Bluesource – Klawock Heenya Improved Forest Management Project

March 6, 2020

ACR 459

Klawock Heenya Corporation

Prepared by: Bluesource, LLC

bluesource

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A. PROJECT OVERVIEW

A1. PROJECT TITLE

The project title is "Bluesource – Klawock Heenya Improved Forest Management Project."

A2. PROJECT TYPE

This project is to be registered under the American Carbon Registry Standard[1] (ACR, July 2018) as an Improved Forest Management (IFM) project and an approved ACR Improved Forest Management Methodology.[2]

A3. PROOF OF PROJECT ELIGIBILITY

Eligibility for this Improved Forest Management project has been determined with reference to the ACR Standard Version 5.1 and the Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands, Version 1.3.

The Bluesource – Klawock Heenya Improved Forest Management Project meets all relevant eligibility requirements as described in Table A3.1 below.

Table A3.1. Project Eligibility Requirements

Eligibility Requirements	Proof of Eligibility	Reference
Ownership Type	The project ownership is private non-federal U.S. forestland.	Section G1. Proof of Title
Project Proponent has third-party certification or no commercial timber harvesting	There are no ongoing commercial timber harvests, and therefore the corporation does not require certification.	Section A5.1. Background Information
Project area meets the definition of Forestland condition as per USFS FIA program definition	Per the ACR Forest Carbon Project Standard 2.1, the project meets the definition of forestland through a minimum of 10% forest cover (or equivalent stocking) by live trees of any size.	Section A4. Location
Project start date	The project start date of July 27, 2018 coincides with the signing of the Carbon Marketing & Development Agreement between the Klawock Heenya Corporation and Bluesource, provided	Section H1. Start Date

[1] ACR. 2018. American Carbon Registry Standard, Version 5.1. American Carbon Registry, Arlington, VA, USA.
[2] ACR. 2018. Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal Forestlands, Version 1.3, April 2018, American Carbon Registry, Arlington, VA, USA.

	separately for verification purposes. This complies with Start Date requirements of the ACR Standard Version 5.1, that the project must have a validated/verified Start Date of January 1, 2000 or after.	
Project term	The Project Proponent commits to maintain the carbon project scenario stocking levels on the project area at least for the required Project Term of 40 years.	Section H2. Project Timeline
Crediting Period	In compliance with ACR Standard Version 5.1 (July 2018) and the Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands, Version 1.3, the crediting period for the project is 20 years.	Section H2. Project Timeline
Real	GHG removals are quantified based on inventory of the standing stock in the project area at the time of verification.	See also Section D. Monitoring Plan and Section E. Quantification
Land Title	For all areas included in the project, long term land titles have been issued and ownership is thus clear, unique, and uncontested.	See also Appendix A: Ownership Docs
Direct Emissions/ Offset Title	GHG emission reductions generated by the project activity are generated from forest carbon sources and sinks over which Klawock Heenya Corporation has all management and ownership rights. The Corporation holds offset title to all lands in the project area (see Section G. Ownership and Title) and all rights to carbon credits/offsets produced through management of forests in the project area (attestation provided separately for verification purposes).	Section G2. Chain of Custody
Additionality	Additionality for the project has been shown through a regulatory surplus test, a common practice test, and an implementation barrier test.	Section C. Additionality
Permanent	The long-term setup, risk analysis, and buffer establishment assure permanence of the project benefits.	Section B8. Permanence

Net of Leakage	Possible leakage effects due to activity shifts are quantified and deducted from the GHG benefits.	Section E3. Leakage
Independently Validated and Verified	In accordance with ACR methodology, the project benefits will be verified by SCS Global Services.	
Community and Environmental Impacts	Impacts on community and environment were analyzed in accordance with the ACR Standard 5.1, and net positive impacts were confirmed.	Section F. Community & Environmental Impacts

A4. LOCATION

A GIS shapefile of the project area, "KHC_Boundary.shp" was provided separately for verification. This shapefile gives unique identification and delineation of the specific extent of the project. Figures on the following pages provide additional details.

- Figure A-1. Vicinity map that shows project location, including latitude/longitude coordinates.
- Figure A-2. Hydrological map that shows hydrology for the project area.
- Figure A-3. Canopy cover map that shows where project areas meet the US Forest Service definition of forestland (at least 10% tree cover). Non-forested acres were removed.
- Figure A-4. Topographical map of the project area.
- Figure A-5. Road map that shows both public and private roads near and on the project area. There are no major roads in the project area. Existing foot trails may be unmapped.
- Figure A-6. Ownership map that shows parcels owned by Klawock Heenya Corporation.

Figure A-1. Vicinity Map with Latitude and Longitude

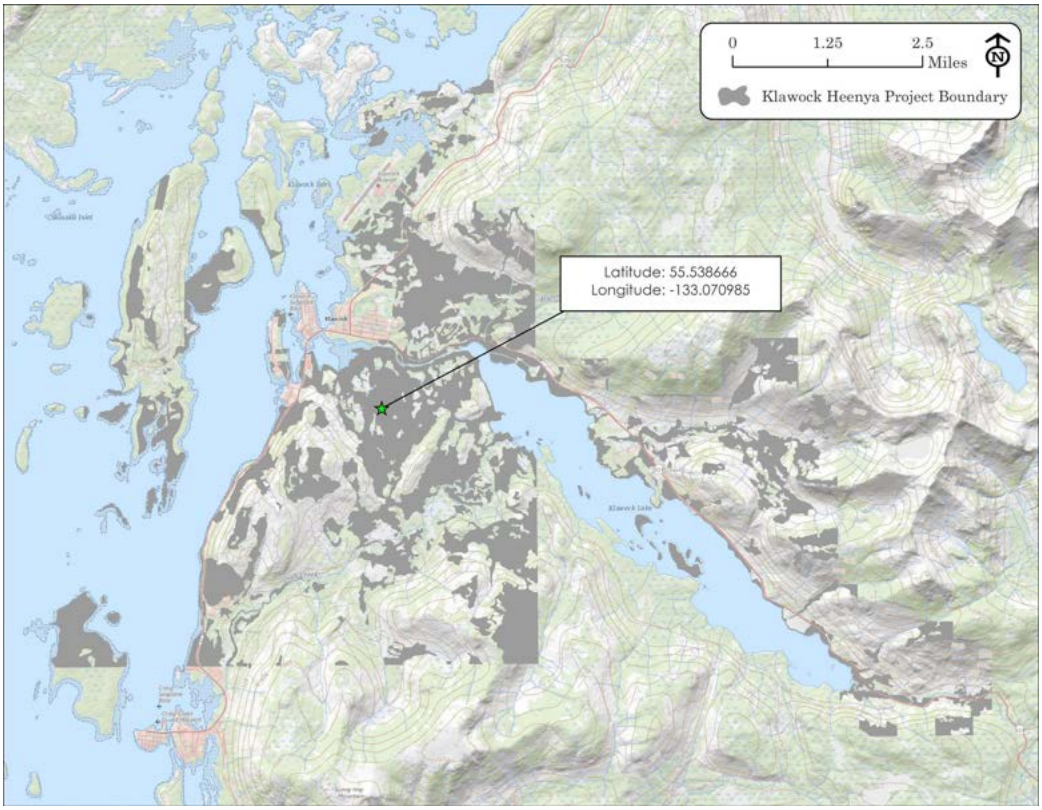


Figure A-2. Regional Hydrology Map

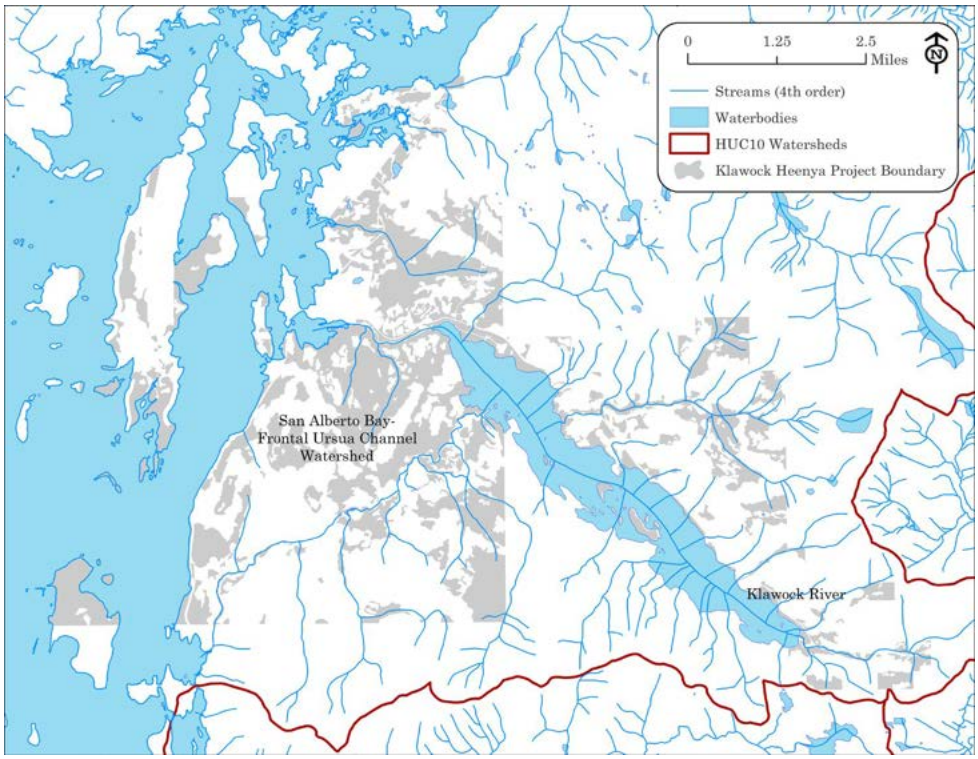


Figure A-3. Canopy Cover Map depicting greater than 10% canopy cover.

