Winston Creek
Forest Carbon Project

October 10, 2017

Version 2.0

PORT BLAKELY

Prepared by: L&C Carbon

Contents

A.
PROJECT OVERVIEW

A1. PROJECT TITLE

The project title is the "Winston Creek Forest Carbon Project."

A2. PROJECT TYPE

This project is to be registered under the American Carbon Registry Standard[1] (ACR, 2015) as an Improved Forest Management (IFM) project and has been developed in compliance with the ACR Forest Carbon Project Standard[2] , Version 2.1 (2010) and an approved ACR Improved Forest Management Methodology[3].

A3. PROOF OF PROJECT ELIGIBILITY

Eligibility for this Improved Forest Management project has been determined with reference to the ACR Forest Carbon Project Standard, Version 2.1.

Port Blakely's Winston Creek forest carbon project meets all relevant eligibility requirements as described in Table A-1.

Table A-1. Eligibility Requirements

Eligibility Requirements	**Method to Meet Requirement**
Ownership Type	Provide copies of the full interest fee simple land titles for all tax parcels within the Project Area to demonstrate ownership is non-federally owned forestland within the United States.
Project proponents forestlands are subject to commercial timber harvest activities under an existing forest management plan	Provide a copy of the county property zoning map demonstrating all tax parcels are zoned commercial forest and provide a copy of the Forest Resource Management Plan.
Evidence of existing and on-going forest management	Provide a copy of the Forest Resource Management Plan that demonstrates timber harvesting is the primary objective.
Project Area meets the definition of Forestland condition as per USFS FIA program definition	Provide a copy of the forest inventory summary by stand to demonstrate that all acres within the project boundary are at least 10 percent stocked by forest trees of any size and are not currently developed for non-forest use.

[1] ACR. 2015. American Carbon Registry Standard, Version 4.0. American Carbon Registry, Arlington, VA, USA.
[2] ACR. 2010. Forest Carbon Project Standard, Version 2.1. American Carbon Registry, Arlington, VA, USA.
[3] ACR. 2016. *Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal Forestlands*, Version 1.2, December 2016, American Carbon Registry, Arlington, VA, USA.

Project start Date	Project start date is April 17, 2017, which is later than January 1, 2000 as required by the ACR Standard, Version 4.0.
Project term	The project term is 40 years, as per the ACR Forest Carbon Standard v2.1. Over the project term, Port Blakely commits to project continuance, monitoring and verification.
Crediting Period	The initial crediting period is 20 years, as per the ACR Forest Carbon Standard v2.1
Real	The project seeks no issuance of ex ante credits.
Direct emissions/Offset title/Land title	GHG emission reductions generated by the project activity are generated from forest carbon sources and sinks over which Port Blakely has all management and ownership rights. Port Blakely 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.
Additional	Additionality is demonstrated in Section C below.
Permanent	Permanence is addressed by the project through ongoing assessment of risk using the ACR Tool for Risk Analysis and Buffer Determination v1.0 and contributions commensurate with risk, determined using the tool, to the ACR buffer pool.
Net of Leakage	Leakage is addressed using the ACR-approved Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands.
Independently validated and verified	The project is being submitted for independent validation and verification in September 2017.
Community and environmental impacts	Net positive community and environmental impacts are demonstrated in Section F below.
Forest definition	All areas qualify as forestland per the methodology (Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands v1.2) definition of at least 10% stocked by forest trees of any size, and not currently developed for non-forest uses.
Eligible landownership type	All landownership types, including private as in the case of this project, are eligible per the ACR Forest Carbon Project Standard v2.1.

Project Temporal Boundary

The project start date is April 17, 2017. Although Port Blakely began evaluating a forest carbon project in the Winston Creek area as early as the fall of 2016, it did not take formal action to commit land management actions to increase carbon stocks within the Winston Creek properties until April 2017, at which time it initiated a forest carbon inventory. At that time, Port Blakely's leadership committed to sequestering carbon beyond all legal and regulatory requirements, as well as above and beyond Business-As-Usual activities. A copy of the Forest Resources Management Plan covering the Project Area is included in Appendix A.

The project term will be 40 years, with two crediting periods of 20 years each.

A4. LOCATION

The Winston Creek Project Area is located in western Washington state. It is about 10 miles southwest of the town of Morton and about 20 miles northwest of Mount St. Helens. The Project Area boundary contains about 10,088 acres classified as commercial forestland. Primary access is via Highway 12 near Mossyrock. All access routes into the Project Area are gated.

The center point of the Project Area is: -122.396933 46.460078 Decimal Degrees
122°23'48.96"W 46°27'36.279"N.

The Project Area is bordered by public and private lands, with a number of nonindustrial ownerships adjacent or in close proximity. The neighboring lands contain similar species mixes and growing conditions as those found in the Project Area.

Historically the area's use as a timber production area dates back to the late 1800's. Port Blakely acquired the parcels within the project boundary over the past 13 years, with the largest blocks purchased from RLF Cascade Land Holdings in 2003 and Rainier Timber Company in 2004. Under the previous owners' management and harvest program, the majority of the land was intensively managed for wood production. The reforestation efforts that followed harvest were primarily through planting native tree seedlings produced in local nurseries. The current forest is the result of the early management and logging process and has resulted in a forest predominately of Douglas-fir that vary in density and age classes.

A GIS library, including a shape file of the Project Area will be made available to the Verification Body and the Registry.

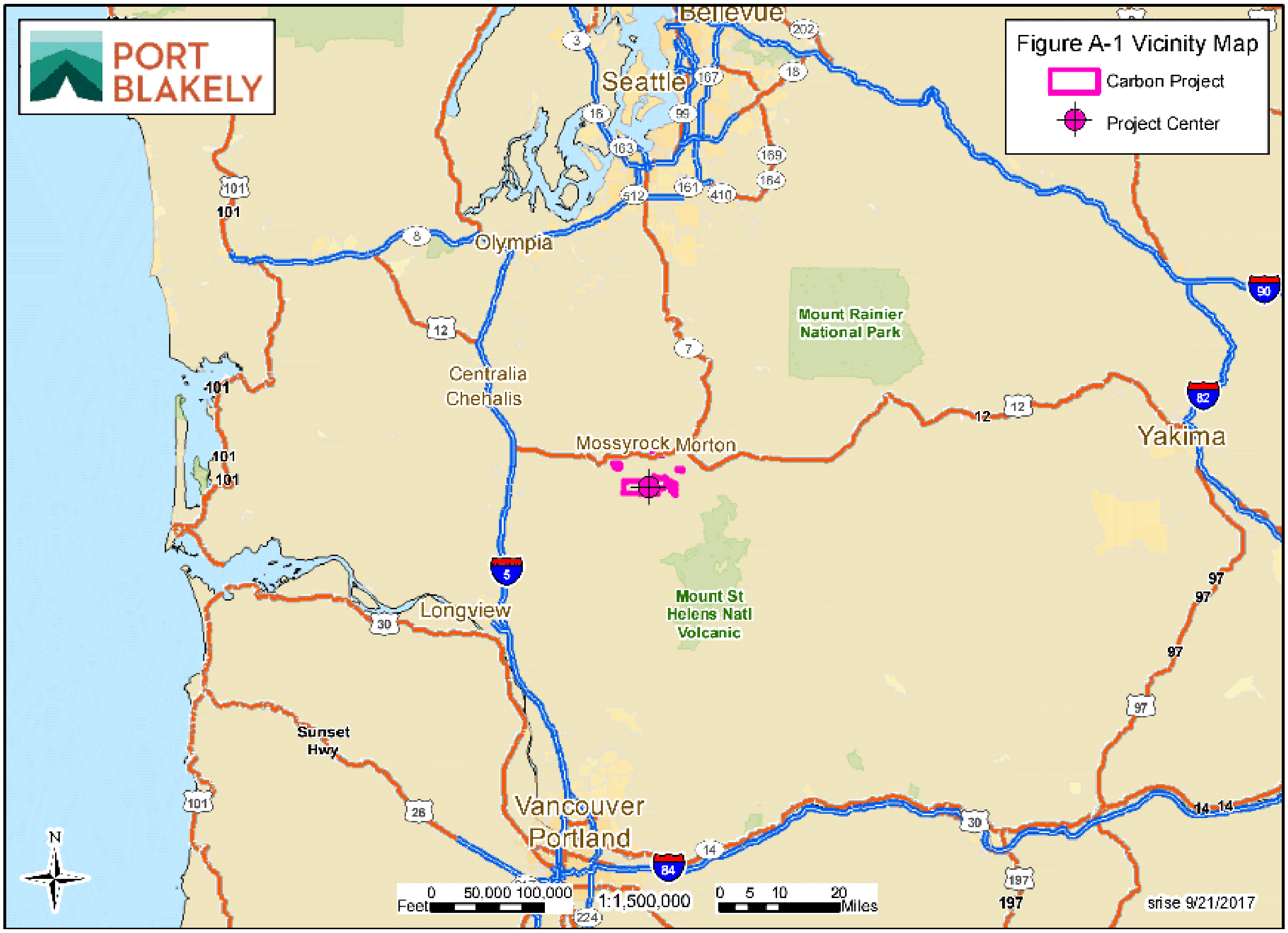


Figure A-1. Vicinity Map of the Winston Creek Project Area

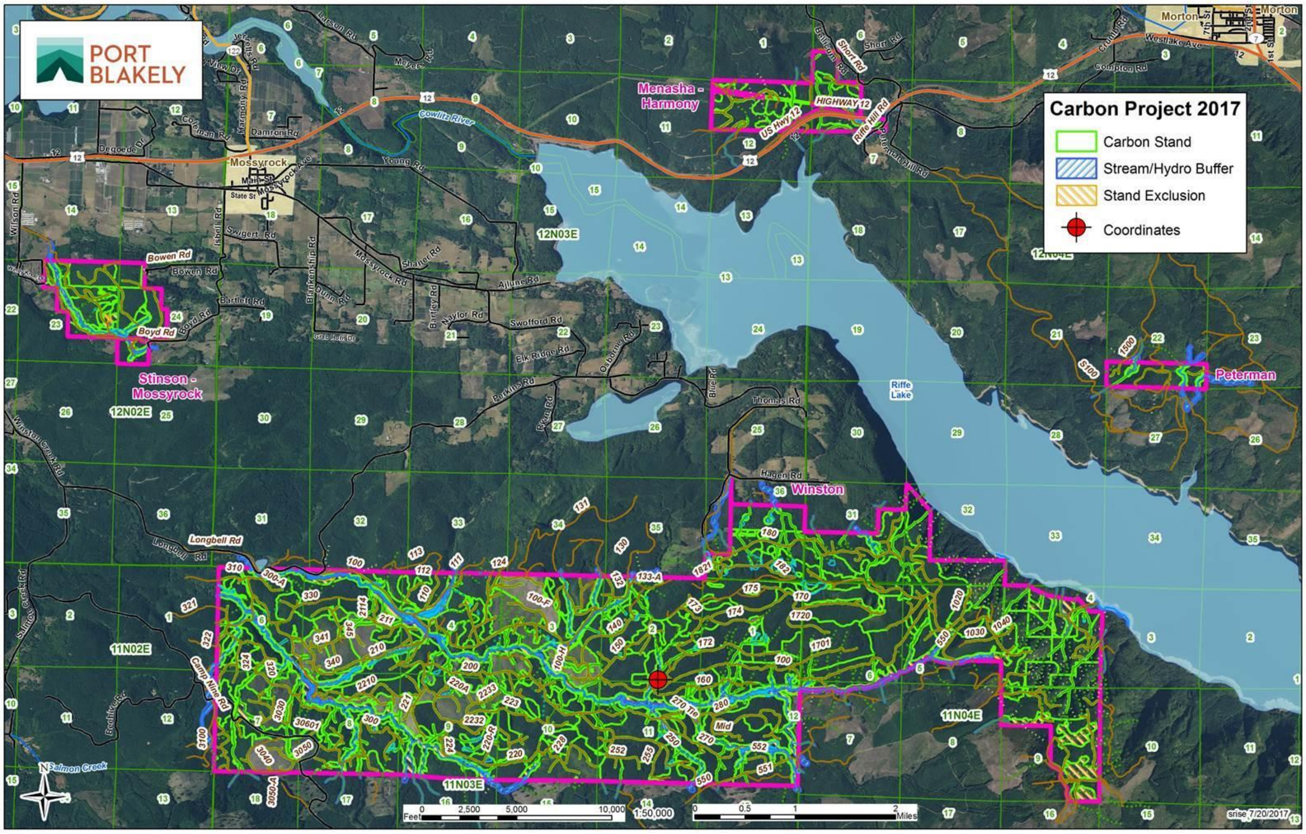


Figure A-2. Winston Creek Project Boundary

A5. BRIEF SUMMARY OF PROJECT

A5.1 Description of Project Activity

The project activity will increase carbon stocks by maintaining existing forest biomass and restricting harvests to less than the annual forest biomass growth over the project period. The planned harvest levels over the project period are well below the volumes permissible under federal and state laws, including Washington's Forest Practice Act and the implementing regulations and rules. The result of this reduced harvest regime will be an extension of rotation age, well beyond the common practice of shorter-rotation management of the neighboring forest owners.

