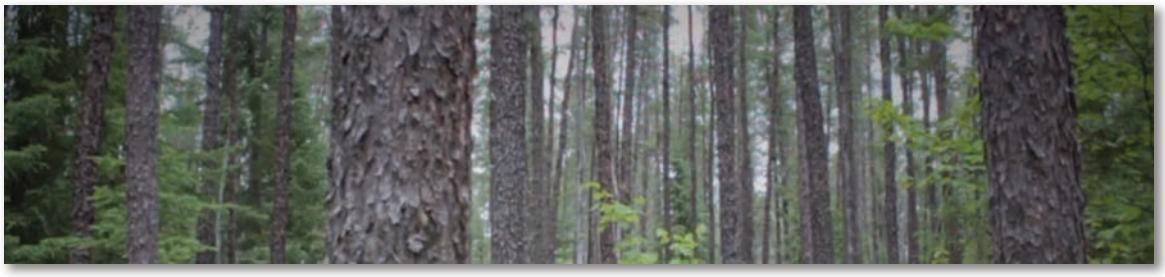
ONTARIO BIODIVERSITY AFFORESTATION PROJECT
PROJECT DESIGN DOCUMENT

A Carbon Sequestration Project for the Renewal of
High Biodiversity Forest on inactive Land



ISO 14064-2

Prepared by
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(Currently Undergoing Validation)

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1.0 Project Description

1.1 Title & Type

The title of the project is the **Ontario Biodiversity Afforestation Project (OBAP)**. The project proponent, Forest Carbon Alliance (FCA) proposes to undertake the project on land where agriculture practices historically took place but no longer dictate the land use. OBAP is a small-scale grouped Afforestation/ Reforestation (AR) project that converts lands to forest high in biodiversity, which in the absence of the project would continue to remain below its ecological potential. Project Areas that display the ecological conditions described in this Project Development Document (PDD) are identified and approved for reporting in OBAP.

1.2 Purpose & Objectives

The purpose of the project is to re-establish long-lived forest species on land historically cleared for agriculture in order to increase biodiversity and ecosystem effectiveness which, in the absence of the project, would continue to exist below its current ecological potential. OBAP will ensure long-term land use change through the afforestation of the project areas that meet the criteria outlined below. The project will increase the biomass carrying capacity of project areas by restoring them to original high biomass content forest conditions. The project will remove carbon dioxide (CO_2) from the atmosphere through the growth of woody plant tissue and therefore increase the rate of carbon sequestration by plants.

This PDD is developed in accordance with ISO14064-2 standards for Greenhouse Gas Project. Emission removal enhancements created by the implementation of the project will result in the measurable increase in carbon storage within approved project areas.

Each project area is subject to a 100-year period of growth and to a 50-year crediting period for which the total removal enhancements will be quantified. The aggregated project areas are expected to total no less than 50,000 tonnes of CO2 equivalent (tCO2e) ex-ante for the initial financing period. During subsequent financing periods, additional project areas shall contribute to the total ex-ante tonnes of sequestered CO2 equivalents, resulting in a growing total of removal enhancements sequestered throughout the project.

1.3 Locations & Conditions

1.3.1 Project Region Boundaries

The project is implemented in northeastern Ontario, Canada and falls within both the Boreal and Great Lakes St-Lawrence Forest Regions. The town of Matheson has been identified as a representative community for the Boreal Forest project areas. Matheson is located at Latitude-Longitude 48°53'N, 80°46'W. The Town of Sturgeon Falls is located at Latitude-Longitude 46°38'N,-79°92'W and is considered to be a representative community to the Great Lakes St- Lawrence (GLSL) Forest Project area (see Figure 1).

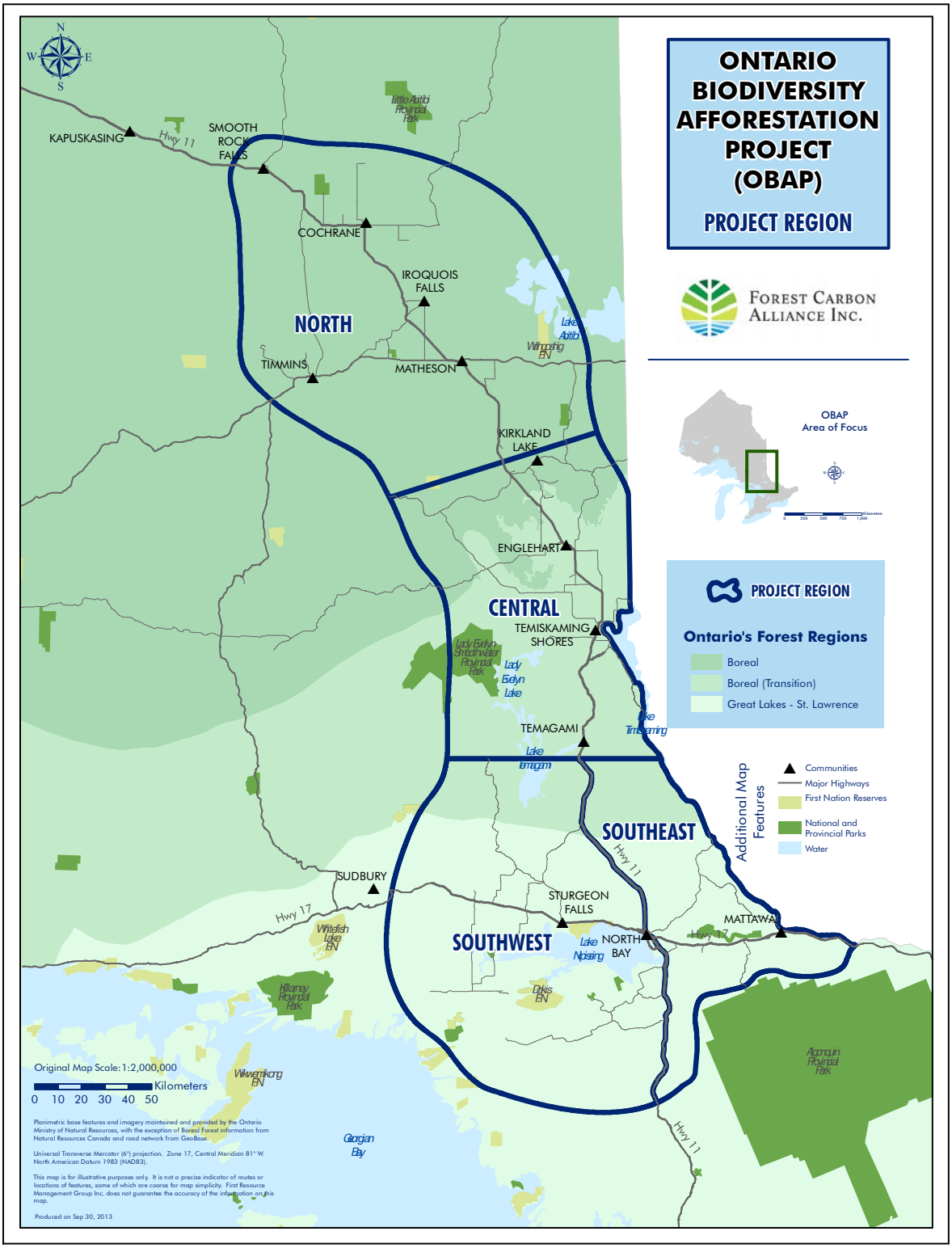

Figure 1 - Map of Project Region and Forest Region

The project region can be described as having four portions, the southwest, southeast, central and Northern portions. The west boundary of this project region is considered to approximately be parallel to the city of Timmins along with the Eastern boundary is considered to be the town of Kirkland Lake. A complete list of the communities present within the project region is available in Section 1 of the Supplementary Documentation.

1.3.2 Geology & Climate

The central and northern portion of the project regions surficial soil and geology is primarily the result of the deposition of glacial material into historical Lake Barlow-Ojibway. The deposits left after the glacial lake drained consist of sandy boulder tills in various morainal landforms and glacio-fluvial sand and gravel in eskers, kames, outwash plains and deltas.

The northern half of the project regions (Boreal Forest) is predominantly Gleysolic soils with extensive clay lacustrine deposits but also includes, coarse sandy textured, and glacio-fluvial outwash deposits. Deep peat deposits can also be found within the northern portion of the project region. Soils are relatively young and are dominated by mor, and occasionally moder, forest humus forms with non-glacial deposits including aeolian sand, alluvial sand, and silt and organic depoßsits. The topography is characteristically flat to gently rolling as most of the landforms that were created by the retreat of the glacier were subsequently buried by clay deposited in glacial Lake Barlow-Ojibway[1]. Paleozoic rock is the substrate to the claybelt areas which dominates the northern half of the project region.

The project region falls within Ecoregion 3E, 4E and 5E. This description is based on the major geographical characteristics and uniformity in vegetation cover[2]. Site regions further divide these classes. The project region encompasses the following: 3E-5, 3E-6, 4E-4, 5E-5, and 5E-5 (According to the Northeast Region Forest Ecosystem Classification (NORFEC). The Climate in Ecoregion 3E is described as having a moderate microthermal, moist humid due the influence of Hudson and James Bay. Ecoregion 4E is humid and cool dominated by mixed forest, Ecoregion 5E is cool-temperate, humid and is moderated by the Great Lakes.

The transition between Boreal and GLSL Forest occurs approximately where bedrock dominated terrain with a thin mantle of glacial till consisting of Glacio-fluvial outwash deposits of sand and gravel replace the clay based deposits of the northern half of the project region. An obvious change in surface geology is the “downdrop” from the precambian shield. The Paleozoic rock of the claybelt faults with the Timiskaming rift system, a continental scale rock structure extending northwest from Lake Timiskamaing dating from the Jurassic period.

[1] 2011-2021 Approved Timiskaming Forest Management Plan

[2] Rowe, J.S. 1972. Forest Regions of Canada. Dept. Environ., Can. Forest Service, Ottawa, Ontario, Publ. No. 1300. 172 pp.

The southern half of the project region (or GLSL) is dominated by erosion resistant bedrock outcroppings. These outcroppings create moderate rolling, to hilly regions with plateaus and willow surface soils remnant of glacial Lake Barlow. The glacially derived sandy textured soils include gravel and boulder grades in willow to moderate depth. These willow sands dominate much of the surface soils. In wider distributions of bedrock humo-ferric podzol and peat soils occur.

Variations in temperature within the project zone can be significant. Typical winters are long and cold, while summers are short and warm and it's common to see temperatures below -30°C during the peaks of the winter, and above 30°C in the warmest days of the summer. Winters conditions occur from as early as November until mid-April. The proximity to James and Hudson Bay influences the humidity of the climate within the northern portion of project region. The tables below summarize and compare the average climatic data for the period of 1971-2000 for Cochrane and North Bay. The range from the northern edge of the project region (Cochrane) and the southern community (North Bay) provides the range of expected normal climatic conditions.

North Bay is located at Latitude 46°21'49, N Longitude 79°25'22" W. Data norms from 1971 to 2000 are provided in Table 1.

Table 1 – North Bay Climate Normal

Month:	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Daily Maximum (°C)	-8	-6	0	8	17	21	24	22	17	10	2	-5	9
Daily Minimum (°C)	-18	-16	-10	-2	6	11	13	12	7	2	-5	-14	-1
Precipitation:													
Rainfall (mm)	17	10	32	51	86	95	100	100	113	92	59	20	775
Snowfall (cm)	63	52	38	16	2	0	0	0	0	6	35	61	273
Precipitation (mm)	68	53	65	67	88	95	100	100	114	98	90	71	1008
Degree Days:													
Above 24 °C	0	0	0	0	0	0	1	1	0	0	0	0	2
Above 18 °C	0	0	0	1	6	24	48	33	7	0	0	0	119
Above 15 °C	0	0	0	3	23	65	116	88	22	2	0	0	318
Above 10 °C	0	0	0	12	85	183	265	227	92	18	1	0	882
Above 5 °C	0	0	5	45	199	328	420	382	217	75	10	1	1682
Above 0 °C	2	5	28	128	347	478	575	537	365	189	48	6	2706
Below 0 °C	405	312	177	29	0	0	0	0	0	6	89	289	1307
Below 5 °C	559	449	310	97	7	0	0	0	2	47	201	439	2109
Below 10 °C	713	590	460	213	48	5	0	1	27	144	342	593	3136
Below 15 °C	868	731	614	354	141	38	6	16	107	283	491	748	4398
Below 18 °C	961	816	707	442	217	87	31	54	182	375	581	841	5295

http://climate.weatheroffice.gc.ca/climateData/canada_e.html

Cochrane is located at Latitude 49°04'00" N and Longitude 81°02'00" W. Data normal from 1971 to 2000 is provided in Table 2.

Table 2 – Cochrane Climate Normal

Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Maximum (°C)	-12	-9	-2	7	16	21	24	22	16	8	0	-9	7
Daily Minimum (°C)	-25	-23	-16	-6	2	6	10	9	4	-1	-9	-21	-6
Precipitation:													
Rainfall (mm)	1	1	10	26	70	91	90	88	108	70	25	4	583
Snowfall (cm)	72	41	49	18	4	1	0	0	1	8	39	65	297
Precipitation (mm)	72	42	58	45	73	91	90	88	109	78	64	69	880
Degree Days:													
Above 24 °C	0	0	0	0	0	0	1	0	0	0	0	0	2
Above 18 °C	0	0	0	0	4	13	30	21	4	0	0	0	73
Above 15 °C	0	0	0	2	16	39	78	60	13	0	0	0	206
Above 10 °C	0	0	0	9	62	128	211	174	55	9	0	0	648
Above 5 °C	0	0	1	32	152	263	365	326	155	43	4	0	1340
Above 0 °C	0	2	13	91	285	412	520	481	297	129	26	1	2256
Below 0 °C	571	449	289	70	2	0	0	0	0	18	157	465	2020
Below 5 °C	726	588	432	161	24	2	0	0	8	87	285	619	2930
Below 10 °C	881	730	586	288	89	17	1	3	58	207	431	774	4064
Below 15 °C	1036	871	741	431	198	77	23	44	166	354	581	929	5449
Below 18 °C	1129	956	834	519	279	141	68	98	247	447	671	1022	6411

http://climate.weatheroffice.gc.ca/climateData/canada_e.html

1.3.3 Project Area(s) within the Region

Project areas are individual parcels of land identified within the project region where activities are to be implemented. The project areas are eligible for consideration if they meet all ecological characteristic detailed in this section. Detailed maps of each project area boundaries and stratification are available in Schedule A of this document. These areas are predominantly grasslands with moderate to medium accumulation of shrubs species, transitional spruce along the perimeter and incidental spruce within the larger clearings.

Eligible project areas should be well drained, where no peat or poorly drained organic soils are found. Project areas shall not be wetlands as described by the Ontario Wetland Evaluation System (OWES). "Lands that are seasonally or permanently flooded by shallow water as well as lands where the water table is close to the surface; in either case the presence of abundant water has caused the formation of hydric soils and has favored the dominance of either hydrophytic or water tolerant plants"[3]

The project areas display the characteristics as described in Figures 2 to 5. Surface grass and sedge cover is comprised of a mix of naturally occurring species and introduced perennials used in agriculture. All project area maps, aerial photos, initiation of the stratification of vegetation cover, history and legal references are described in *Schedule A – Project Area Files*

Figure 2 illustrates the eligible grass component that may be present on a project area. The grass "non-crop" vegetation reduces the availability of light, moisture, and growing space for longer-lived coniferous species. The dense concentration of these grasses inhibits soil warming, restricts seed germination and seedling development while also

[3] Ontario Wetland Evaluation System, 1st Edition Version 1.2 Queens Printer © 2013

causing physical damage including snow press, smothering and whipping[4]. These dynamics affect the rate of natural ingress and succession of spruce and pine. Grasses can however provide soil nitrogen and nutrients essential to the establishment of longer-lived coniferous species. Heavy grass can also add the organic matter which will contribute to soil structure, and therefore improve nutrient availability. The incidental occurrence of spruce that has established on the site can be seen in the background of the image.

Figure 2 - Example of Grass on Project Areas

Figure 3 and Figure 4 shows an example of a typical project area with shrub vegetation. Shrub vegetation such as red osier dogwood, speckled and green alder and various willow species are present in patches and are typically distributed along the edges of open areas or within areas of poor drainage. These species compete with longer-lived coniferous species for available growing space, water, light and nutrients, thereby reducing the ability of these conifers to establish and grow.

[4] Ecology Traits of Plants Species that compete with boreal and temperate forest Conifer F. Wayne Bell, Maureen Kershaw, Isabelle Aubin, Nelson Thiffault, Jennifer Dacosta, Alan Wiensczyk

Figure 3 - Example Red Osier Dogwood on Project Areas

Figure 4 - Example shrubs in on Project Areas

Figure 5 illustrates a typical natural distribution of longer-lived coniferous species that have naturally established in a project area. The distributions of low-density coniferous species commonly occur around boundaries within narrowing areas with an adjacent seed source, and occasionally in certain open areas.

Figure 5 – Example of Transitional Conifers on Project Areas

1.4 GHG Removal Mechanism & Technologies

1.4.1 Predictive Modeling

The GHG emission reductions are achieved through the establishment of long lived tree species. Analytical tools are used to quantify the GHG emission reductions and removal enhancements. Specifically, the quantification of these removal enhancements are achieved using predictive modeling as described below.

Predictive modeling is a tool used in *Process 3 – Development of Carbon* (see Figure 9). These techniques are used in the estimation of carbon stocks on project areas.

1.4.1.1 MIST

MIST (Modeling and Inventory Support Tool) is used for generating growth and yield information of the appropriate tree species. The calculation for estimates of Sources Sinks and Reservoirs (SSR's) is performed using the CBM-CFS3 version 1.2 (Carbon Budget Model – Canadian Forest Sector) and confirmed using appropriate allometric equations. Section 6.0 describes the process of developing accurate growth and yield information and the processes for deriving the GHG emission reductions and removal enhancements using the CBM-CFS3.

MIST is a Microsoft Access-based program that provides the user the ability to generate growth and yield information based on an extensive suite of updated yield curve information using a provincial (Ontario) data set. The program is the provincial standard approach that is used in all forest management plans on Crown land. The program utilizes computer fitted and statistical techniques supported through the government's provincial growth and yield program. MIST provides the option to create yield curves

for natural-origin and plantation forest conditions (separate sets of coefficients), which vastly improves yield projections.

1.4.1.2 CBM-CFS3

The CBM-CFS3 is a model of forest ecosystem carbon dynamics developed by the Canadian Forestry Service that can be used by forest managers and analysts to assess carbon stocks and changes in carbon stocks. Although developed primarily to assess carbon dynamics at the operational scale, the model can also be used to explore carbon dynamics for smaller areas, down to the site level. The model is also used to assess past or future changes in carbon stocks based on management actions and natural disturbances. The CBM-CFS3 accounts for carbon stocks and stock changes in tree biomass and DOM pools.

The CBM-CFS3[5] modeling framework can be used to simulate the dynamics of all forest carbon stocks required under the Kyoto Protocol (above-ground biomass, below-ground biomass, litter, dead wood and soil organic carbon). It is compliant with the carbon estimation methods outlined in the *IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry (2003)* report.

1.4.1.3 Allometric Equations

The project makes use of Allometric equations to manipulate carbon stocks at the individual tree level (*The Canadian National Tree Aboveground Biomass Equations, Lambert, Ung, Raulie)*. These equations were used to develop carbon stocks for the baseline scenario where individual tree ingress and delayed natural succession scenarios applied.

1.5 GHG Emissions and Removal Enhancements

The OBAP will achieve removal enhancements by quantifying the anticipated establishment of long-lived forest species and the associated carbon captured in these trees. (tCO2e) will be sequestered and stored in the SSR's deemed relevant and affected. The determination of relevant, affected related SSRs are described further in *Section 2*.

1.6 Identification of Risk

A risk of permanence and reversal process was undertaken for the project region. The distribution of the project areas throughout the project region allows for significant mitigation of risk associated with permanence and reversals. Risk factors have been identified and rationalized on the basis of their effect to the overall emission reduction created by the project.

The assessment of the project risk of non-permanence was conducted with guidance from the Verified Carbon Standard (VCS) Agriculture, Forestry and Other Land Use (AFOLU) Non-Permanence Risk Tool. The tool assigns risk rating factors based on circumstances related to the longevity and security of the project and on mitigation strategies that can be

[5] http://carbon.cfs.nrcan.gc.ca/CBMCFS3_e.html

employed to manage the circumstance. Each risk area (internal, external and natural) are described in Sections 1.6.1 through to 1.6.4.

1.6.1 Risk of Inaccurate Estimation of Future Yields

Significant effort has been taken to reduce uncertainty in the development of the OBAP. For example, in *Process 2 - Stratification*, and *Process 3 - Carbon Stocks*, the applied practices used to represent land and to quantify growth and yield expectations are consistent with industry standards for forest management planning. The use of government approved methodologies and has been evaluated with known growth and yield realized data from growth and yield data. It is known that growth conditions fluctuate as a result of microclimate conditions, variances in growing degree-days and micro-site productivity from the northern portion of project region comparatively to the south. For this reason, consultation with regional growth and yield specialist will be made to ensure yields are not over representative. These factors could also result in higher yields than projected. Variation in the rate and type of precipitation could also have repercussions on the growth rate of tree species. The risk in drastic changes in yield estimation associated with these environmental variances is considered minimal.

1.6.2 Risk of Reversal

Wildfire

A number of factors affect the risk of reversal resulting from a wildfire. Project sites are spread throughout a large geographic area allowing for a distinct separation between Project Areas and natural buffering of the sites. It is very unlikely that a wildfire would affect all project sites simultaneously. In the event of a fire, there is a significant fire suppression infrastructure within the Project Region and for this reason this risk is considered to be minimal.

Fire suppression in Ontario employs many seasonal fire suppression staff through the Forest Fire Management Branch on the Ministry of Natural Resources. While this branch is predominantly reserved for suppression on Crown land, it reduces the likelihood of fires occurring outside the project areas traveling through the project region and eventually into the project areas. Fire fighting and suppression on private land is handled by the Municipal local firefighting authorities. The road network to these project areas creates quick and easy access reducing the risk of complete carbon stock loss.

In addition, the project proponent has over 15 years of experience in implementing fire prevention and response plans on the management of Crown lands in the region. This includes the provision of training to operate in the forest and establishing and monitoring compliance to standards on access to fire suppression equipment while operations are being conducted. While this does not specifically pertain to fire prevention on project lands, the resources at the project proponent's disposal remain the same.

A) Internal Risk

Species Choice

All species planted are native to the project areas. OBAP seeks to regenerate Boreal and Great Lakes St Lawrence forest conditions where it historically occurred and therefore the planting of jack pine, red pine, black spruce and white spruce will result in the reestablishment of these areas to forest conditions. See *Schedule C - Treatment and Work Schedules,* for details on the species selection. Seeds were collected from the appropriate seed zones and confirmed by the Ontario Government Tree Improvement Specialist[6].

Management Team

Refer to Section 1.7.1 Management and Technical Planning Team for a detailed description of the management team.

Presence

The management team has an office located within the project region. Relatively minimal amounts of travel are required to visit the project areas.

Financial Viability

The project proponents have evaluated and understand the financial resources required to successfully implement and maintain the project. The risk of bankruptcy is minimal. The project proponents have extensive experience in forest renewal activities and the project activities are scheduled only if the capital funding has been earmarked for the project. The capital required to undertake the monitoring activities in the future is deemed marginal but has been included in the project development expenditures for the duration of the project.

Opportunity Cost

The determination and demonstration of the Baseline and for Demonstration of Credible Alternative Land Use scenarios were analyzed for each project area. Alternative Land Use scenarios include;

- Conversion to pasture,
- Annual grass removal, and
- Mineral extraction

These alternatives are assessed to have investment, technological, institutional, social and ecological barriers that make them economically challenging.

