

ApplicationOffset Project Data Report for Listing anthe Initial Reporting Period Bluesource – Allegheny Improved Forest Management U.S. Forest Offset Project

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OPR Staff Use Only	Date Report Received	OPR Tracking Number:	Date Report Reviewed	OPR Staff Use Only

Part I. Entity Submitting Report

This form ~~is~~ being submitted by the Authorized Project Designee (APD).

Completed By: [Joshua Strauss](#)

Mailing Address: [1935 E Vine Street, Suite 300, Murray, UT 84121](#)

Phone Number: [949-233-1501](#)

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Date Form Completed: [7/23/2018](#)

Part II. Offset Project Information

Project Name: ~~Blue Source~~[Bluesource](#) - Allegheny Improved Forest Management Project

OPD Project ID: [ACR276](#)

ARB Project ID: [CAFR5226](#)

City: Horner

State: West Virginia

Zip: 26372

Registry: American Carbon Registry

Compliance Offset Protocol: U.S. Forest Projects

Version: November 14, 2014

Start Date: [10/27/2015](#)

Reporting Period End Date: ~~10/264/30/~~[2017](#)

Crediting Period: [10/27/2015](#) to [10/26/2040](#)

The commencement date is signified by the submittal of the project listing form ACR. Per page 15 of the ARB Forest Protocol, an IFM project's commencement date can be signified by the submittal of the project's listing information.

~~The reporting period end date is predicted to be 24 months from project commencement.~~

Part III. OPO/APD Information

Offset Project Operator

OPO Name: Allegheny Rural NMTC Forestlands, LLC

CITSS ID#: CA1940

Mailing Address: P.O. Box 9162, Chapel Hill, NC 27515

Contact Person: Kaarsten Turner- Dalby

Phone Number: 303-838-2515

Email: kaarsten@forestlandgroup.com

Authorized Project Designee

APD Name: Blue Source LLC

APD's CITSS ID#: CA1278

Contact Person: Joshua Strauss

Mailing Address: 1935 E Vine Street, Suite 300, Murray, UT 84121

Phone Number: 949-233-1501

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Email: jstrauss@bluesource.com

Part IV. Land Ownership

1. Whether the Offset Project Operator is the owner in fee for the project area. Yes
 - a. If yes, provide documentation (e.g. deed of trust, title report) showing the Offset Project Operator's ownership interest in the property and its interest in the trees and standing timber on the property.

Please see provided deeds. [\(Provided separately for verification purposes.\)](#)

2. **Forest Owners:**
[Allegheny Rural NMTC Forestlands, LLC](#)

- 2.3. Offset project type (reforestation, improved forest management, or avoided conversion).

Improved Forest Management

3.1. A description of the management activities that will lead to increased carbon stocks in the Project Area, compared to the baseline.

Project Activities:

As stated in the Allegheny management plan, "the goal of timber management is to maximize the value, quality, and growth potential of the entire forest. Harvest strategies will focus on capturing the value of financially mature timber through mainly improvement type harvests. Regeneration harvests with retention will also be utilized where the stand has been degraded, creating residual basal areas targeting 20 square feet per acre. By concentrating treatments on stands having a substantial element of mature timber, AF Rural NMTC Ten Year Management Plan 29. TFG will ultimately create a better distribution of size classes, higher quality sawtimber, and substantial in growth from small to large sawtimber." As stocking shifts from the small to the large sawtimber class, total carbon levels maintained across the project area increase.

Baseline Activities:

The baseline harvesting scenarios must consider West Virginia BMPs as noted in Attachment I. Outside of SMZ zones, there are no regulations on harvesting. Clear cut and single tree selection harvests would be the predominant silvicultural techniques applied in the baseline, converting the uneven aged stands to even aged. This would cause rotation ages to decrease, decreasing the age class structure on the property and significantly reducing the carbon stocks as management trends away from natural forest management.

Thus, the management strategies utilized in the project scenario will maintain increased stocks above the baseline over time.

4. Indicate if the offset project occurs on public or private lands, and further specify if the offset project occurs on any of the following categories of land:

Private Lands

- a. Land that is owned by, or subject to an ownership or possessory interest of a Tribe; No
- b. Land that is "Indian lands" of a Tribe, as defined by 25 U.S.C. §81(a)(1); or No
- c. Land that is owned by any person, entity, or Tribe, within the external borders of such Indian lands. No

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Part V. Offset Project Area

1. Governing jurisdiction, and latitude/longitude coordinates: 38.45° N/ -80.97° W

2. Project Area Assessment Areas

<u>Supersection</u>	<u>Assessment Area</u>	<u>Acres</u>
<u>Allegheny & North Cumberland Mountains</u>	<u>Allegheny & North Cumberland Mountains Cove Forests</u>	<u>9,260</u>
	<u>Allegheny & North Cumberland Mountains Mixed Hardwoods</u>	<u>590</u>
	<u>Allegheny & North Cumberland Mountains Northern Hardwoods</u>	<u>26,446</u>
	<u>Allegheny & North Cumberland Mountains Oak-Hickory</u>	<u>5,087</u>
	<u>Southern Allegheny Plateau Oak-Hickory</u>	<u>440</u>
<u>Southern Allegheny Plateau</u>	<u>Southern Allegheny Plateau Upland Hardwoods</u>	<u>988</u>
	<u>Total</u>	<u>42,812</u>

*Subtotals may not sum to total due to rounding.

3. Identify and describe the governing jurisdiction(s) applicable to the Project Area.

Governing Jurisdiction: Clay County is located in the Fourteenth Judicial Circuit or West Virginia.
Latitude/ Longitude: 38.45° N/ -80.97° W

4. Describe how the Project Area was determined.

The project area was determined using GIS to include 42,812 forested acres owned by Allegheny Rural NMTC Forestlands, LLC (referred to as Allegheny throughout the OPDR).

Allegheny owns in total 46,673 acres. Non-forested acres were removed from the project, including mines, roads, right-of-ways, and streams. All excluded areas were removed within a minimum mapping unit of 2.5 acres. After these areas of non-forest were excluded, the total project area included 42,812 acres. To ensure no neighboring properties encroached into the Project Area, ownership extent has been confirmed by property managers and will be further verified in the field.

To ensure project boundaries are accurate, Allegheny's land managers continually survey the property and update shapefiles with the new survey as soon as they are provided a survey plat from the professional surveyor. The project area boundary was created using the most up-to-date shapefile at the time of the project's commencement.

It is important to note, that the in West Virginia, publicly available PLSS data is not available. Further, according to regional professional foresters, in the Appalachian region, fee-based county tax mapping information is not

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trustworthy for reliable ownership verification – either geographical placement of a parcel, shape or alignment of a parcel, or even the existence of a parcel.

A supporting georeferenced shapefile has been provided separately for verification purposes.

2.5. Existing land cover and land use

Land Cover: The Project Area's land cover is mainly hardwood forests. All non-forest acres will be removed from the project.

Land Use: The current land use is commercial forestry.

3.6. Forest vegetation types

The two five main forest type types across the property (42% total forest cover) is mature Yellow Poplar-White are Cove Forests (24%), Mixed Hardwoods (2%), Northern Hardwoods (56%), Oak-Red Oak forests, Hickory (14%), and White Oak-Red Oak-Black Oak forest (57%). The remaining acres (<1%) is mixed hardwoods, with Birch and Sycamore as the major species within this vegetation type. Upland Hardwoods (2%).

4.7. Site classes class

As currently assessed, 100% of the property is considered low site class as the annual forest productivity (cubic feet/ acre) is less than 120 cubic feet/ acre. Site class will be was determined using NRCS soil data and the associated NRCS Forestland Productivity reports.

5.8. Land pressures and climate zone/classification

Though the region is widely used for timber production, there are several non-timber land pressures including coal, oil, gas, and wind production.

Climactic zone: The project area falls within climactic one 6b zone 7b on the USDA plant hardiness zone map.¹ Average annual extreme minimum temperatures for this zone range from -5 to 6 10 degrees Fahrenheit. In West Virginia's mountains, the growing season is about 140 days per year with a mean annual precipitation of 40 to 50 inches distributed fairly evenly throughout the year. The normal daily average temperature in the summer is about 75 degrees Fahrenheit and in winter, about 45 degrees Fahrenheit.

6.9. Historical land uses, current zoning, and projected land use within project area and surrounding areas

This property has been historically used for commercial timber operations (See management history in section 8b for more detail). The land is projected to remain as working timberland throughout the duration of the current forest ownership. -The project area falls into unincorporated areas of Clay County, West Virginia, which has no zoning classification.

7.1. Project Area Assessment Areas

Supersection	Assessment Area	Acres
Southern Allegheny Plateau	Southern Allegheny Plateau Lowland Hardwoods	55
	Southern Allegheny Plateau Oak-Hickory	611

¹ <http://planthardiness.ars.usda.gov/PHZMWeb/>

	Southern Allegheny Plateau Upland Hardwoods	760
Allegheny & North Cumberland Mountains	Allegheny & North Cumberland Mountains Cove Forests	17,255
	Allegheny & North Cumberland Mountains Mixed Hardwoods	87
	Allegheny & North Cumberland Mountains Oak- Hickory	24,171
	Total	42,940

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8. General description of the forest conditions within the Project Area:
a. Species (tree) composition;

Chestnut Oak, Red Oak, Red Maple, and Yellow Poplar are the main species found across the property, comprising 60% of the total live basal area in the Project Area. The remaining species are a mix of northern hardwood species. Of the softwood species, eastern hemlock, Virginia pine, and white pine only comprise 3% of the total live basal area across the Project Area.

Species	Total Live Basal Area (Sq. ft.)	Frequency
American Beech	40.56	2%
Basswood	67.96	3%
Black Birch	44.77	2%
Black Cherry	62.44	3%
Black Gum	21.10	1%
Black Locust	13.40	1%
Black Oak	64.14	3%
Chestnut Oak	412.06	17%
Cucumber	43.68	2%
Eastern Hemlock	45.77	2%
Elm	8.09	0%
Hickory	74.20	3%
Misc Hwd	12.35	1%
Mtn. Magnolia	4.43	0%
Other Softwood	1.24	0%
Pitch Pine	4.93	0%
Red Maple	260.81	11%
Red Oak	353.31	15%
Sassafras	8.70	0%
Scarlet Oak	76.81	3%
Sugar Maple	205.90	8%
Sycamore	22.88	1%
Virginia Pine	3.25	0%
White Ash	14.94	1%
White Oak	108.99	4%
White Pine	9.77	0%
Yellow Birch	3.91	0%
Yellow Buckeye	3.01	0%
Yellow Poplar	430.39	18%
Grand Total	2,423.78	100%

b. Age class distribution;
From the last FSC audit information, the majority of the stands (99%) within the Project Area are over 61 years old, while about 1% of the property is aged 16-60 years old, and less than 1% of the property is under 15 years old.

Age Class	Acre	% Area
0-15	213	0.5%
16-60	382	0.9%
61+	42,343	98.6%

G. Management history:

According to AF Rural NTMC LLC, "The AF Rural NMTC property has been exposed to various forms of timber management since its existence. The property has always been an industrial property with coal mining, oil and gas development and timbering activities.

Some records indicate that timbering started on the property around 1901 with large contracts to local sawmills that harvested the best large, high quality timber. Georgia Pacific Corporation operated a sawmill at Swandale until 1977 when the operations ceased due to failure to comply with contractual obligations.

In the Pittston and Pegasus area, ownership focused on the coal resource and timber management was a secondary concern. There were timber cutting contracts with various local sawmills and all contracts imposed strict diameter limit cutting. Virtually no cull trees were cut and it was logger's choice on what was harvested. These Pittston-Pegasus contracts expired in 1991.

In 1991 the Barringer family purchased the property and started practicing intense forest management. Coastal Lumber harvested timber with contracts that were supervised by Barringer management that contained variable diameter limiting cutting with all cull trees being cut. This occurred until 1994 when improvement type harvests were incorporated. Stands were marked using individual tree selection with the emphasis to improve stand quality and yields. Trees that were mature, poor form, less desirable, forest fire damaged and culls were removed."

9-10. Indicate whether the project will employ a Qualified Conservation Easement.
No.

Part VI. Offset Project Eligibility

1. A statement as to whether any GHG reductions or GHG removal enhancements associated with the Project Lands have ever been listed or registered with, or otherwise claimed by, another registry or program, or sold to a third party prior to listing, including;
 - a. Have any lands within the Project Area ever been listed or registered with an offset project registry or program in the past?
 - b. Have greenhouse gas emission reductions or removal enhancements associated with lands within the Project Area been credited or claimed for the purpose of greenhouse gas mitigation or reduction goals, whether in a voluntary or regulatory context?
 - c. If yes, identify the registry or program (include vintages and reporting period).

None of the Project Lands have ever been listed, registered with, or otherwise claimed by, another registry or program. No greenhouse gas emission reductions or removal enhancements associated with lands within the Project Area have ever been credited or claimed for the purpose of greenhouse gas mitigation or reduction goals, whether in a voluntary or regulatory context.

2. A statement as to whether the project is being implemented and conducted as the result of any law, statute, regulation, court order, or other legally binding mandate? If yes, explain.

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The project is not being implemented and conducted as the result of any law, statute, regulation, court order, or other legally binding mandate.

3. Declaration that the offset project does *not* employ broadcast fertilization.

The offset project does not employ broadcast fertilization.

4. If the Forest Project is located on public land, a description and copies of the documentation demonstrating explicit approval of the offset project's management activities and baseline including any public vetting processes necessary to evaluate management and policy decisions concerning the offset project.