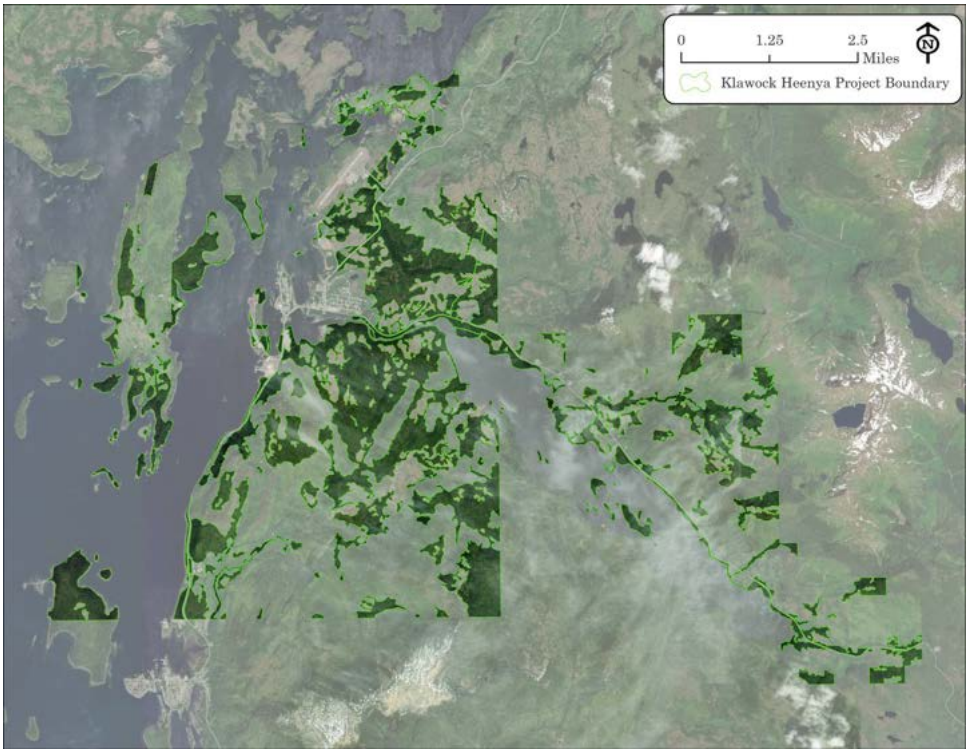


Figure A-4. Topography Map

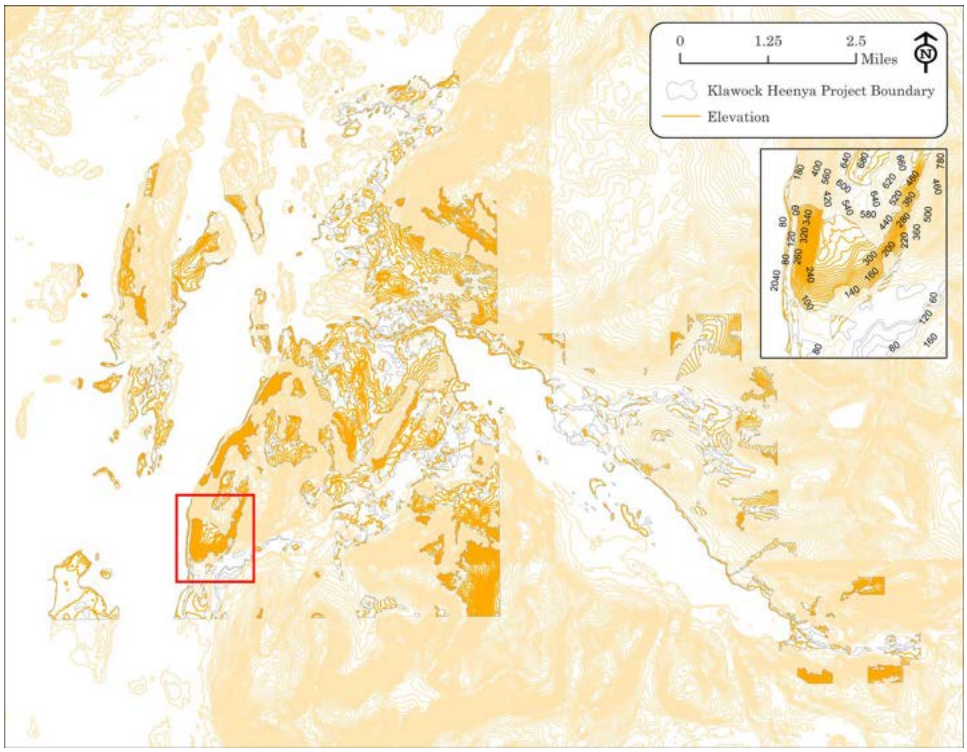


Figure A-5. Roads Map

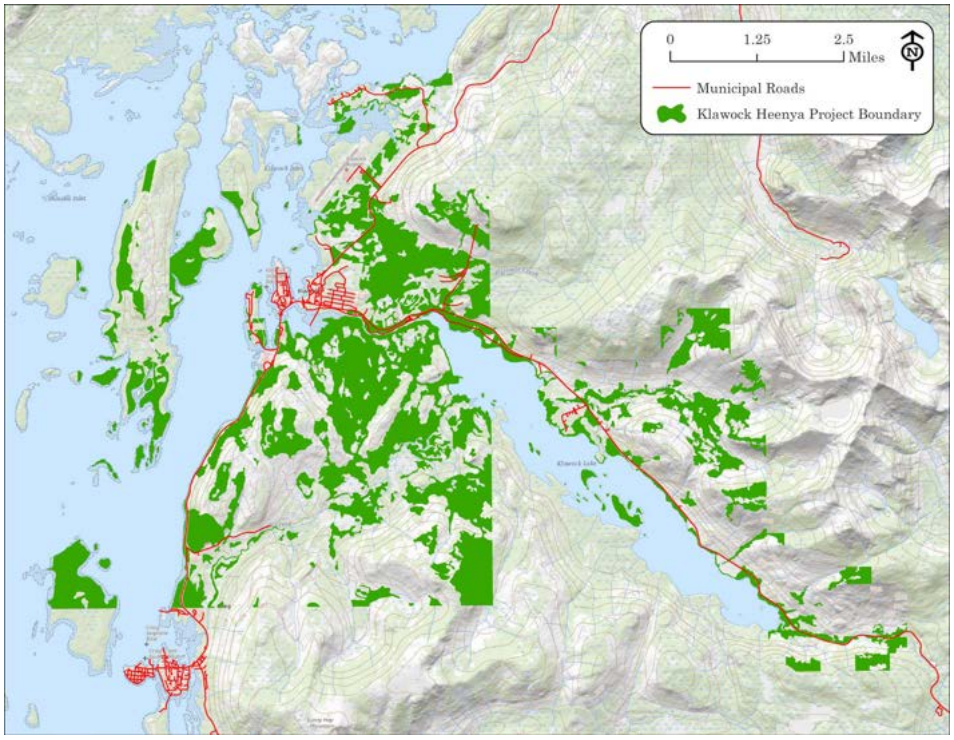
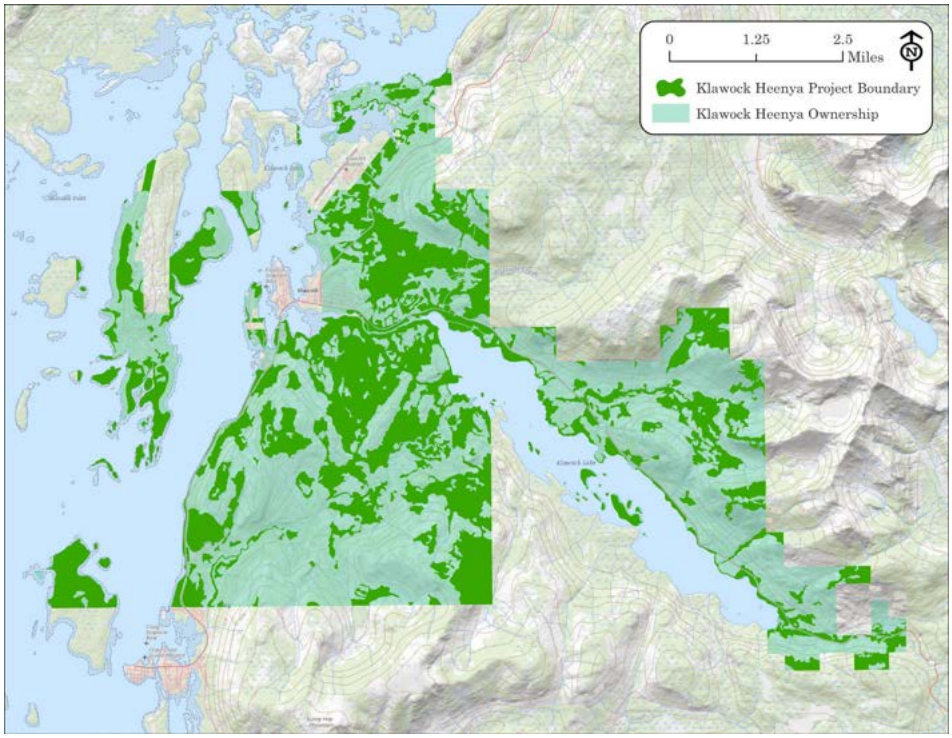


Figure A-6. Ownership Map



A5. BRIEF SUMMARY OF PROJECT

A5.1 Background Information

The Klawock Heenya Improved Forest Management Project is located on 8,619 acres of conifer, western hemlock-Sitka spruce and western redcedar-hemlock forests in Southeast Alaska. By committing to maintain forest CO2 stocks above the regional baseline, the project will provide significant climate benefits through carbon sequestration.

A5.2 Description of Project Activity

The project activity is Improved Forest Management, with the Corporation's forest management practices representing a significant improvement in the carbon storage and conservation value than higher return, more aggressive management regimes of industrial private lands in the region, which are characterized by shorter, even-aged rotations. Management decisions of the forest focus on sustainable, natural forest growth and non-commercial forest maintenance for essential activities and forest health. The project ensures long-term sustainable management of the forests, which could otherwise undergo significant commercial timber harvesting.

A5.3 Project Purpose and Objectives

By committing to maintain forest CO2 stocks above the regional baseline level, the project will provide significant climate benefits through carbon sequestration. The aim of this project is also to ensure long-term continuance of all environmental benefits provided by the conservation of this forestland.

A6. PROJECT ACTION

A6.1 Prior Physical Conditions

Climactic Zone

The project is located on Prince of Wales Island in southeast Alaska and is within Zone 7b on the USDA plant hardiness zone map. The average annual extreme minimum temperature for this zone is 5-10 degrees (F).

Ecosystem/Vegetation

The forests of Southern Alaska are a segment of temperate rain forest extending along the Pacific Coast from Northern California to Cook Inlet in Alaska. Glacial retreat across this region has revealed new land along the emerging coastline and some island inlets. Dominant factors influencing the ecosystem include abundant moisture, cool temperatures and disturbances such as windstorms and flooding. Some of the ecosystem types found in the regions of the project area are wetlands, beach fringes and forest ecosystems, alpine environments in higher elevation regions, and recently deglaciated lands. This region has abundant moisture, high water tables, and poorly drained soils over compacted glacial till, which results in many types of wetland conditions that serve as wildlife habitat for migrating shorebirds,

waterfowl, deer, bears and many other species. Tree species composition is diverse across this region and influenced by location, topography, drainage, soil type and stand history. According to the USDA Forest Service Technical Report on the forest ecosystems of Southeast Alaska[3], the species composition in this region is about 73% western hemlock, 12% Sitka spruce, 5% western redcedar, 5% Alaska cedar, 5% mountain hemlock and other softwoods, and 5% various hardwoods such as black cottonwood and red alder.

Disturbances

Owing to regulatory influence in this region as part of Tongass National Forest prior to 1971, most of the forest is old growth. Sections of secondary growth can largely be attributed to logging, with occasional windthrow and landslides as disturbances in these regions. In 1984, Klawock Heenya Corporation began harvesting on approximately 8,619 acres of forestland that is part of Klawock Heenya Corporation. The harvested timber primarily served the round-log export market and logging operations ceased in 2005.

Land Use

The Alaska Panhandle is the southeast region of the State of Alaska containing coastal sections of the state along with the numerous offshore islands. This region extends 540 miles of coastline from Yakutat in the north to Dixon entrance in the south. This region is approximately 19 million acres, comprises the bulk of Alaska's timber resource, and has always been a crucial factor in the regional economy. Before being colonized, these regions primarily experienced subsistent use by the Native Tribes, Tlingit and Haida Indians with a predominant dependence on these forests for fuel and building materials for housing and transportation. From 1980 to 2005, regional land use largely involved sawtimber and pulpwood production for regional and export markets. Land that was not engaged in wood product production has been developed for subdivisions and conveyed to shareholders or developed for commercial use in the vicinity of Klawock city.

