Anew – Two-Hearted Forestry Project

March 29, 2023

ACR 673

The Nature Conservancy

Prepared by: Anew Climate, LLC

anew

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A. PROJECT OVERVIEW

A1. PROJECT TITLE

The project title is "Anew – Two-Hearted Forestry Project".

A2. PROJECT TYPE

This project is to be registered under the American Carbon Registry Standard[1] (ACR, 2020) as an Improved Forest Management (IFM) project, under 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 7.0 and Improved Forest Management for Non-Federal U.S. Forestlands Version 1.3. The Anew – Two-Hearted Forestry Project meets all relevant eligibility requirements as described in Table A 3.1 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.	See section G1. PROOF OF TITLE
Project proponent has third-party certification or no commercial timber harvesting	The project proponent is certified under Forest Stewardship Council.	See also 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, the project meets the definition of forestland through a minimum of 10% forest cover (or equivalent stocking) by live trees of any size.	See also section A4. LOCATION
Project start date	The project start date of July 19, 2019 coincides with the landowners intent to commence a carbon project. The project Start Date complies with requirements of the ACR protocol, that the project must have a validated/verified Start Date of January 1, 2000 or after.	See also section H1. START DATE.
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.	See also section H2. PROJECT TIMELINE.

[1] ACR. 2020. American Carbon Registry Standard, Version 7.0. 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.

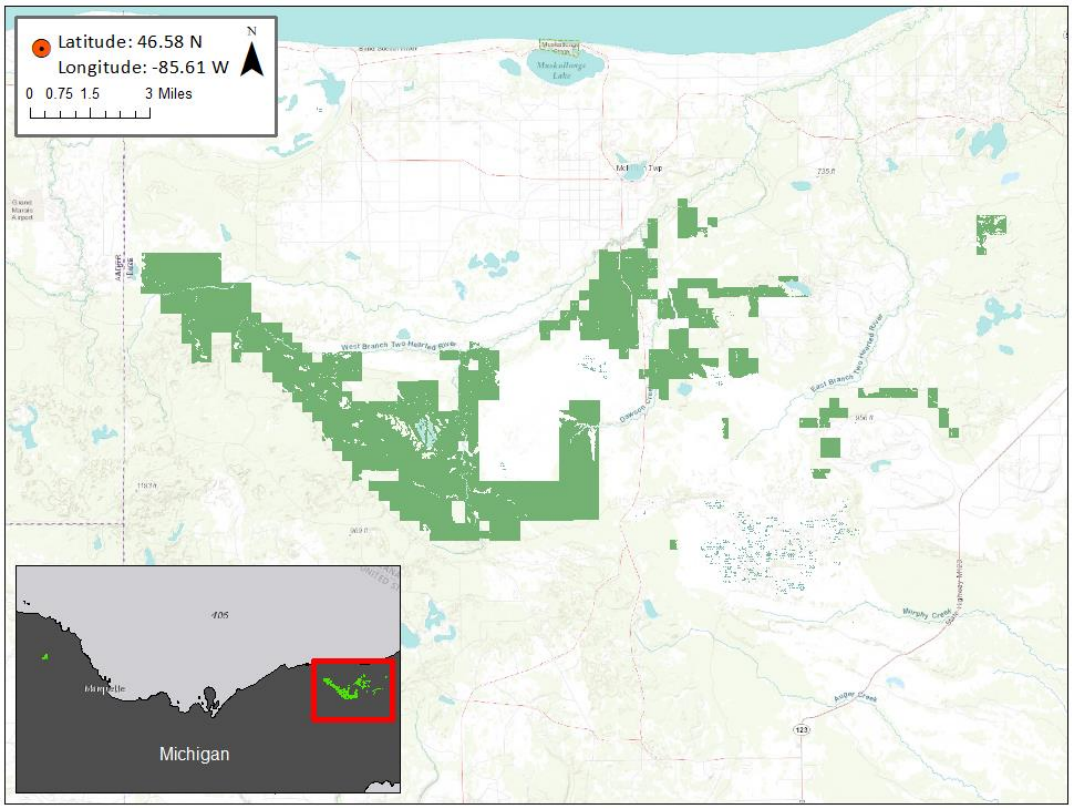
Crediting Period	In compliance with ACR Standard Version 7.0, the crediting period for the project is 20 years.	See also section H2. PROJECT TIMELINE.
Real	GHG removals are quantified based on inventory of the standing stock in the project area at the time of verification.	See also sections D. MONITORING PLAN and E. QUANITIFCATION
Land Title	For all areas included in the project, long term land titles have been issued and ownership is thus clear, unique, and uncontested.	Deeds provided
Direct Emissions/ Offset Title	GHG emission reductions generated by the project activity are generated from forest carbon sources and sinks over which The Nature Conservancy has all management (Deeds and Contracts provided) and ownership rights. The Nature Conservancy holds title to all lands in the project area (see Section G below) and all rights to carbon credits/offsets produced through management of forests in the project area (Deeds and Contracts provided).	See also 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.	See also section C. ADDITIONALITY
Permanent	The long-term setup, risk analysis, and buffer establishment assure permanence of the project benefits.	See also section B8. PERMANENCE.
Net of Leakage	Possible leakage effects due to activity shifts are quantified and deducted from the GHG benefits.	See also 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 7.0, net positive impacts were confirmed.	See also section F. COMMUNITY & ENVIRONMENTAL IMPACTS

A4. LOCATION

A GIS shapefile of the project area was provided separately for verification. This shapefile gives unique identification and delineation of the specific extent of the project. Vicinity map (Figure A-1.) gives project location and latitude/longitude coordinates. Figure A-2. shows the Anew – Two-Hearted Forestry Project in the context of local hydrology. The canopy cover map (Figure A-3.) clearly shows that the project meets

the US Forest Service definition of forestland (at least 10% tree cover) as forest covers the majority of the project area. Non-forested acres were removed from the project to a minimum mapping unit of 1 acre. A topographic map, Figure A-4. is also provided as a reference. The roads map, Figure A-5. shows the public and private roads near and on the property, additional foot trails may exist that are not mapped. The ownership map, Figure A-6 shows the extent of land owned by The Nature Conservancy.

Figure A-1. Vicinity Map with Latitude and Longitude



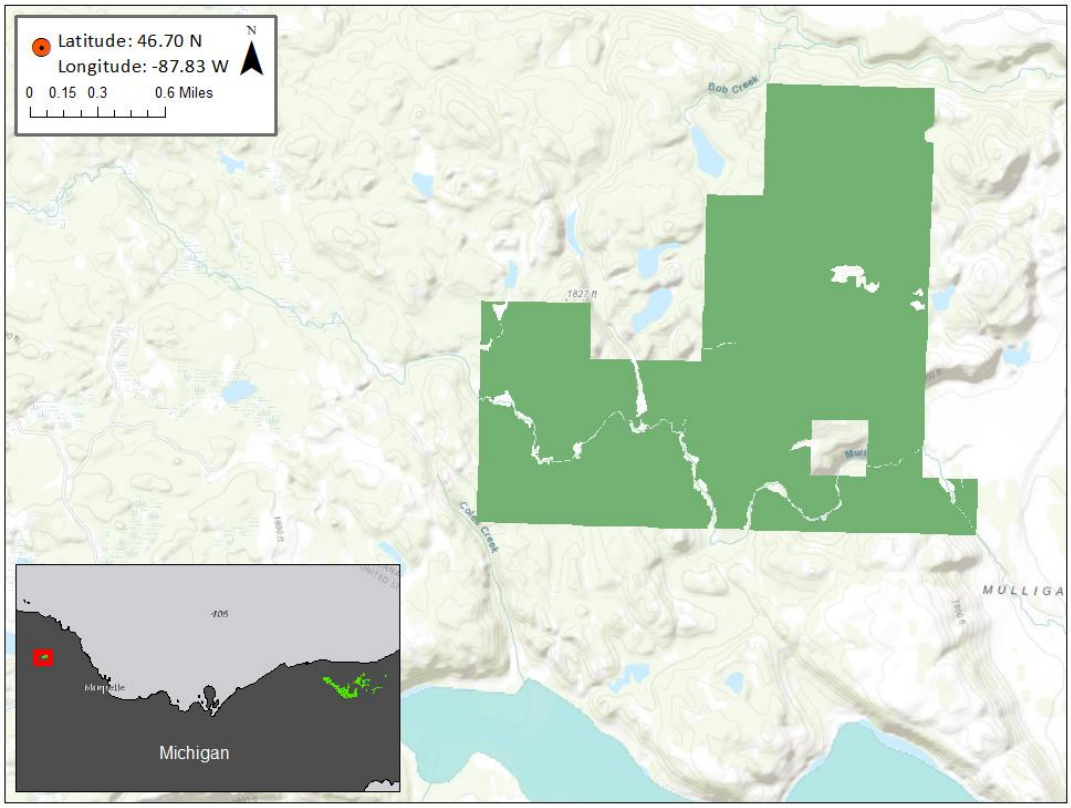
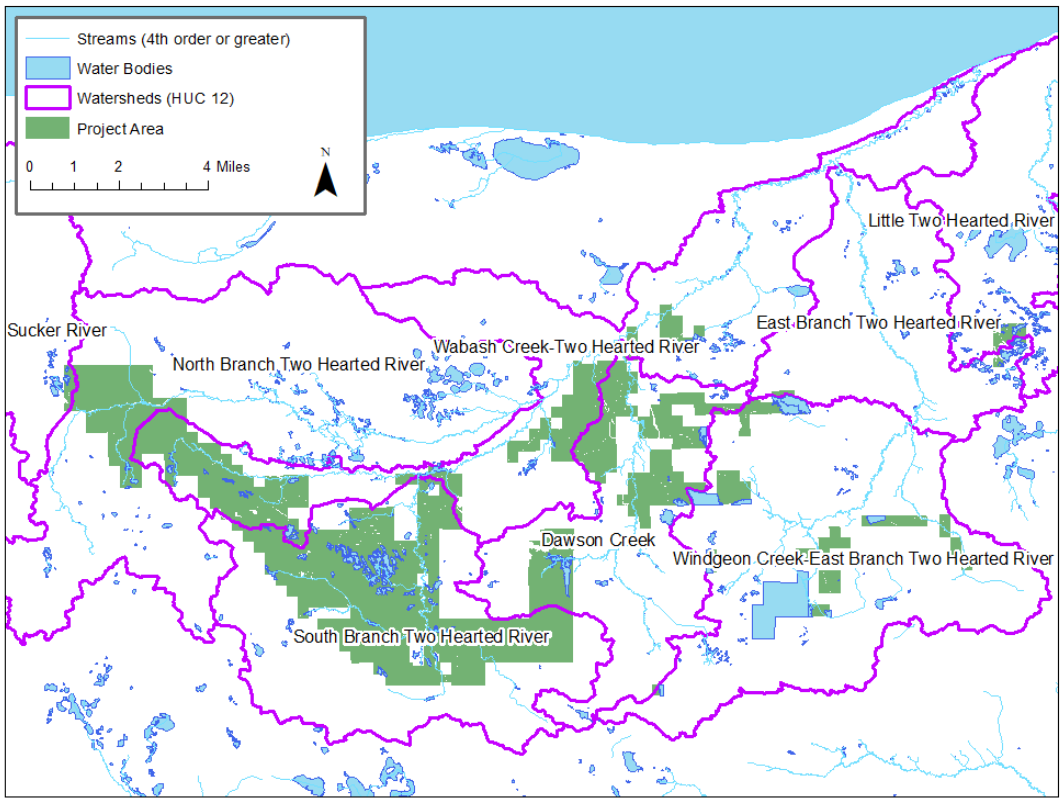