Project Longevity

Refer to Section 1.2 Purpose & Objectives for a description of the project longevity.

B) External Risk

Land Tenure

[6] Randy Ford, R.P.F., Tree Improvement Specialist, Ontario Ministry of Natural Resources, Forest Health and Silviculture Section.

Refer to SCHEDULE A – Project Area Files for documentation on land tenure on project areas. No known potential upstream effects are anticipated as the project is protected by a legally binding agreement referred to as a Carbon Transfer Agreement (CTA).

Community Engagement
Refer to Section 1.10 Stakeholder Consultation for a summary of stakeholder consultation completed to date and anticipated outreach activities.

Political Risk
A governance score (of between -2.5 and 2.5) was calculated from the mean of Governance Scores across the six indicators of the World Bank Institute's Worldwide Governance Indicators (WGI). Table 3 provides an average of the risk rating over the most recent five years of available data.

Future Harvesting
This risk is minimal; landowners participating have described their desire not to harvest wood products from these lands and have subsequently agreed to register this condition on title to ensure the current and future landowner will adhere to the prescription detailed in this document.

Risk of Change to Legal Framework
Project activities are implemented on privately owned property. Changes in public policy that might affect the ability for a private landowner to engage in the project are deemed irrelevant.

Table 3 - Government Risk Rating

WGI	2007	2008	2009	2010	2011	Average
Voice and Accountability	1.39	1.42	1.44	1.38	1.41	1.41
Political Stability No violence	0.98	1.02	1.11	0.92	1.04	1.01
Government Effectiveness	1.77	1.79	1.83	1.86	1.85	1.82
Regulatory Quality	1.59	1.64	1.68	1.67	1.68	1.65
Rule of Law	1.78	1.79	1.79	1.79	1.76	1.78
Control of Corruption	1.99	1.99	2.07	2.07	1.98	2.02
						1.62

The government score rating of 1.62 was calculated for Canada using information source from the WGI as per VCS practice. This equates to a risk rating factor of zero as per the VCS Risk tool.

C) Natural Risk
Fire
See Section 1.6.2 – risk of reversal.

Drought or Flood

Drought and floods would have the most effect on growth if they occur in the initial period of seedling establishment. This risk is considered to be minimal. A retreatment has been budgeted in the unlikely event that a follow up treatment is needed.

Pest and Disease Outbreak
Historically, the occurrence of pest and disease outbreak in the forest ecosystems of the project region is lower in proportions compared to fire occurrence. Forest tent caterpillar, spruce budworm and Jack pine budworm outbreaks have been present within the region in the past although they tend to remain isolated and monitored by the project proponent separately. No pest or disease outbreaks are currently found within the project sites. The project proponent has cooperated with the government of Ontario in the monitoring and implementation of pest management plans over the last 15 years.

Extreme Weather
The occurrence of extreme weather is considered to be proportionally smaller than fire and insect outbreak. For this reason the reduction in carbon stocks on all project areas as a result of extreme weather is considered to be negligible. Weather conditions within the project region do not typically host violent winds. Blow down events tend to occur most severely where wind speeds have an opportunity to gather intensity. Tree species are tolerant to frost conditions and are typically not to be planted within floodplains or areas of storm control. The loss of carbon stocks associated with the occurrence of extreme weather is not considered to be of significance.

Geological Risk
Geological risk is considered to be negligible. No significant geological features or dynamics that affect forest cover exist within the project region. The risk category is not applicable to the project.

D) Final Risk Rating
The assessment of non –permanence risk indicates that all risk associated with the projects permanence is minimal, and that the applicable mitigation strategies have been employed in order to manage the circumstances that may not be foreseeable at this time.

- Internal Risk: the risks rating associated with this category have been determined to be 0. No criteria are applicable to the project as the management capacity, structure of the project and financial circumstances are favorable to long term permanence.
- External Risk: the risk rating associated with this category have been determined to be 0. None of the criteria are applicable to the project.
- Natural Risk: The risk rating associated with this category have been determined to be 0. While the risk of fire, disease, storms and floods cannot be eliminated, the circumstances within the project zone are such that the appropriate mitigation strategies can be employed to minimize their severity.

The sum of all categories is equal to 0 and thus combined non-permanence risk rating of the project is 0. Due to the length of AFOLU projects, VCS criteria require projects to apply a minimum risk rating on 10 to account for the unforeseen circumstances that

cannot be forecasted so far in advance. This tool requires a minimum buffer to account for non-permanence to be 10% of the total sequestered tCO2e resulting from the implementation of project activities. The OBAP will apply an additional 15% to buffer against uncertainties and ranges in the expected forest productivity associated with the project. The total buffer pool is 25% of the total sequestered tCO2e.

1.6.3 Reserve Requirements

The buffer reserve pool requirement will be met using a mechanism where the desired 25 % reserve buffer requirements are met by acquiring offset credits in tCO2e from other independent projects occurring outside the project region. These offset credits will be set aside and retired from sale under this project. See Section 2 in the Supplementary Documentation for the GHG report and the verification report.

1.6.4 Leakage Assessment

Leakage is considered to be an increase in emissions attributable to the projects based on its location and the associated change in land use. The potential for leakage is described below. Rationale is provided for its inclusion/omission from consideration in the *with project* scenario.

Internal
Internal leakage is considered to be leakage occurring within the project areas outside of the eligible planting areas. Little internal leakage if any is expected as a result of this project. As participating landowners, they have been identified through the consultation process as having expressed an interest in establishing forest on their properties. The increased leakage associated with tree removal, or burning of biomass is not expected to influence the project emissions, as this practice was not prevalent amongst landowners at the time of the consultations.

External
External leakage is considered to be leakage occurring outside of the project areas but within the project region. A small amount of leakage may be expected to result from the implementation of the OBAP. Additional clearing of forested areas or reclaiming fallow farmlands for the purpose of agriculture is not expected to increase as a result of the project areas. Section 12.7 Effects of Climate Change describes the effects of climate change to the project region. Changes that would favorably affect agricultural industries are not expected to influence the project areas. Project areas largely have uneven topography and distribution, with low productivity making them unfavorable for economic farming activities regardless of climatic differences. It is not anticipated that the project will create any significant increase in pressure on forested lands to be cleared for the purpose of agriculture today or in the future.

1.7 Roles and Responsibilities
The project proponent is Forest Carbon Alliance (FCA) a Joint Venture Company (JV) between First Resource Management Group Inc. (FRMG) and CarbonZero. Individuals from both organizations manage the project and participate on a number of technical task

teams. The roles and responsibilities including contact information for the project proponent are provided below.

Forest Carbon Alliance Inc.
P.O. Box 920, Englehart, Ontario, Canada
P0J 1H0
Phone: (705) 544-2828
Fax: (705) 544-2921

The project proponent is responsible for selecting personnel and organizing the business relationships required to make successful financial transactions required for the projects feasibility. The project proponent is responsible for the undertaking of the monitoring, implementation plans and maintaining records of project activities.

1.7.1 Management and Technical Planning Team

The project management and planning team is responsible for preparing the production schedule, treatment plans, documentation, assumptions and rationale associated with the development of the PDD and its implementation. This team oversees the successful development of the GHG program from concept, to validation, and verification. Members of this team include: Yves Vivier, Etienne Green, and Dan Fraleigh.

Yves Viver R.P.F. is the Forest Program Manager at First Resource Management Group. He is a Registered Professional Forester in Ontario with 10 years experience in project management and forest management planning. Yves has led the development and management of various forest management and GIS based projects. As well, he is the author of the 2006-2011 and 2011-2021 Forest Management Plan for the Timiskaming Forest. Yves has been directly involved in various Ontario Forest Industry Association-lead initiatives to streamline forest management planning processes.
Business Address: P.O. Box 920, Englehart ON, P0J1H0
Phone Number: 705-544-2828 ext 232
Email: yves.vivier@frmg.ca

Etienne Green R.P.F. Is the Carbon Project Forester with First Resource Management Group. He has expertise in forest carbon methodologies, markets and third party standards. He has experience in landscape level modeling and dynamics and been involved in the development of the forest carbon program since its conception.
Business Address: P.O. Box 920, Englehart ON, P0J1H0
Phone Number: 705-961-0572
Email: etienne.green@frmg.ca

Dan Fraleigh is the Chief Operating Officer with Carbonzero and has over 16 years of experience in areas ranging from technology and development to media and entertainment. Since 1997, he has been involved in managing and developing telecom and web-based projects for enterprise level companies including: Novartis, Mediconsult, and Rogers. A technology "greening" advocate and eco-motivated entrepreneur, Dan is adviser and/or board member to a number of environmentally focused and socially minded organizations including; SaveGreen, Live Green Toronto, Fashion Takes Action and Greenmom. As an accomplished performer and tv host, he has worked both in front

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1.7.2 Project Implementation Team

The Project Implementation Team is responsible for the planning and implementation of the OBAP activities which include site preparation, silvicultural assessment, monitoring, training and compliance. Members of this team include: Yves Vivier, Etienne Green, Wayne Pawson,
Brenda Jenings and John Burak.

Wayne Pawson is responsible for the implementation of FRMG's forest renewal programs. He is a forest management technician with 21 years experience in silvicultural operations. He graduated from Sir Sanford Fleming College in 1988. Prior to joining the FRMG team, Wayne worked for the Ministry of Natural Resources as well as the Wahgoshig First Nation where he established their silvicultural program under the Community's Economic Development Corporation.
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1.7.3 Advisory Group

This team is responsible for providing legal, and strategic guidance for permanence assurance and financially viable mechanisms associated with the duration and development of verifiable carbon benefits. Members of this group include: Phil Green, Jim Stewart and David Sharpless.

Phil Green has worked with most of the major forest products companies across Canada for over 20 years. He has helped woodlands operations from British Columbia to the Maritimes implement and achieve certification for sustainable forest management systems. He has also worked with woodlands operations in areas such as log scaling and performance measurement.
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Jim Stewart is a term lender, merchant banker, venture capitalist, turnaround investor, operator and crisis manager. Since 1976, Mr. Stewart has been Chairman or Chairman and CEO and significant investor in over twenty successful midmarket corporate turnarounds. He was Chairman and/or CEO of 10 companies with total sales of over $400 million. While still active as an investor and turnaround consultant, he is concentrating on guiding management through periods of rapid change.
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David Sharpless brings extensive executive, business and legal experience spanning 35 years. David spent more than twenty years practicing business law as a partner at a major Canadian law firm before embarking on a business career where he has been instrumental in the significant growth of several notable firms. David has recently been appointed Chairman of New Carbon Economy Fund Venture Management Inc. He is a director of a number of public and private companies including e3 Solutions Inc., a director and Chairman of the Audit Committee of Micromem Technologies Inc. (US and CNSX listed company); Chairman of the Independent Review Committee of Portland Investment (formerly AIC); and Chairman and CEO of Maverick Inc., a private investment and consulting firm.

1.7.4 Contacts

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1.8 Eligibility

1.8.1 GHG Standards and Compliance with Good Practice Guidance (GPG)

The *AR-ACM0003: Afforestation and Reforestation of lands except wetlands version 2.0.0* was used as a tool for rationalizing and quantifying removal enhancements generated by the project activities in this GHG project. The methodologies may be modified at a future time to comply with another GHG Methodology. Tools available in this methodology include:

a) *AR-AM-Tool-08-v4.0.0 Estimation of non-CO2 GHG emissions resulting from burning of Biomass Attributable to an A/R CDM project activity*

This tool is not applicable to the OBAP or the development of the PDD since there is no burning of biomass scheduled during the implementation of the project.

b) *AR-AM-Tool-02-v1.0 Combined tool to identify the baseline scenario and demonstrate Additionality in A/R CDM project Activities*

This tool is Applicable to the demonstration of additionality as referenced in *Schedule A-Project Area Files*

c) *AR-AM-Tool-12-v2.0.0.0 Estimation of Carbon stocks and changes in carbon stocks in deadwood and litter in A/R CDM Project Activities*

This tool is not applicable to the OBAP, the estimation of carbon stocks changes in Deadwood and litter is completed using the CBM-CFS3 model.

d) *AR-AM-Tool-14-v3.0 Estimation of Carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM Project Activities*.

This tool is applicable to the OBAP, and is used in Process 3 - Developing Carbon Stocks.

e) *AR-AM-Tool-15-v1.0 Estimation of the increase in GHG emissions attributable to Displacement of pre-project agricultural activities in A/R CDM project activity*

This Tool is not applicable to the OBAP. Project baseline scenario does not entail the displacement of pre-project agricultural activities. See results Project areas files for documentation to this effect.

f) *AR-AM-Tool-08-v16.0.Tool for Estimation of Change in Soil Organic Carbon stocks due to the implementation of A/R CDM project Activities*.

This Tool is applicable to OBAP and is used in Process 4 – Net emission assertion. Stratification of lands applicable to this tool is completed during Process 2- Stratification

The following documents have also provided guidance for the quantification of emission reductions, development of project development document and the implementation and monitoring plans. The use of these guiding documents will ensure the project is developed to the highest biodiversity and quantification standards.

a) VCS Agriculture Forestry Other Land Use Non-Permanence Risk Tool
b) Climate Community and Biodiversity Project Design Standards
c) The approved Forest Management Plan for the 2011-2021 Timiskaming Forest [7]

[7] http://www.appefmp.mnr.gov.on.ca/eFMP/viewFmuPlan.do?fmu=280&fid=100095&type=CURRENT&pid=100095&sid=8917&pn=FP&ppyf=2011&ppyt=2021&ptyf=2011&ptyt=2016&phase=P1

1.8.2 Deviances from Methodologies and Assumptions

Any deviances from the methodologies will be individually rationalized however no deviances from the methodologies are expected. Field implementation decisions during the establishment of the project are intended to address the long-term ecological integrity of the project areas. If circumstances do not allow for a planned treatment to be carried out, then the rationale for the deviation will be documented in the Project Area File (PAF), such that adjustments to the carbon stocks may be amended.

1.9 Environmental Impact Assessment

There is no legal requirement to conduct an Environmental Impact Assessment for the implementation of OBAP. The proponent has however conducted an in-depth analysis of the impacts to the social, environmental and economical values which is summarized in Section 12.8 Potential Negative Impacts to Climate, Community & Biodiversity

1.10 Stakeholder Consultation

1.10.1 Partnership Outreach

The partnership outreach process is an ongoing process that identifies candidate lands and their respective landowners. The following is a summary of this process to date.

- **September, 2012:** A database containing geographic information was developed containing aerial photographs, inventory information, boundaries, and classifications relevant to assessing the biomass content for project region.
- **September, 2012:** Approximately 4,500 hectares were identified as showing a potential for inclusion in the OBAP project while broadly meeting the criteria for additionality. These areas were considered candidate project areas. A closer assessment of the additionality and baseline is conducted on a project area basis.
- **October, 2012:** A project information package that outlines the benefits, implications and details of the offset project was created for consultation and information sharing with the potential landowners of the candidate areas. This process is ongoing. The project allows for the inclusion of new project areas as landowners are contacted.
- **October, 2012:** A Memorandum of Understanding (MOU) was drafted to enter into a partnership with the landowner of the candidate areas. The MOU would be signed by both parties to express interest in completing the associated due diligence and drafting legal agreements for the partnership.
- **November – ongoing:** Establishing a relationship for a partnership with the landowners of the candidate areas is conducted via personal visits to the landowner's homes. Numerous visits were made in order to convey information relating the implementation phase, duration, species choice, and potential locations. The project information packages were used and distributed to all contacted landowners. Many landowners showed initial interest in participating and sometimes referred to family members. Some displayed little interest or desire to participate. In such cases they were removed from the candidate list. Phone calls were made in an attempt to inform the landowners who do not reside within the parcel of potential areas. This method of consultation proved to be significantly less effective than visiting and making personal contact.

- **Ongoing:** The landowners who expressed a desire to enter into a partnership with the project proponent sign the memorandum of understanding. At this point the landowner understood that work needed to be completed by the project proponent to accurately estimate the areas and treatments required in order to reach ecological thresholds. Subsequent consultation would take place to review proposed project maps and to ensure that both parties were in agreement regarding the implementation of the project.
- **Ongoing:** The project proponent continues to seek candidate land and approve them for consideration in the project on an annual basis. See Process 1- Project Area Inclusion.

1.10.2 Public Consultation Review Period

The project proponent will publish this PDD online to the FCAI website. The project page is dedicated to communicating details relating to the project for a 4-week period prior to validation and during project implementation. The PDD can be viewed and comments can be posted at the following location; http://forestcarbonalliance.com/. The PDD is also available to be viewed in person at the Englehart office and the Toronto office upon request.

1.11 Project Cycles

This PDD allow for the inclusion of project areas through the cycle described below. This cycle outlines the processes used for the inclusion of project areas, their stratification, method of quantification, reporting and monitoring. The cycle is broken down into three schedules, and six processes.

1.11.1 Schedules

Schedule A - Project Area Files

This schedule contains projects areas approved for implementation of project activities. Each Project Area File (PAF) must contain the following Project Area File Requirement (PAF#) in order to be complete and subsequently be approved for consideration in the project.

Project Area File # 1 Landowner Contact & Lot Information
Project Area File # 2 Land uses, Title and Deed Evidence
Project Area File # 3.1 Baseline: Scenario with Highest SSR Removal
Project Area File # 3.2 Baseline: Investment Analysis
Project Area File # 3.3 Baseline: Additionality Evidence
Project Area File # 4 Signed Legal Agreements
Project Area File # 5 Map & Shapefiles of Project Areas

Incomplete Project Area Files are maintained at the Englehart office electronically. Once they are completed and internally approved by the proponent when considered suitable for carbon accounting. The approved PAF's are appended to the PDD Schedule A. Schedule B and Schedule C subsequently updated upon the completion of the carbon accounting.

Schedule B – Treatments and Work Schedules

This Schedule contains information regarding the planned implementation of project activities necessary to generate the desired emission reductions. A full description of the eligible activities is available in Section 1.11.7. The Project Summary Table (PST) contains data, which is updated as new project area files are completed.

Project Summary Table #1 Planned Site Preparation by Project Area
Project Summary Table #2 Planned Tree Planting by Project Area
Project Summary Table #3 Monitoring Schedule by Project Area

Schedule C – Reports
This section contains the information relating to the modeling of carbon stocks by stratum and scenario; it also includes the net emission assertion summary by project areas using the information available in the respective Project Area File.

Project Summary Table # 4 Carbon Stocks at Current Year
Project Summary Table # 5 Carbon Stocks in Baseline
Project Summary Table # 6 Carbon Stocks in Project Scenario
Project Summary Table # 7 Project Emission Reduction Assertion
Project Summary Table # 8 GPD Reports and Statements

1.11.2 Project Processes

The process of identifying project area, assessing their potential, quantifying their carbon stock potential, developing implementation and treatment plans and subsequently including the results in reports and tables is summarized in the following six project processes

The processes have been developed consistent with the criteria outline in this PDD as it relates to additionality, permanency, representation and carbon stocks. The project processes are summarized as follows;

i) Project Process Work Flow
ii) Process 1- Definition of Additionality
iii) Process 2- Stratification of Project Areas
iv) Process 3- Development of Carbon Stocks
v) Process 4- Net Emissions Assertion
vi) Process 5- Treatment & Work Schedules

Description of Project Work Flow and Processes

The Project Work Flow in Figure 6 describes the general requirements and additional steps to be completed in order to consistently identify and represent land to be included in the OBAP. As described below, candidate land is identified and the landowners are contacted by the means described in Step 2. Information regarding the eligibility of the lands under a GHG project is collected with the consent of the landowner. Eligibility information includes ensuring that no land tenure and ownership claims or disputes over boundaries are ongoing or unresolved. The ecological conditions prior to the start of the

project are described and, as such, the baseline and additionality of the GHG project is assessed (see Process 1). Legal documentation surrounding the desire of the landowner to proceed with the project is completed along with the transfer of carbon rights (through the CTA) and permanency on title. The stratification of the projects lands is completed (see Process 2) and all current information relating to the project areas is completed.

The project area is then approved since it's considered suitable for carbon accounting. In Step 6 the project proponent will undertake the development of carbon stocks based on the current carbon stocks, baseline carbon stock, and project carbon stock as defined in Process 3. The proponent will subsequently ensure the net emission assertion is compiled using the carbon stock estimate in Process 4 and complete a treatment and monitoring plan for the project areas described in Process 5.

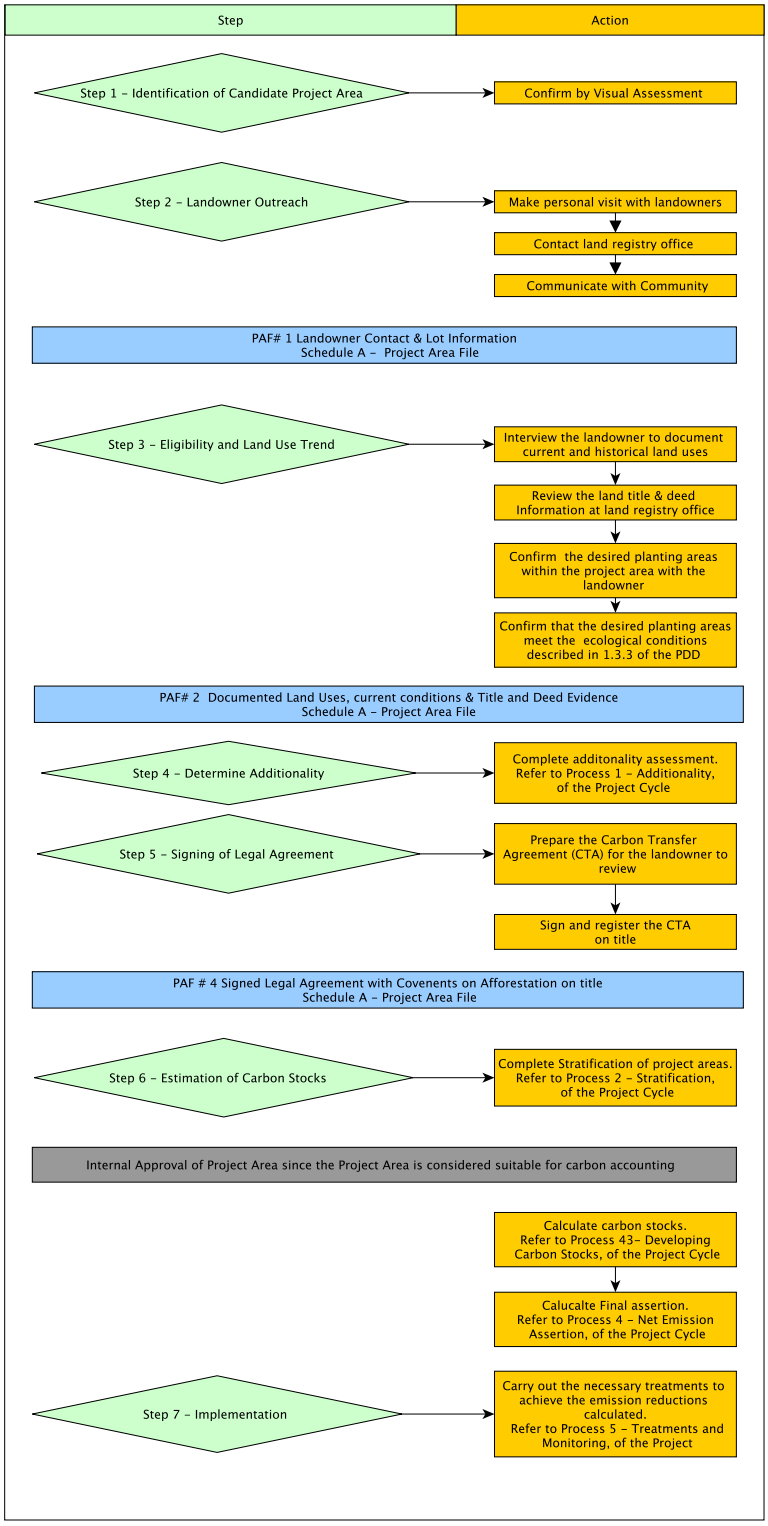

Figure 6 – Project Process Work Flow

The process described in Figure 7 is sourced from the IPCC **AR-AM-Tool-02-v1** and is used to determine the additionality. The proponent will examine the project areas against the criteria set out in this process. The proponent will also provide evidence of the definition of additionality in the Project Area File under PAF# 3.1, 3.2, 3.3. The result of this process is to determine additionality at the Project Area level and the baseline scenario.