This project does not occur on public lands, so therefore this section is not applicable.

5. If the Forest Project is located on the following categories of land, a description and copies of documentation demonstrating that the land within the Project Area is owned by a tribe or private entities:

This project does not occur on tribal lands, so therefore this section is not applicable.

6. If commercial harvesting is either planned or ongoing within the Project Area, a description of how the Forest Owner satisfies one of the three requirements for employing and demonstrating sustainable long-term harvesting practices on all of its forest landholdings (refer to Section 3.8.1).

- ☐ Not applicable; no commercial harvesting is occurring within the Project Area.
- ☒ Third party certification under the Forest Stewardship Council, Sustainable Forestry Initiative, or Tree Farm System, whose certification standards require adherence to and verification of harvest levels which can be permanently sustained over time.
- ☐ Adherence to a renewable long-term management plan that demonstrates harvest levels which can be permanently sustained over time and that is sanctioned and monitored by a state or federal agency.
- ☐ Employ uneven-aged silvicultural practices and maintain canopy retention averaging at least 40% across the forest, as measured on any 20 acres within the entire forestland owned by the Forest Owner, including land within and outside of the Project Area (areas impacted by Significant Disturbance may be excluded from this test).

7. A description of how the offset project meets (or will meet) the definition of "Natural Forest Management" (refer to Section 3.8.2), including:

- a. Composition of native species;

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<u>Species</u>	<u>Total Live Basal Area (Sq. ft.)</u>	<u>Frequency</u>
<u>Ailanthus</u>	<u>0.15</u>	<u>0%</u>
<u>Am Hornbeam, Musclewood</u>	<u>0.58</u>	<u>1%</u>
<u>American Basswood</u>	<u>3.51</u>	<u>3%</u>
<u>American Beech</u>	<u>8.09</u>	<u>7%</u>
<u>American Elm</u>	<u>0.03</u>	<u>0%</u>
<u>Bitternut Hickory</u>	<u>0.48</u>	<u>0%</u>
<u>Black Cherry</u>	<u>0.17</u>	<u>0%</u>
<u>Black Locust</u>	<u>0.27</u>	<u>0%</u>
<u>Black Oak</u>	<u>2.92</u>	<u>3%</u>
<u>Black Walnut</u>	<u>0.21</u>	<u>0%</u>
<u>Blackgum</u>	<u>2.27</u>	<u>2%</u>
<u>Chestnut Oak</u>	<u>12.85</u>	<u>11%</u>
<u>Cucumbertree</u>	<u>2.16</u>	<u>2%</u>
<u>E. Hophornbeam</u>	<u>0.03</u>	<u>0%</u>
<u>Eastern Hemlock</u>	<u>6.45</u>	<u>6%</u>
<u>Eastern Redbud</u>	<u>0.07</u>	<u>0%</u>
<u>Flowering Dogwood</u>	<u>0.10</u>	<u>0%</u>
<u>Magnolia Spp.</u>	<u>0.16</u>	<u>0%</u>
<u>Mockernut Hickory</u>	<u>1.51</u>	<u>1%</u>
<u>Northern Red Oak</u>	<u>4.18</u>	<u>4%</u>
<u>Norway Spruce</u>	<u>0.04</u>	<u>0%</u>
<u>Other</u>	<u>0.01</u>	<u>0%</u>
<u>Paulownia, Empresstree</u>	<u>0.09</u>	<u>0%</u>
<u>Pawpaw</u>	<u>0.08</u>	<u>0%</u>
<u>Pignut Hickory</u>	<u>6.54</u>	<u>6%</u>
<u>Pin Cherry</u>	<u>0.02</u>	<u>0%</u>
<u>Pitch Pine</u>	<u>0.18</u>	<u>0%</u>
<u>Red Maple</u>	<u>14.21</u>	<u>13%</u>
<u>River Birch</u>	<u>0.13</u>	<u>0%</u>
<u>Sassafras</u>	<u>0.33</u>	<u>0%</u>
<u>Scarlet Oak</u>	<u>3.65</u>	<u>3%</u>
<u>Serviceberry Spp.</u>	<u>0.08</u>	<u>0%</u>
<u>Shagbark Hickory</u>	<u>0.73</u>	<u>1%</u>
<u>Silver Maple</u>	<u>0.02</u>	<u>0%</u>
<u>Slippery Elm</u>	<u>0.19</u>	<u>0%</u>
<u>Sourwood</u>	<u>1.71</u>	<u>2%</u>
<u>Sugar Maple</u>	<u>11.17</u>	<u>10%</u>
<u>Sweet Birch</u>	<u>2.93</u>	<u>3%</u>
<u>Sweetgum</u>	<u>0.78</u>	<u>1%</u>

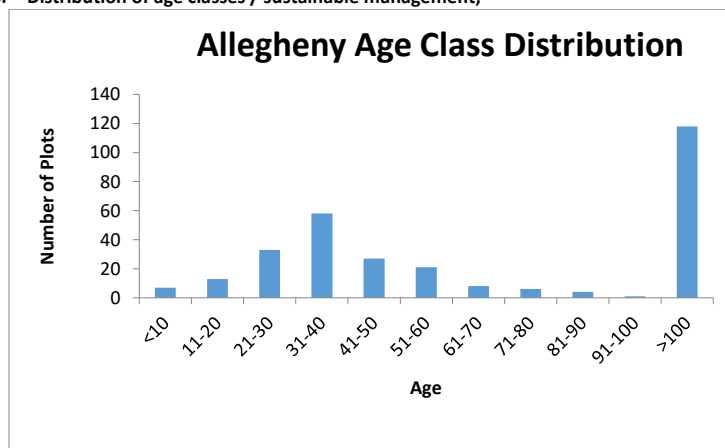
Sycamore	1.69	1%
Virginia Pine	0.14	0%
White Ash	0.51	0%
White Oak	8.86	8%
Yellow Birch	0.86	1%
Yellow Buckeye	0.22	0%
Yellow-Poplar	11.43	10%
Total	112.77	100%

*Total may not sum to 100% due to rounding

The project area naturally consists of a mixed species distribution where no single species' prevalence, measured as the percent of basal area of all live trees in the Project Area, exceeds the percentage value of standing live carbon shown under the heading 'Species Diversity Index' in the Assessment Area Data File. The minimum weighted average species diversity index across the Project Area % is 60%, found in the Southern Allegheny Plateau Lowland Hardwoods, while the remaining assessment areas range from 65-70%-69%. As seen in section V.8 at the table above, the most prevalent species on the property is Yellow Poplar (18%), which falls well below 60% threshold.

- i. Explain how the project will demonstrate a trend toward achieving the Species Diversity Index of native species and meet this requirement within 25 years. NA
- ii. If the Project Area does not naturally consist of a mixed species distribution: Will or have you provided a written statement from the government agency in charge of forestry regulation in the state where the project is located stipulating that the Project site is not capable of meeting the requirement of mixed species distribution. NA

b. Distribution of age classes / sustainable management;



Across the project area, less entire Project Area, which is smaller in acreage than 1% of the project's forestlands are maintained in age classes the watersheds noted in Part X. Attachment E.4., less than 6.8% of the inventories plots were determined to be 20 years old—or younger.

c. Structural elements (standing ~~and lying~~ dead wood);

Live C	Dead C	% Standing Dead
37.442.0	1.40.6	3.1.4%

As of the end of the first reporting period, standing deadwood accounted for 0.6 mt C/acre or 1.4% of the total carbon in standing live trees throughout the property. There are no portions of the property that are currently subject to salvage harvesting operations. As of the start date, the project did not meet the 1 mt C/acre structural elements criteria of the COP for U.S. Forest Projects, but the Project will continue to progress towards meeting this criteria based on the standing deadwood retention requirements laid out in the Project's forest management plan. In the Allegheny Management Plan, snags will be retained and recruited, continuing progress towards meeting the structural elements criteria.

8. On a watershed scale up to 10,000 acres (or the Project Area, whichever is smaller), projects must maintain, or make progress toward maintaining, a maximum of 40% of the project's forest lands in ages that are less than 20 years old. (Areas impacted by Significant Disturbance are exempt from this test until 20 years after reforestation of such areas.) Does the acreage within this project meet this requirement?
Yes. Please see the Modeling Explanation document, provided separately for verification.

a. Explain how the project demonstrates continuous progress toward meeting this requirement within the next 25 years. NA

9. A description of the management activities that will lead to increased carbon stocks in the Project Area, compared to the baseline.

As stated in the Allegheny management plan, "the goal of timber management is to maximize the value, quality, and growth potential of the entire forest. Harvest strategies will focus on capturing the value of financially mature timber through mainly improvement type harvests. Regeneration harvests with retention will also be utilized where the stand has been degraded, creating residual basal areas targeting 20 square feet per acre. By concentrating treatments on stands having a substantial element of mature timber, AF Rural NMTC Ten-Year Management Plan." As stocking shifts from the small to the large sawtimber class, total carbon levels maintained across the project area increase.

Thus, the management strategies utilized in the project scenario will maintain increased stocks above the baseline over time.

Currently, the quantity

10. Does the Project Area have a canopy cover that is greater than 10 percent?
Yes. See Attachment F for supporting documentation

11. Indicate how the offset project meets the definition of lying dead wood is commensurate with recruitment from standing dead trees as the project maintains an average Natural Forest Management per Table 3.2 in the Compliance Offset Protocol US Forest Offset Projects, November 14, 2014:

a. Does the project consist of at least one metric to 95% native species based on the estimated sum of carbon (C) in the standing live carbon pool? Improved Forest Management Projects are assessed using estimates of basal area per acre. Yes

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Part VII. Carbon Stock Inventory

IFM-1 Standing Live

All live trees will be recorded for for species, DBH (to nearest 0.1 inch), % missing/rotten wood (using procedure outlined below), and decay class (using the Domke et al. 2011 classification system). If a tree will be snapped, the height as the tree originally stood, as well as the height in the tree's current condition (in feet), will be recorded.

Total height and height to a 4" top will be measured to the nearest foot for all trees sampled on every plot. All heights will be recorded for each tree; however, in the instances where heights could not be recorded due to landscape limitations, the missing heights will be regressed by species using all measured total heights.

Missing and cull deductions will be calculated by dividing each damaged tree into thirds (considering the height of the tree as it originally stood, based on the height of similar nearby trees) and estimating the percentage that will be missing or rotten in each third. This percentage figure will be then multiplied by the approximate percentage of tree biomass found in each third of a typical tree (65% in the bottom third, 25% is in the middle third, and 10% is in the top third according to CAR's FPP 3.3 Quantification Guidance document) to get the total deduction percentage.

Additional detail on the measurement of standing live can be found in the Inventory Methodology below.

Biomass will be computed using the component ratio method and Jenkins coefficients following the procedures and equations outlined in "The Forest Inventory and Analysis Database: Database Description and User's Manual Version 4.0 for Phase 2," and as specifically described in Appendix J Tables 1 through 4. As stated in the COP, biomass will be converted into 0.5 to calculate the mass (kg) in carbon. This product must be multiplied by 0.001 tons/kg to convert the mass to metric tons of carbon. Then, the product will be multiplied by 3.664 to convert the metric tons of carbon into metric tons of CO₂e.

Gross cubic foot volume will be calculated using equations outlined in Woodall et al. 2011, "Methods and Equations for Estimating Aboveground Volume, Biomass, and Carbon for Trees in the U.S. Forest Inventory, 2010".

The belowground portion of live and dead trees is calculated using the component ratio method ("CRM") described in Appendix J of the FIA documentation cited in the Protocol.

	Weighted Average tCO ₂ e/acre	Total tCO ₂ e
Start Date Estimate	137.2	5,891,143

Projected Growth. The Northeast (NE) variant of the Forest Vegetation Simulator (Dixon and Keyser 2013) will be used to model forest growth, mortality and harvest over 100 years. Plot data will be entered into a database readable by FVS, with each plot entered as an individual stand and each tree record multiplied by the appropriate factor to determine trees per acre. After entry into FVS, the "forest" will be grown 100 years and the resulting tree list used to calculate biomass.

For project and baseline modeling, all FVS defaults will be used besides the following calibration components:

- The location code: Wayne (914)
- Age of the stands
- Site index values derived from a site index tree at each plot
- Minimum acceptable harvest volumes of 2,000 board feet/ acre
- Minimum DBH for all harvests

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Site index will be determined using cores collected during the inventory. Cores will be collected from a determined "indicator species" that is representative across the entire project area. For each plot, the site index value of the determined indicator species will be entered into FVS, which will automatically calibrate the site index values to each measured species using default conversion values. Site index values for each species does not need to be calculated prior to running FVS.

FVS defaults used can be found in Part VIII, section 3.

Adjustments for Start Dates: To determine CO₂ stocks at the project commencement date, the tree data will be degrown from the date of inventory to the project's start date of 10/27/2015. This adjustment will take place by growing individual trees backwards at the appropriate seasonal rate based on FVS predicted diameter growth rates for each tree. Each sapling and tree will be grown from the inventory date for 10 years to calculate the annual reduction in tree per acre (TPA) for each tree. This method for determining individual tree mortality will be done separately for trees and saplings. The default mortality settings for the NE Variant of FVS will be used for all of the baseline modeling.

Modeling Project Activities:

The following prescription will be modeled in FVS, as stated in the Ten-Year Management plan:

"Yellow Poplar—White Oak—Northern Red Oak type: A large portion of this type is found in streamside management zones (SMZs). Therefore, silvicultural prescriptions are secondary to FSC requirements and West Virginia Best Management Practices (BMPs). Within these constraints, usual practice is the selection of an occasional mature stem within the buffer zone. For stands that are immature, single aged, and outside the SMZ buffer, a crown touching crop tree release prescription will be the most usual tactic.