A6.2 Description of Project Technologies, Products, Services, and Expected Level of Activity

There is no ongoing or future commercial harvesting intended for the carbon project area. Management considerations for the project area will promote uneven-aged silviculture practices. The landowners will only undertake non-commercial pruning, if required, to promote understory growth as it serves as habitat for Sitka black-tailed deer, black bear, mountain goats and moose, among other wildlife species.

A6.3 Project Action

By committing to maintain forest CO2 stocks above the baseline level, the project will provide significant climate benefits through carbon sequestration. The project action will allow the forest to progress naturally with no commercial harvesting. Bluesource - Klawock Heenya Improved Forest Management

[3] The Forest Ecosystem of Southeast Alaska, USDA Forest Service General Technical Report - https://www.fs.fed.us/pnw/pubs/pnw_gtr25/gtr025a.pdf

Project will achieve GHG removals by sequestering more atmospheric CO_2 than a baseline scenario in live aboveground biomass, belowground biomass, and standing dead wood.

A7. *EX ANTE* OFFSET PROJECTION

Total projected GHG removal is 659,674 $mtCO_2e$ (without risk buffer deduction) over the first crediting period of 20 years (including GHG removal from long-term wood products). Table A7.1 lists the estimates of GHG emissions reductions per year:

Table A7.1. Estimate of Net ERTs by Year.

Project Year	Year	Estimates of GHG emission reductions (mtCO2e)
0	2018	Start Date
1	2019	84,546
2	2020	74,575
3	2021	79,583
4	2022	79,583
5	2023	79,583
6	2024	38,401
7	2025	38,401
8	2026	35,379
9	2027	13,840
10	2028	13,838
11	2029	13,115
12	2030	13,114
13	2031	13,113
14	2032	13,112
15	2033	13,110
16	2034	12,201
17	2035	12,200
18	2036	12,199
19	2037	12,198
20	2038	12,197

A8. PARTIES

The project was implemented by Klawock Heenya Corporation, the landowner, and Bluesource, LLC, a carbon offsets project developer and technical modeler. Project verification was completed by SCS Global Services and the forest carbon inventory was conducted by Terra Verde Inc.

Table A-3. Project Partners & Responsibilities

Project Parties	Personnel/Point of Contact	Roles and Responsibilities	Contact Information
Klawock Heenya Corporation	Mary Edenshaw Chief Operations Officer	Project Proponent – financing and implementation of long-term project management, landowner, and title holder	Klawock Heenya Corp 7054 Klawock Hollis Hwy Klawock, AK 99925
Bluesource, LLC	Josh Strauss Vice President	Offset Developer – coordination of project implementation, modeling,	Bluesource LLC 1935 E. Vine Street Murray, UT 84121 Phone: 949-233-1501
SCS Global Services	Christie Pollet-Young Director, GHG Verification	Verifier	SCS Global Services 2000 Powell Street Emeryville, CA 94608 Phone: 510-452-8000
Terra Verde Inc.	Brian Kleinhenz Vice President	Contractor - Forest Inventory	Terra Verde Inc. 1200 E. Ennis Ct. La Center, WA 98629

B. METHODOLOGY

B1. APPROVED METHODOLOGY

The methodology used for the Bluesource - Klawock Heenya Improved Forest Management Project is the American Carbon Registry Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands, Version 1.3. (April 2018)

(hereinafter called the "methodology")

B2. METHODOLOGY JUSTIFICATION

All applicability criteria of the selected methodology are fulfilled by the Bluesource - Klawock Heenya Improved Forest Management Project:

1. *This methodology is applicable only on non-federally owned forestland within the United States*

   The land under Klawock Heenya Corporation's management has been conveyed to them under the Alaska Native Claims Settlement Act of 1971 and is non-federally owned private forestland.

2. *The methodology applies to lands that can be legally harvested by entities owning or controlling timber rights on forestland*

   Klawock Heenya Corporation controls the timber rights on the forestland and can legally harvest (see Ownership Docs).

3. *Private or non-governmental organization ownerships subject to commercial timber harvesting at the project Start Date in the with-project scenario must be certified by FSC, SFI, or ATFS or become certified within one year of the project Start Date. If there are no ongoing harvests at the project Start Date, but harvests occur later in the project life cycle, the project area must become certified before any commercial timber harvesting can occur*

   There is no commercial timber harvesting occurring on or after the project Start Date.

4. *All Tribal lands in the United States, except those lands that are managed or administered by the Bureau of Indian Affairs, are eligible under this methodology, provided that they meet ACR requirements for Tribal lands*

   N/A. The carbon project area is managed by Klawock Heenya Corporation, which is an incorporated entity and a private forestland owner.

5. *Public non-federal ownerships currently subject to commercial timber harvesting in the with-project scenario must:*
   - *be certified by FSC, SFI, or ATFS or become certified within one year of the project Start Date; or*

- *have its forest management plan sanctioned by a unit of elected government officials within a state, or a state agency, or a federal agency*
    - *Please note that any such forest management plans must be updated at minimum every 10 years*
- *If there are no ongoing harvests on a public non-federal ownership at the project Start Date, but harvests occur later in the project life cycle, the project area must become certified by FSC, SFI, or ATFS, or develop a sanctioned management plan before any commercial timber harvesting can occur.*

N/A. Klawock Heenya Improved Forest Management Project is not on public non-federal lands.

6. *Use of non-native species is prohibited where adequately stocked native stands were converted for forestry or other land uses after 1997*

   There is no use of non-native species where adequately stocked native stands were converted for forestry or other land uses after 1997.

7. *Draining or flooding of wetlands is prohibited*

   There is no draining or flooding of wetlands on or after the project Start Date.

8. *Project Proponent must demonstrate its ownership or control of timber rights at the project start date*

   See attached Deeds (Appendix A: Ownership Docs)

9. *The project must demonstrate an increase in on-site stocking levels above the baseline condition by the end of the Crediting Period*

   Stocking levels increase well above the baseline conditions for the duration of the project and by the end of the Crediting Period (see Section E1. Baseline).

B3. PROJECT BOUNDARIES

The physical project boundaries include 8,619 acres of forestland, shown in the maps and in the shapefile "KHC_Boundary.shp."

See Section H2. Project Timeline for the temporal boundaries of the project.

B4. IDENTIFICATION OF GHG SOURCES AND SINKS

Carbon pools	Included / Optional / Excluded	Justification / Explanation of Choice
Above-ground biomass carbon	Included	Major carbon pool subjected to the project activity.
Below-ground biomass carbon	Included	Major carbon pool subjected to the project activity.

Standing dead wood	Included/Optional	Major carbon pool in unmanaged stands subjected to the project activity. Project Proponents may also elect to include the pool in managed stands. Where included, the pool must be estimated in both the baseline and with project cases. For this project, standing dead wood will be included in all stands.
Lying dead wood	Optional	Project Proponents may elect to include the pool. Where included, the pool must be estimate in both the baseline and with project cases. For this project, lying dead wood will **not** be included.
Harvested wood products	Included	Major carbon pool subjected to the project activity.
Litter/Forest Floor	Excluded	Changes in the litter pool are considered *de minimis* as a result of project implementation.
Soil organic carbon	Excluded	Changes in the litter pool are considered *de minimis* as a result of project implementation.

Gas	**Source**	**Included / Excluded**	**Justification / Explanation of choice**
CO_2	Burning of biomass	Excluded	However, carbon stock decreases due to burning are accounted as a carbon stock change.
CH_4	Burning of biomass	Included	Non-CO_2 gas emitted from biomass burning.
N_2O	Burning of biomass	Excluded	Potential emissions are negligible.

Leakage Source		**Included / Optional / Excluded**	**Justification/ Explanation of Choice**
Activity-Shifting	Timber Harvesting	Excluded	Project Proponent must demonstrate no activity-shifting leakage beyond the *de minimis* threshold will occur as a result of project implementation
	Crops	Excluded	Forestland eligible for this methodology do not produce agricultural crops that could cause activity shifting
	Livestock	Excluded	Grazing activities, if occurring in the baseline scenario, are assumed to continue at the same levels under the project scenario and thus there are no leakage impacts
Market Effects	Timber	Included	Reductions in project outputs due to project activity may be compensated by other entities in the marketplace. Those emissions must be included in the quantification of project benefits.

B5. BASELINE

The baseline scenario represents an aggressive industrial harvest regime, targeted to maximize net present value at a 6% discount rate (for private industrial forestlands) typical of ca. 2018 practices in the project region on Alaska Native Corporation lands.

Baseline practices involve pre-commercial thinning on overstocked second growth stands while simultaneously harvesting merchantable timber on old growth stands. Final harvest for the baseline was modeled for when the stand reached 12,000 BF, with an intermediate round of pre-commercial thinning at 15 years. Derivation and justification for the baseline is detailed in Section E. Quantification.

B6. PROJECT SCENARIO

The project scenario consists of managing the forestland for natural growth with no current or future commercial harvesting, and only non-commercial pruning for forest health and wildlife habitat promotion, as described in Section A6. Project Action.

B7. REDUCTIONS AND ENHANCED REMOVALS

The project will achieve greenhouse gas reductions through natural growth of forestland on lands that otherwise could be heavily cut in the baseline scenario. The existing carbon stocks will be preserved as there is no current or future commercial harvesting and the stocks will increase as a result of the growth occurring in the absence of commercial harvesting.

B8. PERMANENCE

Project Proponents must conduct their risk assessment using the *ACR Tool for Risk Analysis and Buffer Determination*. All Project types must claim a value from risk categories A, B and C. Additional values that must be selected by project type include:

Forestry projects claim one value from each:

- D Conservation Easement (if applicable)
- E Fire
- F Disease/pest
- G Levee failure/water table changes (required only if forested wetlands comprise more than 60% of project area)
- H Other natural disaster risk scores.

1. Management and Governance Risks: All project types must select one value form each risk category that applies:

A	Financial	• 4% Default Value • 3% US Public and Tribal Lands
B	Project Management	• 4% Default Value • 3% US Public and Tribal Lands
C	Social/Policy	• 2% Default Value • 5% if project is located outside of the US • 3% if project is located outside of the US and demonstrates community engagements through ACR-approved mechanism
D	Conservation Easement Deduction	• -2% Default value • -3% if there is regular onsite monitoring of activities related to carbon-specific conservation activities

2. Natural Disaster Risks: Select one value from each risk category that applies:

E	Fire	• 8% if project is located in an area where fire greater than 1000 acres has occurred within 30 mile radius of project area in prior 12 months • 4% if project is located in high fire risk region • 2% if project is located in low fire risk region (verifiable evidence must be provided) • 1% for agriculture and grassland projects only
F	Diseases and Pests	• 8% if epidemic disease or infestation is present within project area, or within 30 mile radius of project area • 4% Default Value
G	Levee Failure and Water Table Changes	• 2% Default for all wetland projects (and for forest projects where more than 60% of the project area is a forested wetland)
H	Other Natural Disaster Events	• 2% Default Value for all sequestration projects

Calculated Risk Score

Section 1 (A + B + C + D) + Section 2 (E + F + G + H) = Total Risk score %

Section 1 (4 + 4 + 2 + 0) + Section 2 (2* + 4** + 0 + 2) = 18%

*Southeast Alaska is characterized by its cool and wet climate which has supported old-growth conifer forest ecosystems, prevalence of wetlands and small disturbance gaps. The dominance of late-successional, fire sensitive species like Western Hemlock and Sitka Spruce, along with multi-aged stand structures indicate that large fires are rare in these coastal rainforests.