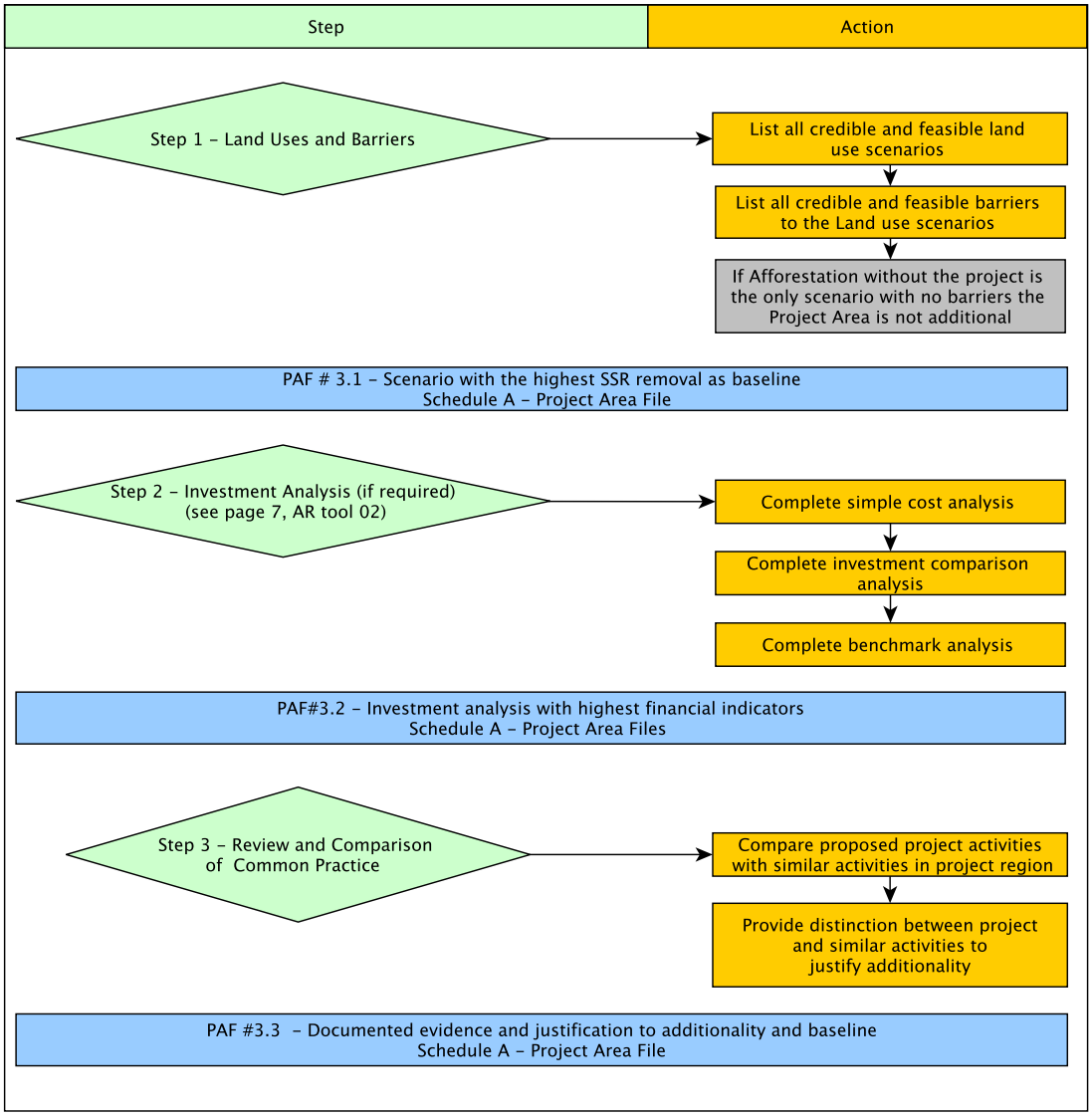

Figure 7 - Process 1- Definition of Additionality

The project proponent will examine the project areas against the criteria and methods described in Figure 8. **AR-AM-Tool-14-v3.0** is used for the quantification of carbon stock in trees and shrubs on land excluding wetlands defined by OWES as confirmed by field visits. . Crown cover is used as the measure of stratification and an indicator of biomass.

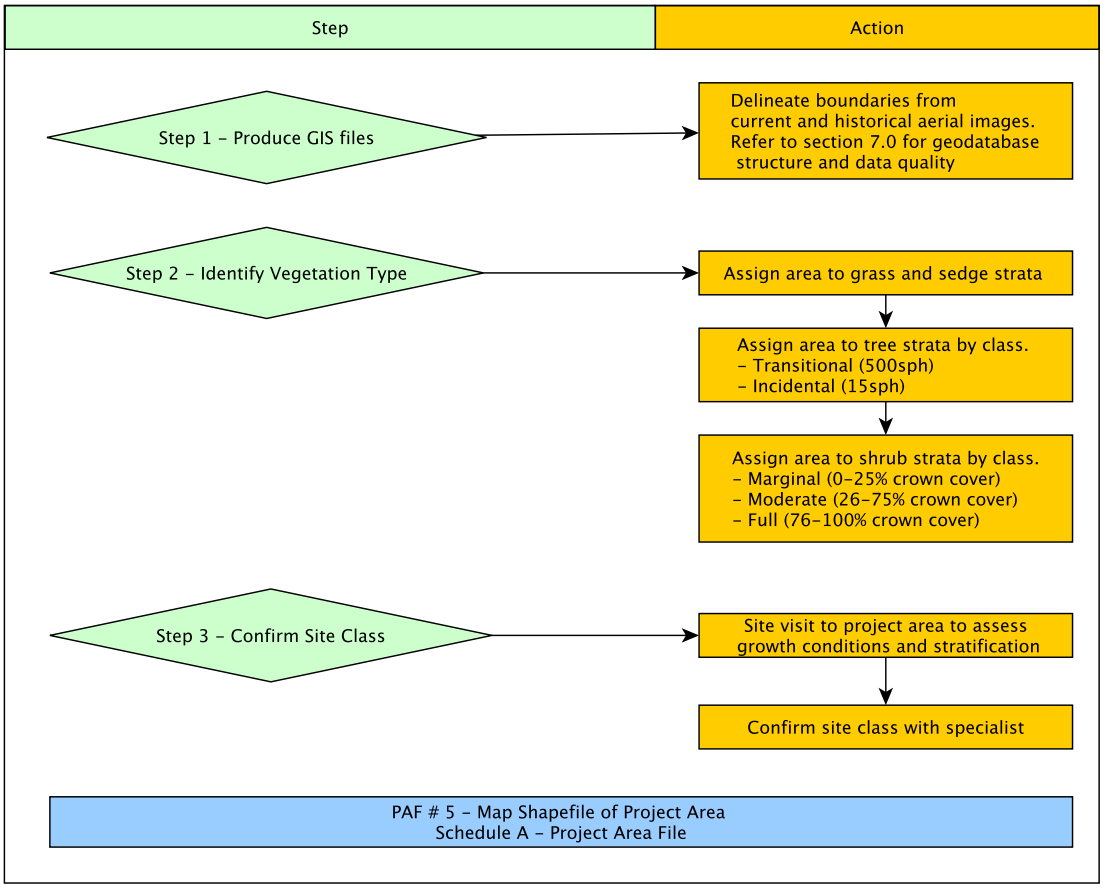

Figure 8 - Process 2 - Stratification

The process of developing carbon stocks for the current carbon stock, baseline carbon stock and project carbon stock is described in Figure 9. Based on the aerial stratification of the Project Area from PAF#5, the proponent examines carbon stocks based on crown cover as per AR-AM-Tool-14-v3.0. This tool is used only for the determination of carbon stocks at the current and baseline scenarios. The use of predictive modeling tools MIST and Canadian Budget Model – Canadian Forest Sector (CBM-CFS3) are used to determine project carbon stocks. The results are summarized in the Project Summary Table (PST) available in *Schedule C – Reports*.

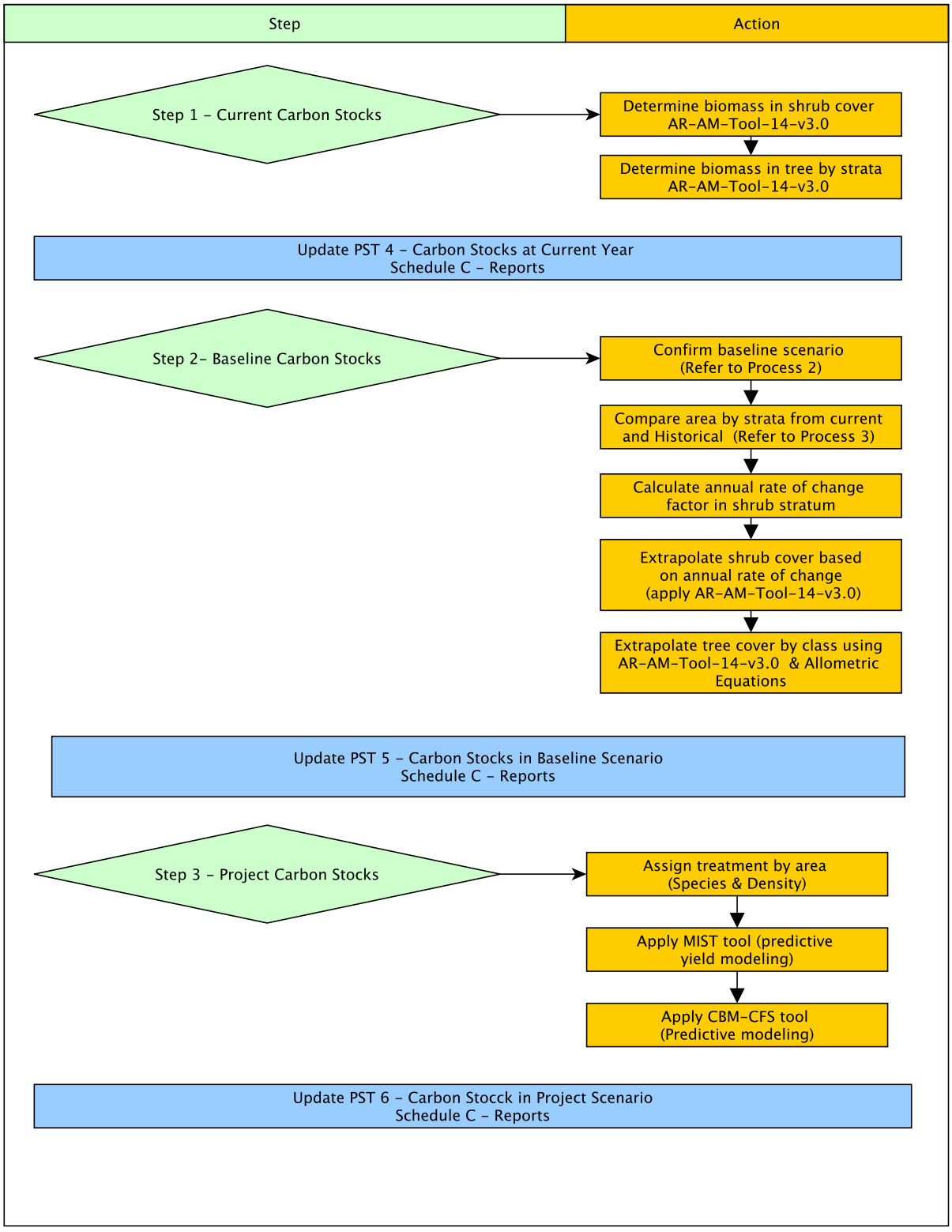

Figure 9 - Process 3 - Developing Carbon Stocks

Process 4 provides the necessary steps to calculate a net emission assertion. Based on the results of Process 3 (Step 1) and Step 2 through 4, a net assertion is made. The results are summarized in *Project Summary Table 7 in Schedule C – Reports*.

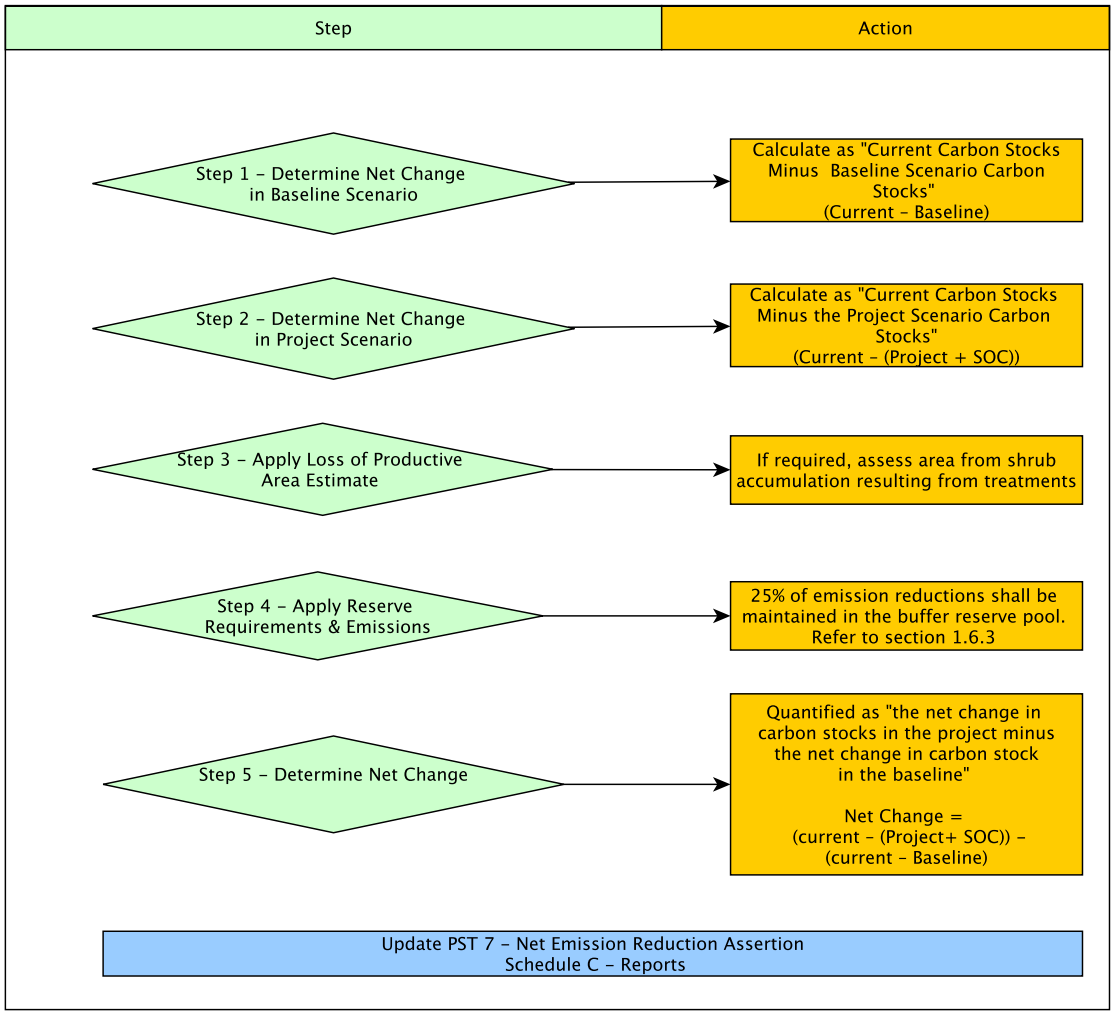

Figure 10 - Process 4 - Net Emission Assertion

The proponent will implement the process described in Figure 11 for the implementation of the project, which includes completing the regeneration requirement assessment (silviculture prescription for the project area). It also includes step to initiate the monitoring plan and assessment of free-growing resulting from project activities.

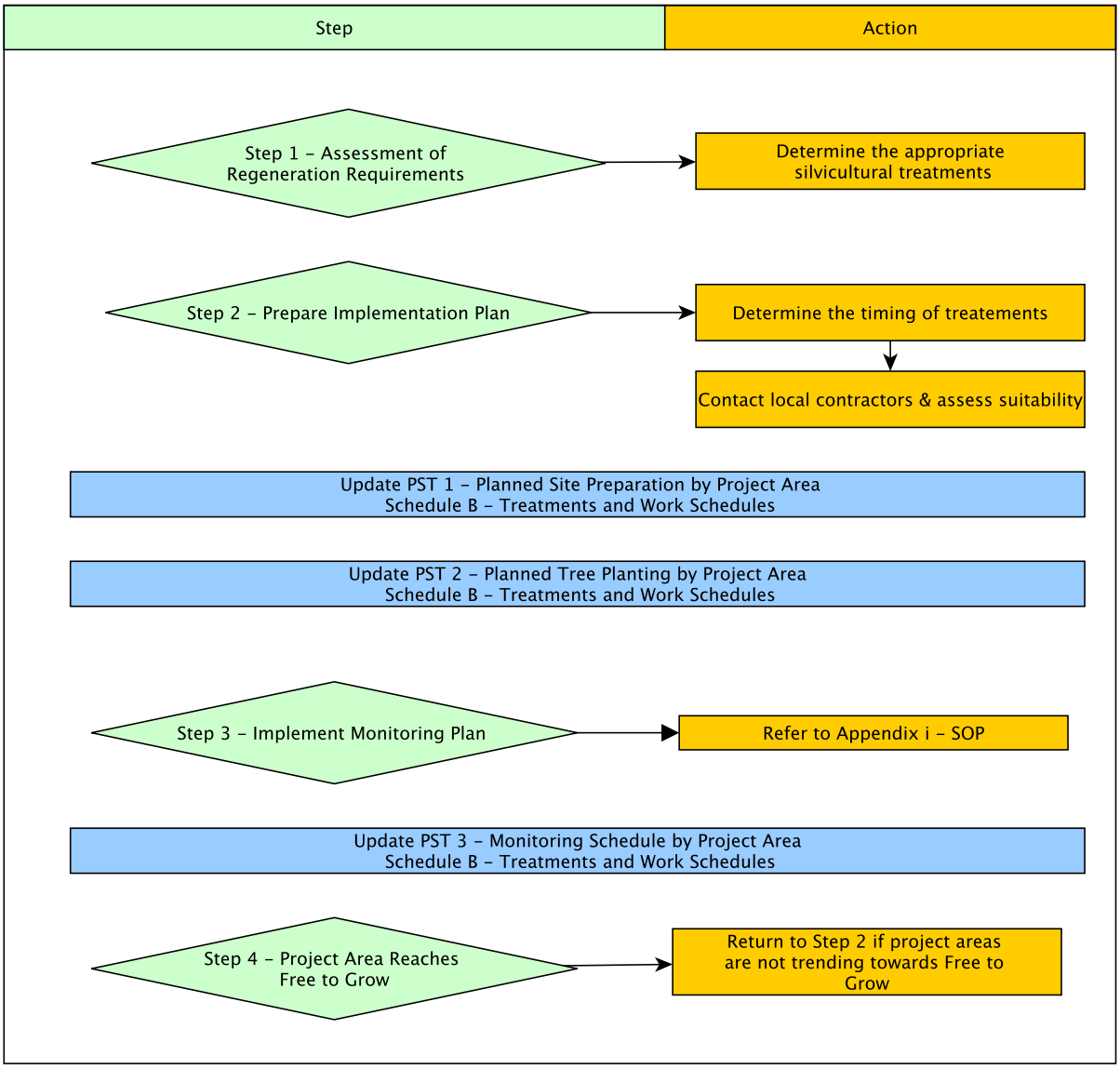

Figure 11 - Process 5 Treatments and Monitoring

1.11.3 Community Employment Engagement

Opportunities for involvement in the implementation of project activities will be made available for Communities within the project region. The most qualified and appropriate candidate will be selected to complete the work required for the successful establishment of trees. Efforts will be made to engage available First Nation contractors within the project region to complete silvicultural activities scheduled for the project.

1.11.4 Worker training and orientation and relevant law

All workers will receive onsite training by Wayne Pawson on their worker rights, relevant legislation and appropriate silvicultural techniques to be used during the

implementation of this project. Relevant laws include to worker safety include Ontario Health and Safety (OH&S) Act & Regulations – section 43
Ministry of Labour (MOL) – Worker Health & Safety Awareness in 4 Steps (effective July 1, 2014) and the Employment Standards Act version 4.0
The documented evidence of this training will be retained on file at the proponent's office.

1.11.5 Schedule of Activities

The schedule of activities is available in *Schedule B- Treatments and Work Schedule*.

1.11.6 Dispute and Grievance Resolution

No disputes or grievances are anticipated at this time as all landowners have been engaged in the development of this project from the beginning. A dispute or grievance will be addressed on a case-by-case basis by the project proponent however the following steps will be taken.

- The project proponent shall attempt to resolve in good faith any known issues before it is declared a dispute by the stakeholder
- The proponent will participate in the grievance resolution process by engaging with the parties with the authority to settle the issue.
- Project activities will be suspended, unless circumstance allows for their continuation during the resolution process.
- If the dispute cannot be resolved within a reasonable timeframe (30 days upon notice from stakeholder) An independent third party mediator should be provided. (Given the large geographic scale of the project the independent third party mediator is not pre-identified). The independent third party mediator must render a neutral reasoned evaluation of the merits of both cases parties, and encourage closure to the dispute.
- All grievances and related responses must be clearly documented, retained and publicized for stakeholder review.

1.11.7 Description of Project Activities

The project activities are described below in accordance with the chronological plan described in *Schedule B – Treatments and Work schedule* . The planning and preparation of the silvicultural treatments have been designed and completed by Wayne Pawson, Yves Vivier R.P.F. and Etienne Green R.P.F. The implementation of project activities will be done by qualified and experienced local contractors that have received training on the project specification requirements as described above in the community engagement process. Training for the safe implementation of project activities will be conducted by John Burak. Training records will be retained at the FRMG office in Englehart.

Mechanical Site Preparation

The process of mechanical site preparation (MSIP) on projects areas is an eligible silvicultural treatment that could be used to prepare the site for the establishment of seedlings. Project areas will be treated as required and in accordance with the IPCC guidance for soil disturbance in AFOLU. Soil disturbance shall not exceed 10% of all

area within the project region. Where soil disturbance is applied it shall follow natural contours of the terrain and the MSIP will be mapped and retained in the geodatabase

Herbicide Application

The application of herbicide on project areas is a required treatment that controls the grass and shrub competition impeding the establishment of the conifer seedlings on the project areas. In the absence of this treatment, the successful establishment of seedlings would prove to be significantly more challenging, reducing the carbon stock gains feasible by the OBAP. Herbicides will be applied by a certified licensed herbicide applicator using a manual system that allows for precise application and within the environmental parameters required for maximizing the benefit of the application. The application of herbicides will be mapped and retained in the geodatabase. This will also assist in monitoring post-treatment.

Manual Brush Clearing

The removal of brush is a necessary treatment for the establishment of shade intolerant Boreal forest species when early succession shrub species occupy the site and compete for available sunlight, soil moisture and nutrients. Manual brushing will be required on portions of project areas and will only be employed as required for the successful establishment of the conifer seedlings. The removed brush will be left on site as per IPCC GPG for AFOLU. Project areas that were brushed will be mapped and retained in the geodatabase to assist in future monitoring.