White Oak—Black Oak—Northern Red Oak Type: Acceptable growing stock includes scarlet oak, chestnut oak, black oak, white oak, red oak, yellow poplar, hickory, white ash and red maple. Maturity for this type is defined as areas where 30% of the basal area of merchantable stems (acceptable and unacceptable growing stock) has attained a dbh $\geq 18"$ and where at least 75% of the merchantable basal area is contained in sawtimber-sized stems. Well-stocked areas contain at least 75 BA. These areas are candidates for regeneration cuts. Normally, regenerated stands should not exceed 10 acres; unless sufficient residual basal area is retained in either a scattered or clumped arrangement, or at least 300 stems per acre of acceptable advanced regeneration is retained. Selection of a stand or area for a regeneration cut is based upon: the presence of or potential for acceptable regeneration of acceptable growing stock (AGS); the size of the area; the level of the allowable annual cut; the potential for loss of volume within the area; aesthetics; wildlife considerations; and accessibility. Such sites are not candidates for partial cuts due to insufficient basal area and/or volume per acre.

Sycamore—Maple—American Elm Type: Single tree selection will be the primary harvest strategy. Usually, stands of this type are only harvested when there is harvest activity on an adjacent stand of a different forest type. According to FSC and BMP guidelines, at least 50% of the canopy must be retained when harvesting within an SMZ. Shade is primarily retained in non-merchantable stems and lower valued species."

The above silvicultural prescription will be modeled using 5-10 year simulation periods with harvest frequencies triggered when a stand reaches the appropriate basal area target for each treatment. Species retention post-harvest will be determined with consultation from the forest managers. Overall, hardwoods species will be preferred over softwood.

Adjustments for Reporting Period Calculations: To determine CO₂ stocks at the end of the reporting period, all trees will be grown forward to the reporting period end date set at the appropriate seasonal rate based on FVS predicted diameter growth rates for each tree (the same method used for the start date calculations). In addition, the mortality that occurred between the inventory and the reporting period will be simulated by decreasing or increasing the trees per acre for each tree record at the appropriate rate based on the FVS predicted mortality rate for each tree. All

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plots harvested during the reporting period will be re-inventoried so that all harvested trees will be removed from the inventory for the reporting period calculations.

IFM-3 Standing Dead

All standing dead trees of $\geq 5''$ DBH and $\geq 15'$ of height will be recorded for species (if possible), height as the tree originally stood, height in the tree's current condition (in feet), DBH (to nearest 0.1 inch), % missing/rotten wood (using procedure outlined above), and decay class (using the Domke et al. 2011 classification system).

Standing dead wood carbon will be calculated by estimating above and below ground biomass in the same manner it will be for live trees and then converting this figure to CO₂e. Domke et al. 2011 will be used to apply Structural Loss Adjustments and Density Reduction Factors for standing dead trees.

The estimates of standing dead wood will be calculated on a per acre basis for each stratum. A project-wide estimate of standing dead wood is calculated using a weighted average with weights assigned based on stratum size.

Estimates

Provide a description of standing dead will be updated in the project scenario every time new the inventory data is collected. For the baseline, standing dead is projected to remain constant over the 100 year baseline at 4.1 tonnes CO₂ per acre.

	Weighted Average tCO ₂ e/acre	Total tCO ₂ e
Start Date Estimate	4.1	176,734

IFM-6 Soil (if applicable)

Excluded.

IFM-7 Carbon in in-use forest products

Carbon in in-use forest products will be calculated based on standing tree inventory data methodology. No specific inventory processes apply.

Wood products calculations will be completed using an excel model based on the ACR Forest Project Calculation worksheet. (Provided separately for verification purposes.)

A default regional value will be used for mill efficiency and product mix based on weighted average of relative acreage.

End of Reporting Period Estimate

Project Harvested Wood Products Summary	Total (tCO ₂ e)	tCO ₂ e/acre
Total Harvested Wood Products	208,812	4.86
Long-term storage in in-use wood products	44,268	1.03

IFM-8 Forest product to quantify carbon in landfills

Forest products stocks for each required carbon in landfills will be calculated based on standing tree inventory data pool in the forest project's offset boundary. The inventory methodology must describe the information required in. No specific inventory processes apply. Forest product carbon in landfills will be calculated in accordance with the procedures described per Appendix CA.3 of the Forest Compliance Offset Protocol.

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End-of-Reporting-Period Estimate

Project Harvested Wood Products Summary	Total (tCO ₂ e)	tCO ₂ e / acre
Long term storage in wood products in landfills	22,134	0.52

IFM-9 Biological emissions from site preparation

NA

A. IFM- U.S. Forest Projects, November 14 Biological emissions/removals from change in harvesting on forestland outside the Project Area, 2014.

NA

IFM-17 Biological emissions from decomposition of forest products

Biological emissions from decomposition of forest products will be calculated based on standing tree inventory data. No specific inventory processes apply. Biological emissions from decomposition of forest products will be quantified as a component of carbon stored in in-use forest products (IFM-7) and landfills (IFM-8).

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Inventory ~~Methodology~~Methodology

For all applicable carbon pools, the following inventory methodology ~~will be~~was employed:

Project Boundary: The offset Project Area ~~will be~~was determined using the most recent geospatial file of the ~~of the~~ property. All roads, right-of-ways, major water bodies, and other non-forested areas ~~will be~~were removed from the Project Area. The minimum mapping unit for the project area was 2.5 acre (or approximately 1 hectare) (Knight and Kunetta 2003). Some forested areas ~~may be~~were removed due to management considerations.

Pre-Sampling Stratification: The original inventory design was laid out based on the landowner's existing cover types, grouped into the following 4 groups: BIRCH, SYC 61+, WO, BO, NRO 61+, Young, and YP, WO, NRO 61+. However, when taking into account the variability in each stratum (to minimize sampling error), as well as the original verification considerations (having enough plots to pass sequential sampling), different numbers of plots were placed into each stratum. For further specification, please see the "Allegheny Modeling Explanation 7 17 18" document, provided separately for verification.

Post-Sampling Stratification: The Project ~~will be~~was stratified into ~~three~~six distinct strata. The stratification ~~is be~~ based on the most recent stands geospatial file and inventory in order to reduce the sampling error below 5.1%. Stratification was conducted post-inventory using remote sensing techniques described in the "Allegheny Assessment Area Stratification 7 17 18" provided separately for verification. The resulting strata acres and spatial distribution are shown below.

Strata	Acres
Allegheny & North Cumberland Mountains Cove Forests	9,260
Allegheny & North Cumberland Mountains Mixed Hardwoods	590
Allegheny & North Cumberland Mountains Northern Hardwoods	26,446
Allegheny & North Cumberland Mountains Oak-Hickory	5,087
Southern Allegheny Plateau Upland Hardwoods	440
Southern Allegheny Plateau Oak-Hickory	988
Total	42,812

*Sub-totals may not sum to 100% due to rounding.

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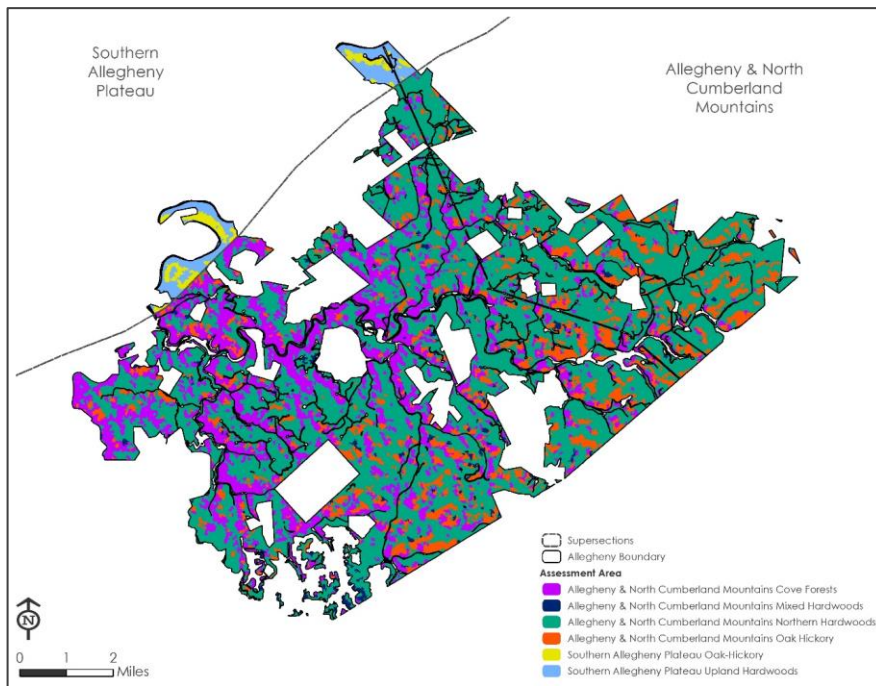
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Plot Number and Locations: A network of randomly selected systematic permanent inventory plots will be installed across the project area. Using the Random Point Generator The Fishnet Grid tool in ArcGIS, was used to create a grid for each of the cover types provided in the initial stand file provided by the landowner. The initial stand file included the following cover types: Birch, White Oak - Black Oak - Red Oak, Young, and Yellow Poplar - White Oak - Red Oak. Using these four cover types, four fishnets were created and overlapped with each stand type for a total of 296 plots will be selected across the entire project area, placed the plots at least 74.4 feet apart, ensuring no overlapping plot boundaries. The final 296 plots sampled were the number needed to reach <5.1% sampling error.

Monumentation: Permanent inventory plot centers will be monumented with a rebar pole pounded into the ground and topped with a small rebar cap flush with the ground.

Sampling Method: Permanent, fixed-radius plots will be established across the Widen Tract of Allegheny Rural NMTC Forestlands, LLC's property to facilitate precise tracking of individual tree growth and ease of verification. At each plot location, a 1/40th acre (37.2' radius) fixed-radius plot will be established to measure all trees greater than or equal to 5.0" in diameter at breast height (DBH); and a 1/100th acre (11.8' radius) sub-plot will be taken to capture live woody trees and saplings less than 5" (1.0 to 4.9" DBH). This plot design gave forest managers the opportunity to consistently track the growth and development of specific trees over an extended timeline and will allow for improved ease of plot location during field work and site verifications.

The protocol defines trees as "A woody perennial plant, typically large and with a well-defined stem or stems carrying a more or less definite crown with the capacity to attain a minimum diameter at breast height of 5 inches and a minimum height of 15 feet with no branches within 3 feet from the ground at

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maturity." As a result, please measure all species $\geq 1"$ DBH that meet this definition (a master list of FIA species co-ords for trees found on the property can be found on the final page of this document). As a result, inventory crew measured all species $\geq 1"$ DBH that met this definition. For all trees in the fixed-radius plot, species, status, DBH (to the nearest tenth of an inch), 4" top height (to the nearest foot or +/- 5' for difficult to measure trees), phantom 4" top height (using nearby live trees of same species and DBH), and decay class (for snags) were measured. In the subplot, species and DBH were recorded for each eligible tree. Defect for live trees was estimate by dividing the tree into thirds based on total original height and weighted according to the protocol. Defect for dead trees used the same method except considered defect in the bole only instead of the whole tree. Measurements for DBH and height of irregular trees used the methods outlined in the Forest Inventory and Analysis National Core Field Guide Version 7.1. Further specification for field measurements are provided in the "Allegheny Carbon Inventory Methodology 7 17 18" document.

Statistical Standard: Mean volume estimates (e.g. above ground carbon per acre) for the ownership ~~will be~~ were reported with a minimum statistical precision of +/- 5% of the mean at the 95% confidence level. These objectives may be adjusted for more or less precision based on a property-specific analysis of data collection cost relative to return.

Sampling Frequency: Full project level inventories of the carbon project will be conducted at 6-12 year intervals. Inventories of select portions of the Project Area will be updated periodically in response to natural disturbance or significant forest management activities. Traditional pre and post harvest monitoring techniques will be employed to inform land managers of potential needs to implement a more comprehensive monitoring of carbon pools (refer to Pearson, Brown, Birdsey 2007).

Harvest Re-Measurement: If a plot is harvested, the plot will be re-measured within 6 months of yarding to assess which trees will be taken out so that the inventory can be updated for the current reporting period. Blue Source will work with Allegheny Rural NMTC Forestlands, LLC to determine which plots have been harvested during the reporting period.

Data Collection Materials: Data ~~will be~~ was collected on hand held electronic data recorders. If data recorders ~~are~~ were not available, field data ~~can be~~ was collected on paper tally sheets and manually entered into a computer for data analysis. All data sheets ~~will be~~ were scanned and sent to Blue Source.

Field personnel used the following equipment for obtaining forest-carbon inventory data: 75' or longer Logger's Tape designed to measure in 10ths of feet and 10ths of inches for diameter, clinometer capable of measuring height in feet and slope angle, laser rangefinder capable of measuring height to the nearest +/- 1', as well as distance (+/- 1'), electronic data recorder (EDR), compass, GPS handheld unit (capable of 3 meter accuracy) with point locations, Distance Measuring Equipment (DME) or rangefinder, cover type maps and aerial Photographs, pencils and permanent marker, flagging, aluminum tree tags, aluminum nails (cannot contain iron as this may damage the tree), hammer, tube paint or spray paint for marking DBH measurement and tree number, rebar poles and caps for marking plot centers (.5 in diameter, 2 ft. length), species code list, paper tally sheets (in case EDR fails), overview and point location maps.