Figure A-2. Regional Hydrology Map



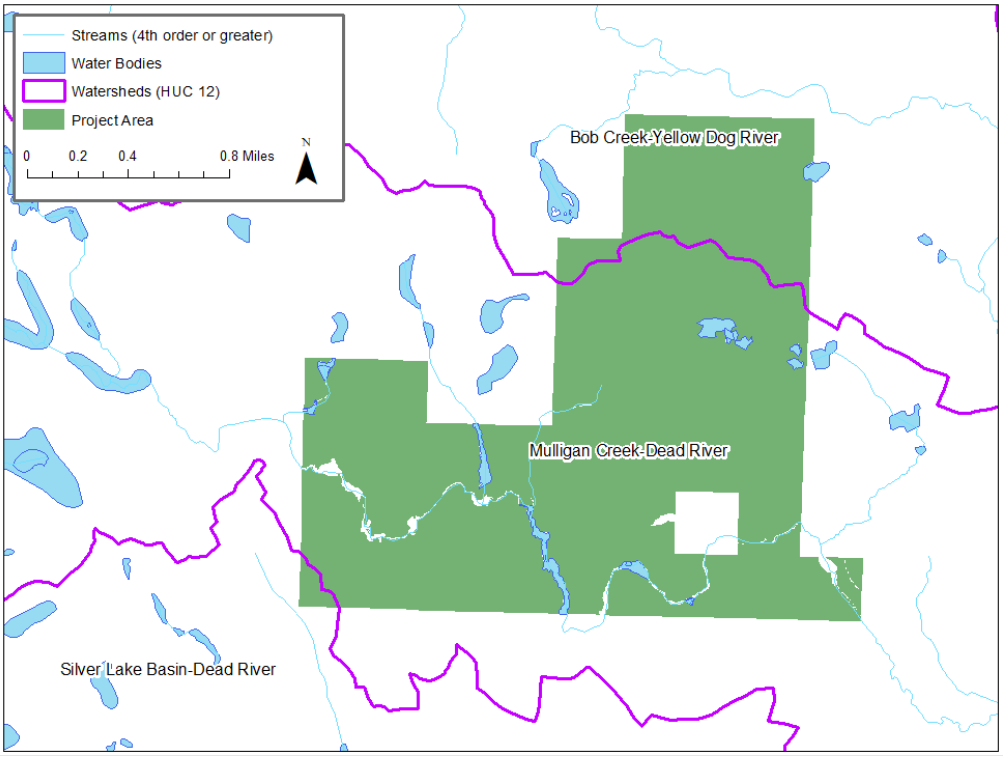
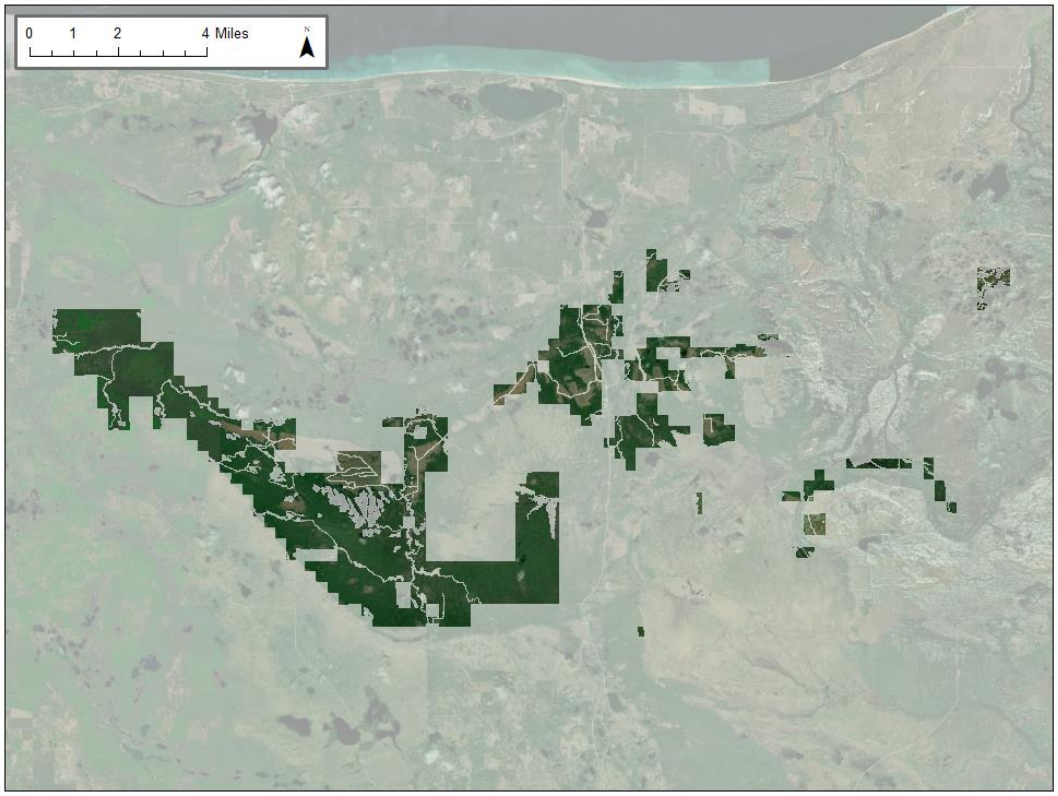


Figure A-3. Canopy Cover Map depicting greater than 10% canopy cover.



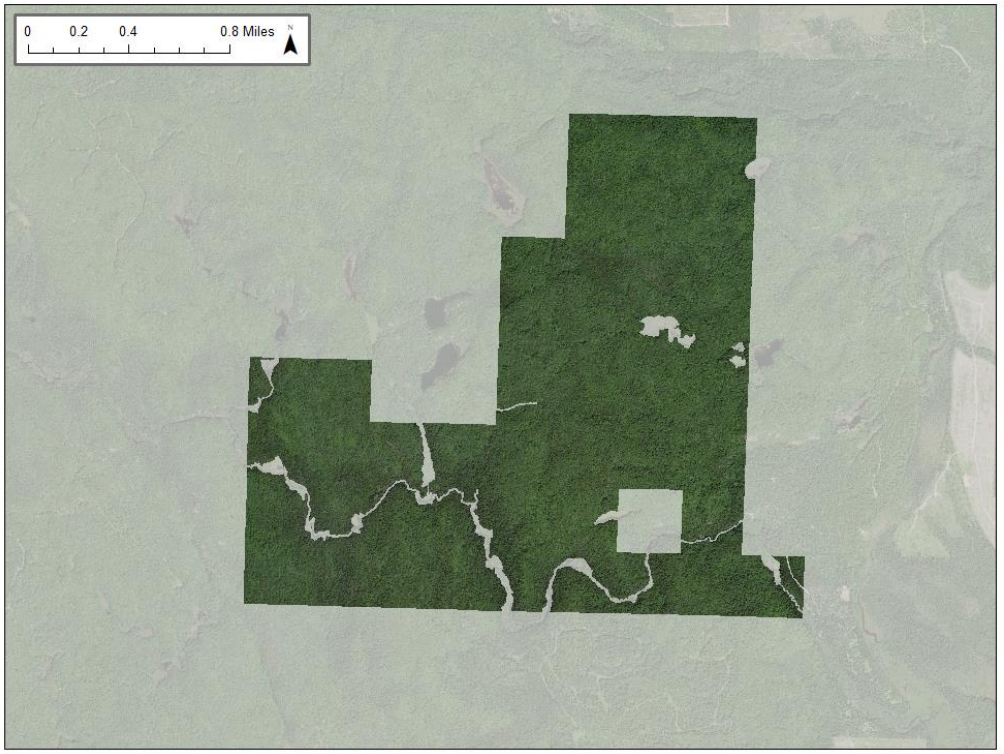
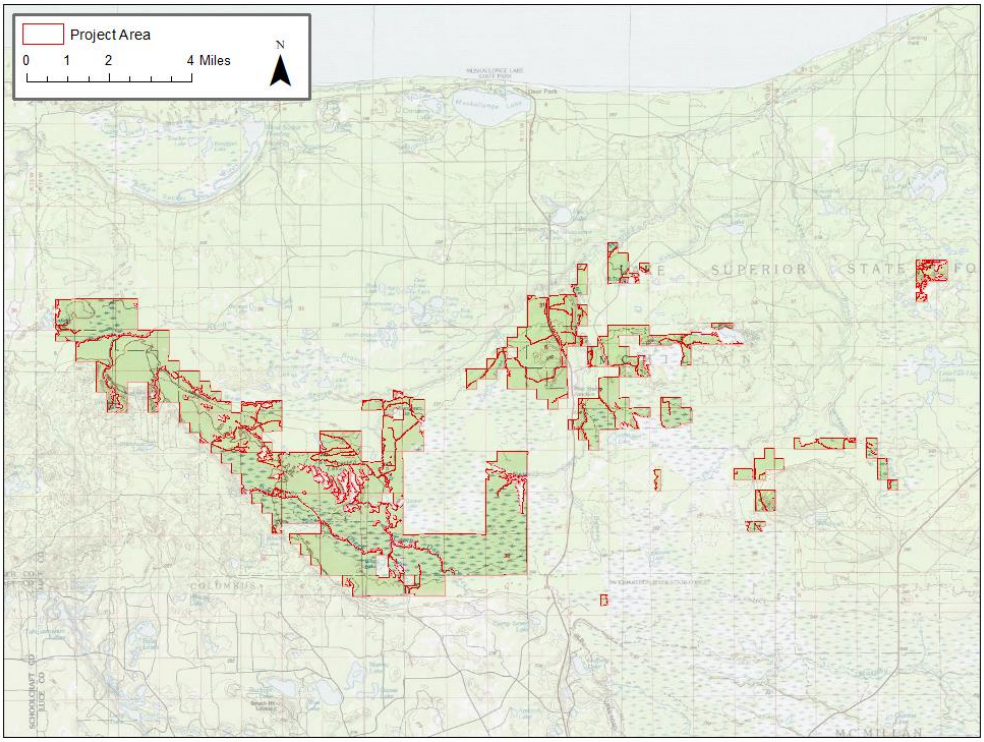