Tree Planting

The hand planting of the project areas will be completed by local tree planting contractors. Tree planting densities have been selected to achieve the optimal forest condition required to achieve associated project objectives. Tree planting treatments have been developed for rich sites and only native plant species are used with no genetically modified organisms (GMO) treatments. The project will also use seedlings that have been grown in local tree nurseries. Red Pine, Jack Pine, White and Black Spruce will be planted based on the site conditions. If any deviations from the planned treatments are necessary in order to address local site conditions, they will be approved by a registered professional forester and documented on a case-by-case basis. Adaptation in response to unexpected site conditions (e.g. often changes in micro site conditions) are incorporated in FRMG's treatment methodologies in order to achieve the desired forest condition described above.

Field Assessment and Sampling

Field assessment of the project areas is required prior to the implementation of project activities to confirm their suitability and to establish monitoring permanent sample plots. Following the project activities, monitoring sample plots (MSP) will be established to complete the assessment and monitoring of tree growth and regeneration success and the effectiveness of silviculture treatments. Using MSP's for monitoring provides a consistent approach to the evaluation and representation of regeneration success.

11.12 Adaptive Management Cycle

The project has implemented an adaptive approach to ensure that the project is managed to the best available standards with regards to updated knowledge of side conditions, predictive modeling techniques and carbon accounting. Evidence of the adaptive management cycles is available in Process 5 – Treatments and monitoring. Under this process the proponent is required to review information that may lead to the inaccurate estimation of GHG Emission reductions if new or different information becomes available throughout the implementation and monitoring of project activities. These changes will be reflected in the project areas files and the respective project area tables updated.

2.0 Identifying GHG Sources, Sinks and Reservoirs to the Project

Sources, Sinks or Reservoirs (SSRs) are pools of carbon that can be measured or estimated by the project proponent and are defined as follows:

> **Source:** Physical unit or process that releases a GHG into the atmosphere
> **Sink:** Physical unit or process that removes a GHG from the atmosphere
> **Reservoir:** Physical Unit or component of the biosphere, geosphere, or hydrosphere with the capability to store or accumulate a GHG removed from the atmosphere by a GHG Sink or captured from a GHG source.

The identification of the SSR's is important for the consistent representation of the flux of carbon from one pool to another in order to maintain consistency, transparency and accuracy while comparing baseline and project scenario carbon stocks.

2.1 Established Criteria for identifying Controlled, Related and Affected SSR's

All sinks that are attributable to project activities and considered relevant, related, and affected by this project are identified and designated.
Criteria and methodologies for assessing Controlled, Related or Affected SSR's is sourced directly for the process outline is outline in Figure A.2 Comparison of terms, and from figure A.2 Identifying and Selecting GHG sources sinks and reservoirs of the ISO-14064-2 document. Based on this approach, the following steps are taken to ensure all GHG SSR's are considered and quantified accordingly:

1. Identify the project processes and activities
2. Identify the SSR controlled by the project proponent through the implementation of project activities.
3. Identify SSR physically related to the implementation of project activities
4. Identify SSR affected by the project through consideration of the associated effects.
5. Identify parameters used to measure or estimate SSR

2.2 Description of Identified Controlled SSRs

SSRs that are controlled by the project proponent are based on the flux of carbon from the atmosphere to plants (biomass). These include all above and below ground biomass

accumulations where energy from the sun is transferred into plant material. The increase or decrease of all biomass within the project areas are controlled by the project proponent. Table 4 shows the SSRs considered to be Above & Below Ground Biomass, Soil Organic Carbon (SOC), and Dead Organic Material and Litter (DOM).

Table 4 - Controlled SSR

GHG Type	GHG Pool	SSR Class	Description of SSRs	Figure A.2 Flow Chart	SSR Parameter	
					Baseline	Project
Controlled	Live Tree Biomass	Sink	This pool includes all living above and below-ground biomass of live trees. Including (roots, stump, leaves & needles branches)	Relevant	Estimated using GPG from ARACM 0003- and allometric equation.	Modeled using CBM-CFS3 - CP1, CP2,
	Live Shrub Biomass	Sink	This pool includes all living above and below-ground biomass of Shrubs including above and below ground (roots, shoots and leaves)	Relevant	Estimated using GPG from ARACM 0003- Crown Cover equations	Estimated with crown cover equasion from IPCC
	Dead Tree Biomass	Reservoir	This pool includes all dead above and below-ground biomass of trees. Including (roots, stump, leaves & needles branches)	Relevant	Estimated using GPG from ARACM 0003- and allometric equation.	Modeled using CBM-CFS3 - CP3, CP4,
	Dead Shrub Biomass	Reservoir	This pool includes all dead above and below-ground Biomass of Shurbs including above and below ground (roots, shoots and leaves)	Relevant	Estimated using GPG from ARACM 0003- Crown Cover equasions	(Above and Belowground biomass) Modeled using CBM-CFS3 - CP3, CP4,
	Litter and Organic Material	Sink	This pool includes all live and dead herbaceous plant matter (eg: grass and sedge)	Relevant	Default Value grassland in boreal plains from IPCC GPG	Modeled using CBM-CFS3 - CP5
	Soil Organic Carbon	Sink	This pool includes all net changes in organic carbon within soil not included in the biomass of plants	Relevant	Estimated using GPG from IPCC tool	Estimated using GPG from IPCC tool

The sources of carbon are attributable to emissions relating to the establishment of the biomass and in some cases the decay of other biomass.

2.2.1 Above & Below Ground Biomass

Above ground and below ground biomass is a carbon sink that is affected by the growth of trees resulting from the implementation of project activities. The sink's dynamics will be modeled using the CBM-CFS3 model and supported with growth and yield data generated in the Modeling and Inventory Support Tool (MIST). This sink is directly attributable to the implementation of project activities inside the project boundary.

2.2.2 Soil Organic Carbon

The fluctuation in SOC following project implementation is expected to increase as a result of higher sequestration rates from biomass within project areas. Soil carbon dynamics and carbon flux will be tracked using CBM-CFS3 but will not contribute to the net GHG assertion in this project. For consistency, and to alleviate differences in methods of quantifying changes in SOC, the use of the International Panel on Climate Change (IPCC) tool for estimating change in SOC is used. It is expected that this tool will provide a conservative estimate SOC change. Default values will be used to mitigate potential discrepancies with the use of this tool and to remain consistent with the methods for estimating changes in SOC from the IPCC. This strategy will reduce the potential differences in outcomes when compared to other methods for calculating changes in the SOC sink. The appropriate practices surrounding soil disturbance patterns, soil type and time since treatment defined in the tool will be employed at the project areas level during

the implementation of project activities to conform to the assumptions made in the tool. This ensures that the appropriate default values and assumptions are accounted for and based on the silvicultural technique required.

2.2.3 Dead Organic Material & Litter

Dead Organic Material (DOM) on the project areas is controlled by the implementation of the project activities. DOM dynamics pertaining to carbon flux is modeled using the CBM-CFS3. This sink is directly attributable to the implementation of project activities inside the project boundary. SSRs related to the project are described in Table 5. The decay of plant material and combustion of plant material as a source is a result of project activities required under silvicultural good practices in the project region.

2.3 Description Identified of Related SSR

SSR's that are related to the project are based on the impacts of project implementation.

Table 5 - Related SSR

GHG Type	GHG Pool	SSR Class	Description of SSRs	Figure A.2 Flow Chart	SSR Parameter	
					Baseline	Project
Related	Decay of plant material	Source	The implementation of Project activities will result in the decay of biomass as lying dead wood, and herbaceous plants are broken down organically.	Not Relevant	Not Considered	Estimated using GPG from biomass accumulation resulting from Implementation
	Combustion plant material	Source	The implementation of project activities does not include the planned combustion or forest fire.	Not Relevant	Not Considered	Not Considered

2.4 Description of Identified Affected SSR

The affected SSRs to the project are identified in Table 6. Vehicle Equipment and Emissions are not considered as they represent a small amount for their one time occurrence during the implementation of project activities.

Table 6 - Affected SSR's

GHG Type	GHG Pool	SSR Class	Description of SSRs	Figure A.2 Flow Chart	SSR Parameter	
					Baseline	Project
Affected	Harvested Wood Products	Reservoir	This Pool includes all biomass from live or dead tree that are harvested, and removed from the project area.	Not Relevant	NA	Not considered
	Construction Materials	Source	The production of construction material as a result of implementation of project activities.	Not Relevant	Not Considered	Not Considered
	Vehicle and Equipment Emissions	Source	Emissions associated with the burning of fossil fuels related to the implementation of project activities.	Relevant	Not Considered	Monitored, Fuel consumption
	Fertilizers	Source	Emissions associated with the production and use of fertilizers.	Not Relevant	Not Considered	Not Considered
	Input Production	Source	Emission associated with the growing of seedlings and production of herbicides	Not Relevant	Not Considered	Not Considered

3.0 Determining Baseline Scenario

The baseline scenario is determined on an individual Project Area basis and stored in their respective Project Area File. Refer to *Process 1 – Additionality* for more detail. An in-depth description of the Baseline scenarios to be approved for considering in the project is described below for the project areas within the project region.

3.1 Criteria for Assessing and Justifying the Baseline Scenario

The Project uses the A/R Methodological *Tool 02"Combined Tool to Identify Baseline Scenario and demonstrate additionality in A/R CDM project Activities version 1.0*" to determine the baseline scenario to establish local land use trends within the Project Region and their subsequence plausibility as they relate to the project areas.

The criteria for identifying the baseline scenario is based on identifying verifiable land use trends within the Projects Region and also examining the financial, ecological and social mechanisms that affect the feasibility of these trends. Each project area is subject to the assessment described in AR-AM-Tool-2-v1.0, and the result of this tool identifies the baseline scenario as:

- Grasslands remaining grasslands with ingress of competing vegetation and moderate natural succession

3.2 Existing and Alternate Activities

The project planning phase and project implementation phase both have different start dates that are past December 31st 1999 as described in the IPCC tool. The expected start date is May 1st, 2014. The only project activities that have taken place prior to this date are site preparation techniques required for the implementation of project activities that will result in emission reductions. The project is solely contingent on the sale of emission reductions. Prior to the project start date a feasibility assessment of the GHG project was completed. The findings were summarized in a project package, which was the basis of a business arrangement for the forward sale of the offset project. The OBAP would not occur if it were not for the mutual desire to financially profit from the creation of emission reductions.

Identification of illegal Activities

Illegal activities within the project region are not expected to have any effects to the project climate, community and biodiversity benefits derived from implementing project activities on the project areas. Relatively low levels of poaching fish & wildlife and illegal logging are the activities that most relates to these benefits. Given the size and scope of the project region, it is unreasonable to expect that the specified project areas would contribute to these illegal activities, or that the project proponent has the ability to mitigate the occurrence of the illegal activities mentioned. Local law enforcement and

through the Ontario Provincial Police (OPP) and Conservation Officers (CO) provide the most effective means to limit these illegal activities.

3.2.1 Identification of alternative land use scenarios to A/R project activity

Identify credible alternative land use scenarios to the proposed CDM project activity

Alternative land use scenarios used to establish the baseline scenarios to the project activities are based on local knowledge of the economics affecting land values and land use trends. Factors affecting land use evolve overtime and are based on agriculture markets, site conditions, ecological capacities and the financial barriers to landowners.

Alternative 1) Conversion to Pasture or Cropland
This alternative assumes the project areas are converted to pasture, graze or cropland. In this alternative the project areas enter into a growth cycle of perennials aimed at supporting the highest yield for cattle grazing. Cash cropping would involve growing the most economical crop; in most cases corn and soybean are produced. This alternative assumes the land use intent is to generate financial return from the sale of crops or cattle. All efforts are focused on producing economic rotations.

Alternative 2) Annual Grass Removal
This alternative assumes the project areas continue to support grass and sedge species that are removed annually and left to regenerate naturally. Biomass is either burned, or harvested with intent to produce hay. This alternative assumes the land use intent is to control the grass component but no effort is undertaken to increase the biomass content of the candidate sites.

Alternative 3) Continuation of Pre Project Land Use
This alternative assumes the candidate sites remain below their maximum potential biomass carrying capacity, no effort is taken to remove the grass component, produce economic cash crops or cattle graze. Only natural succession occurs, resulting in marginal increases in brush and incidental species such as spruce. The biomass content within the candidate site increases naturally as ingress occurs. This alternative assumes that no effort in land management is required.

Alternative 4) Forestation of Project Lands without A/R activities
This alternative assumes candidate sites are renewed to Boreal or Great Lake-St Lawrence Forest conditions. Efforts are taken to control competition, prepare soils and plant the appropriate species at appropriate densities and that adequate monitoring efforts are taken. This assumes all efforts are made to increase the biomass content of the site at its most effective rate.

Alternative 5) Mineral Extraction
This alternative assumes surface mineral extraction and rights are exercised on the Project Areas. Significant biomass is lost in the process. This assumes all efforts are taken place to identify potential minerals of value within the site and that they are

distributed in a way that requires an open pit format.

Consistency of credible alternative land use scenarios with enforced mandatory applicable laws and regulations

No mandatory laws and regulation restrict the landowner from developing the candidate sites into agricultural lands as long as they take the necessary steps to meet the requirements of the municipal zoning bylaws. No mandatory applicable law restricts the use of candidate lands in any alternative as described above.

The Mining Act[8] authorizes licensed prospectors to enter private property that is deemed open for mining claim staking. While it is encouraged by the Ontario Ministry of Northern Development and Mines to never enter private properties unannounced, there are no notification requirements on the part of the prospector. In some instances mining rights are held by the Crown, in most cases the landowner holds the mining rights. A landowner with mineral rights is legally entitled to enter into an agreement with a prospector for mineral exploration.

Relevant Acts
Aggregate Resources Act, R.S.O. 1990, c. A. 8, as amended
Conservation Land Act, R.S.O. 1990, c. C. 28, as amended
Assessment Act, R.S.O. 1990, c. A. 31, as amended
Environmental Assessment Act, R.S.O. 1990, c. A. 18, as amended
Environmental Bill of Rights, 1993, S.O. 1993, c. 28, as amended
Environmental Protection Act, R.S.O. 1990, c. E. 19, as amended
Nutrient Management Act, 2002, S.O. 2002, c. 4, as amended
Agricultural Tile Drainage Installation Act, R.S.O. 1990, c. A. 14, as amended
Clean Water Act, 2006, S.O. 2006, c. 22, as amended
Conservation Authorities Act, R.S.O. 1990, c. C. 27, as amended
Drainage Act, R.S.O. 1990, c. D. 17, as amended
Lakes and Rivers Improvement Act, R.S.O. 1990, c. L. 3, as amended
Ontario Water Resources Act, R.S.O. 1990, c. O. 40, as amended
Planning Act, R.S.O. 1990, c. P. 13, as amended
Municipal Act, 2001, S.O. 2001, c. 25, as amended
Health Act, 2009, S.O. 2009, c. 31, as amended
Beef Cattle Marketing Act, R.S.O. 1990, c. B. 5, as amended
Fertilizers Act, R.S.C. 1985, c. F-10, as amended (Federal)
Grains Act, R.S.O. 1990, c. G. 10, as amended
Pest Control Products Act, S.C. 2002, c. 28, as amended (Federal)
Pesticides Act, R.S.O. 1990, c. P. 11, as amended

3.2.2 Barrier Analysis

Identification of barriers that would prevent the implementation of at least one alternative land use scenarios

[8] http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90m14_e.htm

1) Investment Barriers are described as barriers other than insufficient financial return relating to the amount of capital available, the lack of access to credit or dept funding availability.

Alternative 1: The cost associated with preparing the land for crop production may prevent this land use scenario. Other factors such as the land area, configuration and topography affect the availability of capital required to implement this alternative since they reduce the efficiency of crop production. Lower capital requirements exist for the establishment of pasture however it can still be a deterrent based on the individual investor.

Alternative 4: The cost associated with the renewal of forest on fallow lands may prevent this land use scenario. The net present value of harvesting timber is insufficient to justify the cost given that the investor must wait approximately 75 to 85 years until trees are mature before recuperating their initial investment.

2) Institutional Barriers described as risk relating to change in government policy, or enforcement of land use legislation.

Alternative 5: Changes in the interpretation of the Mining Act, or in municipal zoning regulations may prevent the land use scenario. It is likely that any surface mining activities would be very small scale. Changes in government policy and land use rights are not likely to significantly affect these efforts.

3) Technological barriers described as lack of materials, or infrastructure required for implementation.

Alternative 1: The infrastructure required for the transportation of heavy machinery involved in the production of crops may prevent this land use scenario. All bridges in the area have a maximum weight, which limits the machinery that can be transported to and from the lands.

Alternative 2: The infrastructure required for transporting heavy loads may prevent this land use scenario. While most infrastructure in the project regions is sophisticated, all bridges in the area have a maximum weight, which limits what may be transported to and from the lands.

Alternative 5: The infrastructure required for the transportation of heavy machinery involved in surface or other types of mining may prevent this land use scenario. All bridges in the area have a maximum weight, which limits what can be transported to and from the lands.

4) Related to local tradition described as knowledge or lack of, laws, customs, market conditions, equipment of technology.

Alternative 2: Local market conditions may limit the economic viability of the removal of grass. The mechanical harvesting of hay, distance to be traveled, road conditions, and the

quality of hay are all factors relating to the financial viability of this alternative. The production of hay is interrelated with feed for cattle or other animals.

> *5) Prevailing Practice barriers related to a prevailing practice described as the land use scenario being "first of its kind"*

Alternative 4: Afforestation is not a prevailing practice. Strips of trees are occasionally planted to serve as wind barriers however the implementation of landscape afforestation is seldom undertaken. This land use scenario may prevent this land use scenario. With the exception of growth and yield studies or small parcels of land planted as pilot projects or wind barriers, the reforestation of area that occurs within the project region is primarily done on Crown land, or in rare cases.

> *6) Ecological barriers related to soil conditions, wind, catastrophic natural events, meteorological events, opportunistic species, unfavorable ecological successions, and pressures from grazing,*

Alternative 1: Soil and ecological conditions may prevent this land use scenario. The quality of this land for crop production is a barrier to the viable crop production as well as growing season variations such as frost-free days and precipitation.

> *7) Social barriers related to demographic pressures on land, social interest conflict, illegal practices, lack of trained labor, lack of organization.*

Alternative 4: Social pressures and family history may prevent this land use scenario. Locally, there are many generations of landowners that have ancestors who have cleared and farmed their lands. The reforestation of land similar to these areas is often in conflict with local social views and cultural interests.

> *8) Land tenure barriers related to communal ownership, absence of clearly defined legislation,*

No land tenure barriers exist. Ownership of all lands is clearly defined and there is no ambiguity. Legislation is clearly defined.

Elimination of land use scenarios that are prevented by the identified barriers.

Table 7 provides a detailed description of the alternative land use scenarios and their associated barriers.

Table 7 - Alternative Land Uses

Land Use Scenario	**Applicable Barriers**
Alternative 1) Conversion to Pasture or Cropland	1) Investment Barriers 3) Technological Barriers 6) Ecological Barriers

Alternative 2) Annual Grass Removal	3) Technological Barriers 4) Related to local tradition
Alternative 3) Continuation of Pre-Project Land Use	
Alternative 4) Forestation of Project lands Without A/R activities	1) Investment Barriers 5) Prevailing Practice Barriers 7) Social Barriers
Alternative 5) Mineral Extraction	2) Institutional Barriers 3) Technological Barriers

Determination of baseline scenario (if allowed by the barrier analysis)

Barriers 1, 5 and 7 prevent the land use scenario. "Alternative 4 - Forestation of Project Lands without A/R Activity" is unlikely and unfeasible within the timeframe of the project since the required investment, the social and cultural interests and prevailing practices make the land use scenario unattractive to landowners. Thus, the remaining land use scenario without barriers is "Alternative 3 continuation of pre-project Land Use".

3.2.3 Investment Analysis

Not Applicable to the OBAP

3.2.4 Common Practice Analysis

Similar practices to those employed in the project are limited to small research plots for the purpose of measuring yield used in forest management. Example of this can be seen at the Kirkwood plantation site near Thessalon, Ontario. However these activities differ in that they are contingent on research grants and partnerships. They also differ in that scientific research sample plots are relatively small and have a focused objective to measure and quantify performance under a range of growth scenarios. Only the Northern Ontario Pilot Project provides the greatest similarities with OBAP. There was are no known project that can be used as a measure of similar projects that have been successfully implemented, or are currently being implemented, that meet the requirement of this common practice analysis.

Forestation projects under the same legal framework and comparable environment are not common due to the intense financial commitment it requires. Afforestation activities that occur within the project region on Crown land can provide some context, however while the techniques employed for the project activities are similar, their legal framework differs significantly. In the Crown land context, lands are harvested and subsequently regenerated using silvicultural techniques that include site preparation, natural regeneration, herbicide applications, thinning, aerial seeding and tree planting.

3.3 Assumption, Data Availability and Reliability

The assumptions used in ***AR-TOOL14 Version 4.1 - Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM*** in A/R CDM require the use

of Equations 27. Equations 26 and 27 require the assignment of values to the variables in each equation. These equations are described in Equations 26 and 27. Table 8 provides a list of values required to complete the calculation.

Equation 26

(EQ26 - AR-AM Tool 14v004.1)

$$C_{SHRUB,t} = 44/12 * CF_s * (1+R_s) * \sum A_{SHRUB} * B_{SHRUB}$$

Where :

$C_{SHRUB,t}$	=	Carbon stock in shrub Biomass within the project boundaries at point of time year 0
CF_s	=	Carbon fraction of shrub biomass; t $C(t.d.m)_{-1}$
R_s	=	Carbon stock in shrub Biomass within the project boundaries at given point of time in year 0
A_{SHRUB}	=	Area of Shrub Biomass stratum at of time year 0
B_{SHRUB}	=	Shrub Biomass per hectare in shrub biomass stratum at given point of time in year 0

Equation 27

(EQ27- AR-AM Tool 14v004.1)

$$B_{SHRUB,t} = BDR_{SF} * B_{FOREST} * CC_{SHRUB\ i,t}$$

Where:

$B_{SHRUB,t}$	=	Shrub biomass per hectare in shrub biomass stratum *i*, at a given point of time in year *t*; t d.m. ha-1
BDR_{SF}	=	Ratio of shrub biomass per hectare in land having a shrub crown cover of 1.0 and default above-ground biomass content per hectare in forest in the region/country where the A/R CDM project is located; dimensionless
B_{FOREST}	=	Default above-ground biomass content in forest in the -1 region/country where the A/R CDM project is located; t d.m. ha
$CC_{SHRUB\ i,t}$	=	Crown cover of shrubs in shrub biomass stratum *i* at a given point of time in year *t* expressed as a fraction

Table 8 - Data Assumption & Source of Default Values

Variable	Value	Source
BDR_{sf}	0.1	A default value of 0.10 should be used unless transparent and verifiable information can be provided to justify a different value.
C_{shrub}	Calculated	Carbon stock in shrub biomass within the project boundary at a given point of time in year. (Calculated for current and year 50)
CF_s	0.47	Carbon fraction of shrub biomass; t C (t.d.m.)-1 IPCC default value of 0.47 t C (t.d.m.)-1 is used
R_s	0.4	The value of RS will be 0.40 [Table 4.4 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories] unless transparent and verifiable information can be provided to justify different values
A_{shrub}	NA	*Measured by project proponent*
B_{shrub}	NA	*Calculated by project proponent*.
B_{forest}	83	Values from Table 3A.1.4 of IPCC GPG-LULUCF 2003 are used unless transparent and verifiable information can be provided to justify different value
CC_{shurb}	NA	Estimated by project proponent. Three sub strata exist for shrub crown cover. The high ranges of ground cover will be employed: Full: stk 1.0, Moderate: stk 0.74, and Marginal: stk 0.49 See Section on Table 12 - Criteria

Equation 27 must be completed to determine the appropriate B_{SHRUB} value based on the project proponent estimation of crown cover in Equation 26.