A5.2 Background Information

Western Washington supports some of the densest and productive forests in North America. Site index maps show more site class I and II land in forests west of the Cascade Range than in other parts of the

western forested landscape. The Winston Creek Project Area is a good example of a highly productive forest in the Pacific Northwest.

Port Blakely's management of the Winston Creek Project Area is independently third-party certified through the Sustainable Forestry Initiative (SFI). The initial SFI certification for all U.S forest properties in Washington and Oregon was completed in 2002. The current SFI certification, which encompasses the Project Area, expires on June 14, 2021.

This is a new project to be registered under the American Carbon Registry (ACR). All properties that make up the Project Boundary has never been included in a forest carbon project. Neither verified emissions reductions (VERs) nor any underlying emissions reduction and/or carbon attributes to be registered on the ACR generated by this project have been serialized, registered or retired or otherwise transacted on another registry and/or under another standard or program.

A5.3 Project Purpose and Objectives

The purpose of this improved forest management carbon project is to increase the forest carbon stocks during the project period by extending the rotation age of the standing timber. This will be accomplished by harvesting less timber volume as compared to growth over the project period. Also, this management regime will improve the overall forest health and resiliency of the Project Area.

The objective of this project is to generate non-timber revenue over the project period. The carbon revenue will replace some forgone timber harvest revenue over the project period.

A6. PROJECT ACTION

The Winston Creek Forest Carbon Project will achieve GHG removals by maintaining existing forest cover and by growing substantially more biomass cubic volume than will be harvested over the project period, in effect extending the rotation age of the forest stands within the Project Area. The forest within the project boundary will sequester atmospheric CO2 in live above-ground biomass and below-ground biomass.

To ensure Port Blakely meets the Sustainable Forestry Initiative (SFI) requirements for sustainable forest management, the company relies on a number of corporate documents that guide all aspects of its forest management. These documents include a silviculture manual, an operations guide, several guides on protecting wildlife, a guide on addressing biological legacy features in harvest units, and best management practices for roads and for logging. Port Blakely updates its corporate forest management documents on a periodic basis. Copies of these corporate documents will be made available to the Verification Body and Registry upon request.

Port Blakely utilizes two teams to manage its forest property. The Harvest Team overseas all aspects of commercial forest products removal. The Forest Manager responsible for all forest harvesting activities is Jerry Bailey. The Resource Team, led by Gareth Waugh, is responsible for GIS, inventory, silviculture, reforestation, and pre-thinning across all U.S. lands.

A7. *EX ANTE* OFFSET PROJECTION

This project is expected to generate Net Emission Reductions of 853,572 metric tons of CO2 equivalent (tCO2-e) per acre over the initial 20-year crediting period of 20 (hereafter, all tons refer to metric tons). Project year refers to the year at the end of the annual interval, i.e. project year 2018 is from September 1, 2017 to August 31, 2018. This convention is followed hereafter.

Table A-2. Estimate of Net ERTs by Year

Project Year	Annual net GHG emission reductions (t CO2)	Cumulative emission reductions earned (t CO2)
2017	357,331	357,331
2018	447,976	805,307
2019	4,917	810,224
2020	3,708	813,932
2021	2,879	816,811
2022	2,371	819,182
2023	2,413	821,595
2024	2,302	823,897
2025	2,271	826,186
2026	2,234	828,402
2027	2,211	830,613
2028	2,251	832,864
2029	2,297	835,161
2030	2,447	837,608
2031	2,552	840,160
2032	2,696	842,856
2033	2,332	845,188
2034	2,575	847,763
2035	2,795	850,558
2036	3,014	853,572
First Crediting Period Total	853,572	

A8. PARTIES

The project was developed by Port Blakely, in consultation with several partners. Project parties' roles and responsibilities are elaborated in the Table A-3.

Table A-3. Project Partners & Responsibilities

Project Parties	Personnel/Point of Contact	Roles & Responsibilities	Contact Information
Port Blakely	Teresa Loo	Project proponent	Port Blakely US Forestry 8133 River Drive SE Tumwater, WA 98501 360-596-9439 tloo@portblakely.com
L&C Carbon	David Ford	Lead contractor – project development	L&C Carbon LLC 710 SW Carmen Heights Dr Dundee, OR 97115 503-449-6957 Davidford27@gmail.com
Latta Forestry	Greg Latta, Ph.D.	Sub-contractor to L&C Carbon – carbon baseline and project scenario modeling	Latta Forestry 310 NW Green Acres Lane Albany, OR 97321 541-619-9212 lattaforestry@gmail.com
TerraCarbon	David Shoch, Director, Forestry and Technical Services	Sub-contractor to L&C Carbon - GHG Plan advisor, and inventory design	TerraCarbon 700 Harris Street, #201B Charlottesville, VA 22903 434-326-1144 david.shoch@terracarbon.com

B.
METHODOLOGY

B1. APPROVED METHODOLOGY

This project uses the approved ACR *Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands*, Version 1.2, December 2016, together with the following procedures and tools:

- ACR Tool for Risk Analysis and Buffer Determination v1.0
- US Department of Energy Section 1605b Forestry Appendix[4]

B2. METHODOLOGY JUSTIFICATION

This methodology was chosen for this project for the following reasons:

1. The methodology used for this project, *Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands*, Version 1.2, December 2016, is approved by ACR;
2. The project meets the applicability requirements of the methodology, as detailed in Table A-1; and
3. The project is an IFM project and the methodology is for IFM projects.

The project meets the applicability conditions under Section A2 of the methodology, as per Table B 1.

Table B-1. Applicability Conditions

Applicability Conditions	Demonstration of compliance
Applicable only on non-federally-owned forestland within the United States	The Project Area is located on private U.S. forestland, owned by Port Blakely. Evidence is provided in copies of the full interest land deeds and accompanying title reports for all tax parcels within the Project Area.
Applicable to lands that are subject to commercial timber harvest activities by entities owning and controlling timber rights on forestland under an existing forest management plan	The Project Area is under the ownership and control of Port Blakely and subject to commercial timber harvest in accordance with forest management plan documents. Further evidence is provided in a copy of the county property zoning map demonstrating all Port Blakely owned tax lots within the Project Area zoned commercial forest.
Private or non-governmental organization ownerships must be certified by FSC, SFI, or ATFS, or become certified within one year of the project Start Date	All Port Blakely U.S. forestland, including the entire Project Area, is certified under the Sustainable Forestry Initiative (SFI). Evidence is provided in a copy of the SFI (see Appendix H) – Certificate US008909-1.

[4] US DOE Forestry Appendix: http://www.eia.gov/survey/form/eia_1605/gdlins.html

Use of non-native species is prohibited where adequately stocked native stands were converted for forestry or other land uses after 1997	The Project Area is composed entirely of native forest types, demonstrated in the April-May 2017 inventory, and no non-native species are used in any post-harvesting plantings.
Project proponent must demonstrate its ownership or control of timber rights for a period not less than 12 months prior to the project Start Date	The Project Area has been under Port Blakely's ownership for more than 12 months prior to the project start date. Evidence is provided in copies of the full interest land deeds for all tax parcels within the Project Area.
Project must demonstrate an increase in on-site stocking levels above the baseline by the end of the Crediting Period	The project is projected to increase on-site stocking levels above the baseline condition by the end of the Crediting Period, documented in Section E6 below.
Prohibition on draining or flooding of wetlands	The project activity does not involve any hydrological manipulation of wetlands.

A forest carbon inventory was completed in May 2017 and the data is being submitted for validation and verification.

B3. PROJECT BOUNDARIES

B3.1 Physical Boundary

The Project Area is delineated in a shape file archived in the project database and illustrated in Figure A-2. All areas within the project boundary qualify as forestland per the methodology definition of >10 percent stocking, and not currently developed for non-forest uses. This includes some forest areas temporarily un-stocked (e.g. recently harvested). Areas excluded are riparian management zones, roads, and non-forest areas.

The center point of the Winston Creek Forest Carbon Project is located approximately 10 miles southeast of Mossyrock, Washington. Figure B-1 shows the location of the Project Area, road network, and stream locations. Figure B-2 shows townships, ranges and sections, and topography of the Project Area. Figure B-3 shows county tax parcels boundaries. Figure B-4 shows the state and county roads located in the Project Area.