Figure A-4. Topography Map



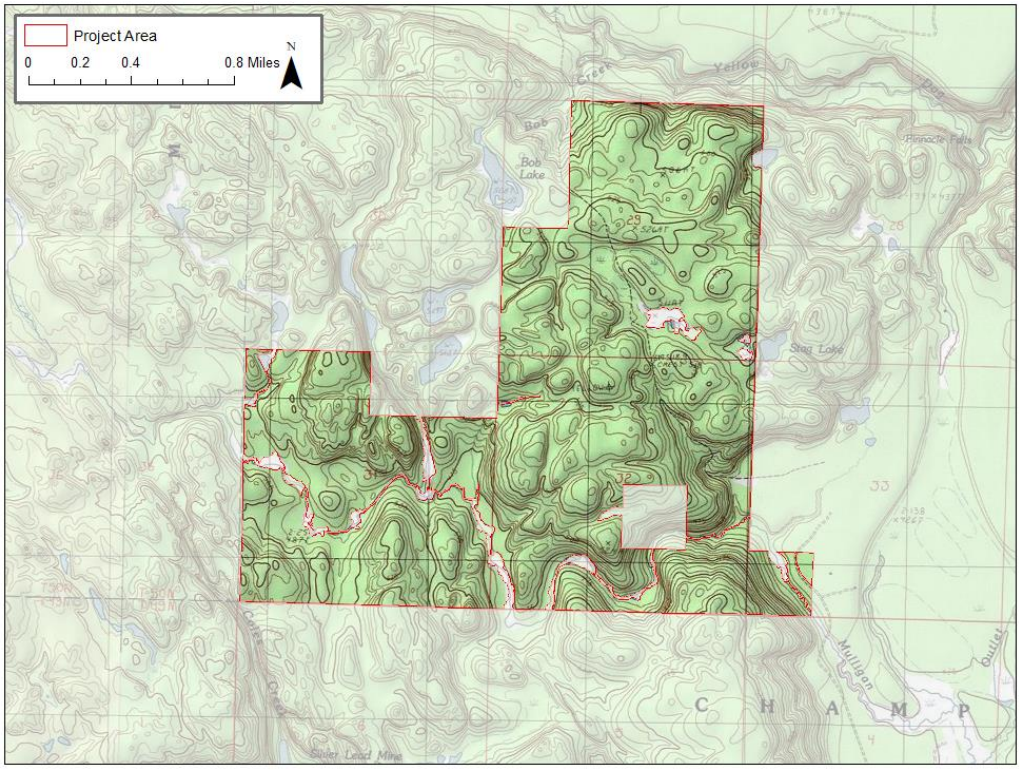
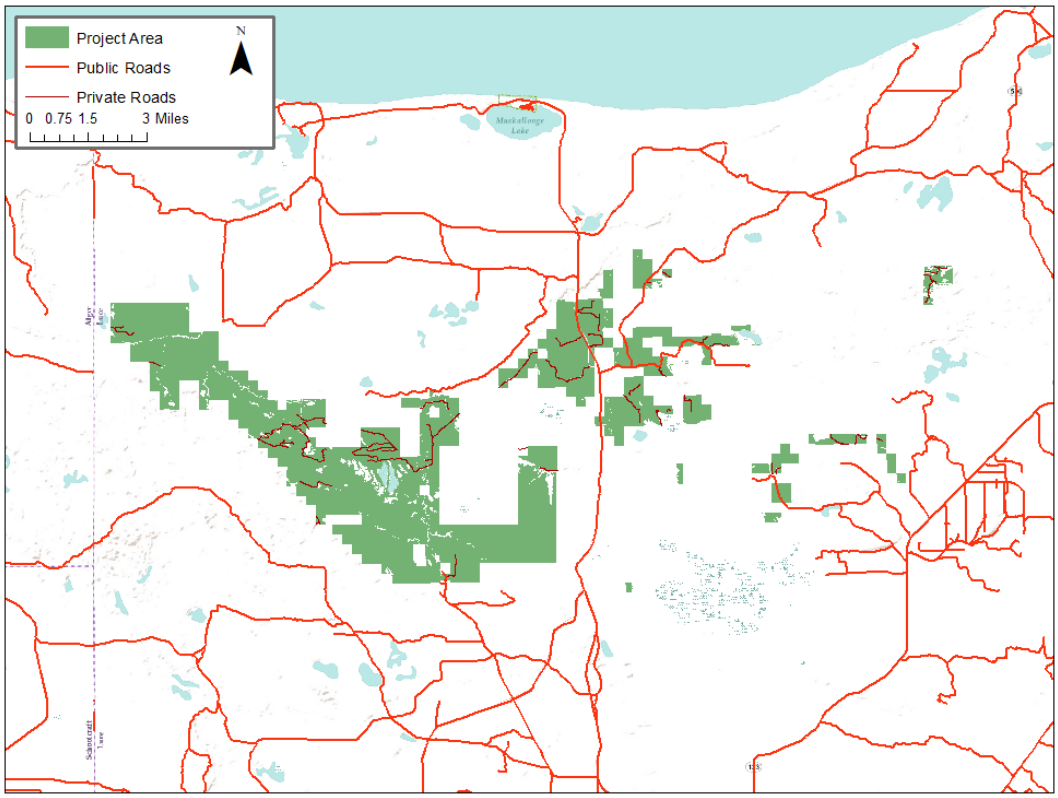


Figure A-5. Roads Map



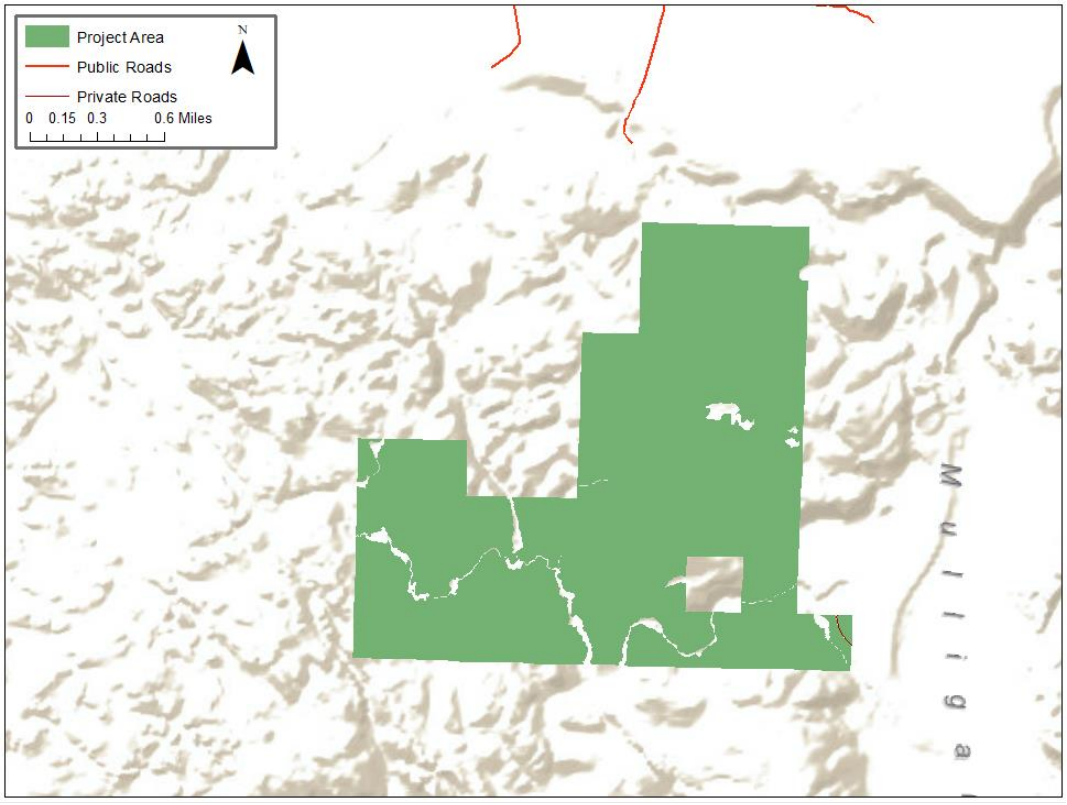
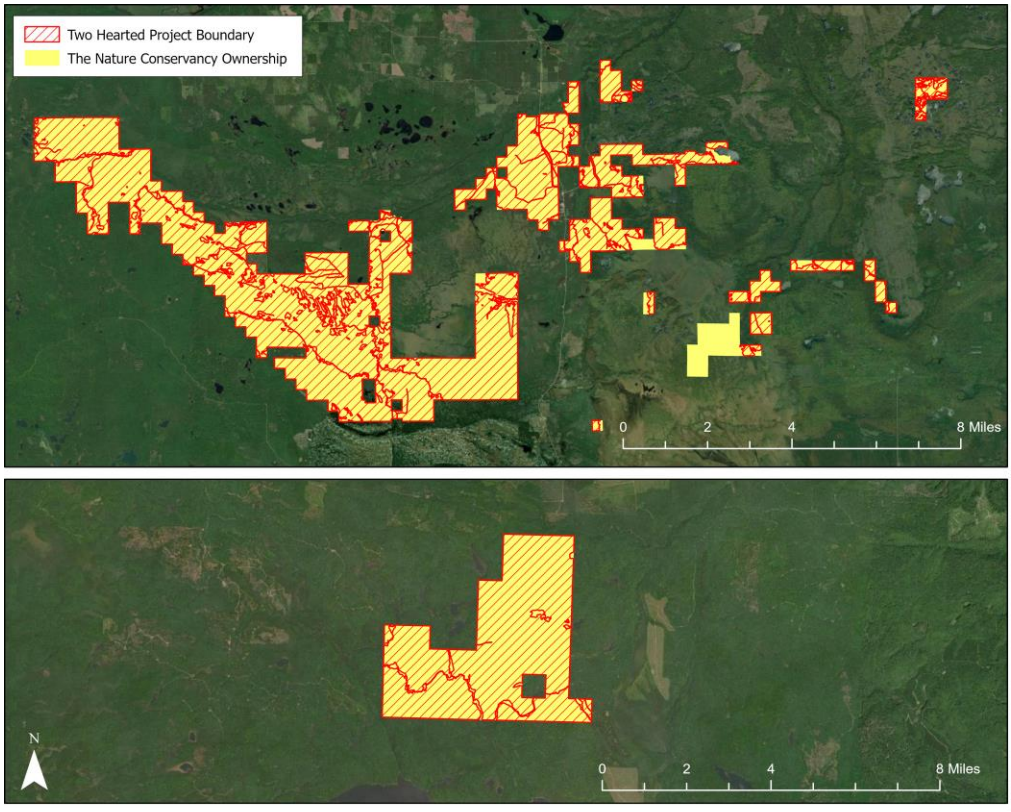