Table 11 provides the values and sources used in the estimation of carbon stocks at year zero.

The results of these calculations are outline in Table 9.

Table 9 - Results of Equation 27

	CC Shrub Full	CC Shrub Moderate	CC Shrub Marginal
B_{SHRUB}	8.3	6.1	4.1

3.4 Present or Future Relevant Information

The project uses the best information and techniques available at the time of the project development. Should future information relevant to the project be identified it will be incorporated into the project where applicable through the adaptive management cycle described in Section 11.12.

3.5 Differences between the Project and Baseline Scenario

The implementation of the OBAP will result in a change in the level of sequestration provided by the yield of woody plants species occuring within the project areas. The project areas will increase their carrying capacity as compared to the pre-project activities for the full 100 year timeline of the project. The resulting habitat will shift from a grass based to a forest based ecosystem which is expected to drastically increase the biodiversity in the areas.

4.0 Determining GHG SSR's Relevant to the Baseline Scenario

4.1 Criteria for Assessing and Identifying GHG SSR's relevant to the project

The project uses guidance from the AR-AM-Tool-14-v3.0 [9] to estimate carbon stocks within the aerial stratification area. This tool provides guidance and several available methods for the estimation of carbon stock in the shrubs and trees that have been stratified.

GHG SSR's are estimated in order to represent the carbon stock within the project area prior to the establishment of the project. Under ISO-14064-2 an IPCC methodology or best available methodology will be used.
The Allometric Equation technique (technique 2) for estimating carbon stocks in tree biomass within substrata grass incidental and transitional was selected. The carbon stocks stored within the grass and herbaceous species occurring on project areas was not estimated because it was determined that the rate of ingress from shrub strata during the project crediting period (50 years) would completely cover occurrence of the grass by the end of this period.

4.1.1 Baseline Carbon Stocks

Shrub
Carbon stocks in year zero are estimated using Equations 26 and 27 and default values from the IPCC-GPG Using *Process 3 - Development of carbon stocks*. In order to estimate the biomass by strata, the areas by Crown Cover Classification (*see Process 2 – Stratification*) is used. Default Values from

[9] Methodological Tool- Estimation of Carbon Stocks and Change in Carbon stocks of trees and shrubs in AR/CDM project activities

Table 8 - Data Assumption & Source of Default Values are used in the calculation of carbon stocks of shrubs. Results from Equation 27 for B_{SHRUB} by crown cover is found in Table 9. These values are subsequently used to determine shrub carbon stocks at year zero using the stratification results from Process 2. These results are available by Project Areas and show the stratification and the subsequent results for carbon in stocks as a result of Equation 34. See *Project Area Table #5 Carbon Stocks: Baseline Scenario*. Equation 36 and 37 will not be applied as carbon stocks for shrubs in the Baseline is calculated as Full Crown cover by Year 50 Rate of Change is constant throughout all project areas.

Tree

Carbon stocks in the baseline scenario for trees are estimated using the Process 4 – Development of carbon stocks. Allometric equations that estimate individual tree growth was used as per guidance from AR-AM-Tool-14-v3.0 14 with the yield estimates further defined in Section 6.1 of this PDD. The results of aerial stratification of the grassland area and subsequent carbon stocks using allometric equations are in *Project Area Table #5 Carbon Stocks: Baseline Scenario*. See Section 1.8.1 GHG Standards and Compliance with Good Practice Guidance (GPG) for further information on the use of allometric equations in this PDD.

The total cumulative carbon stock stored in shrubs and trees for Year 0 by sub-stratum is summarized in *Table 5 - Carbon Stocks : Baseline Scenario* and available in *Schedule C – Reports in Project Area*

4.2 Additional Criteria for identifying baseline GHG SSR

Criteria for identifying the baseline scenario are described in Section 3.0 and an individual assessment of the baseline scenario is available in each Project Area File. No additional criteria are expected.

4.3 Relevant SSR to the Project Scenario

All relevant SSRs to the project scenario are identified in Table 4, which are controlled and relevant. These include above and below ground biomass, change in SOC and litter.

4.4 Relevant SSR to the Baseline Scenario

Similarly to the project scenario, relevant SSRs are described in Table 4.

4.5 Comparison between the Project SSR and Baseline GHG SSR

The difference between the baseline and project scenario is made by comparing the carbon stocks found in the Project Summary Table 5 and 6 in Schedule C. These tables are updated, as additional area is included into the project.

The project baseline GHG SSR is described as the delay in growth or the impeded growth of long lived forest species native to the Great Lakes St-Lawrence and Boreal forest. These project areas, which historically supported healthy and diverse forest ecosystems,

are now suppressed by the farming attempts that took place within their geographic areas. The result is an inactive state between farmed land and forest ecosystems with significantly diminished biomass content. The project scenario involves the removal of vegetation, which has established itself and the artificial regeneration of forest ecosystems that provide higher biomass contents. The GHG fluctuation between the baseline and project scenario is that of a slight decrease followed by a rapid increase in the storage of GHG through above and below ground biomass, litter, and soil organic carbon.

5.0 Selecting GHG SSR for Monitoring and Estimation

The effectiveness of forest regeneration and thus individual tree growth is used as the measure of carbon sequestration performance. The procedures for monitoring regeneration success are summarized as follows:

5.1 Criteria and Procedure for Selected SSR

1. Monitoring of the selected SSR will account for the total planted areas following the implementation of project activities, which consists of the sum of all treatment areas. These treatment areas represent the total eligible areas contributing to attaining the GHG assertions that will be reported in Schedule C – Reports.
2. Statistically appropriate sample sizes and confidence levels will be calculated to establish the appropriate number of MSP required for assessing the renewal and growth at each monitoring event.
3. The placement of MSP locations will be generated randomly. UTM Grid coordinates indicate the center of the round permanent circle plot. These will be marked by GPS as subsequent monitoring events/sampling will use the same plot location.
4. The first monitoring event will be the planting success. This will include an assessment of density in stems per hectare (SPH), and an assessment of the conformance with the intended silvicultural prescription. This is to be conducted according to the SOP outlined in APPENDIX I – SOP.
5. The Second monitoring event will be the seedling establishment. This will take place 1 year following the tree planting and will assess the height in meters, density in stems per ha, mortality, and lying dead wood. This monitoring event will determine the requirement for additional treatments and adjustments to the anticipated Free to Grow (FTG) year. This is to be conducted according the SOP outlined in APPENDIX I – SOP.

6. The final monitoring event will include a Free to Grow assessment, and forest inventory assessment. This monitoring event will include a report, which indicates that the tree planting activities have resulted in a free growing forest meeting the requirements of the Well-Spaced Free growing Regeneration Assessment Procedure for Ontario (WSFG, 2005) and displaying growth on trend within the acceptable level of variation (within 95% confidence interval of MIST measurable inputs.). No subsequent monitoring events will occur by the proponent. This is to be conducted according to the SOP outlined in APPENDIX I – SOP

5.2 Estimated GHG SSR

Estimated GHG SSR are described in Section 2.2

5.3 Monitored GHG SSR

The procedures for monitoring relevant SSR included in this report are described below. The SSR's considered relevant and included in the implementation of project activities are listed in Table 10. These criteria, monitoring methods and indicators are the basis for maintaining data to be used for verification of carbon stocks created by the project.

Table 10 - Monitoring Criteria for Estimated SSR

SSR	Monitoring Method	Measurement Indicator
CP1- Standing Live Tree	Field sampling and reporting	Height(m), DBH and Density (SPH)
CP2 Roots (course and Fine)	Derived from CP1	Root to shoot ratio
CP3 Standing Dead Tree	Field sampling and reporting	Height (m), DBH and Density (SPH)
CP4 Lying Dead Wood	Field sampling and reporting	Occurrence and density
CP5 Litter and Forest Floor	Relative to growth in CP1, CP3 and CP4	CBM-CFS3 Model Results
CP6 Soil Organic Carbon	Not monitored	IPCC Change in SOC methodology

6.0 Quantifying GHG Emissions, Emissions Reductions and Removal Enhancements by SSR

6.1 Criteria and Procedure for Quantifying GHG SSR Relevant to the Project

The OBAP scenario consists of renewing areas that have been cleared and left underproductive (as a result of social land use pressures) with long-lived coniferous tree species.

The expected outcome at the end of the duration of the project is a healthy, diverse, mature and historically appropriate Boreal and Great Lakes St Lawrence forest condition that supports habitat for a host of species at the site and landscape level. These results are achievable under the timeframe constraints if active silvicultural interventions are implemented. The desired forest conditions will be achieved through the application of professional knowledge and associated silvicultural techniques that are known to successfully regenerate a forest to the desired condition.

The non-native perennials species that have been employed in grazing and cash cropping that are often found present within project areas will slowly diminish with the

reestablishment of the native tree species resulting from the implementation of project activities. Optimal forest growth on the project areas will achieve biodiversity objectives and climate objectives within the next 100 years while providing important social and ecological benefits today.

6.1.1 Structure of Procedure

The projected forest growth and yield is determined using the MIST. The following discussion is specific to the proponent's procedure for generating stand level volumes (m^3/ha) for the species selected for the project. This procedure is used in *Process 3- Developing Carbon Stocks*.

Once the appropriate species were selected to be planted on individual sites, MIST is used to generate the species specific yield curve development information. The proponent provides the rationale and technical details supporting the yield curves (by site class) for the project region. Local knowledge or technical details specific to quadrants or project areas shall be updated in the PAF. A check list[10] that provides the directions for implementation and application of the yield curves is referenced. This document also describes the inputs and options available to users of these models. Results of the validation exercise for this tool are available in Penner *et al* (2008).

6.1.2 Determination of Site Class

Site Class is a classification of the site productivity (site class by species) for an individual ecosite. There are a number of options for evaluating site class. The productivity of a project areas will vary based on its location. The following approach will be used to confirm the site class.

Based on a preliminary review of the project potential areas and using local knowledge, it has been determined that the ecosites present in the central northern portions are predominately 5f to 5m. These will be confirmed for each project areas and updated in the respective Project Area Files. There are also anticipated isolated pockets of varying soil conditions.

For 5f, the site class is determined to be Site Class = 1 for Sb and Site Class = 2 of Pj.[11]
For 5m, the site class is determined to be Site Class = 1 for Sb and Pr[12]

Where other species are to be planted the same approach will be undertaken to determine the appropriate site class.

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[10] MIST Yield Curves: Planning Team Checklist. Dated 12th February 2009.

[11] Correspondence with Ken Lennon, R.P.F., NESI Forest Productivity Specialist and Scott MacPherson, R.P.F., Forest Productivity Specialist,
Silvicultural Guide to Managing for Black Spruce, Jack Pine and Aspen on Boreal Forest Ecosites in Ontario, Book III, September 1997

[12] Correspondence with Ken Lennon, R.P.F., NESI Forest Productivity Specialist and Scott MacPherson, R.P.F., Forest Productivity Specialist
Silvicultural Guide to Managing for Black Spruce, Jack Pine and Aspen on Boreal Forest Ecosites in Ontario, Book III, September 1997

Confirmation of the assumptions will include field measurement data and field review of the ecosites, use of the productivity matrix from the provincial silviculture guides and utilizing local growth and yield site class cross-reference tables.

In conversation with the Provincial Forest Productivity Specialists[13], it was confirmed that fallow farm within the project region lands tend to have higher site classes as they would have originally been selected for farming based on better than average site conditions. These sites therefore are considered to have higher site productivity based on their historical use. This assumption was confirmed with the provincial Growth and Yield Coordinator. In order to confirm these results, the site class and sivilcultural intensity were also cross-referenced using the Ecological and Management Interpretations for Northeast Site Types – Book III[14]. In this manual, the following was confirmed:

Silvicultural Intensity Considerations see matrix on page 112 & 124
Site productivity (site class by Species) see page 110 & 122

Where available, a review of the provincial forest resource inventory parameters including, site class, species and stocking are evaluated for determining and rationalizing the site class for the purpose of deriving the yield estimates within each project area. It is acknowledged that this information is known to be less accurate on private land parcels because it's not periodically updated as would adjacent Crown land under the Crown Forest Sustainability Act (CFSA). It is for this reason that field inspections are required to confirm the site productivity. This information is kept in the respective Project Area File.

Stocking is determined on the basis of the project objectives, the review of the individual sites, species and with input from the landowners. The stocking for black spruce and white spruce dominated sites are set at 3,000 stems per hectare (sph), and the red pine at 2,500 sph. Figure 12 provides a comparison of the growth and yield data for black spruce generated using MIST between site class 1 through to site class 2 with a stocking of 3,000 sph. Figure 13 provides a comparison of the growth and yield data for white spruce generated using MIST between site class 1 through to site class 2 with a stocking of 3,000 sph. Figure 14 provides a comparison of the growth and yield data for red pine generated using MIST between site class 1 through to site class 2 with a stocking of 2,500 sph. The following are the parameters used in MIST to derive the growth and yield information.

Yield Curve Paramaters:

Species: 100% Sb or 100% Pr
Site Class: 1, 1.25, 1.5, 1.75 and 2
Stocking: 100%
Survival: 100%

[13] Correspondence with Ken Lennon, R.P.F., NESI Forest Productivity Specialist and Scott MacPherson, R.P.F., Forest Productivity Specialist

[14] Silvicultural Guide to Managing for Black Spruce, Jack Pine and Aspen on Boreal Forest Ecosites in Ontario, Book III, September 1997

Delay/acceleration: 0
Sph;
Pr - 2,500
Sb – 3,000
Sw – 3,000

The methodology used to generate the inputs and associated yields are consistent with the Ontario government approved Forest Management Plan for the Timiskaming Forest (for which a portion of the project areas fall within). The same approach shall be used for the southern portion of the project region. The methodology and the growth and yield parameters used to derive this information were also reviewed and confirmed by the Northeast Science and Southern Science and Information Forest Productivity Specialists[15].

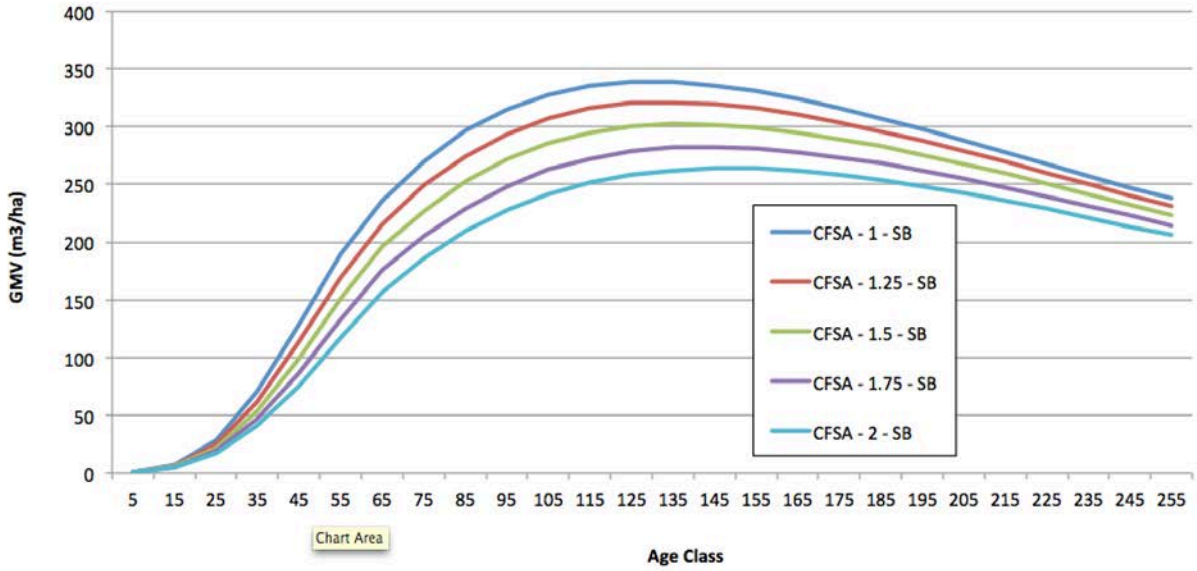


Figure 12 - Comparison black spruce yields by site class at 3,000 sph.

[15] Correspondence with Ken Lennon, R.P.F., NESI Forest Productivity Specialist, MNR (for black spruce and white spruce) and Scott McPherson, R.P.F. SSIS, Forest Productivity Specialist, MNR (for red pine)

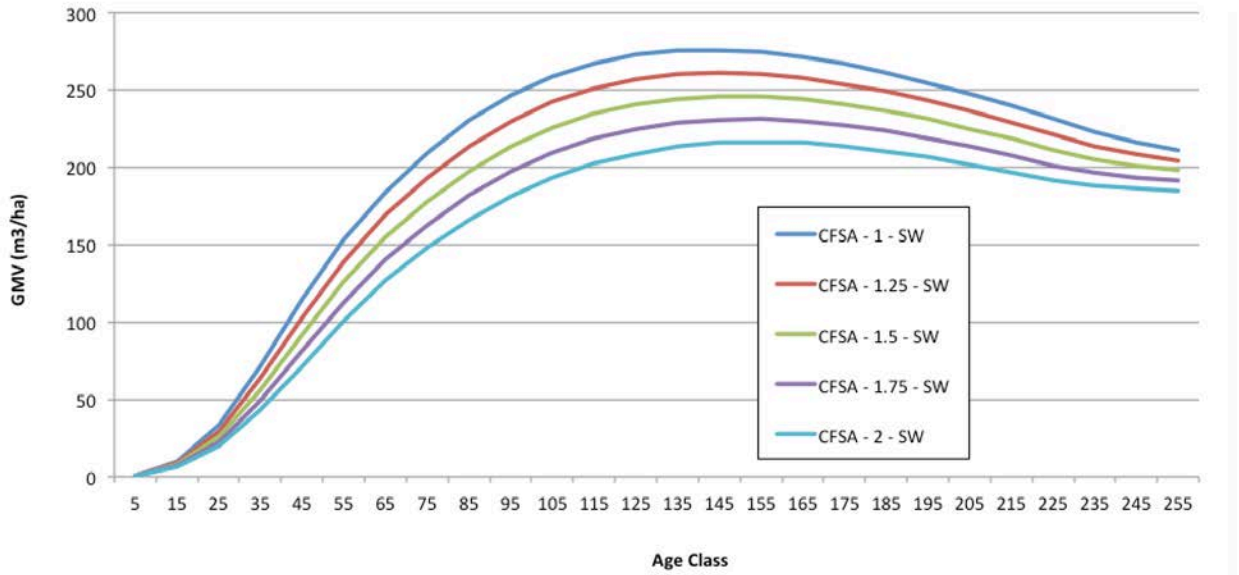


Figure 13 - Comparison of white spruce yields by site class at 3,000 sph.

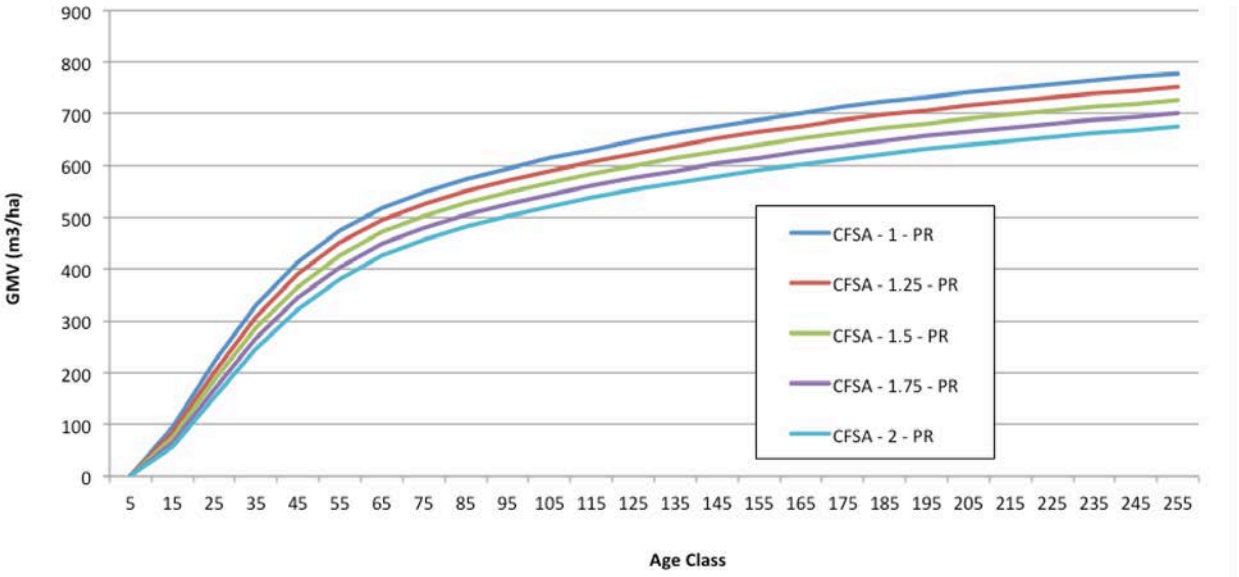


Figure 14 - Comparison of red pine yields by site class at 2,500 sph.

Table 11 - Comparison of Projected Yield provides a comparison of the projected yields in MIST (CFSA and Close diameter limits with site class 2) with the most current growth and yield data plots from the Kirkwood Forest which is located in the Northeast and the most current and comparable available information[16]. As shown in Table 11 the MIST projected yields closely resemble those of actual realized yields and confirms that the yield projected in MIST are conservative estimates (especially given that the top diameter factors are larger than those used in CBM-CFS3).

[16] As per correspondence and advice from Scott McPherson, R.P.F. SSIS, Forest Productivity Specialist, MNR (for red pine)

There is a significant difference between the GMV from the Kirkwood plots and those of the projected yields. It is likely due to a difference in site class, and adjustments will be made to all yield curves once a final confirmation of the site class for each site has been determined.

Table 11 - Comparison of Projected Yield in m^3

Age (Age in MIST)	KIRK9				MIST SC2				
	Density	HT (average)	DBH	GMV	Density	HT (average)	DBH	GMV (CFSA)	GMV (Close)
35	2302	n/a	16.3	343.9	2384	12.3	16.5	244.8	294.6
44	2297	18.5	18.1	429.3	n/a	n/a	n/a	n/a	n/a
47 (45)	2257	19.4	18.5	447.1	2250	15.4	17.5	321.3	381.5
50	2173	20.3	19.3	487.1	2078	16.7	18.0	351.1	414.4
54 (55)	2074	21.4	20.1	517.7	2078	18.1	18.4	380.9	447.2
59	1970	22.8	20.7	539.7	n/a	n/a	n/a	n/a	n/a
66 (65)	1757	25.2	21.7	546.8	1887	20.5	19.3	425.1	493.9
76 (75)	1446	n/a	23.6	550.9	1698	22.6	20.1	457.7	526.5
84 (85)	1272	28.2	24.9	562.5	1521	24.5	21.0	482.9	550.0

Figure 15 compares the gross merchantable volume between the Kirkwood plots and the yield curves generated in MIST using the CFSA (10 cm) and Close (4 cm) top diameter limits on site class 2.