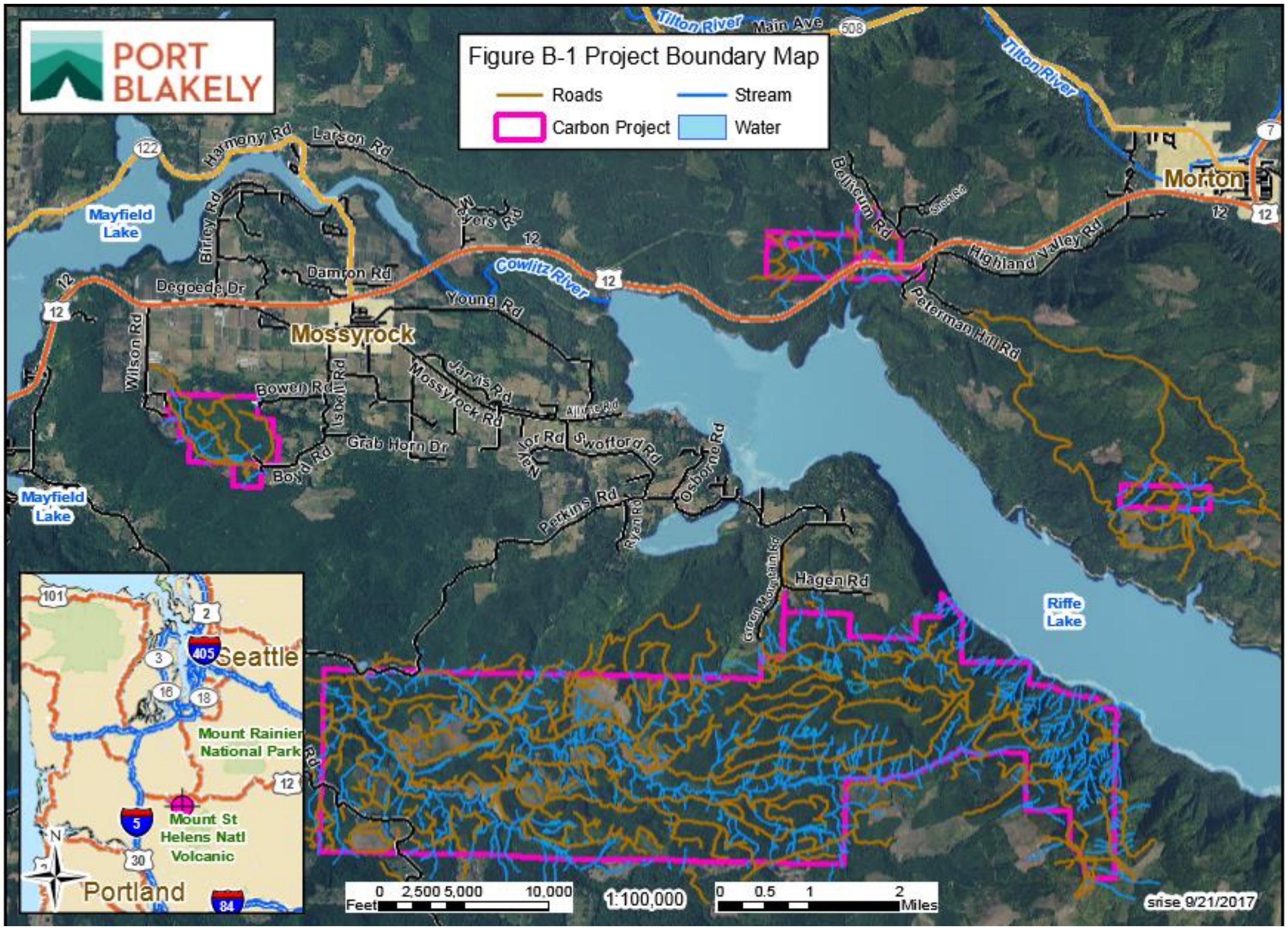


Figure B-1. Winston Creek Forest Carbon Project Location, Roads & Streams

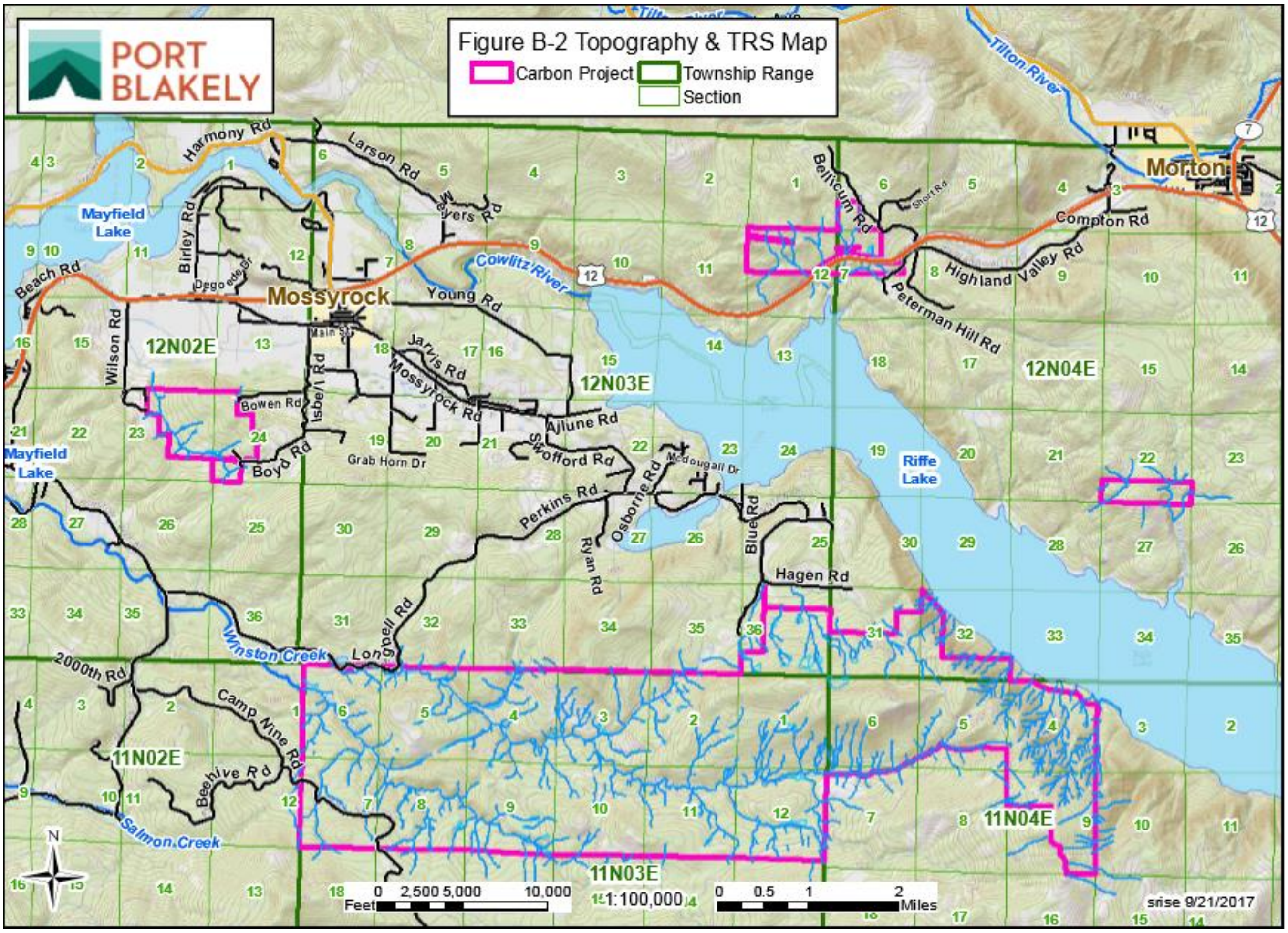


Figure B-2. Winston Creek Forest Carbon Project Topography & TRS

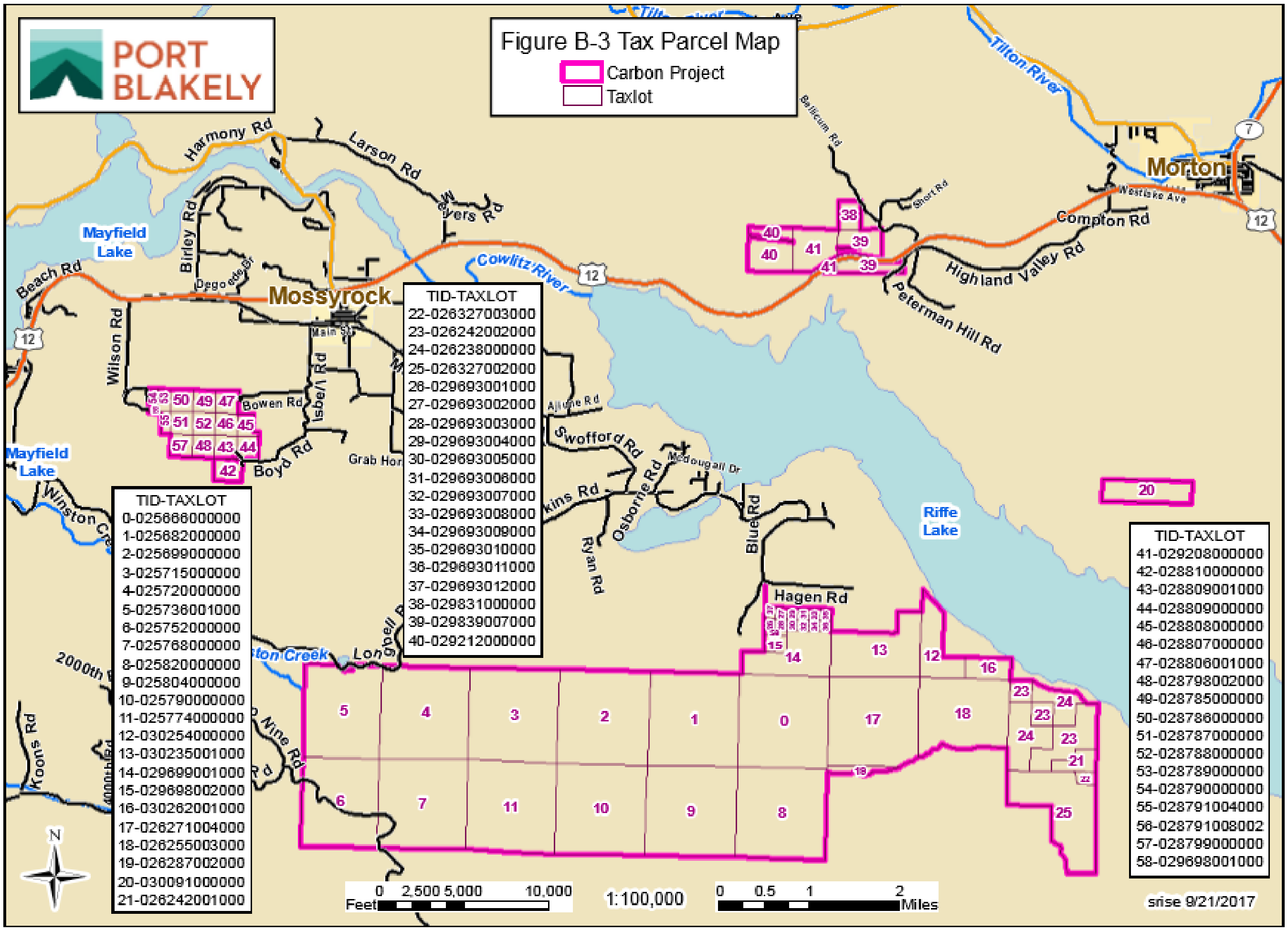


Figure B-3. Winston Creek Forest Carbon Project Tax Parcels

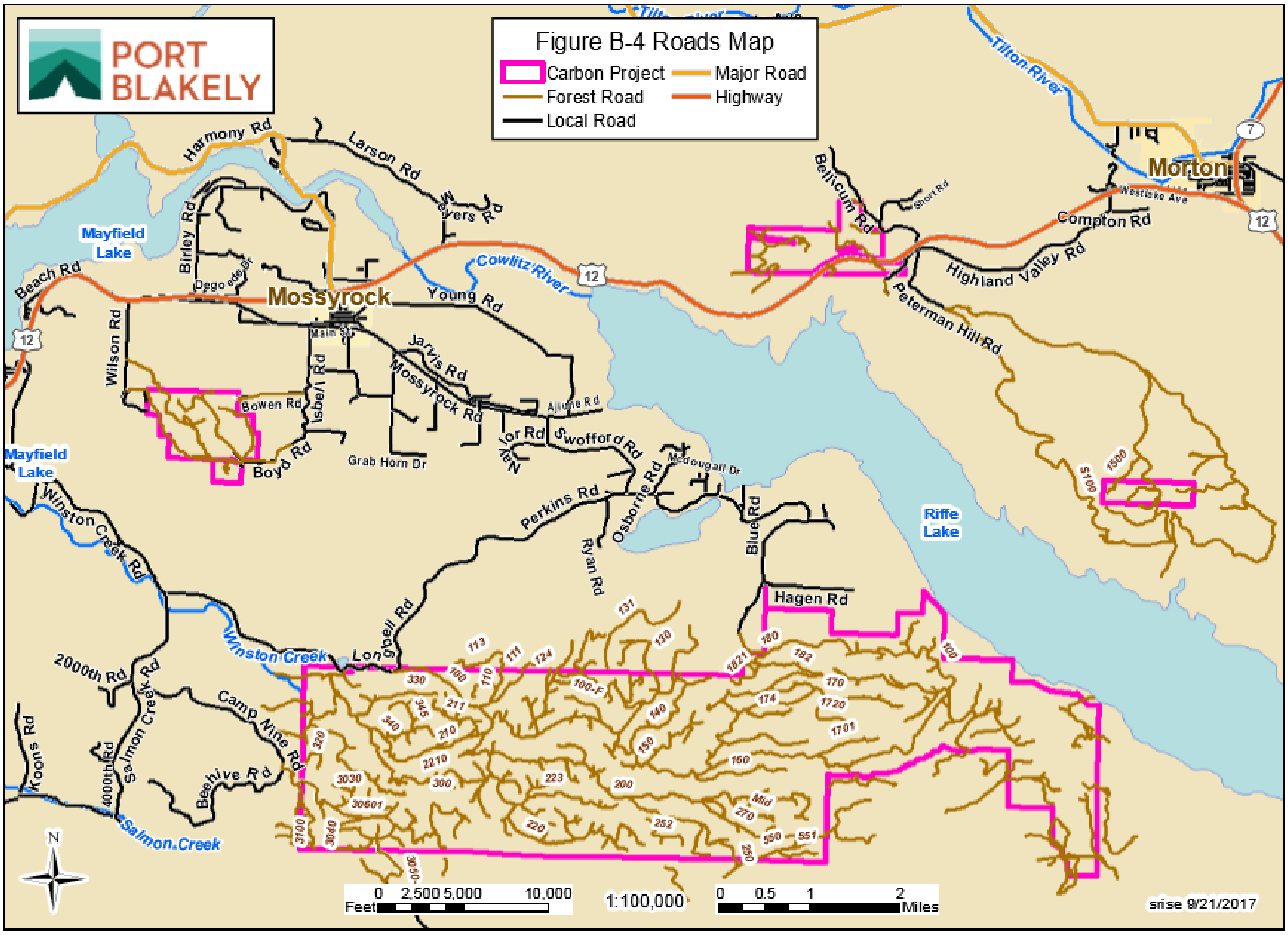


Figure B-4. Winston Creek Forest Carbon Project Roads

B3.2 Project Spatial Boundary

The total property within the Project Area is 10,088 acres. The project boundary consists of all lands designated and managed as commercial forest. The Project Area was stratified into eight unique strata as an initial step of the inventory process. Appendix B contains a list of all strata. A description of the strata is contained in the Winston Creek Forest Carbon Forest Project Inventory report (see Appendix D). A map of the project boundary can be found in Figure B-5.

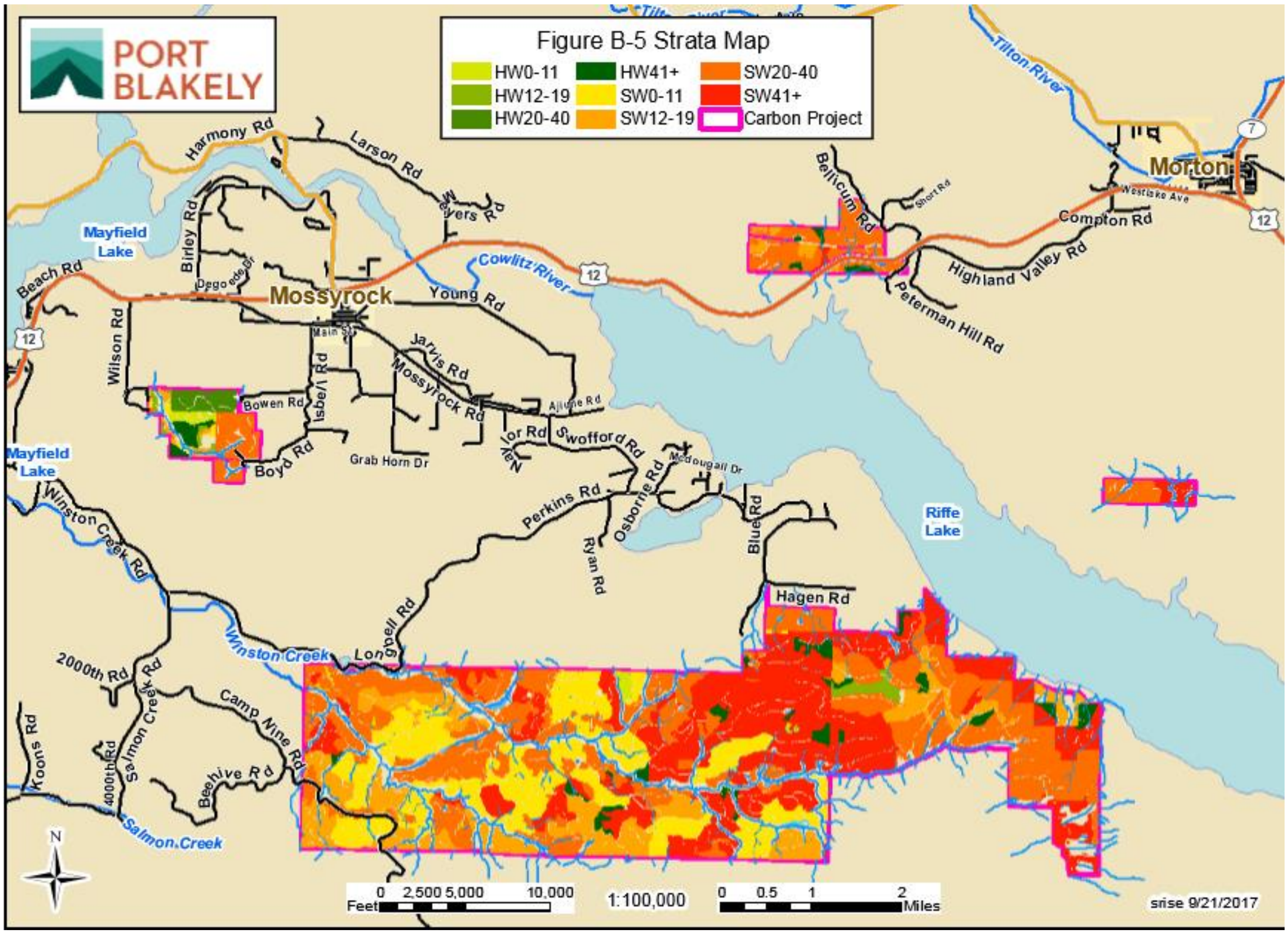


Figure B-5. Winston Creek Forest Carbon Project Boundary

B3.3 Project Temporal Boundary

The project start date is April 17, 2017. The initial crediting period is from April 17, 2017 to April 16, 2037. The project term will be 40 years, with two crediting periods of 20 years each. The project period is from April 17, 2017 to April 16, 2057.

Although Port Blakely began evaluating a forest carbon project in its western Washington state property as early as the fall of 2016, it did not take formal action that committed to land management actions that will increase carbon stocks on within the Project Area until April 2017. Port Blakely formalized its commitment by implementing a forest carbon inventory on the Project Area and committed to sequestering carbon beyond all legal and regulatory requirements, as well as above and beyond Business-As-Usual activities.

B4. IDENTIFICATION OF GHG SOURCES AND SINKS

Identification of GHG sources and sinks follows 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 1.2, December 2016.

Selection of GHG sources and sinks in the project boundary is summarized in Table B-2.

Table B-2. GHG Sources/Sinks & Justification for Inclusion/Exclusion

GHG source/sink	Included / Optional / Excluded	Justification
Above-ground biomass carbon	Included	Major carbon pool subjected to the project activity. The project employs a minimum dbh of 3.0 inches.
Below-ground biomass carbon	Included	Major carbon pool subjected to the project activity. The project employs a minimum dbh of 3.0 inches.
Harvested wood products	Included	Major carbon pool subjected to the project activity.
Standing dead wood	Excluded	Standing dead wood is an optional pool under the IFM methodology where all stands are managed in a Project Area. All stands are managed in the Project Area so the pool is excluded from the project activity.
Lying dead wood	Excluded	Lying dead wood is an optional pool under the IFM methodology and is excluded for this project.
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 soil carbon pool are considered *de minimis* as a result of project implementation.
CH4 Emissions from Biomass Burning	Included	This pool is included. It is conservatively assumed to be zero in the baseline. No logging slash is burnt in either the baseline or with-project cases as part of management practices. Burning of slash is rarely done because of rapid

