata in the baseline scenario
t	1, 2, 3, ..., t^* years elapsed since the start of the IFM project activity
$\frac{44}{12}$	Ratio of molecular weight of CO ₂ to carbon (t CO ₂ e t C ⁻¹)

To calculate the annual change in carbon stored in wood products Equation 28 was used:

$$\Delta C_{WP,t_1,t_2} = \frac{C_{WP,t_2} - C_{WP,t_1}}{T}$$

where:

$\Delta C_{WP,t_1,t_2}$	Annual carbon stock change in wood products between times t_1 and t_2 , averaged over the monitoring period (t C yr ⁻¹)
$\Delta C_{WP,t_2}$	Carbon stock of wood products at time $t = 2$ (t C)
$\Delta C_{WP,t_1}$	Carbon stock of wood products at time $t = 1$ (t C)
T	Number of years between monitoring times t_2 and t_1 ($T = t_2 - t_1$) (yr)
t	1, 2, 3, ..., t^* years elapsed since the start of the IFM project activity

To calculate wood products the Winjum et al. Method was used (Annex AX). The Winjum et al. Method was chosen as it may be applied to any vegetation type found throughout the world. The following equations were used:

To calculate the biomass of the total volume extracted from within the project area Equation 31 was used:

$$EXC_{WP,ty} = \sum_{h=1}^{HPS} \sum_{j=1}^{SPS} (V_{ex,h,ty,j} \times D_j \times CF_j)$$

where:

$EXC_{WP,ty}$	Summed stock of extracted biomass carbon from within the project area for class of wood product ty (t C)
$V_{ex,h,ty,j}$	Volume of timber extracted from within the project area during harvest h for species j and wood product class ty (m3)
D_j	Basic wood density of species j (t d.m. m-3)
CF_j	Carbon fraction of biomass for tree species j; IPCC default value = 0.5 (t C t-1 d.m.)
h	1, 2, 3, ..., HPS harvests since the start of the IFM project activity
j	1, 2, 3, ..., SPS tree species in the project scenario

ty	Wood product class, defined here as sawnwood, wood-based panels, other industrial roundwood, and paper and paper board
----	--

To calculate the total carbon in harvested timber that enters the wood products pool based on mill efficiencies and product disposition percentages Equation 32 was used:

$$C_{Mill,ty} = \sum_{s,w,oir,p}^{ty} EXC_{WP,ty} \times (1 - WW)$$

where:

$C_{Mill,ty}$	Summed stock of carbon remaining in wood products of class ty from within the project area after milling (t C)
$EXC_{WP,ty}$	Summed stock of extracted biomass carbon from within the project area for class of wood product ty (t C)
WW	Wood waste fraction based on mill efficiency
s,w,oir,p	Wood product categories: sawnwood, wood-based panels, other industrial roundwood, and paper and paperboard

Following the Winjum et al. Method, the wood waste fraction (WW) was assumed to be 0.19 as the PAIs exist within a developed country.

To calculate the total carbon removed from the project area stored in each type of wood product Equation 33 was used:

$$C_{WP,ty} = \sum_{s,w,oir,p}^{ty} ((C_{Mill,ty} - SLF) - \left(\frac{MLF}{20}\right))$$

where:

$C_{WP,ty}$	Total carbon removed from the project area stored in each type, ty, of harvested wood products (t C)
$C_{Mill,ty}$	Summed stock of carbon remaining in wood products of class ty from within the project area after milling (t C)
SLF	Fraction of wood products that will be emitted to the atmosphere within 3 years of timber harvest (t C)
MLF	Fraction of wood products that is considered stored for the medium term and emitted to the atmosphere each year after harvest for 20 years (t C)
ty	Wood product class, defined here as sawnwood, wood-based panels, other industrial roundwood, paper and paper board
t	1, 2, 3, ..., t* years elapsed since the start of the IFM project activity

Per the VM0003 Methodology, a default value of 0.62 was used for *OF* for both sawnwood and paper product classes.

To calculate the fraction of wood products emitted to the atmosphere within three years of timber harvest Equation 34 was used:

$$SLF = (C_{Mill,ty}) \times slp$$

Where:

SLF	Fraction of wood products emitted to the atmosphere within 3 years of timber harvest (t C)
-------	---

$C_{mill,ty}$	Sum of carbon remaining in wood products of class ty from within the project area after milling (t C)
slp	Short-lived proportion
ty	Wood product class, defined here as sawnwood, wood-based panels, other industrial roundwood, and paper and paper board

Per the VM0003 Methodology, default slp values of 0.12 and 0.24 were used for sawnwood and paper product classes, respectively.

To calculate the fraction of wood products stored between years 3 and 5, Equation 36 was used:

$$MLF_{3,5} = C_{mill,ty} \times slp_{adj}$$

where:

$MLF_{3,5}$	Fraction of wood products that is considered stored for the medium term for the period $t = 3$ years to $t = 5$ years (t C)
$C_{mill,ty}$	Summed stock of biomass carbon extracted from within the project area for wood product class ty after milling (t C)
slp_{adj}	Short-lived proportion for the period $t = 3$ years to $t = 5$ years
MLF	Fraction of wood products that is considered stored for the medium term and emitted to the atmosphere each year after harvest for 20 years (t C)

Per the VM0003 Methodology, default slp_{adj} values of 0.08 and 0.16 were used for sawnwood and paper product classes, respectively.

To calculate the fraction of wood products stored between years 5 and 100, Equation 37 was used.

$$MLF_{5,100} = (C_{mill,ty} - SLF - MLF_{3,5}) \times fo$$

where:

$MLF_{5,100}$	Fraction of wood products that is considered stored for the medium term for the period $t = 5$ years to $t = 100$ years (t C)
$C_{Mill,ty}$	Summed stock of biomass carbon extracted from within the project area for class of wood product ty after milling (t C)
SLF	Fraction of wood products emitted to the atmosphere within 3 years of timber harvest (t C)
fo	Fraction oxidized (as determined by Table 3 in the VM0003 Methodology)

To calculate the fraction of wood products stored for the medium term Equation 35 was used.

$$MLF = MLF_{3,5} + MLF_{5,100}$$

where:

MLF	Fraction of wood products that is considered stored for the medium term and will be emitted to the atmosphere each year after harvest for 20 years (t C)
$MLF_{3,5}$	Fraction of wood products that is considered stored for the medium term for the period $t = 3$ years to $t = 5$ years (t C)
$MLF_{5,100}$	Fraction of wood products that is considered stored for the medium term for the period $t = 5$ years to $t = 100$ years (t C)

Baseline GHG emissions were estimated according to VM0003 Section 8.4, Equation 6:

$$GHG_{BSL,E} = \sum_{t=1}^{t^*} (E_{BSL,BiomassBurn,t})$$

where:

GHG _{BSL,E}	Greenhouse gas emissions as a result of forest management activities within the project area in the baseline, t CO2-e
E _{BSL, BiomassBurn,t}	Non-CO2 emissions due to biomass burning as part of forest management during the year t in the baseline, t CO2-e
t	1, 2, 3 ...t* years elapsed since the start of the IFM project activity, years

Logging slash (E_{BSL, BiomassBurn,t}) in the baseline scenario is excluded according to the methodology, as such, GHG_{BSL,E} was calculated as zero.

While baseline emissions require a current inventory to determine starting carbon stocks, greenhouse gas emissions as a result of forest management activities within the project area in the baseline are modeled predictions of a future scenario. As such, they are considered ex-ante values.

Quantification of ex-ante onsite carbon stocking was carried out by following the allometric method approach defined in VM0003.

The volume and biomass equations and references were sourced from the US Forest Inventory & Analysis (FIA) program, which are also used in both the California Air Resources Board and Climate Action Reserve programs, and are available on both of these programs' websites, in Annex BI. Biomass equations were compiled in proprietary visual basic analysis code (VBA) in Microsoft Excel and data analysis software. Tree species, DBH, height, decay, and region-specific biomass equations were used to calculate carbon estimates in tonnes of CO2 equivalent. Carbon was only calculated for trees above 12.7 centimeters at DBH and above.

[Uncredited Reserve Stock](#)

When a PAI is first enrolled to the grouped project, $\Delta C_{BSL,tree}$ and $\Delta C_{BSL,DW,standing}$ shall be conservatively reduced to reflect the nine-percent (9%) portion of initial carbon stocks to be set aside to the URS (see Section 3.6).

1. Calculate nine percent (9%) of the initial carbon stocks (tCO₂e) for the AGBG Living and AG Standing Dead pools, respectively. Initial carbon stocks shall be based on inventory data, projected via FVS to the PAI start date.
2. Deduct reserved AGBG Living carbon calculated in Step 1 from the start of the baseline model (Annex AG).
3. Deduct reserved AG Standing Dead carbon from the start of the baseline model (Annex AG).
4. Calculate $\Delta C_{BSL,tree}$ and $\Delta C_{BSL,DW,standing}$

This procedure shall result in baseline depletion rates for $\Delta C_{BSL,tree}$ and $\Delta C_{BSL,DW,standing}$ that are conservatively lower in baseline emissions, resulting in fewer VCU as compared to otherwise.

5.2 Project Emissions

Procedures for the quantification of project emissions and/or removals were taken from Section 8.5 of the VM0003 Methodology. The following equations were utilized:

To calculate the actual net greenhouse gas removals in the project Equation 10 was used.

$$\Delta C_{ACTUAL} = \Delta C_P - GHG_E$$

where:

ΔC_{ACTUAL}	Actual net greenhouse gas removals by sinks (t CO ₂ e)
ΔC_P	Sum of the changes in above-ground biomass, dead wood and wood products in the project scenario (t CO ₂ e)
GHG_E	Increase in GHG emissions as a result of implementation of the proposed IFM project activity within the project area (t CO ₂ e)

To calculate the sum of the changes in above-ground biomass, dead wood, and wood products in the project Equation 11 was used.

$$\Delta C_p = \sum_{t=1}^{t^*} \Delta C_t \times \frac{44}{12}$$

where:

ΔC_p	Sum of the changes in above-ground biomass, dead wood and wood products in the project scenario (t CO2e)
ΔC_t	Annual change in carbon stock in all selected carbon pools for year t (t C yr-1)
t	1, 2, 3, ..., t^* years elapsed since the start of the IFM project activity
$\frac{44}{12}$	Ratio of molecular weights of CO2 and carbon (mol mol-1)

To calculate the annual change in carbon stocks in the project Equation 12 was used.

$$\Delta C_t = \sum_{i=1}^{M_{PS}} (\Delta C_{AG,i,t} + \Delta C_{BG,i,t} + \Delta C_{DW,i,t} + \Delta C_{WP,i,t})$$

where:

ΔC_t	Annual change in carbon stock in all selected carbon pools for year t (t C yr-1)
$\Delta C_{AG,i,t}$	Annual carbon stock change in above-ground biomass of trees for measurement stratum i; may be an average over the monitoring period (t C yr-1)

$\Delta C_{BG,i,t}$	Annual carbon stock change in below-ground biomass of trees for measurement stratum i ; may be an average over the monitoring period (t C yr-1)
$\Delta C_{DW,i,t}$	Annual change in the dead wood carbon pool for measurement stratum i ; may be an average over the monitoring period (t C yr-1)
$\Delta C_{WP,i,t}$	Annual change in the wood products carbon pool for measurement stratum i ; may be an average over the monitoring period (t C yr-1)
i	1, 2, 3, ..., MPS measurement strata in the project scenario
t	1, 2, 3, ..., t^* years elapsed since the start of the IFM project activity

Average carbon stocks in above-ground biomass per unit area was estimated based on field measurements in sample plots. As the allometric equation method was chosen, the following equations from the VM0003 Methodology were used:

To calculate the above-ground biomass of tree by species Equation 19 was used.

$$C_{ABtree_{l,j,i,sp,t}} = \sum_{l=1}^{N_{j,sp}} f_j(DBH, H) \times CF_j$$

where:

$C_{ABtree_{l,j,i,sp,t}}$	Carbon stock in above-ground biomass of tree l of species j in plot sp in measurement stratum i at time t (t C tree-1)
---------------------------	---

CF_j	Carbon fraction of biomass for tree species j ; IPCC default value = 0.5 (t C t ⁻¹ d.m.)
$F_j(DBH,H)$	Allometric equation for species j linking diameter at breast height (DBH) and possibly height (H) to above-ground biomass of trees (t. d.m. tree ⁻¹)
i	1, 2, 3, ..., MPS measurement strata in the project scenario
j	1, 2, 3, ..., SPS tree species in the project scenario
l	1, 2, 3, ..., $N_{j,sp}$ sequence number of individual trees of species j in sample plot sp
t	1, 2, 3, ..., t^* years elapsed since the start of the IFM project activity

To calculate carbon stocks in below-ground biomass of trees Equation 20 was used.

$$C_{BBtree_{l,j,i,sp,t}} = C_{ABtree_{l,j,i,sp,t}} \times R_j$$

where:

$C_{bBtree_{l,j,i,sp,t}}$	Carbon stock in below-ground biomass of tree l of species j in plot sp in measurement stratum i at time t (t C tree ⁻¹)
$C_{aBtree_{l,j,i,sp,t}}$	Carbon stock in above-ground biomass of tree l of species j in plot sp in measurement stratum

	i at time t (t C tree-1)
R_j	Root-shoot ratio appropriate for biomass stock of species j (dimensionless)

Following the 2006 IPCC Guidelines for National Greenhouse Gas Inventories – Ch4 Forest Land (Annex BP), a root-to-shoot ratio of 0.24 was used for all species in all measurement strata.