Figure A-6. Ownership Map



A5. BRIEF SUMMARY OF PROJECT

A5.1 Background Information

The Anew – Two-Hearted Forestry Project is located on approximately 23,294 acres of northern hardwood forest and conifer bog, distributed throughout Luce and Marquette Counties in the Upper Peninsula of Michigan. The land enrolled under this carbon project is owned by The Nature Conservancy (TNC). Despite being owned by TNC, the property was not subject to any easements or other restrictions on commercial harvesting activities prior to carbon project initiation and was managed according to an approved Forest Management Plan (FMP). The FMP detailed future harvesting goals for the property, which were significantly curtailed upon the establishment of the carbon project, thereby protecting carbon stocks on the property for decades to come. The property has a long history of industrial ownership; it was first heavily logged in the late 1800s and used for its mineral resources in the early 1900s. The land is projected to remain as working timberlands throughout the duration of the current forest ownership. TNC decided to pursue carbon revenues on this land in 2019 to help offset the costs of forest management and assist in accelerating the pace in which it can execute supplemental tree planting and other costly silvicultural activities, road improvements to protect infrastructure and water quality, and other management options. The carbon revenues from this project will also be used to steward and manage the historic, beautiful watershed, and provide for protection of additional, high quality climate mitigating forestland in the Northwoods.

The Anew – Two Hearted Forestry Project has the needed legal protections in place to assure its long-term protection, ongoing stewardship, and restoration. Funds from the carbon project will also provide needed resources to assure long-term protection, management to increase forest resiliency and carbon sequestration impact, as well as additional climate mitigation protection across the Northwoods. Carbon revenue helps offset the costs of forest management and assists in accelerating the pace of execution of supplemental tree planting and other costly silvicultural activities, road improvements to protect infrastructure and water quality, and other management options.

A5.2 Description of Project Activity

The project activity is improved forest management, and TNC's forest management practices focus on forest health and stewardship and will result in a significant improvement in the carbon storage on the land. Management decisions of TNC for this forest focus on sustainable, natural forest growth and maintenance harvests for essential activities, recreation, wildlife habitat, and forest health. The project ensures long-term sustainable management of the forests, which could otherwise undergo increased commercial timber harvesting under TNC's existing FMP. Conservation lands in the area often employ commercial timber operations to reach funding targets to continue the preservation of forestlands, acquisition of conservation easements, or allow for continued sustainable operations in the absence of available funding through traditional methods, such as grant writing or charitable donations. Community benefits arising from the project include access to recreational activities on the property, and the protection of the Two Hearted River, Sucker River, Little Two Hearted River-Frontal Whitefish Bay, Dead River, and Iron River watersheds. Other community benefits in addition to recreation and water quality

and flow include jobs and wide-ranging mammals. Working forest carbon projects such as Two Hearted ensure that economies with a strong forest products market will remain intact while also making certain that the project area will remain forested for the benefit of future generations.

A5.3 Project Purpose and Objectives

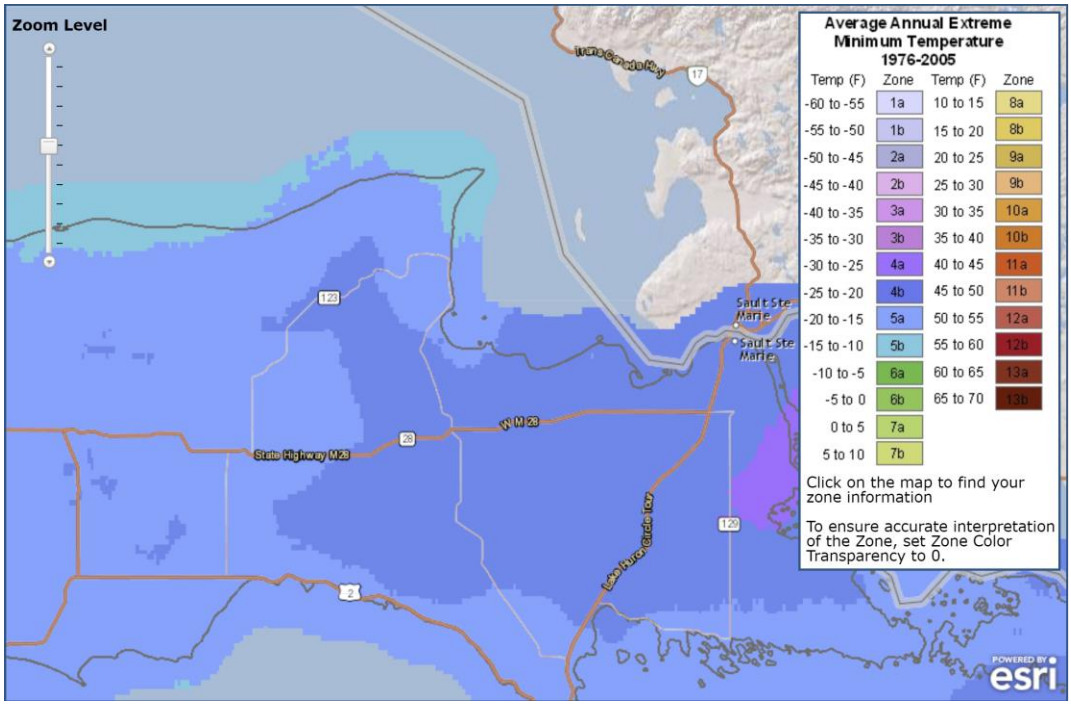
By committing to maintaining forest tCO_2e stocks above the existing onsite volumes, the project will provide significant climate benefits through carbon sequestration. The aim of this project is also to ensure long-term continuance of all environmental benefits provided by the preservation of the hardwood stands and wildlife habitat in the forestland. Forest resources are managed to achieve ecological, social, and economic objectives where possible, and have reduced the risks of climate change. Enhancing carbon sequestration and storage is a major goal of the forest management plan. It takes some pressure off the need to harvest and allows the consideration of possible future timber stand improvement projects, or enhanced roads beyond the bare minimum requirements.

A6. PROJECT ACTION

A6.1 Prior Physical Conditions

Climactic zone

The project area falls within climatic zone 5a on the USDA plant hardiness zone map. Average annual extreme minimum temperatures for this zone range from -20 to -15 degrees Fahrenheit. Michigan's growing season is approximately 140 days/year with a mean annual precipitation of 32 to 51 inches distributed evenly throughout the year. The normal daily average temperature in the summer is about 72 degrees Fahrenheit and in the winter it's about 26 degrees Fahrenheit.



Ecosystem/Vegetation

Forest types throughout the property include northern hardwoods, lowland hardwoods, conifer bog, and oak-hickory forest types. Prevalent tree species in the carbon project region include beech, hemlock, white pine, yellow birch, spruce, fir, aspen and black cherry. Understory species include balsam fir, red maple, paper birch, cherry and aspen.

Land Use

Regional land use is predominantly forestry, common harvest prescriptions include clear cut, shelterwood harvests, and single tree selection. Other than commercial forestry, low-density development is common throughout the Upper Peninsula, especially for waterfront properties and second homes.

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

Harvest levels will remain below average annual growth over the course of the project, and the project proponent currently plans to conduct minimal commercial harvesting using light-touch uneven-aged prescriptions given the anticipated revenue provided by carbon. The landowner is committed to following state Best Management Practices so as not to impact water quality in the area.

A6.3 Project Action

The project will provide significant climate benefits through continued carbon sequestration as carbon payments are intended to replace revenue lost due to commercial timber activity on the property. The project action will allow the forest to progress naturally with less intensive commercial harvesting than would otherwise be expected on similar conservation properties in the region. Anew – Two-Hearted Forestry Project will achieve GHG removals by sequestering more atmospheric tCO_2e than a baseline scenario in live aboveground biomass, belowground biomass and standing dead wood.

A7. *EX ANTE* OFFSET PROJECTION

Assuming carbon pricing remains robust to allow TNC to continue to limit harvesting and focus on forest health stewardship, total projected GHG emissions reductions are 814,299 tCO_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. Estimated of Net Emission Reduction Tons (ERTs) by Year

Project Year	Calendar Year	Estimated Removals Emissions Reductions tCO_2e	Estimated Other Emissions Reductions tCO_2e	Total estimated GHG emission reductions tCO_2e
0	2019	0	0	0
1	2021	123,122	23,609	146,724
2	2022	15,660	3,573	19,233
3	2023	15,660	0	15,660
4	2024	15,660	0	15,660
5	2025	40,394	0	40,394
6	2026	40,394	0	40,394
7	2027	40,394	0	40,394
8	2028	40,394	0	40,394
9	2029	40,394	0	40,394
10	2030	39,531	0	39,531
11	2031	39,531	0	39,531
12	2032	39,531	0	39,531
13	2033	39,531	0	39,531
14	2034	39,531	0	39,531
15	2035	36,841	0	36,841
16	2036	36,841	0	36,841
17	2037	36,841	0	36,841
18	2038	36,841	0	36,841
19	2039	36,841	0	36,841
20	2040	33,192	0	33,192
Total		787,124	27,182	814,299

A8. PARTIES

The project was implemented by The Nature Conservancy, the landowner, and Anew Carbon Development, LLC, a carbon offsets project developer. Project verification was completed by SCS Global Services and the forest carbon inventory was conducted by Compass Land Consultants. Technical modeling was conducted by Anew Carbon Development, LLC.

Table A-3. Project Partners & Responsibilities

Project Parties	Personnel/Point of Contact	Roles and Responsibilities	Contact Information
The Nature Conservancy	Rich Tuzinsky, Land Protection Director	Project Proponent – financing and implementation of long-term project management	The Nature Conservancy 101 E. Cesar E. Chavez Avenue, Lansing, Michigan, 48906, USA.
Anew Carbon Development, LLC	Megan McKinley, Director	Offset Developer – coordination of project implementation, modeling,	Anew Carbon Development LLC 582 Market St., Suite 1505 San Francisco, CA 94104
SCS Global Services	Christie Pollet-Young, Director, GHG Verification	Verifier	SCS Global Services 2000 Powell Street Emeryville, CA 94608
Compass Land Consultants	Todd Bishop, Managing Partner	Contractor – Forest Inventory	Compass Land Consultants E3310 State Road M28 Au Train, MI, 49806

B. METHODOLOGY

B1. APPROVED METHODOLOGY

The methodology used for the Anew – Two-Hearted Forestry 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), herein after called the "methodology".