		decomposition rates of slash due to high moisture levels and warm temperatures during the majority of the year.
Market Leakage	Included	As more wood is harvested in the baseline than in the project scenario, market leakage is accounted for, which reflects that wood supply elsewhere increases in response to project activity—attributable reductions, assuming demand is constant.

B5. BASELINE

The IFM baseline is project-specific and is the legally permissible harvest scenario that maximizes Net Present Value (NPV) of perpetual wood products harvests. The baseline management scenario is based on silvicultural prescriptions commonly used by landowners across the region and that are referenced in publications by the U.S. Forest Service[5] [6] to perpetuate existing onsite timber producing species while fully utilizing available growing space. The discount rate assumption for calculating NPV for this project is 6%, per the IFM methodology for private lands. Maximizing NPV revenue from perpetual wood product harvests in the baseline modeling scenarios results in a harvest schedule used to establish baseline stocking levels through the first 20-year baseline period. The baseline management regime rapidly harvests the older stands through clearcutting to establish young fast growing stands in the early years of the baseline period.

B6. PROJECT SCENARIO

Port Blakely, through its forest management planning documents, has committed to a reduction in harvest levels below annual growth that will lead to longer rotations resulting in greater carbon storage.

B7. REDUCTIONS AND ENHANCED REMOVALS

The project activity produces net emission reductions by increasing stocking relative to the baseline, via improved forest management practices previously described in Sections A5, A6, and B6.

[5] Curtis, Robert O.; Marshall, David D.; DeBell, Dean S., eds. 2004. Silvicultural options for young-growth Douglas-fir forests: the Capitol Forest study—establishment and first results. Gen.Tech. Rep. PNW-GTR-598. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 110 p.

[6] Curtis, R.O.; DeBell, D.S.; Harrington, C.A. [et al.]. 1998. Silviculture for multiple objectives in the Douglas-fir region. Gen. Tech. Rep. PNW-GTR-435. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 123 p.

B8. PERMANENCE

The project addresses permanence by application of the *ACR Tool for Risk Analysis and Buffer Determination v1.0* to assess risk of reversal and withhold from issuance a commensurate percentage of ERTs to be held in reserve in the ACR buffer pool. Appendix F contains the risk analysis project calculation.

C.
ADDITIONALITY

To meet the ACR's Forest Carbon Project Standard v2.1 requirement that the Winston Creek Forest Carbon Project GHG removals are additional, the three-prong additionality test is applied to demonstrate project additionality. The three-prong additionality test demonstrates that the project activity is additional, as detailed below.

C1. REGULTORY SURPLUS TEST

Management of the commercial forestland within the boundary of the Winston Creek Forest Carbon Project is governed by the State of Washington Forest Practices Act[7] and the Washington State Practices Rules[8].