QA/QC Field Procedures: At least 5% of the plots ~~will be~~ were checked by a different forester than cruised the plot, ~~preferably~~ specifically by someone senior to the field crew. This ~~will involve~~ involved full plot measurement to identify any problems with determining in/out trees, species calls, defect measurements, DBH measurements, and height measurements. Any consistent height, species, DBH, or defect errors ~~will be~~ were resolved by talking with the foresters.

QA/QC Desk Procedures: The following QA/QC approach ~~is~~ was designed to ensure that field data, once input, ~~is~~ was appropriately managed and maintained, and that subsequent calculations using that data to determine onsite carbon stocks and associated ARBOC issuance ~~are~~ were correctly implemented. A three-stage QA/QC process with a defined review group for the project ~~will be~~ was established, engaging both

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personnel intimately familiar with all project files and documentation, as well as independent reviewers are/were able to bring “fresh eyes” to key outputs.

Independent Forester Review: The project implementation team (Blue Source) 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/were led by one of these foresters. Prior to finalization, a second forester who did not lead development of that component is/was tasked with a QA/QC review including random examinations and data checks to identify and fix any errors.

Technical Review: Once quantitative outputs are/were finalized, exported from Access/FVS to Excel, and are/were ready to be transferred into the Offset Project Data Report (OPDR) and other project documents, an independent manager reviewed these outputs. This individual performs/performed data checks by tracing key outputs back from final ARBOC calculations through the chain of Excel documents to the underlying Access/FVS database.

Senior Management Review: Once outputs have been/were transferred from Excel to the OPDR 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/reviewed text, grammar and formatting for presentation and accuracy.

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 Blue Source for a minimum of 15 years.

IFM-1 Standing Live:

Please see the “Allegheny Carbon Inventory Methodology 7 17 18” document, provided separately for verification.

IFM-3 Standing Dead:

Measurements for dead trees will include all the same measurements as live trees, as well as decay class (classes 1-5). Please see the “Allegheny Carbon Inventory Methodology 7 17 18” document, provided separately for verification, for additional detail.

IFM-6 Soil (if applicable): Excluded.

IFM-7 Carbon in in-use forest products: NA

No specific inventory processes apply.

IFM-8 Forest product carbon in landfills (if applicable): NA

Forest product carbon in landfills was calculated based on harvest volume data. No specific inventory processes apply.

IFM- 9 Biological emissions from site preparation: NA

IFM-14 Biological emissions/removals from change in harvesting on forestland outside the Project Area:

Calculated using a default 20% “leakage” factor applied to the difference in harvest volume relative to baseline.

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IFM-17 Biological emissions from decomposition of forest products:

Biological emissions from decomposition of forest products will be calculated based on standing tree inventory data. No specific inventory processes apply. Biological emissions from decomposition of forest products will be quantified as a component of carbon stored in in-use forest products (IFM-7) and landfills (IFM-8). Please see the "Allegheny Carbon Inventory Methodology 7 17 18" document, provided separately for verification.

Monitoring Plan

Annual monitoring will be carried out to track changes in carbon stocks. The Project Owner will submit annual Offset Project Data Reports and undertake 6-year site verification for 100 years following ARBOC issuance. Annual monitoring reports will contain inventory updates reflecting growth, harvest, and any significant disturbances.

The Project Area will be re-inventoried at least every 12 years. During re-inventory, a subset of the current 296 permanent plots, sufficient to maintain desired inventory confidence statistics, will be visited and re-measured. Inventories of select portions of the Project Area will be updated periodically in response to natural disturbance or significant forest management activities. Any plots that are subject to harvesting activities or significant disturbances will be reinventoried.

If plot monumentation cannot be found during a re-inventory, the plots will be re-monumented using the same procedures as the original monumentation at the same GPS location of the given plot.

Any updates to the inventory methodology will be approved in advance by a third-party verification body and by ARB, and documented in the project change log.

In addition to inventory sampling, management staff will monitor the general health and condition of the forest forest management activities (e.g. road maintenance, timber harvesting, boundary marking, etc.), typically conducted on primary accessroads and notable bridges/culverts annually.

Each year, the forest carbon inventory and documentation will be updated via the following process:

1. New forest inventory data obtained from scheduled sampling during the previous year will be incorporated.
2. Annual harvests will be carefully tracked based on timber sale data.
 - a. All harvests boundaries will be recorded
 - b. Harvest volumes are recorded with dates and harvest locations, backed with verifiable scale receipts
3. Mining operators are responsible for giving the landowner advance notice of surface operations, any impact of which will be tracked and reported in annual harvest volumes and area as stated above.
4. Inventory data will be updated to account for any significant natural disturbance (e.g. insect infestation, fire, destructive wind storm, etc.).
5. New inventory samples or harvest data, modeling growth, and disturbances using FVS or another approved growth will be incorporated.
6. Any necessary modification to spatial data based on strata boundary adjustments or other changes will be made.
7. Results will be incorporated in the annual OPDR

Potential Pests and Diseases

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Most of the insect and disease damage on the property is minimal. There is the occasional defoliation of trees due to loopers, gypsy moth, eastern tent caterpillars, fall webworm, bagworm, black knot in black cherry, and the anthracnose of sycamores. Historical damage has been minimal. Monitoring for the pests described below will be continuous as field personnel travel in and through the property.

Gypsy Moth, *Lymantria dispar*, is potentially the most destructive forest pest threatening the Allegheny Property. Personnel in the Office of Plant and Pest Services predict the frontal wave of the moth to likely arrive to the southern West Virginia region during the next decade. Field personnel will vigilantly monitor the Marmet Property and will help identify outbreaks if they occur. If future defoliation or death occurs the damage will be recorded and reported to the landowner where an assessment will be made and a strategy designed. Pesticide spraying for gypsy moth may be considered.

The emerald ash borer (EAB) is a potentially serious insect pest to the eastern hardwood forests. Reports indicate EAB has quickly spread throughout the state of West Virginia and evidence of mortality is becoming more frequent. The insect will likely have a direct impact to the ash on this property. During harvest preparation, ash trees will be selected for removal in order to salvage the timber before it is lost. The EAB quarantine is now statewide. In fact, most of the eastern United States is within the federal quarantine limits; so all ash timber can be transported within these boundaries.

Sudden Oak Death (SOD) is also a possible pest on the property even though most of the confirmed cases to date have been located on the west coast and in Canada. Infected plants should be destroyed. While risk for this disease is low, the potential loss is considerable due to the high stocking of oak and alternate ericaceous hosts of the fungus throughout the property. General monitoring will include observing for bark cankers and foliar wilting.

The hemlock wooly adelgid is not considered a serious problem on the property because of very small amount of hemlock growing on the property. General monitoring will observe for the white wooly masses on the tree branches.

The landowner will utilize integrated pest management for the control of these and other pests. Local officials and experts will be contacted if serious outbreaks of any of these pests are discovered. Advice and recommendations will be sought in order to control problem pests. The first alternative for controlling pests will be through cultural means, such as harvesting, clearing, and burning or manual removal of the pest or infected plant. Any biological or chemical control methods will be performed as necessary and with the recommendation and assistance of local officials and experts.

If pesticide application is necessary, the landowner will develop a treatment prescription prior to any chemical use. The plan will include chemical application objectives, rate and method of application, risks and benefits of the chemical used and alternatives considered.

Rare, Threatened, or Endangered Species

The landowner or their consulting foresters annually update data on rare, threatened or endangered species' locations, typically through the state's Natural Heritage Program. If there is a sighting of a species or habitat on or near the FMU, the landowner maps the location and takes all necessary precautions, which will vary depending on the situation, during management activity.

If the presence of an RTE species or community type is suspected on the Allegheny Property, the landowner will either conduct a field survey prior to management activities, or manage as if the species is present. When an RTE species or community type is confirmed present, management activities may include but are not limited to the following:

- Modifying timber harvest prescriptions and adding the changes as an addendum to

[the timber harvest plan.](#)

- [Creating conservation zones, or maintaining existing zones, to enhance the viability of populations and their habitats, including their connectivity within the landscape.](#)
- [Controlling activities such as hunting, fishing, trapping and collecting to ensure adequate protection of the species or community type.”](#)

B. [Describe the calculation methodologies used to determine metric tons per acre for each of the carbon pools included in the Offset Project Data Report.](#)

[IFM-1 Standing Live:](#)

[Gross and sound cubic foot volume was calculated using equations and coefficients developed by Scott \(1981\), based on guidance from “Methods and Equations for Estimating Aboveground Volume, Biomass, and Carbon for Trees in the U.S. Forest Inventory, 2010” \(Woodall, 2011\).](#)

[Biomass was computed using the component ratio method and Jenkins coefficients following the procedures and equations outlined in “The Forest Inventory and Analysis Database: Database Description and Users Manual Version 4.0 for Phase 2,” and as specifically described in Appendix J, Tables 1 through 4. As stated in the COP, biomass was converted into 0.5 to calculate the mass \(kg\) in carbon. This product was multiplied by 0.001 tons/kg to convert the mass to metric tons of carbon. Then, the product was multiplied by 3.664 to convert the metric tons of carbon into metric tons of CO2e.](#)

[Projected Growth](#)

[For further specification, please see the “Allegheny Modeling Explanation 7 17 18” document, provided separately for verification.](#)

[Site Index](#)

[NRCS SSURGO data and “Forestland Productivity” reports were obtained from NRCS for Clay County, WV. This information was used to determine a site index species and value for every plot. For further specification, please see the “Allegheny Modeling Explanation 7 17 18” document, provided separately for verification.](#)

[Silvicultural Methods](#)

[Below is a description of the silvicultural prescriptions used in the modeling. To determine the amount of additional regeneration after certain types of harvests, regeneration model input ratios from Nunery and Keeton 2010 were used \(“Forest carbon storage in the northeastern United States: Net effects of harvesting frequency, post-harvest retention, and wood products”, Table 4\).](#)

Prescription	Regime Description
Grow	Default FVS “let-grow” scenario with no harvest activities.
Single-tree selection	10-year re-entry period with no species preferences.
Shelterwood	Two-stage cut: Shelterwood cut to a residual basal area target of 50 square feet basal area followed by overstory removal with no species preferences. Minimum 40-year reentry period; 80 square feet stocking trigger.
Variable Retention Harvest	Variable basal area retention targets with no species preferences. 40-year re-entry period.

[Legal Constraints](#)

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As stated in West Virginia Silvicultural Best Management Practices for Controlling Soil Erosion and Sedimentation from Logging Operations (2009), "The federal Clean Water Act of 1972, amended in 1977, specified under section 208 that states must reduce silvicultural non-point source (NPS) pollution. This law led West Virginia to enact the Logging Sediment Control Act (LSCA), West Virginia Code 19-1B in 1992. The LSCA mandates the use of Best Management Practices (BMPs) to limit and control erosion and soil movement into streams."

Stream BMPs: "The minimum SMZ width or distance between exposed or disturbed soil and a perennial or intermittent stream should be no less than 100 feet slope distance on either side of the stream from the top or edge of the channel. On ephemeral streams it should be no less than 25 feet slope distance on each side from the edge of the channel or visible scour."

To model these constraints, the SMZ will be determined by placing a 100ft buffer will be placed around all intermittent and perennial streams, and a 25ft buffer will be placed around ephemeral streams. Within these constraints, usual practice is the selection of an occasional mature stem within the buffer zone and maintaining at minimum 50% of the live basal area within these zones.

FVS Modeling

The Northeast variant of the Forest Vegetation Simulator (Keyser 2010) was used to model forest growth, mortality and harvest over 100 years. Plot data and tree data was entered into a database readable by FVS, with each plot entered as an individual stand and each tree record multiplied by the appropriate factor to determine trees per acre. TPA, species, height, and DBH were used as inputs for the TreelnIt input file. After entry into FVS, the "forest" was grown 100 years and the resulting tree list used to calculate biomass. Simulations were conducted in 5-year increments. The predicted DBH and total heights were used for all future projections of DBH and total height.

All FVS defaults for the Lake States variant were used besides the following calibration components:

- The location code for Monongahela National Forest (921)
- Site index values derived from NRCS soil data
- The minimum acceptable harvest volume was set to 600 cubic feet per acre based on the minimum harvest volumes for the property
- The minimum and maximum DBH for harvestable trees in the single tree selection and shelterwood harvests was set to 2"-32" based on property specifications for harvestable timber

For further specification, please see the "Allegheny Modeling Explanation 7 17 18" document, provided separately for verification.

Adjustments for Start Date

To determine CO2 stocks at the project commencement date, the tree data was grown backwards to 10/27/2015. Detail on how the data was grown can be found in the "Allegheny Modeling Explanation 7 17 18" document, provided separately for verification.

Adjustments for Reporting Period Calculations

To determine CO2 stocks at the end of the reporting period, the initial inventory was assumed to be reflective of the end of reporting period stocks. This is because the inventory was completed less than 1 month following the end of reporting period, so the inventory is fully reflective of all growth and harvesting that occurred during this period.

Belowground Live/Dead

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The belowground portion of live and dead trees is calculated using the component ratio method ("CRM") described in Appendix J of the Forest Inventory and Analysis (FIA) documentation cited in the COP.

IFM-3 Standing Dead:

Standing dead wood carbon is calculated by estimating above and below ground biomass in the same manner it was for live trees and then converting this figure to CO₂e.

Standing dead wood is calculated on a per acre basis for each stratum. A project-wide estimate of standing dead wood is calculated using a weighted average with weights assigned based on stratum size.