To calculate total carbon stocks in trees Equation 21 was used:

$$C_{treei,sp,t} = \sum_{j=1}^{SPS} (C_{ABtree\ l,j,i,sp,t} + C_{BBtr\ l,j,i,sp,t})$$

where:

$C_{treei,sp,t}$	Carbon stock in trees in plot sp of measurement stratum i at time t (t C)
$C_{ABtree\ l,j,i,sp,t}$	Carbon stock in above-ground biomass of tree l of species j in plot sp in measurement stratum i at time t (t C tree-1)
$C_{BBtr\ l,j,i,sp,t}$	Carbon stock in below-ground biomass of tree l of species j in plot sp in measurement stratum i at time t (t C tree-1)
i	1, 2, 3, ..., MPS measurement strata in the project scenario
j	1, 2, 3, ..., SPS tree species in the project scenario

t	1, 2, 3, ..., t^* years elapsed since the start of the IFM project activity
-----	---

To calculate the carbon stocks in trees for each measurement stratum Equation 22 was used:

$$C_{tree,i,t} = \frac{A_i}{Asp_i} \sum_{sp=1}^{P_i} C_{tree,i,sp,t}$$

where:

$C_{tree,i,t}$	Carbon stock in trees in measurement stratum i at time t (t C)
$C_{tree,i,sp,t}$	Carbon stock in trees in plot sp of measurement stratum i at time t (t C)
Asp_i	Total area of all sample plots in measurement stratum i (ha)
A_i	Area of measurement stratum i (ha)
sp	1, 2, 3, ..., P_i sample plots in measurement stratum i in the project scenario
i	1, 2, 3, ..., MPS measurement strata in the project scenario

t	1, 2, 3, ..., t^* years elapsed since the start of the IFM project activity
-----	---

To calculate the annual carbon stock changes in above-ground biomass of trees Equation 23 was used.

$$\Delta C_{AG,i,t} + \Delta C_{BG,i,t} = \frac{C_{tree,i,t_2} - C_{tree,i,t_1}}{T}$$

where:

$\Delta C_{AG,i,t}$	Annual carbon stock change in above-ground biomass of trees for measurement stratum i (t C yr-1)
$\Delta C_{BG,i,t}$	Annual carbon stock change in below-ground biomass of trees for measurement stratum i (t C yr-1)
$C_{tree,i,t}$	Carbon stock in trees in measurement stratum i at time t (t C)
T	Number of years between monitoring time t_1 and t_2 ($T = t_2 - t_1$) (yr)
i	1, 2, 3, ..., MPS measurement strata in the project scenario
t	1, 2, 3, ..., t^* years elapsed since the start of the IFM project activity

Dead wood carbon pools within the project were calculated in the same manner as the baseline. Information related to the calculation of dead wood stocks is available in Section 5.1.

As no harvesting took place within the PAIs during the monitoring period, wood products were not calculated for the project scenario. However, in the future when harvesting does occur carbon stocks contained within wood products will be calculated using the same equations and methods described in Section 5.1.

From VM0003 Methodology Section 8.5.2, Equation 35, the ex-ante change in GHG emissions as a result of the implementation of the IFM project activity within the project area can be estimated as:

$$GHG_{PS,E} = \sum_{t=1}^{t^*} (E_{PS,BiomassBurn,t})$$

where:

GHG_{PS,E}	Greenhouse gas emissions as a result of forest management activities within the project area in the project scenario; t CO ₂ -e
E_{PS, BiomassBurn,t}	Non-CO ₂ emissions due to biomass burning as part of forest management during the year <i>t</i> in the project scenario; t CO ₂ -e
t	1, 2, 3 ... <i>t</i> years elapsed since the start of the IFM project activity

Because the only GHG emitting activity considered by the methodology is biomass burning, and no biomass burning will take place within the project area for the duration of the project, the emissions as a result of the project are zero.

Quantification of ex-ante onsite carbon stocking was carried out by following the allometric method approach defined in VM0003. The volume and biomass equations and references were sourced from the US Forest Inventory & Analysis (FIA) program, which are also used in both the California Air Resources Board and Climate Action Reserve programs, and are available on both of these programs' websites, in Annex BI. Biomass equations were compiled in proprietary visual basic analysis code (VBA) in Microsoft Excel and data analysis software. Tree species, DBH, height, decay, and region-specific biomass equations were used to calculate carbon estimates in tonnes of CO₂ equivalent. Carbon was only calculated for trees above 12.7 centimeters at DBH and above.

Within the ex-ante model the two main parameters used were the *Annual Delta C_{actual}* and the *Baseline Depletion Rate*. The *Annual Delta C_{actual}* is an estimate the project proponent developed for yearly carbon accretion rates in a per acre basis in the southeastern United States based on inventories conducted in the region. The *Baseline Depletion Rate* was developed by the project proponent to approximate the yearly decrease in baseline stocks from the project starting year. Both parameters

rough estimates. As such, they were only used in the ex-ante accounting model and not within ex-post calculations.

Default values that were used within equations contained in Sections 5.1 and 5.2 are further provided below:

<i>Equation Number</i>	<i>Default Name</i>	<i>Default Abbreviation</i>	<i>Default Value</i>
20	Root-to-shoot ratio	R_j	0.24
32	Wood Waste Fraction	WW	0.19
33	Proportion of Remaining Wood Products Oxidized (sawnwood & paper)	OF	0.62
34	Short-lived proportion (sawnwood)	slp (sawnwood)	0.12
34	Short-lived proportion (paper)	slp (paper)	0.24
35	Short-lived proportion years 3 to 5 (sawnwood)	Slp_{adj} (sawnwood)	0.08
35	Short-lived proportion years 3 to 5 (paper)	Slp_{adj} (paper)	0.16

Uncredited Reserve Stock

The project shall account for emissions from the implementation of limited harvesting as allowed by the policies of Forest Carbon Works which include continuous thinning, group selection and patch cuts for the purpose of maintaining forest health (IFM-1, see section 1.11). These emissions shall be quantified based on measurements of stock change according to the measurement methods required by VM0003. Were the total project emissions as a result of harvesting as allowed by policy exceed the quantity of the URS, such excess emissions shall be accounted for in the selected carbon pools and equation 12 (see Section 3.3).

5.3 Leakage

Under the VM0003 methodology, leakage emissions are quantified as the GHG emissions due to market effects resulting from a shift in harvest through time. Ex-ante Leakage is estimated using VM0003 Methodology Section 8.6, Equation 39:

$$LK = LK_{MarketEffects}$$

where:

LK	Total GHG emissions due to leakage; tCO2e
LK _{Market Effects}	Total GHG emissions due to impacts of project on timber supply and demand; tCO2e

Leakage due to market effects will be calculated from VM0003 Methodology Section 8.6.1, Equation 41:

$$LK_{MarketEffects} = LF_{ME} * (\Delta C_{ACTUAL} - \Delta C_{BSL})$$

where:

LK _{Market Effects}	Total GHG emissions due to market- effects leakage through decreased timber harvest; t CO2-e
LF _{ME}	Leakage factor for market-effects calculations; dimensionless
ΔC _{ACTUAL}	Actual net greenhouse gas removals by sinks; t CO2-e
ΔC _{BSL}	Baseline net greenhouse gas removals by sinks; t CO2-e

The leakage factor (LF_{ME}) will be determined by using forest type default values provided by the VM0003 methodology for all PAIs. This U.S. Forest Service's Forest Inventory and Analysis (FIA) data is the default within the methodology in Section 9.1.

Within each measurement stratum, the proportion of total biomass in merchantable species (PMP_i) will be calculated and compared with the mean proportion of total merchantable biomass for each forest type (PML_{FT}). These calculations were carried out in Annex O. Values for the merchantable biomass as a proportion of total biomass by forest type (PML_{FT}) were obtained from Section 9.1 of the VM0003 methodology.

Merchantable biomass is defined as total gross biomass (including bark) of a tree 12.7 centimeters (5 in) DBH or larger from a 30.48 centimeters (1 ft) stump to either the minimum of 10.16 centimeters (4 in) top DOB of the central stem or the highest merchantable height of the central stem. Trees are not considered merchantable if they are not a species that is commercially harvested in the region or have bole forms that would prevent efficient milling of wood products from taking place.

After PMP_i and PML_{FT} are calculated for each measurement stratum, a leakage deduction factor (LF_{ME}) will be applied to that estimate for each measurement stratum, determined by the relationship between PMP_i and PML_{FT} :

Where:

PML_{FT} is equal ($\mp 15\%$) to PMP_i , $LF_{ME} = 0.4$

PML_{FT} is $> 15\%$ less than PMP_i , $LF_{ME} = 0.7$

PML_{FT} is $>15\%$ greater than PMP_i , $LF_{ME} = 0.2$

Where:

PML_{FT}	Mean merchantable biomass as a proportion of total above ground tree biomass for each forest type; % (default values see parameter table)
PMP_i	Merchantable biomass as a proportion of total above ground tree biomass for measurement stratum i within the project boundaries; %
LF_{ME}	Leakage factor for market-effects calculations; dimensionless

Following this procedure, LF_{ME} was determined to be 0.2 for all initial Chestnut Properties, as calculated in Annex AL.

Property Name	Measurement Stratum	PML_{FT}	PMP_i	LF_{ME}
Saline Bluff	1	73%	25%	0.2
Fourche La Fave	2	73%	23%	0.2
Hickls	3	73%	40%	0.2
Rooks Ranch	4	73%	17%	0.2
Black River	5	73%	29%	0.2
Harding/Freed	6	73%	6%	0.2
Dickson	7	73%	14%	0.2
El Ranchos	8	73%	13%	0.2
El Ranchos	9	73%	27%	0.2

An applicability condition of using the VM0003 Methodology is that the project will not have any leakage because of activity shifting to lands owned by the project proponent that are outside the project area. Per Eligibility Criteria 2d, there will be no leakage due to activity shifting on lands managed and operated by the project proponent and the associated land owners. The project

proponent (FCW) does not own any lands, forested or otherwise. The only associated landowner at the time of validation, Chestnut, has enrolled all forested lands in their ownership per the MLA located in Annex D. This prevents any activity shifting leakage because the project proponent and landowner do not have any unenrolled forested lands to shift harvesting onto. Market leakage assessments will occur at validation and verification and the appropriate market leakage discount factor will be applied (VCS Standards 3.15.8 & 3.15.9).

Uncredited Reserve Stock

As the policies of Forest Carbon Works limit harvesting to continuous thinning, group selection and patch cuts (IFM-1) as the project technology and measure under ERA (see section 1.11), and accounting for related harvest emissions from the URS must be in accordance with the policy, then no activity shifting leakage of harvesting in the baseline scenario (section 3.4) is possible. The limited harvest emissions associated with the URS are generated by the project technologies and measures.

5.4 Estimated Net GHG Emission Reductions and Removals

Under the VM0003 Methodology, net greenhouse gas reductions and removals must be estimated by using the Equation 42 of the VM0003 Methodology:

$$C_{IFM} = \Delta C_{ACTUAL} - \Delta C_{BSL} - LK$$

where:

C_{IFM}	Net anthropogenic greenhouse gas reductions and removals (t CO ₂ e)
ΔC_{ACTUAL}	Actual net greenhouse gas removals by sinks (t CO ₂ e)
ΔC_{BSL}	Baseline net greenhouse gas removals by sinks (t CO ₂ e)
LK	Total GHG emissions due to leakage (t CO ₂ e)

$$\Delta C_{ACTUAL} = \Delta C_P - GHG_E$$

Where:

ΔC_{ACTUAL}	Actual net greenhouse gas removals by sinks (t CO ₂ e)
ΔC_P	Sum of the changes in above-ground biomass, dead wood and wood products in the project scenario (t CO ₂ e)

GHG _E	Increase in GHG emissions as a result of implementation of the proposed IFM project activity within the project area (t CO ₂ e)
------------------	--

Sum of the changes in above-ground biomass, dead wood, and wood products in the project scenario will be calculated from VM0003 Methodology Section 8.5.1 using Equation 11:

$$\Delta C_P = \sum_{t=1}^{t^*} \Delta C_t \times \frac{44}{12}$$

Where:

ΔC_P	Sum of the changes in above-ground biomass, dead wood and wood products in the project scenario (t CO ₂ e)
ΔC_t	Annual change in carbon stock in all selected carbon pools for year t (t C yr ⁻¹)
t	1, 2, 3, ..., t * years elapsed since the start of the IFM project activity
44/12	Ratio of molecular weights of CO ₂ and carbon (mol mol ⁻¹)

Annual change in carbon stock in all selected carbon pools for year t will be calculated from VM0003 Methodology Section 8.5.1 using Equation 12:

$$\Delta C_t = \sum_{i=1}^{MPS} (\Delta C_{AG,i,t} + \Delta C_{BG,i,t} + \Delta C_{DW,i,t} + \Delta C_{WP,i,t})$$

Where:

ΔC_t	Annual change in carbon stock in all selected carbon pools for year t (t C yr ⁻¹)
$\Delta C_{AG,i,t}$	Annual carbon stock change in above-ground biomass of trees for measurement stratum i; may be an average over the monitoring period (t C yr ⁻¹)
$\Delta C_{BG,i,t}$	Annual carbon stock change in below-ground biomass of trees for measurement stratum i; may be an average over the monitoring period (t C yr ⁻¹)
$\Delta C_{DW,i,t}$	Annual change in the dead wood carbon pool for measurement stratum i; may be an average over the monitoring period (t C yr ⁻¹)
$\Delta C_{WP,i,t}$	Annual change in the wood products carbon pool for measurement stratum i; may be an average over the monitoring period (t C yr ⁻¹)
i	1, 2, 3, ..., MPS measurement strata in the project scenario
t	1, 2, 3, ..., t * years elapsed since the start of the IFM project activity

The annual change in the dead wood carbon pool for each measurement stratum shall be the sum of the lying and standing deadwood components. Lying and standing deadwood components are differentiated as VM0003 v1.3 requires standing deadwood to be sampled using a plot method, while lying dead is to be sampled using a transect method.

The Chestnut Properties underwent an inventory in 2022. All inventory data underwent Quality Assurance/Quality Control checks as described in Annex BG. The plot allocation process using the “Calculation of the number of sample plots for measurements within A/R CDM project activities” tool v2.1.0 can be found in Annex G. The table below outlines the number of plots inventoried by PAI.

PAI	# of Plots
Saline Bluff	12
Fourche La Fave	15
Hickls	12
Rooks Ranch	14
Black River	13
Harding/Freed	11
Dickson	5
El Ranchos	8
Total	90

Below ground carbon stocks were estimated using a root-to-shoot ratio (R) of .24 for broadleaf forests with biomass above 150 tonnes per hectare per Annex BP. This root-to-shoot ratio was used for all measurement strata, including pine plantations.

