GROUPED PROJECT: PROTECTION OF TASMANIAN NATIVE FOREST

ADDITION 10 – WISEDALE

Forests Alive Pty Ltd

Project Title	*Grouped Project: Protection of Tasmanian Native Forest. Addition 10 – Wisedale*
Version	*3.0*
Date of Issue	*27/08/2013*
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1 PROJECT DETAILS

1.1 Summary Description of the Project

Addition 10 – Wisedale (hereafter referred to as Addition 10) is being included in the Forests Alive Grouped Project: Protection of a Tasmanian Native Forest. Addition 10 constitutes 850.56 hectares of native forest on private land. This land will continue to be harvested in the absence of the IFM project. For more information, refer to Grouped Project PDD.

Addition 10 comprises both wet and dry sclerophyll eucalypt forest. The vegetation communities are identified by the dominant eucalypts in the canopy, which include *E. viminalis*, *E. amygdalina*, and *E. obliqua*.

1.2 Sectoral Scope and Project Type

Addition 10 is being included in the Forests Alive Grouped Project: Protection of a Tasmanian Native Forest. The project activity is an AFOLU project. The project uses an Improved Forest Management (IFM) methodology, specifically the conversion of Logged Forests to Protected Forests (LtPF) methodology.

1.3 Project Proponent

The project proponent and contact point for Addition 10 is William Robert Gooch and Marie Celma Gooch. The Gooch family have owned and managed the property since 1915.

Contact person(s):	William Robert Gooch
Title:	Landowner
Address:	3171 Frankford Road, Frankford, Tasmania, 7275
Telephone number:	0408 961 141
Email:	wisedale@bigpond.com

The project proponent is responsible for implementing the Monitoring Plan for Addition 10. The proponent has the necessary skills and knowledge to oversee this process and the resources (ensured by the anticipated revenue from carbon credits) to employ qualified agencies to undertake the required tasks. To support this, the proponent will be provided with a ‘property transition folder’ (as detailed within the Grouped Project PDD) subsequent to first verification.

1.4 Other Entities Involved in the Project

Forests Alive Pty Ltd is acting as the implementing partner and is responsible for the development, validation and first verification of the instance. Forests Alive (previously Redd Forests) is a leading forestry carbon project developer in Australia.

Contact person:	Virginia Young
Title:	Managing Director
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Telephone number:	+61 (0) 282 709 908
Email:	virginia@forestsalive.com
Website:	http://www.forestsalive.com

An outline of Forests Alive’s staff including their roles and responsibilities is provided in section 1.15 of the grouped project PDD.

1.5 Project Start Date

The project proponent for the Addition 10 project activity instance entered into a contractual agreement with the implementing partner (Forests Alive) on 26th of July 2011. This therefore constitutes the start date of the project.

1.6 Project Crediting Period

The project crediting period will be for a period of twenty-three years and 8 months, i.e. until 31 March 2035, with crediting commencing with the first verification. The instance falls within the timeframe of the Grouped Project.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

The Forests Alive Grouped Project does not constitute a mega project >1,000,000 annually. The total VCU's generated annually from currently registered additions is 144,582. The current additions being validated will constitute an additional <25,000 VCU's (Pending final validation). The total therefore will be <1,000,000 VCU's annually.

The Grouped project is not a large project because it avoids less than 300,000 tonnes of CO_2e per year.

Table No. 1. Annual VCUs generated.

Grouped Project	170,000 VCU's Annually
Addition 10	4,686 VCU's Annually

Table No. 2. Estimated GHG emission reductions or removals. Reductions/Removals display as a negative value.

Years	Estimated GHG emission reductions or removals (tCO_2e)
2012	-2,054
2013	-40,235
2014	-958
2015	-29,504
2016	-476
2017	-471
2018	-473
2019	-460
2020	-17,705
2021	-52
2022	-48
2023	-76
2024	-97
2025	-92
2026	-118
2027	-122
2028	-39,984
2029	471
2030	441
2031	398

2032	369
2033	330
2034	310
2035	286
Total estimated ERs	130,321
Total number of crediting years	23.7
Average annual ERs	5,481

It should be noted that the crediting period starts mid-2011, and runs to March, 2035. Therefore there are slight differences between the average annual ERs and the total avoided gas emissions associated with the implementation of IFM activities (equation 24). The more conservative value is used. This is further explained in section 3.4.

1.8 Description of the Project Activity

The purpose and objective of the Grouped Project is to protect native forest that will be logged in the absence of carbon finance. Protecting forests from timber harvesting reduces emissions caused by harvesting and maintains the forest carbon stock.

With regard to the lifetime of the *project activity* The Grouped Project start date is 1 April 2010. The grouped project ceases 25 years after this start date on 31st March 2035. There is nothing within the contractual agreement between the project proponent and Forests Alive from renewing the agreement at the end of this period. The proponent has in place, an adaptive management plan for a period of 30 years. This plan is detailed within the Non Permanence Risk Report and established a structured approach to identifying, monitoring, mitigating and reporting on risks and changing circumstance within the instance area. A full copy of the plan is provided to the validator for their review.

1.9 Project Location

The geographical extent of Addition 10 is confined by cadastral boundaries. The properties owned by the proponent are listed in Table No. 03 and mapped in Figure No. 01. This property covers 1652 ha, of which 850 ha is commercially harvestable native forest and subject to IFM activities. The instance area is recorded using KML and SHP files. The proponent has included all of the commercial, native forest that is under their ownership.

Table No. 03. Addition 10 properties with forested areas owned by the project proponent.

Name of property	Name of owner	PID	Total Hectares
Wisedale	Marie Celma Gooch and William Robert Gooch	7331611	649
Wisedale	Marie Celma Gooch and William Robert Gooch	6532163	1003

Point Label	Latitude	Longitude
A	-41.2595	146.6465
B	-41.2761	146.6974
C	-41.3312	146.7041
D	-41.3081	146.6630
E	-41.2853	146.6396

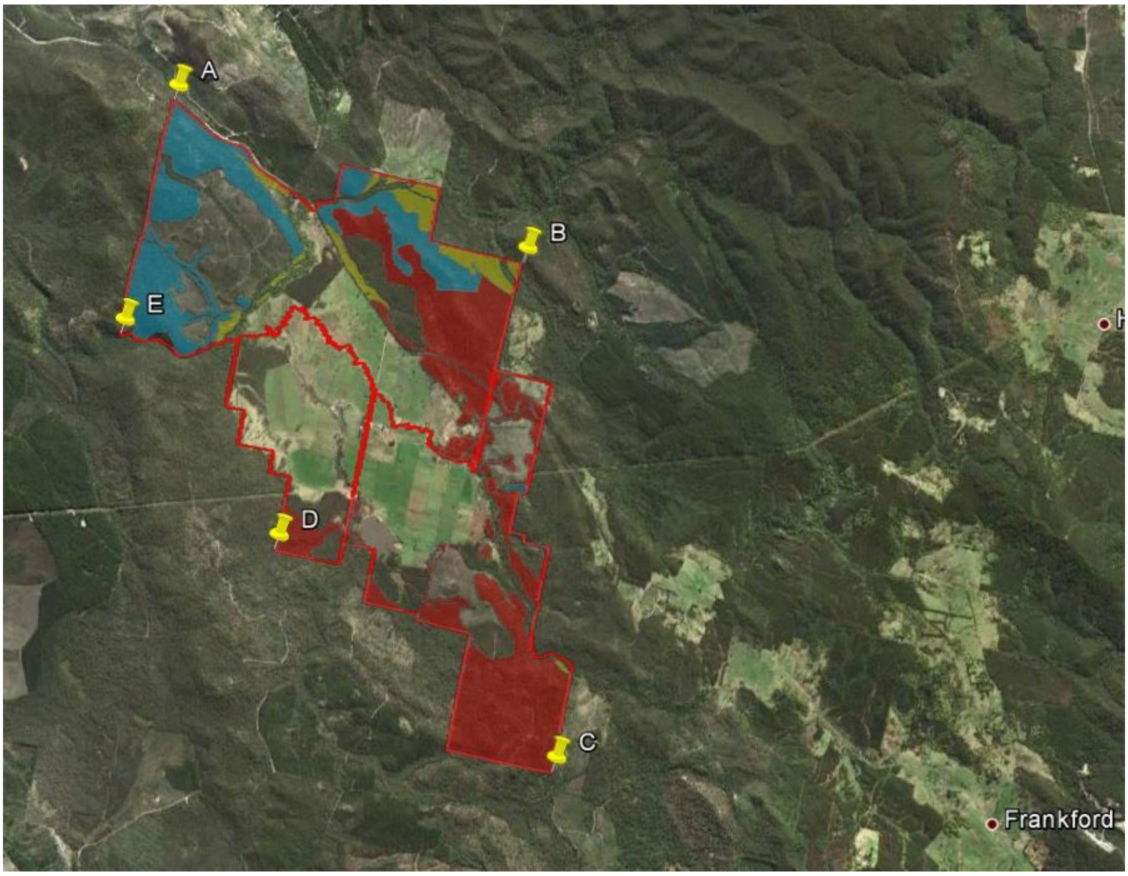

Figure No. 01. Map of the project activity instance, Addition 10, in the Forests Alive's IFM Grouped Project. Strata 1 (Red), Strata 2 (Blue) and Strata 3 (Yellow)(Source: Google Earth).

1.10 Conditions Prior to Project Initiation

Addition 10 has been developed on the property known as 'Wisedale'. The property is managed for a combination of production forestry and grazing. There is Private Timber Reserve (PTR) as a caveat on the almost all of the native forest that is commercially harvestable. This information is available for review by the validator. Private timber reserves were created to enable landowners to have their land dedicated for commercial forest management.

Within the production forests the landowner manages for a combination of sawlog and woodchips.

The project area constitutes all of the forested land that has previously been logged, has current harvesting plans and can continue to be harvested into the future.

The respective property name and unique property identification number (PID) is detailed in Table No. 03. The property is mapped in Figure No. 01. The project area is under the ownership of Marie Celma Gooch and William Robert Gooch. Proof of ownership is available for review by the validator.

Throughout the past 30-40 years, the landowner has implemented a combination of selective logging across almost all of the forested land on the property. In the 1980s, this was predominately low intensity logging for sawlog; the 1990s marked a shift towards more intensive harvesting for woodchips, consistent with logging trends across Tasmania. Extraction rates on the property from this period have ranged from 800 to 4000 t per harvesting event, i.e. 60-70% of the standing biomass in each logging coupe. This has generated substantial greenhouse gas emissions through the logging process, and degraded the carbon stocks in the native forests.

Table No. 06 outlines the logging history, while Table No. 05 provides the list of past Forest Practices Plans which support this history. This evidence of previous forest harvesting both within the property and on adjoining and nearby private land clearly demonstrates that Addition 10 is within a commercially viable distance to existing transport networks, and both a port for timber export and a mill for timber processing.

The project will generate carbon credits by preventing greenhouse gas emissions that would occur under a ‘business-as-usual’ scenario. This will allow the project proponent to avoid continued forest harvesting by utilising carbon finance. Protection of the project activity instance under an IFM model will both prevent the emissions generated from logging and allow the forest to continue to sequester carbon as it approaches its pre-logged condition.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

See the PDD for the Grouped Project: Protection of a Tasmanian Native Forest.

The project proponent has historically adhered to all legislation, including:

- *Tasmanian Forest Practices Act 1985;*
- *Tasmanian Forest Practices Code 2000;* and,
- *Tasmanian Forest Practices Regulation 2007.*

This is evident from the re-issue of Forest Practices Plans as evidenced by the weighbridge records provided over many years (see Table No. 05).

To date, the establishment and management of the instance have been handled by the implementing partner. Forests Alive followed all relevant legislation, including the regulations listed above and:

- *Australian Workplace Safety Standards Act 2005;*
- *Tasmanian Workplace Health and Safety regulations 1998;*
- *Australian Fair Work Act 2009*.

Relevant contracts and standard operating procedures are available for review.

1.12 Ownership and Other Programs

1.12.1 Proof of Title

The proof of ownership of Addition 10 by William Robert Gooch and Marie Celma Gooch is available for review by the project validator. This consists of land title documentation showing the cadastral parcel boundaries, PID and the name of the legal landowner for the project area. This documentation contains evidence of approval from the Tasmanian Land Titles Office.

The contractual agreement between the landowner and the implementing partner (Forests Alive) is also available for review. This demonstrates the landowners' approval for the IFM project to be implemented on the instance.

1.12.2 Emissions Trading Programs and Other Binding Limits

The Grouped Project and all instances within the Grouped Project do not reduce GHG emissions under an emissions trading scheme, to meet binding limits or similar.

1.12.3 Participation under Other GHG Programs

With regard to the registration of the project under any other GHG program, section 1.13 of the Grouped Project PDD states the following;

The Grouped Project relates specifically to the generation of carbon credits through improved forest management. The project will not create any other form of environmental credit.

Where there are other financial incentives to protect carbon stocks (for example, conservation covenants), these areas will be excluded from the project activity instance generating verified carbon units (refer to section 1.16).

Where VCUs are recognised under alternative carbon programs (e.g. NCOS, CFI or CAR), each carbon credit can only be sold once. The proponent must provide information on any accounts registered under other carbon standards. The sum of carbon credits sold from the project activity instance cannot exceed the number of VCUs generated. This ensures that the project will create only the number of environmental (specifically carbon) credits identified in this document.

Note that each Addition is subject to requirement outlined above. Each addition cannot and will not be registered under any other GHG program.

1.12.4 Other Forms of Environmental Credit

Note that each Addition is subject to the requirement outlined above. Each addition cannot and will not be registered under any other GHG program or claim any other environmental credits under the VCS program.

1.12.5 Projects Rejected by Other GHG Programs

The Grouped Project, nor any additions have been neither submitted nor rejected under any other GHG programs.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

Consistent with the Grouped Project requirements and in accordance with the relevant VCS methodologies, Addition10 complies with the following eligibility requirements:

1. The instance is located within the project area of the state of Tasmania, Australia.
2. The duration of the crediting period (26th of July 2011 to 31st of March 2035) is within the Grouped Project timeframe (1st April 2010 to 31 March 2035).
3. The project activity instance is located entirely on private land. The landowner is the project proponent, the sole legal landowner and the signatory to a contract with Forests Alive as the implementing partner. The proponent (legal landowner) does not own any other native forested land within Australia.
4. The PIDs, property names and formal ownership titles are detailed in Table No. 03.
5. The instance includes native forest that is under threat from legally permitted and planned timber harvesting. This is demonstrated by a history of logging, confirmed by an extensive record of previous Forest Practices Plans and or weighbridge records (see Table No. 05), and continuing eligibility for Forest Practices Plans.
6. The instance satisfies all requirements and applicability conditions as defined in the relevant VCS guidelines and GreenCollar IFM LtPF methodology:
    a. Forest management in the baseline scenario is planned timber harvest (see Table No. 07).
    b. Forest use in the project scenario will not involve commercial timber harvest or forest degradation.
    c. Merchantable volume (m^3) is estimated in accordance with forest inventory procedures detailed within the grouped project PDD (Section 1.4).
    d. The area in Addition 10 is clearly defined through KML files within cadastral boundaries.
    e. The Addition10 instance does not include peatland or wetlands.
7. All carbon emissions and reductions were calculated using the GreenCollar IFM LtPF methodology, with support and guidance from the Forests Alive's standard operating procedures for completing the calculations.
8. The instance has been implemented in accordance with the most recent versions of the Forests Alive's standard operating procedures, including those for stratification of the vegetation, undertaking the forest inventory through fieldwork, data management and quality assurance, and calculations.
9. Addition 10 will be subject to monitoring events in accordance with Section 3.0 of the Grouped Project's PDD and Monitoring Plan.