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Calculated standing dead will be updated in the project scenario every time new inventory data is collected. For the baseline, standing dead is projected to remain constant over the 100-year baseline at 2.23 tonnes CO₂ per acre.

IFM-6 Soil (if applicable): NA

IFM-7 Carbon in in-use forest products:

Carbon in in-use forest products was calculated using actual harvest volumes, following the steps in Appendix C.3 of the COP. Calculations have been provided separately for verification purposes.

A default regional value was used for mill efficiency and product mix based on weighted average of relative acreage.

IFM-8 Forest product carbon in landfills (if applicable):

Forest product carbon in landfills is calculated in accordance with the procedures described in Appendix C of the Forest Protocol.

IFM- 9 Biological emissions from site preparation: NA

IFM-14 Biological emissions/removals from change in harvesting on forestland outside the Project Area:

Calculated using a default 20% "leakage" factor applied to the difference in harvest volume relative to baseline.

IFM-17 Biological emissions from decomposition of forest products:

Biological emissions from decomposition of forest products was quantified as a component of carbon stored in in-use forest products (IFM-7) and landfills (IFM-8).

C. Provide a summary of the inventory of carbon stocks for each carbon pool (or approach used, if inventory is not applicable).

IFM-1 Standing Live:

	<u>Average tCO₂e/acre</u>	<u>Total tCO₂e</u>
<u>Start Date</u>	<u>151.7</u>	<u>6,495,100</u>
<u>End of Reporting Period</u>	<u>154.1</u>	<u>6,595,018</u>

IFM-3 Standing Dead:

	<u>Average tCO₂e/acre</u>	<u>Total tCO₂e</u>
--	--	-------------------------------

Start Date	2.23	95,513
End of Reporting Period	2.23	95,513

IFM-6 Soil (if applicable): NA

IFM-7 Carbon in in-use forest products:

End of Reporting Period Long-term storage in in-use wood products (tCO2e)						
Units	Lumber	Plywood	Oriented Strandboard	Non Structural Panels	Miscellaneous Products	Paper
Hardwood	7,394	0	2,708	746	227	168
Softwood	109	0	62	116	5	4

IFM-8 Forest product carbon in landfills (if applicable):

End of Reporting Period Long-term storage in wood products in landfills (tCO2e)						
Units	Lumber	Oriented Strandboard	Non Structural Panels	Miscellaneous Products	Paper	
Hardwood	12,245	1,084	676	587	515	
Softwood	70	25	105	13	12	

IFM-9 Biological emissions from site preparation: NA

IFM-14 Biological emissions/removals from change in harvesting on forestland outside the Project Area:
NA

IFM-17 Biological emissions from decomposition of forest products: NA

Actual Harvested Wood Products Summary	Total (tCO2e)	tCO2e / acre
Total Harvested Wood Products	41,123	0.96
Actual Carbon in Harvested Wood Delivered to Mill	66,314	1.55
Actual Carbon in Trees Harvested for Wood Products	124,962	2.92
Actual Carbon Stored Long-term in Wood Products - Excluding Landfill	11,541	0.27
Actual Carbon Stored Long-term in Wood Products - Landfill	15,332	0.36
Actual Carbon Stored Long-term in Wood Products - Including Landfill	26,873	0.63

D. Inventory Confidence Statistics—Estimate

Total	n	Stratified Standard Error	Bound	Sampling Error
6,067,877,690,532	250	115,000,204,266	189,175,336,018	3.15.0%
	296			

The inventory sampling error is at the end of the reporting period was calculated as follows:

- 1) $115,000,204,266 * 1.645 = 189,175,336,018$
- 2) $(189,175,336,018 / 6,067,877,690,532) * 100 = 3.15.0\%$

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The ~~predicted~~ sampling error of 3.15.0 is below 5.1%, so no confidence deduction should be applied to the inventory results.

E. ~~Reversal Risk Rating~~ Estimate

Reversal Risk Rating ~~will be~~ was calculated using the following formula:

Reversal Risk= 100% - (1-Financial Failure) x (1-~~Illegal Forest Biomass Removal~~IllegalForestBiomassRemoval) x (1-Conversion) x (1-~~Over Harvesting~~OverHarvesting) x (1-~~Social Risk~~SocialRisk) x (1-Wildfire) x (1-Disease/Insect Outbreak) x (1-~~Other Catastrophic Events~~OtherCatastrophicEvents)

= 1-~~((1-.05) * (1-0.0) * (1- 0.02) * (1-0.02) * (1-0.02) * (1-~~0.04~~) * (1-0.03) * (1-0.03))~~

=19.2%

Buffer Pool Contribution: 2,119,179 net ARBOCs * 0.192 = 407,650 ARBOCs contributed to the Forest Buffer Account.

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Part VIII. Offset Project Baseline

- The aboveground Common Practice (CP) value is 91,587.1 mtCO₂e/acre with a total live value of 109,8104.0 mtCO₂e/acre. The project's aboveground ICS live carbon stocks of 137,2126.9 mtCO₂e/acre is above the CP value, and thus the CP is equal to the Minimum Baseline Level (MBL).

Supersection	Assessment Area	Site Class	CP	Acres
Southern Allegheny Plateau & North Cumberland Mountains	Southern Allegheny Plateau Lowland Hardwoods & North Cumberland Mountains Cove Forests	All Low	6090.5	559,260
	Southern Allegheny Plateau Oak-Hickory & North Cumberland Mountains Mixed Hardwoods	Low	9252.3	611,590
	Southern Allegheny Plateau Upland Hardwoods & North Cumberland Mountains Oak-Hickory	Low	6893.2	760,446
	Allegheny & North Cumberland Mountains Cove Forests Northern Hardwoods	Low	9186.8	17,255,087
Southern Allegheny Plateau	Southern Allegheny & North Cumberland Mountains Mixed Hardwoods Plateau Oak-Hickory	Low	5291.7	87,440
	Southern Allegheny & North Cumberland Mountains Oak-Hickory Plateau Upland Hardwoods	Low	9368.2	24,171,988
-	Weighted Average/ Total	-	9187.5	42,940,812

*Note: sub-totals may not sum to 100% due to rounding.

1.2 Baseline Carbon Stocks

Aboveground (mtCO ₂ e/acre)	Belowground (mtCO ₂ e/acre)	Live (mtCO ₂ e/acre)	Dead (mtCO ₂ e/acre)	Standing (mtCO ₂ e/acre)
91,587.49	18,317.1	109,8104.5	4,12.23	113,9106.78

Summary of Applicable Baseline Carbon Pools

Carbon Pool	Total tCO ₂ e	mtCO ₂ e / acre
IFM-1 Standing Live:	4,475,851	104.5
IFM-3 Standing Dead:	95,513	2.23
IFM-7: Long-term storage in in-use wood products	11,527	0.27
IFM-8: Long-term storage in wood products in landfills	11,208	0.26

- If the Forest Project's initial standing live carbon stocks are below Common Practice, a determination of the "High Stocking Reference" for the Project Area.

Because the project's initial standing live carbon stocks are above common practice, this section is non-applicable.

3.4 Baseline Wood Products Summary:

Baseline Harvested Wood Products Summary	Total (tCO ₂ e)	tCO ₂ e / acre
Baseline Carbon Harvested for Wood Products (tonnes CO ₂ e)	220,143	5.13
Baseline Carbon Delivered to Mill (tonnes CO ₂ e)	116,676	2.72
Baseline Carbon Stored in Wood Products – Excl. Landfill (tonnes CO ₂ e)	46,670	1.09
Baseline Carbon Stored in Wood Products Incl. Landfill (tonnes CO ₂ e)	70,005	1.63

4.5. Baseline Modeling

As stated, Please see document, “Allegheny Modeling Explanation 7 17 18”, provided separately for verification.

6. Harvest Planning

- Is harvesting planned in section 6.2.1.2 of the protocol, all legal Project Area? Yes
- Optional: Does the project use a harvest schedule model? No.

7. Provide an estimate of carbon that was stored long-term in harvested wood products in the baseline.

End of Reporting Period Long-term storage in wood products in in-use wood products (tCO ₂ e)						
Units	Lumber	Plywood	Oriented Strandboard	Non-Structural Panels	Miscellaneous Products	Paper
Hardwood	3,144	0	6,388	317	537	396
Softwood	218	1	257	232	22	16

End of Reporting Period Long-term storage in wood products in landfills (tCO ₂ e)						
Units	Lumber	Plywood	Oriented Strandboard	Non Structural Panels	Miscellaneous Products	Paper
Hardwood	5,207	2,557	287	1,384	1,214	5,207
Softwood	140	1	103	210	56	49

Baseline Wood Products Summary	Total (tCO ₂ e)	tCO ₂ e / acre
Total Harvested Wood Products	36,179	0.85
Baseline Carbon in Harvested Wood Delivered to Mill	57,451	1.34
Baseline Carbon in Trees Harvested for Wood Products	108,261	2.53
Baseline Carbon Stored Long-term in Wood Products - Excluding Landfill	11,527	0.27
Baseline Carbon Stored Long-term storage in wood products in landfills	11,208	0.26
Baseline Carbon Stored Long-term in Wood Products - Including Landfill	22,735	0.53

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8. Secondary Effects

The equation below outlines the process by which secondary effects are calculated for IFM projects:

$$\text{If } \sum_{n=1}^y (AC_{hv,n} - BC_{hv,n}) < 0, \text{ then } SE_y = (AC_{hv,y} - BC_{hv,y}) \times 20\%$$

Where

SE_y = Estimated annual Secondary Effect (used in Equation 6.1).

$AC_{hv,n}$ = Actual amount of onsite carbon harvested in reporting period n (prior to delivery to a mill), expressed in CO₂-equivalent tons.

$BC_{hv,n}$ = Estimated average baseline amount of onsite carbon harvested in reporting period n (prior to delivery to a mill), expressed in CO₂-equivalent tons, as determined in Step 1 of Section 6.2.3.

Y = The current year or reporting period.

In the case of the Allegheny IFM project, this equation is calculated as follows:

$$= (124,962 - 108,261) \times 0.2$$

= NA (project wood products are greater than baseline wood products so no deductions are required for this reporting period)

Secondary Effects Inputs	Tonnes CO ₂ e
Actual Carbon in Trees Harvested for Wood Products	124,962
Baseline Carbon in Trees Harvested for Wood Products	108,261
Difference Between Actual and Baseline Carbon in Trees Harvested for Wood Products	16,701
Secondary Effects Emissions	NA

Total Net GHG reductions and GHG removal enhancements (QRy) For the Reporting Period

This final calculation for the project reporting period is carried out in the *Allegheny ARBOC Calculation Worksheet* (provided separately for verification purposes) and summarized below.

Summary	Tonnes CO ₂ e
ARBOCs Issued	2,119,179
Buffer Pool Contributions	407,650
Annual ARBOCs Issued to Account Holder	1,711,529

9. Provide a projection of baseline and actual harvesting volumes from the Project Area over 100 years.

Please see Attachment H.

10. Baseline Modeling

Please see provided proprietary document, "Allegheny Modeling Explanation 7_17_18"

11. Provide a description of any and all legal constraints affecting forest management activities in the Project Area. Include documentation of legal constraints and a description of each constraint that could

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affect the baseline(referring to Section 6.2.1.2); for each constraint provide a narrative that constraint has on forest management.

Please see Attachment I below.

12. Provide a description of the modeling techniques used to simulate the effect of any constraints on carbon stocks.

Please see provided proprietary document, "Allegheny Modeling Explanation 7 17 18".

13. The OPO will demonstrate financial feasibility of the growth and harvesting must be incorporated. Thus, all legal constraints (detailed in Attachment I) will be modeled regime assumed for the baseline by conducting a financial analysis of the anticipated growth and harvesting regime that captures all relevant costs and returns, taking into the baseline consideration all legal, physical, and biological constraints, using regional norms or documented costs and returns for the Project Area or other properties in the Forest Project's Assessment Area. Please see Attachment J.

Site index for each plot will be measured as outlined in Part VII IFM 1. Similarly, FVS will be calibrated as described in Part VII IFM 1.

Clearcut and single tree selection treatments will be modeled using 5-10 year simulation periods with harvest frequency triggered when a stand reaches the appropriate basal area targets for each treatment. Species retention post harvest will be determined using FVS defaults.

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Part IX. Other Offset Programs Have any Attestations and OPO Signature

~~I certify under penalty of perjury under the laws of the State of California the GHG reductions and/or GHG removal enhancements for Blue Source Allegheny Improved Forest Management Project from 10/27/2015 to 10/26/2040 will be measured in accordance associated with the Compliance Offset Protocol U.S. Forest Projects, November 14, 2014, and all information required to be submitted to ARB is true, accurate, and complete.~~

Initial:

A. ~~I understand I am voluntarily participating in the California Greenhouse Gas Cap and Trade Program under title 17, article 5, and~~ Project Lands have ever been listed or registered with, or otherwise claimed by doing so, I am now subject to all regulatory requirements and enforcement mechanisms of this, another registry or program and subject myself to the jurisdiction of California as the exclusive venue to resolve any and all disputes arising from the enforcement of provisions in this article., or sold to a third party prior to listing?
No.

Initial:

B. ~~I understand that~~ Have any lands within the Project Area ever been listed or registered with an offset project activity and implementation of the offset project must be in accordance with all applicable local, regional, and national environmental and health and safety laws and regulations that apply to the offset project location. I understand that offset projects are not eligible to receive ARB or registry offset credits for GHG or program in the past? No

C. Have greenhouse gas emission reductions and GHG or removal enhancements that are not in compliance associated with lands within the Project Area been credited or claimed for the requirements of the cap and trade program purpose of greenhouse gas mitigation or reduction goals, whether in a voluntary or regulatory context? No.