Both the project and baseline ex-ante scenarios utilize the same underlying forest inventory data to forecast. Per the methodology, no activity-shifting leakage shall be permitted during the span of the project.

The table below forecasts the ex-ante GHG removals and reductions over the first crediting period. The ex-ante model in Annex AM, the results of which are shown below, differs from the ex-post model because it assumes the continued expansion of project acreage throughout the project crediting period. The project proponent anticipates acquiring or leasing 200,000 hectares but only 40,000 hectares will be forested and enrolled in the Chestnut Carbon Conservation Project. Therefore, the ex-ante model assumes a total enrollment of 40,000 hectares over the course of the project. For 2022, ex-ante projections included as part of Table 14 assumes a project area of 648.8 hectares (1,603 acres), which is equal to the project area applied for accounting of ex-post GHG emission reductions and/or removals for the year 2022.

Table 14: Ex-ante GHG removals and reductions

Year	Total Cohort Hectares	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
------	-----------------------	---	--	--	--

5 Jul 2022-31 Dec 2022	648.8	(198)	3,002	640	2,560
2023	5,625	(3,515)	53,350	11,373	45,492
2024	10,603	(6,626)	100,558	21,437	85,747
2025	15,580	(9,737)	147,767	31,501	126,003
2026	20,558	(12,847)	194,976	41,565	166,258
2027	25,536	(15,958)	242,184	51,628	206,514
2028	30,513	(19,069)	289,393	61,692	246,769
2029	35,490	(22,179)	336,602	71,756	287,025
2030	40,469	(25,290)	383,811	81,820	327,280
2031	40,469	(25,290)	383,811	81,820	327,280
2032	40,469	(25,290)	383,811	81,820	327,280
2033	40,469	(25,290)	383,811	81,820	327,280
2034	40,469	(25,290)	383,811	81,820	327,280
2035	40,469	(25,290)	383,811	81,820	327,280
2036	40,469	(25,290)	383,811	81,820	327,280
2037	40,469	(25,290)	383,811	81,820	327,280
2038	40,469	(25,290)	383,811	81,820	327,280
2039	40,469	(25,290)	383,811	81,820	327,280
2040	40,469	(25,290)	383,811	81,820	327,280
2041	40,469	(25,290)	383,811	81,820	327,280
2042	40,469	(25,290)	383,811	81,820	327,280
2043	40,469	(25,290)	383,811	81,820	327,280
2044	40,469	(25,290)	383,811	81,820	327,280
2045	40,469	(25,290)	383,811	81,820	327,280
2046	40,469	(25,290)	383,811	81,820	327,280
1 Jan 2047-4 Jul 2047	40,469	(17,352)	263,337	56,138	224,551
Total	40,469	(537,408)	8,155,949	1,738,671	6,954,685

5.5 Quantification of Uncertainty

The determination of sampling error for the purposes of calculating the uncertainty deduction will be assessed at the project-level using a 90 percent confidence interval, per the requirements of Section 8.7.1 of VM0003. Measurement stratum-level sampling variances will be combined to a single project-level sampling variance, weighted by measurement stratum acreage relative to the total project acreage

(w_{ij}) as is standard for stratified samples. Following from Lohr (2014), the project-level sampling variance will be estimated as

$$var(\bar{x}) = \sum_{i=1}^M \sum_{j=1}^{L_i} (w_{ij})^2 var(x_{ij})$$

where M is the total number of PAI at any given time and L_i is the number of measurement strata in the i^{th} PAI subject to the constraint that $\sum_{i=1}^M \sum_{j=1}^{L_i} w_{ij} = 1$.

For both the project and baseline scenarios, the included carbon pools for above ground biomass, below ground biomass, wood products and standing dead wood were all either measured as part of the plot-based inventory sample or were modeled based on input inventory data from the plot-based sample. In accordance with VM0003, since these pools were measured as part of the same sample, they will share the same %SEM. The %SEM will be calculated based on plot-based inventory data. Even though the above ground biomass, below ground biomass, and standing dead pools are distinguished in VM0003, the pools were measured on the same plot as the statistical measurement device, and thus the pools are treated accordingly to statistically estimate the %SEM of the plot-based inventory.

For both the project and baseline scenarios, lying dead wood shall be estimated as part of the transect-based inventory sample, resulting in a distinct sample from the plot-based inventory. Thus, the %SEM of the Lying deadwood pool shall be distinctly estimated using the inventory data collected from the transect-based sample.

6 MONITORING

6.1 Data and Parameters Available at Validation

Data / Parameter	$A_{BSL, i}$					
Data unit	Acres					
Description	Area of baseline measurement stratum, i					
Source of data	GIS analysis, county data, survey data					
Value Applied	<table border="1"> <thead> <tr> <th>Measurement Stratum</th> <th>Area (hectares)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>98.7</td> </tr> </tbody> </table>		Measurement Stratum	Area (hectares)	1	98.7
Measurement Stratum	Area (hectares)					
1	98.7					

	2	62.8
	3	99.0
	4	74.2
	5	127.4
	6	58.5
	7	3.8
	8	60.5
	9	63.9
Justification of choice of data or description of measurement	Using a combination of GIS, survey, and county data allowed the most accurate calculation of acreage. Refer to Annex BN. Project area calculated according to VCS Standard A1.5 by project proponent on 22 March 2023.	
Purpose of data	Determination of baseline scenario	
Comments		

Data / Parameter	BEF																																							
Data unit	Dimensionless																																							
Description	Biomass expansion factor for conversion of annual net increment in stem biomass to total above ground tree biomass increment for species <i>j</i>																																							
Source of data	VM0003 Methodology v1.3 Section 8.5.1.1																																							
Value Applied	<table border="1"> <thead> <tr> <th>Climatic zone</th> <th>Forest type</th> <th>Minimum dbh (cm)</th> <th>BEF₂ (overbark) to be used in connection to growing stock biomass data (Equation 3.2.3)</th> <th>BEF₁ (overbark) to be used in connection to increment data (Equation 3.2.5)</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Boreal</td> <td>Conifers</td> <td>0-8.0</td> <td>1.35 (1.15-3.8)</td> <td>1.15 (1-1.3)</td> </tr> <tr> <td>Broadleaf</td> <td>0-8.0</td> <td>1.3 (1.15-4.2)</td> <td>1.1 (1-1.3)</td> </tr> <tr> <td rowspan="3">Temperate</td> <td rowspan="2">Conifers: Spruce-fir</td> <td>0-12.5</td> <td>1.3 (1.15-4.2)</td> <td>1.15 (1-1.3)</td> </tr> <tr> <td>Pines</td> <td>0-12.5</td> <td>1.3 (1.15-3.4)</td> <td>1.05 (1-1.2)</td> </tr> <tr> <td>Broadleaf</td> <td>0-12.5</td> <td>1.4 (1.15-3.2)</td> <td>1.2 (1.1-1.3)</td> </tr> <tr> <td rowspan="2">Tropical</td> <td>Pines</td> <td>10.0</td> <td>1.3 (1.2-4.0)</td> <td>1.2 (1.1-1.3)</td> </tr> <tr> <td>Broadleaf</td> <td>10.0</td> <td>3.4 (2.0-9.0)</td> <td>1.5 (1.3-1.7)</td> </tr> </tbody> </table>				Climatic zone	Forest type	Minimum dbh (cm)	BEF ₂ (overbark) to be used in connection to growing stock biomass data (Equation 3.2.3)	BEF ₁ (overbark) to be used in connection to increment data (Equation 3.2.5)	Boreal	Conifers	0-8.0	1.35 (1.15-3.8)	1.15 (1-1.3)	Broadleaf	0-8.0	1.3 (1.15-4.2)	1.1 (1-1.3)	Temperate	Conifers: Spruce-fir	0-12.5	1.3 (1.15-4.2)	1.15 (1-1.3)	Pines	0-12.5	1.3 (1.15-3.4)	1.05 (1-1.2)	Broadleaf	0-12.5	1.4 (1.15-3.2)	1.2 (1.1-1.3)	Tropical	Pines	10.0	1.3 (1.2-4.0)	1.2 (1.1-1.3)	Broadleaf	10.0	3.4 (2.0-9.0)	1.5 (1.3-1.7)
Climatic zone	Forest type	Minimum dbh (cm)	BEF ₂ (overbark) to be used in connection to growing stock biomass data (Equation 3.2.3)	BEF ₁ (overbark) to be used in connection to increment data (Equation 3.2.5)																																				
Boreal	Conifers	0-8.0	1.35 (1.15-3.8)	1.15 (1-1.3)																																				
	Broadleaf	0-8.0	1.3 (1.15-4.2)	1.1 (1-1.3)																																				
Temperate	Conifers: Spruce-fir	0-12.5	1.3 (1.15-4.2)	1.15 (1-1.3)																																				
		Pines	0-12.5	1.3 (1.15-3.4)	1.05 (1-1.2)																																			
	Broadleaf	0-12.5	1.4 (1.15-3.2)	1.2 (1.1-1.3)																																				
Tropical	Pines	10.0	1.3 (1.2-4.0)	1.2 (1.1-1.3)																																				
	Broadleaf	10.0	3.4 (2.0-9.0)	1.5 (1.3-1.7)																																				
	Source: IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry (2003), Table 3A.1.10.																																							

Justification of choice of data or description of measurement methods and procedures applied	Calculation process detailed in VM0003 Methodology v1.3 Section 8.5.1.1. BEF used in Chestnut Carbon Conservation Project selected by project proponent on 10 October 2022.
Purpose of data	Determination of baseline scenario
Comments	

Data / Parameter	CF _j
Data unit	tCt ⁻¹ d.m.
Description	Carbon fraction of dry matter
Source of data	Default value from IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry – Section 4.3
Value Applied	0.5 tCt ⁻¹ dry matter
Justification of choice of data or description of measurement methods and procedures applied	Recommended in VM0003 Methodology v1.3 Section 8.4. CF _j used in Chestnut Carbon Conservation Project selected by project proponent
Purpose of data	Calculation of baseline emissions
Comments	

Data / Parameter	D _j
Data unit	T d.m. ft ⁻³
Description	Basic wood density of species j
Source of data	Winjum et al. 1998 Annex AX
Value Applied	

Species	Wood Density (T/ft ³)	Species	Wood Density (T/ft ³)	Species	Wood Density (T/ft ³)
American beech	0.027	Bur oak	0.031	Overcup oak	0.031
American hornbeam	0.027	Cherrybark oak	0.032	Pecan	0.031
American sycamore	0.026	Common persimmon	0.031	Post oak	0.032
Ash spp.	0.025	Cottonwood and poplar spp.	0.022	Red maple	0.025
Bald cypress	0.026	Eastern hophornbeam	0.030	Shagbark hickory	0.032
Basswood spp.	0.021	Eastern redbud	0.028	Shumard oak	0.032
Birch spp.	0.028	Elm spp.	0.028	Southern red oak	0.032
Black cherry	0.023	Hackberry spp.	0.025	Sweetgum	0.025
Black oak	0.032	Hickory spp.	0.033	Water oak	0.032
Black walnut	0.028	Loblolly pine	0.027	Water tupelo	0.028
Eastern redcedar	0.019	Northern red oak	0.032	White oak	0.031
Blackgum	0.029	Osage-orange	0.031	Willow oak	0.032
Boxelder	0.025	Other hardwood	0.030		
Justification of choice of data or description of measurement methods and procedures applied	Data published and used by the United States Forest Service. Recommended by VM0003 Methodology v1.3 8.5.1.3 Method 2. D _j used in Chestnut Carbon Conservation Project selected by project proponent on 29 January 2023.				
Purpose of data	Calculation of baseline emissions				
Comments					

Data / Parameter	D _{DW}														
Data unit	T d.m. ft ⁻³														
Description	Basic wood density of dead wood in the density class- sound (1), intermediate (2), and rotten (3)														
Source of data	Harmon et al. 2011 Annex BQ														
Value Applied	<table border="1"> <thead> <tr> <th>Decay Class</th> <th>Standing Dead (g/cm³)</th> <th>Downed Dead (g/cm³)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.40</td> <td>0.40</td> </tr> <tr> <td>2</td> <td>0.38</td> <td>0.33</td> </tr> <tr> <td>3</td> <td>0.35</td> <td>0.26</td> </tr> </tbody> </table> <p>Average density (g/cm³) for standing dead and downed dead trees for all species and sites by decay class. Source: Harmon et al. 2011, Table 4.</p>			Decay Class	Standing Dead (g/cm ³)	Downed Dead (g/cm ³)	1	0.40	0.40	2	0.38	0.33	3	0.35	0.26
Decay Class	Standing Dead (g/cm ³)	Downed Dead (g/cm ³)													
1	0.40	0.40													
2	0.38	0.33													
3	0.35	0.26													
Justification of choice of data or description of measurement methods and procedures applied	Data published and used by the United States Forest Service. Recommended by VM0003 Methodology v1.3 8.5.1.2. D _{DW} used in Chestnut Carbon Conservation Project selected by project proponent on 29 January 2023.														
Purpose of data	Determination of baseline scenario														
Comments	Dead wood pool conservatively excluded														

Data / Parameter	f _j (DBH, H)
Data unit	T d.m. tree ⁻³
Description	Allometric equation for species j linking diameter at breast height (DBH) and possible height (H) to above ground biomass of living trees
Source of data	California Air Resources Board

Value Applied	Species and region specific
Justification of choice of data or description of measurement methods and procedures applied	Equations selected are specific to all PAI regions. Data published and used by the California Air Resources Board. f_j used in Chestnut Carbon Conservation Project selected by project proponent on 29 January 2023.
Purpose of data	Determination of baseline scenario
Comments	