Leakage Management

For this project, leakage is not a significant risk. This is based on an assessment of both activity shifting and market leakage, in accordance with Step 5 of the methodology. The circumstances outlined below apply to all additions under the Grouped Project.

<u>Activity Shifting:</u>

Consistent with step 5.1, an assessment will be undertaken to examine the potential for leakage through activity shifting as a result of the project. No leakage from this cause is permitted under the GreenCollar IFM Methodology.

The logging projections for the instances will be based upon the historical logging records and will be consistent with current legislation and FullCam regeneration rates.

In addition, each individual proponent is required to demonstrate the absence of activity shifting leakage. If they do not hold any other forested properties in Australia, this is considered an adequate demonstration that activity shifting leakage cannot occur. In instances where the proponents do own forested land which is not entirely included within the project, there is opportunity for leakage through activity shifting. In order to address this, the landowner will provide documentation on the land use of any additional forested properties in their possession. At the initial verification of the property, the proponent must detail in the project file:

- the location of the land;
- historical records showing trends in harvest volumes; and
- if available, forest management plans prepared ≥24 months prior to the start of the project showing harvest plans on all owned/managed lands.

As part of the annual verification requirements, the landowner must demonstrate that activity shifting has not occurred to any forested land not included in the IFM project. The harvesting record from with-project time for these forested areas is therefore required to show either;

- no deviation from historical trends; or
- no deviation from forest management plans.

If forest management plans have been prepared ≥24 months prior to the start of the project, these logging projections are preferable to using historical rates.

Market Leakage:

Step 5.2 requires a determination of a leakage factor due to market leakage.

The GreenCollar IFM LtPF methodology states:

"The leakage factor is determined by considering where in the country logging will be increased as a result of the decreased supply of the timber caused by the project." (Box 2, page 38)

Public forests are harvested to satisfy quotas

State forests (i.e. those on public land) in Tasmania are managed by the government business enterprise, Forestry Tasmania. Specifically, these native forests are managed to meet set quotas of high quality sawlog (300 000m^3 per annum from 2010 to 2030) with pulp and other wood products produced as byproducts of the sawlog harvesting process. This is recorded both in their Sustainability Charter[1] and in the wood supply agreements with Gunns Ltd and Ta An Tasmania Pty Ltd[2]. Similar agreements have been established for all state forests in Australia, according to the National Forest Policy Statement, in order to "[provide] certainty and security for existing and new wood products industries to facilitate significant long-term investments in value-adding projects in the forest products industry."[3] State-specific quotas are detailed in Regional Forest Agreements[4]. Since state forests of Australia are harvested according to long-term quotas, there is no risk that harvesting will be shifted to native forests on public land as a result of the project.

Private native forests in Tasmania produce a minimal quantity of sawlog

The contribution of Tasmania's private native forests to the timber industry is minimal. State forests in Tasmania produce around 580 000m^3 per year, while private native forests produce around 50 000m^3. This has declined steadily from the 200 000m^3 produced on private land at

[1] Forestry Tasmania (2008) Forest Management Plan: Sustainability Charter, p19. Available from <http://www.forestrytas.com.au/uploads/File/pdf/Charter_2008.pdf> [viewed 18/02/2011]
[2] Forestry Tasmania (2010) Wood Supply Agreements. Available from <http://www.forestrytas.com.au/forest-management/wood-supply-agreements> [viewed 18/02/2011]
[3] Department of Agriculture, Forestry and Fisheries (1995) National Forest Policy Statement: A New Focus for Australian Forests, Australia. Available from < http://www.daff.gov.au/__data/assets/pdf_file/0019/37612/nat_nfps.pdf> [viewed 18/02/2011]
[4] Department of Agriculture, Forestry and Fisheries (2010) Regional Forest Agreements Home, Australia. Available from <http://www.daff.gov.au/rfa> [viewed [18/02/2011]

the start of the decade[5]. Indeed, Tasmania contributes only 22% of all the sawlog and veneer timber harvested in private native forests, which in turn only contribute 10% of all the sawlog and veneer timber harvested in Australia[6]. Tasmania's private native forests therefore contribute only 2.2% of high value wood products - a tiny fraction. The sawlog produced on this project site (4000t per year) is minimal: this low volume ensures that it could have no impact on Australian prices, without even considering it is competing on an international market. Private native forests across Tasmania (let alone the project area) do not produce enough sawlog timber to affect price. The marginal reduction in available timber resources will not affect prices and therefore does not encourage market leakage.

Evidence from past and current forest practices plans indicate that 80-94% of the timber from the project area is used to produce pulp and paper products. However, as detailed above, public forests across Australia and private forests on the mainland are logged almost exclusively for sawnwood. In these instances, pulp is a low-value byproduct. Tasmania is the only State within Australia that harvests private, native forests almost exclusively for woodchips. There is therefore no risk of market leakage to these forests on mainland Australia because of decreased supply of timber caused by the project. The leakage factor is therefore determined by considering where logging for pulp and paper may be increased in response to the project.

Ecological constraints on forest growth

Logging of private lands in Australia is managed on a property-specific basis. Harvesting on private land is currently conducted according to individual landowners' intentions and needs, rather than to satisfy quotas from government or processing agencies. Forest Practices Plans (or the state equivalent) are organised by landowners or their representatives. Those landowners who choose to log their native forests (rather than pursue conservation covenants) will continue to do so at one of two maximums. They will either clearfell their land and allow natural regeneration, which generates the highest possible immediate return: this was historical practice on much of Forests Alive's pilot project, where a quarter of the property was clearfelled in 2006. Alternatively, they will log to obtain the maximum sustainable yield, which involves harvesting roughly 70% of biomass every twenty to twenty-five years, exemplified by the baseline scenario for this project area. In either situation, forests are logged according to the landowners' assessments or advice from a forest agency of the volume of merchantable timber available and the price they will obtain for the sale of the woodchips and small quantity of sawn timber. ***It is therefore not ecologically viable to increase permitted extracted volumes within existing concessions because they are already harvested at (or above) the maximum sustainable rate.***

Market demand is unable to satisfy concession requirements

All available evidence indicates that native forest harvesting within Australia is decreasing, with little or no likelihood of an increase in the future. Consider the following findings from the most recent and comprehensive research into the Australian Forestry sector:[7]

> *"Low consumption growth and surging plantation resources characterises Australia's wood products industry.*
>
> *Plantations now supply 82% of the wood for solid wood products manufacturing (sawn timber and wood panels) in Australia (Figure 7). Production of native forest solid wood products has contracted by an average 2% pa over the past two decades.*
>
> *Hardwood plantation chips are decimating native forest chip exports, the single biggest market for native forest wood. On current trends, we can expect a near complete displacement of Australian native forest chip exports within the next few years".*

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[5] Parsons, M.; Pritchard, P. (2009) The role, values and potential of Australia's private native forests, Rural Industries Research and Development Corporation 09/049, Australia.

[6] Parsons, M.; Pritchard, P. (2009) The role, values and potential of Australia's private native forests, Rural Industries Research and Development Corporation 09/049, Australia.

[7] Ajani, J. (2011) Australia's wood and wood products industry, situation and outlook, Fenner School of Environment and Society, Australian National University, Australia.

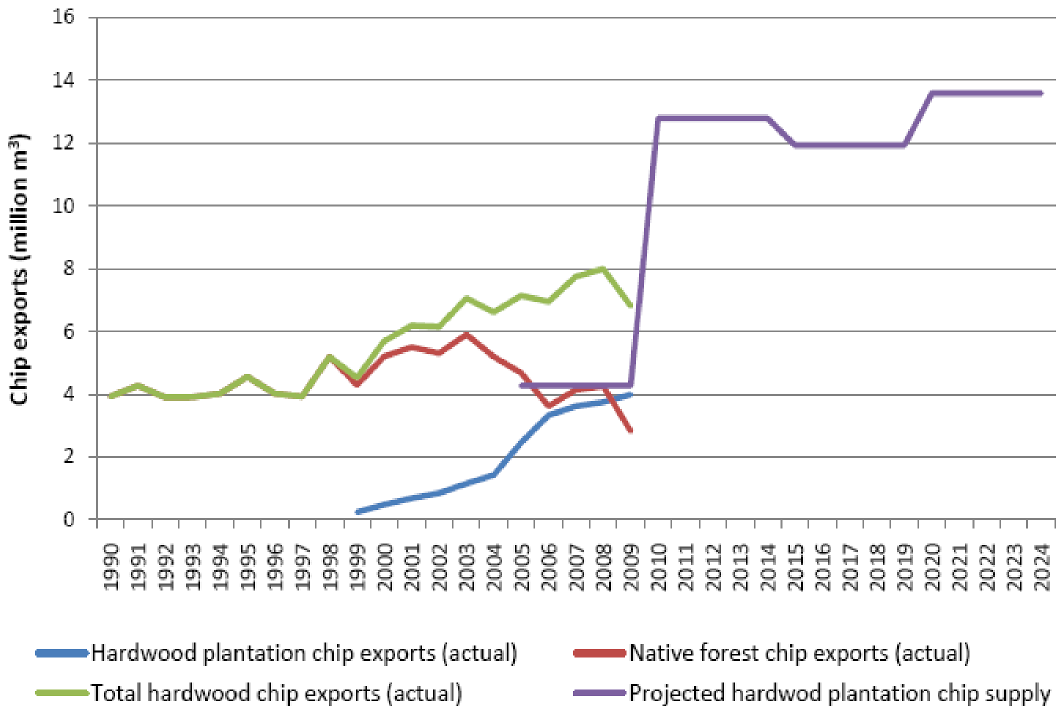

Figure No. 2. Australian hardwood chip exports and projected plantation supply

More importantly, ***in the absence of <u>increasing</u> market demand, annual permitted extracted volumes actually cannot be increased, nor can new concessions be issued.*** Land owners and forest agencies not only would not want to log without this demand, but actually cannot undertake a commercial logging event in the absence of an established customer demand. This is because the approval of a concession requires demonstration of the following:

- the destination of the forest product (export demand); and
- a commercial transaction record between the seller (landowner) and the buyer.

Clearly, these requirements cannot be fulfilled in the absence of increasing demand – which is the case for native forest-sourced wood products in Australia. Therefore, approval of increased commercial logging within established concessions – or the issue of additional concessions beyond the current rate – is not possible.

Annual extracted volumes are a response to current market demand and the available timber within a planned and approved harvesting area. It is neither legally nor biologically possible to increase the permitted harvest rate nor issue new concessions. This is because native forests are already harvested at the maximum sustainable rate in response to a steadily declining demand.

Falling prices remove incentives for logging

Finally, it is evident that leakage will not occur due to the shifting incentives. It is clear that timber harvesting on private land in Tasmania is determined by individual landowners in response to market demand. Private landowners, unlike publicly managed forests, are not subject to binding timber supply agreements. Therefore, annual harvesting rates will only increase if the decreased supply of timber from the establishment of the project leads to an increase in price for woodchips. More recently, there has been a market shift to pursue opportunities for 'biomass' related products from native forests. While no facility exists within Tasmania to support logging for pellets and or power, this remains a potential new market driver for native forest logging within Tasmania.

This is not plausible.

Tasmania's pulp and paper products are competing in international markets, which have been in decline for the past decade. This is firstly because supply is increasingly exceeding demand, and secondly because of a shift in market preferences from native forest-sourced to plantation-sourced wood products. This is reflected in the steadily falling price. Australian National University economist Judith Ajani calculates that the real (inflation-adjusted) price of pulp has trended downwards by an average of 2.4% per year over the past twenty years[8].

The declining value of pulp is only going to be exacerbated as supply continues to outstrip demand. Internationally, the pulp industry is expanding its capacity by more than 25 million tonnes between 2008 and 2012 – roughly five times the world's projected increase in consumption. This growth in supply is concentrated in low-cost competitors such as Indonesia, Brazil, China, Russia and Uruguay[9]. On mainland Australia, pulp is produced only as a byproduct of sawnwood[10]. In Tasmania, the pulp supply is increasing as Eucalyptus plantations across the state mature (refer to Figure No. 2). Output of plantation timber in 2004 was an estimated 2 520 000 (tonnes + m^3), but this is projected to increase to 6 640 000 (tonnes + m^3) by 2019 as these plantations mature, even with no new plantation establishment[11]. 80% of this output is intended to produce low-value woodchips[12]. The timber from the project area is certainly too minimal to impact prices. It is also worth noting that two of the three non-plantation woodchip mills in Tasmania (at Hampshire and Bell Bay) are closing down[13], which means that local demand is further suppressed, exacerbating the oversupply of native forest timber.

The well-documented decline in demand for pulp sourced from native forests, rather than plantations,[14] is driven partially by market preferences and partially by costs. The cost effectiveness of harvesting plantation for pulp far exceeds that for native forests. Harvesting plantation is a largely mechanised operation due to the consistency of tree size and distribution whereas native forests require expensive machinery, manpower and infrastructure. The trend towards plantation-sourced wood is only confirmed by the closure of these woodchip mills. To support this, a 2010 study into trends within the Tasmanian Forest Industry reports that the downturn in the industry has had the greatest impact in the native forest sector, where 41% of jobs have been lost since 2006, compared to 26% of jobs dependent on hardwood plantations and 18% of those dependent on softwood plantations[15].

There is therefore no possibility that reducing timber supply from the project area will lead to harvesting of native forests elsewhere through market leakage. Output is simply too small to affect price, particularly as the supply of plantation wood is increasing rapidly and demand for native forest pulpwood is declining steeply.

The establishment of this project will therefore not lead to an increase in annual extracted volumes or to the issue of new concessions.

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[8] Ajani, J. (11/10/2007) Gunns' double-barrelled dilemma, *The Age*. Available from <http://www.theage.com.au/news/business/gunns-doublebarrelled-dilemma/2007/10/10/1191695991840.html?page=fullpage#contentSwap1> [accessed 22/02/2011]

[9] Lang, C. (2007) Banks, Pulp and People: A Primer on Upcoming International Pulp Projects, Urgewald, Germany. Available from <http://www.greenpressinitiative.org/documents/BPP_A_FIN_2.pdf> [accessed 22/02/2011

[10] Parsons, M.; Pritchard, P. (2009) The role, values and potential of Australia's private native forests, Rural Industries Research and Development Corporation 09/049, Australia.

[11] Green, G. (2004) Plantation Forestry in Tasmania: the current resource, current processing and future opportunities, Timber Workers for Forests. Available from < http://www.twff.com.au/documents/research/pftpt1.pdf> [viewed 22/02/2011]

[12] Harwood, C. (2010) Sawn timber from native forests and plantations in Tasmania, *CRC for Forestry Bulletin* **13** Available from <http://www.crcforestry.com.au/publications/downloads/Bulletin-13-Sawn-timber-properties.pdf> [viewed 22/02/2011]

[13] (25/11/2010) Gunns quarantines Triabunna mill from closure, *ABC News*. Available from <http://www.abc.net.au/news/stories/2010/11/25/3076498.htm?site=northtas> [accessed 22/02/2010]

[14] Nicholson, A. (11/06/2010) Demand for plantation timber continues to grow, *Stateline Tasmania*. Available from <http://www.abc.net.au/news/video/2010/06/11/2925275.htm> [access 22/02/2011]

[15] Schirmer J (2010) 'Tasmanian Forest Industry, Trends in Forest Industry Employment and Turnover, 2006–10.' CRC for Forestry. (CRC for Forestry: Hobart)

Illegal logging is effectively non-existent in Australia, as detailed above.