Initial:

In signing this form, I certify under penalty of perjury of the laws of California that the information contained in this form is true, accurate, and complete. I further certify that I am an Account Representative of the Offset Project Operator (OPO).

Signature:

Printed Name: Roger Williams, IV

Title: President, Blue Source LLC

Date: 10/27/2015

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Part X. Attachments

Attachment A: Forest Owner

Please see corresponding folder containing all deeds, provided separately for verification purposes.

Attachment B: Public Projects

N/A

Attachment C: Qualified Conservation Easement

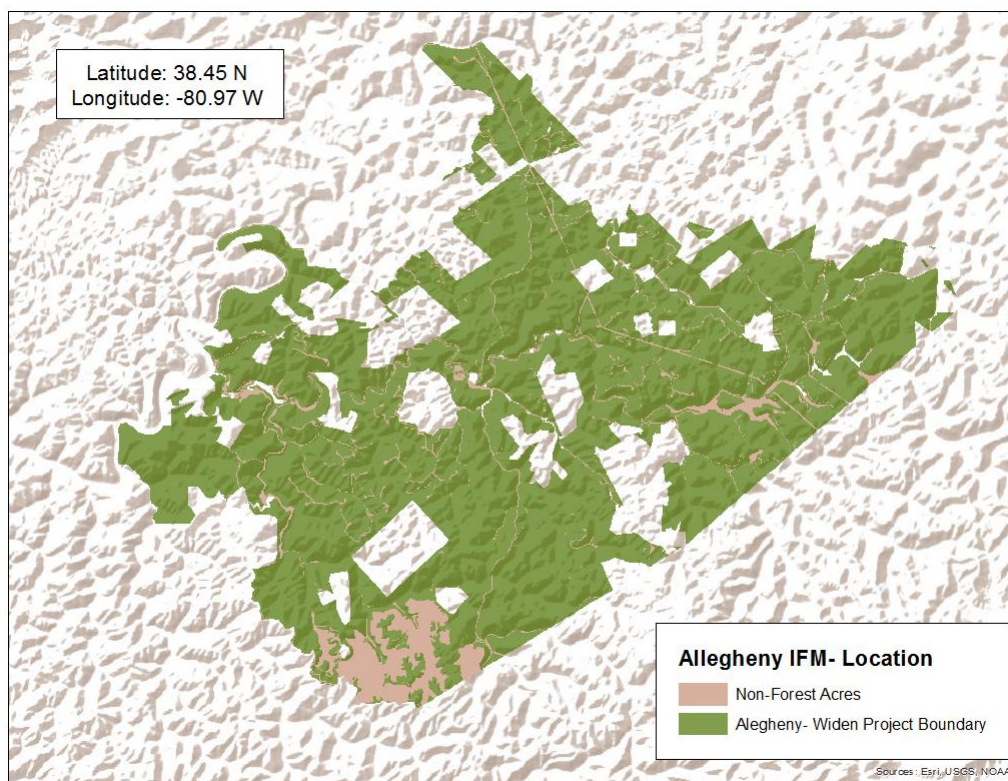
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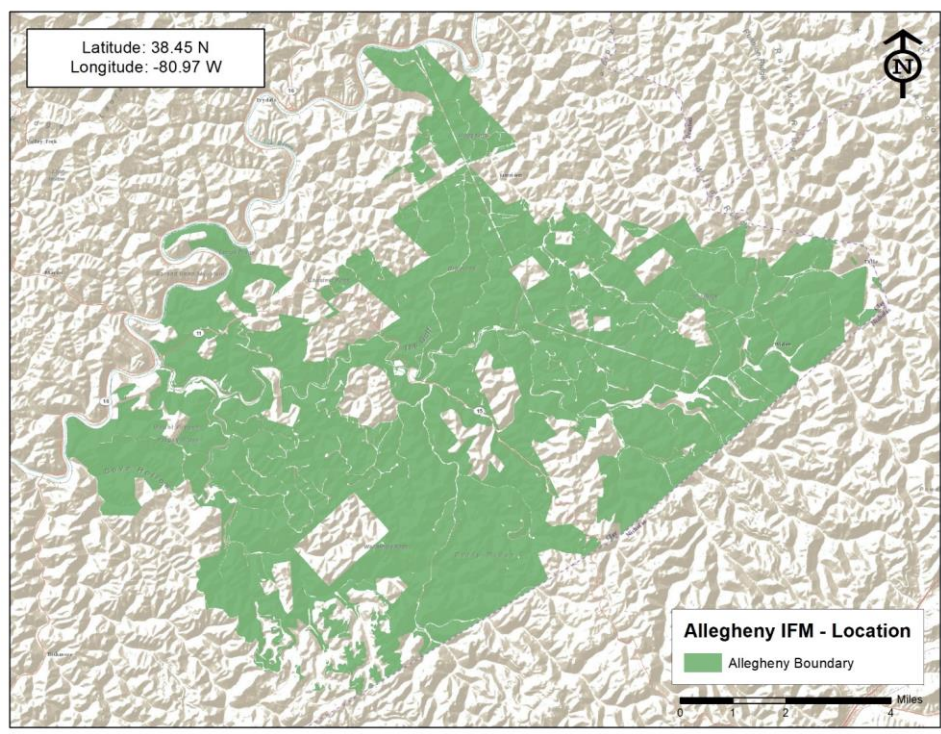
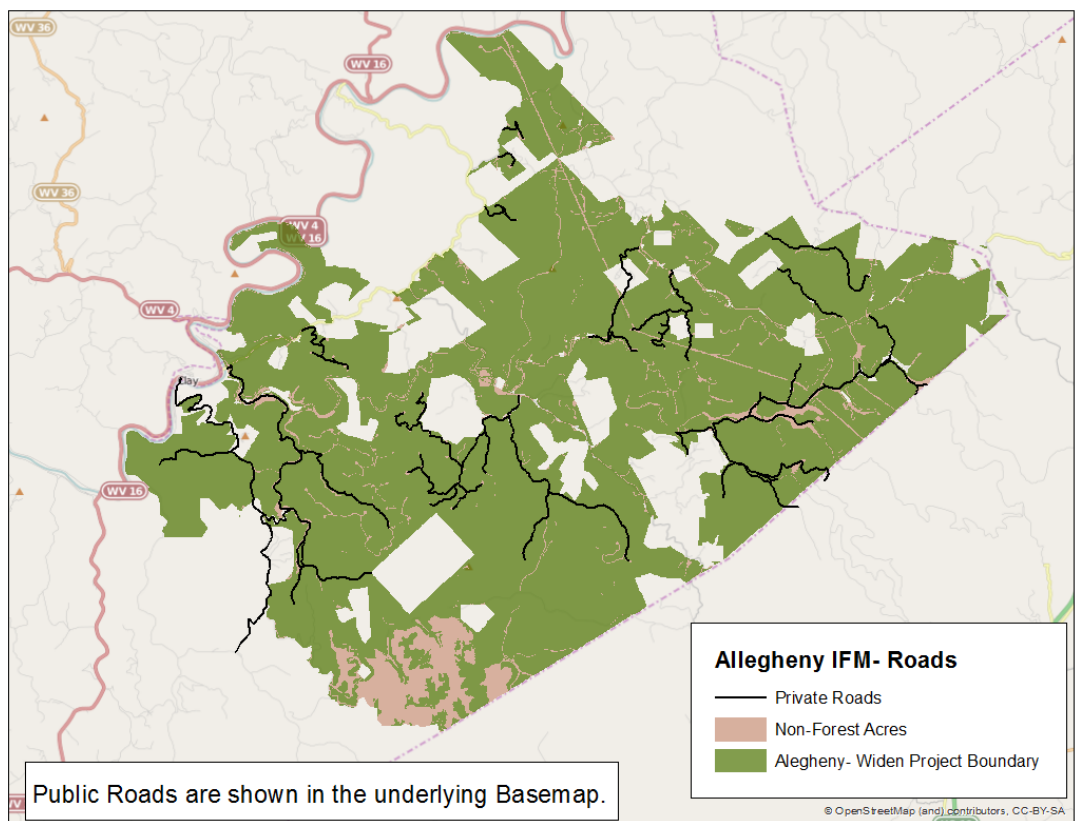
Attachment D: Tribal Projects

N/A

Attachment E: Project Maps

1. Latitude/longitude coordinates



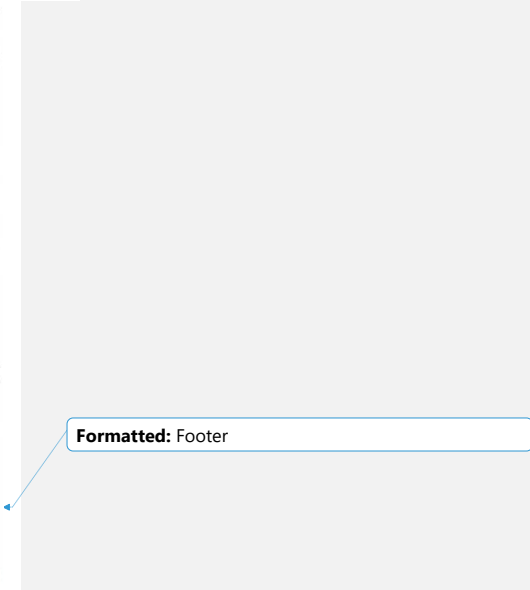
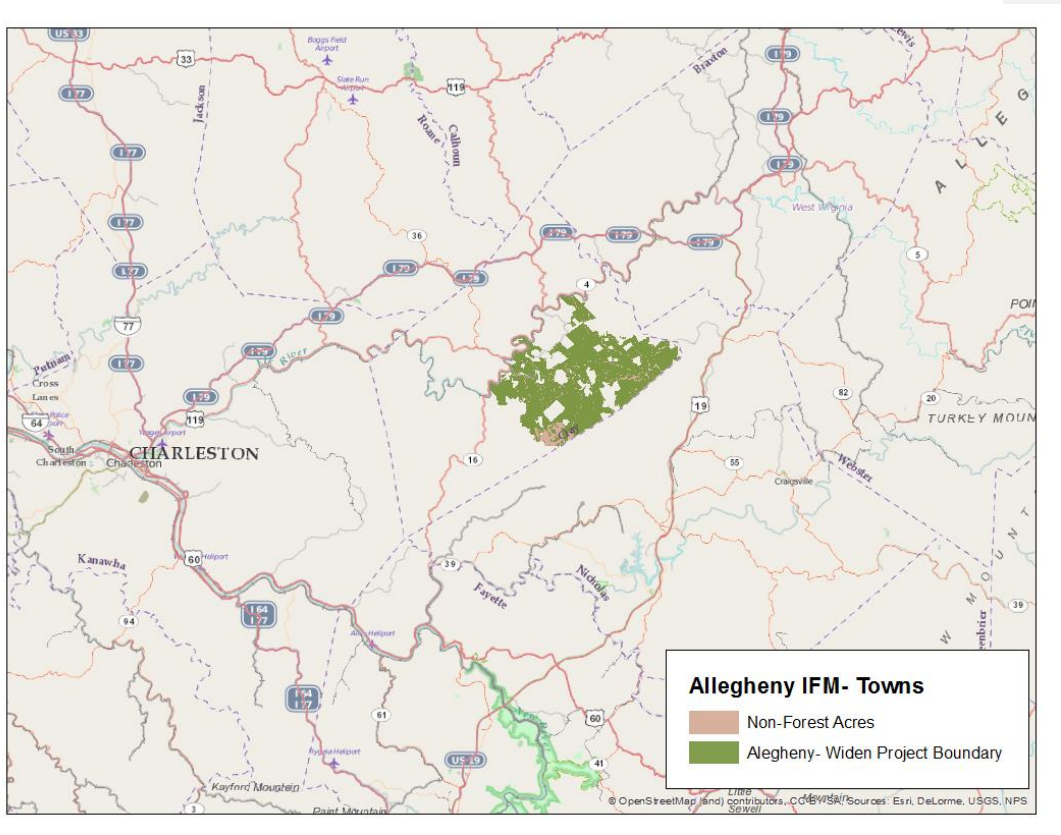


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2. Public and private roads (map)

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3. Towns (map)