Data / Parameter	OF, WW
Data unit	Kg kg ⁻¹
Description	<p>OF = Fraction of wood products that will be emitted to the atmosphere between 5 and 100 years after production;</p> <p>WW = Fraction of extracted biomass effectively emitted to the atmosphere during production</p>
Source of data	<p>Winjum et al. 1998</p> <p>Annex AX</p>
Value Applied	<p>OF = Value of 0.62 given by VM0003 v1.3 for both sawwood and paper and paperboard</p> <p>WW = Value of 0.19 given by VM0003 v1.3 for developed countries</p>
Justification of choice of data or description of measurement methods and procedures applied	Values provided by VM0003 Methodology v1.3 Section 8.5.1.3 Equation 32. OF, WW used in Chestnut Carbon Conservation Project selected by project proponent on 29 January 2023.
Purpose of data	Calculation of project emissions
Comments	

Data / Parameter	Data unit	Description	Source of data	Value Applied	Justification of choice of data or description of measurement methods and procedures applied	Purpose of data	Comments
PML _{FT} Saline Bluff	%	Mean merchantable biomass as a proportion of total above ground tree biomass for each forest type	VM0003 Methodology v1.3 Section 8.6.1	73%	Recommended in VM0003 Methodology v1.3. PML _{FT} used in Chestnut Carbon Conservation Project selected by project proponent on 29 January 2023.	Calculation of leakage	
PML _{FT} Fourche La Fave	%	Mean merchantable biomass as a proportion of total above ground tree biomass for each forest type	VM0003 Methodology v1.3 Section 8.6.1	73%	Recommended in VM0003 Methodology v1.3. PML _{FT} used in Chestnut Carbon Conservation Project selected by project proponent on 29 January 2023.	Calculation of leakage	
PML _{FT} Hickls	%	Mean merchantable biomass as a proportion of total above ground tree biomass for each forest type	VM0003 Methodology v1.3 Section 8.6.1	73%	Recommended in VM0003 Methodology v1.3. PML _{FT} used in Chestnut Carbon Conservation Project selected by project proponent on 29 January 2023.	Calculation of leakage	
PML _{FT} Rooks Ranch	%	Mean merchantable biomass as a proportion of total above	VM0003 Methodology v1.3 Section 8.6.1	73%	Recommended in VM0003 Methodology v1.3. PML _{FT} used in Chestnut Carbon	Calculation of leakage	

		ground tree biomass for each forest type			Conservation Project selected by project proponent on 29 January 2023.		
PML _{FT} Black River	%	Mean merchantable biomass as a proportion of total above ground tree biomass for each forest type	VM0003 Methodology v1.3 Section 8.6.1	73%	Recommended in VM0003 Methodology v1.3. PML _{FT} used in Chestnut Carbon Conservation Project selected by project proponent on 29 January 2023.	Calculation of leakage	
PML _{FT} Harding/Freed	%	Mean merchantable biomass as a proportion of total above ground tree biomass for each forest type	VM0003 Methodology v1.3 Section 8.6.1	73%	Recommended in VM0003 Methodology v1.3. PML _{FT} used in Chestnut Carbon Conservation Project selected by project proponent on 29 January 2023.	Calculation of leakage	
PML _{FT} Dickson	%	Mean merchantable biomass as a proportion of total above ground tree biomass for each forest type	VM0003 Methodology v1.3 Section 8.6.1	73%	Recommended in VM0003 Methodology v1.3. PML _{FT} used in Chestnut Carbon Conservation Project selected by project proponent on 29 January 2023.	Calculation of leakage	
PML _{FT} El Ranchos	%	Mean merchantable biomass as a proportion of total above ground tree biomass for	VM0003 Methodology v1.3 Section 8.6.1	73%	Recommended in VM0003 Methodology v1.3. PML _{FT} used in Chestnut Carbon Conservation Project selected by project proponent on 29	Calculation of leakage	

		each forest type			January 2023.		
--	--	------------------	--	--	---------------	--	--

Data / Parameter	R												
Data unit	Kg kg ⁻¹												
Description	Root-shoot ratio appropriate for biomass increment of forest type/biome												
Source of data	IPCC, Good Practice Guidance for Land Use, Land -Use Change and Forestry, 2003												
Value Applied	<table border="1"> <thead> <tr> <th>Vegetation Type</th> <th>Aboveground biomass (t/ha)</th> <th>Root-to-shoot ratio, R</th> </tr> </thead> <tbody> <tr> <td>Conifer forest/plantation</td> <td><50</td> <td>0.46</td> </tr> <tr> <td>Conifer forest/plantation</td> <td>50-150</td> <td>0.32</td> </tr> <tr> <td>Conifer forest/plantation</td> <td>>150</td> <td>0.23</td> </tr> </tbody> </table> <p>Average belowground to aboveground biomass ratio (root-shoot ratio, R) in natural regeneration by broad category (tonnes dry matter). Source: Table 3A.1.8 IPCC, Good Practice Guidance for Land Use, Land -Use Change and Forestry, 2003.</p>	Vegetation Type	Aboveground biomass (t/ha)	Root-to-shoot ratio, R	Conifer forest/plantation	<50	0.46	Conifer forest/plantation	50-150	0.32	Conifer forest/plantation	>150	0.23
Vegetation Type	Aboveground biomass (t/ha)	Root-to-shoot ratio, R											
Conifer forest/plantation	<50	0.46											
Conifer forest/plantation	50-150	0.32											
Conifer forest/plantation	>150	0.23											
Justification of choice of data or description of measurement methods and procedures applied	Recommended per VM0003 Methodology v1.3. R used in Chestnut Carbon Conservation Project selected by project proponent on 29 January 2023.												
Purpose of data	Determination of baseline scenario												
Comments													

Data / Parameter	SLF
-------------------------	-----

Data unit	Unitless										
Description	Short-lived fraction- proportion of wood products that oxidize immediately in the first three years after harvesting										
Source of data	Winjum et al. 1998 Annex AX										
Value Applied	<table border="1"> <thead> <tr> <th>Wood Product Class</th> <th>SLF</th> </tr> </thead> <tbody> <tr> <td>Sawnwood</td> <td>0.12</td> </tr> <tr> <td>Woodbase panels</td> <td>.06</td> </tr> <tr> <td>Other industrial roundwood</td> <td>0.18</td> </tr> <tr> <td>Paper and paperboard</td> <td>0.24</td> </tr> </tbody> </table>	Wood Product Class	SLF	Sawnwood	0.12	Woodbase panels	.06	Other industrial roundwood	0.18	Paper and paperboard	0.24
Wood Product Class	SLF										
Sawnwood	0.12										
Woodbase panels	.06										
Other industrial roundwood	0.18										
Paper and paperboard	0.24										
Justification of choice of data or description of measurement methods and procedures applied	Recommended per VM0003 Methodology v1.3. SLF used in Chestnut Carbon Conservation Project selected by project proponent on 29 January 2023.										
Purpose of data	Calculation of project emissions										
Comments											

6.2 Data and Parameters Monitored

Data/ Parameter	A _i
Data unit	Hectares
Description	Area of measurement stratum i
Source of data	GIS area
Description of measurement methods and procedures to be applied	Area defined by property boundaries, watershed boundaries, and operational unit boundaries. Monitoring and measuring will be performed by project proponent. Measurement using ArcGIS software is highly accurate. Per VCS Standard 3.16.5, where measurement and monitoring equipment is used, the project proponent shall ensure the equipment is calibrated according to the equipment's specifications and/or relevant national or international standards.

Frequency of monitoring/ recording	Annually																					
Value applied	<table border="1"> <thead> <tr> <th>Measurement Stratum</th> <th>Hectares</th> </tr> </thead> <tbody> <tr><td>1</td><td>98.7</td></tr> <tr><td>2</td><td>62.8</td></tr> <tr><td>3</td><td>99.0</td></tr> <tr><td>4</td><td>74.2</td></tr> <tr><td>5</td><td>127.4</td></tr> <tr><td>6</td><td>58.5</td></tr> <tr><td>7</td><td>3.8</td></tr> <tr><td>8</td><td>60.5</td></tr> <tr><td>9</td><td>63.9</td></tr> </tbody> </table>	Measurement Stratum	Hectares	1	98.7	2	62.8	3	99.0	4	74.2	5	127.4	6	58.5	7	3.8	8	60.5	9	63.9	
Measurement Stratum	Hectares																					
1	98.7																					
2	62.8																					
3	99.0																					
4	74.2																					
5	127.4																					
6	58.5																					
7	3.8																					
8	60.5																					
9	63.9																					
Monitoring equipment	ArcGIS software																					
QA/QC procedures to be applied	Geospatial boundaries will be checked to confirm accuracy through the use of management plans, official surveys and publicly available data. Aerial imagery will be used to check for agreement with digitized boundaries. Online tax maps will also be checked for agreement with ownership boundaries. Project shapefiles will be kept current and backed up.																					
Purpose of data	Calculation of project emissions																					
Calculation method	ArcGIS “Calculate Geometry” tool																					
Comments																						

Data/ Parameter	Ap
Data unit	Hectares/Acres
Description	Area of sample plot
Source of data	See Annex AE for Chestnut Conserve Monitoring Protocol v2.0
Description of measurement methods and procedures to be applied	Plots measured in accordance with standard forest measurement practices. Project proponent will be responsible for performing measurement. Monitoring and measuring will be performed by project proponent. Further description of measurement methods can be found in Annex AE, Chestnut Conserve Monitoring Protocol v2.0. Per VCS Standard 3.16.5, where measurement and

	monitoring equipment is used, the project proponent shall ensure the equipment is calibrated according to the equipment's specifications and/or relevant national or international standards.										
Frequency of monitoring/ recording	At least prior to baseline reassessment										
Value applied	5.09 meters (16.7ft 1/122.8 Hectares 1/50 acre)										
Monitoring equipment	Measuring tape, laser or equivalent to establish plot radius										
QA/QC procedures to be applied	<table border="1"> <thead> <tr> <th>Stage</th> <th>QA/QC Step</th> </tr> </thead> <tbody> <tr> <td>Inventory</td> <td>Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.</td> </tr> <tr> <td>Inventory</td> <td>Project proponent will ensure that foresters follow behind forestry technicians checking their measurements on a sample of plots until they are sure proper techniques are being used and the quality of measurements suffices</td> </tr> <tr> <td>Data Checks</td> <td>Inventory data are sent to project proponent and reviewed for data accuracy. Feedback is given to the project proponent's forester regarding this data. The data is entered into the treelist workbook. This data is backed up on project proponent's servers</td> </tr> <tr> <td>Data Checks</td> <td>Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.</td> </tr> </tbody> </table>	Stage	QA/QC Step	Inventory	Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.	Inventory	Project proponent will ensure that foresters follow behind forestry technicians checking their measurements on a sample of plots until they are sure proper techniques are being used and the quality of measurements suffices	Data Checks	Inventory data are sent to project proponent and reviewed for data accuracy. Feedback is given to the project proponent's forester regarding this data. The data is entered into the treelist workbook. This data is backed up on project proponent's servers	Data Checks	Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.
Stage	QA/QC Step										
Inventory	Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.										
Inventory	Project proponent will ensure that foresters follow behind forestry technicians checking their measurements on a sample of plots until they are sure proper techniques are being used and the quality of measurements suffices										
Data Checks	Inventory data are sent to project proponent and reviewed for data accuracy. Feedback is given to the project proponent's forester regarding this data. The data is entered into the treelist workbook. This data is backed up on project proponent's servers										
Data Checks	Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.										
Purpose of data	Calculation of project emissions										
Calculation method	Varies by stand										
Comments	Fixed radius plot design										

Data/ Parameter	$DM_{n,i,t}$
Data unit	cm
Description	Diameter of piece n of dead wood along the transect in measurement stratum i , at time t
Source of data	Field measurement in sample transects

Description of measurement methods and procedures to be applied	Project proponent will be responsible for performing measurement. Monitoring and measuring will be performed by project proponent. Further description of measurement methods can be found in Annex AE, Chestnut Conserve Monitoring Protocol v2.0. Per VCS Standard 3.16.5, where measurement and monitoring equipment is used, the project proponent shall ensure the equipment is calibrated according to the equipment's specifications and/or relevant national or international standards.										
Frequency of monitoring/recording	At least prior to baseline reassessment										
Value applied	Specific to each piece of dead wood along the transect in measurement stratum i , at time t										
Monitoring equipment	Logger tape or laser										
QA/QC procedures to be applied	<table border="1"> <thead> <tr> <th>Stage</th> <th>QA/QC Step</th> </tr> </thead> <tbody> <tr> <td>Inventory</td> <td>Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.</td> </tr> <tr> <td>Inventory</td> <td>Project proponent will ensure that foresters follow behind forestry technicians checking their measurements on a sample of plots until they are sure proper techniques are being used and the quality of measurements suffices</td> </tr> <tr> <td>Data Checks</td> <td>Inventory data are sent to project proponent and reviewed for data accuracy. Feedback is given to the project proponent's forester regarding this data. The data is entered into the treelist workbook. This data is backed up on project proponent's servers</td> </tr> <tr> <td>Data Checks</td> <td>Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.</td> </tr> </tbody> </table>	Stage	QA/QC Step	Inventory	Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.	Inventory	Project proponent will ensure that foresters follow behind forestry technicians checking their measurements on a sample of plots until they are sure proper techniques are being used and the quality of measurements suffices	Data Checks	Inventory data are sent to project proponent and reviewed for data accuracy. Feedback is given to the project proponent's forester regarding this data. The data is entered into the treelist workbook. This data is backed up on project proponent's servers	Data Checks	Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.
Stage	QA/QC Step										
Inventory	Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.										
Inventory	Project proponent will ensure that foresters follow behind forestry technicians checking their measurements on a sample of plots until they are sure proper techniques are being used and the quality of measurements suffices										
Data Checks	Inventory data are sent to project proponent and reviewed for data accuracy. Feedback is given to the project proponent's forester regarding this data. The data is entered into the treelist workbook. This data is backed up on project proponent's servers										
Data Checks	Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.										
Purpose of data	Calculation of project emissions										
Calculation method	Measured										
Comments	Dead wood pool conservatively excluded										
Data/ Parameter	DBH										
Data unit	Cm.										