The State of Washington Practices Act and the administrative Practices Rules sets some specific requirements regarding forest management activities. The requirements relevant for this project are limiting the size of a single clearcut to no larger than 240 acres, replanting tree seedlings after clearcut harvesting, and ensuring at least 190 trees per acre are 4 feet tall or on site after the fifth growing season after harvest.

The State of Washington Practices Act and the administrative Practices Rules regarding riparian management areas (surrounding stream courses and waterbodies) do not affect the Project Area, as all riparian management areas are excluded from the Project Area. Further, The State of Washington Practices Act and the administrative Practices Rules regarding threatened and endangered species do not affect the Project Area, as there are no identified threatened or endangered species nesting within the Project Area.

Port Blakely executed a voluntary safe harbor agreement with the U.S. Fish & Wildlife Service for the management of Northern Spotted Owl and Marble murrelett habitat. As this is a voluntary agreement, it is not legally binding and does not affect the project baseline modeling.

Importantly, the project activity, characterized by extending rotations beyond the economic optimum, is not mandated by any state or federal law or any legally-binding commitment under which the Project Area is subject.

The Winston Creek Forest Carbon Project forest management activities exceed the minimum requirements of the State of Washington Forest Practices Act, and thus passes the regulatory surplus test.

C2. COMMON PRACTICE TEST

The project activity passes the common practice additionality test as described in the ACR Forest Carbon Project Standard v2.1 based on several factors; including exceeding the common practice rotation age

[7] http://apps.leg.wa.gov/RCW/default.aspx?cite=76.09
[8] http://www.dnr.wa.gov/about/boards-and-councils/forest-practices-board/rules-and-guidelines/forest-practices-rules

for stands in western Washington, being penalized on price by local sawmills for growing and harvesting larger diameter logs which is being partially offset by carbon revenue, and exceeding the average metric ton of CO2 value per acre across the Project Area as compared to other private forestlands across the Pacific Northwest region.

The common silvicultural practice in western Washington (west of the Cascade Range) is managing conifer stands to a short rotation (30-45 years depending on site class), clearcutting, and replanting with native conifers – predominately Douglas-fir and western hemlock.[9] The typical rotation age has been declining over the past several decades.[10]

There are several reasons for the decline in forest stand rotation age. First, land ownership of private lands adjacent to the Project Area, as well as forestlands across the western Washington region are now predominately held by Real Estate Investment Trusts (REITs) and Timber Investment Management Organizations (TIMOs). These organizations are managed to generate a higher rate of return for their investors over a shorter time period than traditional forestland owners return targets. For example most REITs and TIMOs operate on a 10 to 15 year fund cycle, as compared to traditional forestland owners who generally have a longer-term return on investment timeframe.[11]

Sawmills in the region have followed this trend and have retooled their primary log breakdown equipment and now seek smaller diameter logs to maximize production rates. For example, the primary buyers of timber from the Project Area pay less money per thousand board feet for oversized logs as demonstrated by a recent price log sheet. A copy of a recent log price sheet is contained in Appendix E to demonstrate the price reduction for oversized logs. In addition, the export market is now paying a premium for smaller diameter logs as foreign sawmills are being retooled to accommodate smaller diameter wood. This has the effect of reinforcing the downward trend in stand rotation ages.

Port Blakely bought the majority of the Project Area from industrial forest owners in 2003 and 2004. There are about 3,200 acres of older forest stands older than 41 years. The remainder of the stands are less than 40 years old. Blakely plans to manage the Project Area to a rotation age of about 60 years old. At the project start date, on average the Project Area contains greater amounts of stored CO2 than private stands adjacent to the Project Area and across the western Washington region.

The project activity is projected to harvest less than the annual growth. By limiting annual harvests, the average stand age will increase resulting in increasing CO2 reductions over the project period. Currently, the average carbon stocks of the Project Area are above the average carbon stocks of forestland adjacent to the Project Area and across the western Washington region.

[9] http://www.cfr.washington.edu/research.smc/working_papers/smc_working_paper_6.pdf
See Figure 3 Rotation age by Species and Site Class, page 11.

[10] Conversations with Port Blakely foresters and decades of observations of harvesting on forestlands across the Pacific Northwest.

[11] http://www.dovetailinc.org/report_pdfs/2007/dovetailtimoreit0507wo-1.pdf

As the project activity is designed to achieve a 60-year rotation age, it cannot be characterized as common practice.

C3. IMPLEMENTATION BARRIERS TEST

The project activity faces a financial barrier. Net present values were calculated referencing the baseline and project scenarios outlined in Sections E1 and E6 below, using a 6% discount rate over the 20-year crediting period from 2018 to 2037. Property taxes were ignored, as they are equal in the two scenarios.

The project activity without carbon revenue is expected to generate a NPV (in 2017 $) of $21,175,319. This is a substantially lower return than the NPV maximization scenario that would yield an expected NPV (in 2017 $) of $89,966,223. Thus, the project activity is clearly not the most profitable forest management; however, revenue from the sale of carbon offset is an important incentive to project implementation.

D.
MONITORING PLAN

D1. MONITORED DATA AND PARAMETERS

The data and parameters to be used for monitoring the project activity are described in Table D-1. Further details on measurement and calculation of carbon stocks are discussed in Section E.

Table D-1. Data and parameters to be monitored

Data or Parameter Monitored	$C_{P,TREE,t}$
Unit of Measurement	Metric tons CO_2
Description	Carbon stored in above and below-ground live trees at the beginning of year *t*
Data Source	Forest inventory and annual observations by project proponent
Measurement Methodology	Consistent with SOPs detailed in Appendix C
Data Uncertainty	To be calculated as the mean +/-10% at the 90% confidence interval
Monitoring Frequency	Every 5 years or less, at request of ERT issuance
Reporting Procedure	Initially reported in the GHG plan for the project. Project proponent annually monitors harvest amounts and natural events that impact standing tree inventory and reports changes in the annual ACR project monitoring report.
QA/QC Procedure	Follow SOP procedures for data analysis and reporting detailed in Appendix C
Notes	

Data or Parameter Monitored	$BS_{P,t}$
Unit of Measurement	Metric tons CO_2
Description	Carbon stock in logging slash burned in the project year *t*
Data Source	Port Blakely forester
Measurement Methodology	Green standard tons biomass is ocularly estimated by Port Blakely forester for all burn piles. This is the same estimate reported to Washington Department of Natural Resources for burn permit approval. Green standard tons estimate then multiplied by 0.9072 (standard tons to metric tons) * 50% (dry weight to green weight ratio[12]) * 0.5 (carbon fraction biomass) * 3.664 (CO_2 to carbon ratio) to produce estimate in metric tons CO_2..

[12] Corresponding to a moisture content of 100%; Biermann, C.J., 1996. Handbook of pulping and papermaking. Academic press.

Data Uncertainty	None assessed
Monitoring Frequency	Annually, during any timber harvest activities
Reporting Procedure	Annual estimates tracked internally by spreadsheet. None reported in the initial GHG plan for the project, as no slash was burned in the initial reporting period. Out-year values reported in the ACR project monitoring reports.
QA/QC Procedure	Project proponent annually confirms with company forester prior to submission of annual monitoring report to ACR. Estimate reviewed by Washington Department of Natural Resources.
Notes	

Data or Parameter Monitored	$C_{p, HWP,t}$
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	Project ERT worksheet
Measurement Methodology	Annual log scale records for timber sold and removed from the Project Area
Data Uncertainty	None
Monitoring Frequency	Annually, during timber harvest activities and by collection of log scale records for logs sold and delivered to mills
Reporting Procedure	Project proponent to incorporate actual annual harvest volumes into updated ERT worksheet calculations to be filed with ACR annual monitoring report
QA/QC Procedure	Project proponent to review ERT HWP values and ensure they are consistent with reported timber harvest removals from based log scale records
Notes	

Data or Parameter Monitored	Project Area
Unit of Measurement	Acres
Description	Area of IFM project
Data Source	Project boundary map
Measurement Methodology	Project Area delineated using 2015 National Agriculture Imagery Program (NAIP) imagery. Boundaries were initially delineated in the office, and then adjustments were made during ground reconnaissance in 2017. The final boundaries were made into ArcView shapefiles and contain only commercial forestland.
Data Uncertainty	None
Monitoring Frequency	Not monitored

Reporting Procedure	Reported in GHG Plan and all monitoring reports.
QA/QC Procedure	None
Notes	

Data or Parameter Monitored	Sample plot area
Unit of Measurement	Acres
Description	Area of forest inventory sample unit
Data Source	SOP in Appendix C
Measurement Methodology	As per SOP detailed in Appendix C. Note that the inventory employs variable radius and fixed radius plots.
Data Uncertainty	None
Monitoring Frequency	Sample plot area is not monitored
Reporting Procedure	Reported in project monitoring reports in years that a new inventory is completed
QA/QC Procedure	As per SOP requirement in Appendix C
Notes	

Data or Parameter Monitored	Tree species
Unit of Measurement	Taxon (to species level)
Description	Species of tree measured in forest inventory sample unit
Data Source	Forest inventory
Measurement Methodology	As per SOP detailed in Appendix C
Data Uncertainty	None
Monitoring Frequency	Sample plots are to be measured every 10 years or sooner
Reporting Procedure	Reported in inventory data
QA/QC Procedure	As per SOP requirement in Appendix C
Notes	

Data or Parameter Monitored	$GHG_{P,t}$
Unit of Measurement	Metric tons CO_2e
Description	Greenhouse gas emission resulting from the implementation of the project in year (t)
Data Source	Calculated using equation 13 of the methodology
Measurement Methodology	Not measured (calculated from monitored parameter $BS_{P,t}$)
Data Uncertainty	None
Monitoring Frequency	Annually
Reporting Procedure	Reported in project monitoring reports
QA/QC Procedure	As per SOP requirement in Appendix C
Notes	

E.

QUANTIFICATION

E1. BASELINE

As described in Section C of the *Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands*, Version 1.2, December 2016, "baseline determination is project-specific and must describe the harvesting scenario that would maximize Net Present Value (NPV) of perpetual wood products harvests over a 100-year modeling period".

The discount rate for calculating NPV varies by ownership class. In the case of this project, the discount rate used for the baseline calculation was 6% (private industrial land). Further conditions for the baseline and project scenarios are described below. Justification for the baseline case is described in Table E-1.

Table E-1 Baseline carbon stocks and model projections

Applicability Conditions	Demonstration of compliance
"The baseline management scenario shall be based on silvicultural prescriptions recommended by published state or federal agencies to perpetuate existing onsite timber producing species while fully utilizing available growing space" (Section C1)	The baseline management scenario was based on silvicultural prescriptions for Northwest Coastal forests as summarized in publications by Oregon State University. [13]
"Required inputs for the project NPV calculation include the results of a recent timber inventory of the project lands, prices for wood products of grades that the project would produce, costs of logging, reforestation and related costs, silvicultural treatment costs, and carrying costs"(Section C1)	NPV calculation was done based on the most recent timber inventory of project lands (2017). Stumpage prices and all costs for logging, reforestation, silviculture, and carrying costs were obtained from proprietary data collected and retained by Port Blakely, based on actual experience, and used in its internal modeling to inform management decisions.
"Project Proponents should use a constrained optimization program that calculates the maximum NPV for the harvesting schedule while meeting any forest practice legal requirements"	NPV maximization model was programmed to consider constraints such as harvest flow, net revenue flows, and average harvest level accounting parameters (documented in model output runs that are available for inspection).
"Wood products must be accounted" {in the baseline calculation}	Harvested wood products are accounted for in the baseline calculations (documented in the ERT calculation worksheets).
"Consideration shall be given to a reasonable range of feasible baseline assumptions and the selected assumptions should be plausible for the duration of the baseline application"	A total of five baseline runs were simulated as part of the analysis using different assumptions for harvest levels to maximize NPV. Model run records are available for inspection.
"The ISO 14064-2 principle of conservativeness must be applied for the determination of the baseline scenario. In particular, the	All baseline model runs were established using published variables, the expertise of local forest managers and other natural resource professionals in the region. Choice of

[13] Klausse Puettmann http://www.cof.orst.edu/cof/fs/kpuettmann/publications.htm

conservativeness of the baseline is established with reference to the choice of assumptions, parameters, data sources and key factors so that project emission reductions and removals are more likely to be under-estimated rather than over-estimated, and that reliable results are maintained over a range of probable assumptions"	assumptions, parameters, data sources and other key factors follow the principle of conservativeness. Evidence includes restricting the total volume that could be harvested in any year of the initial 20-year crediting period.