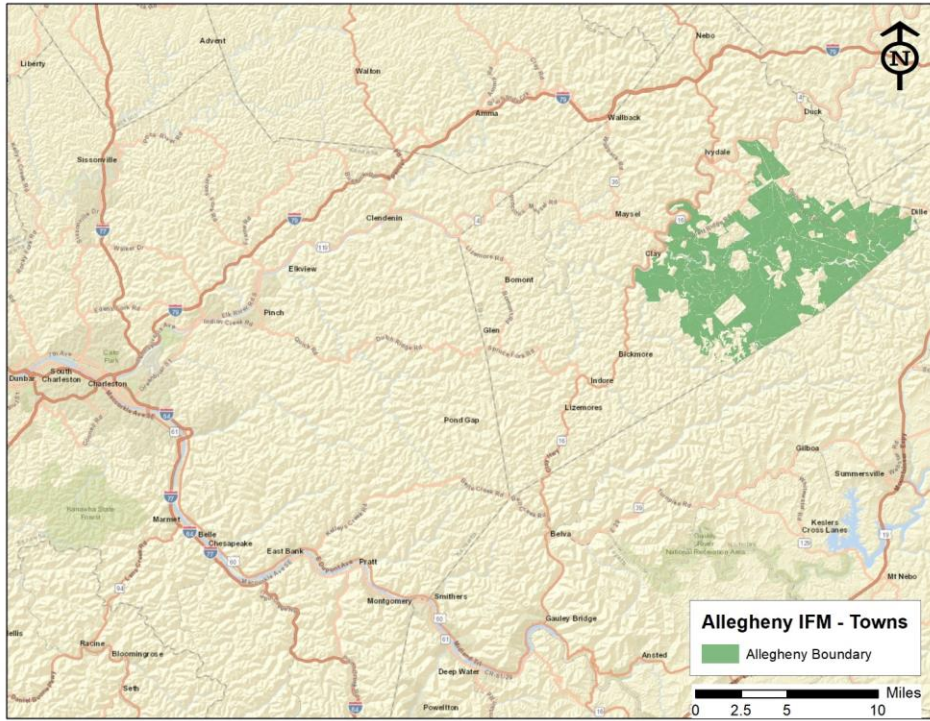


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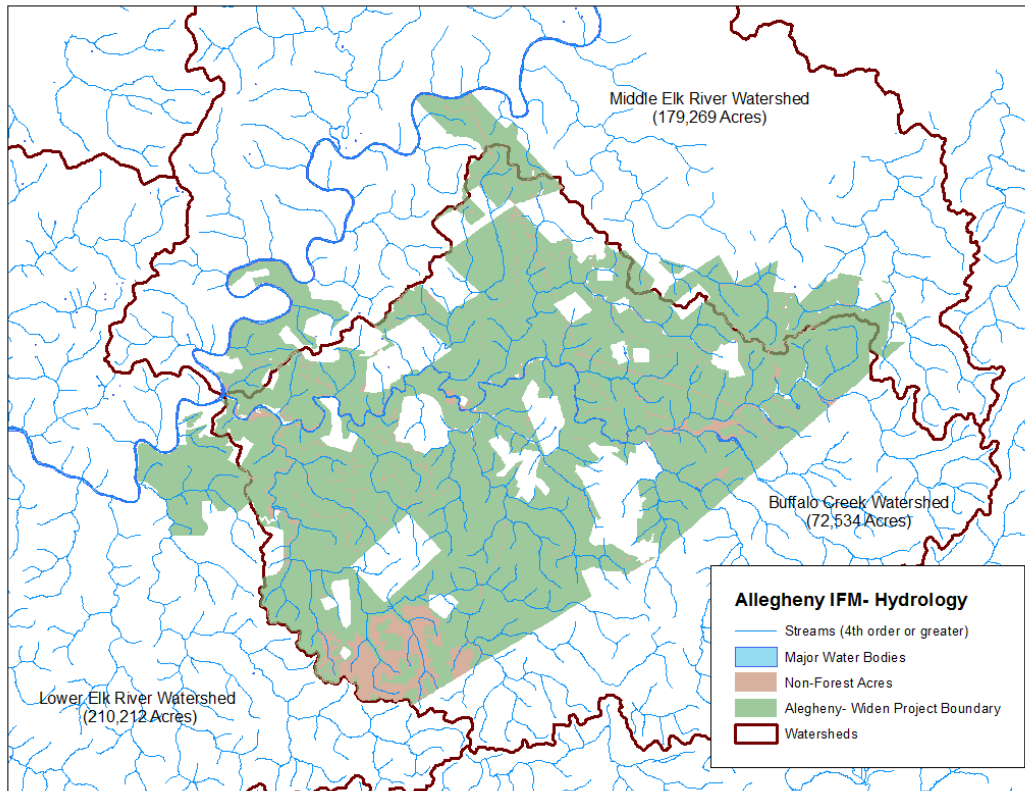
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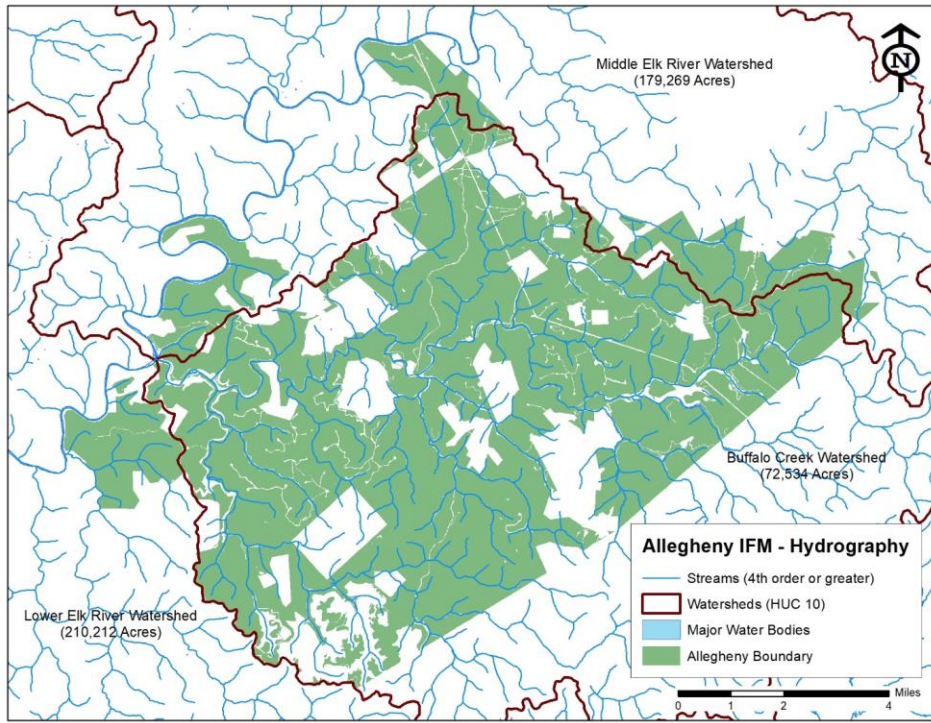


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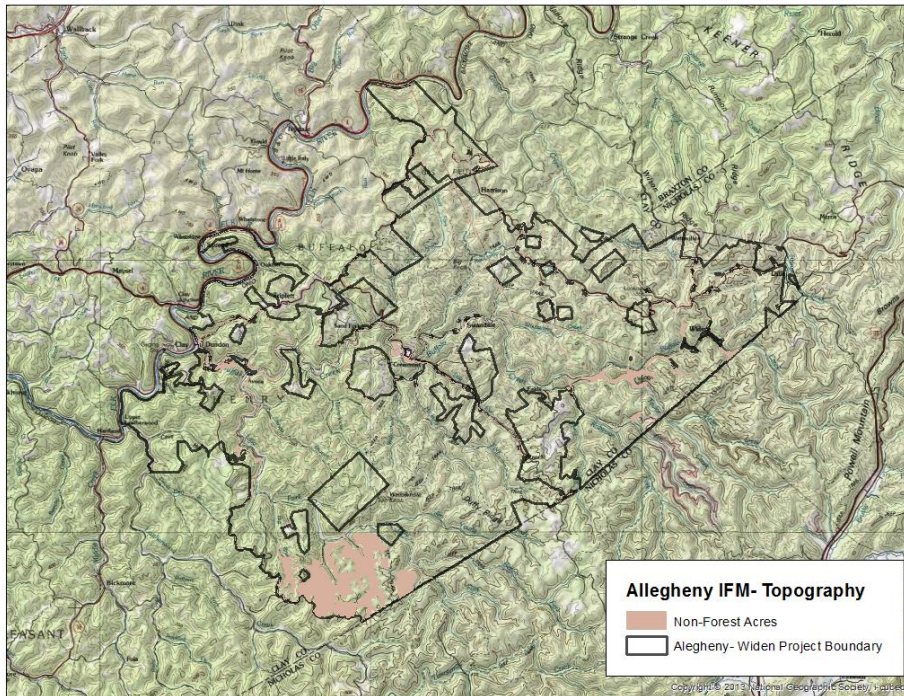


4. Major watercourses (4th order or greater), water bodies, and watershed description (map)



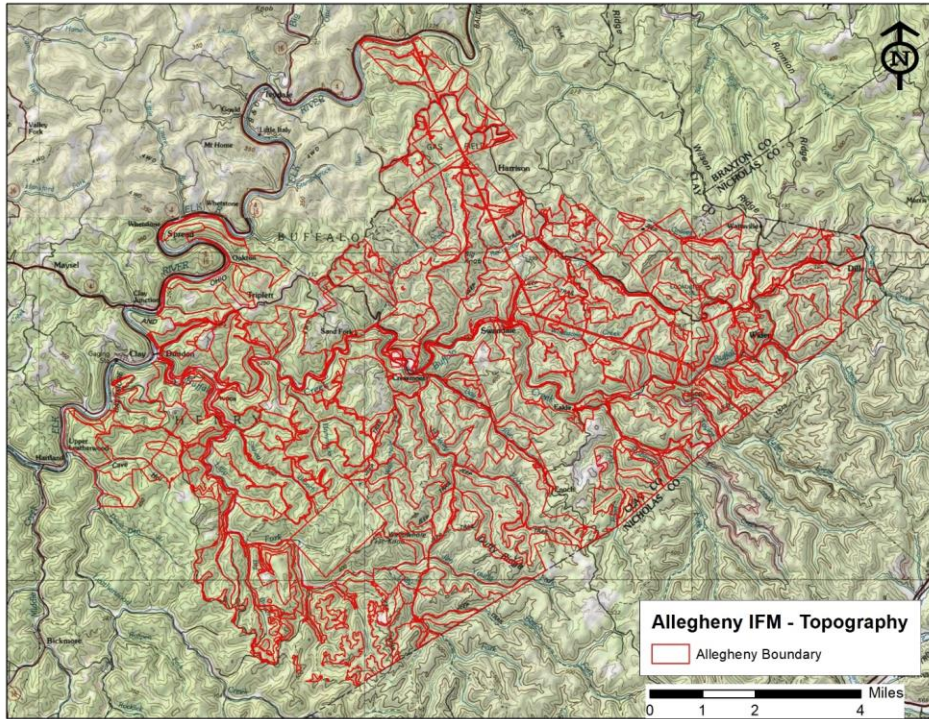


5. Topography (map)



Townships, ranges;

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6. Existing land cover and sections or latitude/longitude (optional): N/A

7. Forest vegetation types (optional): N/A

8. Site classes (optional): N/A

6-9. Land pressures and longitude (map) climate zone/classification (optional): N/A
See map 1.

10. Georeferenced. Historical land uses, current zoning, and projected land use within the Project Area (optional): N/A

7. A georeferenced shape file

11. (or other electronic file that can be read in a geographic information system) that clearly identifies the Project Area and boundaries. Please see provided georeferenced shapefile provided separately.

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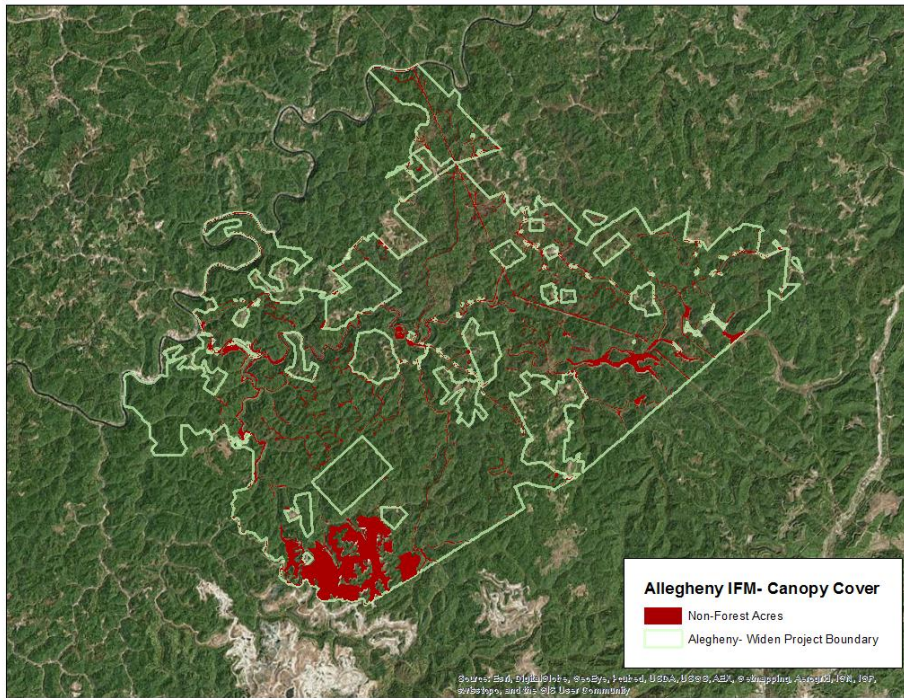
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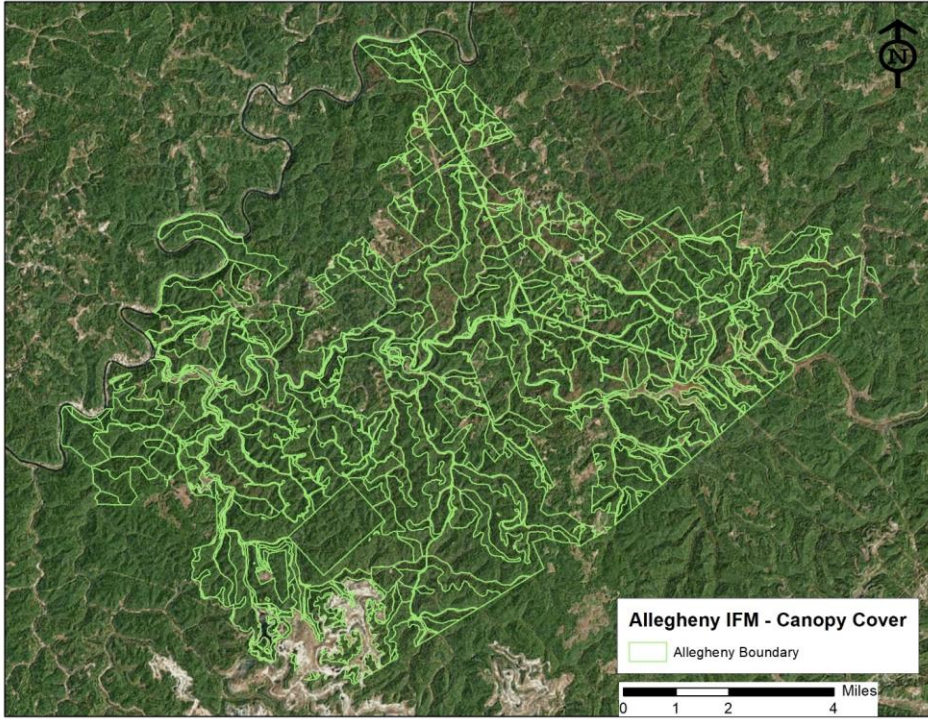
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Attachment F: Canopy Cover