Description	Diameter at breast height of tree (1.3716m or 4.5 ft.)	
Source of data	Field measurements in sample plots	
Description of measurement methods and procedures to be applied	<p>Project proponent will be responsible for performing measurement. Monitoring and measuring will be performed by project proponent. Further description of measurement methods can be found in Annex AE, Chestnut Conserve Monitoring Protocol v2.0. Per VCS Standard 3.16.5, where measurement and monitoring equipment is used, the project proponent shall ensure the equipment is calibrated according to the equipment's specifications and/or relevant national or international standards.</p>	
Frequency of monitoring/recording	At least prior to baseline reassessment	
Value applied	Specific to each measurement taken	
Monitoring equipment	Logging tape, biltmore stock, caliper or equivalent	
QA/QC procedures to be applied	Stage	QA/QC Step
	Inventory	Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.
	Inventory	Project proponent will ensure that foresters follow behind forestry technicians checking their measurements on a sample of plots until they are sure proper techniques are being used and the quality of measurements suffices
	Data Checks	Inventory data are sent to project proponent and reviewed for data accuracy. Feedback is given to the project proponent's forester regarding this data. The data is entered into the treelist workbook. This data is backed up on project proponent's servers
	Data Checks	Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.
Purpose of data	Calculation of project emissions	
Calculation method	Measured prior to baseline reassessment, otherwise modeled using FVS, Annex AZ.	
Comments		

Data/ Parameter	H	
Data unit	m..	
Description	Height of tree	
Source of data	Field measurements in sample plots	
Description of measurement methods and procedures to be applied	<p>Project proponent will be responsible for performing measurement. Monitoring and measuring will be performed by project proponent. Further description of measurement methods can be found in Annex AE, Chestnut Conserve Monitoring Protocol v2.0. Per VCS Standard 3.16.5, where measurement and monitoring equipment is used, the project proponent shall ensure the equipment is calibrated according to the equipment's specifications and/or relevant national or international standards.</p>	
Frequency of monitoring/ recording	At least prior to baseline reassessment	
Value applied	Specific to each tree measured	
Monitoring equipment	Biltmore stick, clinometer, hypsometer or equivalent	
QA/QC procedures to be applied	Stage	QA/QC Step
	Inventory	Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.
	Inventory	Project proponent will ensure that foresters follow behind forestry technicians checking their measurements on a sample of plots until they are sure proper techniques are being used and the quality of measurements suffices
	Data Checks	Inventory data are sent to project proponent and reviewed for data accuracy. Feedback is given to the project proponent's forester regarding this data. The data is entered into the treelist workbook. This data is backed up on project proponent's servers
	Data Checks	Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.
Purpose of data	Calculation of project emissions	
Calculation method	Measured prior to baseline reassessment, otherwise modeled using FVS, Annex AZ.	

Comments	Heights of trees on “estimate plots” estimated using regression function built into FPS software											
Data/ Parameter	L											
Data unit	Cm.											
Description	Length of the transect to determine volume of lying dead wood											
Source of data	Field measurements in sample transects											
Description of measurement methods and procedures to be applied	<p>Project proponent will be responsible for performing measurement. Monitoring and measuring will be performed by project proponent. Further description of measurement methods can be found in Annex AE, Chestnut Conserve Monitoring Protocol v2.0. Per VCS Standard 3.16.5, where measurement and monitoring equipment is used, the project proponent shall ensure the equipment is calibrated according to the equipment’s specifications and/or relevant national or international standards.</p>											
Frequency of monitoring/ recording	At least prior to baseline reassessment											
Value applied	See Inventory Protocol											
Monitoring equipment	Logger tape or laser											
QA/QC procedures to be applied	<table border="1"> <thead> <tr> <th>Stage</th> <th>QA/QC Step</th> </tr> </thead> <tbody> <tr> <td>Inventory</td> <td>Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.</td> </tr> <tr> <td>Inventory</td> <td>Project proponent will ensure that foresters follow behind forestry technicians checking their measurements on a sample of plots until they are sure proper techniques are being used and the quality of measurements suffices</td> </tr> <tr> <td>Data Checks</td> <td>Inventory data are sent to project proponent and reviewed for data accuracy. Feedback is given to the project proponent’s forester regarding this data. The data is entered into the treelist workbook. This data is backed up on project proponent’s servers</td> </tr> <tr> <td>Data Checks</td> <td>Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.</td> </tr> </tbody> </table>		Stage	QA/QC Step	Inventory	Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.	Inventory	Project proponent will ensure that foresters follow behind forestry technicians checking their measurements on a sample of plots until they are sure proper techniques are being used and the quality of measurements suffices	Data Checks	Inventory data are sent to project proponent and reviewed for data accuracy. Feedback is given to the project proponent’s forester regarding this data. The data is entered into the treelist workbook. This data is backed up on project proponent’s servers	Data Checks	Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.
Stage	QA/QC Step											
Inventory	Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.											
Inventory	Project proponent will ensure that foresters follow behind forestry technicians checking their measurements on a sample of plots until they are sure proper techniques are being used and the quality of measurements suffices											
Data Checks	Inventory data are sent to project proponent and reviewed for data accuracy. Feedback is given to the project proponent’s forester regarding this data. The data is entered into the treelist workbook. This data is backed up on project proponent’s servers											
Data Checks	Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.											

Purpose of data	Calculation of project emissions
Calculation method	Measured
Comments	Dead wood pool conservatively excluded

Data/ Parameter	N	
Data unit	Dimensionless	
Description	Total number of wood pieces intersecting the transect	
Source of data	Field measurements in sample transects	
Description of measurement methods and procedures to be applied	<p>Project proponent will be responsible for performing measurement. Monitoring and measuring will be performed by project proponent. Further description of measurement methods can be found in Annex AE, Chestnut Conserve Monitoring Protocol v2.0. Per VCS Standard 3.16.5, where measurement and monitoring equipment is used, the project proponent shall ensure the equipment is calibrated according to the equipment's specifications and/or relevant national or international standards.</p>	
Frequency of monitoring/ recording	At least prior to baseline reassessment	
Value applied	Specific to each transect measured	
Monitoring equipment	Go-no-go Fuel Sizing Gauge	
QA/QC procedures to be applied	Stage	QA/QC Step
	Inventory	Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.
	Inventory	Project proponent will ensure that foresters follow behind forestry technicians checking their measurements on a sample of plots until they are sure proper techniques are being used and the quality of measurements suffices
	Data Checks	Inventory data are sent to project proponent and reviewed for data accuracy. Feedback is given to the project proponent's forester regarding this data. The data is entered into the treelist workbook. This data is backed up on project proponent's servers

	<table border="1"> <tr> <td>Data Checks</td> <td>Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.</td> </tr> </table>	Data Checks	Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.
Data Checks	Data is compiled to ensure that all allocated plots have been visited and measurements have been taken.		
Purpose of data	Calculation of project emissions		
Calculation method	Measured		
Comments			

Data/ Parameter	PMP _i																				
Data unit	%																				
Description	Merchantable biomass as a proportion of total above ground tree biomass for measurement stratum / within the project boundaries																				
Source of data	Inventory data																				
Description of measurement methods and procedures to be applied	Calculate merchantable biomass and total above ground biomass following VM0003 Methodology v1.3 Section 9.1. Project proponent will be responsible for measurement.																				
Frequency of monitoring/ recording	At least prior to baseline reassessment																				
Value applied	<table border="1"> <thead> <tr> <th>Measurement stratum</th> <th>PMP_i (%)</th> </tr> </thead> <tbody> <tr><td>1</td><td>25</td></tr> <tr><td>2</td><td>23</td></tr> <tr><td>3</td><td>40</td></tr> <tr><td>4</td><td>17</td></tr> <tr><td>5</td><td>29</td></tr> <tr><td>6</td><td>6</td></tr> <tr><td>7</td><td>14</td></tr> <tr><td>8</td><td>13</td></tr> <tr><td>9</td><td>27</td></tr> </tbody> </table> <p>PMP_i was calculated by dividing merchantable biomass (total gross biomass of a tree 12.7 centimeters (5 in) DBH or larger from a 30.48 centimeters (1 ft) stump to either the minimum of 10.16 centimeters (4 in) top DOB of the central stem or the highest merchantable height of the central stem. Trees are not considered merchantable if they are not a species that is commercially</p>	Measurement stratum	PMP _i (%)	1	25	2	23	3	40	4	17	5	29	6	6	7	14	8	13	9	27
Measurement stratum	PMP _i (%)																				
1	25																				
2	23																				
3	40																				
4	17																				
5	29																				
6	6																				
7	14																				
8	13																				
9	27																				

	harvested in the region or have bole forms that would prevent efficient milling of wood products from taking place) by total biomass in the project area.
Monitoring equipment	N/A
QA/QC procedures to be applied	Calculations are double checked for accuracy.
Purpose of data	Calcalaton of market effects leakage
Calculation method	Divide merchantable biomass by the total above ground biomass
Comments	

Data/ Parameter	T
Data unit	year
Description	Number of years between monitoring period time t_2 and t_1 ($T = t_2 - t_1$)
Source of data	Monitoring reports
Description of measurement methods and procedures to be applied	Calculated by subtracting the monitoring period start year t_1 from the current monitoring period year t_2
Frequency of monitoring/ recording	Each reporting period
Value applied	Specific to each monitoring period
Monitoring equipment	Calendar
QA/QC procedures to be applied	Calculations are double checked for accuracy
Purpose of data	Calculation of project emissions
Calculation method	$T = t_2 - t_1$
Comments	

Data/ Parameter	URS																			
Data unit	tCO2e																			
Description	Uncredited Reserve Stock																			
Source of data	Inventory data																			
Description of measurement methods and procedures to be applied	Nine percent (9%) of initial carbon stock per VM0003 Methodology v1.3 Section 9.1. Project proponent will be responsible for measurement.																			
Frequency of monitoring/ recording	Upon the addition of each new PAI to the grouped project																			
Value applied	<table border="1"> <thead> <tr> <th>PAI</th> <th>URS (tCO2e)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2,186</td> </tr> <tr> <td>2</td> <td>986</td> </tr> <tr> <td>3</td> <td>2,605</td> </tr> <tr> <td>4</td> <td>2,938</td> </tr> <tr> <td>5</td> <td>4,901</td> </tr> <tr> <td>6</td> <td>3,012</td> </tr> <tr> <td>7</td> <td>180</td> </tr> <tr> <td>8</td> <td>3,435</td> </tr> </tbody> </table>		PAI	URS (tCO2e)	1	2,186	2	986	3	2,605	4	2,938	5	4,901	6	3,012	7	180	8	3,435
PAI	URS (tCO2e)																			
1	2,186																			
2	986																			
3	2,605																			
4	2,938																			
5	4,901																			
6	3,012																			
7	180																			
8	3,435																			
Monitoring equipment	N/A																			
QA/QC procedures to be applied	Calculations are double checked for accuracy.																			
Purpose of data	Account for emissions from limited harvesting to promote forest health according to the policies of Forest Carbon Works, such as continuous thinning																			
Calculation method	9% of total carbon stock in living and standing dead trees																			
Comments	See Section 3.3																			

6.3 Monitoring Plan

The objective of the monitoring plan is to provide an overview of the procedures and timing planned for the collection, organization, and processing of relevant data and parameters listed in Section 6.2.

Field data collection was conducted through the use of a smartphone application named OxyLus and data were processed by using a desktop computer program called Nephos. Both are proprietary technologies developed by the project proponent and are considered commercially sensitive. Information on the use of these technologies, including the calibration of equipment, is provided in Annex J.

Fixed-area sample plots will occur within each instance with the location randomly allocated. The targeted precision level for biomass estimation across the project will be +/- 10% of the mean at a 90% confidence level. The initial sampling intensity was determined based on ex-ante estimations input to the "Calculation of the number of sample plots for measurements within A/R CDM project activities Version: 02.1.0" tool. Currently, the project is within +/- 25.8% of the mean at a 90% confidence level. However, this is expected to improve in future monitoring periods as additional plots and PAIs are added to the project. Depending on forest characteristics, plots will have a radius between 3.597 meters (11.8 feet or 1/100 ac) and 9.144 meters (30 feet or 1/50 ac).

When determining whether a tree is within a plot, the distance from the plot center to the center (pith) of the tree at breast height will be measured. Note that trees that are partially within the plot radius but do not have their centers within this radius are not included. Measurements of plot radius will be taken horizontally.

The following data will be gathered for each living and dead tree greater than, or equal to, 12.7 centimeters in diameter that fall within a given plot radius:

- Species
- Distance from plot center (m)
- Azimuth from plot center (degrees)
- Tree status – living or dead. If dead, the decay class will be designated
- Total height (m)
- Merchantable height, if applicable (m)
- Height to dead or broken top, if present (m)
- Diameter at breast height (cm)
- Missing biomass (%)

Each allocated plot will be located in the field using a GPS device and a chance device. Once located as precisely as possible, the field cruiser will close their eyes, spin around, and randomly throw a hat or object over their shoulder as the chance device; the object's landing point will then be taken as the center of the plot for measurement. Plot border-line trees will be determined post process using the horizontal distance to the face of each tree, DBH measurements, and notes from the cruiser. If necessary, plots will be revisited in order to confirm determinations of in or out trees. Azimuth including declination will be recorded for all trees.

If a plot landed along a distinct edge, no steps will be carried out by the field cruiser other than to make note that the plot landed along a distinct edge and complete the plot as normal. With the GPS location, the distance and azimuth of each tree in the plot, as well as additional records of trees both on and off the plot, the plot layout can be reconstructed using photogrammetry and the mirage method could be applied post inventory process, if necessary.

Non-stocked plots will not be treated differently from stocked plots. The Project Area will not be revised as a result of non-stocked plots; non-stocked plots will simply make no contribution to carbon stock estimates though they will still be included in the inventory.

In addition to tree attribute data collected during the inventory, the lying dead wood pool will be monitored using the Harmon and Sexton 1996 method, Annex BF, as described in the VM0003 Methodology.

Following VM0003 Section 9.3, where the Chestnut properties are not homogeneous, the project area shall be stratified into homogeneous units to increase measurement precision of carbon stock, as defined in Section 5 of this document. The creation of measurement strata shall always be completed ex-ante using aerial imagery datasets and, where available. Both the baseline and project scenarios use the same measurement stratification. There are currently 9 measurement strata in the project.