LANDFIRE's data on Biophysical Settings indicates the Alaska Pacific Maritime Ecosystem, which includes the Alaskan Panhandle, has the lowest risk out of all fire regime groups[4]. There have been no recorded natural forest fires in this region and only several, small, human-made fires have been recorded in this region since logging operations began in this region. Project area is in low risk fire region based on this data.

**The 2017 report of forest health conditions in Alaska[5] indicates the occurrence of Alaska Yellow Cedar decline, which is a non-infectious disorder, across the Alaska panhandle. This is exclusive to young growth stands. Spruce-aphid activity has been the only recent pest occurrence in the region and has severely declined after the cold winter of 2016/17, with affected trees appearing to recover. There were no epidemic forest diseases or pests as per the report.

Buffer Pool Contribution

Total Risk score % * Total ERTs generated for reporting period = Buffer pool contribution in ERTs at time of issuance.
*18 % * 85,546 = 15,219 credits of buffer pool contribution (rounded up)*

[4] Fire Regimes in Alaskan Pacific maritime ecosystems, USDA Forest Service Report - https://www.fs.fed.us/database/feis/fire_regimes/AK_Pacific_maritime/all.html#FireFrequency

[5]Forest Health Conditions in Alaska – 2017, USDA Forest Service Report - https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd572286.pdf

C. ADDITIONALITY

C1. REGULTORY SURPLUS TEST

Relevant laws, regulations, statues, legal rulings, and other regulatory frameworks that affect the project activity:

National laws, regulations and policies.

N/A - Clean Water Act (Section 518 demonstrates inherent authority of the Tribes to waters and activities on their reservations under principles of federal Indian common law)
N/A - Endangered Species Act (Section 10(e) demonstrating exemption of the Act for subsistence hunting, even of threatened and endangered species for Alaska Natives)
Alaska National Interest Lands Conservation Act (ANILCA), 1980
The Logger's Guide to the New OSHA Logging Safety Standards, 1995

State & Local laws.

N/A- Alaska Forest Resources and Practices Act. AS 41.17 (not applicable to Alaska Native Cooperation Land)

Binding International Agreements.

Paris Agreement, 2016
Kyoto Protocol (signed, not ratified)
United Nations Framework Convention on Climate Change, 1992
United Nations Convention on Biological Diversity, 1992 (signed, not ratified)
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973
UNESCO World Heritage Convention, 1972

None of the above or any other existing law, regulation, statute, legal ruling, or other regulatory framework in effect as of the Start Date July 27, 2018 effectively requires the forest carbon project activity and its associated GHG emissions reductions/removal enhancements. Consequently, the project passes the Regulatory Surplus test.

C2. COMMON PRACTICE TEST

The Bluesource - Klawock Heenya Improved Forest Management Project is on the regional corporation land owned by the Klawock Heenya Corporation on Prince of Wales Island, in Southern Alaska. Under the Alaska Native Claims Settlement Act of 1971 (ANCSA), these lands have been conveyed to Native Village and Regional Corporations and are not obligated to adhere to any regional forestry laws. The Alaska Forest Resources and Practices Act. AS 41.17 serves only as a guideline.

This region predominantly has western hemlock-Sitka spruce and western redcedar-hemlock forest systems, and some regions of the property are Mixed Conifer stands. Prior to the land getting conveyed under ANCSA, common harvesting and silvicultural practices in this region included clearcuts to encourage deer browse, and balanced regeneration of both spruce and hemlock. With the opening and expansion of mill operations in the region from the 1940s to the 1970s, the Forest Service adopted a 100-acre cutting unit limit for the long-term timber sales. With the enactment of ANCSA in 1971, and Alaska National Interest Lands Conservation (ANILCA) in 1980, significant sections of high-volume timber stands of the Tongass National Forest was withdrawn for Native settlements and wilderness protection. After 1980, Native corporations began harvest operations on their private timberlands, and most of the timber was exported overseas. This timber boom coincided with the setup of a pulp mill in the region (in Ketchikan) and Native Corporations managed their land to optimize production of sawtimber and pulpwood.

More recently, Canadian mill demand for pulpwood from Southeast Alaska has driven up the price for pulp logs, which increases the potential for aggressive forest management practices and shorter rotations in the region. To meet regional and international demand for wood products, sections of Klawock Heenya Corporation lands which were actively managed for timber were clearcut using helicopter or cable logging. Since these are private timberlands that aren't encumbered by any federal or state regulations, if the Bluesource - Klawock Heenya Improved Forest Management Project was not implemented, the forest management could feasibly resemble that of an industrial forestland ownership in the region. Instead, the project will exceed the common practice as described in Section A6. Project Action.

C3. IMPLEMENTATION BARRIERS TEST

- ***Financial***
- *Technological*
- *Institutional*

Implementation Barriers	*Choose one of the following three:*
Financial	Does the project face capital constraints that carbon revenues can potentially address; *or* is carbon funding reasonably expected to incentivize the project's implementation; *or* are carbon revenues a key element to maintaining the project action's ongoing economic viability after its implementation? **Yes = Pass; No = Fail**
Technological	Does the project face significant technological barriers such as R&D deployment risk, uncorrected market failures, lack of trained personnel and supporting infrastructure for technology implementation, or lack of knowledge on practice/activity, and are carbon market incentives a key element in overcoming these barriers? **Yes = Pass; No = Fail**
Institutional	Does this project face significant organizational, cultural, or social barriers to implementation, and are carbon market incentives a key element in overcoming these barriers? **Yes = Pass; No = Fail**

If the project passes the Regulatory Surplus and Common Practice tests, and at least one Implementation Barrier test, ACR considers the project additional.

The Klawock Heenya Corporation (KHC) relies on limited funds to implement projects, and any additional revenue sources are always welcome. If KHC officials chose, they could cut the forests to generate timber revenue to fund other projects, which is what many other tribal corporations end up doing in the face of budget shortfalls. However, the officials tasked with managing the KHC forestland would like to avoid aggressive forest management and would rather focus on maintaining or enhancing the ecosystem service benefits of the forestland. Implementing the carbon project will ease pressure to harvest more aggressively for timber revenues, as maintaining and enhancing the carbon stocks will be rewarded with the crediting and sale of carbon credits, thereby creating a financial incentive to maintain and enhance the stocking in the forests during the duration of the carbon project.

Please see the KHC_RP_ERT_HWP.xslx file for details on the potential revenue that could be made from potential timber harvesting that could legally and feasibly occur on the property in the lifetime of the carbon project. The baseline harvests could generate an NPV of $13.6 million in timber revenues KHC, which could be funneled into projects that have nothing to do with maintaining the ecosystem services provided by the forests. However, because of the projected carbon project scenario revenues, KHC can focus on maintaining the ecosystem services generated from their forestland, and don't have to be tempted into harvesting to generate timber revenues. Overall, this financial incentive meets the requirement to demonstrate that "carbon funding is reasonably expected to incentivize the project's implementation" as outlined in both the ACR protocol and standard.

C4. PERFORMANCE STANDARD TEST

The Bluesource - Klawock Heenya Improved Forest Management Project uses the three-pronged approach; therefore, this step is not required.

D. MONITORING PLAN

D1. MONITORED DATA AND PARAMETERS

Data or Parameter Monitored	A_1
Unit of Measurement	Acres
Description	Area of IFM Project
Data Source	GIS shape file derived from GPS coordinates
Measurement Methodology	Strata area figures adjusted based on stocking levels and species distribution projected in modeling and verified through inventory updates
Monitoring Frequency	Every 5 years, following with inventory update
Value applied:	8,619
Reporting Procedure	Handheld GPS unit, GIS software
QA/QC Procedure	Meta data is kept current and uncorrupted
Purpose of Data	Calculation of project emissions
Calculation method:	Calculated in ArcGIS
Notes	

Data or Parameter Monitored	T
Unit of Measurement	Year
Description	Number of years between monitoring time t and t1 (T = t2 – t1)
Data Source	Monitoring reports
Measurement Methodology	
Monitoring Frequency	Yearly
Value applied:	Calendar
Reporting Procedure	
QA/QC Procedure	All calculations double checked for accuracy prior to submission for verification
Purpose of Data	Calculation of project emissions
Calculation method:	Subtraction
Notes	

Data or Parameter Monitored	Diameter at breast height of tree
Unit of Measurement	Inches (to $1/10^{th}$ inch)
Description	Tree diameter measure 4.5 feet above ground
Data Source	Field measurement
Measurement Methodology	Measured with loggers tape or calipers
Monitoring Frequency	Every 5 years after the first inventory

Value applied:	
Reporting Procedure	Handheld GPS unit or cruise tally sheet
QA/QC Procedure	Equipment will be maintained in excellent condition. Breast height marked with permanent paint on all record trees > 5" diameter
Purpose of Data	Calculations of project emissions
Calculation method:	N/A
Notes	

Data or Parameter Monitored	H
Unit of Measurement	Feet
Description	Total height of tree and phantom height for broken tops
Data Source	Field measurement
Measurement Methodology	Measured with clinometer or hypsometer
Monitoring Frequency	Every 5 years after the first inventory
Value applied:	
Reporting Procedure	Handheld GPS unit or cruise tally sheet
QA/QC Procedure	Equipment will be maintained in excellent condition. All heights will be double checked for reasonableness prior to submission for verification.
Purpose of Data	Calculations of project emissions
Calculation method:	N/A
Notes	

Data or Parameter Monitored	Decay Class
Unit of Measurement	
Description	Qualitative degree of decomposition
Data Source	Forest Inventory
Measurement Methodology	Qualitative assessment of dead tree into 1 of 4 decay classes based on class descriptions
Data Uncertainty	None
Monitoring Frequency	Every 5 years after the first inventory
Value applied:	
Reporting Procedure	Handheld GPS unit or cruise tally sheet
QA/QC Procedure	Equipment will be maintained in excellent condition. All decay classes will be double checked for reasonableness prior to submission for verification
Purpose of Data	
Calculation method:	
Notes	

Data or Parameter Monitored	Tree Live/Dead Status
Unit of Measurement	
Description	Live or Dead
Data Source	Forest Inventory
Measurement Methodology	Measured per the Klawock Heenya Carbon Plot Methodology
Data Uncertainty	None
Monitoring Frequency	Every 5 years after the first inventory
Value applied:	
Reporting Procedure	Handheld GPS unit or cruise tally sheet
QA/QC Procedure	Equipment will be maintained in excellent condition. All tree statuses will be double checked for reasonableness prior to submission for verification
Purpose of Data	
Calculation method:	
Notes	

Data or Parameter Monitored	Defect
Unit of Measurement	%
Description	Qualitative percent of missing biomass
Data Source	Forest Inventory
Measurement Methodology	Tree defect is qualitatively assessed for missing biomass in the bole from 1 ft stump to total height. The exception is for broken tops below 4" DOB when the percent biomass missing is calculated from 1 ft stump to broken top. Top height and phantom height are measured and missing biomass in the broken portion is calculated post-inventory.
Data Uncertainty	None
Monitoring Frequency	Every 5 years after the first inventory
Value applied:	Tree-specific
Reporting Procedure	Handheld GPS unit or cruise tally sheet
QA/QC Procedure	Equipment will be maintained in excellent condition. All tree defects will be double checked for reasonableness prior to submission for verification.
Purpose of Data	
Calculation method:	
Notes	