E1.1 Model inputs

Required inputs for the project NPV calculation include the results of the 2017 timber inventory[14] of the land within the Project Area, growth and yield under a range of silvicultural treatments, prices for wood products of grades that the project would produce, costs of logging, reforestation as required under the Washington State Forest Practices Rules (Title 222 WAC), silvicultural treatment costs, and carrying costs. Harvesting and hauling costs are also included as appropriate to the terrain and volume of material being removed.

Forest stands were modeled in the baseline case using the Forest Vegetation Simulator (FVS) ORGANON Variant for growth and yield followed by use of the Generalized Algebraic Modeling System (GAMS) for a linear programming harvest schedule maximizing NPV. Both models were run for a 100-year timeframe using a 1-year time period for the first 20 years and then 5-year periods throughout the remainder of the modeling time horizon.

The linear programming model results provide the values for the basic baseline calculation given in Equation 5. The two basic carbon pools considered are live tree and harvested wood products. The baseline average carbon stocking level is derived by two distinct steps. In the first step, Equation 5 is used to calculate the 20-year average carbon stocking level for live trees and harvested wood products.

$$C_{BSL,AVE} = \frac{\sum_{t=0}^{20}\left(C_{BSLTREE,t}\right)}{21} + \frac{\sum_{t=1}^{20}\left(C_{BSL,HWP,t}\right)}{20} \qquad (5)$$

where:

t	Time period (in years)
$C_{BSL,AVE}$	21-period, 20-year average baseline carbon stock (in metric tons CO_2)

[14] See Winston Creek Forest Carbon Project Inventory Report – Appendix D

$C_{BSL,TREE,t}$	Baseline value of carbon stored in above and below ground live trees (in metric tons CO_2) at point in time *t.*
$C_{BSL,HWP,t}$	Baseline value of carbon remaining in wood products 100 years after being harvested in time period *t* (between point in time, *t-1*, and point in time *t*, in metric tons CO_2)

Once the 20-year average stocking level is obtained, a separate periodic carbon flux for the baseline is calculated using Equation 6. This periodic carbon stocking value are comprised of the actual periodic tree carbon flux and the 20-year average HWP flux.

$$\Delta C_{BSL,t} = \Delta C_{BSL,TREE,t} + \overline{C}_{BSL,HWP} \qquad (6)$$

where:

t	Time in years
$\Delta C_{BSL,t}$	Change in the baseline carbon stock (in metric tons CO_2) for period *t* (stock change between point in time *t-1* and point in time *t*).
$\Delta C_{BSL,TREE,t}$	Change in the baseline carbon stock stored in above and below ground live trees (in metric tons CO_2) for period *t*(stock change between point in time *t-1* and point in time *t*).
$\overline{C}_{BSL,HWP}$	Twenty-year average value of annual carbon remaining stored in wood products 100 years after harvest (in metric tons CO_2).

This $\Delta C_{BSL,t}$ value is then used as the baseline value for all periods prior to the point in time *T* in which the baseline stocking level reaches the 20-year average, after which $\Delta C_{BSL,t}$ is set equal to 0.

The linear programming model equations, variables, and parameterization used to populate values for Equations 5 & 6 is presented below. The model maximizes NPV accounting for constraints such as harvest flow and maximum harvest volume, while accounting for detailed silvicultural activity timing, revenues, and costs across the project area.

The objective function used in the linear program is:

$$MAX \quad \sum_{t<t^n} \left[R(t) - C(t)\right](1+i)^{-(d(t)-2017)} \qquad \text{Objective function (LP1)}$$

Subject to the constraints:

$$\sum_t X(p,t,m) = a(p) \quad \forall p \qquad \text{Allocation of all available area (LP2)}$$

$$\sum_{t^*>t}\sum_{m} N(p,t,t^*,m) = \sum_{m} X(p,t,m) + \sum_{t^*<t}\sum_{m} N(p,t^*,t,m) \quad \forall p, t < t^n$$

Allocation of regenerated area (LP3)

$$\sum_{p}\sum_{m} X(p,t,m) * y^X(p,t,m,x) * (1-f) + \sum_{p}\sum_{t^*<t}\sum_{m} N(p,t^*,t,m) * y^N(p,t,m,x) * (1-f) = H(x,t) \quad \forall x, t < t^n$$

Harvest accounting (LP4)

$$\sum_{l} H(l,t) * v(l) = R(t) \quad \forall t < t^n$$

Revenue accounting (LP5)

$$\sum_{p}\sum_{m}\sum_{l} X(p,t,m) * y^X(p,t,m,l) * (\sum_{c_{mbf}} k(c_{mbf}) + 1000 * \sum_{l'} y^X(p,t,m,l')^{-0.65}) + \sum_{p}\sum_{t^*<t}\sum_{l} N(p,t^*,t,m) * y^N(p,o,m,l) * (\sum_{c_{mbf}} k(c_{mbf}) + 1000 * \sum_{l'} y^N(p,o,m,l')^{-0.65}) + \sum_{s}\sum_{p}\sum_{t^*>t}\sum_{c_{acre}} k(c_{acre}) * N(p,t,t^*,m) + \sum_{l} m * H(p,t,l,s) = C(t) \quad \forall t < t^n$$

Cost accounting (LP6)

$$\sum_{p}\sum_{l}\sum_{s} H(p,t,l,s) * v(l) \le b(t) * z \quad \forall t > 1 \quad and \quad t < t^n$$

Maximum Annual Harvest Limit (LP7)

Sets:

c	the set of cost types (road, overhead, reforestation, fixed, and other)
c_{mbf}	the subset of per mbf cost types (road, overhead)
c_{acre}	the subset of per acre cost types (reforestation, fixed, and other)
l	the subset of the yield item set *x* which includes log products in board foot volumes for use in revenues and cost accounting
m	the set of all silvicultural prescriptions. The management options for existing strata forest include a no thinning option as well as a thinning of 33% of the standing volume removed proportionally across size classes and species in each time period in which the strata would have at least 10 mbf/acre standing volume. Managements available to strata upon regeneration include a planting of 436 Douglas-fir seedlings per acre and the option to thin

	33% of the standing volume proportionally across size classes and species in each time period in which the strata would have at least 150 ft^2/acre basal area.
p	the set of strata to be scheduled for management
s	the set of species (Douglas-Fir DF, White Wood WW, Western Redcedar CD, Other Softwood OS, Red Alder RA and Other Hardwood OH)
t	the set of time periods or years over which the model will be run with $t = 1,\ldots,t^n$ with t^n representing the option to never harvest a stand therefore $\sum_{t<t^n} 1$ is the number of periods which is 38. The first 20 time periods are one year in length and the remaining periods are five years in length
x	the set of yield items which include species, board foot volumes and carbon accounts

Parameters:

a(p) the acreage of strata *p*
b(t) the length in years of time period *t*
d(t) the date of time period *t*
f reduction for defect and breakage (10%)
h(l) the haul costs in $/mbf specific to log product *l* are:

Tree Farm	DF	WW	OS	CD	RA	OS
Winston Creek	58	60	56	37	55	56

i the discount rate (6%)
k(c) forest management costs:

Roads	$8/mbf
Overhead	$13/mbf
Reforestation	$421/acre
OtherSilviculture	$263/acre
Fixed	$81/acre

v(s) the log prices in $/mbf for yield item logs of species *s* are:

Species	DF	WW	OS	CD	RA	OH
Log Price ($/mbf)	697	609	543	952	712	301

$y^N(p,t,m,l)$ the volume in strata p in time period *t* under prescription *m* of log product *l*
$y^X(p,t,m,l)$ the volume in strata p in time period *t* under prescription *m* of log product *l*
z the maximum annual volume allowed (set at 88,023 mbf/yr in the baseline to even the initial harvests over the first two years)

Variables:

C(t) the costs in a time period *t*
H(p,t,l,s) the harvest volume of strata *p* in a time period *t* of log product *l and species s*

N(p,t,t,m)* acres of regenerated strata *p* planted in time period *t* and to be harvested in time period t^*allocated to management *m*
R(t) the revenues in a time period *t*
X(p,t,m) acres of existing strata *p* to be harvested in time period *t* assigned to management *m*

Following is a simplified explanation of the PBWC GHG plan mathematical presentation of the linear programming model used to determine the baseline harvest schedule and resulting net present value maximizing baseline, described equation-by-equation.

Equation LP1: this is the objective function which sums the net present value for PBWCR. Basically the revenues in period t (R(t)) minus the costs in period t (C(t)) are discounted by dividing (the negative exponent) by 1+discount rate to the year of the value minus 2017.

Equation LP2: this constraint requires that every existing acre of every strata (a(p)) has to have a plan (X(p,t,m)) to harvest or not harvest it for the next 100 years.

Equation LP3: this constraint says that we not only have to have a plan as to when to harvest each acre of each existing stand (X), but we must have a similar plan for each subsequent newly regenerated acres (N). Note that this equation allows these regenerated stands (N) to be reharvested if determined to be advantageous thus N appears on both side of this equation.

Equation LP4: this equation uses the harvesting planned in each time period for each existing (X) and regenerated (N) acre using the Forest Vegetation System (FVS) generated yield tables (Y^X and y^N for existing and regenerated stands respectively) and stores in in the variable H.

Equation LP5: this equation uses the harvest in time period (H) calculated in LP4 along with the log prices (v) to calculate the revenue in each time period (R).

Equation LP6: this equation uses the planned activities for each existing (X) and regenerated (N) acre along with harvesting, planting and hauling costs to calculate the costs in each time period (C). Note that the harvesting costs are represented by a negative exponential equation where harvest cost per mbf is equal to 1000 times the mbf removed to the -0.65 power. This specification captures the higher per unit costs associated with harvesting young stands as compared to the lower costs per unit of harvesting older stands.

Equation LP7: this equation limits the harvest in time period (H) calculated in LP4 to be less than or equal to the maximum annual harvest limit *z* times the years in the time period b(t).

The baseline average was calculated using (Equation 5 above) is 39.82 metric tons of CO_2/acre over the project's 10,088 net acres which amounts to 401,672 metric tons of CO_2.

$$C_{BSL,AVE} = \frac{\sum_{t=0}^{20}\left(C_{BSLTREE,t}\right)}{21} + \frac{\sum_{t=1}^{20}\left(C_{BSL,HWP,t}\right)}{20} = 401{,}672 \ tCO_2$$

The baseline scenario's initial stocking level of 1,782,368 metric tons of CO_2 is above $C_{BSL,AVE}$ and thus the actual baseline periodic tree carbon flux $\Delta C_{BSL,t}$ should be used until the projected stocking level reaches the long term average (time t = T) . The change in baseline carbon stock calculated using (Equation 6 above) for year 1 was -718,317 t CO_2, or -71.21 tons of CO_2/acre.