Ex-post stratification is not required as none of the activities listed in VM0003 Section 9.3, including unexpected disturbance or forest management activities, have occurred during this crediting period to date.

Where measurement stratification is implemented, the stratified sampling frame will be independent of observed plot data. For the purpose of the estimation of carbon stocks, the number of measurement strata and measurement strata boundaries will be irrelevant so as long as every sample unit will be assigned to a measurement stratum. To reduce sample size and improve the precision of the carbon stock estimate for a given sample size, the sampling frame will be stratified into regions of homogenous carbon stock, per Section 9.3 of VM0003. Forest type will be interpreted from stand typing as an indicator of regions of homogenous carbon stock. See section 5 for more detail on stratification.

Two factors could significantly influence the accuracy of estimates, resulting in potentially biased estimates: dropping sampled plot locations from the sample frame due to inaccessibility and failing to use random sampling in the selection of sample sites. With respect to the first, the protocol specifies that unreachable areas shall be excluded from the sampling frame and the project area; all areas of the project must be subject to sampling. With respect to the second, the protocol requires the use of a random chance device to spatially allocate plots for measurement using GIS and a second level of chance device in the field to randomly locate the plot center at the approximate allocated point.

Where non-conformances with the validated monitoring plan exist at the time of any verification, the project proponent shall justify any non-conformances of the plan as a project description deviation according to the requirements of Section 3.19 of the VCS Standard.

Forest Carbon Works will continue managing the project throughout the project lifetime, including the ongoing monitoring, reporting, and verification of underlying data and parameters that contribute to the quantification of project greenhouse gas emission reductions and removals through the life of the project’s crediting period. Forest Carbon Works will oversee inventory updates, data collection and processing, to ensure continued project reporting and monitoring activities. All data will be saved to secure cloud-based servers regularly. Data collected as part of the monitoring activities shall be maintained for at least 2 years following the end of the project. A line diagram showing the flow of data is provided below:



The project proponent, Forest Carbon Works, is a project developer with expertise in the technical aspects of carbon offset project design, planning, and development with a focus on forest biometrics, carbon accounting methodologies, and remote sensing. Key personnel have extensive experience validating and verifying projects under the Verified Carbon Standard (VCS), California Air Resources Board (ARB), Climate Action Reserve (CAR) Standard, Gold Standard and Climate Community & Biodiversity (CCB) Standard. Key personnel are Verra-approved experts in IFM and REDD.

In terms of organization structure, the project proponent is divided into a project development team and a field team. The project development team is responsible for all quantification, modeling, and documentation associated with the project, while the field team is responsible for the forest inventory and any related field work. The field team is led by regional foresters who have extensive experience practicing forestry in their respective regions. Regional foresters will lead all on-the-ground monitoring activities that will take place during the lifetime of the project, including data collection and inventory management.

The project proponent will be responsible for all oversight and accountability of monitoring activities throughout the life of the project. If contractors are used for collecting inventory data, they will be trained and supervised directly by project proponent staff.

Geospatial boundaries of the Chestnut Properties will be checked to confirm accuracy through the use of management plans and publicly available data. Aerial imagery will be used to check for agreement with digitized boundaries. Online tax maps will also be checked for agreement with ownership boundaries.

QAQC procedures will be carried out on all recorded measurements throughout the inventory process by the Project Proponent. All measurements will be reviewed for completeness, thoroughness, and accuracy by the Project Proponent during and after the inventory cruise. Evaluation of tree

measurements will be performed using photogrammetry on image data collected in the field. During the review and processing of collected inventory data, inconsistent, seemingly erroneous, and/or otherwise insufficient data will be investigated using photogrammetric methods and where necessary the forest technician will be further consulted by the Project Proponent team. If necessary, the forest technician will revisit plots and update measurements as necessary.

Inventory data will be checked using the following QAQC procedures:

- Assessment of unusual DBH measurements
- Assessment of unusual height measurements
- Ensuring that total height > live crown bottom height
- Ensuring that total height \geq height to top kill in dead trees
- Ensuring phantom heights are used correctly for broken trees (both live and dead)
- Check DBH relative to height
- Check biomass defect to ensure no percentages over 100
- Check carbon calculations to ensure reasonable results
- Ensure all trees have proper species entries

Field instruments will be calibrated before and throughout the inventory to ensure the collection of the most accurate and precise data.

Upon event of natural disturbance (such as fire, wind, pests) that may alter the carbon stocks in the project area, the affected area will be delineated into appropriate, new management strata and all plots within the affected area re-measured prior to subsequent verification. All affected areas that are greater than 1 hectare will be delineated. If no plots fall within the disturbance region, new plots may be allocated. New plots shall be randomly allocated to preserve unbiased estimates of carbon stocks.

7 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

7.1 Data and Parameters Monitored

The Chestnut Carbon Conservation Project inventory applied all rules set out in the VCS Standard for ex-post carbon accounting calculation and complies with inventory requirements set out in VM0003. The project area was inventoried according to the Monitoring Protocol (see Annex AE).

For ex-post GHG accounting, the inventory data was compiled into an Excel workbook that uses US Forest Service Inventory and Analysis (FIA) equations to determine biomass of carbon in tons from entered diameter, height, and species information for each tree sampled. With this biomass value, tons were then converted into tonnes of carbon dioxide equivalent (tCO₂e) by multiplying tons by 0.5, the IPCC default value carbon fraction of biomass (VM0003), multiplied by 44/12, the ratio of molecular weight of CO₂ and carbon (VM0003). Tonnes of CO₂ equivalent was then multiplied by the trees per acre of each plot to determine carbon density, denoted in tonnes CO₂ equivalent per acre (tCO₂e/acre). Carbon density for each tree and each carbon pool (above ground living, above ground dead, above & below ground living, below ground dead excluded per VM0003) was summed for each plot, in turn averaged over each measurement strata. However, below ground living was calculated by multiplying the root-to-shoot ratio (R - see Annex BP) by the sum of above ground living prior to being summed for each plot and measurement strata. The variance of this average carbon density per measurement strata was then weighted by the area of each measurement stratum to determine standard error for the project over this monitoring period.

According to Annex BD, all inventoried tree species are accepted by mills for sawtimber, pulpwood, and chip. When calculating PMP_i, all living tree biomass was included, less any merchantable defect and missing biomass identified during the inventory, multiplied by 0.8 to determine merchantable biomass. PML_{FT} for ex-post accounting was selected from the table included in Section 9.1 of the methodology based on species inventory data: dominant species by basal area were used to select the Oak Hickory and Loblolly Shortleaf Pine forest types, which both have PML_{FT} of 73%. Because PMP_i is less than PML_{FT} - 15%, per Annex F the value for LFME is 0.2. Details of these calculations can be found in Annex BE and Annex AL, both of which provide the method used to calculate LFME.

Data / Parameter	A Saline Bluff
Data unit	Hectares Acres
Description	Area of Saline Bluff (measurement stratum 1)
Value applied:	98.7 243.9
Comments	GIS calculated project area

○

Data / Parameter	A Fourche La Fave
Data unit	Hectares Acres
Description	Area of Fourche La Fave (measurement stratum 2)

Value applied:	62.8 155.3
Comments	GIS calculated project area

Data / Parameter	A _{Hickls}
Data unit	Hectares Acres
Description	Area of Hickls (measurement stratum 3)
Value applied:	99.0 244.6
Comments	GIS calculated project area

Data / Parameter	A _{Rooks Ranch}
Data unit	Hectares Acres
Description	Area of Rooks Ranch (measurement stratum 4)
Value applied:	74.2 183.1
Comments	GIS calculated project area

Data / Parameter	A _{Black River}
Data unit	Hectares Acres
Description	Area of Black River (measurement stratum 5)
Value applied:	127.4 314.8
Comments	GIS calculated project area

Data / Parameter	A _{Harding}
-------------------------	----------------------

Data unit	Hectares Acres
Description	Area of Harding/Freed (measurement stratum 6)
Value applied:	58.5 144.5
Comments	GIS calculated project area

Data / Parameter	A Dickson
Data unit	Hectares Acres
Description	Area of Dickson (measurement stratum 7)
Value applied:	3.8 9.3
Comments	GIS calculated project area

Data / Parameter	A El Ranchos 1
Data unit	Hectares Acres
Description	Area of El Ranchos (measurement stratum 8)
Value applied:	60.5 149.6
Comments	GIS calculated project area

Data / Parameter	A El Ranchos 2
Data unit	Hectares Acres
Description	Area of El Ranchos 2 (measurement stratum 9)
Value applied:	63.9 157.9
Comments	GIS calculated project area

Data / Parameter	Ap
Data unit	Hectares Acres
Description	Area of sample plot
Value applied:	0.00814016 0.020113838
Comments	Plots are radial and have a 5.09 meter (16.7 ft) radius

Data / Parameter	$DM_{n,i,t}$
Data unit	Centimeters
Description	Diameter of piece n of dead wood along the transect in measurement stratum i , at time t .
Value applied:	Value will be calculated when measurement is performed. Lying dead was conservatively not sampled or credited for MP1 but is eligible for sampling and crediting during future monitoring periods.
Comments	Transect will be applied along two 50m lines (100m total), following the line intersect method (Annex BM). Minimum measurement diameter is 10cm.

Data / Parameter	DBH
Data unit	Centimeters
Description	Diameter at breast height of tree
Value applied:	Varies by tree and plot
Comments	Trees measured are above 12.7 centimeters (5 in) DBH

Data / Parameter	H
Data unit	Meters
Description	Height of tree
Value applied:	Varies by tree and plot
Comments	Estimated by Forest Vegetation Simulator based on tree species and diameter; USFS approved modeling tool

Data / Parameter	L
Data unit	Meters
Description	Length of the transect to determine volume of lying dead wood.
Value applied:	100
Comments	Line intersect method used (Annex BM). Lying dead was conservatively not sampled or credited for MP1 but is eligible for sampling and crediting during future monitoring periods.

Data / Parameter	N
Data unit	Dimensionless
Description	Total number of wood species intersecting the transect.
Value applied:	Value will be calculated when measurement is performed. Lying dead was conservatively not sampled or credited for MP1 but is eligible for sampling and crediting during future monitoring periods.
Comments	Line intersect method (Annex BM).

Data / Parameter	PMP _{SalineBluff}
Data unit	%
Description	Merchantable biomass as a proportion of total above ground tree biomass for measurement stratum / within the project boundaries
Value applied:	25%
Comments	

Data / Parameter	PMP _{FourcheLaFave}
Data unit	%
Description	Merchantable biomass as a proportion of total above ground tree biomass for measurement stratum / within the project boundaries
Value applied:	23%
Comments	

Data / Parameter	PMP _{Hickls}
Data unit	%
Description	Merchantable biomass as a proportion of total above ground tree biomass for measurement stratum / within the project boundaries
Value applied:	40%
Comments	

Data / Parameter	PMP _{RooksRanch}
Data unit	%
Description	Merchantable biomass as a proportion of total above ground tree biomass for measurement stratum / within the project boundaries
Value applied:	17%
Comments	

Data / Parameter	PMP _{BlackRiver}
Data unit	%
Description	Merchantable biomass as a proportion of total above ground tree biomass for measurement stratum / within the project boundaries
Value applied:	29%
Comments	

Data / Parameter	PMP _{Harding/Freed}
Data unit	%
Description	Merchantable biomass as a proportion of total above ground tree biomass for measurement stratum / within the project boundaries
Value applied:	6%
Comments	

Data / Parameter	PMP _{Dickson}
-------------------------	------------------------

Data unit	%
Description	Merchantable biomass as a proportion of total above ground tree biomass for measurement stratum / within the project boundaries
Value applied:	14%
Comments	

Data / Parameter	PMP _{EIRanchos}
Data unit	%
Description	Merchantable biomass as a proportion of total above ground tree biomass for measurement stratum / within the project boundaries
Value applied:	13%
Comments	

Data / Parameter	PMP _{EIRanchos, Strata 2}
Data unit	%
Description	Merchantable biomass as a proportion of total above ground tree biomass for measurement stratum / within the project boundaries
Value applied:	27%
Comments	

Data / Parameter	T
-------------------------	---

Data unit	Years
Description	Number of years between monitoring period time t_2 and t_1 ($T = t_2 - t_1$) Project Start: 5 July 2022, MP End 1/31/2023
Value applied:	.57
Comments	

Data/ Parameter	URS																			
Data unit	tCO ₂ e																			
Description	Uncredited Reserve Stock																			
Value applied	<table border="1"> <thead> <tr> <th>PAI</th> <th>URS (tCO₂e)</th> </tr> </thead> <tbody> <tr><td>1</td><td>2,186</td></tr> <tr><td>2</td><td>986</td></tr> <tr><td>3</td><td>2,605</td></tr> <tr><td>4</td><td>2,938</td></tr> <tr><td>5</td><td>4,901</td></tr> <tr><td>6</td><td>3,012</td></tr> <tr><td>7</td><td>180</td></tr> <tr><td>8</td><td>3,435</td></tr> </tbody> </table>		PAI	URS (tCO ₂ e)	1	2,186	2	986	3	2,605	4	2,938	5	4,901	6	3,012	7	180	8	3,435
PAI	URS (tCO ₂ e)																			
1	2,186																			
2	986																			
3	2,605																			
4	2,938																			
5	4,901																			
6	3,012																			
7	180																			
8	3,435																			
Comments	See Section 3.3																			

7.2 Baseline Emissions

All rules and regulations established in the VM0003 Methodology v1.3 were followed in the development of establishing baseline emissions ex-post. While VM0003 does not provide specific details regarding what is needed within Section 7.2 of the joint Project Description / Monitoring and Implementation Report, our interpretation is that a description of the Baseline Model inputs, methods, and outputs is required. Further information on how Baseline Model outputs were used in final project carbon accounting is provided in Section 7.5.