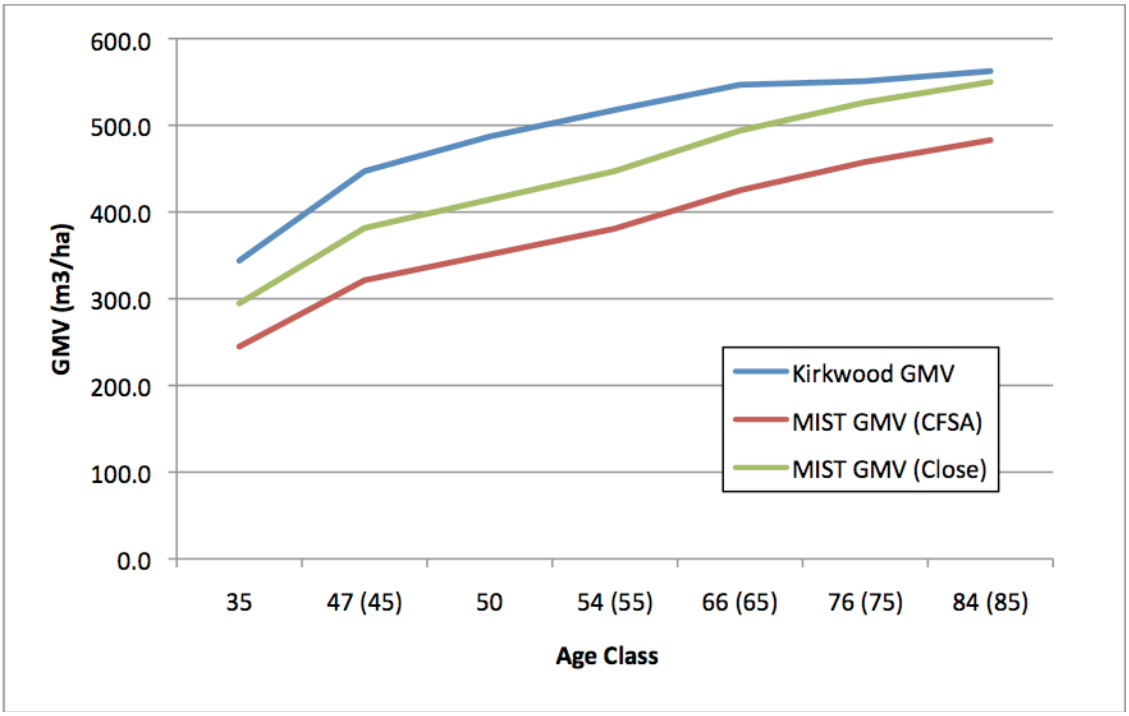


Figure 15 - Comparison of GMV in MIST and Kirkwood Forest

6.2 Criteria and Procedure for Quantifying GHG SSR Relevant to the Baseline

As discussed previously, the project areas consist of abandoned marginal farmland that currently supports a combination of grassland and shrubs. The natural succession that has occurred on all project areas has resulted in a mixture of shrub species with incidental conifer ingress originating from seeding from mature conifers along the margins of the project areas. Adequately quantifying the rate of ingress of shrubs and natural growth is the basis for describing the carbon stocks within the vegetation currently growing on the project areas. The following describes the process implemented to assess carbon stock estimates for existing trees and shrubs.

6.2.1 Assessment of Project Areas

Geo-referencing techniques were utilized to compare two sets of images dating from 1978 and 2008. The imagery was used to compare and stratify the boundaries of the current vegetation cover and to derive the area of dynamic vegetation cover on project areas. The differences in grassland to shrub cover over the 30 year period were used to assess the project area rate of natural succession into shrub vegetation. Where boundaries did not align, a conservative estimate was used to avoid over estimation of treatment areas. Where the exact time frame was not known, conservative estimates were used to ensure the rate of ingress is not under estimated.

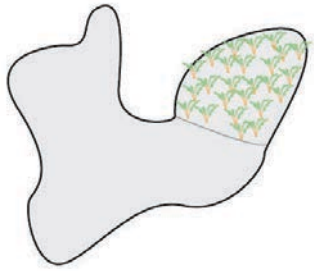
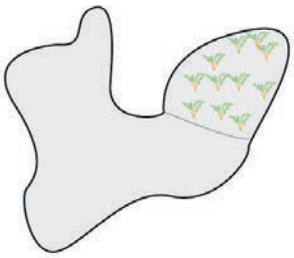
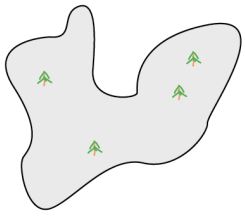
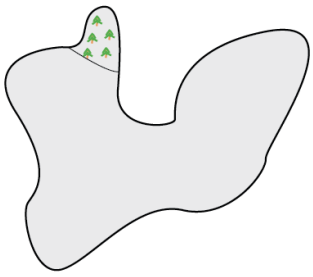
6.2.2 Aerial Stratification

The procedure for stratification is outlined in *Process 2 – Stratification*. This process uses the criteria outlined in AR-AM-Tool-14-v3.0. The aerial stratification is based on an assessment of ground cover from the 2008 aerial imagery. The stratification applies a two-tier approach where the shrub strata and grass strata are delineated into substrata and the amount of ingress from shrub and incidental tree species is then quantified.

Only the substrata: Shrub Full, Shrub Moderate, Shrub Marginal and Grass strata were assigned and delineated by area. Substrata Grass Incidental is based on the total eligible area outside of shrub strata. The Substrata Transitional will be assigned proportional values based on total grass incidental strata. The area (in hectares) is then broken down by project areas in their respective Project Area File. Table 14 provides a breakdown of the criteria by stratum.

Table 12 - Criteria for the Aerial Stratification of Project Areas

Strata	Substrata	Value
Shrub		Area greater than 0.5 hectares in size with non-tree species woody vegetation cover of Alder and Willow species It is assumed that shrub Crown Cover will increase at a rate equal to full (100%) crown cover by age 50. This rate of change in shrub stratification over time is determined to be a conservative estimate as evidence (historical photos) suggests a lower variable rate based on project area.
	Full	Greater than 0.5 hectare in size, with 75-100% shrub ground cover

		
	Moderate	Greater than 0.5 hectare in size, with 50-74% shrub ground cover 
	Marginal	Greater than 0.5 hectare in size, with 5-49% shrub ground cover 
Grass		Area greater than 0.5 hectares in size with non-woody vegetation cover or sedges, graminoids and grass
	Incidental	95% of total Grass strata greater than 0.5 in size is to be assigned ground cover with spruce densities of 15 SPH, aged 20 years or less 
	Transitional	5 % of total Grass strata is to be transitional with ground cover with spruce densities of up to 500 SPH, aged 20 years or less 

6.3 Assumption, uncertainty and avoidance of overestimation

The OBAP teams have undertaken the necessary steps in their determination of area and assumptions to ensure that the removal enhancements have not been overestimated. The geodata base and data management system are parallel to those used in forest management within the province.

6.4 Demonstration of Appropriateness and Good Practice

By undertaking this project to the ISO-14064-2 and using GPG where ever possible the proponent minimizes the chance that the removal enhancements would be over estimated.

6.5 Baseline Estimate SSR by Modeling

The baseline scenario, as determined, is available in the Project Area File. The rate of ingress common to project areas was determined by assessing the rate of change in stratification from the current to the historical imagery. The change in vegetation cover of this period of time is used to determine ingress and natural succession rates.

6.5.1Above Ground Biomass in Shrubs

All shrub area delineated as (*Marginal and Moderate)* are considered to have 100% stocking as per substrata (*Full*). The imagery used to delineate shrub boundaries is 5 years older than the year zero project start date of 2013. Thus, applying this conservative margin will reduce the likelihood that the actual carbon stocks are underestimated in the baseline scenario.

As the project areas progress through natural succession and ingress it is assumed that the delineated area under strata *Grass Incidental* becomes *Shrub Strata*. Trees currently established in substrata *Grass Incidental* will be accounted for in addition to all biomass in *shrub strata*. While this strategy implies a crown cover from vegetation of above 100%, it is believed that this conservative assumption will reduce the likelihood that actual stocks carbon in the baseline are underestimated.

6.5.2 Above Ground Biomass in Trees

Tree carbon stock estimates in each individual substrata including the *Grass Incidental* and *Grass Transitional* shown in Table 13 will be estimated by the Allometric equations described in the baseline scenario and by the yield tables. Yield tables are described and rationalized in detail in Section 6.1. Expected forest growth rates are contingent on the successful implementation of silvicultural techniques. It is known that the realized yields resulting from the silvicultural techniques scheduled to be used for the project are greater than the naturally occurring growth and yields expected in the baseline. In order to reduce the likelihood of underestimating actual carbon stocks, these yields will be used to estimate tree carbon stock in the baseline scenario. *Project Summary Table 5 – Carbon Stocks: Baseline Scenario by Strata* shows the total carbon stock of the baseline scenario over the permanence period of 100 year.

6.6 Project Estimate SSR by Modeling

The calculation of net GHG removal is based on projected levels of sequestration of black spruce, white spruce and red pine in the project area. The calculation of estimates of SSRs was performed using the CBM-CFS3 version 1.2 (Carbon Budget Model – Canadian Forest Services). The growth and yield parameters (i.e. site class, densities,

survival, stocking, etc.) were incorporated into the MIST growth and yield model for red pine, black spruce and white spruce to derive growth data. This data was then inputted into the CBM-CFS3 forest stand carbon flux model to produce the level of sequestration (i.e., combined total elemental C in all the relevant pools/compartments) at the end of the project permanence period (100 years).

The CBM-CFS3 uses a series of pools identified in Table 13 for this model For the purpose of quantifying the carbon pools for the OBAP there are 6 project carbon pools (CP) that will be reported and 5 that will be included for the project for the purposes of calculating the net GHG assertion.

The units reported in the model results in CBM-CFS3 (including all tables and graphs) are provided in total tones of C for the project and tonnes of C/ha.

6.7 Modeling Results by SSR

This section presents the results of the CBM-CFS3 modeling analysis for the project scenario. It describes in detail the CBM pools that are combined to determine the OBAP Carbon pools. The results of the project are expressed as tCO2e and summarized by Project Area and Project Total for each of the CP's. Refer to Figure 9 for a description of the *Process 4 - Development of Carbon Stocks*.

Until such time as the final site class is confirmed by for each project areas, site class 2 will be used for deriving the growth and yield data to generate the project scenario. It is expected that most of the sites will be between site class 1 and 1.5 based on preliminary assessments and analysis. Confirmation of site class for verification and will occur during field monitoring.

6.7.1 CP1 – Standing Live Trees

The contribution of each CBM pools included in the CP1 - Standing Live Trees project pool over the 100 year project period is available in the PST which describes the individual CBM-CFS3 carbon pools contributing to OBAP. In this case, CP1 includes carbon in the merchantable portion of softwood stem wood and stem bark (excluding tops and stumps), softwood branches, sapling and sub-merchantable stem wood (including associated bark), tops and stumps of merchantable trees (including the associated bark) and softwood foliage. No hardwood aboveground biomass was included as only conifer species are planted as part of the project.

6.7.2 CP2 – Roots (Coarse and Fine)

The contribution of each CBM pools is included in the CP2 – Roots (coarse and fine) project pool over the 100-year project period. Table 13 describes the individual CBM-CFS3 carbon pools contributing to OBAP Carbon Pools. In this case, the project CP includes carbon in softwood fine roots and softwood coarse roots. There are no hardwood fine or coarse roots included as all species planted are conifer.

6.7.3 CP3 – Standing Dead Trees

The contribution of each CBM pools is included in the CP3 - Standing Live Trees project pool over the 100-year project period. Table 13 describes the individual CBM-CFS3 carbon pools contributing to OBAP Carbon Pools. In this case, the project CP includes carbon in DOM with input from the softwood merchantable biomass pool, softwood other biomass pool.

6.7.4 CP4 – Lying Dead Wood

The contribution of each CBM pools is included in the CP4 – Lying Dead Wood project pool over the 100 year project period. Table 13 describes the individual CBM-CFS3 carbon pools contributing to OBAP Carbon Pools (as identified in the model). In this case, the project CP includes carbon in DOM with input from merchantable stemwood and/or stem snags and belowground fast DOM with input from coarse roots.

6.7.5 CP5 – Litter and Forest Floor

The contribution of each CBM pools is included in the CP5 – Litter and Forest Floor project pool over the 100 year project period. Table 13 describes the individual CBM-CFS3 carbon pools contributing to OBAP Carbon Pools (as identified in the model). In this case, the project CP includes carbon in DOM with input from foliage biomass and fine roots in the forest floor (aboveground very fast DOM), input from branches, tops, stumps and submerchantable trees (aboveground fast DOM) and input from aboveground very fast, fast and Medium DOM pools (aboveground slow DOM).

6.7.6 CP6 – Soil

The contribution of each CBM pools is included in the CP6 – Soil project pool over the 100-year project period. This CP has been included for information purposes only and is not included in the overall carbon contributing to the SSR. Table 13 in this case, includes carbon in DOM with input from fine root biomass in the mineral soil and input from the belowground very fast and fast DOM pools.

Table 13 - SSR's Units Modeled in Project Scenario

CBM-CFS3 Carbon Pools (CP)	**Included in Carbon Pools**
CP1 – Standing Live Trees	Aboveground Biomass[17] in tCO_2e
CP2 – Roots (Coarse and Fine)	Belowground Biomass[18] in tCO_2e
CP3 – Standing Dead Trees	DOM in tCO_2e
CP4 – Lying Dead Wood	DOM in tCO_2e
CP5 – Litter and Forest Floor	DOM in tCO_2e
CP6 – Soil (n/a)	SOC in tCO_2e

[17] includes Foliage(SW) + Foliage(HW) + Merch(HW) + Merch(SW) + Other(SW) + Other(HW)
[18] includes Coarse(SW) + Coarse(HW) + Fine(SW) + Fine(HW)

Table 14 - SSR's Units Estimated in Baseline Scenario

ARACM003 & GPG IPCC Methodology	Included in Carbon Pools
Shrubs Biomass	Above & Belowground Biomass in tCO_2e
Tree Biomass	Above & Belowground Biomass in tCO_2e
Grass Biomass	Above & Belowground Biomass in tCO_2e

6.7.7 Total Contributions by all Carbon Pools

The *Project Summary Table # 6 Carbon Stocks: Project Scenario SSR* found in Schedule C, documents the tonnes of C for the Project Area in each OBAP carbon pool at 50 years. Results are shown per hectare and by project area included in OBAP project at 50 years (which is the project crediting period).

6.8 Test of Error and Inconsistencies

6.8.1 Confirmation of Estimation of SSRs using Allometric Equations

The initial estimate of SSRs was conducted using the allometric equations in order to confirm that modeling assumptions and estimates were within comparable levels to other methodologies using for calculating SSR's. Section 3 of the Supplementary Documentation provides detailed information on the allometric equations used to derive the SSR.

Change in Soil Organic Carbon
The change in soil organic carbon can be estimated using the AR-AM-Tool-16-v1.1.0 *"Tool for estimation of change in soil organic Carbon stocks due to the implementation of A/R CDM project Activities"* This tool allows for the determination of changes in SOC for the project areas.

Estimate of Non-CO2 Emissions
It is expected that the total project emission reduction will be less than 5% emission from CO2 and non-CO2 gases and therefore is considered irrelevant in the implementation for the project activities.

6.9 Net Reduction Assertion

The net GHG assertion generated by the implementation of the OBAP was calculated by summing the carbon stock scenarios listed in *Process 4 – Net Emissions Assertion*. The net reduction assertion generated during implementation (in tCO2e) in this project is found in the *Project Summary Table #7 – Project Emissions Reduction Assertion*.

7.0 Managing Data Quality

7.1 Established Quality Management Criteria

Sensitivity Analysis

In order to identify any potential risk of deviation from the project scenario, a sensitivity analysis was performed on the carbon modeling results.

The sensitivity analysis consisted of applying the higher and lower site classes to yield development in the geographic project area, and apply a factor in delay/acceleration of renewal efforts.

This sensitivity analysis provides the upper and lower bounds associated with the inputs and assumptions used for developing the project scenario. It will also provide a basis for comparison of the project scenario results to those of the sensitivity analysis when site productivity is adjusted (from site class 2 to site class 1), "close" top diameter measurement are used and finally when delay/acceleration factors are applied to renewal efforts on the development of growth and yield data.

Planning Data Base & Inventory

A planning composite inventory was created by combining multiple spatial data layers (including the forest resource inventory, imagery and site visits and plot measurements) to develop an inventory of the project area. This section describes the inventory information and classifications that have been used for the analysis. Sources of information used to update the inventory, define the landbase and prepare the planning inventory started with the forest resources inventory (FRI) as the base data structure. The data was then updated using imagery captured from the 1970's to 2009 period, as well as recent site surveys, plot information, and any pertinent information provided by the landowner.

A geodatabase (OBAP.gdb) was created to store all geographic information to be used for the Ontario Boreal Afforestation Project. The geodatabase contains three datasets with associated feature classes and attribution:

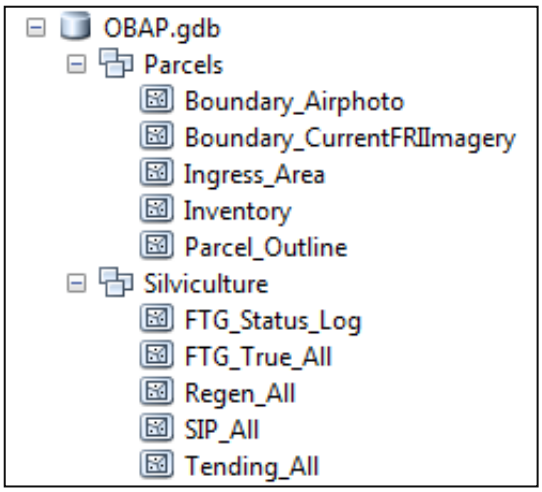


Figure 16 - Data Structure of OBAP geodatabase

To remain credible, it's important to acknowledge that over estimation of data quality & accuracy can affect the reliability of the GHG removal enhancements assertions.

Accurate quantification of GHG removal enhancements is contingent on consistent field sampling, accurate areas estimations and defendable science-based assumptions.

All geographic data, photos, and maps related to OBAP are stored in a defined data structure and are consistently updated to ensure proper documentation.

- Root folder: **Parcel_Data**
    - Subfolder: **Additional_Maps**
        - Contains a variety of maps for internal use. Up-to-date maps of current project areas are stored under the *Current_Parcels* subfolder
    - Subfolder: **Current_Parcels**
        - Separated by parcel name, this folder holds GPS data and maps for each current parcel. Additional geographic data related to these project areas is stored in the OBAP geodatabase.
    - Subfolder: **Extra_Data**
        - Contains data for internal use, including some archived information. Data for current Project Areas is located in the subfolder *Current Parcels*
    - Subfolder: **Photos**
        - Includes subfolders named by Forest, with associated black and white aerial photos (ex: Nipissing, Sudbury, etc.). Note that all acquired airphotos are included in this subfolder, not exclusive to current parcels.
            - Airphotos are stored and named dependent on their use:
                - Processed/Georeferenced: *ParcelID_YearofPhoto_Image#perParcel*_GeoRec.jpg (note image # is added only if necessary)
                - Unprocessed: *ParcelID_YearofPhoto_PhotoIdentifier_Image#perParcel*_Unprocessed.jpg (note image # is added only if necessary)
    - Geodatabase: **OBAP.gdb**
        - A geodatabase was created to track and store all processed geographic data for OBAP. The geodatabase contains two datasets with associated feature classes and attribution.
        - The *Parcels* feature dataset includes feature classes representing pre-treatment boundaries and inventory information, with updates to data occurring after treatment.
        - The *Silviculture* feature dataset includes feature classes encompassing a silvicultural treatment tracking system, which processes from site-prep to planting to monitoring.
            - Parcels
                - Boundary_Airphoto
                    - Project ares boundaries as seen on black and white FRI airphotos, stored in the *Photos* folder
                    - Tracked data includes:
                        - PARCEL_NAME: designated parcel name
                        - PHOTO: name of air photo that boundary was digitized from
                - Boundary_CurrentFRIImagery

- Project Ares boundaries digitized from current FRI RGB orthophotos, *excluding areas of vegetation ingress*
- Tracked data includes:
    - PARCEL_NAME: designated parcel name

- Ingress_Area
    - Representation of ingress per parcel
    - Ingress_Area + Boundary_CurrentFRIImagery = Parcel_Outline
    - Tracked data includes:
        - PARCEL_NAME: designated parcel name
        - INGRESS: rate of ingress (H = Full, M = Moderate, L= Marginal, N = Grassland)
        - AREA_HA: ingress area in hectares
- Inventory
    - Detailed descriptions of ground conditions within the area of interest
    - Tracked data includes:
        - POLYID: unique ID number
        - POLYTYPE: polygon type representing ground features
        - OWNER: owner of the area
        - YRUPD: year of data update
        - SOURCE: source of data update
        - DEVSTAGE: development stage
        - SPCOMP: desired species composition after plant
        - YRDEP: year of last depletion (Note: values are *PRE-* year listed)
        - HT: surveyed height
        - STKG: surveyed stocking
        - PLANFU: forest unit once planted
        - AGE: age
        - BMI_ID: ID number linked to the most recently available BMI for the associated forest
        - PARCEL_NAME: designated parcel name
        - INGRESS: rate of ingress (H = High, M = Medium, L= Low, N = None)
        - AREA_HA: Area in hectares
    - Parcel_Outline
        - Outline of OBAP project areas
        - Tracked data includes:
            - PARCEL_NAME: associated designated parcel name
            - AREA_HA: area in hectares

- Silviculture
    - FTG_Status_Log
        - All areas that have been treated with a primary treatment (i.e. planted) but are not yet at free-to-grow (FTG) status.
        - Tracked data includes:
            - PARCEL_NAME: designated parcel name
            - YRDEP: (Note: values are *PRE-* year listed)
            - TRTMTHD1: applied treatment method
            - TREAT_YR: treatment year
            - SP1: first species
            - SP2: second species

        - SP3: third species
        - HT: surveyed height
        - STKG: surveyed stocking
        - PW, PR, PJ, SB, SW, PO: percent of area represented by specific tree species
        - FTG_SCHED: year that the area is scheduled for FTG
        - SURVEY_YR: survey year
        - FTG: indicates if area is FTG
- FTG_True_All
    - Regenerated area that has achieved FTG status
    - Tracked data includes:
        - PARCEL_NAME: designated parcel name
        - YRDEP: year of last depletion (Note: values are *PRE*-year listed)
        - TRTMTHD1: applied treatment method
        - TREAT_YR: treatment year
        - SP1: first species
        - SP2: second species
        - SP3: third species
        - HT: surveyed height
        - STKG: surveyed stocking
        - FTGFU: FTG forest unit
        - PW, PR, PJ, SB, SW, PO: percent of area represented by specific tree species
        - SURVEY_YR: survey year
- Regen_All
    - Project areas with regeneration treatments or with planned regeneration treatments. All OBAP project areas are included in this layer, which is an accumulating layer. Project Areas with or without site prep, but with no primary treatment (i.e. not planted), will have a treatment method coded as *TRTMTHD1 = UNK* and all fields related to the primary treatment will be blank. When the area is planted, the *TRTMTHD1* value will be changed to *PLANT* and associated regeneration fields will be populated. When a primary treatment method has been applied, the area is copied into the FTG_Status_Log feature class to be tracked as it grows to FTG status
    - Tracked data includes:
        - PARCEL_NAME: designated parcel name
        - YRDEP: year of last depletion (Note: values are *PRE*-year listed)
        - TRTMTHD1: applied treatment method
        - TREAT_YR: treatment year
        - TREAT_MO: treatment month
        - SP1: first species
        - SP2: second species
        - SP3: third species
        - AVG_DENS: average density
        - STOCK_TYPE: stock type
        - GROWER: grower
        - SEED_SOURC: seed source

        - RETRTMTHD: retreatment method
        - RETRT_YR: retreatment year
        - RETRT_MO: retreatment month
        - SCH_SIP: year of scheduled site prep
        - SCH_PLANT: year of scheduled plant
        - SCH_SEED: year of scheduled seeding
        - SCH_TEND: year of scheduled tending
        - FTG: indicates if area is FTG
    - SIP_All
        - Areas where site prep treatments have been completed in preparation for a primary treatment.
        - Tracked data includes:
            - TREAT_YR: treatment year
            - PARCEL_NAME: designated parcel name
            - TRTMTHD1:applied treatment method
            - PRODTYPE: product type (chemical)
            - EQUIPMNT: equipment type (mechanical)
    - Tending_All
        - Areas where additional treatment was completed after a primary treatment has occurred
        - Tracked data includes:
            - TREAT_YR: treatment year
            - PARCEL_NAME: designated parcel name
            - TRTMTHD1: applied treatment method
            - GRNDTYPE: ground type
            - PRODTYPE: product type (chemical)
- Geodatabase: **Parcel_Search.gdb**
    - A geodatabase used for internal purposes during the process of land acquisition

7.2 Double Accounting

The avoidance of double accounting is achieved throught meticulous data tracking and management assocaited with the manipulation of geographic information stored within the geodatabase.