Data or Parameter Monitored	Species Composition
Unit of Measurement	%
Description	Spp. composition as a percentage of basal area

Data Source	Forest Inventory
Measurement Methodology	Derived from basal area calculations from inventory data.
Data Uncertainty	None
Monitoring Frequency	Every 5 years after the first inventory
Value applied:	
Reporting Procedure	
QA/QC Procedure	Species identification is confirmed at verification.
Purpose of Data	Calculation of project emissions
Calculation method:	Basal Area = 0.005454 * DBH^2
Notes	

Data or Parameter Monitored	Harvested Wood Products
Unit of Measurement	Metric tons CO_2
Description	Carbon remaining in stored wood products 100 years after harvest for the project in year t.
Data Source	NA
Measurement Methodology	NA
Data Uncertainty	None
Monitoring Frequency	Annual data summed for the monitoring period, applied as average annual for the monitoring period
Value applied:	
Reporting Procedure	
QA/QC Procedure	NA
Purpose of Data	
Calculation method:	
Notes	

Data or Parameter Monitored	Forest Carbon
Unit of Measurement	Metric tons of CO_2
Description	Carbon stores in above and below ground live trees at the beginning of the year t
Data Source	Forest Inventory
Measurement Methodology	Consistent with 'KHC_Carbon_Plot_Methodology.pdf'
Data Uncertainty	To be calculated as the mean +/- 90% confidence interval
Monitoring Frequency	Every 5 years or less, or at request for ERT issuance
Value applied:	
Reporting Procedure	
QA/QC Procedure	Consistent with 'KHC_Carbon_Plot_Methodology.pdf' - The inventory will use a random sample design and re-

	measure the same permanent plots, which targeted a precision level of +/- 10% of the mean live tree biomass with 90% confidence.
Purpose of Data	
Calculation method:	
Notes	

D2. MONITORING PLAN

Each year, the Project Proponent shall submit a signed Attestation that:

- Confirms the continuance of project activities;
- Confirms that ownership remains clear and uncontested;
- Discloses any negative environmental or community impacts or claims of negative environmental and community impacts, and documents plans to mitigate any reported negative environmental or community impacts;
- Addresses any significant change in external conditions that would affect the quality or environmental integrity of the project.

The following material outlines the monitoring plan to be followed during the decade following the initial project validation and verification.

General Monitoring Method

In the year prior to validation/initial verification, a representative sample of 70 fixed radius permanent inventory plots were established across the project area. All permanent plots will be re-inventoried at least twice over the following decade to calibrate forest growth models and improve carbon sequestration projections.

The heavily monumented and well-maintained plot design gives forest managers the opportunity to consistently track the growth and development of specific trees over an extended timeline and allows for improved ease of plot location during field work and site verifications. All plots will be re-measured in a manner consistent with the Inventory Methodology, provided separately for verification. [6]

In addition to the full inventory update of the entire property that will be conducted on all plots every 5 years, inventories of select portions of the Project Area will be updated periodically in response to natural disturbance or significant forest management activities. Following natural disturbance events, affected project stands will be assessed for damage. If damage is significant, the affected areas will be re-inventoried and project scenario models will be adjusted to reflect onsite carbon stocks.

In years in which forest plots are not re-inventoried carbon stocks will be monitored through forest growth and yield modeling.

6 The details of the carbon inventory methodology are considered commercially sensitive material as the methodology is the result of considerable investment of Blue Source LLC's resources.

In addition to inventory sampling, management staff will consistently monitor the general health and condition of the forest throughout the course of normal forest management activities (e.g., road maintenance, ecological studies, boundary marking), reducing the risk of reversal by disease, pest invasion, and unauthorized timber removal.

Bluesource LLC ("Bluesource") will oversee the execution and reporting of all project reporting, modeling, and monitoring activities on behalf of the landowner. The landowner will be responsible for "on the ground" forest management activities on the project area, and Terra Verde Inc. will conduct inventory measurements and data collection. After forest inventory data collection, Terra Verde Inc. will report results to Bluesource for processing and updating of modeling projections. After processing is complete Bluesource will house all data and submit the necessary documentation for compliance with ACR standards. Bluesource will ultimately store project data for at least ten years after the conclusion of the project.

Data Processing and Storage

Manually and electronically filed data are stored and archived. Backup copies of all electronically stored data are maintained in a separate data center with scheduled archiving to assure data protection. Future revisions to project documents after initial verification and registration will be clearly identified by saving them as separate files and including the date of revision in any modified documents. All data will be stored on Dropbox or similar online cloud storage service and kept by Bluesource for a minimum of 15 years.

QA/QC Field Procedures

Field Procedures

At the end of each field day, individual foresters will email their plots from the data recorders (or paper) to the senior forester. The senior forester will then look for irregularities in the data and ask the field crew to confirm the data or remeasure any plots that cannot be reconciled. The senior forester will then add all the data to a master spread sheet.

At least 5% of the plots will be checked by a different forester than cruised the plot, preferably by someone senior to the field crew. This will involve full plot measurement to identify any problems with determining in/out trees, species calls, defect measurements, DBH measurements, and height measurements. Any errors noted during the check cruise will be used to update the master spread sheet file. Any consistent height, species, DBH, or defect errors will be resolved by talking with the foresters and removing crew members if need be.

Desk Procedures

The following QA/QC approach is designed to ensure that field data, once input, is appropriately managed and maintained, and that subsequent calculations using that data to determine onsite carbon stocks and associated ERT issuance are correctly implemented.

A three-stage QA/QC process with a defined review group for the project will be established, engaging both personnel intimately familiar with all project files and documentation, as well as independent reviewers who are able to bring "fresh eyes" to key outputs.

Independent Forester Review: The project implementation team (Bluesource LLC) has a team of foresters with intimate knowledge of the files, models and documents. The development of quantitative components, such as Access databases, FVS model runs and Excel workbooks, are led by one of these foresters. Prior to finalization, a second forester who did not lead development of that component is tasked with a QA/QC review including random examinations and data checks to identify and fix any errors.

Technical Review: Once quantitative outputs are finalized, exported from Access/FVS to Excel, and are ready to be transferred into the GHG Plan and other project documents, an independent manager reviews these outputs. This individual performs data checks by tracing key outputs back from final ERT calculations though the chain of Excel documents to the underlying Access/FVS database.

Senior Management Review: Once outputs have been transferred from Excel to the GHG Plan and other project documents, a senior manager reviews these documents and checks that all quantitative elements have been correctly exported from the underlying workbook. At this stage, the senior manager (or other individual not involved in document preparation) also reviews text, grammar and formatting for presentation and accuracy.

E. QUANTIFICATION

E1. BASELINE

INVENTORY DEVELOPMENT OVERVIEW

The carbon inventory of the project area was conducted in September 2018. The inventory employed a sample of 70 nested, fixed-radius circular plots installed in a random distribution across the project area. The nested plots consist of a 1/25th acre plot recording trees >= 5" and a 1/150th acre plot recording trees >1" and <5" DBH. The entire project area (8,619 acres) was assigned to five sampling strata with regard to average height of stands (see Baseline Stratification section below for details).

Table E1--a. Project acreage.

Strata	Project Area (acres)	Constrained Area (acres)	Number of Plots
A	1,100.43	90.07	9
B	1,512.68	103.82	14
C	2,913.45	74.16	24
D	2,546.09	24.60	20
E	546.22	10.22	3
Total	8,618.86	302.87	70

GROWTH MODEL OVERVIEW

Field measurement protocols are documented in KHC_Carbon_Plot_Methodology.pdf." Strata were delineated based on height measurements of the project area using LiDAR and ifSAR available for the project area.

Total aboveground biomass carbon was estimated from inventory data applying species group-specific allometric equations sourced from Jenkins et al 2003[7]. Root biomass was then estimated from total aboveground biomass using component ratios from Jenkins et al 2003, to produce total live tree biomass. Total live tree biomass was converted from pounds to metric tons, multiplied by 0.5 to estimate carbon fraction, then multiplied by 3.664 to calculate CO2 equivalent.

Carbon in standing dead wood was estimated in the same way as live trees, with deductions for decay class recorded in the field. Decay classes were recorded according to the ACR standard using the methodology-defined class (see table E-1b).

Table E-1b. ACR decay classes

[7] Jenkins, J.C., Chojnacky, D.C., Heath, L.S. and R.A. Birdsey. 2003. National-scale biomass estimators for United States tree species. Forest Science 49:12-35

Decay Class	Description
Decay Class 1	Tree with branches and twigs that resembles a live tree (except for leaves)
Decay Class 2	Tree with no twigs but with persistent small and large branches.
Decay Class 3	Tree with large branches only.
Decay Class 4	Bole only, no branches.

Growth and Yield Simulation

For growth and yield projections, we used the US Forest Service Forest Vegetation Simulator (FVS) Alaska (AK) variant. FVS-AK was calibrated to the project area. For hemlock and spruce species, an SDIMAX of 619 was used, based on results from a recent a regional study[8], instead of the default value for the FVS-AK variant. A site index for western hemlock of 80 was used for all strata and species.

Table E-1c. Site index for project area.

Stratum/stand	Site index of reference species	Reference species
All Strata	80	Western Hemlock

The FVS "NoTriple" command was entered to avoid excessive tree records and speed processing.

Initial carbon stock estimates for the project start date were back-modeled via FVS-AK with the approach outlined below.

1. Inventory Start Date -End Date data were entered into FVS-AK and grown for 10 years with no management (with "NoTriple" keyworded to track individual trees and permit cross-referencing to raw inventory dataset).
2. For each live tree (ascribed a unique identifier), annual diameter growth was derived assuming linear growth during the 10-year projection interval (i.e. for DBH, annual growth calculated as DBH at end of 10-year interval *minus* DBH at beginning of 10-year interval, reported in the FVS Treelist output, *divided by* 10).
3. For each live tree, diameter data from the Inventory Start Date - End Date inventory were degrown referencing the annual rates derived in step 2 above, subtracting one year annual growth (i.e. one growing season) from the Inventory Start Date - End Date measurement value.
4. Initial carbon stocks were recalculated using the degrown data. No harvests or significant disturbances took place during the intervening period. Diameter of standing dead trees were assumed to be constant through the period.
5. The baseline scenarios were subsequently modeled entering the degrown inventory data into FVS-AK.

[8] Poage, Nathan J., David D. Marshall, and Michael H. McClellan. "Maximum stand-density index of 40 western hemlock–Sitka spruce stands in southeast Alaska." Western Journal of Applied Forestry 22.2 (2007): 99-104.

Table E1-d. De-grown results for above and belowground (live and dead) tree biomass.

Live CO2 Stats

Strata	Average of Live CO2e	StdDev of Live CO2e	Plots
A	293.98	275.13	9
B	271.04	178.15	14
C	141.74	91.77	24
D	117.88	56.41	20
E	101.89	66.03	3

Dead CO2 Stats

Strata	Average of Dead CO2e	StdDev of Dead CO2e	Plots
A	10.07	15.94	9
B	5.01	7.62	14
C	25.78	46.14	24
D	18.95	32.12	20
E	25.87	31.54	3

Estimated total stock in live and dead trees in Start Date, de-grown from the inventory data, is 1,658,398 t CO2 (= 192.4 t CO2/ac * 8,619 acres). These calculations are detailed in the 'InvDate', 'IndTreeGrow', and 'TreeList' tabs in KHC_Start_RP_CO2.xlsx.