Baseline Model Inputs

Baseline carbon stock values used for determining net GHG emission reductions and removals were generated ex-ante by FVS (Southern Variant used – see Annex H) using a 100-year time frame. Inputs into the Baseline Model included tree attribute data taken from the project inventory, and site-specific spatial information for each management stratum (modeling unit). Additionally, individual tree records with DBH and height were backcast to the beginning of the respective PAI start date. Modeling unit, also referred to as management stratum, boundaries were defined by dividing PAIs into areas with distinct silvicultural planning regimes based on state and local forest management regulations and best-management-practices (see section 3.4 and Annex Y and Z), as well as by speaking with foresters located in the region of the PAIs to confirm plausibility. Annexes BD and A also provide confirmation of the legality and plausibility of the baseline silviculture. All management strata (modeling units) underwent a QAQC procedure as described in Annex BG. See Section 5 for more detail on management strata.

Baseline Model Methods

Silviculture used within the ex-post Baseline Model included three separate regimes dependent on the operational constraints for each management stratum (modeling unit):

No Management Constraints (CLR 1)

- Commercial thin from below down to 6.503 sq m (70 sq ft) BA/ac in year 15
- Commercial thin from below down to 6.503 sq m (70 sq ft) BA/ac in year 25
- Rotation harvest in year 33
- Plant with loblolly pine at 400 trees/acre following rotation harvest

Streamside Management Zones in AR (SMZ AR)

- Commercial thin from above down to 4.645 sq m (50 sq ft) BA/ac every 10-20 years

Streamside Management Zones in AL (SMZ AL)

- Commercial thin from above down to 50% canopy cover every 10-20 years

Baseline Model Outputs

Outputs from the FVS Baseline Model included the following summaries, with information displayed in 10-year cycles for the 100-year modeling time frame:

1. Aboveground and belowground living carbon ($\Delta\text{CBSL}_{\text{tree}}$, VM0003 Equation 3)
2. Aboveground dead carbon ($\Delta\text{CBSL}_{\text{DW}}$, VM0003 Equation 4)
3. Harvested wood products ($\Delta\text{CBSL}_{\text{WP}}$, VM0003 Equation 5)

All references to “Stand ID” within FVS outputs, Annexes AG, AZ, and BR refer to management strata.

Baseline – Aboveground and Belowground Living Carbon ($\Delta\text{CBSL}_{\text{tree}}$, VM0003 Equation 3) Modeled above and below-ground living carbon is reported by management stratum and 10-year FVS cycle in

Annex AZ. To aggregate from management strata to the relevant measurement strata (see Management Strata table in Section 5), the following procedure was carried out in Annex AG:

- Above and below ground living carbon for related management strata were summed to the relevant measurement strata (see Section 5). Aggregated measurement strata total carbon is reported by 10-year model cycle in Annex AG.
- The URS (section 3.6.1) was applied to the first 10-year model cycle for each measurement strata. URS for each measurement stratum is reported in Table 25 and is calculated in Annex BE.
- Following VM0003 equation 3, the change in above and below ground carbon for each measurement stratum was annualized over the 100-year model for input to ERR accounting (Annex AL).

Baseline – Dead Carbon ($\Delta\text{C}_{\text{BSL,DW}}$, VM0003 Equation 4)

Dead wood carbon is reported by management stratum and 10-year FVS cycle in Annex AZ. To aggregate management strata dead wood carbon to the relevant measurement strata (Section 5), the following procedure occurred in Annex AG:

- Dead carbon for related management strata was summed to the relevant measurement strata and reported by 10-year FVS model cycle. See Section 5 for a table that relates each management strata and the associated measurement strata.
- Following VM0003 equation 4, change in dead wood carbon for each measurement stratum was annualized over the 100-year model for input to the ERR accounting model, Annex AL

Baseline – Carbon in Harvested Wood Products ($\Delta\text{C}_{\text{BSL,WP}}$, VM0003 Equation 5)

A Cut List displaying a record of each tree scheduled for harvest in FVS by management stratum is located in Annex BR.

- Each tree record present in the Cut List was assigned to the relevant measurement strata in Annex BR.
- The VM0003 Winjum method was utilized to quantify carbon stored in harvested wood products for each tree record in the Cut List, per Section 5.1.
- Tree-level harvested wood products were summarized to the relevant measurement strata.
- Following VM0003 equation 5, the change in baseline harvested wood products was annualized over the 100-year model for input to ERR accounting (Annex AL).

Table 15: Baseline Model Calculations. All numbers for equation used correspond to equation numbers in VM0003 Methodology v1.3.

Parameter	Description	Quantity	Unit	Equation Used
$\Delta\text{C}_{\text{BSL,tree}}$	Carbon stock change in trees in the baseline	(615.00)	tCO ₂ e	3
$\Delta\text{C}_{\text{BSL, DW}}$	Carbon stock change in dead wood in the baseline	(0.70)	tCO ₂ e	4
$\Delta\text{C}_{\text{BSL,WP}}$	Carbon stock change in wood products in the baseline	402.62	tCO ₂ e	5

$\Delta C_{BSL,P}$	Carbon stock change in all pools in the baseline	(213.09)	tCO ₂ e	2
GHG_BSL,E	Emissions resulting from forest management activities within project area in the baseline	-	tCO ₂ e	6
ΔC_{BSL}	Baseline net GHG removals by sinks	(213.09)	tCO ₂ e	1

7.3 Project Emissions

All rules and regulations established in the VM0003 Methodology v1.3 were followed in the development of determining ex-post project emissions. While VM0003 does not provide specific details regarding what is needed within Section 7.3 of the joint Project Description / Monitoring and Implementation Report, our interpretation is that a description of the inputs, methods, and outputs related to project emissions is required. Further information on how ex-post project emissions and/or removal values were used in final project carbon accounting is provided in Section 7.5.

The forest inventories conducted within all PAIs were performed between the beginning and ending of Monitoring Period 1. As such, it was necessary to backcast trees sampled in the inventory to PAI start date by using FVS modeling software (Southern Variant – see Annex H) to determine initial carbon stocking. Similarly, trees were also grown forward from measurement to the end of MP1. Backcasted and grown values for each tree sampled in the inventory have been provided in Annex BE, while FVS files in Annex AZ related to the backcast have been provided. All treelist values have undergone a QAQC procedure to verify accuracy as seen in Annex BG.

ΔC_{AG} was calculated by summing the carbon (tC) contained in above ground living trees in each measurement stratum at the beginning and end of the Monitoring Period and finding the difference, Annex BE. ΔC_{BG} was calculated by using a root-to-shoot ratio (R) of .24, as defined in Annex BP, see Section 5.4 for more detail. R was multiplied by above ground living biomass to determine below ground living biomass. ΔC_{AG} was then summed from management strata into the associated measurement strata, see Annex AG. See section 7.2 for a description of the steps taken to aggregate management strata to relevant measurement strata.

ΔC_{DW} contains two components; lying and standing dead wood. Standing dead wood carbon was estimated using inventory data contained in Annex BE, summed by management stratum then summed again by measurement stratum (Annex AG). See section 7.2 for a description of the steps taken to aggregate management strata to relevant measurement strata. FIA biomass equations, which incorporate the decomposition class of the tree per the VM0003 Methodology, were used to calculate initial standing dead wood. To determine change in standing dead wood over the current monitoring period, FVS was used to forecast future standing dead wood carbon stocks over the next 100 years. This value was averaged over a 100 year time period (expressed as tCO₂e/acre/year), Annex AG. Lying dead wood is conservatively not being credited during MP1 but is an included pool and will be credited in future monitoring periods.

As no harvests took place during Monitoring Period 1, wood products were excluded from ex-post calculations.

All final outputs from Annex AG associated with the project scenario were summarized by measurement stratum and converted into tC/acre, if necessary, by dividing by 44/12 prior to use within Annex AL.

The table below shows the results of these ex-post project model calculations.

Table 16: Project Model Calculations. All numbers for equation used correspond to equation numbers in VM0003 Methodology v1.3.

Parameter	Description	Quantity	Unit	Equation Used
ΔC_{AG}	Annual carbon stock change of above ground biomass of trees over this monitoring period	2,147.13	tCO ₂ e	18
ΔC_{BG}	Annual carbon stock change of below ground biomass of living trees over this monitoring period	515.31	tCO ₂ e	18
ΔC_{DW}	Annual carbon stock change of dead wood biomass over this monitoring period	97.30	tCO ₂ e	12, 25
ΔC_{WP}	Annual carbon stock change of wood products over this monitoring period	-	tCO ₂ e	12, 28
ΔC_t	Annual carbon stock change in all selected pools for year t	2,759.74	tCO ₂ e	12
ΔC_P	Sum of changes in all carbon pools in project scenario	2,759.74	tCO ₂ e	11
GHG_E	Increase in GHG emissions resulting from implementation of IFM forest management activities within project area	-	tCO ₂ e	38
ΔC_{Actual}	Actual net emissions removals from project by sinks	2,759.74	tCO ₂ e	10

Uncredited Reserve Stock

As no harvesting took place during the monitoring period, the URS has not been depleted and no adjustments are required (see Section 3.3). See Table 25 for the Chestnut Properties' contribution to the uncredited reserve stock.

7.4 Leakage

The process used to calculate ex-post leakage is described in Section 5.3 Estimated GHG Emission Reductions and Removals: Leakage. Visual Basic for Applications (VBA) was used in the attached Accounting Model workbook to perform calculations at an instance, monitoring period, and entire project level. To see an example of the calculation process performed without the use of VBA, see the "Diagnostics" tab of Annex AL.

As described in Section 7.1, PMP for each measurement stratum was calculated based on total merchantable biomass of the measurement stratum compared with the PML for the chosen forest type. All measurement strata PMPs were within +/- 15% of PML_{FT} and per VM0003, ex-post LF_{ME} was determined to be 0.2. LK was calculated according to VM0003, where LK equals the change in GHG removals in the project scenario less the GHG removals in the baseline, multiplied by LF_{ME}. See Annex AL for calculations of LK, which shall equal LK_{MarketEffects}. The outputs of these calculations are shown below.

Property Name	Measurement Stratum ID	PML _{FT}	PMP _i	LF _{ME}
Saline Bluff	1	73%	25%	0.2
Fourche La Fave	2	73%	23%	0.2
Hickls	3	73%	40%	0.2
Rooks Ranch	4	73%	17%	0.2
Black River	5	73%	29%	0.2
Harding/Freed	6	73%	6%	0.2
Dickson	7	73%	14%	0.2
El Ranchos	8	73%	13%	0.2
El Ranchos	9	73%	27%	0.2

Table 17: Leakage Calculations. All numbers for equation used correspond to equation numbers in VM0003 Methodology v1.3.

Parameter	Description	Value	Unit	Equation Used
LK	Total GHG emissions due to leakage	594.56	tCO ₂ e	42
LK _{MarketEffects}	Total GHG emissions due to impacts of a project on timber supply and demand	594.56	tCO ₂ e	44
LF _{ME}	Leakage factor for market-effects calculations	0.2	Dimensionless	44

7.5 Net GHG Emission Reductions and Removals

As described in the previous subsections of Section 7, all ex-post calculations for the following values can be found in provided workbooks: Annex BE, Annex AL, or Annex BR. Baseline, Project, and Net GHG emissions reductions and/or removals were calculated within the Accounting Model in Visual Basic for Applications (VBA) in Annex AL.

Baseline inputs required to run the Ex-Post Accounting Model included:

- $\Delta C_{BSL,tree,i,t}$
- $\Delta C_{BSL,DW,i,t}$
- $\Delta C_{BSL,WP,i,t}$
- Monitoring period length
- Ratio of molecular weight of CO₂ to carbon
- Acreage

Equations 3, 4, and 5 from VM0003 Methodology v1.3 were used to convert the inputs to $\Delta C_{BSL,tree}$; $\Delta C_{BSL,DW}$; and $\Delta C_{BSL,WP}$. Equation 2 was subsequently used to calculate the value of $\Delta C_{BSL,P}$. Because there were no greenhouse gas emissions as a result of forest management activities within the baseline scenario, GHG_{BSL,E} was equal to zero and $\Delta C_{BSL,P} = \Delta C_{BSL}$, per equation 1.

Ex-post project emissions reductions and/or removals required inputs for $\Delta C_{tree,i,t}$; $\Delta C_{DW,i,t}$; $\Delta C_{WP,i,t}$; monitoring period length, ratio of molecular weight of CO₂ to carbon, and acreage. ΔC_t was calculated using Equation 12 from the VM0003 Methodology v1.3 and the inputs described above. Equation 11 was subsequently used to calculate the value of ΔC_P by converting ΔC_t to tCO_{2e}. Because there were no greenhouse gas emissions as a result of forest management activities within the project area during Monitoring Period 1, GHG_E was equal to zero and $\Delta C_P = \Delta C_{actual}$, per equation 10.

Ex-post leakage was also calculated within the Accounting Model in Visual Basic for Applications (VBA) in Annex AL. The inputs required were ΔC_{BSL} , which was previously calculated using Equation 1 from the VM0003 Methodology v1.3; ΔC_{actual} , which was previously calculated using Equation 10; PMP_i , the merchantable biomass as a proportion of total above ground tree biomass for measurement stratum *i* within the project boundaries; and PML_{ft} , the mean merchantable biomass as a proportion of total above ground tree biomass for each forest type. PMP_i was determined using the treelist in Annex BE. The total merchantable biomass in the project area was divided by the total gross biomass in the project area. PML_{ft} was determined using the Data/Parameter table for PML_{ft} in VM0003 Methodology v1.3 Section 9.1 to assign a default value for percent of merchantable biomass to each forest type in the project area. LF_{me} was calculated using PMP_i and PML_{ft} as inputs for the process detailed below Equation 42. Equation 42 was then used with the inputs ΔC_{BSL} , ΔC_{actual} , and the LF_{me} value to calculate $LK_{Market\ Effects}$. As $Market\ Effects$ is equal to Leakage per Equation 40, this provides the final leakage value for the monitoring period.