Reporting Period 1:

$$\Delta C_{BSL,t} = \Delta C_{BSL,TREE,t} + \overline{C}_{BSL,HWP} = -718{,}317 \ \text{tCO}_2$$

Estimated values for each of these project baseline parameters over the 20-year project time frame can be found in the Port Blakely Winston Creek Forest Carbon Project ERT worksheet (see Appendix G).

E1.2. In consideration of legal restraints

We used a constrained optimization program that calculates the maximum NPV for the harvesting schedule while meeting all forest practice legal requirements. The key constraint was to limit the total volume of annual harvest to 88 mmbf per year over the initial 20-year crediting period.

Per the ACR Forest Project Standard, and the IFM methodology requirements, baseline activities within the project area were modeled to comply with all national, state, and local laws. The legal restraints modeled as part of the baseline are contained in the Washington State Forest Practices Rules (Title 222 WAC) that regulates management practices on forest lands to protect resources such as water, timber, fish and wildlife.

The major constraints to forest management under federal and state law relate to the protection of water quality, endangered species, and reforestation requirements. Water quality is addressed through protection of stream courses and waterbodies. In this project, all riparian management zones (RMAs) were removed from the Project Area so no modeling of this constraint was required. There are no known threatened or endangered species identified within the Project Area, so no modeling of this constraint was required. The State of Washington requires that all lands harvested meet a stocking requirement of 190 trees per acre within five growing seasons after harvest. Port Blakely exceeds this stocking requirement, as it plants up to 540 trees per acre within eighteen months of clearcut harvesting, so no modeling of this constraint was required. The State of Washington does limit individual clearcuts to no more than 240 acres; however, it is common practice for Port Blakely to limit clearcut size to under 120 acres.

E2. PROJECT SCENARIO

The Port Blakely Winston Creek Forest Carbon Project will achieve GHG removals by maintaining existing forest cover by growing more biomass cubic volume than will be harvested over the project period. This section describes the basic modeling conducted to estimate the expected amount atmospheric CO_2

sequestered in live aboveground biomass, belowground biomass, and wood products in the project scenario. Equation 14 is used compute change in project carbon stock for each time period:

$$\Delta C_{P,t} = \Delta C_{P,TREE,t} + C_{P,HWP,t} \tag{14}$$

where:

t	Time in years
$\Delta C_{P,t}$	Change in the project carbon stock (in metric tons CO_2) over time period t
$\Delta C_{P,TREE,t}$	Change in the project carbon stock stored in above and below ground live trees (in metric tons CO_2) over time period t
$\Delta C_{P,DEAD,t}$	Change in the project carbon stock stored in dead wood pools live trees (in metric tons CO_2) over time period t
$C_{P,HWP,t}$	Carbon remaining stored in wood products 100 years after harvest (in metric tons CO_2) for the project over time period t

With the change in the project carbon stock stored in above and below ground live trees for year t calculated using Equation 11.

$$\Delta C_{P,TREE,t} = \left(C_{P,TREE,t} - C_{P,TREE,t-1}\right) \tag{11}$$

where:

t	Time in years
$\Delta C_{P,TREE,t}$	Change in the project carbon stock stored in above and below ground live trees (in metric tons CO_2) over time period t
$C_{P,TREE,t}$	Change in the project value of carbon stored in above and below ground live trees at the beginning of the year t (in metric tons CO_2) and t-1 signifies the value in the prior year

The modeling to get values for input into Equations 14 & 11 for the project scenario uses the same initial inventory and growth and yield data as described above for the baseline scenario. The linear programming model described in Equations LP1 through LP7 are used with the following changes and additions.

- The maximum annual volume allowed *z* is changed to 2,500 mbf/yr reflecting the project scenario reduced harvest level. Equation LP7 applies this maximum annual harvest level over the 100-year modeling time horizon.

The change in project carbon stock calculated using (Equation 14 above) for time period 1 was 31,118 tons of CO_2/acre respectively.

Reporting Period 1:

$$\Delta C_{P,t} = \left(C_{P,TREE,t} - C_{P,TREE,t-1}\right) + C_{P,HWP,t} = \ 31{,}118 \text{ tCO}_2$$

Estimated values for each of these project parameters over the 20-year project time frame can be found in the attached spreadsheet.

E3. LEAKAGE

Per the IFM methodology (Section D6), "If the project decreases wood product production by >5% relative to the baseline then the Project Proponent and all associated land owners must demonstrate that there is no leakage within their operations – i.e., on other lands they manage/operate outside the bounds of the ACR carbon project." This is termed activity shifting leakage.

Due to the project activity, there will be more than a 5% decrease in wood product production relative to the baseline. However, the project proponent has an "entity-wide management certification" that covers all lands with active timber management programs (see Appendix H).

For market leakage per Section D7 (equation 17) of the IFM methodology, the project activity will decrease total wood products produced by 25% or more over the Crediting Period, hence the assigned market leakage deduction (*LK*) is 40%.

E4. UNCERTAINTY

Estimation of baseline uncertainty for pools and emissions sources for each measurement pool are calculated using Equation 10. In all cases uncertainty is expressed as the 90% confidence interval as a percentage of the mean. Per Equation 10, the uncertainty in the baseline scenario is defined as the square root of the summed errors in each of the measurement pools included. Our modeled baseline results for tree and wood products carbon use the above described confidence interval of the input inventory data.

$$UNC_{BSL} = \frac{\sqrt{\left(C_{BSL,TREE,1} \cdot e_{BSL,TREE}\right)^2 + \left(\overline{C}_{BSL,HWP} \cdot e_{BSL,TREE}\right)^2}}{C_{BSL,TREE,1} + C_{BSL,HWP}} \quad (10)$$

where:

UNC_{BSL}	Percentage (in %) uncertainty in the combined carbon stocks in the baseline.
$C_{BSL,TREE,1}$	Carbon stock in the baseline stored in above and below ground live trees (in metric tons CO_2) for the initial inventory in year *1*.
$\overline{C}_{BSL,HWP}$	Twenty-year baseline average value of annual carbon (in metric tons CO_2) remaining stored in wood products 100 years after harvest.

$e_{BSL,TREE}$	Percentage uncertainty (in %) expressed as 90% confidence interval percentage of the mean of the carbon stock in above and below ground live trees (in metric tons CO_2) for the initial inventory in year *1*.

The 2017 inventory of the property area achieved a sampling standard error of +/-7.30% at the 90% Confidence Interval for mean cubic feet per acre. Inserting this error estimate along with values of 1,782,368 for $C_{BSL,TREE,1}$ and 23,153 for $\overline{C}_{BSL,HWP}$ puts the value of UNC_{BSL} at 7.21%.

$$UNC_{BSL} = \frac{\sqrt{\left(C_{BSL,TREE,1} \cdot e_{BSL,TREE}\right)^2 + \left(\overline{C}_{BSL,HWP} \cdot e_{BSL,TREE}\right)^2}}{C_{BSL,TREE,1} + \overline{C}_{BSL,HWP}} = 7.21\%$$

Given that the initial inventory along with its sampling standard error serves as the starting point for both baseline and project scenarios, the resulting uncertainty is identical as well. Project scenario uncertainty at time period t,$UNC_{P,t}$, is calculated using equation 18:

$$UNC_{P,t} = \frac{\sqrt{\left(C_{P,TREE,t} \cdot e_{P,TREE}\right)^2 + \left(C_{P,HWP,t} \cdot e_{P,TREE}\right)^2}}{C_{P,TREE,t} + C_{P,HWP,t}} \tag{18}$$

where:

$UNC_{P,t}$	Percentage (in %) uncertainty in the combined carbon stocks in the project in year *t*.
$C_{P,TREE,t}$	Carbon stock in the project stored in above and below ground live trees (in metric tons CO_2) in year *t*.
$C_{P,HWP,t}$	Annual carbon (in metric tons CO_2) remaining stored in wood products in the project 100 years after harvest in year *t*.
$e_{P,TREE}$	Percentage uncertainty (in %) expressed as 90% confidence interval percentage of the mean of the carbon stock in above and below ground live trees (in metric tons CO_2) for the last remeasurement of the inventory prior to year *t*.

Inserting this error estimate along with values of 1,782,368 for $C_{P,TREE,1}$ and 0 for $C_{P,HWP,1}$ puts the value of $UNC_{P,1}$ at 7.3%.

$$UNC_{P,1} = \frac{\sqrt{\left(C_{P,TREE,1} \cdot e_{P,TREE}\right)^2 + \left(C_{P,HWP,1} \cdot e_{P,TREE}\right)^2}}{C_{P,TREE,1} + C_{P,HWP,1}} = 7.3\%$$

Combined baseline and project uncertainty for time period *t*, UNC_t, is calculated using Equation 19.

$$UNC_t = \frac{\sqrt{(\Delta C_{BSL,t} \cdot UNC_{BSL})^2 + (\Delta C_{P,t} \cdot UNC_{P,t})^2}}{\Delta C_{BSL,t} + \Delta C_{P,t}} \tag{19}$$

Where:

UNC_t	Total project Uncertainty in year *t*, in %
$\Delta C_{BSL,t}$	Change in the baseline carbon stock and GHG emissions (in metric tons CO_2e) for year *t*. (Section E1)
UNC_{BSL}	Baseline uncertainty, in % (Section E4)
$\Delta C_{P,t}$	Change in the project carbon stock and GHG emissions (in metric tons CO_2e)for year *t*. (Section E2)
$UNC_{P,t}$	With-project uncertainty in year *t*, in % (Section E4)

If calculated UNC_t in equation (19) is <10%, then UNC_t shall be considered 0% in Equation 20 below.

E5. REDUCTIONS AND REMOVAL ENHANCEMENTS

Determining additional annual net greenhouse gas emission reductions requires calculation of the difference in changes in carbon stocks between the project and baseline and accounting for required adjustments. Annual net greenhouse gas emission reductions ($C_{ACR,t}$) are calculated using equation 20 by adjusting the difference between the project and baseline carbon stock changes for leakage and uncertainty then multiplying by a non-permanence buffer deduction:

$$C_{ACR,t} = (\Delta C_{P,t} - \Delta C_{BSL,t}) \cdot (1 - LK) \cdot (1 - UNC_t) \cdot (1 - BUF) \tag{20}$$

where:

$C_{ACR,t}$	Annual net greenhouse gas emission reductions (in metric tons CO_2e) at time *t*
$\Delta C_{P,t}$	Change in the project carbon stock and GHG emissions (in metric tons CO_2e)for year *t*. (Section E2)
$\Delta C_{BSL,t}$	Change in the baseline carbon stock and GHG emissions (in metric tons CO_2e) for year *t*. (Section E1)
LK	Leakage discount (Section E3)
UNC_t	Total Project Uncertainty, (in %) for year *t* (Section E4). UNC_t will be set to zero if the project meets ACR's precision requirement of within 10% of the mean with

90% confidence. If the project does not meet this precision target, UNC_t should be the half-width of the confidence interval of calculated net GHG emission reductions

BUF The non-permanence buffer deduction as calculated by the ACR Tool for Risk Analysis and Buffer Determination

The change in project carbon stock calculated using (Equation 20 above) for time period 1 was 31,118 metric tons of CO_2. The change in baseline carbon stock calculated using (Equation 6 above) for time period 1 was -718,317 metric tons of CO_2 respectively. *LK* from Section E3 was determined to be 40%, UNC_t from Section 4 is 0%, and *BUF* from Appendix F is 18.0% resulting in $C_{ACR,t}$ values for time period 1 of 357,331 metric tons of CO_2.