Summary

The pressure on native forests is intense because landowners believe their future income may be constrained by the shift in demand towards plantation-sourced timber (notably by the proposed Gunns' pulp mill) and because of high-level discussions about constraining logging of native forests. This is inducing landowners to obtain and use concessions to clearfell native forests for conversion to plantations: this explains why the conversion rate from native forest to plantations within Tasmania increased to 7768 ha in 2008–09 from 5657 ha in 2007–08[16]. If private land in Tasmania is not already harvested at the maximum rate, carbon financed IFM projects will not be the reason for any increase. Rather, they provide one of the few mechanisms to protect native forests while generating a competitive return.

Therefore, although this project will permanently reduce harvest levels within the project area for the project lifetime, there is no capacity or incentive for timber harvesting to shift to other forests in Australia. Rather, IFM projects will stop not only logging of native forests within the project area, but also establishes carbon finance as a competitive land use. This will deter landowners from either ongoing selective logging or converting native forests to plantation or pasture to compensate for the declining revenue from logging. In this way, the project arguably has a negative leakage effect, promoting positive biodiversity and carbon outcomes.

There will be no leakage from market effects within national boundaries by removing the timber yield from this property. For these reasons, a leakage factor of zero was considered appropriate.

The market leakage factor of zero will be assessed at each monitoring event. The project proponent will need to provide evidence that annual extracted volumes have not increased above the baseline threshold during the monitoring period. To achieve this, the project proponent must obtain data about the net volume extracted from private native forests in Tasmania (the most probable site for market leakage to occur) during the monitoring period, or as close as possible. This should be contrasted to the average volume extracted from this area during the ten years prior to the project's start date. If the net volume is lower in the project scenario, or if spikes can be justified (for example, by unusual clearfell events by a major forestry company), it can be reasonably assumed that no market leakage has occurred as a result of the project.

Commercially Sensitive Information

The project budget, business model and financial reports associated with the instance are excluded from the PDD. The information is confidential.

Further Information

There are no additional relevant legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and/or temporal information that have a bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

This grouped project will use VM0010 v.1.1: Methodology for Improved Forest Management: Conversion of Logged to Protected Forests. This methodology was developed by GreenCollar

[16] Forest Practices Authority, Annual Report, 2008 – 2009.

Solutions Pty Ltd, validated by Rainforest Alliance and DNV, and approved under the Verified Carbon Standard on 11 February 2011.

The project also uses:

- The VCS Tool for AFOLU Methodological Issues;
- The Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities;
- The VCS Guidance Document: VCS Project Registration and VCU Issuance Process (version 1.1);
- The CDM Tool for the Calculation of the Number of Sample Plots for Measurements within A/R CDM Project Activities (as applied using the Winrock Sampling Calculator); and
- The VCS Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination.

2.2 Applicability of Methodology

The methodologies utilised achieve the project proponents' goal of preventing emissions from logging and enhancing the carbon stock of the native forests by using carbon finance.

The project proponents will use carbon finance to protect native forests from a combination of ongoing selective logging and clearfelling. The selected methodology provides the means to conservatively estimate the carbon emissions generated under the baseline scenario identified for each instance, compared with the project-scenario of Improved Forest Management. In particular, this methodology identifies the relevant carbon stocks, provides the equations to calculate emission reductions and identifies the relevant conditions to demonstrate eligibility and additionality. Therefore, the methodology is compatible with the goals, circumstances and activity of the Grouped Project and each project activity instance. The eligibility criteria in the GreenCollar IFM LtPF methodology are addressed below.

- *Forest management in the baseline scenario must be planned timber harvest.*

For each instance, the baseline will be a continuation of historical timber harvesting in accordance with the requirements of the Tasmanian Forest Practices Code 2000.

- *Under the project scenario forest use is limited to activities that do not result in commercial timber harvest or forest degradation*.

The project scenario prevents commercial timber harvesting and forest degradation for twenty-five years. To ensure that no timber has been harvested, the instances will be monitored annually.

• *Planned timber harvest must be estimated using forest inventory methods that determine allowable off take as volume of timber (m3/ha).*

The projected timber extraction rates for each instance will be determined using fieldwork and software that generate a forest inventory in volume of timber (m3/ha). This is used to determine allowable off take volumes in conjunction with historical harvesting rates obtained from forest practices plans and the stated logging intentions of the project proponent.

• *The boundaries of the forest land must be clearly defined and documented*.

The grouped project boundaries comprise the State of Tasmania as defined under section 1.5. Each project activity instance within the State will be individually defined and documented through the following;

1. KML files specifying the exact boundary of the instance;
2. Property cadastral boundaries showing the extent of the land area under ownership of the project proponent;
3. Aerial imagery showing the plot locations within the boundaries of the project activity instance.

• *Baseline condition cannot include conversion to managed plantations*.

Any native forests which the proponent plans to convert to plantations will not be included in the project.

• *Baseline scenario, project scenario and project case cannot include wetland or peatland.*

Through the stratification process detailed under section 1.16 of the Grouped Project PDD v1.20, any wetlands and or peatlands are excluded from an instance. The grouped project therefore incorporates only standing forest.

2.3 Project Boundary

The only greenhouse gases being considered are carbon dioxide and methane (to determine likely emissions in case of fire). This satisfies the recommendations of the VCS Tool for AFOLU Methodological Issues. The carbon pools considered in the calculations include changes in carbon stocks found in aboveground biomass, dead wood and harvested wood products. Aboveground biomass and harvested wood products are both carbon sinks, the former storing carbon in the project scenario and the latter in the baseline scenario. Harvested wood products must be included because deforestation does not necessarily lead to net atmospheric emissions if long-lived products retain carbon. It is important to note that the historical and future planned harvesting within the project area is predominantly for pulpwood (80-100%) and therefore has a high rate of atmospheric emission.

Carbon pools in belowground biomass, litter and soil have not been included. These sinks are typically less than the *de minimis* (5% of total increase in carbon stock) on mineral upland soils; and in any case, their exclusion is conservative. For example, the exclusion of carbon stored in organic matter in the soil satisfies the A/R CDM Methodology “Procedure to determine when accounting of the soil organic carbon pool may be conservatively neglected in CDM A/R project activities”10: the project area does not include organic soils, erosion is reduced by retaining the forest and fine litter remains on-site. The exclusion of vehicular emissions from logging is similarly conservative; while nitrous oxide does not need to be considered as no nitrogen fertilisers are used nor nitrogen-fixing species planted.

Table No. 4. Carbon Sinks

Source		Gas	Included?	Justification/Explanation
Baseline	Carbon stocks in extracted timber	CO_2	Yes	See section 2.3 above. The carbon in merchantable timber is calculated per hectare for each strata. The logging projects which were planned over the project lifetime are then used to calculate the carbon extracted for each strata during a logging event. Regrowth is accounted for after a logging event and acts as a carbon sink.
		CH_4	No	
		N_2O	No	
		Other	No	
	Emissions from wood product retirement	CO_2	YES	After a logging event has taken place the carbon in the biomass is stored in wood products. The proportions of sawlog and pulpwood created by each harvesting event are calculated. The lifetime of the products are then used to calculate the length of time carbon is stored in these products.
		CH_4	NO	
		N_2O	NO	
		Other	NO	
	Decomposition of dead wood from harvested trees	CO_2	YES	The creation of deadwood from each logging event is calculated in Equation 5. The volume of dead wood is then used to calculation the change in carbon stock of dead wood resulting from timber harvest per hectare.
		CH_4	NO	
		N_2O	NO	
		Other	NO	
Project	Fire Disturbance	CO_2	YES	CO_2 equivalent is used for fire disturbance which considers both CO_2 and CH_4
		CH_4	YES	Methane is included as a CO_2 equivalent in the fire disturbance calculations (Equation 17 of the project calculations)
		N_2O	NO	
		Other	NO	

2.4 Baseline Scenario

Consistent with the requirements of the methodology, each instance requires the establishment of a realistic and credible baseline scenario. This is the business-as-usual land-use that would have occurred in the baseline of the IFM project activity. It must therefore reflect relevant national and sectoral policies or circumstances, and historical practice for the project activity instance and/or proponent, as documented by past Forest Practices Plans.

The process for establishing the baseline scenario is detailed in the Forests Alive's standard operating procedures for IFM calculations, available for review by the validator.

The baseline scenario is supported by the application of land-use records, field surveys, data and feedback from stakeholders and information from other sources as appropriate. In particular, the baseline scenario will be tested using the current VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities (see Section 2.5). This tool was developed and is issued by the VCSA, and approved on 21 May 2010.

The logging projections are developed from a mixture of known logging history patterns and landowner interviews.

For Addition 10, the FPPs were summarised and combined with comprehensive landowner interviews to determine an accurate logging history and projections. The landowner identified areas on a map of the project area which coincided with different harvesting events and the areas where he planned to undertake a harvest event in the future. These areas were checked against the current state of the forest as observed during field work and from satellite imagery. The areas were cross checked with dates to check the feasibility of an event happening at a certain year (for example a thick, mature forest obviously was not logged after 2000) and so forth.

In each addition, the historical information from forest practices plans and or weighbridge records were used to determine the ratio of "sawn timber: pulp". This was supported by discussions with the landowner and reflects the predominant end market for the species on each land area. Harvesting from the Addition 10 project area was almost entirely for woodchip to create paper products.

In addition, the project area contains significant road networks and established log landing and loading areas as a result of past harvesting operations. As a result, the ongoing logging of the planned, ongoing logging of the forest will not require significant, new infrastructure or a deviation from standard harvesting techniques. All harvesting infrastructure and operations are Governed by the Forest Practices Authority of Tasmania. There are no areas of land within Addition 10 that contain soils prohibiting harvesting operations or requiring infrastructure such as cable logging equipment (which is permitted for logging on steep slopes within Tasmania).

There have been no regulation changes relating to logging on private land in Tasmania since 2010. This reflects the status quo that is outlined within section 2.5 of the Grouped Project PDD. Conversion is restricted to 40 ha of land per year until 2015 (and cannot form the IFM baseline). The main market for private native forests is woodchips and will continue to be woodchips for the forseeable future. Note the reopening of a woodchip mill in Tasmania on the 11th of June 2013 with the intention to *process 1 million tonnes per annum* (http://www.abc.net.au/news/2013-06-10/gunns-woodchip-mill-open-again/4743944). The baseline scenario as outlined within the Grouped Project PDD and each project addition has not changed, ie. There have been no regulatory changes since 2010 impacting upon the ability of private landowners to undertake native forest logging in accordance with the baseline scenario. The markets for sawn wood from private land are virtually non-existent. Sawn wood is almost exclusively sourced from the ~1.1 million hectares of public, commercial forest Estate within Tasmania where it is sourced at a much reduced cost than that obtainable from private land.

This pattern of high proportions of pulp: sawlog 95:5 is reflective of harvesting within Tasmanian native forests and is the baseline projection for each addition.

2.4.1 Fire

As outlined within section 1.1 of the Grouped Project PDD, fires within Tasmania are closely monitored and subject to rapid response. The landowner for addition 9 communicates closely with the local fire brigade and forest management companies during the 3-month fire season each year.

Eucalyptus forests are typically fire prone. However, the Central and Southern Highlands are only susceptible to fire for a few months of the year due to consistently low temperatures and high rainfall in the areas. Owing to the nature of the forest on the property and prior harvesting events, the forest is generally a grassy, open understory. These characteristics suggest that a wildfire event of sufficient ferocity to destroy a substantial area of the forest is unlikely within the project period.

Given the history of commercial logging, the properties contain significant roads, making public access restricted and controllable; thus the land parcel is at little risk from intentional fires.

Furthermore, the proponent has a strategy for fire abatement. This strategy includes the maintenance of all existing roads and tracks within the road network throughout the forest. The extensive road network across the property means that the majority of forest falls within 200m of road access. Bulldozers are used to maintain existing firebreaks. The landowner has a program of controlled fuel reduction burning outside of summer. This involves adopting a patch burning approach where areas of ground cover less than 4 hectares in size are burnt.

The proponent has fire fighting equipment and knowledge to fight fires and has access to fire fighting equipment. The project proponent is also a member of the local fire brigade. Furthermore, much of the addition 9 lands adjoins State-owned land managed by Commercial timber companies. Given the proximity to land that is owned by commercial timber companies, there is a history of rapid response to fire events on adjoining land.

Consistent with the calculations (equation 17) the areas recorded as having been subject to a fire event within the Addition 9 strata are shown below. This information was provided by the project proponent and included research on the Tasmanian Fire Service (TFS) website.[17]

Table No. 05. FPP records issued for Addition 10 prior to the start of the IFM project.

Date	*Event*	*Extracted volume t*	*Pulp: Sawlog*	*Forest Practices Plan Reference*
2001	Thin	7100	98:2	TAM 330
2001	Thin	3000	98:2	RMS0044
2000	Thin	3100	98:2	DT103e
2001	Thin	4000	100:0	TAM0058
2002	Thin	1500	100:0	TAM201
2004	Thin	2000	100:0	TAM0457

[17] Tasmanian Fire Service, http://www.fire.tas.gov.au/ <accessed 18/4/2013>

Table No. 06. Logging history of the tenth instance before the implementation of the Forests Alive's IFM grouped project in 2010.

Strata	Strata Area (ha)	Date	Event	% biomass extracted	Area to be logged (ha)	Percentage Area	% Biomass of Area Removed
Stratum 1	505.25	1982	Thin	0.7	217.71	43.09	30.16
Stratum 1	505.25	1984	Thin	0.7	7.16	1.42	0.99
Stratum 1	505.25	1986	Thin	0.7	30.88	6.11	4.28
Stratum 1	505.25	1988	Thin	0.6	188.27	37.26	22.36
Stratum 1	505.25	2000	Thin	0.6	34.38	6.80	4.08
Stratum 1	505.25	2001	Thin	0.6	113.49	22.46	13.48
Stratum 1	505.25	2002	Thin	0.6	83.95	16.62	9.97
Stratum 2	273.66	1988	Thin	0.6	59.92	21.90	13.14
Stratum 2	273.66	1990	Thin	0.7	102.17	37.33	26.13
Stratum 2	273.66	1992	Thin	0.7	86.83	31.73	22.21
Stratum 2	273.66	2004	Thin	0.6	61.37	22.43	13.46
Stratum 3	71.65	1990	Thin	0.6	10.33	14.42	8.65
Stratum 3	71.65	2000	Thin	0.6	3.18	4.44	2.66

Table No. 07. The logging projections for Addition 10 – Marlborough Estaate. These projections are based on historical land uses and planned rates of harvest, and form the business-as-usual baseline scenario.

Strata	Standing merchantable volume (m3/ha) at the project start date	Year of harvest	Years in a post-harvest state	Harvesting Regime	Operating Area (ha)	Mean extracted volume per unit area (m^3/ha)
Stratum 1	111.1	*2013*	12	Selective harvest	266	77
		2015	13	Selective harvest	43	81
		2020	18	Selective harvest	118	75
Stratum 2	194.9	2015	15	Selective harvest	68	140
		2020	18-20	Selective harvest	2	126
		2028	24	Selective harvest	155	136
Stratum 3	92.1	2015	15	Selective harvest	34	65

2.5 Additionality

The following analysis is completed using the VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities. This tool was developed and is issued by the VCSA, and approved on 21 May 2010. The conclusions are valid for all instances included in the Grouped Project.

STEP 1: Identification of alternative land use scenarios to the AFOLU project activity

1a: Define alternatives to the project activity:

The project activity maintains the native forest within the defined instances, using carbon finance to generate revenue from Improved Forest Management.

There are 7 alternative land use scenarios to the AFOLU grouped project activity. Options 3-6 require various forms of logging and transport machinery, as described in the *Forest Practices Code 2000*. The project proponent will develop the baseline scenario for any specific project activity instance, with support from the implementing partner, in accordance with the most recent version of the Forests Alive's standard operating procedures for conducting IFM calculations.