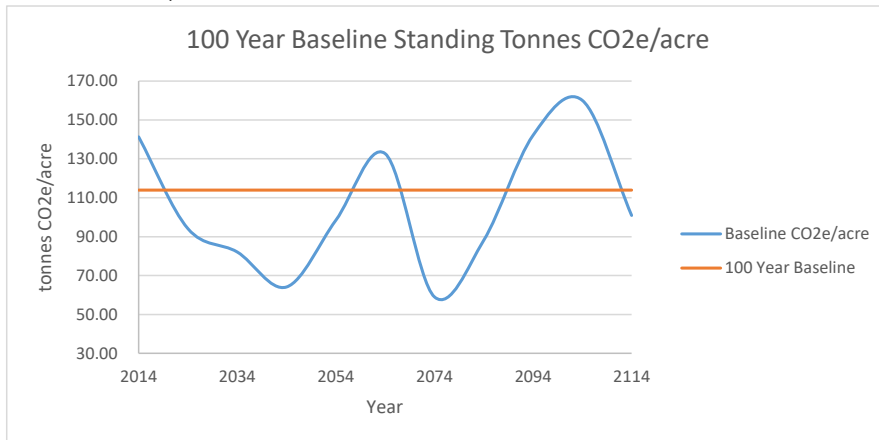
[As evident by recent aerial imagery, the Project Area contains greater than 10% canopy cover.](#)

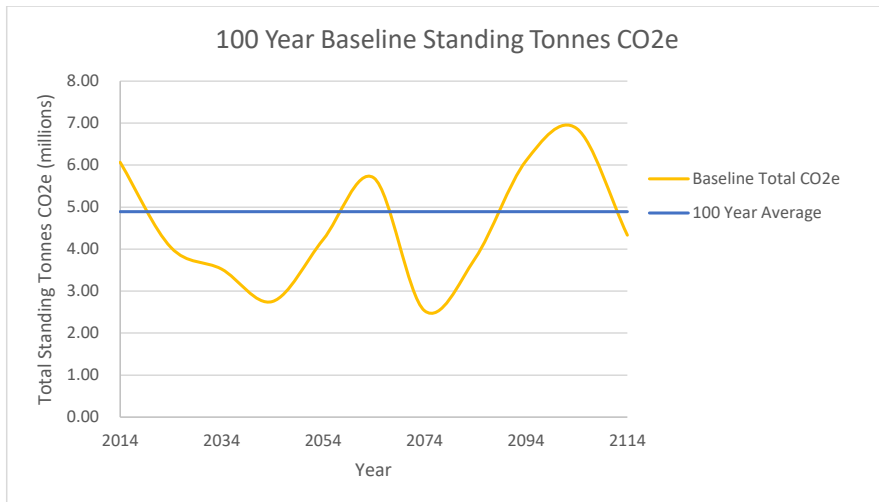


[Non-forested areas were removed from the project area within a minimum mapping unit of 2.5 acres. An analysis of the forest cover within the Project Area confirmed the remaining forested acres contain 99% forest cover.](#)

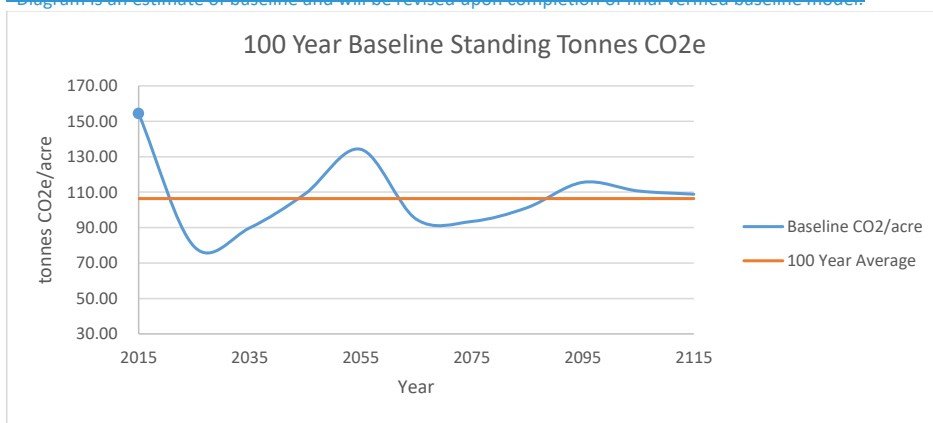


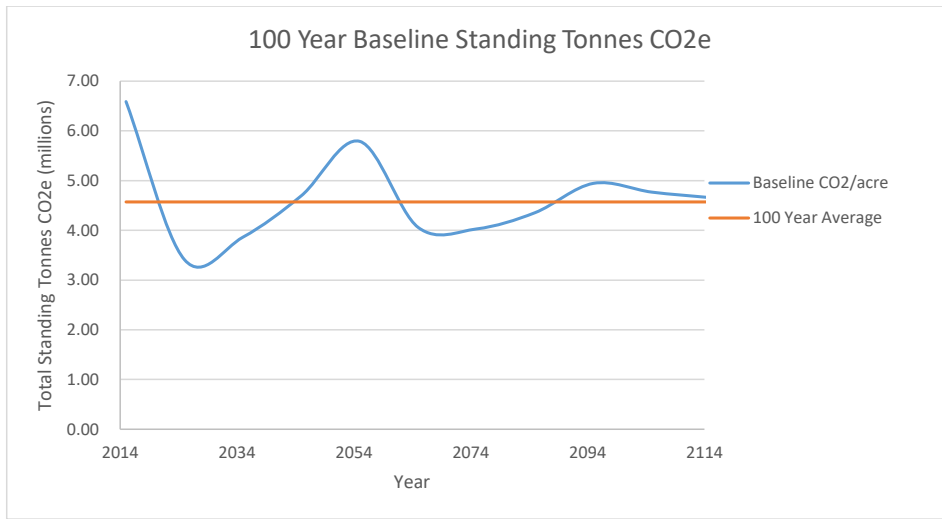
Attachment G: 100-year Baseline



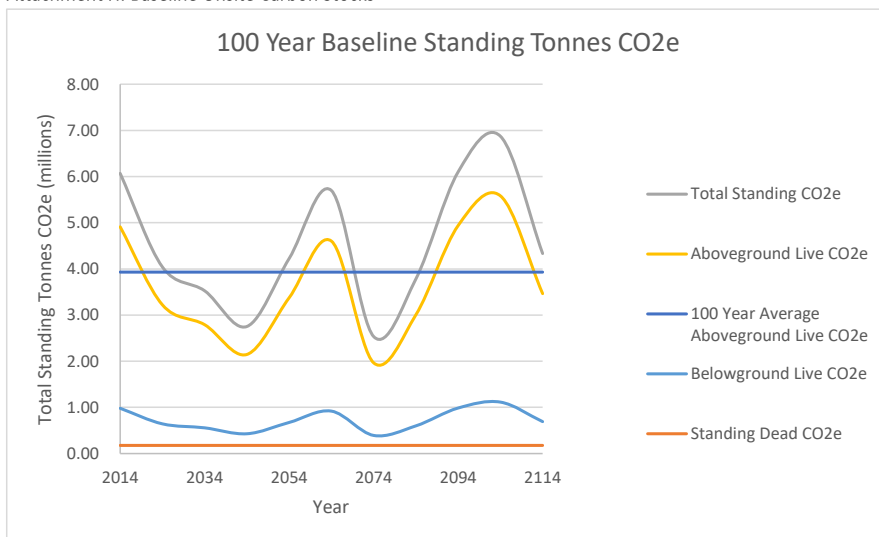


*Diagram is an estimate of baseline and will be revised upon completion of final verified baseline model.

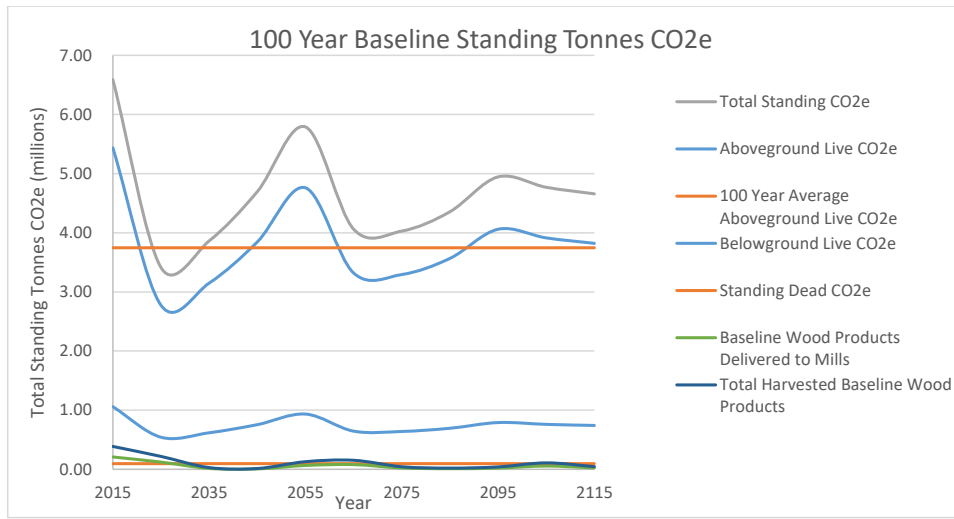




Attachment H: Baseline Onsite Carbon Stocks



*Diagram is an estimate of baseline and will be revised upon completion of final verified baseline model.



Within 5-10 years after the project commencement, a large majority of the carbon stocks on the property will be harvested using even-aged [silviculture](#) techniques. Over the next forty years, these stocks will re-establish to current levels. At this time, another large even-aged harvest is anticipated. Following this second harvest, the remaining growing stock will continue to grow until the end of the 100-year timeframe.

Attachment I: Legal Constraints

As stated in [West Virginia Silvicultural Best Management Practices for Controlling Soil Erosion and Sedimentation from Logging Operations \(2009\)](#), “The federal Clean Water Act of 1972, amended in 1977, specified under section 208 that states must reduce silvicultural non-point source (NPS) pollution. This law led West Virginia to enact the Logging Sediment Control Act (LSCA), West Virginia Code 19-1B in 1992. The LSCA mandates the use of Best Management Practices (BMPs) to limit and control erosion and soil movement into streams.

Stream BMPs: “The minimum SMZ width or distance between exposed or disturbed soil and a perennial or intermittent stream should be no less than 100 feet slope distance on either side of the stream from the top or edge of the channel. On ephemeral streams it should be no less than 25 feet slope distance on each side from the edge of the channel or visible scour.”

To model these constraints, the SMZ will be determined by placing a 100ft buffer will be placed around all intermittent and perennial streams, and a 25ft buffer will be placed around ephemeral streams. Within these constraints, usual practice is the selection of an occasional mature stem within the buffer zone and maintaining at minimum 50% of the live basal area within these zones.

Attachment J: Financial Feasibility

A financial analysis (Forest Protocol section 6.2.1.3, option 1) of the baseline growth and harvest regime reveals that the activities represented in baseline scenario are clearly feasible. [Please see “Allegheny Baseline Financial Feasibility 7 17 18”, provided separately for verification.](#)

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Part XI. Attestations and OPO Signature

I certify under penalty of perjury under the laws of the State of California the GHG reductions and/or GHG removal enhancements for Blue Source- Allegheny Improved Forest Management Project from 10/27/2015 to 10/26/2040 will be measured in accordance with the Compliance Offset Protocol U.S. Forest Projects, November 14, 2014, and all information required to be submitted to ARB is true, accurate, and complete.

Initial:

I understand I am voluntarily participating in the California Greenhouse Gas Cap-and-Trade Program under title 17, article 5, and by doing so, I am now subject to all regulatory requirements and enforcement mechanisms of this program and subject myself to the jurisdiction of California as the exclusive venue to resolve any and all disputes arising from the enforcement of provisions in this article.

Initial:

I understand that the offset project activity and implementation of the offset project must be in accordance with all applicable local, regional, and national environmental and health and safety laws and regulations that apply to the offset project location. I understand that offset projects are not eligible to receive ARB or registry offset credits for GHG reductions and GHG removal enhancements that are not in compliance with the requirements of the cap-and-trade program.

Initial:

In signing this form, I certify under penalty of perjury of the laws of California that the information contained in this form is true, accurate, and complete. I further certify that I am an Account Representative of the Offset Project Operator (OPO).

Signature:

Printed Name: Roger Williams

Title: President, Blue Source LLC

Date: 7/23/2018

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