Time Period 1:

$$C_{ACR,1} = \left(\Delta C_{P,1} - \Delta C_{BSL,1}\right) \cdot \left(1 - LK\right) \cdot \left(1 - UNC_1\right) \cdot \left(1 - BUF\right) = 357{,}331 \text{ tCO}_2$$

E6. *EX-ANTE* ESTIMATION METHODS

E6.1 Ex-ante estimates of above and belowground biomass

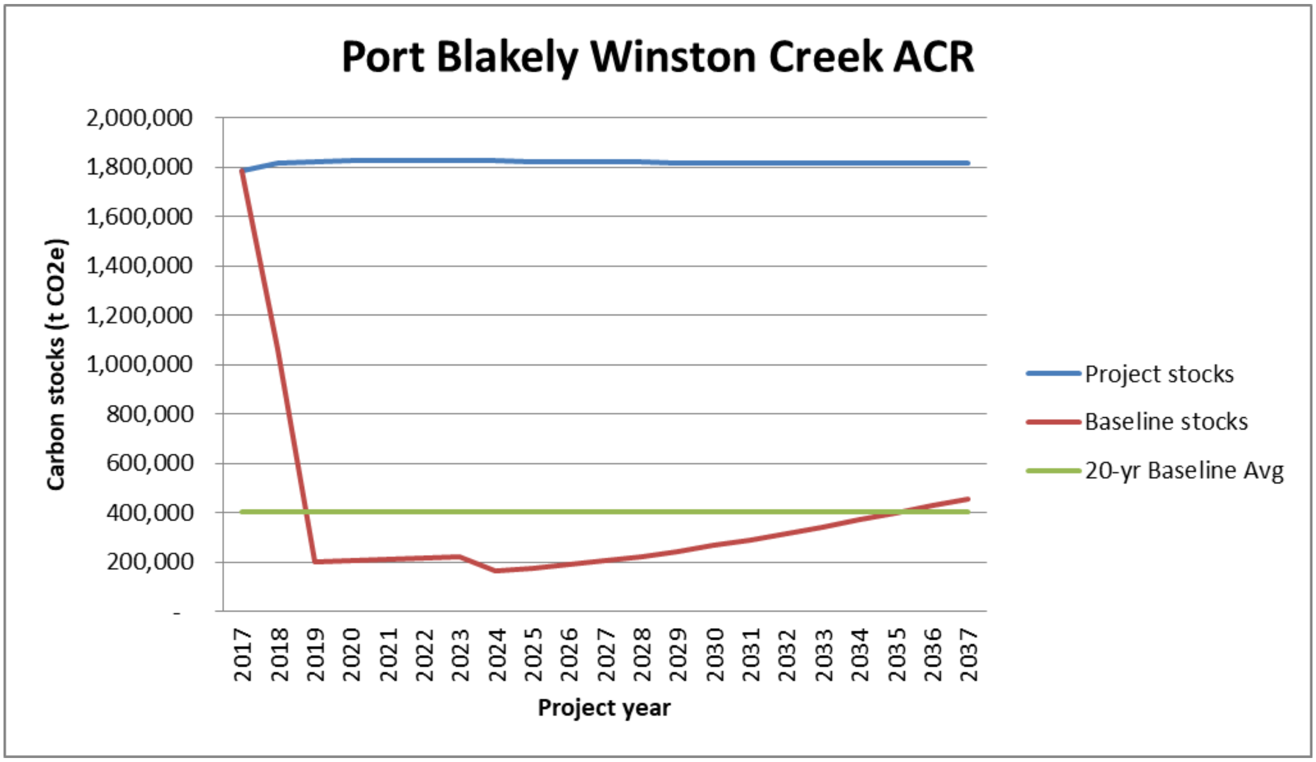
Ex-ante estimates of carbon sequestered in above-ground and below-ground live tree biomass over time are sourced from the US Forest Service Forest Vegetation Simulator[15], specifically the ORGANON Variant. Carbon calculations of above and belowground biomass by species are provided by USFS within the FIADB and BioPak. All tree species within project lands are native tree species appropriately modeled with the ORGANON Variant of the FVS model.

E6.2 Projected carbon sequestered

Carbon sequestered for the project area is modeled in Figure E-1 for the first crediting period, while values are reported in Table A-22.

[15] USDA Forest Service, Forest Vegetation Simulator http://www.fs.fed.us/fmsc/fvs/software/

Figure E-1. Projected carbon sequestration per acre for the project.



F.
COMMUNITY & ENVIRONMENTAL IMPACTS

F1. NET POSITIVE IMPACTS

Community and environmental impact assessments were not undertaken or necessary prior to project implementation as there are no perceived negative community or environmental effects of implementing the project activity (Port Blakely managers pers. comm.).

The project action will have a positive effect on the community due to maintaining local jobs, generating tax revenues, and continued charitable contributions to local communities by Port Blakely. In addition, the positive environmental benefits generated by the project activity will result in positive benefits to the citizens of the local communities, as described below.

Improved Forest Management in the Project Area will generate positive environmental benefits including: reduced soil erosion and compaction, improved water quality, improved air quality, and improved wildlife habitat – including more acres of older successional and complex forest structure for wildlife habitat over the project term.

Port Blakely is committed to providing the key habitat elements essential to fish and wildlife species across the Project Area. Thus, it is Port Blakely's company policy that management will be accomplished in a manner that maintains and/or enhances biological diversity to the extent practical based on the distribution of our ownership.

At the local scale, management emphasizes the importance of the retention of snags, and woody debris, creation of vertical structural diversity, and protection of riparian areas, wetlands and ecologically sensitive sites. In addition, Port Blakely actively supports and participates in research and conservation planning at landscape and regional scales to contribute where possible to the maintenance or enhancement of biological diversity.

Examples of our participation in landscape level conservation planning include:

- Participation in the development and implementation of the Forest and Fish Agreement with participants in the Timber, Fish and Wildlife and CMER
- Participation and financial support of the Northwest Landscape Study Group and the Western Wildlife Task Group of the National Council for Stream and Air Improvement
- Participation through programs coordinated by the Washington Forest Protection Association
- Development and implementation of the Safe Harbor Agreement, Landowner Option Plan, and Cooperative Habitat Enhancement Agreement

Port Blakely plans to manage the Project Area to a rotation age of 60 years. This project action will result in reducing the number of harvest entries from three every 100 hundred years (common practice on adjacent private industrial land) to one every 100 years. This reduction in the number of entries will significantly reduce the overall amount of disturbance across the Project Area, resulting is less soil movement and compaction. This will lead to improved water quality over the project term.

Port Blakely employs two wildlife professionals that work with forest managers to ensure wildlife concerns are integrated into all management actions. One example is that Port Blakely executed a voluntary safe harbor agreement with the U.S. Fish & Wildlife Service for the management of Northern Spotted Owl and Marble murrelett habitat. Although neither of these endangered species currently use the Project Area for nesting, the project activity will increase the potential nesting habitat for these endangered species. The safe harbor agreement protects Port Blakely from certain restrictions that other private landowners must abide by if these endangered species utilize their land for nesting.

According to the Washington Department of Natural Resources, plantation forestry began in the mid-1900s in Western Washington (where the Project Area is located). Short rotations (30 to 45 years), clearcutting, and intensive site preparation (both mechanical and burning) have some negative environmental effects; including soil erosion, air pollution due to slash burning, and the loss of the number and size of snags and the amount of decayed wood in the forest.

Port Blakely plans to minimize the amount of slash burning by implementing the following management actions: 1) chipping chunks of landing slash large enough to meet an economic threshold; and 2) scatter slash across harvest units to reduce concentrations that would interfere with tree planting activities. This will contribute to improved air quality. Further, Port Blakely plans to create and manage snags across the Project Area to enhance wildlife habitat.

Collectively, the planned actions of Port Blakely will have a positive environmental effective over the project term.

F2. STAKEHOLDER COMMENTS

Stakeholders are provided opportunity to comment on forest management activities planned and implemented by Port Blakely through the Washington Department of Natural Resources or directly to the company.

Under the State of Washington Forest Practices Act, Port Blakely is required to file an application for any planned forest management operations; such as harvesting, slash burning, herbicide application, and silvicultural treatments (i.e. planting and thinning). Each application is made available to the public, and is reviewed and approved by Washington DNR prior to the initiation of the operation(s).

If a stakeholder or the public requests more information or provides a comment through the Washington DNR application process, Port Blakely's corporate policy is to contact and directly engage the individual requesting information or providing the comment for the purpose of satisfying any concern raised about the company's forestry operations. Further, Port Blakely provides written notice to adjacent landowners of any planned herbicide applications.

Port Blakely has been a forest landowner in western Washington since the late 1800s and has a commitment to sustainable forest management, is community minded through charitable contribution of employee time and financial donations, and is a responsible neighbor to adjacent landowners.

G.

OWNERSHIP AND TITLE

G1. PROOF OF TITLE

All lands contained within the Winston Creek Forest Carbon Project Area are currently titled to Port Blakely. A copy of Deeds and Title Insurance reports will be provided to the Verification Body.

G2. CHAIN OF CUSTODY

Not Applicable – no offsets have been bought or sold previously, nor has the project entered into any forward option contracts.

G3. PRIOR APPLICATION

The project proponent, Port Blakely, has never submitted an IFM project to or had an IFM project rejected under any other greenhouse gas program on any lands it owns in the United States.

H.
PROJECT TIMELINE

H1. START DATE

The project Winston Creek Forest Carbon Project has a project start date of April 17, 2017, the date the carbon inventory was initiated. This start date is appropriate and consistent with ACR Forest Carbon Project Standard as it occurs after November 1, 1997 and is the date on which Port Blakely made a commitment to modify its management regime to increase carbon stocks in the Project Area during the project period.

H2. PROJECT TIMELINE

The schedule of project activities in chronological order for important aspects of the Winston Creek Forest Carbon Project is displayed in Table H-1.

Table H-1. Schedule of Project Activities.

Project activity	Date	Source/Notes
Project start date and start of the initial crediting period	April 17, 2017	Port Blakely action to commit the Project Area to a land management regime that will increase carbon stocks.
Forest inventory	April-May 2017	
Validation and first verification of project	Anticipated 2018	
Registration of the project	Anticipated 2018	
End date of first project crediting Period	March 31, 2037	20 years as required by ACR Forest Carbon Project Standard.
Second crediting period	April 1, 2037 – March 31, 2057	Baseline re-evaluated in April 2037, as well as revisions to comply with any revised ACR standards.
End date of project Term	March 31, 2057	40 years as required by ACR Forest Carbon Project Standard.

Frequency of Monitoring, Reporting and Verification - Annual Attestation - New ERT Issuance - Full Verification by an ACR-approved third-party verifier	2018-2037	As required by ACR Forest Carbon Project Standard. Annually Desk-based verification prior to issuance of new ERTs. Every five years
Relevant Project Activities - Re-inventory Project Area		 Every 10 years

APPENDICIES

A. **Port Blakely Forest Resource Management Planning Documents List**

B. **Winston Creek Forest Carbon Project Inventory Stata List & Inventory Plot List**

C. **Winston Creek Forest Carbon Project Inventory SOPs**

D. **Winston Creek Forest Carbon Project Inventory Report**

E. **Log Price Sheets**

F. **ACR Tool For Risk Analysis and Buffer Determination V1.0 Calculation**

G. **Winston Creek Forest Carbon Project – ACR ERT Worksheet**

H. **SFI Certificate**