1. Native forest remains standing without registering as an AFOLU activity:
   This scenario fulfils one of the alternative land uses identified in the VCS Tool for Demonstration and Assessment of Additionality: i.e. the project proponent undertakes the project activity of Improved Forest Management without carbon finance. This is not a financially viable option as it prohibits the landowner from earning any income from the native forests on their land. It is not a realistic baseline scenario.

2. Covenant all of the forested land:
   The landowner places the entire forest estate within a Conservation Covenant that is binding on the land title. In the past, this would generate some income, typically in the form of a lump sum payment. Today, registration of a land parcel as a Conservation Covenant is entirely voluntary and is associated with no financial incentives. Like an IFM LtPF project, this helps to maintain and enhance ecosystem services. However, many landowners have already pursued this option, which has been available since the *Nature Conservation Act 2002*. Landowners currently are only participating in covenant programs on a voluntary basis and the rate of landowners signing convent agreements is declining. The carbon market provides an opportunity for diversification. Moreover, even when associated with financial incentives, Conservation Covenants were not competitive with the return even for low-value wood products. As a voluntary program, they certainly do not provide a viable means for protecting the carbon stocks in native, privately owned forests on a significant scale.

3. Selective logging:
   The landowner adopts a policy of sustainable selective logging on the property. This is the second alternative land use identified in the VCS Tool for Demonstration and Assessment of Additionality: the continuation of the pre-project activity. This is a credible baseline scenario, which satisfies both historical practice and common practice.

4. Clearance and native regeneration:
   The landowner adopts a policy of clearfell and native regeneration. This baseline scenario would generate a high number of carbon credits, due to the very high emissions from clearfell in the first few years of the project activity and the slow regeneration of native species in later years. This is a credible baseline scenario, which satisfies both historical practice and common practice. However, it is likely to be implemented on a much smaller scale than selective logging as the long-term returns are lower, because this practice does not maximise forest regrowth rates.

5. Clearance and conversion to plantation:
   The landowner adopts a policy of clearing the established forest for timber and establishing an *E. nitens* plantation in its stead. This is a credible baseline scenario on up to 40ha per property per year, satisfying both historical practice and common practice. However, where this is the baseline scenario, the relevant area will be excluded from the project because it does not conform to the eligibility criteria in the GreenCollar IFM LtPF methodology.

6. Clearance and conversion to pasture:
   The landowner clearfells the established forest and uses the land for grazing sheep and cattle, preventing regeneration of the forest. This is a credible baseline scenario on up to 40ha per property per year, satisfying both historical practice and common practice. It is particularly plausible for landowners who are increasing their animal stocks or trying to avoid exhausting the land by reducing stock density.

7. Logging of native forests is banned in Tasmania:
   It is possible that the Forest Practices Authority will, in the future, impose further restrictions on the logging of native forests in Tasmania. If logging of native forests is banned, the baseline scenario would resemble the project scenario: the absence of logging would permit the recovery of native forests, and the carbon stocks would be

protected and enhanced. In this scenario, the carbon stocks would be protected and enhanced. However, this is an unlikely scenario. If such policy changes were introduced, the only possible revenue from native forests would be some form of environmental compensation to landowners. Such action would also negate any landowner income derived from the sale of carbon credits (i.e. the project scenario). It is therefore unlikely that government will constrain native timber harvesting due to the loss of income for landowners, and subsequent economic and political costs of compensation. It is also worth noting that, even in discussions with environmental groups, there has been no suggestion that timber harvesting on private lands be abolished. For example, with recent discussions about the future logging of publicly owned 'State Forest' which is currently managed by the Government Business Enterprise, Forestry Tasmania, specific reference is made to private land within the principles:

"Encourage and support but not mandate to seek assistance for certification and protect, maintain and enhance high conservation value forests on their properties[18]."

This reflects both the socio-economic acceptance of logging on private lands and the political reluctance to impose any form of regulation on private forest logging. Instead, it is more likely that the need for Forest Stewardship Council or similar certifications will be imposed on native forest wood products, compared to plantation-sourced timber. Such regulations will still permit logging events and the accompanying greenhouse gas emissions.

1b: Consistency with mandatory laws and regulations:

Native forest remains standing:
This scenario is in compliance with all the applicable legal and regulatory requirements

Covenant all forested land:
This scenario is in compliance with all the applicable legal and regulatory requirements

Selective logging:
This scenario is in compliance with all the applicable legal and regulatory requirements.

Clearance and native regeneration:
This scenario is in compliance with all the applicable legal and regulatory requirements.

Clearance and conversion to plantation:
This scenario is currently in compliance with all the applicable legal and regulatory requirements. However, it cannot be implemented at a rate greater than 40ha per property per year and will be banned altogether after 2015, based on the 2009 policy amendments for the issuance of Forest Practices Plan. This reflects the goal of the "Tasmanian Government Policy for Maintaining a Permanent Native Forest Estate" (December 2009)[19] to end 'broad scale clearing' by 2015.

It is worth noting that the FPA's Annual Report (2008-2009) reported that "the rate of conversion to plantation increased from 2007-2008 levels despite cessation of conversion on State forest and by some large forestry companies complying with the voluntary Australian Forestry Standard. The FPA notes that conversion continued to be carried out at a high level on private land". This demonstrates the clearance and

[18] *Tasmanian Forest Statement of Principles to Lead to an Agreement* http://www.premier.tas.gov.au/__data/assets/pdf_file/0009/134991/draft_principles.pdf {accessed 23/11/2010)
[19] *Tasmanian Government Policy for Maintaining Permanent Native Forest Estate, November, 2009<http://www.dier.tas.gov.au/forests/permanent_native_forest_estate_policy{accessed 14/1/2011}*

conversion over the next five years is a very viable baseline scenario for most Tasmanian native forests, at least until 2015.

Clearance and conversion to pasture:
This scenario is currently in compliance with all the applicable legal and regulatory requirements. However, it cannot be implemented at a rate greater than 40ha per property per year and will be banned altogether after 2015, based on the 2009 policy amendments for the issuance of Forest Practices Plan. This reflects the goal of the "Tasmanian Government Policy for Maintaining a Permanent Native Forest Estate" (December 2009)[20] to end 'broad scale clearing' by 2015.

Logging of native forests is banned in Tasmania:
As outlined above, Option 7 describes a possible change to regulation. However, because it imposes constraints on private landowners' capacity to generate income, it does not offer a plausible baseline scenario. It is more likely that policymakers will require FSC or similar certification, allowing landowners to continue generating revenue from timber harvest.

STEP 2: Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land use scenarios.

2a: Determine appropriate analysis method

Given that all instances within the Grouped Project are within the IFM VCS category, the project proponent will generate no financial or economic benefits other than income attained through the carbon market. For this reason and consistent with the VCS tool for additionality, each instance will require an assessment against the simple cost analysis (Sub step 2b, option 1). This must be completed in the project file, but does not need to be repeated at monitoring events.

2b: Option I. Apply simple cost analysis

Each project activity instance generates income from the sale of carbon credits.

The most significant cost for project proponents in developing the VCS IFM project is engaging Forests Alive Pty Ltd to undertake stratification, fieldwork, calculations and prepare the Project Design Documents in accordance with the Verified Carbon Standard. The costs associated with project implementation for each instance will be available for review by the validator.

In each instance, project proponents forfeit potential income from the sale of woodchips and sawlog timber. The market for woodchips has been declining by an average of 2.4% per year over the past twenty years[21], though the price of good-quality sawlog remains high (>$30). The sheer volume of wood products per hectare mean that timber harvesting remains viable – particularly if it is the only means to generate revenue from native forests.

If the proponents were to continue the project activity without carbon finance (i.e. let the forest stand without registration as a VCS project) or register it as a conservation covenant, they would not generate any income from the land. While these are not attractive options, they are a viable alternative scenarios and cheaper than the CDM/VCS project activity. Therefore, the project activity satisfies the investment analysis for additionality.

The simple cost analysis for addition 10 is summarised in the following table format.

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[20] *Tasmanian Government Policy for Maintaining Permanent Native Forest Estate, November, 2009<http://www.dier.tas.gov.au/forests/permanent_native_forest_estate_policy{accessed 14/1/2011}*

[21] Ajani, J. (11/10/2007) Gunns' double-barrelled dilemma, *The Age*. Available from <http://www.theage.com.au/news/business/gunns-doublebarrelled-dilemma/2007/10/10/1191695991840.html?page=fullpage#contentSwap1> [accessed 22/02/2011]

Table No. 08. Cost analysis summary. The current market price was correct on publication, 8th March, 2013. These values are taken from the thirty year financial plan provided to the validator.

Forestry product:	Average yield per annum:	Current market price ($):	Annual Value to the project proponent ($) (revenue less costs):
Pulp and sawlog	1,206tonnes of pulp 25 tonnes of sawlog	$5/tonne of pulp $50/tonne of sawlog	~$2,834
Carbon	4,686 (VCUs)	$9/VCU	~$31,509
Project scenario without carbon-financing	0	0	0

For comparison the NPV for a logging only scenario is $83,771 and the NPV for a carbon project scenario is $1,241,464.

2.6 Methodology Deviations

Equations 13-15 are subject to a deviation as described and justified below;

The same data and model parameters entered into FullCAM for Equation 9 were used to calculate the carbon stock in aboveground trees (tC/ha), the required output of Equation 15. Its inputs are based on local taxonomix-, geographic- and climatic-specific information, and allometric relationships identified in the Technical Reports prepared for the National Carbon Accounting System[22]. FullCAM is part of the Australian National Carbon Accounting System (N-CAT) and international best practice in modelling carbon flows. However, the program does:

"*tend to be highly conservative and radically underestimates forest carbon generated from mixed native species (Brendan and Mackey, 2008).*"[23]

Moreover, for each stratum, FullCAM's output was calibrated according to fieldwork estimates of aboveground trees (m^3/ha) in 2011, and consistent between the baseline and project scenarios until the first harvest. Because FullCAM was available as a best practice option, Forests Alive is submitting a deviation from the less precise, accurate and conservative requirements of the GreenCollar IFM methodology. Equations 13-15 were therefore not required, and FullCAM used to calculate the product of Equation 15 (tC/ha). See Section 4.3 of the Grouped Project PDD for a more detailed explanation of this deviation.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

The procedure for quantification of the baseline emissions and/or removals, including all relevant equations, are described below.

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[22] Raison, J. (2001) Carbon Accounting and Emissions Trading Related to Bioenergy, Wood Products and Carbon Sequestration: Development of a 'Toolbox' for Carbon Accounting in Forests, *IEA Bioenergy Task 38: Workshop in Canberra/Australia*, CSIRO, Forestry and Forest Products. Available from <http://www.ieabioenergy-task38.org/workshops/canberra01/cansession1.pdf> [viewed 07/03/2011]

[23] as cited by Kapambwe, M.; Keenan, R.; (2009) Biodiversity Outcomes from Carbon Biosequestration, The University of Melbourne, commissioned by The Department of Sustainability and Environment, pp 23. Available from <http://www.dse.vic.gov.au/CA256F310024B628/0/761E59489BC57A9ACA2576810079C4D4/$File/Biosequestration+and+Biodiversity.pdf> [viewed 04/03/2011]

Calculating the carbon stock harvested and extracted

The aboveground biomass was calculated using species-specific allometrics and wood densities where possible; the allometrics for equivalent species or the general forest-type for the remaining trees; and an IPCC-recommended carbon fraction and Biomass Conversion and Expansion Factor. These tools are appropriate as the forest inventory data allows accurate volume estimates, to which expansion factors can be readily applied. The BCEF method is applied to the project area to determine the initial carbon stock, and therefore the stock removed in timber and dead wood under the baseline scenario.

The volume of merchantable timber per tree was derived from the DBH measured for each individual tree, combined with the height estimated from an instance-specific height curve, using the Farm Forestry Toolbox v5.0. This program was developed by Private Forests Tasmania, a statutory authority funded by the Tasmanian government and private forest owners. The allometrics in the Toolbox were developed from an extensive collection of field data by Forestry Tasmania, the government department responsible for measuring State Forests. They were therefore developed from Tasmanian tree species growing locally, i.e. in climatic and geographic conditions typical of the species and state. Unfortunately, the measurements used for the FFT were conducted in the 1970s and 1980s, and there are no records or published papers from that time (confirmed by Bric Milligan, Forestry Tasmania). Therefore, it was not possible to find out the specific boundary conditions or error margins used in developing the allometrics. However, the fact that the FFT comprises allometrics derived from species-specific data in Tasmania and remains the primary tool (within a commercial application) for calculating merchantable timber volume is reflective of its accuracy.

The Farm Forestry Toolbox included allometrics for the main species harvested in Tasmania. In the Forests Alive's project area, this will probably include *Eucalyptus obliqua, E. delegatensis*, *E. pauciflora*, *E. dalrympleana E. viminalis*, *E. amygdalina*, *E. regnans*, *Nothogagus cunninghamii*, *Acacia dealbata* and *A. melanoxylon*. There were no specific allometrics for *E. ovata*, *E. pulchella*, *E. gunnii*, *E. coccifera*, *E. tenuiramis* or *E. rubida*. However, a Tasmanian botanist identified species with a similar stature and growth form[24], and their allometrics were accordingly used to calculate the merchantable volume of the equivalent species in the project area. Specifically, *E. gunnii* is comparable to *E. pauciflora*; *E. rubida* is comparable to *E. dalrympleana*, and *E. pulchella*, *E. ovata*, *E. coccifera*, *E. rodwayi* and *E. tenuiramis* are all similar to *E. amygdalina*.

Neither the species-specific allometrics nor a suitable equivalent was available for a range of other forest species (specifically those of neither the Eucalyptus nor Acacia genera) found in the project site. For these species, a general allometric for Australian native sclerophyll forest was utilised. This allometric was derived from 135 trees, and had an R^2 value of 0.963[25].

This general equation, from Keith *et al.* (2000), was also used to test the FFT results. The DBH and height of 10 larger trees of each species was measured, and the merchantable volume of timber calculated using the Farm Forestry Toolbox and Keith *et al.*'s allometric equations. Since the Keith *et al.* allometric calculates the aboveground biomass in kilograms, this figure was converted into the merchantable timber volume (m^3) by dividing it by the BCEF (1.17) and the wood density (t/m^3). The wood density figures are extracted from the manual for the Farm Forestry Toolbox. Each project activity instance must include graphs for the merchantable species present on site, demonstrating the outputs of the FFT and those obtained through applying the allometric equations from Keith *et al*.

The species *E. amygdalina*, *E. dalrympleana*, *E. delegatensis* and *E. pauciflora* showed deviations from the Keith *et al.* output. Through comparison of tree heights attained from other properties in close proximity, these deviations appear random and are perhaps explained by local anomalies in the relationship between DBH and height.