Ex-post net GHG emissions reductions and/or removals required inputs for ΔC_{actual} , which was previously calculated in VM0003 Methodology v1.3 Equation 10; ΔC_{BSL} , which was previously calculated in Equation 1; Leakage, which was previously calculated in Equation 40; and baseline and project uncertainty (UNC_P and UNC_{BSL}). Uncertainty in the baseline and project scenarios was determined to be the square root of the summed errors in each of the measurement pools, weighted by the size of the pool. $CIFM_{Error}$ was calculated using Equation 46 and the UNC_P and UNC_{BSL} values. Equation 47 was subsequently used to determine if the uncertainty deduction and discount factor were applicable to the determination of net GHG emissions reductions and/or removals and were used to calculate $CIFM_{adjusted}$. Because $CIFM_{Error}$ is equal to 29.6% for the Chestnut Carbon Conservation Project, the discount factor is calculated to be 7.8% using Equation 48 and the uncertainty deduction is applied.

Ex-post buffer pool allocations were calculated using the BRR, the portion of carbon credits to be withheld as a buffer reserve. The BRR for all instances was determined to be 15% of net GHG emission reductions or removals. This was determined via the use of the *VCS Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination*, which can be found in Annex E. Internal, external, and natural risks were considered in the project's risk analysis and the BRR was acreage-weighted across all PAIs. The BRR was multiplied by the net GHG emissions reductions or removals (tCO_{2e}) to find the number of credits allocated to the buffer pool for the project in each monitoring period.

All ex-post calculation methods will have QAQC standards applied to them as detailed in Annex BG. All inputs and outputs will be reviewed, and monitoring period dates and Table 7.5 will be updated. Additionally, the project proponent will ensure that all baseline emissions are negative and project emissions are positive.

Table 18: Total Baseline and Project Calculations

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)	Buffer pool allocation	VCUs eligible for issuance
5 July 2022-31	-167	2,167	466	1,722	258	1,464
December 2022						
1						
January 2023-31	-45	592	127	470	70	400
January 2023						
Total	-212	2,759	593	2,192	328	1,864

Table 19: Comparison of ex-ante and ex-post accounting model calculations

Year	Ex-ante emissions reductions /removals	Achieved emissions reductions/ removals	Percent difference	Justification for the difference
2022	2,560	1,722	-39%	The estimated and actual project area enrolled differed.
2023	437	470	7%	

Table 20: VCUs Issued by PAI and year

		Year	
		2022	2023
PAI	1	265	45
	2	79	20
	3	214	71
	4	154	46
	5	351	88

	6	91	26
	7	12	4
	8	298	99
	Totals	1,464	400

Table 21: VCUs (raw) issued for GHG Reductions by PAI in 2022

GHG Reductions, 2022							
Instance	Δ CBSL (tCO ₂ e)	Leakage (tCO ₂ e)	Uncertainty Deduction	Δ CBSL, adjusted (tCO ₂ e)	Buffer Reserve Rate	Buffer Reserve Contribution	VCUs eligible for issuance
1	7	1	7.8%	5	15%	1	5
2	-7	-1	7.8%	-5	15%	-1	-4
3	-2	0	7.8%	-1	15%	0	-1
4	17	3	7.8%	12	15%	2	11
5	84	17	7.8%	62	15%	9	53
6	49	10	7.8%	36	15%	5	30
7	2	0	7.8%	2	15%	0	1
8	18	4	7.8%	13	15%	2	11
Project	168	34	7.8%	124	15%	19	105

Table 22: VCUs (raw) issued for GHG Reductions by PAI in 2023

GHG Reductions, 2023							
Instance	Δ CBSL (tCO ₂ e)	Leakage (tCO ₂ e)	Uncertainty Deduction	Δ CBSL, adjusted (tCO ₂ e)	Buffer Reserve Rate	Buffer Reserve Contribution	VCUs eligible for issuance
1	1	0	7.8%	1	15%	0	1
2	-2	0	7.8%	-1	15%	0	-1
3	-1	0	7.8%	0	15%	0	0
4	5	1	7.8%	4	15%	1	3
5	21	4	7.8%	16	15%	2	13
6	14	3	7.8%	10	15%	2	9
7	1	0	7.8%	1	15%	0	0
8	6	1	7.8%	4	15%	1	4
Project	45	9	7.8%	33	15%	5	28

Table 23: VCUs (raw) issued for GHG Removals by PAI in 2022

GHG Removals, 2022							
--------------------	--	--	--	--	--	--	--

Instance	Δ CP (tCO ₂ e)	Leakage (tCO ₂ e)	Uncertainty Deduction	Δ CP adjusted (tCO ₂ e)	Buffer Reserve Rate	Buffer Reserve Contribution	VCUs eligible for issuance
1	415	83	7.8%	306	15%	46	260
2	132	26	7.8%	98	15%	15	83
3	343	69	7.8%	253	15%	38	215
4	229	46	7.8%	169	15%	25	144
5	475	95	7.8%	351	15%	53	298
6	96	19	7.8%	71	15%	11	60
7	18	4	7.8%	13	15%	2	11
8	458	92	7.8%	338	15%	51	287
Project	2,167	433	7.8%	1,599	15%	240	1,359

Table 24: VCUs (raw) issued for GHG Removals by PAI in 2023

GHG Removals, 2023							
Instance	Δ CP (tCO ₂ e)	Leakage (tCO ₂ e)	Uncertainty Deduction	Δ CP, adjusted (tCO ₂ e)	Buffer Reserve Rate	Buffer Reserve Contribution	VCUs eligible for issuance
1	71	14	7.8%	52	15%	8	44
2	35	7	7.8%	25	15%	4	22
3	114	23	7.8%	84	15%	13	72
4	68	14	7.8%	50	15%	8	43
5	119	24	7.8%	88	15%	13	75
6	28	6	7.8%	20	15%	3	17
7	6	1	7.8%	4	15%	1	4
8	153	31	7.8%	113	15%	17	96
Project	593	119	7.8%	437	15%	66	372

Table 25: Credited and Uncredited Reserve Stock by PAI (Living and Standing Dead)

PAI	Initial Carbon Stocks (tCO ₂ e)	Uncredited Reserve Stock (tCO ₂ e)	Credited Carbon Stock (tCO ₂ e)
1	24,293	2,186	22,107
2	10,952	986	9,967
3	22,940	2,065	20,875
4	32,644	2,938	29,706
5	54,453	4,901	49,552
6	33,464	3,012	30,452
7	2,001	180	1,821
8	38,162	3,435	34,727

Project	218,908	19,702	199,206
---------	---------	--------	---------

APPENDIX A: IMPLEMENTATION PARTNER ROLES AND RESPONSIBILITIES

- The implementation partner must comply with all local, state, and federal laws, including payment of property taxes.
- The implementation partner must consent to a credit check.
- The implementation partner must maintain the timber rights to the forest.
- The implementation partner may not plant non-native trees in the forest.
- The implementation partner may not employ broadcast fertilization within the forest.
- The implementation partner must coordinate with Forest Carbon Works if a conservation easement is placed on the forest. The addition of a conservation easement will be relevant to the project scenario and is not part of the baseline scenario.
- The implementation partner must notify Forest Carbon Works if they are planning to enroll in any state-administered tax program.
- The implementation partner must disclose any unexamined legal encumbrances on the forest prior to signing the Membership Lease Agreement, including right-of-way easements.
- The implementation partner must provide Forest Carbon Works staff with periodic access to the forest (with reasonable prior notification).
- The implementation partner must fill out an online form each year detailing any major updates related to the forest, including disturbances, harvests, firewood collection, changes in ownership or potential changes in ownership.
- The implementation partner must maintain their forest during the 100-year Legacy Period.
- Any harvests must be approved by FCW and follow an FSC-approved management plan.
- The implementation partner must promptly notify Forest Carbon Works of forest disturbances including damage by fire, wind, pest, or disease.
- If choosing to commercially harvest at any time, harvests must be approved by Forest Carbon Works and have an FSC-certified (Forest Stewardship Council) forest management plan in place. Forest Carbon Works will assist in making this possible at no cost.

APPENDIX B: ATTESTATION

ATTESTATION

Date: _____

I, _____, am qualified to practice forestry in the United States and have confirmed the legality and plausibility of the specific management practices modeled as the baseline scenario for each of the following Project Activity Instances, listed below by unique identifier:

For each Project Activity Instance, I have confirmed that the model for the following elements of forest management is common practice for the region in which it resides:

- Harvest rotations
- Harvest methods
- Species harvested and planted
- Riparian management areas
- Areas of steep slope or unstable soils
- Maximum patch cut areas

Signature of attestation:

APPENDIX C: ANNEXES

Table 1: Annexes

Annex	Title	Conf.
Annex A	<u>Comparable Harvest Examples</u>	
Annex B	<u>UMN - FCW Research Statement 2022</u>	
Annex C	<u>The Arkansas Timber Price Report</u>	
Annex D	<u>Chestnut Signed MLA's</u>	
Annex E	<u>AFOLU Non-Permanence Risk Tool v4.0</u>	
Annex F	VM0003 Methodology for IFM through Extension of Rotation Age v1.3	
Annex G	Chestnut Conserve – Sample Size (2022 MP1) v1.1.xlsx S13021-021-00179-2(1).pdf	
Annex H	<u>FVSn Overview</u>	
Annex I	<u>VCS Standard v4.4 Final</u>	
Annex J	2022 Forest Cruiser Training v1.1.pptx Nephos Digitization Manual.pdf	
Annex K	<u>VCS Program Definitions v4.3 Final</u>	
Annex L	El Ranchos Instance 03302023.pfd Exclusion Updates.zip HardingFreeDickson Instances 03302023.pdf	
Annex M	Chestnut VCS Certification Model.xlsx Kimmeridge Carbon Solutions, L.P. and Chestnut Carbon LLC Proof of Funds.pdf Confidential due to proprietary financial information	Yes
Annex N	UMN – FCW Research Statement 2022.docx. Sent under Annex N on March 31st	
Annex O	Chestnut Conserve TL v2.18 - No URS	
Annex P	Chestnut Conserve Model Results v1.6 - No URS	

Annex Q	Fire as Management Tool Policy v0.1.docx. Sent under Annex Q on March 31st	
Annex R	<u>Tool for the demonstration and assessment of additionality Version 07.0.0</u>	
Annex S	Planting Southern Pines.pdf	
Annex T	NC State Thinning Pine Stands	
Annex U	Thinning Pine Stands	
Annex V	Managing Loblolly Pine Stands, From A to Z	
Annex W	Harvesting Constraints v1.0.docx	
Annex X	RabbitsfootMussel.pdf	
Annex Y	<u>AR Best Management Practices</u>	
Annex Z	<u>AL Best Management Practices</u>	
Annex AA	<u>Forest Harvests and Wood Products Sources and Sink</u>	
Annex AB	<u>Methods for Calculating Forest Ecosystem and Harvested Carbon with Standard Estimates for Forest Types of the United States</u>	
Annex AC	<u>Annual 2020 National Climate Report - National Centers for Environmental Information (NCEI)</u>	
Annex AD	<u>Conserve PD Additionality NPV 1.1</u> Confidential due to proprietary financial inputs related to project development costs	Yes
Annex AE	<u>Chestnut Conserve Monitoring Protocol v2.0</u>	
Annex AF	<u>Chestnut Conserve Implementation Plan v0.2</u>	
Annex AG	<u>Conserve Model Results v1.6</u>	
Annex AH	<u>Uncertainty v0.2</u>	
Annex AI	Chestnut Conserve Non-Permanence Risk Report v2.0 tracked Changes.docx	
Annex AJ	Chestnut Conserve Risk Report Calculation Tool v2.1.xls	
Annex AK	<u>Stakeholder List</u>	

Annex AL	VM0003 Ex-Post Accounting Model v0.23.xlsm	
Annex AM	PD-Table 4.4 v1.5.xlsx	
Annex AN	<u>Civil Rights Act</u>	
Annex AO	<u>FSC-US Forest Management Standard v1.0 with FF indicators</u>	
Annex AP	<u>ES-2016-8830</u>	
Annex AQ	<u>ADA</u>	
Annex AR	<u>Fair Labor Act</u>	
Annex AS	<u>OSHA</u>	
Annex AT	<u>Water Pollution Act</u>	
Annex AU	<u>Endangered Species Act</u>	
Annex AV	<u>Environmental Policy Act</u>	
Annex AW	<u>Ecosphere - 2016 - Stephens - US Federal Fire and Forest Policy Emphasizing Resilience in Dry Forests</u>	
Annex AX	<u>Winjum et al 1998</u>	
Annex AY	VM0003 Ex-Post Accounting Model v0.23 - No URS	
Annex AZ	<u>FVS Model Files</u> An update was sent under Annex AZ on March 31st	
Annex BA	<u>FM Report FSC Full Evaluation FCW 091922 Final</u>	
Annex BB	<u>Chestnut Signed License Agreements</u>	
Annex BC	<u>FSC Forest Management Plans</u>	
Annex BD	<u>Chestnut Conserve Project Forester Attestation Signed</u> Ray Galloway Bio.pdf	
Annex BE	Chestnut Conserve Treelist v2.18	
Annex BF	<u>Guidelines for Measurements of Woody Detritus in Forest Ecosystems</u>	
Annex BG	<u>QAQC Reference V1.0</u>	

Annex BH	<u>PAI Soil Properties for Peat and Organic Matter Identification</u>	
Annex BI	<u>U.S. Forest Projects (June 25, 2015) Volume and Biomass Equations for Forest Offset Projects in All States Except Alaska, California, Oregon, and Washington</u>	
Annex BJ	<u>The Fire and Fuels Extension to the Forest Vegetation Simulator: Updated Model Documentation</u> Lying Dead Reference Table, USDA FS, pp295-296.png	
Annex BK	<u>Chestnut Conserve Lying Dead Quantification by Forest Type Workbook</u>	
Annex BL	<u>Forest Protocol 2015</u>	
Annex BM	Reserved	
Annex BN	<u>Chestnut Surveys</u>	
Annex BO	<u>PAI Maps</u>	
Annex BP	<u>2006 IPCC Guidelines for National Greenhouse Gas Inventories - Ch4 Forest Land</u>	
Annex BQ	Harmon et al. 2011.pdf	
Annex BR	Chestnut Conserve Baseline Wood Products v1.2.xlsm	
Annex BS	No Public Comments Evidence from Verra.pdf	
Annex BT	PAI KML	
Annex BU	Chestnut Conserve Harvest Policy v1.0	