8.0 Monitoring and Documenting

8.1 Purpose of Monitoring

The purpose of the monitoring is to ensure the establishment of forest is successful to the degree of confidence needed to accurately estimate the offset credits generated. Monitoring will assess regeneration success in height and density in order to compare it with the expected MIST values selected for the project area. Confidence interval of 95% for monitored heights and density must fall within the expected MIST values in order to be considered within the acceptable level of variation. Monitoring will also assess growth of preexisting trees estimated in the baseline using MIST yield projections.

8.2 Data Type, Unit and Origin

The Criteria for monitoring relevant SSR's included in this report are described in Table 10 in Section 5.3. The timing of the monitoring is determined at the project area level

and outlined in as such in *PST 3 – Monitoring schedule*. Data collected thorough the monitoring events are stored electronically.

8.2.1 Assessment and Reduction of Uncertainty

Uncertainty relating to the monitoring of SSR's is believed to be minimal and related to human error or inappropriate design of sampling programs. Provincial standards for the establishment of representative sample sizes are well known and will be followed by the project proponent. In order to reduce uncertainty surrounding monitoring and sampling the proponent must always be above the minimum sample size required by the provincial standard.

Monitoring will be conducted by qualified professional and will be mitigated through the use of randomized stratified sampling of planted tree height in meters and density in Stems per hectare. Based on these measurements, confidence interval will be calculated to a minimum level of 95%.

8.3 Established Monitoring Criteria, Methodologies, Procedures and Calibration

8.3.1 Procedure for monitoring GHG SSR

Refer to section 5.0 Selecting GHG SSR for monitoring and estimation. Monitoring shall be carried out in accordance to the timing of PST – 3 Monitoring Schedule, available in Schedule B – Treatments and Work schedule. An Independent third party in conformance with ISO -14062 - 3 will conduct the verification of the Project Areas and associated documentation supporting the net GHG assertion. The verification must occur no more than one year following the completion of first monitoring event scheduled in PST – 3 Confirming that the methods used for monitoring and reporting carbon stocks and develop verification data of SSR as described in *Appendix I-SOP* are reasonable and effective.

During the implementation of project activities, and subsequent monitoring events should a new biodiversity value be identified, guidance from the Forest Management Guide for Conserving Biodiversity at the Stand and Site Scale will be used. [19]The project proponent will implement project activities to the best practice of the industry for its geographic region. The project proponent has an extensive history implementing this type of project activity and a good success record.

Following each scheduled monitoring event in PST 3, a summary of the monitoring event findings related to community and biodiversity objectives shall be developed and made available to the public through the Forest Carbon Alliance Inc. website. All Project Summary Tables will also be made available on the Forest Carbon Alliance Inc. Website for stakeholder review. Refer to the Standard Operating Procedures (SOP) in Appendix I

8.4 Times, Periods and Types

The monitoring times and types may change depending on the project area. The project reporting, monitoring and types of monitoring are described at the project area level in *PST 3 - Monitoring Schedule* by project area in *Schedule B - Treatments and Work Schedules*. This allows for monitoring and subsequent verification events to be matched with ecological milestones, such as meeting seedling establishment or free growing status.

8.5 Monitoring Roles and Responsibilities

It is the responsibility of the project implementation team to carry out monitoring and reporting responsibilities. See Section 1.7 for a detailed assessment of the project team's roles and responsibilities.

8.6 Information Management System

Records and data accumulated during all monitoring events will be stored electronically. These records will be maintained and backed up in separate geographical locations on secure servers. A final report and field survey results of regeneration success will be also be retained and backed up in separate geographical locations on secure servers.

9.0 Documenting the GHG Project

9.1 Proof of Conformance with ISO 14064-2

Proof of conformance with the ISO 14064 program will be made available in *PST 8 – GPG Reports and Statements found in Schedule C – Reports*

[19] Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales Ontario Ministry of Natural Resources 2010

10.0 Validation and Verification of the GHG Project

10.1 Accredited Independent Third Party

The accredidited independent third party performing the Validation and Verification activities for the OBAP is :

Environmental Services, Inc.
3800 Clermont Street N.W. North Lawrence, Ohio 44666
Phone: 330-833-9941

10.2 Statement of conformance with ISO14064-2

All information relevant to the statement of conformance with ISO14064-2 is provided by the third party auditor performing the Validation and Verification. This information will be updated in *PST 8 – GPG Reports and Statements found in Schedule C – Reports*

10.3 Statement of Conformance with ISO14064-3

All information relevant to the statement of conformance with ISO14064-3 is provided by the third party auditor preforming the Validation and Verification. This information will be updated in PST 8 – GPG Reports and Statements found in Schedule C – Reports

11.0 Reporting the GHG Project

11.1 Statements and Users

Statements of the GHG project will be made available on the project website: www.forestcarbonalliance.com.

11.2 Public Availability

This PDD, reports and statements is publicly available for download and public review at www.forestcarbonalliance.com

11.3 Report Format

Reports will be kept electronically at the project proponents Englehart office. In addition, an online version of the report will be made available at Verification. The project proponent will develop the reports in conformance with ISO-14064-2 section 5.13.

11.4 Programs and Period Summary Statements of tCO2e

Summary statement of tCO2e for this GPG program will be reported in the *PST 8 – GPG Reports and Statements* found in *Schedule C – Reports*.

11.5 Assessment of Additionally

The OBAP will make assertions for ex-ante $tCO2_e$ sequestered from the atmosphere in order to ensure adequate project funding throughout implementation. The project will quantify the removal enhancements using the best available information and knowledge to date. As previously stated in Section A, the duration of this project is in permanence for 100 years with a 50-year crediting period. It is believed that the 100-year duration provides significant levels of permanence for the removal of carbon from the atmosphere.

11.6 Assessment of Permanence

The OBAP ensures permanence through the registration of the Carbon Transfer Agreement available in Project Area Files; this ensures the legally binding agreement remains effective despite potential changes in ownership. Through this process the property deeds are examined and it is confirmed that no outstanding legalities around land tenure, and ownership would affect the permanence of OBAP. For additional information refer to Section 1.6.2 Risk of Reversal

11.7 Statement of Good Practice

All information relevant to the statement of good practice with ISO14064-2 is provided by the third party auditor preforming the Validation and Verification. This information will be updated in PST 8 – GPG Reports and Statements found in *Schedule C – Reports*

12.0 Climate, Community, Biodiversity Values Integration

In addition to the climate, the proponent is committed to identifying and creating benefits to the Biodiversity and Community. For this, the framework from CCB (Climate Community and Biodiversity Standard) was been used. Validation and Verification to the CCB Standard is not the intent however the integration of the elements of the standard and proof of concept is. Thus, the project proponent will implement concepts of the standard and demonstrate intent to provide additional benefits to the communities and ecosystems.

12.1 General Information

In addition to the goals and objectives described in Section 1.0 the project intends to achieve the following goals:

12.1.1 Biodiversity Goals:

- Create and maintain habitat on project areas for native species of birds, mammals, and amphibians.
- Contribute to landscape level ecological processes that require suitable habitat for native Boreal and GLSL species of birds, mammals and amphibians.
- Maintain or enhance water quality by reducing erosion and run-off within the project area(s) where possible.
- Create and maintain specific habitat requirements for endangered, threatened or species of concern where appropriate at the project area level.

12.1.2 Community Goals

- Provide an economically achievable means for landowners to realize the benefits associated with afforestation on their property.
- Contribute to the recovery and maintenance of forest conditions that sustains traditional values, cultural identity and lifestyle derived from Boreal and GLSL forest.

- Contribute to the creation of forest habitat that supports socially important wildlife species for the maintenance of cultural values.
- Increase the property value for the landowner by increasing the aesthetic appeal of project areas.
- Employ local people and businesses during project implementation and subsequent monitoring periods.

12.2 Climatic Information

See Section 1.3 Climatic information.

12.3 Community Information

All Project areas include the landowners dwelling however the landowner's livelihood originates from sources of income derived from locations other than the project area. Most landowners have acquired the land as an added benefit to the dwellings and infrastructure and the use of their lands is primarily for pleasure. They neither have the time, expertise, resources nor inclination to devote to improving the productivity of the marginal agricultural lands within their possession.

The communities identified below will help describe the potential interest in the project as it pertains to their livelihood, values and culture. In general, most communities in the project region can be characterized as having a high degree of dependence on natural resource management. These include mineral extraction, forest management and hunting and angling, all of which result in economic benefits to the community. An increase or decrease of these activities can effectively alter a community's economic foundation. The following criteria have been used to identify communities whose interests are related to changes to the natural resources found within the project zone;

- Aboriginal communities whose interests or traditional uses may be affected by project activities.
- Communities with a close proximity to the project
- Communities that may be employed by the implementation of project activities.
- Communities who may benefit from enhanced ecotourism opportunities.

The following list of communities was determined by the project proponent to adequately represent the larger communities with potential interest in the project;

- Iroquois Falls
- Black River-Matheson
- Kirkland Lake
- Timmins
- Cochrane
- Temagami
- Sturgeon Falls
- North Bay

Table 15 - Demographic Profile of Iroquois Falls

Iroquois Falls	2006	2011
POPULATION, INCOME & STATUS		
Population	4,729	4,595
Total Families	1,445	
Median Family Income	$68,691	
Median Persons Income	$28,448	
Non-Immigrant	4,565	
Immigrant	80	
Aboriginal Identify	375	
EDUCATION & EMPLOYEMENT		
No Certificate, Diploma or Degree	1,220	
Apprentice or Trade Certificate	595	
University Certificate Diploma or Degree	330	
Employement Rate (%)	48.2	
Unemployement Rate (%)	8.4	
LABOUR FORCE		
Agriculture & Resource	200	
Contruction & Manufacturing	535	
Retail and Wholesale Trade	190	
Health Care, Education, & Social Service	465	
Business & Finance	255	
Other	400	
AGE AND GENDER		
Median Male Age		48
Median Female Age		48.6
% of the Male population aged 15 and over		86.7
% of the Female Population aged 15 and over		86.5

Statistic Canada 2011 Census[20]

The community of Iroquois Falls based its existence on pulpwood when pulpwood concessions for the Abitibi watershed were assigned to the pulpwood company at the beginning of the 20th century. The community incorporated in 1950 as the town of Iroquois fall with more than 200 dwellings. Today the primary industry remains pulp and paper production[21]

[20] http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=3556031&Geo2=CD&Code2=3556&Data=Count&SearchText=Iroquois%20falls&SearchType=Begins&SearchPR=35&B1=All&Custom=&TABID=1

[21] http://www.iroquoisfalls.com/content/discover-iroquois-falls

Table 16 - Demographic Profile of Black River Matheson

Black River-Matheson	2006	2011
POPULATION, INCOME & STATUS		
Population	2,619	2,410
Total Families	790	
Median Family Income	$61,286	
Median Persons Income	$23,102	
Non-Immigrant	4,650	
Immigrant	80	
Aboriginal Identify	375	
EDUCATION & EMPLOYEMENT		
No Certificate, Diploma or Degree	1,220	
Apprentice or Trade Certificate	595	
University Certificate Diploma or Degree	30	
Employement Rate (%)	48.2	
Unemployement Rate (%)	8.4	
LABOUR FORCE		
Agriculture & Resource	235	
Contruction & Manufacturing	130	
Retail and Wholesale Trade	105	
Health Care, Education, & Social Service	225	
Business & Finance	205	
Other	280	
AGE AND GENDER		
Median Male Age		47.5
Median Female Age		48.5
% of the Male Population Aged 15 and Over		85.2
% of the Female Population Aged 15 and Over		85.6

Statistic Canada 2011 Census [22]

The township of Black River Matheson includes the communities of Holtyre, Matheson, Ramore, Shillington, Val-Gagne and Wavell. The primary industries remain mining forestry and some agriculture. Ecotourism remains an important summer and winter economic driver, as hunting, fishing and canoe tripping are common activities.[23]

[22] http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=3556014&Geo2=PR&Code2=35&Data=Count&SearchText=Black%20RIver%20Matheson&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=1

[23] http://www.blackriver-matheson.com/

Table 17 - Demographic Profile of Kirkland Lake

Kirkland Lake	2006	2011
POPULATION, INCOME & STATUS		
Population	8,248	8,133
Total Families	2,270	
Median Family Income	$55,564	
Median Persons Income	$22,761	
Non-Immigrant	7,570	
Immigrant	445	
Aboriginal Identify	455	
EDUCATION & EMPLOYEMENT		
No Certificate, Diploma or Degree	2,250	
Apprentice or Trade Certificate	775	
University Certificate Diploma or Degree	480	
Employement Rate (%)	50.8	
Unemployement Rate (%)	7.5	
LABOUR FORCE		
Agriculture & Resource	565	
Contruction & Manufacturing	270	
Retail and Wholesale Trade	460	
Health Care, Education, & Social Service	1,005	
Business & Finance	430	
Other	885	
AGE AND GENDER		
Median Male Age		44.4
Median Female Age		46.8
% of the Male Population Aged 15 and Over		84.4
% of the Female Population Aged 15 and Over		85.9

Statistic Canada 2011 Census[24]

The town of Kirkland Lake originated as a gold mining town and saw the rise and fall of several gold mines The community continues to increase its government services, infrastructure and plays host to several festivals, carnivals and tourism focused programs[25].

[24] http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=POPC&Code1=0418&Geo2=PR&Code2=35&Data=Count&SearchText=Kirkland%20Lake&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=1

[25] http://www.discoverkl.ca/

Table 18 - Demographic Profile of Timmins

Timmins	2006	2011
POPULATION, INCOME & STATUS		
Population	42,997	43,168
Total Families	12,525	
Median Family Income	$69,800	
Median Persons Income	$26,364	
Non-Immigrant	40,645	
Immigrant	1,765	
Aboriginal Identify	3,275	
EDUCATION & EMPLOYEMENT		
No Certificate, Diploma or Degree	10,925	
Apprentice or Trade Certificate	3,890	
University Certificate Diploma or Degree	3,035	
Employement Rate (%)	60.9	
Unemployement Rate (%)	7.1	
LABOUR FORCE		
Agriculture & Resource	3,205	
Contruction & Manufacturing	2,705	
Retail and Wholesale Trade	3,860	
Health Care, Education, & Social Service	4,260	
Business & Finance	4,325	
Other	3,975	
AGE AND GENDER		
Median Male Age		39.8
Median Female Age		41.5
% of the Male Population Aged 15 and Over		82
% of the Female Population Aged 15 and Over		83.4

Statistic Canada 2011 Census[26]

The City of Timmins is a large metropolitan area in northeastern Ontario. The city is located on the Mattagami River and home to a rich history of mining and natural resource extraction. Timmins offers commercial flights, public transit, post secondary education and is the major health care referral center for the region. Established in 1912 as a company town, the city now host festivals for language, aboriginal culture and music

[26] http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=586&Geo2=PR&Code2=35&Data=Count&SearchText=Timmins&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=1

Table 19 - Demographic Profile of Cochrane

Cochrane	2006	2011
POPULATION, INCOME & STATUS		
Population	5,487	5,340
Total Families	1,595	
Median Family Income	$61,543	
Median Persons Income	$22,541	
Non-Immigrant	5,230	
Immigrant	185	
Aboriginal Identify	660	
EDUCATION & EMPLOYEMENT		
No Certificate, Diploma or Degree	1,555	
Apprentice or Trade Certificate	500	
University Certificate Diploma or Degree	330	
Employement Rate (%)	59.6	
Unemployement Rate (%)	6.2	
LABOUR FORCE		
Agriculture & Resource	200	
Contruction & Manufacturing	620	
Retail and Wholesale Trade	405	
Health Care, Education, & Social Service	480	
Business & Finance	500	
Other	540	
AGE AND GENDER		
Median Male Age		42.7
Median Female Age		43.8
% of the Male Population Aged 15 and Over		82.6
% of the Female Population Aged 15 and Over		83.3

Statistic Canada 2011 Census[27]

The town of Cochrane was founded in 1908 and incorporated in 1910.[28]. It lies within the arctic watershed and is the avenue to a wide range of ecotourism opportunities from snowmobiling, hunting, fishing and canoe tripping. Its primary industries are natural resource and government services based.

The communities within the project zone continue to rely heavily on economically viable natural resource extraction and sustainable resource management, which is the historic reason for the establishment of most of the communities. Farming and agriculture maintain a minor economic role in certain communities although its contribution has

[27] http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=4806019&Geo2=PR&Code2=48&Data=Count&SearchText=Cochrane&SearchType=Begins&SearchPR=01&B1=All&Custom=

[28] http://www.town.cochrane.on.ca/siteengine/activepage.asp?PageID=193

further declined in recent years. Employment and unemployment rates vary from community to community. The community with the highest employment rate is Timmins, with the city being the only of the identified communities to have increased in population since the previous population census. This trend can be attributed to the boom and bust nature of mineral extraction and mining in the project region. The communities of Cochrane, Iroquois Falls, Kirkland Lake, and Black River-Matheson have all seen their respective populations decline since the last census.
Unemployment rates vary widely between communities. For example, Black River-Matheson and Iroquois Falls have the highest rate of unemployment at approximately 8% while the community of Cochrane has the lowest unemployment rate.

12.3.2 Land tenure and disputes

Land Tenure Disputes are not expected at this point. Refer to Project Area Files for complete documentation regarding the landowners.

12.4 Aboriginal Peoples

Many Aboriginal communities in Northern Ontario continue to have concerns regarding their involvement in the forest management planning process within the project region. These communities within the project region are Matachewan First Nation, Wahgoshig First Nation, and Beaverhouse Aboriginal Community. The most common concerns include the protection of Aboriginal cultural heritage values, environmental concerns and obtaining economic benefits through forest management activities.

Beaverhouse Aboriginal Community

The people of Beaverhouse have preserved and passed on historical knowledge through oral traditions and teachings. The history of this Aboriginal community is centered on hunting, fishing, gathering (iemedicine), trapping, and timber uses. Archaeological evidence suggests that certain sites have been identified to be 6000 to 7000 years old[29]. Other artifacts have been located and identified as belonging to ancestors of the present community which indicate that these Aboriginal peoples have inhabited the region for a significant portion of time and have deep cultural roots in the area.

Wahgoshig First Nation

The community of Wahgoshig First Nation [30] is located approximately 50 km east of the town of Matheson. Wahgoshig First Nation people were historically hunter-gatherers whose traditional territories extended over a large portion of north-eastern Ontario and into the province of Quebec. Prior to 1979, Wahgoshig First Nation people were known as the Abitibi-Ontario. Currently the community consists of 246 people living both on and off the reserve.

Matachewan First Nation

Matachewan First Nations is located within the Timiskaming District of Ontario on Reserve #72 within the townships of Alma and Baden. The Matachewan First Nation

[29] Aboriginal Background Information Report, Beaverhouse First Nation,, 2000

[30] Aboriginal Background Information Report: Wahgoship First Nation Community Profile 2009

reserve is approximately 20 kilometers from the town of Matachewan, which in turn is approximately 100 km from Black-River Matheson.[31]

There are also five Aboriginal communities that are within or adjacent to the North Bay that have interests or traditional uses that may be affected by forest management. Two Indian Reserves, Dokis and Nipissing are situated South and North of Lake Nipissing, respectively. Two other Aboriginal communities, the Mattawa/North Bay Algonquins and the Antoine First Nation, are located in the Mattawa area, but do not have any reserve lands. The Temagami First Nation is located central to the Project Region.

The community's cultural heritage identity is closely tied to traditional uses of resources for hunting, fishing and gathering. A number of historical sites have been identified include burial sites, traditional fishing areas, as well as spiritual and trapping locations. The ecological health and quality of their territorial area is of great importance to the community.

The trapping of furbearing animals has a long social, cultural and economic history in the region and continues to be a common activity. Although far from historical levels, trapping continues to generate income to some Aboriginal and non-Aboriginal residents. The Kirkland Lake District of the Ontario Ministry of Natural Resources (OMNR) currently has 84 registered traplines. There is limited data available on commercial furbearing animal populations, specific to the project region. Forest cover and habitat that support populations of furbearing animals such as beaver marten, fisher, mink, otter, fox, muskrat and lynx remain important locally for the same purposes

12.5 Biodiversity Information

The northern half project region is characterized by a Boreal forest conditions. Fire initiated a dominated and evenly distributed trembling aspen (*Populus tremuloides* Michx.) forest condition as well as significant Jack Pine (*Pinus banksiana L.*) throughout the northern portion of the region. The forest within the northern project region follows the mixedwood successional pathway which is described by trembling aspen, white birch (*Betula papyrifera* Marsh.), or balsam poplar (*Populus balsamifera* L.) as the pioneer species. These species can be found on most moist soil types across this part of the project region. Subsequent succeession into a white spruce (*Picea glauca* (Moench) Voss), black spruce (*Picea mariana* (Mill.) BSP), or balsam fir (*Abies balsamea* (L.)) forest is found. Typically, black spruce and larch (*Larix laricina* (Du Roi) K. Kock) are found growing in the organic deposits on the lower and wetter areas.

The southern half of the project region is host to a greater proportion of Red pine (*Pinus resinosa* Ait.) and white pine (*Pinus Strobus* L.). These species, also influenced by fire can be found on sites with warmer than normal microclimates and the dryer sandier sites. The levels of red pine and white pine where historically higher within the project region. The decrease was caused by the lack of management for the species during historic

[31] Matachewan First Nation Background Information Report for the Timiskaming Forest 2011-2021 Forest Management Plan,, 2009

logging operations. The levels of white and red pine remain relatively low, as the silviculture requirements for the species to regenerate are demanding. Openings in the canopy and exposed mineral soil on the forest floor allow for the seeding and regeneration of white and red pine. White cedar (*Thuja occidentalis* L.) is often found in flood plains and in areas with telluric water. In the southern portion of the project region, increased components of tolerant hardwoods are noticed. Sugar maple (*Acer saccharum* Marsh.) is found on fresh to moist glacial till, most common in pure stands.

The project region supports the growth of green (*Alnus crispa (ait.) Pursh*) and speckled alder (*Alnus rugosa (Du Roi) Spreng.)*. These shrub species range up to 3 meters in height and generally grow in clumps or in thickets and are widespread throughout a range of soils. However, green alder prefers dry and fresh upland soils, typical of a sandy/coarse loamy soils. The speckled alder naturally occurs on moist to wet, poorly drained sites, especially in wet organic soils or along the margin of streams rivers and lakes or swamplands. These shrub species are amongst the first succession species to establish themselves and in many cases are found individually occurring in clearings or in transition areas within project areas. As well, both are frequently found along road sides and other man-made disturbances and are common across North America and the Boreal forest region[32]. Red Osier Dogwood (*Cornus stolonifera Michx*) is also common within the project zone the species can grow up to 2 meters in height, forming dense thickets and occurs across a range of dry to wet habitats. It grows predominantly on poorly drained soils and frequents the margins of rivers, marshes and lakes as well as on roadsides and disturbed soils.