B2. METHODOLOGY JUSTIFICATION

All applicability criteria of the selected methodology are fulfilled by the Anew – Two-Hearted Forestry Project:

1. The land committed to the Two-Hearted Forestry Project is a non-federally owned private forestland.

2. The Nature Conservancy controls the timber rights on the forestland and can legally harvest (Deeds and Contracts provided separately for verification purposes).

3. The landowner will harvest in the future. The property is certified under the Forest Stewardship Council.

4. N/A. The managing legal entity for Anew – Two-Hearted Forestry Project is The Nature Conservancy, a private forestland owner.

5. N/A. Anew – Two-Hearted Forestry Project is not on public, non-federal lands.

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

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

8. See Deeds provided separately for verification purposes.

9. 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 23,294 acres of forestland, shown in the maps in section A4. Please see the provided Project Area Boundary Shapefile for location details.

See 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	Major carbon pool in unmanaged stands subjected to the project activity. Project Proponent 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 Anew – Two-Hearted Forestry Project, standing dead wood will be included in all stands.*
Lying dead wood	Excluded (Optional)	The project proponent elects to include exclude the lying dead wood (LDW) pool. Though lying dead wood may have a meaningful contribution to onsite volumes, the project proponent has conservatively excluded this value as measuring this can be difficult in the field and model over time.
Harvested wood products	Included	Major carbon pool subjected to the project activity,
Litter/Forest Floor	Excluded (Not Optional)	Changes in the litter pool are considered *de minimis* as a result of project implementation.
Soil organic carbon	Excluded (Not Optional)	Changes in the soil carbon pool are considered *de minimis* as a result of project implementation.

Gas	Source	Included / Excluded	Justification / Explanation of choice
tCO_2e	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-tCO_2e 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 Leakage	Timber Harvesting	Excluded	Activity shifting leakage is a decrease in sequestration or increase in emissions outside project boundaries caused by shifting of the harvest activities from the project area to

			other areas owned by the project proponent outside the project area, and it is prohibited by the protocol. As such, the Project Proponent must demonstrate no activity-shifting leakage beyond the de minimis threshold will occur as a result of project implementation. If the Project Proponent owns land outside of the project area, they must demonstrate no activity-shifting leakage occurs by either maintaining certification on all owned lands, not harvesting on lands outside the project area, or maintaining a sustainable management plan approved by ACR.
	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 Leakage	Timber	Included	Market effect leakage is a decrease in sequestration or increase in emissions outside project boundaries caused by shifting of the harvest activities from the project area to other areas owned by the other entities outside the project area. Reductions in project outputs due to project activity may be compensated for by other entities in the marketplace. Those emissions are included in the quantification of project benefits as the project proponent takes a discount to crediting based on the relative difference between project and baseline harvest. The higher the relative decrease in harvesting in the project relative to the modeled baseline, the higher the discount factor applied. Based on the relative change in harvesting, the Two-Hearted project applies the maximum discount factor to crediting of 40%.

B5. BASELINE

The baseline scenario represents a harvest regime typical of working forest regimes on regional conservation land, targeted to maximize net present value at a 4% discount rate, typical of current practices in the project region for non-government organizations. Conservation land includes all lands that are maintained, restored, or enhanced for biological diversity.

The baseline harvesting regime was modeled to align with the treatments outlined in TNC's historic management plan for the property and allows for a sustainable yield of wood products through harvest levels approaching annual growth. If carbon revenues did not provide a viable alternative management approach and source of funding, TNC would have harvested volumes in line with those prescribed in their historic operational plan. Instead, TNC's management under this carbon project will result in a significant improvement in the carbon storage on the land.

Baseline practices are detailed in Section E. Quantification.

B6. PROJECT SCENARIO

The project scenario consists of managing the forestland using uneven-aged silvicultural techniques for generation of wood products in a way that prioritizes carbon sequestration above the former FMP, and focusing on the promotion of wildlife habitat preservation, as described in Section A6. Project Action.

B7. REDUCTIONS AND ENHANCED REMOVALS

The project will achieve greenhouse gas reductions through the natural growth of forestland in the baseline scenario. Forest management could feasibly resemble harvesting close to annual growth, and the project's common practice baseline is modeled to reflect this management option. Introduction of uneven-aged harvest regimes will enhance growth rates to promote additional sequestration and to help maintain carbon stocks above the common practice values of the region.

B8. PERMANENCE

Project Proponent 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

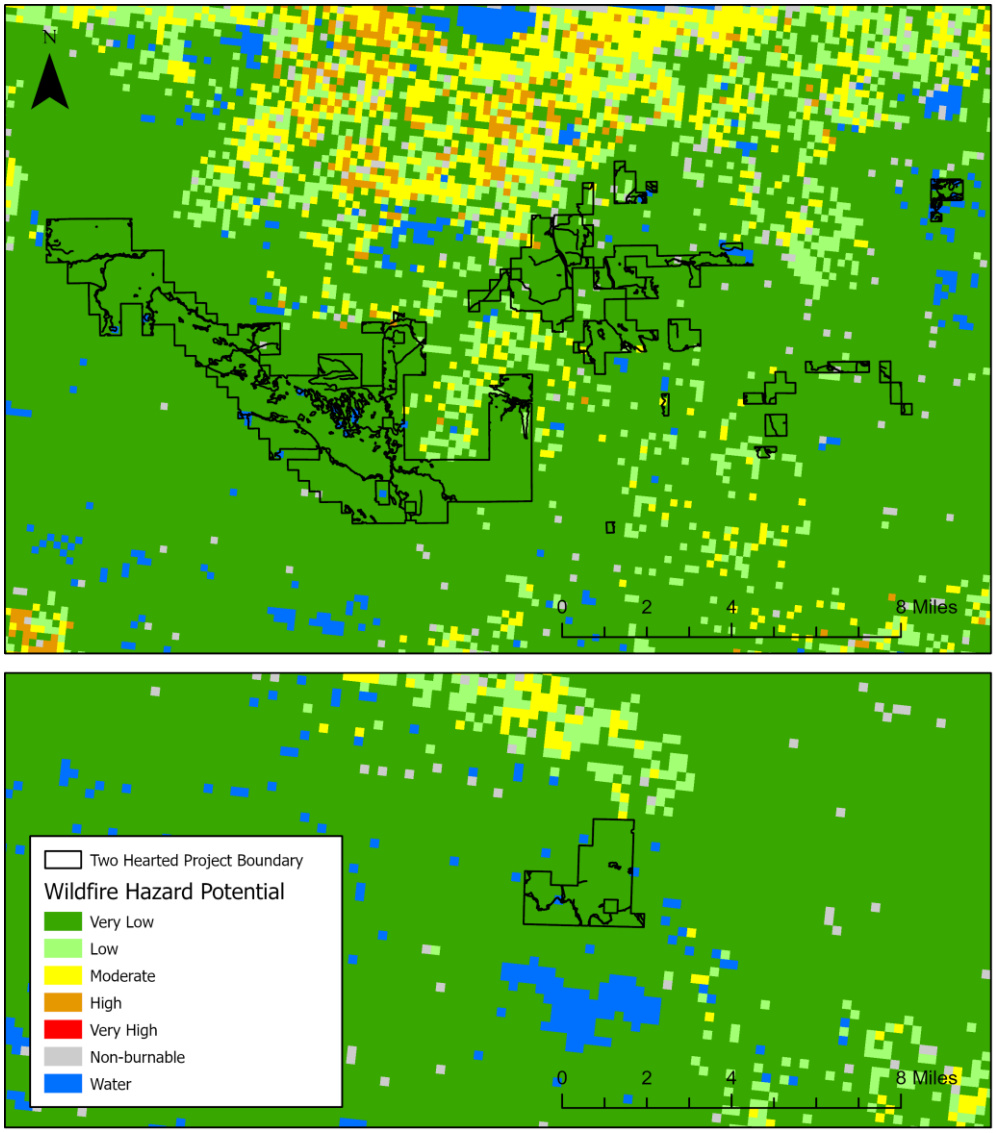
Calculated Risk Score

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%

Buffer Pool Contribution

Total Risk score % * Total ERTs generated for reporting period = Buffer pool contribution in ERTs at time of issuance.



*Project area is in a majority low fire risk region according to the 2020 Wildfire Hazard Potential (WHP) map provided by the USFS.

C.ADDITIONALITY

The Anew – Two-Hearted Forestry Project uses the three-pronged test for additionality described in sections C1-C3, below.

C1. REGULATORY SURPLUS TEST

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

National laws, regulations and policies.

Clean Water Act
Endangered Species Act
Fair Labor Standards Act (1938) (amended)
Multiple-Use Sustained-Yield Act of 1960
National Environmental Policy Act (NEPA)
National Forest Management Act (NFMA)
Resources Planning Act (RPA)
Wilderness Act
The Logger's Guide to the New OSHA Logging Safety Standards, 1995

State & Local laws.

Michigan Department of Natural Resources: Forestry Best Management Practices for Soil and Water Quality
Michigan Commercial Forest Act

Binding International Agreements.

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 July 19, 2019 effectively requires the forest carbon project activity and its associated GHG emissions reductions/removal enhancements. Consequently, the project passes the Regulatory Surplus test.

Michigan Best Management Practices (BMPs) as described in the "Michigan Forestry Best Management Practices for Soil and Water Quality" published by Michigan's Department of Natural Resources. The state BMPs, though mainly voluntary, are adhered to by most commercial timber operators and mandate that harvesting within riparian management zones (RMZs) along waterbodies reduces erosion and minimizes soil disturbances. Within RMZ areas it is recommended not to harvest below 60 sqft basal area. As such,

the project meets and exceeds the BMPS by limiting harvesting to only single-tree-selection cuts down to 75sqft of basal area and does not allow for even-aged harvesting of any kind.

All legal requirements for timber harvesting set out by local, state, or other regulatory ruling listed above are met and exceeded in both the project and baseline scenarios such that all harvest activities outlined are legally permissible.

C2. COMMON PRACTICE TEST

The Anew – Two-Hearted Forestry Project is located in the Upper Peninsula of Michigan. A wide range of wood products, including hard and softwood sawtimber, hardwood veneer, and mixedwood are distributed to mills throughout this region. The region and particularly the ownership have a history of timber harvesting and contracting to logging companies. Throughout the geographic region, forestland is managed for timber products, often through forest management aimed at maximizing the NPV of the timber products coming from the harvests. Multiple forest management professionals, the project proponent, and land manager for the property were all consulted on information relating to the regional timber industry, conservation forest management, and timber demands. These consultants were selected based on their having managed an extensive amount of forestland across multiple properties of varying ownership types in the region. According to the Timber Mart North stumpage price report, as well as Anew's interviews with professionals familiar with the regional industry, wood product demand in this region is strong and consistent across species and product types.