BASELINE STRATIFICATION

The Project employed a post-inventory stratification, utilizing remote sensing techniques. The baseline stratification methodology is outlined in the "KHC Stratification Methodology," provided separately for verification.

BASELINE HARVEST SCHEDULE SCENARIO OVERVIEW

The Baseline Scenario represents an industrial harvest regime designed to maximize the 100-year Net Present Value (NPV) at a 6% discount rate, subject to operational considerations in the region. Only volume from merchantable species count toward costs and revenue for regeneration harvest i.e., hardwood species are not included). The acres to cut of each prescription by plot was determined using a linear programming model, which found the combination of prescriptions that maximizes the NPV over 100 years.

In general, stands have a few different options available:

1) Regeneration harvest only (no precommercial thinning)
2) Precommercial thin, followed by a regeneration harvest, then additional precommercial thin and regeneration harvest.
3) Regeneration harvest followed by precommercial thinning.
4) No harvest only in stream buffers.

Specifically, there are 9 silvicultural prescriptions in the linear programming model, shown in Table E1-e.

Table E1-e. Silvicultural prescriptions used for the baseline harvest schedule.

Prescription	Description
GROW	Grow stand through end of baseline projection, with no silvicultural treatment. This prescription applies to all constrained acres (i.e., RMZ areas).
RHPCT12_1	1. Stand is harvested when it reaches a merchantable volume [redacted] followed by natural regeneration [redacted] 2. Precommercial thinnin [redacted] 3. Stand is regrown until it reaches merchantable volume [redacted] at which time a clearcut is implemented again. 4. If a stand is not regen harvested [redacted] a precommercial thin will be implemented in the first time period [redacted] If a stand is regen harvested [redacted] the only precommercial thins are after a regen harvest, as described in step 2. 5. Repeat steps 1, 2, and 3 until end of baseline projection.
RHPCT12_2	1. Stand is harvested when it reaches a merchantable volume [redacted] followed by natural regeneration [redacted] 2. Precommercial thinnin [redacted] 3. Stand is regrown until it reaches merchantable volume [redacted] at which time a clearcut is implemented again. 4. If a stand is not regen harvested [redacted] a precommercial thin will be implemented in the second time period [redacted] If a stand is regen harvested [redacted] the only precommercial thins are after a regen harvest, as described in step 2. 5. Repeat steps 1, 2, and 3 until end of baseline projection.
RHPCT12_3	1. Stand is harvested when it reaches a merchantable volume [redacted] followed by natural regeneration [redacted] 2. Precommercial thinning [redacted]

	3. Stand is regrown until it reaches merchantable volume [redacted] at which time a clearcut is implemented again. 4. If a stand is not regen harvested [redacted] a precommercial thin will be implemented [redacted] If a stand is regen harvested [redacted] the only precommercial thins are after a regen harvest, as described in step 2. 5. Repeat steps 1, 2, and 3 until end of baseline projection.
RHPCT12_4	1. Stand is harvested when it reaches a merchantable volume [redacted] followed by natural regeneration [redacted] 2. Precommercial thinning [redacted] 3. Stand is regrown until it reaches merchantable volume [redacted] at which time a clearcut is implemented again. 4. If a stand is not regen harvested [redacted] a precommercial thin will be implemented [redacted] If a stand is regen harvested [redacted] the only precommercial thins are after a regen harvest, as described in step 2. 5. Repeat steps 1, 2, and 3 until end of baseline projection.
RHPCT16_1	1. Stand is harvested when it reaches a merchantable volume [redacted] followed by natural regeneration [redacted] 2. Precommercial thinnin [redacted] 3. Stand is regrown until it reaches merchantable volume [redacted] at which time a clearcut is implemented again. 4. If a stand is not regen harvested [redacted] a precommercial thin will be implemented [redacted] If a stand is regen harvested [redacted] the only precommercial thins are after a regen harvest, as described in step 2. 5. Repeat steps 1, 2, and 3 until end of baseline projection.
RHPCT16_2	1. Stand is harvested when it reaches a merchantable volume [redacted] followed by natural regeneration [redacted] 2. Precommercial thinnin [redacted]

	3. Stand is regrown until it reaches merchantable volume [redacted] at which time a clearcut is implemented again. 4. If a stand is not regen harvested [redacted] a precommercial thin will be implemented [redacted] If a stand is regen harvested [redacted] the only precommercial thins are after a regen harvest, as described in step 2. 5. Repeat steps 1, 2, and 3 until end of baseline projection.
RHPCT16_3	1. Stand is harvested when it reaches a merchantable volume [redacted] followed by natural regeneration [redacted] 2. Precommercial thinning [redacted] 3. Stand is regrown until it reaches merchantable volume [redacted] at which time a clearcut is implemented again. 4. If a stand is not regen harvested [redacted] a precommercial thin will be implemented [redacted] If a stand is regen harvested [redacted] the only precommercial thins are after a regen harvest, as described in step 2. 5. Repeat steps 1, 2, and 3 until end of baseline projection.
RHPCT16_4	1. Stand is harvested when it reaches a merchantable volume [redacted] followed by natural regeneration [redacted] 2. Precommercial thinning [redacted] 3. Stand is regrown until it reaches merchantable volume [redacted] at which time a clearcut is implemented again. 4. If a stand is not regen harvested [redacted] a precommercial thin will be implemented [redacted] If a stand is regen harvested [redacted] the only precommercial thins are after a regen harvest, as described in step 2. 5. Repeat steps 1, 2, and 3 until end of baseline projection.

Table E1.f Timber prices.

Commercially viable species in the project area include cedar, hemlock, and spruce.

Species	Market	2017 Value ($)	2019 Value ($)	Average Value ($)
Spruce	Old Growth Foreign Market Log Sales	[redacted]	[redacted]	[redacted]
Hemlock	Old Growth Foreign Market Log Sales	[redacted]	[redacted]	[redacted]
Cedar	Old Growth Foreign Market Log Sales	[redacted]	[redacted]	[redacted]

*Average of 2017 prices, as well as the most recent quarter for the Tongass National Forest

Source: "RV Update Bulletin" worksheet, "OFFICIAL BY16 RV Appraisal Update Bulletin111318" website link

Harvest management cost were estimated to be [redacted] These costs include equipment mobilization, logging (High lead, long span cable yarding), hauling, barging, camping, roadwork (layout/ construction/ maintenance), travel to and from the job site, boundary delineation (property/sale/unit), timber marking/paint. In addition, it was assumed that the administrative costs on the property were $10 per acre. These costs were determined based on conversations with local foresters familiar with logging costs in the area and include references to logging cost reports conducted by the US Forest Service in Alaska. Please see the Southeast Alaska_Cost_Value workbook, provided separately, for additional details on the logging cost assumptions.

Precommercial thinning costs are [redacted] To conservatively estimate thinning costs, it is assumed that all acres are precommercially thinned in the first decade, and all acres are precommercially thinned in the 6th decade. Based on the range of rotation ages for stands in the project area, no stand receives more than two precommercial thins in the 100-year baseline projection.

Ultimately, the financial analysis shows that the baseline harvest activities would be financially viable over a 100-year term using the cost and pricing estimates cited above.

PROJECT HARVEST SCHEDULE SCENARIO OVERVIEW

The Project Scenario is a constrained conservation management regime anticipated to maximize carbon sequestration and other co-benefits (e.g., water quality protection, wildlife habitat). As a result, it is assumed that there is no commercial timber harvesting.

CARBON CALCULATION OVERVIEW

The harvest schedule reports the two CO_2 pools used in the uncertainty calculations:

1) Live Stocks: includes above and below ground live stocks
2) Dead Stocks: includes only above ground dead stocks

ERT CALCULATION OVERVIEW

The ERTs were computed based on the equations and coefficients provided in the ACR Document Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non‐Federal U.S. Forestlands; April 2018.

The mill efficiencies are from the Regional Mill Efficiency Database and are broken down by species group (hardwood vs. softwood) and wood product (pulp vs. sawlog). However, since FVS provides no estimates of carbon by species or wood product, we determined species and product estimates from the ACR wood product classes for the project's Assessment Area (Alaska).

Table E1-g shows the ACR harvested wood product estimates.

Table E1-g. Wood Product Category Percentages

Supersections	Softwood Lumber	Hardwood Lumber	Plywood	Oriented Strand Board	Non-structural Panels	Misc.	Paper	Alaskan Exports
Southeast and South Central Alaska	7.60%	0.00%	0.00%	0.00%	0.00%	0.00%	2.20%	90.20%

Table E1.h. Calculation of Total CO2 Stocks

Strata	Total CO2/Acre	St. Dev	Plots	Acres	%	Std Error	Total CO2
A	304.04	269.62	9	1,100	13%	89.87	334,578
B	276.05	179.02	14	1,513	18%	47.85	417,581
C	167.52	110.99	24	2,913	34%	22.65	488,061
D	136.84	59.64	20	2,546	30%	13.34	348,394
E	127.76	72.22	3	546	6%	41.70	69,784
Total	192.41		70	8,619			1,658,398

Table E1.i. Baseline CO2e stocks.

Year	Live trees (tons CO_2e per acre)	Standing dead (tons CO_2e per acre)	Harvested wood products (tons CO_2e per acre)
2018	174.3	18.1	1.4
2019	157.5	18.3	1.4
2020	140.7	18.4	1.4
2021	123.9	18.5	1.4
2022	107.1	18.7	1.4

2023	90.3	18.8	1.4
2024	84.1	18.4	1.4
2025	78.0	18.0	1.4
2026	71.8	17.6	1.4
2027	65.6	17.2	1.4
2028	59.4	16.7	1.4
2029	59.2	16.3	1.4
2030	59.0	15.9	1.4
2031	58.9	15.5	1.4
2032	58.7	15.1	1.4
2033	58.5	14.7	1.4
2034	57.5	14.3	1.4
2035	56.5	13.9	1.4
2036	55.5	13.5	1.4
2037	54.5	13.1	1.4
2038	53.5	12.6	1.4

The 20 year long-term average baseline value was 101.5 t CO2/acre or 875,205 total tonnes CO2.

The scenarios were projected in FVS-AK for the 100 year scenario. Projections were annualized using linear interpolation. Direct biomass carbon estimates for live trees were output via FVS FFE carbon reports, using Jenkins et al 2003 biomass predictions in metric tons of carbon per acre, matching the calculations applied to the forest inventory measurements.

Standing dead wood was modeled using the Fire and Fuels Extension of FVS (FVS FFE) to produce detailed snag lists for each model cycle. Biomass carbon of each snag was estimated using model output cubic foot volumes of hard and soft components of dead wood, multiplied by dead wood density. Dead wood densities were referenced from the US Forest Service Wood Handbook or from Miles and Smith 2009, and incorporated deductions for decay classes corresponding to the hard and soft dead wood components output from the FVS FFE model and summarized in the table below. Belowground biomass was estimated for hard classes of standing dead wood applying component ratios from Jenkins et al 2003. Standing dead biomass was converted to carbon applying a carbon fraction of 0.5, and carbon converted to carbon dioxide equivalent (CO2e) applying a conversion factor of 3.664.