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[24] N. Fitzgerald, *pers. comm.*, 2010

[25] Keith, H; Barrett, D; Keenan, R (2000) Review of allometric relationships for estimating woody biomass for New South Wales, the Australian Capital Territory, Victoria, Tasmania and South Australia, National Carbon Accounting System: Technical Report No. 5B, Australian Greenhouse Office, Canberra, 70

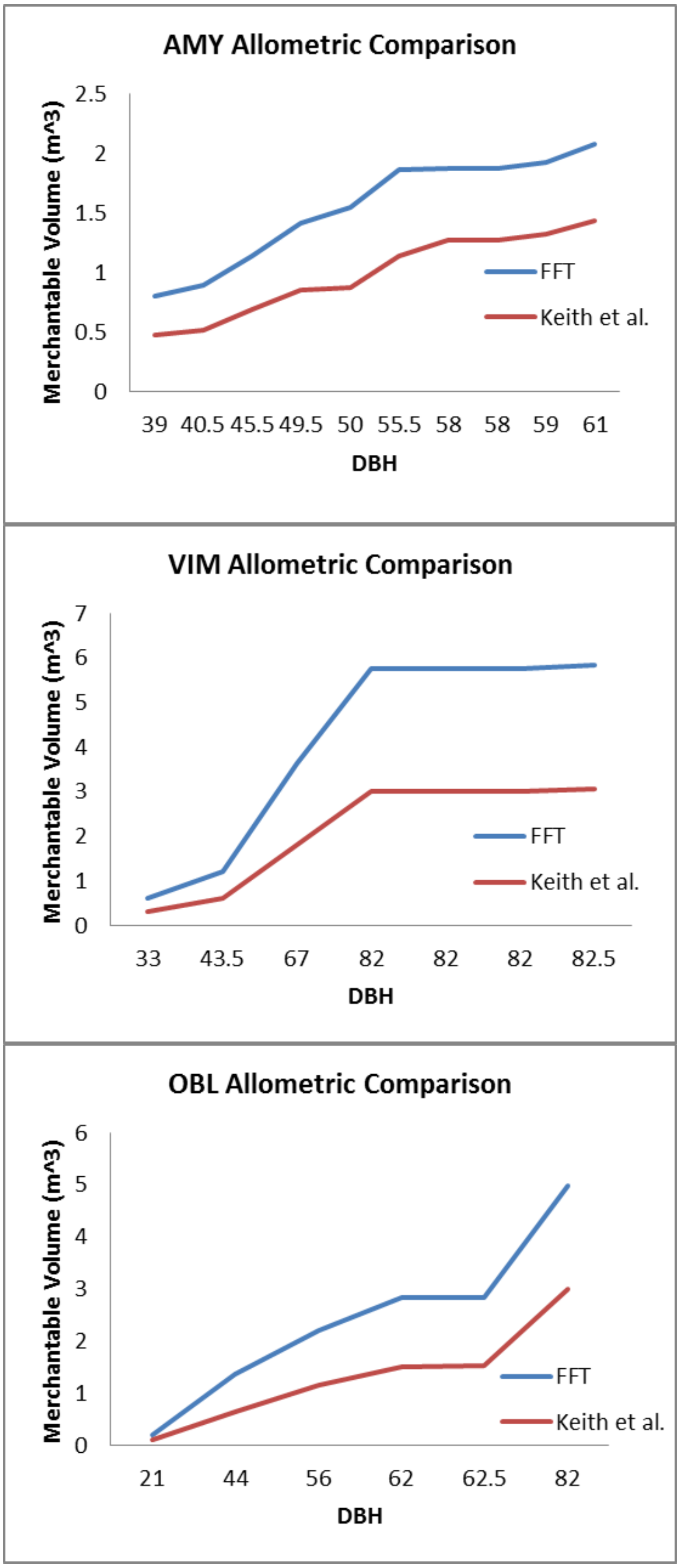
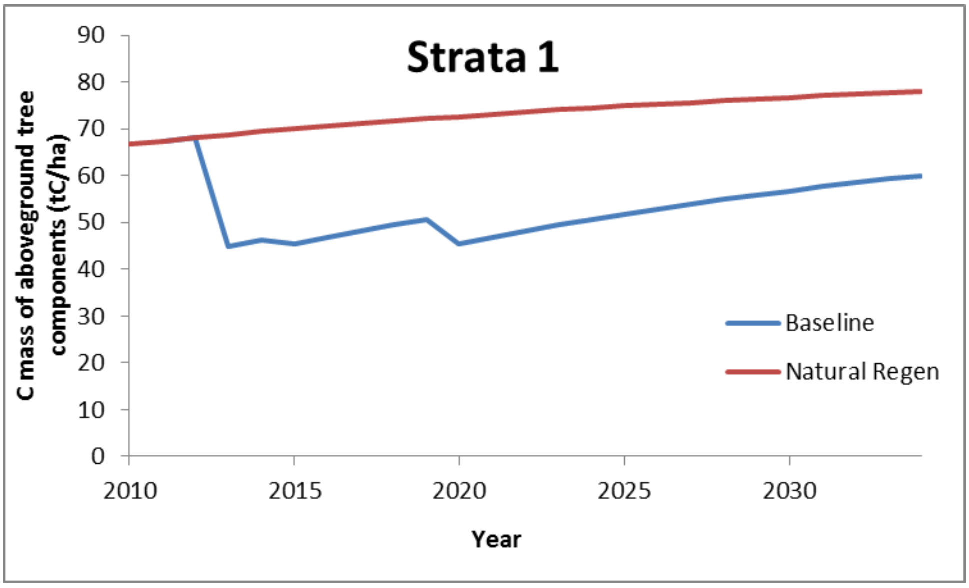
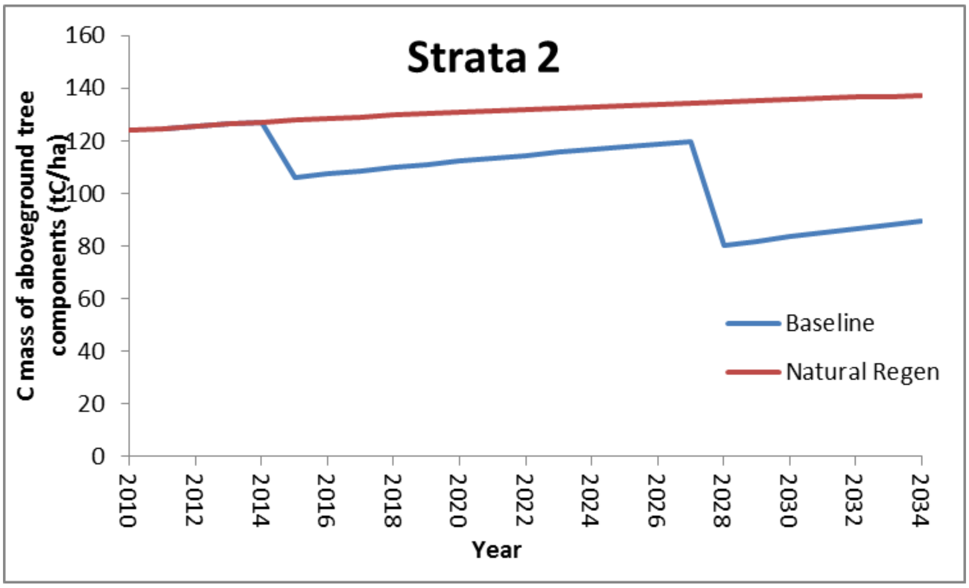


Figure No. 03. The difference between estimates of the merchantable volume using the species-specific allometrics in the Farm Forestry Toolbox (blue line), and the native sclerophyll forest allometric equation developed by Keith et al. (2000) (red line). This was based on ten trees within the Addition instance for *E. amygdalina*, *E. obliqua,* and *E. viminalis.*

Carbon sequestration in the baseline scenario (after planned timber harvest) and project scenario is modelled for each stratum, using FullCAM. The average carbon stock for each strata is shown in the graphs below.





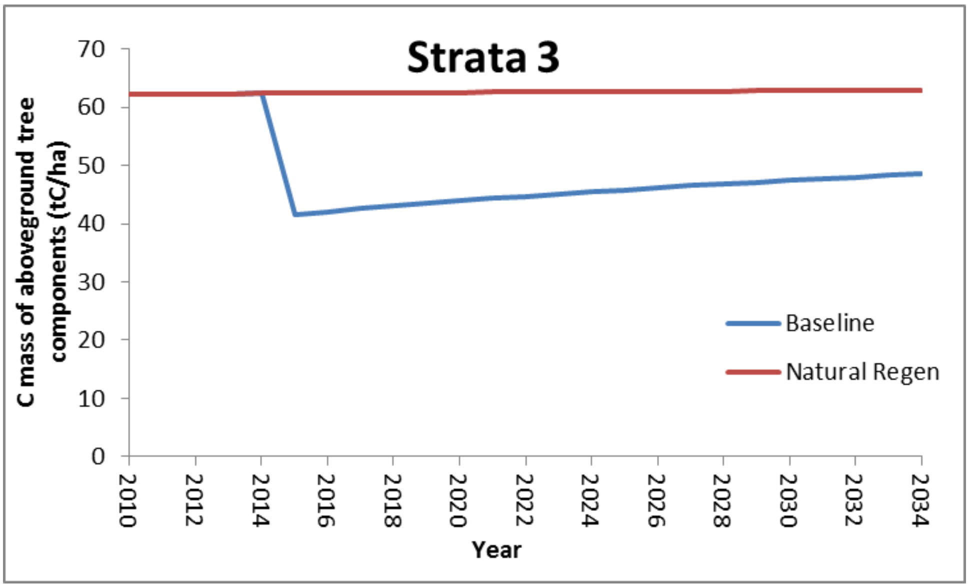


Figure No. 04. Net carbon stored in aboveground trees (tC/ha) in the baseline and project scenarios for the Addition 10 instance. Stratum-specific net sequestration and emissions have been modelled with FullCAM, and graphed as above (Appendix 1).

The Farm Forestry Toolbox was used to determine the merchantable volume of timber for individual trees measured in the sample plots. This formed the basis for calculating the total merchantable volume per species per sample plot (Equation 1). The results of Equation 1 are extrapolated to hectare level and average in Equation 2. This information provided the means to develop logging projections, specifically the volume extracted in m^3/ha at each harvesting event.

Equation 1.

$$V_{j,i,sp} = \sum_{l=1}^{L} V_{l,j,i,sp} \qquad (1)$$

Where:

$V_{j,i,sp}$	merchantable volume for species *j* in stratum *i* in sample plot *sp*, m^3;
$V_{l,j,i,sp}$	merchantable volume for tree *l* of species *j* in stratum *i* in sample plot *sp*; m^3 [8]
l	1, 2, 3 …*L* sequence of individual trees in sample plot;
i	1, 2, 3 …*M* strata;
sp	1, 2, 3 …*SP* sample plots; and
j	1, 2, 3 …*J* tree species.

Equation 2.

$$V_{j,i|BSL} = \frac{1}{SP} * \sum_{sp=1}^{SP} \frac{V_{j,i,sp}}{A_{sp}} \tag{2}$$

Where:

$V_{j,i\|BSL}$	mean merchantable volume per unit area of species j in stratum i in the baseline scenario, $m^3 \cdot ha^{-1}$;
$V_{j,i,sp}$	merchantable volume for species j in stratum i in sample plot sp; m^3;
A_{sp}	area of sample plot sp, ha; [9]
i	1, 2, 3 … M strata;
sp	1, 2, 3 …SP sample plots; and
j	1, 2, 3 …J tree species.

This parameter (projected volume extracted) will be confirmed against measurements of merchantable volume of timber (based on fieldwork samples and assessments with the Farm Forestry Toolbox) and modelling of regeneration rates with FullCAM.

The results of Equation 2 will be used to develop the timber harvest plan.

The necessary harvest and transport machinery are described in the Forest Practices Code 2000[26]. Typically, the instances will be on soils with moderate erodibility[27]. Therefore, while some gentler slopes could be harvested using conventional machines classed as C1-C3, the steeper slopes of the property could require the development of high lead and skyline cable systems. This is the preferred harvesting technique under these conditions as it generally results in less soil disturbance and impact than ground based snigging in similar conditions. The timber would be transported on logging trucks along established logging tracks in the property to the main roads adjacent to the property, and from there to one of the woodchip mills at Triabunna on the east coast of Tasmania. No additional transport or processing systems needs to be designed: timber harvesting has historically been practised on most instances, and therefore suitable infrastructure is in place.

The timber harvest plan for each project activity instance will identify whether any harvesting practices that deviate from this norm will be required, for example due to soils with high erodability or if further infrastructure needs to be constructed. The projected ratio of pulp to sawnwood timber products will also be identified for each individual harvest on all instances.

All non-harvest forested areas within the project area (conservation covenants, streamside buffers, swamp areas, etc) will be excluded using GIS programs prior to stratification to determine the area available for logging within each strata. The exclusion of areas that cannot be harvested is undertaken in accordance with the most recent version of Forests Alive's standard operating procedures for stratification. The areas excluded are a reflection of the requirements stated within the Tasmanian Forest Practices Code 2000[28].

Species that are historically harvested across private forests in Tasmania include *E. amygdalina*, *E. coccifera*, *E. dalrympleana*, *E. delegatensis*, *E. gunnii*, *E. obliqua*, *E. ovata*, *E. pauciflora*, *E. pulchella*, *E. rodwayi*, *E. rubida*, *E. tenuiramis* and *E. viminalis*. There is no

[26] Forest Practices Board (2000). Forest Practices Code, Forest Practices Board, Hobart, 46 http://www.fpa.tas.gov.au/fileadmin/user_upload/PDFs/Admin/FPC2000_Complete.pdf [viewed 24/08/2010]

[27] Laffan, MD; McIntosh, PD (2005) Forest soils formed in Jurassic dolerite in Tasmania: a summary of their properties, distribution and management requirements, Division of Forest Research and Development, Technical Report 25/2005, Forestry Tasmania. http://www.fpa.tas.gov.au/fileadmin/user_upload/PDFs/Geo_Soil_Water/DoleriteSoilsOverview.pdf [viewed 24/08/2010]

[28] Tasmanian Forest Practices Authority (2000) Forest Practices Code. Available from <http://www.fpa.tas.gov.au/index.php?id=81> [accessed 18/04/2011]

minimum or maximum diameter at breast height, top of tree or stump to limit harvests for individual trees: during a clearfell event, all trees will be harvested. During selective logging, some trees will be left standing to support natural regeneration and allow landowners to achieve the maximum sustainable yield. When describing selective logging practices, landowners participating in Forests Alive's IFM projects have indicated that a proportion of trees will be left standing to facilitate natural regeneration and for future harvesting, and that these are typically smaller trees (<30cm DBH). The retention of trees <30cm DBH following selective harvesting is consistent with the guidance within the Tasmanian Forest Practices Code for forest 'thinning operations', but does not reflect legal constraints on extraction rates.

The final timber harvest plan will correlate to the business-as-usual logging projections and be detailed for each individual instance in the following format:

The mean extracted volume per unit area (m^3/ha) will detailed in the final column for each harvest on each stratum. This total will be recorded at an individual species level in the calculations for each instance.

Using this timber harvest plan, the carbon stock of harvested aboveground trees will be calculated using Equation 3.

Equation 3.

$$C_{HB,j,i|BSL} = V_{EX,j,i|BSL} * BCEF_R * CF_j \qquad (3)$$

Where:

$C_{HB,j,i|BSL}$	mean carbon stock of harvested biomass per unit area for species j in stratum i, tC·ha^{-1};
$V_{EX,j,i|BSL}$	mean volume of extracted timber per unit area for species j in stratum i, m^3·ha^{-1};
$BCEF_R$	biomass conversion and expansion factor applicable to wood removals in the project area, dimensionless; [12]
CF_j	carbon fraction of biomass for species j, tC t d.m.$^{-1}$; [13]
i	1, 2, 3 …M strata; and
j	1, 2, 3 …J tree species.

The parameters include the results of Equation 2, combined with the carbon fraction value prescribed in the methodology (0.5) and a Biomass Conversion and Expansion Factor of 1.17. Forests Alive's approached carbon scientists from Australian National University, the University of New England, CSIRO, the NSW Department of Primary Industries 'New Forests' department, Private Forests Tasmania and Forestry Tasmania. There is no available data on a BEF or BCEF because the prevailing focus has been on developing allometrics rather than a BEF/BCEF, or on merchantable timber rather than aboveground trees. In the absence of a species-specific or regional BCEF, this figure was drawn from the 2006 IPCC AFOLU guidelines[29], which provided an estimate for temperate hardwoods. The precise BCEF varies depending on the growing stock level (see Table No. 9).