If the Anew – Two-Hearted Forestry Project was not implemented, the forest management could feasibly resemble harvesting close to annual growth, and the project's common practice baseline is modeled to reflect this management option. This is highly conservative as the management of the property would likely meet or exceed this harvest plan in the near term to balance age-classes and target high-value timber to supply into the market. Conservation groups looking to commercially harvest will often target stands that would benefit from harvests to open the canopy for wildlife, or harvesting stands that are past maturity, in addition to employing more traditional commercial harvesting techniques employed by private landowners in the region. This management objective can employ strip clearcuts within conifer stands, clearcutting mature aspen stands, and a variety of harvest techniques on northern hardwoods to promote stand diversity, which are modeled in the baseline scenario and detailed in Section E. Instead, the project will exceed the common practice as described in Section A6. Project Action, focusing on management for forest health.

C3. IMPLEMENTATION BARRIERS TEST

The financial barrier test was conducted to show that carbon funding reasonably expected to incentivize the project's implementation, and carbon revenues a key element to maintaining the project action's ongoing economic viability after its implementation.

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.	

Per the above figure, the Two-Hearted project passes the financial implementation barrier by answering "Yes" to the question of if "carbon funding is reasonably expected to incentivize the project's implementation". The implementation of the carbon project represents an opportunity cost to lost revenue associated with the potential timber harvesting that could legally and feasibly occur on the property in the lifetime of the carbon project.

Conservation lands in the area often employ commercial timber operations to reach funding targets to continue the preservation of forestlands, acquisition of conservation easements, or allow for continued sustainable operations in the absence of alternate funding. When unable to meet these financial targets through either grants or donations, conservation groups may face difficult decisions on whether to divest properties or find revenue solutions through traditional timber operations. With the revenue provided by carbon funding, the project proponent will be able to avoid making this choice and continue to focus on sustainable management and forest health through continued good management. Carbon funding may also provide additional opportunities for the project proponent to expand current conservation efforts in the region.

A financial feasibility assessment is provided separately for verification demonstrating the financial barrier carbon funding overcomes in project implementation.

C4. PERFORMANCE STANDARD TEST

Under the performance standard approach, projects are required to achieve a level of performance that, with respect to emission reductions or removals, or technologies or practices, is significantly better than average compared with similar recently undertaken practices or activities in a relevant geographic area. This approach is geared towards technology-based solutions, not forestry projects, and so has not been

performed for this project. Instead, the Anew – Two-Hearted Forestry Project uses the three-pronged approach described in sections C1-C3 to support additionality which is applicable to IFM projects. The three-pronged approach requires projects to demonstrate that they exceed currently effective and enforced laws and regulations; exceed common practice in the relevant industry sector and geo-graphic region; and face at least one of three implementation barriers (financial, technological, or institutional).

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:	23,294
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 Arc GIS
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 $1/10^{th}$ an 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 inches in diameter
Purpose of Data	Calculations of project emissions
Calculation method:	N/A
Notes	

Data or Parameter Monitored	H
Unit of Measurement	Feet
Description	Height of tree
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	Consistent with inventory methodology provided.
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 1ft stump to total height. The exception is for broken tops below 4" DOB when the percent biomass missing is calculated from 1ft stump to broken top. Tree defect is assessed by dividing the tree into thirds, estimating percentage of missing carbon volume in each third, and assign a deduction value. Top height and phantom height are measured and missing biomass in the broken portion is calculated post-inventory. For dead tree defect, only bole defect will be estimated from 1ft stump to 4” DOB.
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 tCO_2e
Description	Carbon remaining in stores wood products 40 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 tCO_2e
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 inventory methodology provided.
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 inventory methodology provided - The inventory will use a random sample design and re-measure the same permanent plots established in 2020 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 268 fixed radius permanent inventory plots were established across the project area. The plot network provided enough data to keep total project uncertainty below 10% of the net anthropogenic greenhouse gas removals by sinks across the project, thereby avoiding any uncertainty deductions in the quantification process. 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. [3]

In addition to the full inventory update of the entire property that will be conducted on all plots every 10 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.

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, etc.), reducing the risk of reversal by disease, pest invasion, and unauthorized timber removal.

3 The details of the carbon inventory methodology are considered commercially sensitive material as the methodology is the result of considerable investment of Anew Carbon Development LLC's resources.

Anew Carbon Development LLC (formerly 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 an inventory crew will be responsible for conducting inventory measurements and data collection. After forest inventory data collection, an inventory crew will report results to Anew for processing and updating of modeling projections. After processing is complete, Anew will house all data and submit the necessary documentation for compliance with ACR standards. Anew 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 as well as on an external hard drive and kept by Anew for a minimum of 15 years.

QA/QC Field Procedures

Field Procedures

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

At least 10% of the plots are checked by a different forester than cruised the plot, specifically by someone senior to the field crew. This involves full plot measurement to identify any problems with determining in/out trees, species calls, defect measurements, DBH measurements, and height measurements. A summary report of the cruise checks is to be provided to Anew at the end of the inventory.

The purpose of the check cruise is to identify any consistent errors by either a specific cruiser, or the whole crew, and to verify that all plots are being measured with a high level of diligence. There are two ways to fail a plot during a check cruise.

- If any in/out trees are missed, or erroneously added, the plot fails.
- If there is a trend in any specific data collection-type being erroneously measured, the plot fails.

A trend is defined as ≥25% of all tally trees in the large plot, or ≥25% of all tally trees in the microplot, having consistent errors on the same measurement type. For example, if 10 trees are recorded in the large plot and 3 of those trees have DBH measured in the incorrect location, that plot fails. If Tree Class Code is erroneously recorded on 3 of those trees, that plot fails, or if percent defect is erroneously recorded on 3 trees in that plot, the plot fails. If one tree has an error on DBH, one tree has an error on Tree Class Code,

and one tree has an error on percent defect, the plot still passes. The total number of trees in the plot for the percent error calculation is separated for the total number of trees in the large plot and the total number of trees in the microplot.

If the same cruiser fails more than one plot during the check cruise, all plots completed by that cruiser since the last acceptable check must be revisited and measured again. Any errors noted during the check cruise are used to update the master spread sheet file. Any consistent height, species, DBH, or defect errors are resolved by talking with the foresters, remeasuring plots, and removing crew members as needed.

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 (Anew) 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 from Jan 01, 2020 - Mar 12, 2021. The inventory employed a sample of 268 nested, fixed-radius circular plots installed in a grid distribution across the project area. The nested plots consist of a 1/15th acre plot recording trees >= 5" and a 1/100th acre plot recording trees >=1" and <5" DBH. The entire project area (23,294.43 acres) was assigned to 6 strata, as shown in Table E1-1. See the Baseline Stratification section below for details.

Table E1-1. Area by Strata

Strata	Project Area (acres)	Constrained Area (acres)	Number of Plots
CBOG	7,651.16	667.68	91
FIR	896.57	171.06	13
LOW	1,792.17	107.31	21
NHW	12,128.19	363.52	136
OAK	151.42	16.86	2
PINE	674.91	98.60	5
Total	**23,294.43**	**1,425.03**	**268**

*Sums may not total due to rounding

Growth model overview

Field measurement protocols are documented in the carbon methodology, provided separately.

The ACR protocol requires Improved Forest Management (IFM) projects to establish a baseline harvest scenario against which to measure carbon accumulation attributable to the project. The ACR protocol defines this baseline as the mix of silvicultural practices that maximizes the net present value (NPV) of timber revenues over the 100-yr project lifespan. We used the Forest Vegetation Simulator (FVS), an empirical forest growth and yield model developed by the US Forest Service (USFS), to project carbon stocks and timber revenues under the range of harvest scenarios considered in the baseline. We selected the FVS-LS variant of the FVS growth and yield model, which encompasses Michigan, with model equations for each plot regionally calibrated to the US National Forest located nearest to the Two Hearted project, as shown in Table E1-2.

Table E1-2. Plot Location for FVS Calibration

Nearest National Forest Region	FVS Location Code	Number of Plots
Hiawatha National Forest	907	0
Ottawa National Forest	907	21
Hiawatha National Forest	910	247
Ottawa National Forest	910	0

We used the regionally calibrated FVS to 'degrow' the inventory from the plot-specific inventory date to the project start date (Jul 19, 2019), because the plots were inventoried after the project start date. We first initialized FVS with the original inventory measured on the plot's inventory date and projected the model forward with no harvest in order to estimate tree-level annual growth rates. We ran a single 10-year FVS projection cycle, the default cycle length for the LS FVS variant. We then computed height and diameter growth for each tree over this 10-year interval and divided by 10 to estimate annual growth. Using a monthly growth schedule derived in consultation with a local forester, we determined the fraction of annual growth that had occurred between the project start date and the inventory date and multiplied annual growth for each tree by this fraction. Finally, we subtracted this estimated height and diameter growth for each tree from the observations recorded in the original inventory. We used this growth-adjusted inventory to determine tCO_2e stocks on the project start date (July 19, 2019). We similarly estimated tCO_2e stocks on the project reporting period end date (September 30, 2021) by 'growing' the inventory from the plot-specific inventory date to the Reporting Period Date. We added estimated height and diameter growth according to the months that had elapsed between the inventory and the project reporting period end date.

Total aboveground biomass carbon was estimated from inventory data applying species group-specific allometric equations sourced from Jenkins et al 2003[4]. 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 tCO_2e.

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 Decay Class (Table E1-3).

[4] 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

Table E1-3. ACR decay classes (applied to dead trees)

Decay Class	Decay Factor	Description
1	0.97	Tree with branches and twigs that resembles a live tree (except for leaves)
2	0.95	Tree with no twigs but with persistent small and large branches
3	0.90	Tree with large branches only
4	0.80	Bole only, no branches, heartwood with advanced decay at base
5	0.80	Bole only, no branches, sloughing heartwood

Growth and Yield Simulation

The FVS model requires an individual species code and site index for each forest plot simulated. The site index is a location-specific measure of forest productivity. The SI estimates for this project were calculated using soil site index. Soil data estimates are available from the Web Soil Survey (WSS) maintained by the USDA's Natural Resources Conservation Service (NRCS). Soil classes in the WSS database can encompass multiple sub-classes, each with an associated site index. The site index for each soil sub-class is reported for at least one tree species. We used the R package soilDB developed by the NRCS to spatially co-locate inventory plots within the WSS soil classes and extract the associated soil sub-classes along with their species-specific site indices. The result is a soil class assigned to each plot. Within each plot-specific soil class, we averaged site indices by tree species across soil sub-classes. We then merged the list of tree species associated with each plot-specific soil class with the list of species found in each plot. We assigned each plot the site index of the tree species with the highest basal area in the plot found in both lists.