[9] Kretschmann D. E. 2010. Chapter 5: Mechanical properties of wood. Wood Handbook. U. S. Department of Agriculture, Forest Service, Madison, Wisconsin, General Technical Report FPL-GTR-190: 5-1–5-46.

P. Miles and W. B. Smith. 2009. Specific Gravity and Other Properties of Wood and Bark for 156 Tree Species Found in North America. USFS Research Note NRS-38

Table E1-j. Snag description for project area

Fire Fuel Extension (FFE) snag class	Biomass deduction	FVS description
Soft	0.80	Per FVS FFE: "No branches remain." Corresponds to ACR IFM methodology decay class 4.
Hard	0.97	Per FVS FFE: "Soft snags are more decayed and are assumed to have 80% of the wood density of hard snags." Corresponds to ACR IFM methodology decay class 1.

Source: Rebain et al. (2012). *FVS Fire and Fuels Extension*.

Harvested wood products

Step 1:
Long-term storage in wood products was calculated from FVS projections of removals. Projected harvested volumes were broken out into the following categories: softwood sawlog, softwood pulp, hardwood pulp and hardwood sawlog. Pulp/saw breakdowns referenced merchantability standards in the FVS-AK variant (Dixon et al 2008[10]).

Volumes were converted to biomass by applying species-specific specific gravities referenced from the USFS Wood Handbook 2010 Table 5-3a or from Miles and Smith 2009. Biomass was converted to carbon applying a carbon fraction of 0.5, and then converting to CO2 equivalent by multiplying by 3.664. Harvest tCO2/acre (before delivery to mill) for each modeled group (i.e. baseline stratum) were summed for two categories: hardwood sawtimber and softwood sawtimber.

Step 2:

Carbon transformed to wood products was estimated applying mill efficiency values referenced from the ARB 2015 forest protocol "Regional Mill Efficiency Data.xls" database[11], for the Alaska (AK) region specified in Table E1-k.

Table E1k. Mill efficiency values.

State	Hardwood saw log	Hardwood pulp	Softwood saw log	Softwood pulp
Alaska	0	0	62.8%	58.2%

[10] Dixon, Gary E.; Keyser, Chad E., comps. 2008 (revised March 16, 2012). Northeast (NE) Variant Overview – Forest Vegetation Simulator. Internal Rep. Fort Collins, CO: U. S. Department of Agriculture, Forest Service, Forest Management Service Center. 40p.
[11] Sourced at: https://www.arb.ca.gov/cc/capandtrade/protocols/usforest/usforestprojects_2015.htm

Steps 3 and 4:

Transformed carbon was summed across the hardwood/softwood/pulp/sawtimber categories and then distributed among a range of end wood product classes. Distributions of end wood product classes reference ARB 2015 forest protocol values derived from the supersection (Table E.1.l).

Table E1.l. Wood product carbon distribution

Supersections	Softwood Lumber	Hardwood Lumber	Plywood	Oriented Strand Board	Non-structural Panels	Misc.	Paper	Alaskan Exports
Kodiak Island and Alexander Archipelago	7.60%	0.00%	0.00%	0.00%	0.00%	0.00%	2.20%	90.20%

Wood product amounts retained in storage for 100 years in in-use wood products and landfills were then calculated referencing end wood product class-specific 100-year average storage factors provided in the methodology[12].

Table E1.m. 100 Year Storage Factors

Wood Product Class	In-Use	Landfills
Softwood Lumber	0.234	0.405
Hardwood Lumber	0.064	0.49
Softwood Plywood	0.245	0.40
Oriented Strandboard	0.349	0.347
Non Structural Panels	0.138	0.454
Miscellaneous Products	0.003	0.518
Paper	0.000	0.151
Alaskan Exports	0.391	0.284

Step 5:

Carbon in long-term storage was then summed across in-use wood products and landfills and across modeled groups/baseline strata to produce annual total t CO2 stored in in-use wood products and landfills after 100 years from wood harvested in a given year.

Emissions due to burning logging slash are conservatively assumed in the baseline to be zero. Thus, parameter BSBSL equals zero and the outcome of equation 4 of the methodology, parameter GHGBSL, equals zero.

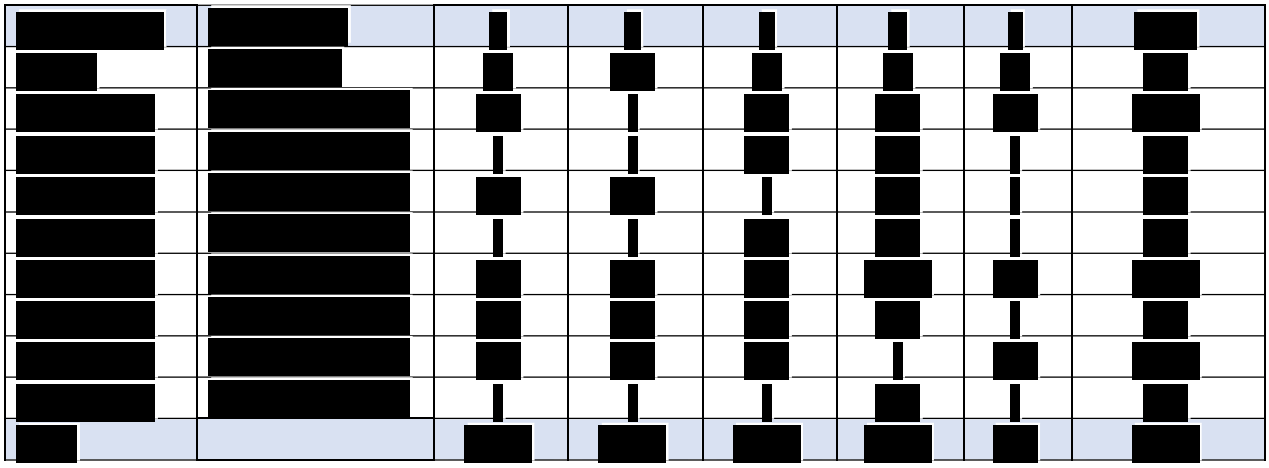
[12] Sourced from Smith JE, Heath LS, Skog KE, Birdsey RA (2006) Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. In: General Technical Report NE-343 (eds USDAFSUSDAFS), PP. 218. USDA Forest Service, Washington, DC, USA.

Baseline Harvest Mix

Table E1.n presents the baseline mix of harvest practices that maximizes the net present value of 100-year cash flows. Maximum NPV under the baseline is $14,785,781.

Table E1.n Baseline and project prescription acreages.

Baseline Prescription Acreages



Project Prescription Acreages

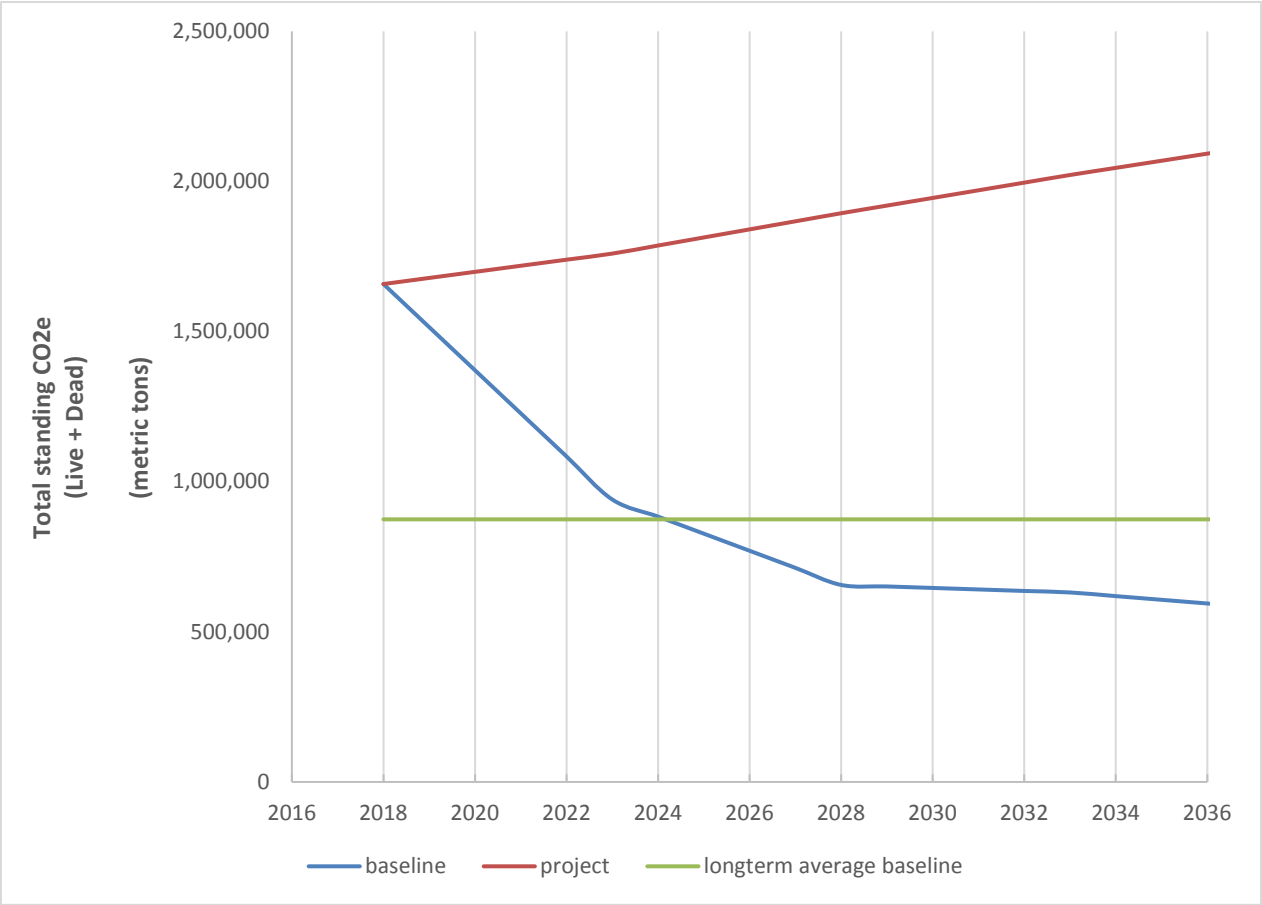
Prescription	Description	A	B	C	D	E	Total
GROW	No Harvest	1,100	1,513	2,913	2,546	546	8,619

Projections of live tree, standing dead wood and harvested wood products carbon stocks in the project area in the baseline scenario for the first crediting period from 2018 to 2038. For the live tree and standing dead pools, stocks represent stocks on July 27the reporting period date of the corresponding year. For harvested wood products (HWP), stocks represent stocks harvested in the annual interval beginning July 27 on the reporting period date of the corresponding year.

From the modeled stocks, we first calculated long‐term average baseline stocking level for the first 20-year crediting period, 875,205 t CO2, and the change in baseline carbon stocks for each year.

The figure below depicts the projected baseline stocks, average baseline stock for the first crediting period, and projected with-project stocks (see below for derivation of with-project stock projections).

Figure E1.a Total standing (Live + Dead) CO_2e under baseline and project scenarios.



E2. PROJECT SCENARIO

Project scenario

The actual project scenario is measured through future inventories over the course of the project lifetime. However, we produce an ex-ante projection of the project scenario assuming the landowner will conduct the harvest types described in the Project Harvest Schedule Scenario Overview section. This ex-ante projection applies in years beyond 2018, as the landowner harvested no timber in the first reporting period.