Table No. 9. Choice of BCEF relative to growing stock level.

Growing stock level (m3):	$BCEF_R$:
<20	3.33
21 – 40	1.89

[29] Paustian, K; Ravindranath, NH; van Amstel, A; Gytarsky, M; Kurz, WM; Ogle, SM; Richards, G; Somogyi, Z (2006) 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Volume 4: Agriculture, Forestry and Other Land Use (AFOLU) Table 4. < http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf> [accessed 21/02/2011]

41 – 100	1.55
100 – 200	1.17
>200	0.89

The carbon stock of extracted biomass is calculated in accordance with Equation 4, using the result of Equation 2 multiplied by species-specific wood densities and the carbon fraction to determine the mean carbon stock extracted from the forest.

Equation 4.

$$C_{EX,j,i|BSL} = V_{EX,j,i|BSL} * D_j * CF_j \qquad (4)$$

Where:

$C_{EX,j,i|BSL}$	mean carbon stock of extracted timber per unit area for species j in stratum i; tC·ha^{-1};
$V_{EX,j,i|BSL}$	mean volume of extracted timber per unit area for species j in stratum i; in m^3·ha^{-1};
D_j	basic wood density of species j; t d.m. m^{-3}; [14]
CF_j	carbon fraction of biomass for species j; tC t d.m.$^{-1}$;
i	1, 2, 3 … M strata; and
j	1, 2, 3 … J tree species.

The wood density figures are based on the species-specific, air dry density values provided in the manual for the Farm Forestry Toolbox, e.g. a mean density of 0.68 g/cm^3 for *E. delegatensis*, 0.8 g/cm^3 for *E. viminalis*, 0.7 g/cm^3 for *E. obliqua* and 0.75 g/cm^3 for *E. amygdalina*. Where there were no species-specific densities, we used either the allometric equivalent (for example, *E. pulchella, E coccifera* and *E. tenuiramis* all had the same density as *E. amygdalina*) or the lowest Eucalyptus density of 0.68 g/cm^3, as this ensured a conservative estimate. With respect to merchantable understorey species, the FFT provided a basic wood density of 0.63 g/cm^3 for *A. dealbata* and 0.65 g/cm^3 for *A. melanoxylon*. As silver wattle is known for the low density of its wood, we adopted this wood density for all other forest species.

<u>Carbon emitted from dead wood:</u>

According to this methodology, dead wood is considered only when it is a by-product of the harvesting process. In Equation 5, the mean extracted carbon stock (product of Equation 4) is subtracted from the mean harvested carbon stock (the product of Equation 3) to calculate the dead wood per stratum.

Equation 5.

$$\Delta C_{DW,i,p|BSL} = A_{i,p} * \sum_{j=1} \left(C_{HB,j,i|BSL} - C_{EX,j,i|BSL} \right) \quad (5)$$

Where:

$\Delta C_{DW,i,p|BSL}$ change in carbon stock of dead wood resulting from timber harvest per unit area in stratum *i* in land parcel *p*, in tC;

$A_{i,p}$ the area of stratum *i* in land parcel p, ha; [15]

$C_{HB,j,i|BSL}$ mean carbon stock of harvested biomass per unit area for species *j* in stratum *i*, $tC \cdot ha^{-1}$;

$C_{EX,j,i|BSL}$ mean carbon stock of extracted timber per unit area for species *j* in stratum *i*, $tC \cdot ha^{-1}$;

j 1, 2, 3 …*J* species;

i 1, 2, 3 …*M* strata; and

p *1, 2, 3 …P* land parcels.

<u>Carbon emitted from the conversion and retirement of wood products:</u>

Equation 6 calculates the net carbon stock of extracted timber per hectare for each stratum. This information is used to calculate the proportion of carbon stored in long-term wood products.

Equation 6.

$$C_{EX,i|BSL} = \sum_{j=1}^{J} C_{EX,j,i|BSL} \quad (6)$$

Where:

$C_{EX,i|BSL}$ mean carbon stock of extracted timber per unit area in stratum *i*, $tC \cdot ha^{-1}$;

$C_{EX,j,i|BSL}$ mean carbon stock of extracted timber per unit area for species *j* in stratum *i*, $tC \cdot ha^{-1}$;

i 1, 2, 3 …*M* strata; and

j 1, 2, 3 …*J* species.

Carbon stocks in wood harvested for conversion to long-term wood products (remaining after 100 years) are included in the baseline scenario as a carbon sink. This methodology adopts the simplifying assumption that the proportion remaining after this time is effectively permanent.

The relevant wood product classes are sawnwood and paper and paperboard. The gross percentages of volume extracted for each wood product class will be assigned based on historical Forest Practices Plans. Based on past Forests Alive's projects, it is projected that 0-30% of the extracted timber will be sawnwood quality, and the remaining 70-100% for pulp and paper[30]. The proportion of biomass extracted that remains sequestered in long-term wood products after 100 years is calculated using Equation 7 and data from Winjum *et al.* (1997)[31]

[30] McCormick, W (2010) <u>Tasmanian forests: future agreement? Parliamentary Library of Australia, Australia.</u> Available from <http://www.aph.gov.au/library/pubs/BriefingBook43p/tasmanian-forests.htm> [accessed 14/04/11]

[31] Winjum, JK; Brown, S; Schlamadinger, B (1998) Forest harvests and wood products: sources and sinks of atmospheric carbon dioxide, *Forest Science* **44**(2) 272-284

and the Climate Action Reserve (2009)[32]. This value is subtracted from the carbon in extracted timber (Equation 8) which is otherwise emitted as carbon dioxide. These equations use the simplifying and conservative assumption that all extracted biomass not retained is emitted in the year harvested.

Equation 7.

$$C_{WP,i|BSL} = \sum_k \left(C_{EX,i,k|BSL} * (1 - WW_k) * (1 - SLF_k) * (1 - OF_k)\right) \quad (7)$$

Where:

$C_{WP,i\|BSL}$	carbon stock sequestered in wood products in stratum i as a result of planned timber harvest in the baseline scenario, in tC·ha^{-1};
$C_{EX,i\|BSL}$	mean carbon stock of extracted timber per unit area in stratum i, tC·ha^{-1};
WW_k	fraction of biomass carbon from wood waste immediately emitted as a by product of milling operations for wood product k, dimensionless; [17]
SLF_k	fraction of biomass carbon for wood product k that will be emitted to the atmosphere within 5 years of timber harvest, dimensionless; [18]
OF_k	fraction of biomass carbon for wood product type k that will be emitted to the atmosphere between 5 and 100 years of timber harvest, dimensionless; [19]
i	1, 2, 3 … M strata; and
k	wood product classes (1. sawnwood, 2. wood-based panels, 3. other industrial roundwood, 4. paper and paper board, and 5. other).

Equation 8.

$$\Delta C_{WP,i,p|BSL} = A_{i,p} * (C_{EX,i|BSL} - C_{WP,i|BSL}) \quad (8)$$

Where:

$\Delta C_{WP,i,p\|BSL}$	change in carbon stock resulting from wood product conversion and retirement from stratum i in land parcel p, tC;
$A_{i,p}$	the area of stratum i in land parcel p, ha; [20]
$C_{EX,i\|BSL}$	mean carbon stock of extracted timber per unit area in stratum i, tC·ha^{-1};
$C_{WP,i\|BSL}$	carbon stock sequestered in wood products in stratum i as a result of planned timber harvest in the baseline scenario, in tC·ha^{-1};
i	1, 2, 3 … M strata; and
p	1, 2, 3 … P land parcels.

Sequestration of carbon through regrowth:

Carbon sequestration in the baseline scenario (after planned timber harvest) is based on local species growth rates as modelled by FullCAM. Forests Alive uses site-specific data to predict native regeneration rates after selective logging and clearfell events.

The strata within each project activity instance will be individually modelled according to their specific logging histories and projections for the baseline scenario. Two values will be

[32] Climate Action Reserve (2009) Forest Project Protocol 3.1: Appendix F. <http://www.climateactionreserve.org/how/protocols/adopted/forest/current/>[accessed 2/07/10].

extracted from FullCAM for the baseline scenario. Firstly, the merchantable volume of timber (tree stems in m^3/ha) will be used in Equations 3 and 4 to confirm the possible volume of extracted timber for each harvest. Secondly, the carbon stock of aboveground trees (tC/ha) will be used to determine the sequestration according to Equation 9.

Equation 9.

$$\Delta C_{RG,i,p|BSL} = A_{i,p} * (RGR_i * TH_{i,p}) \qquad (9)$$

Where:

$\Delta C_{RG,i,p/BSL}$	carbon sequestration resulting from forest regrowth after timber harvest in stratum *i* in land parcel *p*, tC;
$A_{i,p}$	the area of stratum *i* in land parcel *p*, ha; [21]
RGR_i	regrowth rate of forest post timber harvest for stratum *i*, $tC \cdot ha^{-1} yr^{-1}$; [22]
$TH_{i,p}$	number of years since timber harvest in stratum *i* in land parcel *p*, years; [23]
i	1, 2, 3 … *M* strata; and
p	*1, 2, 3 … P* land parcels.

<u>Calculating changes in carbon stocks:</u>

The total annual change in carbon stocks in all pools in the baseline scenario is equal to the stock change from planned timber harvest, plus the carbon stored through the conversion and retirement of wood products. We must also subtract the vegetation regrowth that follows harvest. This is calculated using Equation 10, and annualised using Equation 11. The final result is converted into tonnes of carbon dioxide equivalent by multiplying it by the relative atomic mass of CO_2 to C (44/12), according to Equation 12.

Equation 10.

$$\Delta C_{NET,p|BSL} = \sum_{i=1}^{M} \left(\Delta C_{DW,i,p|BSL} + \Delta C_{WP,i,p|BSL} - \Delta C_{RG,i,p|BSL} \right) \qquad (10)$$

Where:

$\Delta C_{NET,p|BSL}$	net change in carbon stock in the baseline scenario in parcel *p*, in tC;
$\Delta C_{DW,i,p|BSL}$	change in carbon stock from dead wood resulting from timber harvest per unit area in stratum *i* in land parcel *p*, in tC;
$\Delta C_{WP,i,p/BSL}$	change in carbon stock resulting from wood product conversion and retirement from stratum *i* in land parcel *p*, tC;
$\Delta C_{RG,i,p/BSL}$	carbon sequestration resulting from forest regrowth after timber harvest in stratum *i* in land parcel *p*, tC;
i	1, 2, 3 … *M* strata; and
p	*1, 2, 3 … P* land parcels.

Equation 11.

$$\Delta C_{NET|BSL} = \frac{\left(\sum_{p=1}^{P} \Delta C_{NET,p|BSL}\right)}{IFM_{CP}} * t^{*} \quad (11)$$

Where:

$\Delta C_{NET|BSL}$ net change in carbon stock across all parcels in the baseline scenario since the start of the project activity, in tC;

$\Delta C_{NET,p|BSL}$ net change in carbon stock in the baseline scenario in parcel *p*, in tC;

IFM_{CP} project crediting period for the IFM project, in years;

t* time elapsed since the start of the project, in years; and

p *1, 2, 3 … P* land parcels harvested within the crediting period.

Equation 12.

$$GHG_{NET|BSL} = \Delta C_{NET|BSL} * \frac{44}{12} \quad (12)$$

Where:

$GHG_{NET|BSL}$ net greenhouse gas emissions in the baseline scenario since the start of the project activity, tCO_2e;

$\Delta C_{NET|BSL}$ net change in carbon stock across all parcels in the baseline scenario since the start of the project activity, tC; and

44/12 ratio of molecular weights of carbon dioxide and carbon, tCO_2-e tC^{-1}.

3.2 Project Emissions

The merchantable volume of individual trees, collated from DBH using the Farm Forestry Toolbox for Equation 1, is used to calculate GHG emissions and/or removals for the project scenario. This data is already extrapolated to produce an estimate of mean merchantable volume (m^3/ha) for each stratum, and entered into FullCAM to calculate carbon sequestration in the baseline scenario (satisfying Equation 9).

The same data and model parameters entered into FullCAM for Equation 9 were used to calculate the carbon stock in aboveground trees (tC/ha), the required output of Equation 15. Specifically, the box for ‘belowground biomass’ was unchecked when running the FullCAM model. Therefore, the carbon stock in the belowground biomass was not calculated as part of the FullCAM outputs.

The inputs for FullCAM are based on local taxonomix-, geographic- and climatic-specific information, and allometric relationships identified in the Technical Reports prepared for the National Carbon Accounting System[33]. FullCAM is part of the Australian National Carbon

[33] Raison, J. (2001) Carbon Accounting and Emissions Trading Related to Bioenergy, Wood Products and Carbon Sequestration: Development of a ‘Toolbox’ for Carbon Accounting in Forests, *IEA Bioenergy Task 38: Workshop in Canberra/Australia*, CSIRO, Forestry and Forest Products. Available

Accounting System (N-CAT) and international best practice in modelling carbon flows. However, the program does:

> "*tend to be highly conservative and radically underestimates forest carbon generated from mixed native species (Brendan and Mackey, 2008).*"[34]

Moreover, for each stratum, FullCAM's output was calibrated according to fieldwork estimates of aboveground trees (m^3/ha) in 2011, and consistent between the baseline and project scenarios until the first harvest. Because FullCAM was available as a best practice option, Forests Alive's is submitting a methodology deviation from the less precise, accurate and conservative requirements of the GreenCollar IFM methodology. Equations 13-15 were therefore not required, and FullCAM used to calculate the product of Equation 15 (tC/ha).

Equation 13.

$$C_{AB,j,i,t,sp|PRJ} = \sum_{l=1}^{L_{j,i,sp,t}} f_j(X,Y...) * CF_j \qquad (13)$$

Where:

$C_{AB,j,i,t,sp/PRJ}$	carbon stock in aboveground biomass of trees of species j in plot sp in stratum i at time t in the project scenario, tC
CF_j	carbon fraction of biomass for tree group j, tC t d.m.$^{-1}$; [26]
$f_j(X,Y...)$	aboveground biomass of trees based on allometric equation for species group j based on measured tree variable(s), t. d.m. tree^{-1}; [27]
i	*1, 2, 3, … M* strata;
j	*1, 2, 3 … J* tree species;
l	*1, 2, 3, …* $L_{j,i,t,sp}$ sequence number of individual trees of species group j in stratum i at time t in sample plot sp;
t	*0, 1, 2, 3, …* t^* years elapsed since start of the project activity; and
sp	1, 2, 3 …SP sample plots.

from <http://www.ieabioenergy-task38.org/workshops/canberra01/cansession1.pdf> [viewed 07/03/2011]

[34] as cited by Kapambwe, M.; Keenan, R.; (2009) Biodiversity Outcomes from Carbon Biosequestration, The University of Melbourne, commissioned by The Department of Sustainability and Environment, pp 23. Available from <http://www.dse.vic.gov.au/CA256F310024B628/0/761E59489BC57A9ACA2576810079C4D4/$File/Biosequestration+and+Biodiversity.pdf> [viewed 04/03/2011]

Equation 14.

$$C_{AB,i,t,sp|PRJ} = \sum_{j=1} C_{AB,j,i,t,sp|PRJ} \quad (14)$$

Where:

$C_{AB,i,t,sp/PRJ}$	aboveground biomass carbon stock of all trees of stratum i at time t in sample plot sp in the project scenario, tC;
$C_{AB,j,i,t,sp/PRJ}$	carbon stock in aboveground biomass of trees of species j in stratum i at time t in plot sp in the project scenario, tC;
i	*1, 2, 3, … M* strata;
j	*1, 2, 3 … J* tree species; and
t	*0, 1, 2, 3 …t** years elapsed since the start of the project activity.