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-LS with the approach outlined below.

- Inventory Start Date -End Date data were entered into FVS-LS and grown for 10 years with no management (with "NoTriple" keyworded to track individual trees and permit cross-referencing to raw inventory dataset).
- 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).
- 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.
- 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.
- The baseline scenarios were subsequently modeled entering the degrown inventory data into FVS-LS.

Table E1-4. De-grown results for live aboveground and belowground tree tCO_2e

Strata	Avg Live tCO_2e	Std Dev	Number of Plots	Acres	Acres %	Std Error	Total Live tCO_2e	Uncertainty %
CBOG	147.73	96.24	91	7,651.16	32.85%	10.09	1,130,281	11.23
FIR	161.81	58.59	13	896.57	3.85%	16.25	145,075	16.52
LOW	133.05	51.91	21	1,792.17	7.69%	11.33	238,455	14.01
NHW	159.67	80.00	136	12,128.19	52.06%	6.86	1,936,458	7.07
OAK	98.90	99.91	2	151.42	0.65%	70.65	14,975	117.52
PINE	161.03	90.78	5	674.91	2.90%	40.60	108,677	41.47
Total	**153.42**		**268**	**23,294.43**	**100%**		**3,573,921**	**5.52%**

Table E1-5. De-grown results for dead aboveground and belowground tree tCO_2e

Strata	Avg Dead tCO_2e	Std Dev	Number of Plots	Acres	Acres %	Std Error	Total Dead tCO_2e	Uncertainty %
CBOG	7.53	11.27	91	7,651.16	32.85%	1.18	57,615	25.82
FIR	2.24	3.00	13	896.57	3.85%	0.83	2,011	61.08
LOW	3.87	5.55	21	1,792.17	7.69%	1.21	6,932	51.48
NHW	5.38	11.24	136	12,128.19	52.06%	0.96	65,228	29.49
OAK	1.95	2.76	2	151.42	0.65%	1.95	295	164.50
PINE	5.61	11.20	5	674.91	2.90%	5.01	3,788	146.80
Total	**5.83**		**268**	**23,294.43**	**100%**		**135,869**	**18.57%**

Table E1-6. De-grown results for total tree tCO_2e

Strata	Avg Total tCO_2e	Std Dev	Number of Plots	Acres	Acres %	Std Error	Total tCO_2e	Uncertainty %
CBOG	155.26	95.58	91.0	7,651.16	32.85%	10.02	1,187,896	11%
FIR	164.05	57.96	13.0	896.57	3.85%	16.08	147,086	16%
LOW	136.92	51.71	21.0	1,792.17	7.69%	11.28	245,387	14%
NHW	165.04	81.51	136.0	12,128.19	52.06%	6.99	2,001,685	7%
OAK	100.85	102.67	2.0	151.42	0.65%	72.60	15270.18077	118%
PINE	166.64	90.13	5.0	674.91	2.90%	40.31	112,465	40%
Total	**159.26**	-	**268**	**23,294.43**	**100%**	-	**3,709,790**	**5.35%**

Baseline Stratification

There are six strata in the project: CBOG, FIR, LOW, NHW, OAK, and PINE.

Baseline Harvest Schedule Scenario Overview

The Baseline Scenario represents a harvest regime designed to maximize the annual cashflows from a 100-year Net Present Value (NPV) at a 4% 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 area selection for each prescription by plot was determined using a linear programming model (*lpSolve* package), which found the combination of prescriptions that maximizes the NPV over 100 years. There are 5 silvicultural prescriptions in the linear programming model, shown in Table E1-7.

Table E1-7. Silvicultural prescriptions used for the baseline harvest schedule

Prescription	Description
GROW	Grow stand through end of baseline projection, with no silvicultural treatment. Allow existing stocks to grow 100 years. Applies to constrained areas. Applies to all strata.
CC	Cut through all species and classes. Constrained to occur every 40 years. Basal area trigger=80 square feet/acre. Total merchantable timber=600 cubic feet/acre. Second Entry: occurs 10 years after the first cut. Residual=450 trees per acre. Third entry: occurs 25 years after the first cut. Residual=450 trees per acre. Harvest trees greater than 0 inches and less than 0 inches. Subsequent Rotations: Basal area trigger=80 square feet/acre. Total merchantable timber=600 cubic feet/acre. Natural sprouting and regeneration. Applies to strata CBOG, FIR and PINE only.
SHW	Residual basal area =50 feet/acre. Constrained to occur every 40 years. Harvest trees greater than 6 inches. Basal area trigger=80 square feet/acre. Total merchantable timber=600 cubic feet/acre. Overstory Removal occurs 5 years after shelterwood cut. Harvest trees greater than 6 inches. Basal area trigger=80 square feet/acre. Total merchantable timber=600 cubic feet/acre. Subsequent Rotations: Basal area trigger=80 square feet/acre. Total merchantable timber=600 cubic feet/acre. Natural sprouting and regeneration. Applies to strata NHW, FIR, PINE, LOW and OAK only.
STS50	Residual basal area =50 feet/acre. Constrained to occur every 10 years. Harvest trees greater than 6 inches and less than 40 inches. Basal area trigger=100 square feet/acre. Total merchantable timber=600 cubic feet/acre. Q-factor=1.4. Subsequent Rotations: Basal area trigger=100 square feet/acre. Total merchantable timber=600 cubic feet/acre. Natural sprouting and regeneration. Applies to strata NHW, FIR, PINE, LOW and OAK only.
STS75	Residual basal area =75 feet/acre. Constrained to occur every 10 years. Harvest trees greater than 6 inches and less than 40 inches. Basal area trigger=100 square feet/acre. Total merchantable timber=600 cubic feet/acre. Q-factor=1.4. Subsequent Rotations: Basal area trigger=100 square feet/acre. Total merchantable timber=600 cubic feet/acre. Natural sprouting and regeneration. Applies to constrained areas. Applies to strata NHW, FIR, PINE, LOW and OAK only.

Volume yields were output for 100-year projection from FVS-LS, with annual yields interpolated between 10-year cycle outputs.

We then projected the revenues from sawlogs and pulp using the average stumpage price for each species, as provided separately. Stumpage prices were sourced from 1. Diameter thresholds for sawlogs and pulpwood use the default merchantable diameters in FVS-LS variant.

Cost Assumptions

To estimate net revenue from timber harvest, stumpage price by species was used by taking an average from Timber Mart North. It is assumed that all variable management costs are included in the stumpage price estimate. Fixed cost estimates for the property were provided by the landowner.

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.

Baseline Constraints

Management regimes in the baseline scenario were developed under legal constraints, including those cited in the documentation listed in Section C.1, as well as BMPs for protecting water quality during forest harvests in the "Michigan Forestry Best Management Practices for Soil And Water Quality" described in Section C2. For conservatism, harvest was limited to single tree selection in the RMZs.

Table E1-8. Baseline Constraints Table

Constraint	Reference	Geographic Location	Associated Agency	Project Activity to Maintain Compliance	Acres Impacted
RMZ acres	Michigan Forestry Best Management Practices for Soil And Water Quality	Variable buffers (100-175 ft), slope dependent	Michigan Department of Natural Resources	Where harvesting is planned within a RMZ, cutting specifications should be modified to retain a sufficient number of trees to maintain shading of streams and to leave a relatively stable and undisturbed forest floor (less than 10% bare soil exposure).	1,425

ERT Calculation Overview

The ERTs were computed based on the equations and coefficients provided in ACR's 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 baseline and project scenarios were projected in FVS-LS for 100 years. Projections were annualized using linear interpolation. Direct biomass carbon estimates for live trees were output via FVS FFE carbon reports[5], using Jenkins et al. 2003 biomass predictions in metric tons of carbon per acre, matching the calculations applied to the forest inventory measurements.

[5] Rebain et al. (2012). *FVS Fire and Fuels Extension*.

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 (tCO_2e) applying a conversion factor of 3.664.

Harvested wood products were incorporated into ERT calculations following the below steps:

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-LS variant[6].

Volumes were converted to biomass by applying species-level 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 tCO_2e by multiplying by 3.664. Harvest tCO_2e/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[7], for the region specified in Table E1-8. The mill efficiencies 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 class distribution for the project's Supersection, as defined by the California ARB 2015 Forest Protocol, shown below in Table E1-9.

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 E1-9).

[6] Dixon, Gary E.; Keyser, Chad E., comps. 2008 (revised November 2, 2020). Southern (SN) Variant Overview – Forest Vegetation Simulator. Internal Rep. Fort Collins, CO: U. S. Department of Agriculture, Forest Service, Forest Management Service Center. 82p.

[7] Sourced at: https://www.arb.ca.gov/cc/capandtrade/protocols/usforest/usforestprojects_2015.htm

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[8], shown in Table E1-10.

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 tCO_2e 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 BS_{BSL} equals zero and the outcome of equation 4 of the methodology, parameter GHG_{BSL}, equals zero.

Table E1-8. Regional Mill Efficiency for Wood Products

Mill Region	Hardwood Sawlog Efficiency	Hardwood Pulp Efficiency	Softwood Sawlog Efficiency	Softwood Pulp Efficiency
Northern Lake States (NLS)	0.585	0.685	0.63	0.514

Table E1-9. Wood Product Class Distribution

Supersection	Softwood lumber	Hardwood lumber	Plywood	Oriented strand board	Non-structural panels	Miscellaneous	Paper	Alaskan Exports
Laurentian Mixed Forest NLP/EUP	22.84	34.58	0.13	36.72	3.34	2.4	0	0
Laurentian Mixed Forest Southern Superior	15.73	46.09	0.51	25.64	8.54	3.5	0	0

[8] 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.

Table E1-10. 100-Year Storage Factors

Category	In-Use	Landfills
Softwood Lumber	0.234	0.405
Hardwood Lumber	0.064	0.49
Plywood	0.245	0.4
Oriented Strand Board	0.349	0.347
Non-structural panels	0.138	0.454
Misc	0.003	0.518
Paper	0	0.151

Baseline Harvest Mix

Table E1-11 includes the baseline mix of harvest practices that maximizes the net present value (NPV) of annual cash flows over a 100-year projection.

Table E1-11. Baseline and Project Prescription Acreages.