E3. LEAKAGE

Quantification of leakage is limited to market leakage, as no activity-shifting leakage is allowed by the methodology beyond *de minimis* levels. Klawock Heenya Corporation does not commercially harvest timber; therefore, there is no activity-shifting leakage.

Market leakage was determined by quantifying the merchantable carbon removed in both the baseline and with-project cases. Carbon in long-term storage in in-use wood products and landfills, calculated above, was used to assess relative amounts of "total wood products produced" in the two scenarios. No

timber harvest is projected to take place in the project scenario. The decrease in wood production relative to the baseline was then calculated and the applicable market leakage discount factor was determined.

Table E3.a Baseline leakage factors.

Period	Baseline wood products summed over 20-yr crediting period (tons CO_2)	Project wood products summed over 20-yr crediting period (tons CO_2)	Project decrease in wood products relative to baseline (%)	Applicable leakage factor (%)
2018 -2038	248,733	-	100%	40%

E4. UNCERTAINTY

We computed uncertainty in project and baseline CO_2e according to equations 10 and 18 of the ACR protocol. Error terms for live and dead CO_2e are calculated using the inventory data in the "Stats" tabs of KHC_Start_RP_CO2.xlsx. As required by ACR equations 10 and 18, these error terms (e_{TREE} and e_{DEAD}), estimated from the most recent inventory data, are used for computing total CO_2e uncertainty in both the project and baseline scenarios. The ACR protocol also specifies that the error term for live CO_2e (e_{TREE}) be used as the uncertainty estimate for CO_2e stored in wood products. No slash burning is anticipated, so expected greenhouse gas emissions (GHG) under both the project and baseline scenarios are zero. Total uncertainty in combined baseline CO_2e stocks (ACR equation 10) is 14.4%. These calculations are all found in the "Stats" tabs of KHC_Start_RP_CO2.xlsx.

Table E4.a Uncertainty in start date CO_2e stocks.

Live Stats

Strata	Avg Live CO2/acre	StdDev of Live CO2e	Plots	Acres	%	Std. Error	Total CO2
A	293.98	275.13	9	1,100	13%	91.71	323,499
B	271.04	178.15	14	1,513	18%	47.61	410,003
C	141.74	91.77	24	2,913	34%	18.73	412,943
D	117.88	56.41	20	2,546	30%	12.61	300,143
E	101.89	66.03	3	546	6%	38.12	55,653
Total	174.30		70	**8,619**			**1,502,241**

Dead Stats

Strata	Avg Live CO2/acre	StdDev of Live CO2e	Plots	Acres	%	Std. Error	Total CO2
A	10.07	15.94	9	1,100	13%	5.31	11,079
B	5.01	7.62	14	1,513	18%	2.04	7,577
C	25.78	46.14	24	2,913	34%	9.42	75,118
D	18.95	32.12	20	2,546	30%	7.18	48,251
E	25.87	31.54	3	546	6%	18.21	14,132
Total	18.12		70	**8,619**			**156,157**

Percentage uncertainty expressed as 90% confidence interval

Live ($e_{TREE,t=1}$)	15.1%
Dead ($e_{DEAD,t=1}$)	36.9%

E5. REDUCTIONS AND REMOVAL ENHANCEMENTS

Table E5.a shows estimated net reductions and removal enhancements attributable to the Klawock Heenya project over the first 20-year crediting period (2018 - 2038). As the annual project-level uncertainty was above the 10% threshold required by the ACR protocol, an uncertainty deduction was applied to the annual Emission Reduction Tons (ERTs) generated by the project. ERTs presented in Table E1.n incorporate the assumed 40% market leakage. ERTs are dated beginning on July 27, 2018, the project Start Date. Therefore, annual values in Table E5.a correspond to the 1-year interval ending on July 26th of each year. For example, ERTs in 2018 include GHG reductions and removals occurring between July 27, 2018 and July 26th, 2019.

Table E5.a Estimate of net Emission Reduction Tons (ERTs) by year (includes buffer tonnes). The values represented here include a deduction because project-level uncertainty was above 10%.

Project year	Year	Estimated GHG emission reductions (tons CO_2)
0	2018	Start Date
1	2019	84,546
2	2020	74,575
3	2021	79,583
4	2022	79,583
5	2023	79,583
6	2024	38,401
7	2025	38,401
8	2026	35,379
9	2027	13,840
10	2028	13,838
11	2029	13,115
12	2030	13,114
13	2031	13,113
14	2032	13,112
15	2033	13,110

Project year	Year	Estimated GHG emission reductions (tons CO_2)
16	2034	12,201
17	2035	12,200
18	2036	12,199
19	2037	12,198
20	2038	12,197

E6. EX-ANTE ESTIMATION METHODS

Table E6.a shows projected CO_2e stocks under the project scenario described in Section E2. Project Scenario.

Table E6.a Project CO_2e stocks.

Year	Live trees (tons CO_2e per acre)	Standing dead (tons CO_2e per acre)	Harvested wood products (tons CO_2e per acre)
2018	174.3	18.1	0.0
2019	176.6	18.1	0.0
2020	179.0	18.1	0.0
2021	181.4	18.1	0.0
2022	183.7	18.1	0.0
2023	186.1	18.1	0.0
2024	189.2	18.1	0.0
2025	192.3	18.1	0.0
2026	195.4	18.1	0.0
2027	198.5	18.1	0.0
2028	201.7	18.1	0.0
2029	204.6	18.1	0.0
2030	207.6	18.1	0.0
2031	210.5	18.1	0.0
2032	213.5	18.1	0.0
2033	216.4	18.1	0.0
2034	219.2	18.1	0.0
2035	221.9	18.1	0.0
2036	224.7	18.1	0.0

Year	Live trees (tons CO_2e per acre)	Standing dead (tons CO_2e per acre)	Harvested wood products (tons CO_2e per acre)
2037	227.4	18.1	0.0
2038	230.2	18.1	0.0

F. COMMUNITY & ENVIRONMENTAL IMPACTS

F1. NET POSITIVE IMPACTS

Community and Environmental Assessment

1. *An overview of the Project Activity and geographic location.*

   See Section A5. Brief Summary of Project and Section A4. Location.

2. *Applicable laws, regulations, rules, and procedures and the associated oversight institutions.*

   See Section C1. Regulatory Surplus Test.

3. *A description of the process to identify community(ies) and other stakeholders affected by the project and, as applicable, the community consultation and communications plan.*

   Bluesource - Klawock Heenya Improved Forest Management Project is owned by the Klawock Heenya Corporation, which is an incorporated entity and a private forestland owner. All land included in the Klawock Heenya Improved Forest Management Project area is under the ownership of the Klawock Heenya Corporation, and updates regarding the project development and monitoring will be discussed and communicated by the Board of Directors in their scheduled board meetings. Information regarding the carbon project can be requested from the Board of Directors of the Corporation.

4. *An assessment of the project's environmental risks and impacts, including factors such as climate change mitigation and adaptation, biodiversity, air quality, water quality, soil quality, and ozone quality, as well as the protection, conservation, or restoration of natural habitats such as forests, grasslands, and wetlands. The assessment shall: 1) identify each risk/impact; 2) categorize the risk/impact as positive, negative, or neutral and substantiate the risk category; 3) describe how any negative impacts will be avoided, reduced, mitigated, or compensated; 4) detail how risks and*

impacts will be monitored, and how often and by whom; and 5) describe how positive impacts contribute to sustainable development goals (optional).

Impact	Carbon sequestration
Risk Category	Positive
Monitoring Plan (how, how often, by whom)	Forest management activities described in the Forest Management Plans and monitoring for the carbon project is described in Section D2. Monitoring Plan.
If negative, describe aversion, reduction, mitigation, or compensation strategy:	N/A

Impact	Habitat protection for wildlife, plant species, and trees in the forested communities.
Risk Category	Positive
Monitoring Plan (how, how often, by whom)	Forest management activities described in the Forest Management Plans and monitoring for the carbon project is described in Section D2. Monitoring Plan.
If negative, describe aversion, reduction, mitigation, or compensation strategy:	N/A

Impact	Water quality protection
Risk Category	Positive
Monitoring Plan (how, how often, by whom)	Forest management activities described in the Forest Management Plans and monitoring for the carbon project is described in Section D2. Monitoring Plan.
If negative, describe aversion, reduction, mitigation, or compensation strategy:	N/A

Impact	Protection from soil erosion and degradation
Risk Category	Positive
Monitoring Plan (how, how often, by whom)	Forest management activities described in the Forest Management Plans and monitoring for the carbon project is described in Section D2. Monitoring Plan.
If negative, describe aversion, reduction, mitigation, or compensation strategy:	N/A

Impact	Protects area as community resource for education, research, and recreation
Risk Category	Positive
Monitoring Plan (how, how often, by whom)	Forest management activities described in the Forest Management Plans and monitoring for the carbon project is described in Section D2. Monitoring Plan.
If negative, describe aversion, reduction, mitigation, or compensation strategy:	N/A

Bluesource - Klawock Heenya Improved Forest Management Project has no anticipated negative community or environmental impacts. Annual attestations confirming this assessment will be provided separately for verification purposes.

5. *For community-based projects, an assessment of the project's community risks and impacts, including factors such as land and natural resource tenure, land use and access arrangements, natural resource access (e.g., water, fuelwood), food security, land conflicts, economic development and jobs, cultural heritage, and relocation.*

   Bluesource - Klawock Heenya Improved Forest Management Project is not a community-based project.

F2. STAKEHOLDER COMMENTS

N/A. The Project Proponent, Klawock Heenya Corporation is a private forestland owner, and adhered to their internally agreed upon practices of project consultation and notification on associated decision making. Klawock Heenya Corporation will provide references to the publicly available documentation for the project.

G. OWNERSHIP AND TITLE

G1. PROOF OF TITLE

G1.1 Ownership of forestlands

Forestlands included in the project are owned directly by the Project Proponent, Klawock Heenya Corporation, which hold full legal titles and thus have long term control of the land. The relevant patents of interim conveyances are available for review by verifier in a compressed document folder "KHC_Project_Supporting_Documents.zip."

G1.2 Emission reduction rights

Emissions reductions rights are owned by the Project Proponent.

G2. CHAIN OF CUSTODY

No sales or purchasing of offsets was conducted prior to project registration.

G3. PRIOR APPLICATION

The Bluesource - Klawock Heenya Improved Forest Management Project has not previously applied or been registered under any GHG emission trading system or program.

H. PROJECT TIMELINE

H1. START DATE

The Bluesource - Klawock Heenya Improved Forest Management Project has a project start date of July 27, 2018, the date of the contractual signing agreement between the Project Proponent and the Offset Developer. This start date is appropriate and consistent with the ACR Standard Version 5.1.

H2. PROJECT TIMELINE

Below is a schedule of the project activities in chronological order for important aspects of the Bluesource - Klawock Heenya Improved Forest Management Project.

Project Activity	Date	Source/Notes
Project Start Date (Initiation of project activities)	July 27, 2018	CDMA contract signing
Frequency of monitoring, reporting and verification		Every 5 years after the first verification
Length of First Crediting period	Through July 26, 2038	20 years
Expected project longevity	Minimum Project Term of at least 40 Years	40 years