Equation 15.

$$C_{AB,i,t|PRJ} = \frac{1}{SP} * \sum_{sp=1}^{SP} \left(\frac{C_{AB,i,t,sp|PRJ}}{A_{sp}} \right) \quad (15)$$

Where:

$C_{AB,i,t/PRJ}$	mean aboveground biomass carbon stock of trees in stratum i at time t, $tC \cdot ha^{-1}$;
$C_{AB,i,t,sp/PRJ}$	aboveground biomass carbon stock of trees in stratum i at time t in sample plot sp, tC;
$A_{,sp}$	area of sample plot sp, ha; [28]
sp	*1, 2, 3 … SP* sample plots;
i	*1, 2, 3 … M* strata; and
t	*0, 1, 2, 3 … t** years elapsed since the start of the project activity.

Equation 16 was then used to calculate sequestration (tCO2-e/ha) in the project scenario, by determining the difference in the carbon stock each year and multiplying it by the strata area.

Equation 16.

$$\Delta C_{AB,t|PRJ} = \left(\sum_{i=1}^{M} \left(A_i * \frac{C_{AB,i,t2|PRJ} - C_{AB,i,t1|PRJ}}{T} \right) \right) * \frac{44}{12} \qquad (16)$$

Where:

$\Delta C_{AB,t\|PRJ}$	annual carbon stock change in aboveground biomass of trees in year t, $tCO_2e \cdot yr^{-1}$;
$C_{AB,i,t\|PRJ}$	mean aboveground biomass carbon stock of trees in stratum i at time t, $tC \cdot ha^{-1}$;
A_i	area covered by stratum i, ha;
T	number of years between monitoring time $t1$ and $t2$ ($T = t2 - t1$); years;
i	*1, 2, 3 …* M strata;
t	*1, 2, 3 …* t^* years elapsed since the start of the project activity; and
44/12	ratio of molecular weights of carbon dioxide and carbon, $tCO_2e \cdot tC^{-1}$.

3.3 Leakage

For this addition, leakage has a factor of zero. Please refer to section1.13 above and section 3.2 of the Grouped Project PDD.

3.4 Summary of GHG Emission Reductions and Removals

The procedure for quantification of net GHG emission reductions and removals, including all relevant equations, *for AFOLU projects, include net change in carbon stocks is described below.*

Equations 17-20 are used to calculate potential damage or degradation of the carbon stock in aboveground trees in the project scenario. Equation 17 and 18 calculate the risk and likely extent of damage from fire, based on historical incidence of wildfire in the stratum. The *ex ante* estimate uses the average area lost to fire every twenty-five years (based on records lasting fifty years). The *ex ante* estimates or the *ex post* area burnt is multiplied by the difference between aboveground biomass in the project and baseline scenarios. This figure is in turn multiplied by standard IPCC combustion factors (0.63), emission factors (4.7) and the global warming potential (GWP) for methane (21).

Equation 17.

$$\Delta C_{DIST\_FR,t|PRJ} = \sum_{i=1}^{M} (A_{burn,i,t} * B_{i,t|PRJ} * COMF_i * G_{g,i} * 10^{-3} \cdot GWP_{CH4}) \qquad (17)$$

Where:

$\Delta C_{DIST\_FR,t\|PRJ}$	net greenhouse gas emissions resulting from fire disturbance in year t, tCO_2e ;
$A_{burn,i,t}$	area burnt for stratum i at time t, ha; [29]
$B_{i,t\|PRJ}$	average aboveground biomass stock present in the project scenario but absent in the baseline scenario before burning stratum i, time t; t d. m. ha^{-1};
$COMF_i$	combustion factor for stratum i, dimensionless; [30]
$G_{g,i}$	emission factor for stratum i for methane, g kg^{-1} dry matter burnt; [31]
GWP_{CH4}	global warming potential for CH_4 (IPCC default: 21), tCO_2e tCH_4^{-1};
i	1, 2, 3 … M strata; and
t	1, 2, 3, … t^* years elapsed since the start of the IFM project activity.

Equation 18.

$$B_{i,t|PRJ} = \sum_{j=1}^{J} \left(V_{EX,i,j|BSL} * BCEF_R \right) \qquad (18)$$

Where:

$B_{i,t\|PRJ}$	average aboveground biomass stock present in the project scenario but absent in the baseline before burning for stratum i, time t, t d. m. ha^{-1};
$V_{EX,j,i\|BSL}$	mean volume of extracted timber per unit area for species j in stratum i, $m^3 \cdot ha^{-1}$;
$BCEF_R$	biomass conversion and expansion factor applicable to wood removals in the project area, dimensionless; [32]
i	1, 2, 3 … M strata;
j	1, 2, 3 … J tree species; and
t	1, 2, 3, … t^* years elapsed since the start of the IFM project activity.

Equation 19 provides an *ex post* means to measure carbon loss from non-fire natural disturbance.

Equation 19.

$$\Delta C_{DIST,t|PRJ} = \sum_{i=1}^{M}(A_{dist,i,t} * \sum_{j=1}^{J} C_{HB,j,i|BSL}) * \frac{44}{12} \quad (19)$$

Where:

$\Delta C_{DIST,t\|PRJ}$	net greenhouse gas emissions resulting from non-fire natural disturbance in year t, tCO_2e ;
$A_{dist,i,t}$	area disturbed for stratum i at time t, ha; [33]
$C_{AGB,i\|BSL}$	carbon stock in aboveground biomass per unit area in stratum i, $tC \cdot ha^{-1}$;
$44/12$	ratio of molecular weights of carbon dioxide and carbon, $tCO_2e \cdot tC^{-1}$;
i	1, 2, 3 … M strata;
j	1, 2, 3 … J tree species; and
t	1, 2, 3, … t^* years elapsed since the start of the IFM project activity.

Equation 20 allows projections of illegal logging, although this is not considered a plausible risk for IFM projects in Tasmania.

Equation 20.

$$\Delta C_{DIST\_IL,t|PRJ} = \sum_{i=1}^{M}\left(A_{DIST\_IL,i} * \frac{C_{DIST\_IL,i,t|PRJ}}{AP_i} \right) \quad (20)$$

Where:

$\Delta C_{DIST\_IL,t\|PRJ}$	net carbon stock changes as a result of illegal logging at time t, tCO_2e;
$A_{DIST\_IL,i}$	area potentially impacted by illegal logging in stratum I, ha; [38]
$C_{DIST\_IL,i,t\|PRJ}$	biomass carbon of trees cut and removed through illegal logging in stratum i at time t, tCO_2e;
AP_i	total area of illegal logging sample plots in stratum i, ha; [39]
i	1, 2, 3 … M strata in the in the project case; and
t	1, 2, 3, … t years elapsed since the projected start of the project activity.

There will be no projected deductions in the project scenario from illegal logging, non-fire natural disturbance or leakage. Monitoring events will identify whether these elements have generated greenhouse gas emissions, and appropriate adjustments will be made to the carbon schedule if such activities are detected.

Equations 21 and 22 sum the net projected greenhouse gas emissions in the project scenario, less the carbon sequestered through ongoing forest growth, using the products of Equations 13-20. This provided the estimate of carbon sequestered or emitted in the IFM project scenario.

Equation 21.

$$\Delta C_{NET,t|PRJ} = \Delta C_{AB,t|PRJ} - \Delta C_{DIST\_FR,t|PRJ} - \Delta C_{DIST,t|PRJ} - \Delta C_{DIST\_IL,t|PRJ} \quad (21)$$

Where:

$\Delta C_{NET,t\|PRJ}$	net greenhouse gas emissions in the project scenario in year *t*, tCO_2-e;
$\Delta C_{AB,t\|PRJ}$	annual carbon stock change in aboveground biomass of trees in year *t*, $tCO_2e \cdot yr^{-1}$;
$\Delta C_{DIST\_FR,t\|PRJ}$	net greenhouse gas emissions resulting from fire disturbance in year *t*, tCO_2e ;
$\Delta C_{DIST,t\|PRJ}$	net greenhouse gas emissions resulting from non-fire natural disturbance in year *t*, tCO_2e ;
$\Delta C_{DIST\_IL,t\|PRJ}$	Net carbon stock changes as a result of illegal logging at time *t*, tCO_2e; and
t	*1, 2, 3, … t** years elapsed since start of the project activity.

Equation 22.

$$GHG_{NET|PRJ} = \sum_{t=1}^{t^*} \Delta C_{NET,t|PRJ} \quad (22)$$

Where:

$GHG_{NET\|PRJ}$	net greenhouse gas emissions in the project scenario since the start of the project activity, tCO_2e;
$\Delta C_{NET,t\|PRJ}$	net greenhouse gas emissions in the project scenario in year *t*, tCO_2e; and
t	*1, 2, 3, … t** years elapsed since start of the project activity.

Quantifying GHG emission reductions and removal enhancements for the GHG project

As detailed above, the dimensionless leakage factor is considered to be 0 in Tasmania. This is incorporated using Equation 23.

Equation 23.

$$GHG_{LK|LtPF} = LF_{me} * GHG_{NET|BSL} \quad (23)$$

Where:

$GHG_{LK\|LtPF}$	is total market leakage as a result of IFM LtPF activities, tCO2e;
LF_{ME}	is the dimensionless leakage factor for market-effects calculations;
$GHG_{NET\|BSL}$	net greenhouse gas emissions in the baseline scenario since the start of the project activity, tCO_2e.

Therefore, the net greenhouse gas emissions for each stratum, calculated in Equation 24, are the sum of the baseline scenario greenhouse emissions, less the project scenario greenhouse gas emissions.

Equation 24.

$$GHG_{CREDITS|LtPF} = GHG_{NET|BSL} - GHG_{NET|PRJ} - GHG_{LK|LtPF} \qquad (24)$$

Where:

$GHG_{CREDITS/LtPF}$	project greenhouse gas credits associated with the implementation of improved forest management (IFM) activities in the project scenario, tCO_2e;
$GHG_{NET/BSL}$	net greenhouse gas emissions in the baseline scenario since the start of the project activity, tCO_2e;
$GHG_{NET/PRJ}$	net greenhouse gas emissions in the project scenario since the start of the project activity, tCO_2e; and
$GHG_{LK\|LtPF}$	total greenhouse gas emissions due to leakage arising outside the project boundary as a result of the implementation of improved forest management (IFM) activities in the project scenario, tCO_2e.

Uncertainty is taken into account using Equations 25-26. This is calculated within a 95% confidence interval from error/variance with respect to project area, sampling error, harvesting projections and regrowth rates at a stratum-level.

The sampling error is automatically calculated by the Winrock Sampling Calculator, according to the error level for the number of plots completed for that stratum. Uncertainty with respect to the project area is minimal, as GIS programs are used to truth the PI layer and cadastral parcels against satellite images obtained from GoogleEarth and SPOT (or a close equivalent). The uncertainty surrounding the targeted harvest levels will be subject to the landowners' logging history, understanding of the forest (as compared to fieldwork data and FullCAM modelling) and involvement with historical harvesting operations. This level of uncertainty is determined in accordance with the Forest Alive's standard operating procedures for IFM calculations. Error with respect to regrowth rates will be determined from field data at the comprehensive monitoring events every five years.

Before calculating using Equation 25 from the GreenCollar methodology, it is necessary to propagate the error. This is done in accordance with Equation 5.2.2 of the IPCC Good Practice Guideance for LULUCF[35].

$$U_E = \frac{\sqrt{(U_1 \bullet E_1)^2 + (U_2 \bullet E_2)^2 + \cdots + (U_n \bullet E_n)^2}}{|E_1 + E_2 + \cdots + E_n|}$$

The uncertainty values from sampling error, variation in harvesting levels, etc is summed together to produce U_i. This is multiplied by E_i, the removal estimate for stratum *i*. The removal estimate is the percentage of the project's total emission reductions contributed by that stratum. The resulting values for each stratum are individually squared and then summed. The square root of this sum is then calculated and divided by the sum of the removal estimates to produce U_E.

UE should be calculated separately for the project and baseline scenarios, i.e. producing a figure $U_{|PRJ}$ and $U_{|BSL}$. These parameters are used to calculate uncertainty in accordance with Equation 25 and 26.

[35] IPCC (2003) Good Practice Guidance for LULUCF, Institute for Global Environmental Strategies, Japan, pp 5.11. Available from < http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp5/Chp5_1_&_5_2_Uncertainties.pdf> [viewed 29/04/11]

Equation 25.

$$U_{TOTAL|LtPF} = \sqrt{U^2_{|PRJ} + U^2_{|BSL}} \quad (25)$$

Where:

$U_{total/LtPF}$	total uncertainty for LtPF Project, dimensionless;
$U_{/PRJ}$	total uncertainty for the improved forest management activities in the project scenario, dimensionless; and
$U_{/BSL}$	total uncertainty for the baseline scenario, dimensionless.

Equation 26.

$$Credits_{total|LtPF} = GHG_{credits|LtPF} \cdot (1 - U_{total|LtPF}) \quad (26)$$

Where:

$Credits_{total|LtPF}$	total greenhouse gas credits adjusted for uncertainty for each year *t* in the project crediting period;
$GHG_{credits|LtPF}$	project greenhouse gas credits associated with the implementation of improved forest management (IFM) activities in the project scenario, $tCO_2e \cdot year^{-1}$; and
$U_{total/LtPF}$	total uncertainty for LtPF Project, dimensionless.

If total uncertainty is less than or equal to 15%, no deductions are required for uncertainty. If uncertainty is greater than 15%, that percentage of avoided carbon emissions must be deducted from the figure calculated in Equation 24.

Finally, the verified carbon units are calculated by subtracting the VCS buffer (determined by the risk assessment completed for each project activity instance) in accordance with Equation 27.

Equation 27.

$$VCU_{net|LtPF} = (Credits_{total,t2|LtPF} - Credits_{total,t1|LtPF}) - Bu_{|IFM-VCS} \quad (27)$$

Where:

$VCU_{net|LtPF}$	number of verified carbon units; dimensionless;
$Credits_{total.t1|LtPF}$	net anthroprogenic greenhouse gas removals by sinks, as estimated for $t^*=t1$ in tCO_2e;
$Credits_{total.t2|LtPF}$	net anthroprogenic greenhouse gas removals by sinks, as estimated for $t^*=t2$ in tCO_2e; and
$Bu_{|IFM-VCS}$	total number of credits withheld in VCS buffer account.

Table No. 10. Estimated baseline emissions and removals. Estimated baseline emissions and removals are taken from Equation 10. Estimated project emissions and removals are taken from Equation 21.

Years	Estimated baseline emissions (+) or removals (-) (tCO2e)	Estimated project emissions (+) or removals (-) (tCO2e)	Estimated leakage emissions (tCO2e)	Estimated net GHG emission reductions or removals (show as a negative) (tCO2e)
2012	0	-2,054	0	-2,054
2013	38,250	-1,985	0	-40,235
2014	-941	-1,899	0	-958
2015	27,701	-1,803	0	-29,504
2016	-1,271	-1,746	0	-476
2017	-1,211	-1,682	0	-471
2018	-1,149	-1,622	0	-473
2019	-1,095	-1,555	0	-460
2020	16,197	-1,508	0	-17,705
2021	-1,407	-1,459	0	-52
2022	-1,335	-1,383	0	-48
2023	-1,269	-1,345	0	-76
2024	-1,210	-1,306	0	-97
2025	-1,154	-1,246	0	-92
2026	-1,102	-1,221	0	-118
2027	-1,052	-1,173	0	-122
2028	38,860	-1,125	0	-39,984
2029	-1,578	-1,106	0	471
2030	-1,506	-1,065	0	441
2031	-1,437	-1,039	0	398
2032	-1,369	-1,001	0	369
2033	-1,312	-982	0	330
2034	-1,251	-941	0	310
2035	-1,200	-915	0	286
Total	97,160	-33,161	0	-130,321

In the calculations the sum of the baseline scenarios is divided by the credit period (23.7 years). The project scenario emissions are averaged over a whole 24 years, from the year the contract was signed (2011) to 2035. Therefore, in the calculations, when calculating the total avoided greenhouse gas emissions associated with the implementation of IFM activities (Equation 24) the emission reductions per annum is multiplied by the crediting period (23.5 years) which provides a more conservative value than displayed in the table above.