RX	Strata	Baseline Optimized Area	Project Optimized Area
CC	CBOG	2,230.22	0.00
GROW	CBOG	5,420.94	7,651.16
SHW	CBOG	0.00	0.00
STS50	CBOG	0.00	0.00
STS75	CBOG	0.00	0.00
CC	FIR	390.66	0.00
GROW	FIR	92.11	896.57
SHW	FIR	55.81	0.00
STS50	FIR	357.99	0.00
STS75	FIR	0.00	0.00
CC	LOW	0.00	0.00
GROW	LOW	597.39	1,792.17
SHW	LOW	1,043.01	0.00
STS50	LOW	151.77	0.00
STS75	LOW	0.00	0.00
CC	NHW	0.00	0.00
GROW	NHW	3,567.12	11,077.33
SHW	NHW	8,217.97	86.50
STS50	NHW	340.44	73.91
STS75	NHW	2.67	890.44
CC	OAK	0.00	0.00
GROW	OAK	151.42	151.42
SHW	OAK	0.00	0.00
STS50	OAK	0.00	0.00
STS75	OAK	0.00	0.00
CC	PINE	230.52	0.00
GROW	PINE	39.44	674.91
SHW	PINE	345.78	0.00
STS50	PINE	59.16	0.00
STS75	PINE	0.00	0.00

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 2019 - 2039 are as shown in Table E1-12.

Table E1-12. Baseline tCO_2e Stocks

Year	Total Live tCO_2e (t/ac)	Standing Dead tCO_2e (t/ac)	Harvested Wood Products tCO_2e (t/ac)
2019	153.42	5.83	0.42
2021	153.02	4.13	0.42
2022	152.85	3.41	0.42
2023	152.69	2.68	0.42
2024	152.52	1.96	0.42
2025	152.62	1.86	0.42
2026	152.71	1.76	0.42
2027	152.81	1.66	0.42
2028	152.91	1.57	0.42
2029	153.01	1.47	0.42
2030	153.98	1.45	0.42
2031	154.95	1.44	0.42
2032	155.92	1.42	0.42
2033	156.89	1.41	0.42
2034	157.86	1.40	0.42
2035	157.85	1.41	0.42
2036	157.84	1.42	0.42
2037	157.83	1.43	0.42
2038	157.82	1.44	0.42
2039	157.81	1.45	0.42
2040	157.78	1.47	0.42

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).

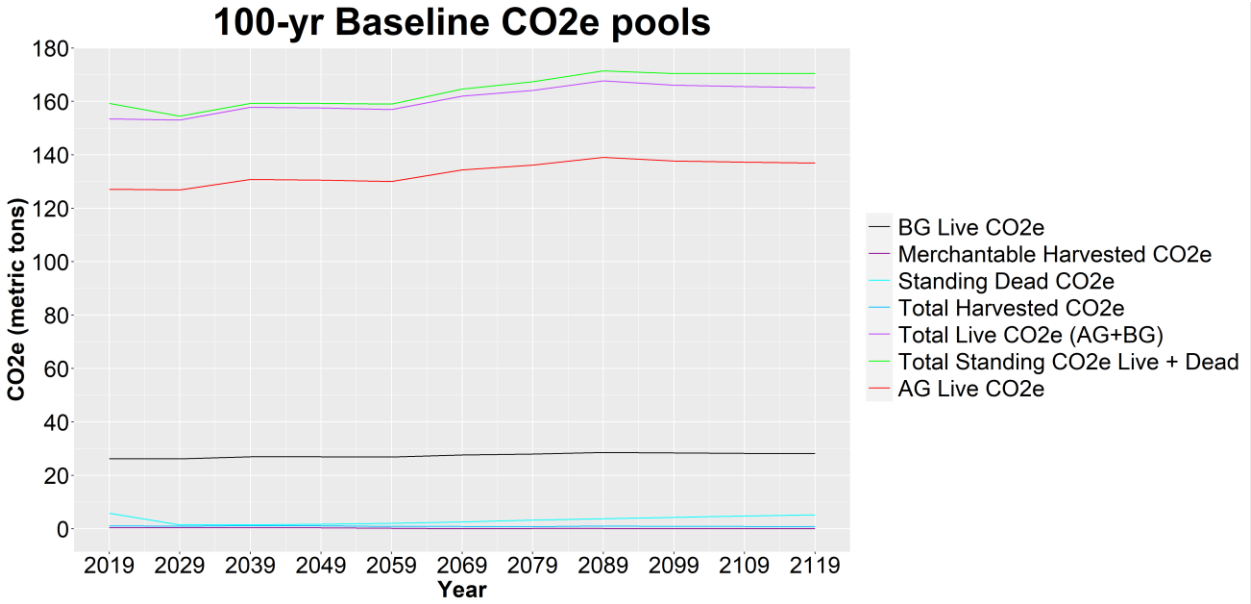


Figure E1-1 Total standing (Live+Dead) tCO_2e under baseline and project scenarios

E2. 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 Section A6.2.

E3. LEAKAGE

Quantification of leakage is limited to market leakage, as no activity-shifting leakage is allowed by the methodology beyond *de minimis* levels. This is demonstrated by the project proponent having entity-wide forest certification that requires sustainable practices on all of their landholdings.

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. The decrease in wood production relative to the baseline was then calculated and the applicable market leakage discount factor was determined.

Table E3-1. Baseline leakage factors

Period	Total HWP stored for 20 yr crediting period Baseline Scenario (tCO_2e)	Total HWP stored for 20 yr crediting period Project Scenario (tCO_2e)	Decrease in Wood Products as Percentage of Baseline Stocks (%)	Applicable Leakage Factor (%)
2019 - 2039	205,539	11,070	94.61%	40.00%

E4. UNCERTAINITY

We computed uncertainty in project and baseline tCO_2e according to equations 10 and 18 of the ACR protocol. Error terms for live and dead tCO_2e are calculated using the inventory data. 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 tCO_2e uncertainty in both the project and baseline scenarios. The ACR protocol also specifies that the error term for live tCO_2e (e_{TREE}) be used as the uncertainty estimate for tCO_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 tCO_2e stocks (ACR equation 10) is described in Table E4-1.

Table E4-1. Uncertainty in total, live and dead tCO_2e

tCO_2e	Uncertainty (%)
Live	5.52
Dead	18.57
Total	5.35

E5. REDUCTIONS AND REMOVAL ENHANCEMENTS

Table A7-1 shows estimated net reductions and removal enhancements attributable to the Two Hearted project over the first 20-year crediting period (2019 - 2,039). As the annual project-level uncertainty was below the 10% threshold required by the ACR protocol, no uncertainty deduction was applied to the annual Emission Reduction Tons (ERTs) generated by the project. ERTs presented in Table A7-1 incorporate the assumed 40% market leakage. ERTs are dated beginning on July 19, 2019, the project Start Date. Annual values in Table A7-1 correspond to the 1-year interval ending on September 30 of each year.

E6. EX-ANTE ESTIMATION METHODS

Table E6-1 shows projected tCO_2e stocks under the project scenario described in Sections A6.2 and E2.

Table E6-1. Project tCO_2e Stocks

Year	Total Live tCO_2e (t/ac)	Standing Dead tCO_2e (t/ac)	Harvested Wood Products tCO_2e (t/ac)
2019	153.42	5.83	0.02
2021	162.18	5.83	0.02
2022	163.28	5.83	0.02
2023	164.38	5.83	0.02
2024	165.48	5.83	0.02
2025	168.34	5.83	0.02
2026	171.21	5.83	0.02
2027	174.08	5.83	0.02
2028	176.95	5.83	0.02
2029	179.81	5.83	0.02
2030	182.62	5.83	0.02
2031	185.43	5.83	0.02
2032	188.23	5.83	0.02
2033	191.04	5.83	0.02
2034	193.85	5.83	0.02
2035	196.46	5.83	0.02
2036	199.07	5.83	0.02
2037	201.69	5.83	0.02
2038	204.30	5.83	0.02
2039	206.91	5.83	0.02
2040	209.27	5.83	0.02

F. COMMUNITY & ENVIRONMENTAL IMPACTS

F1. NET POSITIVE IMPACTS

Community and Environmental Assessment

1. See section A5. Brief Summary of Project and A4. Location.

2. See section C1. Regulatory Surplus Test

3. The Anew – Two-Hearted Forestry Project comprises forestland owned by The Nature Conservancy, a private forestland owner. No formal stakeholder consultation was conducted in advance of the project, nor was any required because the property is privately held. If Project Proponent is contacted by any persons regarding the project, the Project Proponent will provide references to the publicly available documentation for the project.

4.

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	Access to recreation opportunities
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

The Anew – Two-Hearted Forestry Project has no anticipated negative community or environmental impacts. Annual attestations confirming this assessment will be provided separately for verification purposes.

The below identify Sustainable Development Goals to which the project aligns and the positively contributes:

Sustainable Development Goal	Target	Project Action
6. Clean Water and Sanitation	6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes.	The watershed protection goals of the project proponent can be found detailed in the "Water Quality" section of the Two-Hearted River Forest Reserve CFA Forest Management Plan and in the "Protecting Soil & Water Resources" and "Water Quality and Aquatic Habitat" sections of the Mulligan Highlands Forest Reserve Forest Management Plan.
13. Climate Action	13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries. 13.2 Integrate climate change measures into national policies, strategies, and planning.	The goal of the project proponent in committing to sustainable forest management practices will be to continually sequester and prevent intensive forest management as described in both Section B6 and in Section E of this GHG Plan, respectively.
15. Life on Land	15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains, and drylands, in line with obligations under international agreements. 15.2. By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally. 15.a. Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems.	The conservation goals of the project proponent can be found detailed in the "Ecological Management Considerations" section of the Two-Hearted River Forest Reserve CFA Forest Management Plan and the "Protection of Wildlife and Natural Communities" and "Ecological Management Considerations" sections of the Mulligan Highlands Forest Reserve Forest Management Plan.

5. The Anew – Two-Hearted Forestry Project is not a community-based project.

F2. STAKEHOLDER COMMENTS

N/A. The Project Proponent, The Nature Conservancy is a private forestland owner, and adhered to their internally agreed upon practices of project consultation and notification on associated decision making. The Nature Conservancy 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, The Nature Conservancy, who holds full legal titles and thus have long term control of the land. The relevant deeds and contracts are available for review by verifier in a compressed document folder provided.

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 Anew – Two-Hearted Forestry Project has not previously applied or been registered under any GHG emission trading system or program.

H. PROJECT TIMELINE

H1. START DATE

The project "Anew – Two-Hearted Forestry Project" has a project start date of July 19, 2019. This start date is appropriate and consistent with the ACR Standard v. 7.0.

H2. PROJECT TIMELINE

Below is a schedule of the project activities in chronological order for important aspects of the Anew – Two-Hearted Forestry Project.

Project Activity	Date	Source/Notes
Project Start Date (Initiation of project activities)	July 19, 2019	Intent to commence a carbon project.
Frequency of monitoring, reporting and verification		Every 5 years after the first verification
Length of First Crediting period	Through July 18, 2039	20 years
Expected project longevity	Minimum Project Term of at least 40 years	40 years