Grasses found within the project areas are a mix of perennials commonly used in agriculture for pasture, graze or soil nitrification and of naturally occurring graminoids. Some common species include the drooping woodreed (*Cinna latifolia*), dandelion (*Taraxacum officinale)* and sheathed sedge (Carex vaginata), all of which occur throughout the region. Other commonly found grasses include Canadian fleabane (*Conyza canadensis*), and Blue Joint grass, (*Calamagrostis Canadensis (michx.) Beauv*.) which is a large robust grass that grows in clumps that are often intensive and densely crowded[33]. Flowering stems can grow up to 1 meter in height and occur in a wide range of sites. Blue Joint grass grows primarily in swamps, bogs, and ditches and along shorelines and streams but can also be found on dry willow sites, with the species exhibiting a slight preference for calcareous soils.

Birdsfoot trefoil, *(Lotus corniculatus)* is amongst the introduced perennials and can grow up to half a meter in height. The species prefers sandy soils and is used in grazing pasture and hay. Other introduced grass species include Red *(Tryfolium pratense L)* and white Clover (*Trifolium repens L.)*. Both are widespread perennials occurring at different heights that have naturalized in temperate areas.[34]
Fringed Brome (*Bromus Ciliatus L.)* and Timothy *(Phleunum pratense L.)* occur in 1 meter tuffs. Timothy grows best in meadows, in mesic environments and is adapted to cool humid climates. Alfalfa (*Alfalfa medicago*) occurs up to 1 m in height, on well-

[32] Trees in Canada, John Laird Farrar 1995
[33] Field Guide to the common Forest Plants of Northwestern Ontario 1997
[34] http://eolspecies.lifedesks.org/pages/22770

drained soils. The large root systems allow alfalfa to be fairly drought resilient. It is predominately used in graze or harvesting systems.

The Boreal forest region is considered to support lower species diversity when compared to more southern forest regions such as the GLSL, however it is home to many large and midsized mammals. Black bear *(Urnus americanus)* is common in the forested areas, throughout the province and within the project zone. Moose *(Alces alces)* is another impressively sized mammal that feeds on willow and alder in the wet areas within and beside ponds and swamps. The white-tailed deer (*Odocolieus virginianus)* feeds on fleshy branches and shoots throughout the southern portion of the Boreal forest. The elk (*Cervus elaphus*) is present in the southern half of the project region although their occurrence is very low[35]. The gray wolf (*Canis lupus),* coyote (*Canis Latrans*) and red fox (*Vulpes vulpes*) all prey on smaller mammals, however the wolf will work in packs to prey on larger mammals. The Canada lynx *(Lynx lynx)* and bobcat (*Lynx rufus*) can also be found in the zone, although their sightings are infrequent.

Typical smaller mammals that are found in the area are pine marten (*Martes americana*), and porcupine (*Erethizon dorsatum*). The pine marten is a predator that thrives in coniferous forest. The beaver (*Castor canadensis*), otter (*Lutra canadensis*), muskrat (*Ondantra zibethica*) and mink (*mustela vison)* are widespread throughout the project region and found around water bodies. The red squirrel (*Tamiasciurus hudsonicus)*, meadow vole (*Microtus pennsylvanicous*), deer mouse (*Peromyscus maniculatus*) and mole (*Condylura cristata*) are common forest ground dwellers.

Many waterfowl species are common in the region. The canada goose (*Branta Canadensis*), mallard duck (*Anas platyryhnchos*) and great blue heron (Ardea herodias) are widespread throughout. The ruffed grouse (*Bonasa umbellus*) is a common ground dweller in the project region. The great horned owl (*Budo virginianus*) preys on small ground mammals such as voles and is also found within the project region. There are many other birds of prey, which occur within project region. Refer to the Boreal Forest Songbird Initiative website for a complete list[36]

Many toads (*Bufo spp*.) and frogs (*Hyla spp*.), (*Rama Spp*.) are common in the region. The common garter snake (*Thamnophis sirtalis*) is also found within the region. Hundreds of species of vertebrates exist within the project region; invertebrate species are likely to reach the tens of thousands.

12.5.1 Threats to Biodiversity

Threats to the biodiversity described above include many complex dynamics interacting over long periods of time. Between humans and their Environments. Forest fragmentation and fire suppression and land use change within the region are often described as key threats to the ability of the biodiversity within the project region to function[37]. Specific threats to species which create the biodiversity above are addressed in Table 20 – HCVF

[35] http://www.mnr.gov.on.ca/en/Business/FW/2ColumnSubPage/279012.html

[36] http://borealbirds.org/guide/index.php?view=fieldlist&guideid=1&groupid=1&process=1

[37] HCVF report for the Timiskaming forest, 2011

Attributes Within the Project Region. These species will serve as indicator of overall forest health and the associated threats to the biodiversity mentioned above.

12.6 High Conservation Value Forest Identification

The assessment of HCVF identifies values in accordance with the global toolkit for the High Conservation Value Forest Network. This assessment examines the occurrence and current state of known HCVF's within the project region.[38]

> *HCV1- Forest areas containing globally, nationally, or regionally significant concentrations of biodiversity values (e.g., endemism, endangered species, refugia)*

HCV1.1 Protected Areas

There is several conservation reserves within the Project Region.

The Class Environmental Assessment for provincial parks and conservation reserves was approved by the Ontario government in 2004 and took effect in 2005[39]. Some parks and reserves have similar ecological characteristics to those in the project areas and contribute to the achievement of the same wildlife habitat and ecotourism opportunities. The following is a list of provincial parks within the project region and are representative of the conservations values in the project region.

List of Protected Areas

- Pushkin Hills Provincial Nature Reserve
- Esker Lakes Provincial Parks
- Gem Lake Maple Bedrock Provincial Park
- Larder River Provincial Park
- Englehart River Fine Sand Plain and Waterway Provincial Park
- Kettle Lakes Provincial Park
- Wildgoose Outwash Deposit Provincial Park
- Kap-Kig-Iwan Provincial Park
- Sturgeon River Provincial Park
- Restoule Provincial Park
- South Bay Provincial Park
- Grundy Lake Provincial Park
- French River Provincial Park
- Mashkinonje Provincial Park
- Samuel de Champlain Provincial Park
- Mattawa River Provincial Park
- Martin River Provincial Park
- Temagami River Provincial Park
- Kenny Forest Provincial Park
- Finlayson Point Provincial Park
- WJB Greenwood Provincial Park

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[38] http://www.hcvnetwork.org/about-hcvf/The%20high-conservation-values-folder

[39] A Class Environment Assessment for Provincial Parks and Conversation Reserves, Ministry of Natural Resource, 2004

- Greenwater Provincial Park

The following is a list of Conservation Reserves within proximity to the Project region:

- Maisonville Bernhardt Muskeg Maple Moraine Conservation Reserve
- Dunmore Township Balsam Fir Outwash Deposit Conservation Reserve
- McGarry Township Forest Conservation Reserve
- South Grassy Lake Outwash Conservation Reserve
- East Larder River Bedrock Conifer Conservation Reserve
- Mistinikon Lake Uplands Conservation Reserve
- Hillardton Marsh Uplands Conservation Reserve

HCV1.2 Threatened and Endangered species

HCVF Values

Table 20 - HCVF Attributes within Project Region

Species	Description & Threats	Presence
Bald Eagle *Haliaeetus leucocephalus*	Considered a species of Special Concern in northern Ontario. Its population had declined in the 1960's but it continues to recover well, especially in the boreal forest region. Nesting Habitat requirements: nest sites are found typically in large sub-canopy trees along the shores of productive lakes and rivers. Threats to this HCVF include the loss of nesting habitat. Although the species has recovered well since its initial decline it remains a special concern. Management guideline " Forest Management Guide for Conserving Biodiversity at the stand and site scales, (OMNR 2010) describes the AOC persecutions applied to bald eagle nest sites.	Known to Nest Within The Project areas
Common Nighthawk *Chrodeiles minor*	Classified as Threatened. The population is known to have widespread decline across North America. Nesting Habitat requirements are open areas, bare rock or mineral soil, bogs, pastures lands, burns, or cutovers. Threats to this HCVF are similar to that of the bald eagle. However threats to this	Known to Nest Within The Project areas,

	HCVF may be due to mosquito control programs, more intensive agriculture, fire suppression and changes in site preparation methods (COSEWIC 2007a)	
Peregrine Falcon *Falco peregrinus anatum*	Classified as Threatened in Ontario The population declined in the 1960's.Populations continue to recover due to intensive captive breeding and release programs in the past 30 years Typical nesting habitat requirements are on cliffs and high rock outcroppings. Threats to this HCVF include the widespread use of pertinent pesticides. the preferred habitat is a low risk relative to threats from as it prefers habitat environment difficult to access.	Known to Nest Within The Project areas
Whip-poor- will *Caprimulgus vociferus*	Classified as Threatened. The population has experienced a large decline throughout its natural range. Habitat requirements include immature and sparse forest. It commonly utilizes scattered and open coniferustyr plantations for breeding, nesting and foraging Threats to this HVCF include its ability to feed of moths and beetles as it is a major food group. The loss of sparse forest with open understory and open plantations for nesting is also a threat to this species.	Known to Nest Within The Project areas
Rusty Blackbird *Euphagus carolinus*	Classified as a species of Special Concern in Ontario, It prefers habitat characterized by immature conifer along calm bodies of water. Threats to this HVCF include the loss of immature conifer habitat, near shallow water.	Known to Nest Within The Project areas
Canada Warbler *Wilsonia canadensis*	Classified as a species of Special Concern in Ontario, although populations are healthy COSEWIC estimates a total 85 % of the breeding population is located within Canada. Prefers mixedwood forest conditions with	Known to Nest Within The Project areas

	well-developed under-story Threats to this HCVF include the loss of mixed coniferous forest with well-developed understory, its population tends to rise and fall with the outbreaks of Spruce budworm.	
Olive-sided Flycatcher *Contopus cooperi*	Classified as a species of Special Concern in Ontario. It prefers to forage from a high perch. With habitat in open areas with tall trees including near forest edge, natural opening and swamps. Threats to his HCVF are relatively minor. However due to unknown population decline up until 2006 it has been listed as special concern.	Known to Nest Within The Project areas

HCV1.3 Endemic Species

Populations of White and Red pine are stable however significant effort is currently being undertaken locally and provincially to increase its occurrence whenever possible. White and red pine stands historically occupied more area than current levels with the decline attributed to historical logging without adequate silvicultural follow-up treatments. Both of the species, particularly white pine, were commercially important at the turn of the century and up to the 1940's. [40]

While White and Red pine are not considered to be threatened species strictly ecologically speaking, they represent a social value and the desire to increase its occurrence where possible, For this reason it is included as a HCVF with the major threat to these species being fire suppressions and fragmentation.

HCV1.4 Critical Temporal Use

There are no confirmed temporal uses within the project Region & Zone

HCV2- Forest areas containing globally, nationally, or regionally significant large landscape level forests, contained within or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.

There are no confirmed occurrences within the project zone

HCV3- Forest Areas that contain rare threatened or endangered ecosystems.

There are no confirmed occurrences within the project zone

[40] High Conservation Value Forest Assessment for the Timiskaming Forest, Szuba, version 1.2, 2011

HCV4- Forest areas that provide basic services of nature in critical situations (e.g., watershed protection, erosion control.)
HCV4.1 Forest Critical to water Catchments
HCV4.2 Forest Critical to erosion Control
HCV4.3 Forest Providing barriers to destructive fire:
There are no confirmed occurrences within the project Region or Zone

HCV5- Forest areas fundamental to meeting basic needs of local communities (e.g., subsistence, health
There are no confirmed occurrences within the project Region or Zone

HCV6- Forest areas critical to local communities' traditional cultural identity
There are no confirmed occurrences within the project Region or Zone

12.7 Effects of Climate Change

12.7.1 Implication

The Ontario Ministry of Natural Resources conducted a case study on the potential impacts of climate change on the Clay Belt region of northern Ontario[41]. The study included an assessment of the implications to the biodiversity, ecosystems and social-economics for the region that surrounds and includes the project region. The findings and conclusions of this report indicate several possible trends as follows.

a) The project region is susceptible to a shift in forest composition to species common within the Great Lakes St-Lawrence Forest Region. The northward shift in forest composition and the associated habitat is projected to coincide with an overall increase in annual precipitation however an increase in the length of the fire season within the project region is also projected. This would effectively increase seasonal moisture stress on many sites. The projected longer, dryer summers may increase the levels and severity of wildfire, impact soil moisture conditions and therefore overall forest productivity.
b) A shift in forest cover would increase susceptibility of certain species populations. Cold adapted species (e.g., brook trout and non-migrant mammals), may be affected by a change in breeding cycles, habitat, synchrony and pathogens. This may also result in an increase in invasive species occurrence.

The effects of climate change on the socio-economic conditions within the project zone are related to access to natural resources and recreational opportunities. Examples of impacts on recreational opportunities include seasonal constraints or elimination of activities that rely on cold weather such as ice fishing and snowmobiling. Economic sectors such as the forest industry that relies on the use of winter roads may also be negatively affected. However, a prolonged warmer season may increase opportunities to

[41] Climate Change Vulnerability Assessment and adaptation options for Ontario's Claybelt – Case Study, R. Lalonde, J. Gleeson, P. Gray, A Douglas, C. Blakemore, L Ferguson

generate revenue from the cottaging and tourism sectors as well as from the agricultural sector.

12.8 Potential Negative Impacts to Climate, Community & Biodiversity

12.8.1 Impacts to Communities

First Nation Communities

First Nation values are not expected to be affected by the implementation of project activities. The condition of aboriginal values and First Nation communities is not expected to be affected as well. The regeneration of forest conditions on project activities will benefit overall forest conditions in the Project Region. Consequently, the benefits from the increase in forest habitat will be valued by the neighboring Communities. The creation of such conditions may be considered a positive impact to Aboriginal Communities where project areas are within proximity to their traditional areas.

12.8.2 Landowners

Financial Value

Landowners participating in the project are expected to see an increase in the property value of their lands. In addition, the landowners will be eligible to participate in existing programs currently offered by the Ministry of Natural Resources, which offers landowners of a qualifying forest the benefits of a Managed Forest Tax Incentive Program (MFTIP). Under this program landowners are eligible for reductions in their taxes as long as a management plan is maintained and approved for forestlands.

Aesthetic value

As most landowners currently reside in dwellings located on the project areas, the landowner will have the opportunity to enjoy the new views created resulting from the establishment of the forest. The landowner's personal pleasure derived from owning forest dominated land and its associated philanthropic benefits to the climate and community and biodiversity are expected to be a significant motivator for individual participation in OBAP.

Environmental Co-Benefits

The reduction in wind and noise resulting from the project activities is expected to positively affect the landowner's living-conditions within dwellings. Decreased air temperature provided by the shade during hot summer days, and improvements in managing the water table and water quality are other expected benefits to the landowners. Increased opportunities for animal sightings, recreational trails, berry and mushroom picking are also expected benefits.

Potential Negative Impacts

There are little potential negative impacts expected to affect the landowners. The process of stakeholder consultation has effectively engaged landowners that have identified a desire to renew Boreal and Great Lakes St-Lawrence forest and enjoy its associated benefits. The process for conducting the renewal activities is the only identified short-term negative impact as it often will require noisy machinery to implement the planned project activities effectively. Consultation and co-operation with landowners will allow for the mitigation of negative impacts to the landowners and to the project areas.

Relocation of landowners
The project does not require nor create circumstances where a landowner may need to relocate their dwellings and are not affected by the planned project activities.

Loss of Productive Area
Soil compaction, rutting and erosion resulting from the use of small motorized all terrain vehicles during project implementation presents a small and manageable risk to the ecological integrity of project areas. This can be caused by repeated travel over sensitive soils during wet conditions. It is not expected that the potential soil compaction rutting and erosion would cause any significant loss of productive areas.

Impacts to Habitat
The habitat created by the implementation of project activities is directly related to successful seedling establishment. Habitat benefits created by the project will evolve as the growth of forest cover matures. Habitat benefits for a given wildlife species are directly related to the needs and use for that species at varying seral stages (i.e. forest condition at various age intervals).

Impact to Common Species
The implementation of planned project activities is expected to reduce the occurrence of shrub and alder cover while contributing to the habitat requirement of white tailed deer, and moose. Increased forest cover provides shelter and reduces predation. An increase in ground dwelling mammals is expected. The project areas will mature into a conifer condition that will provide habitat for many species of mammals, birds and invertebrates.

12.8.3 Impact to HCVF

During the implementation of project activities no negative impacts to HCVFs are expected.

Bald Eagle
There are no known bald eagles nest occurring with the project areas. No known occupied bald eagle nesting sites are located within a 400 m radius of the project areas. Bald eagle nesting sites are often found within proximity to productive lakes and river.

Common Nighthawk
There are no known nesting sites found within the project areas. The implementation of project activities is not believed to negatively affect this HCV species.

Peregrine Falcon
There are no known nesting sites found within the project areas. As peregrine falcon nesting sites are along cliffs and large tall rock outcroppings. The implementation of activities is expected to have no negative affect to this HCV species.

Whip-poor-will
The Whip-poor-will is known and assumed to be within the project zone as its occurrence is widespread. This HCV species is expected to benefit from the implementation of

project activities, as its habitat requirements are typical of young immature coniferous forest which will be created during the early stages of seedling establishment.

Rusty blackbird
The Rusty blackbird is known and assumed to be within the project zone as its occurrence is widespread. This HCV species is expected to benefit from the implementation of project activities during the early stages of seedling establishment as it prefers immature coniferous stands[42].

Canada Warbler
The implementation of project activities is not expected to affect this HCV species. Canadian warbler populations are relatively stable and prefer forest habitat that is typical of a mix wood forest conditions.

Olive-sided fly catcher
This HCV species is not expected to be negatively affected by the implementation of project activities.

12.8.4 Impacts to Forest Habitat

Contribution to Desired Forest
The Timiskaming Forest Management Plan implements forest management activities on Crown lands. The prescribed forest management activities are derived from social, ecological and economical objectives, defined through the forest management planning process. Through this process, input from a local citizens committee, open houses and public consultation allow for concerned citizens to contribute to the desired forest conditions and values derived from Crown forest. The Conservation Strategy for White and Red Pine Management on the Timiskaming Forest is the direct result of a social and ecological desire to maintain red and white pine on the landscape. The species are currently at the northern extent of their natural range. Project activities will increase the occurrence of red pine on the landscape and will contribute to the direction taken on Crown land for the maintenance of red pine ecosystems.

In addition to the contribution at the project zone and region level, the project will be contributing to the maintenance and creation of habitat critical for the identified HVCF values.

Contribution to Social Economic
The implementation of the project activities will generate small but direct economic returns for the local communities as a result of local contractors implementing selected project activities. The contributions to the project region economic conditions are not expected to be significant since the nature and scope of the project remains relatively small.

[42] Species at Risk Registry : http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=907

12.8.5 Impacts of the without project scenario

Community

The most significant impact expected to be observed by the communities and landowners in the absence of the project is expected to be relatively minor. Landowners within these communities do not have the financial means or expertise to reforest the lands within the project areas and thus they would remain as fallow. This concept is well document in Section 3.2.1 Identification of alternative land use scenarios to A/R project activity. In the without project scenario, the continued neglect for these project areas into the future would result in neither workable farmland, nor forested land which are both considered to be community assets. Thus it is anticipated that the without project scenario could negatively affect that the aesthetic, intrinsic value and financial values to the community and landowners into the future. It is also expected that the project areas be susceptible to higher amount of erosion, greater wind speeds and higher ground surface temperatures. These dynamics are attributable to the lack of forest cover, also affect the communities and landowners values.

Biodiversity

The most significant impact expected to be observed by the communities and landowners in the case of the "without project scenario" is the lack of habitat and forest cover within the project area and its contribution to providing contiguous patches of mature confiner throughout the project region. The lack of forest habitat creates increased pressured on the water table quality, erosion and habitat availability. It is safe to accept that the benefits to habitat, wildlife, and biodiversity achievable through the project scenario would not occur to the degree and effectiveness in the without project scenario.

The without project scenario would result in the continued occurrence of non-native species of grass and sedge used in agriculture. This creates relatively lower levels of biodiversity due to the impediment to the establishment of native forest ecosystem. This ecosystem leads the achievements of the aforementioned biodiversity objectives. The without project scenario may not further impede the establishment process, however it is believed that landscape connectivity and habitat availability would continue suffer in the without project scenario.

12.9 Mitigation of Potential Negative Impacts to Climate, Community & Biodiversity

No negative impacts are expected as a result of implementation of project activities. It is expected that the implementation of project activities will contribute to a variety of social, biodiversity and economic benefits at the various project levels (region, zone and area). With the exception of the potential for accidental fuel spills and periods of noise resulting from machinery, no foreseeable negative impacts to communities are anticipated.

SCHEDULE A – Project Area Files

SCHEDULE B - Treatments and Work Schedule

PST 1 - Planned Site Preperation						
Project Area	**Mechanical**		**Herbicide**		**Manual Brushing**	
	Year	Hectares	Year	Hectares	Year	Hectares
Ing-11b	2014	0.47	2014	0.47	2013	0.47
Ing-11c	2014	0.34	2013/14	1.64	2013	1.30
Ing-11d	2014	1.90	2013	2.61	2013/14	4.51
Ing-11e	2014	0.99	2014	0.99		
Rtr-1a			2013	4.04	2013	0.91
Rtr-1b			2013	0.58		
Rtr-1c			2013	14.54	2013	1.00
Rtr-1d			2013	3.28	2013	1.04
Total		3.70		28.15		9.23

Table Information		
Version	*Date*	*Description*
1	2013-09-15	Planned site preperation for first phase developed durring the initial development for the PDD,
2	2013-12-17	Updated to include Table information for QA/QC

PST 2 - Planned Tree Planting						
Project Area	**Black Spruce**		**White Spruce**		**Red Pine**	
	Year	Ha	Year	Ha	Year	Ha
Ing-11b					2014	0.47
Ing-11e	2014	0.99				
Ing-11d	2014	4.51				
Ing-11c					2014	1.64
Rtr-1a					2014	4.04
Rtr-1b					2014	0.58
Rtr-1c					2014	14.54
Rtr-1d					2014	3.28
Total		5.5				24.55

Table Information		
Version	*Date*	*Description*
1	2013-09-15	Planned Tree Planting for first phase developed durring the initial development for the PDD,
2	2013-12-17	Updated to include Table information for QA/QC

PST 3 - Planned Monnitoring Schedule							
Project Area	**Planting Success**		**Seedling Establishment**		**FTG & Inventory**		**HCV**
	Year	**Ha**	**Year**	**Ha**	**Year**	**Ha**	**Year**
Ing-11b	2014	-	2015	-	2020	-	2014 +
Ing-11e	2014	-	2015	-	2020	-	2014 +
Ing-11d	2014	-	2015	-	2020	-	2014 +
Ing-11c	2014	-	2015	-	2020	-	2014 +
Rtr-1a	2014	-	2015	-	2020	-	2014 +
Rtr-1b	2014	-	2015	-	2020	-	2014 +
Rtr-1c	2014	-	2015	-	2020	-	2014 +
Rtr-1d	2014	-	2015	-	2020	-	2014 +

Table Information		
Version	*Date*	*Description*
1	2013-09-15	Monitoring events Scheduled for seedling establihsment durring the initial development for the PDD,
2	2013-12-17	Planting Success, FTG & inventory and HCV monitoring events added to PST 3 Table as a result of NCR Audit Round 1, Updated to include QA/QC Table Information
3	2014-02-03	Seedling Establishment survey year updated for to 2015 following NCR Round 2 findings.

SCHEDULE C – REPORTS