4 MONITORING

4.1 Data and Parameters Available at Validation

Table No. 11. Data and Parameters Available at Validation

Data Unit / Parameter:	Area potentially impacted by illegal logging in stratum i (ADIST_IL, i);
Data unit:	ADIST_IL, i
Description:	Participatory Rural Appraisal
Source of data:	According to the Monitoring Plan, there is no further need for additional PRAs at future monitoring events.
Value applied:	Zero
Purpose of the data:	To determine the potential risk for illegal logging
Any comment:	The threat to the project area from illegal logging is negligible within Tasmania, while the threat to native forests from legally permitted logging is significant. This was confirmed by the completion of a Preliminary Rural Appraisal. In late 2012, key stakeholders were contacted (see the results in the below) and absolutely ruled out any risk of illegal logging.

Data Unit / Parameter:	Total area of illegal logging sample plots in stratum i (APi);
Data unit:	APi
Description:	N/A
Source of data:	N/A
Value applied:	N/A
Purpose of the data:	N/A
Any comment:	N/A

Data Unit / Parameter:	Area burnt in stratum i at time t (Aburn,i,t);
Data unit:	Aburn,i,t
Description:	
Source of data:	SPOT imagery and site assessment
Value applied:	Zero
Purpose of the data:	Determination of area burnt
Any comment:	The project proponents for each instance live on the property, and regularly visit the forested area included within the Forest Alive's Grouped Project. Fire (specifically the parameter 'area burnt in

	stratum *i* at time *t*), pests and disease are therefore monitored through ongoing surveillance.

Data Unit / Parameter:	Merchantable biomass as a proportion of total above-ground tree biomass for stratum i (PMPi);
Data unit:	PMPi
Description:	Proportion of above ground biomass that is determined as merchantable biomass.
Source of data:	Field data and Farm Forestry Toolbox
Value applied:	N/A
Purpose of the data:	To determine, at 5 yearly intervals, changes in the merchantable biomass from the original baseline data.
Any comment:	Assessed at 5 yearly intervals.

Data Unit / Parameter:	Area covered by stratum i (Ai); and
Data unit:	Ai
Description:	Change in instance area
Source of data:	KML files and property land titles
Value applied:	Zero
Purpose of the data:	Determination of uncertainty in the project activity instance area.
Any comment:	Land title boundaries are recorded and publicly available for review. Any changes in boundary area are easily determined.

4.2 Data and Parameters Monitored

- Project area;
- Carbon stock;
- Illegal logging rates;
- Natural disturbance; and
- Leakage
- Carbon Stock Changes (Five yearly).

Table No. 12. Data and Parameters Monitored

Data Unit / Parameter:	Project Area A_i
Data unit:	Ha
Description:	Project Area
Source of data:	GPS coordinates and/or remote sensing and/or legal parcel records
Description of measurement methods and	Property boundary overlay

procedures to be applied:	
Frequency of monitoring/recording:	Annually
Value monitored:	Property boundaries
Monitoring equipment:	Arc GIS, Google Earth, Land Title Documentation, www.thelist.tas.gov.au
QA/QC procedures to be applied:	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied
Calculation method:	*N/A*
Any comment:	the baseline scenario, strata shall not change with time. The *ex ante* assumption with the project scenario is that the strata will not change with time: modifications can be made *ex post* in the wake of disturbance.

Carbon stock changes:

Determination of carbon stock change in aboveground trees. The determination of carbon stock change in aboveground trees is based upon field inventory data and FullCam. The estimate of uncertainty related to carbon stocks is derived from the original fieldwork, with the variance calculated by using the Winrock Sampling Calculator. This will be re-assessed every five years, when fieldwork is conducted as part of the monitoring event. The increment in merchantable biomass, and therefore carbon sequestered, is extrapolated to hectare level using Equations 13 to 15. These results – and the standard deviation – can be entered into the Winrock Sampling Calculator to determine the variance for each stratum at a 95% confidence interval.

Measurement of carbon stock change is undertaken at 5 year intervals and is therefore not required in the current monitoring event.

Table No. 13. Carbon stock changes

Data Unit / Parameter:	Carbon stock
Data unit:	tC/ha
Description:	Carbon stock in aboveground biomass.
Source of data:	Fieldwork and FullCAM model.
Description of measurement methods and procedures to be applied:	Fieldwork to take samples of DBH and tree heights in the field. Allometrics from the Farm Forestry Toolbox (FTT) are used to determine merchantable volume of timber. FullCAM is used once more to project future carbon sequestration.
Frequency of monitoring/recording:	5 Yearly
Value monitored:	DBH of trees in fieldwork plots
Monitoring equipment:	Fieldwork equipment, FFT, FullCAM
QA/QC procedures to be applied:	Data checked on entry and FullCAM checked by independent sources.
Calculation method:	Volume of timber * 1.17 * 0.5 to determine carbon in merchantable timber.
Any comment:	N/A

Illegal logging:

Illegal logging is de minimis within Tasmania. Please refer to section 3.2 of the Grouped Project PDD for a full justification of this. In summary, commercial forest harvesting is regulated through the Tasmanian Forest Practices Authority (FPA). Illegal logging is absent or *de minimis* on private lands. This is partially because forest harvesting on private land can only occur with the consent of the landowner, and property boundaries are well-marked and recognised within Tasmania. Secondly, the major markets for forest products are saw millers and three large export woodchip mills. Timber can only be sold in these markets when associated with an approved Forest Practices Plan.

Name	Position	Email	Response	Date
Bruce Hay	Professional Forester, Tasmania	bhay@tasland.org.au	Negligible potential for illegal logging	August 2013, Telephone conversation
Josie Kelman	Director, enviro-dynamics (Tasmania)	info@enviro-dynamics.com.au	Negligible potential for illegal logging	August 2013, face to face discussion.
Axel Meiss	Rural Land Management consultant, Tasmania	axel.meiss@rlm.com.au	Negligible potential for illegal logging	August 2013, face to face discussion.
Oliver Strutt	Manager, Understorey Network, Tasmania	oliver@understorey-network.org.au	Negligible potential for illegal logging	August 2013, face to face discussion.

The methodology states:

> "*Ex ante estimation shall be made of illegal logging in the with project case. If the belief is that zero illegal logging will occur within the project boundaries then this parameter may be set to zero if clear infrastructure, hiring and policies are in place to prevent illegal logging.*"

For the reasons outlined above, the threat to the Forests Alive's Project Areas from illegal logging is negligible within Tasmania; while the threat to native forests from legally permitted logging is significant.

Table No. 14. Illegal Logging, Fire and Leakage Parameters

Data Unit / Parameter:	Illegal logging rates
Data unit:	N/A
Description:	N/A
Source of data:	N/A
Description of measurement methods and procedures to be applied:	N/A
Frequency of monitoring/recording:	N/A
Value monitored:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Calculation method:	N/A
Any comment:	N/A

Data Unit / Parameter:	$A_{burn,i,t}$
Data unit:	Ha
Description:	Area burnt in stratum i at time t
Source of data:	GPS coordinates and/or remote sensing data
Description of measurement methods and procedures to be applied:	Spot Imagery to determine area burnt, field inventory to determine stock changes.
Frequency of monitoring/recording:	Annual
Value monitored:	Ha Burnt, stock changes (in the event of a wildfire)
Monitoring equipment:	ARC GIS
QA/QC procedures to be applied:	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied
Calculation method:	If applicable
Any comment:	

Data Unit / Parameter:	Leakage
Data unit:	Ha, harvested, annually from private land within Tasmania
Description:	
Source of data:	Private Forests Tasmania, Annual report 2011
Description of measurement methods and procedures to be applied:	Using the annual report from the Tasmanian Forest Practices Authority, figures on extraction rates and harvesting methods can be attained and compared annually. Figure No. 01 shows a steady decline in extraction rates from native forests across Tasmania (i.e. excluding the first two treatments).
Frequency of monitoring/recording:	Harvesting rates are assessed at annual monitoring events.
Value monitored:	Harvesting rates of native forest from private land within Tasmania
Monitoring equipment:	Private Forests Tasmania, Annual reports. http://www.privateforests.tas.gov.au/publications/annual_reports
QA/QC procedures to be applied:	Comparison of annual report data is cross checked by technical staff members of Forests Alive.
Calculation method:	Comparison of annual harvesting native forest harvesting rates using Microsoft Excel
Any comment:	

4.3 Description of the Monitoring Plan

All instances in the Grouped Project will be subject to the monitoring requirements outlined in the VCS approved “Methodology for Improved Forest Management: Conversion of Logged to Protected Forests”. The monitoring requirements outlined in this methodology are designed specifically to address the needs and concerns associated with Improved Forest Management project activities. They are therefore appropriate for this grouped project.

See section 3.2 of the Grouped Project PDD and Monitoring Plan prepared for the Grouped Project: Protection of a Tasmanian Native Forest.

Forests Alive Pty Ltd is acting as implementing partner on behalf of the project proponents (legal landowners) in the Grouped Project, and is responsible for the development, validation and first verification of each project activity instance. Forests Alive is a leading forestry carbon project developer in Australia.

- Contact person: Virginia Young
- Title: Managing Director
- Address: Suite 3, Level 7, 222 Pitt Street, Sydney, 2000
- Telephone number: +61 (0) 282 709 907
- Email: virginia@forestsalive.com
- Website: http://www.forestsalive.com

Virginia Young has been focused on building national and international understanding of the role of natural forests in mitigating climate change since the late 1990s. Prior to this she worked in the Federal Treasury and then ran her own business.

Working for The Wilderness Society, she pioneered a continental scale approach to nature conservation in Australia, called 'Wild Country' and was instrumental, together with a science team lead by Professor Brendan Mackey from the Australian National University, in securing one of Australia's pre-eminent research grants to build the scientific underpinnings for this work. More recently, she has completed a significant project working for Professor Jonathan West as a Verification Advisor facilitating the assessment of conservation values in areas of Tasmanian forest proposed for reservation by NGO's.

Working with industry and Drs. Aila Keto and Keith Scott, she was part of a leadership team, which delivered groundbreaking native forest protection in Queensland in 1999, including immediate protection of 425,000 hectares of south-east Queensland's forests and a commitment to phased in protection of 1.2 million hectare. She has amassed a formidable understanding of the global wood and wood products industry and of forest ecology.

Her interest in big picture problems and solutions lead her to start exploring the role that natural forests play in fighting climate change. She secured funding for research (again lead by ANU) on the role of forests in mitigating climate change and pioneered policy analysis and development at the national and international level.
She has been involved in international climate processes and campaigns since 2007. The opportunities and challenges which were apparent then lead her to create (working with key ally Global Witness) an alliance of like minded international ENGO's called the Ecosystems Climate Alliance who work together to bring good science, good policy and nature advocacy into the UNFCCC.

Virginia was awarded Wild magazine's Environmentalist of the Year in 2001, and was recognised as one of 20 'Global Wilderness Visionaries' by the World Wilderness Congress in 2010.

Jarrah Vercoe is the Project Manager responsible for the implementation and management of IFM projects in Tasmania. He has a Bachelor of Science (Honours) from the University of Tasmania, 2003. His honours research comprised a critique of approaches to achieving voluntary conservation on private land within Tasmania. Following graduation, Jarrah worked as an environmental consultant for 3 years with GHD. Notably, in 2008 he delivered a large Commonwealth Government 'Caring for our Country' project across Tasmania. Prior to joining Forests Alive, Jarrah was the 'biodiversity coordinator' with NRM South.

Jarrah will be supported by the Forests Alive's Technical Consultant, Lawrence Rimmer. Lawrence holds a Bachelor of Science (Hons) from the University of Edinburgh. His thesis on agricultural capabilities in Scotland was awarded the James Anthony More Memorial prize (2010). His achievements with Forests Alive include:

- Developing a calculation process for IFM projects for efficient and accurate carbon calculation processing.
- Designing standardised formats for maps produced in GIS software.
- Conducting carbon sequestration modelling using FullCAM.
- Providing technical expertise for all projects and has contributed towards company documentation, government submissions and promotional material.

Another key member of the team is Dr Beatriz Garcia. Beatriz was born in Brazil and pursued a Law degree at the University of Brasilia. She holds a Ph.D. in International Law from The Graduate Institute in Geneva. She has written a book on the legal protection of the Amazon published in 2011 by Cambridge University Press. She has worked at the Biodiversity and Climate Change Section of the United Nations Conference on Trade and Development (UNCTAD) particularly on projects aimed at promoting trade and investment in biodiversity products and services from the Amazon. She has held positions as legal advisor at government agencies in Brazil and provided counsel for institutions such as the Amazon Cooperation Treaty Organization, The Earth Council Geneva and a few UN agencies. More recently she has been associated with the Australian Centre for Climate and Environmental Law at Sydney Law School.

It is standard company practice to employ external environmental consultants to complete the fieldwork: they are provided with Forests Alive's standard operating procedures and on-site training in forest inventory techniques at the start of each week of fieldwork (as specified within the Forests Alive's standard operating procedures for fieldwork).

All data is checked independently as a quality control measure to ensure consistency with the field data. An audit sheet has been included in the template for the carbon calculations to ensure that data is entered accurately, that FullCAM is calibrated against fieldwork results and that the timber harvest plan correctly reflects the baseline scenario. The Forests Alive's standard operating procedures for quality assurance and version control are available for review by the validator.

Schedule

Activity description	Indicator	Frequency	Responsibility
Determination of uncertainty in the project activity instance area. Calculated by assessing forested area in satellite images.	Change in instance area	Annually	Project proponent
Determination of carbon stock in aboveground trees per unit area per stratum. Calculated from plot data.	Carbon stock	Every 5 years (first assessment to take place 2016)	Project proponent
Determination of carbon stock change in aboveground trees. Extrapolated from FullCAM modelling and past fieldwork trends.	Carbon stock change	Annually	Project proponent
Determination of carbon stock change in aboveground trees. Calculated from fieldwork data.	Carbon stock change	Every 5 years	Project proponent
Determination of uncertainty in the forest inventory. Calculated using the Winrock sampling calculator.	Sampling error	Every 5 years	Project proponent
Determination of uncertainty in carbon sequestration	Difference (as a percentage) between FullCAM projections	Every 5 years	Project proponent

projections.	and field measurements		
Site visit to assess natural disturbances.	Deforestation in hectares from natural disturbances	Annually	Project proponent
Determination of carbon stock change in the carbon pools by natural disturbances.	Carbon stock change.	Annually (if required)	Project proponent
Participatory Rural Appraisal.	Risk of illegal logging.	Pre-established in the validation / verification of Grouped Project. Not required.	Project proponent
Comparison of the annual extracted volume to the long-term average volume of extracted timber from private native forests in Tasmania.	Market leakage factor.	Annually	Project proponent

Electronic and hard copies of all data are stored in the following two locations:

• Forest Alive's Sydney office: Suite 3, Level 7, 222 Pitt Street, Sydney, 2000
• Forest Alive's, Tasmanian Office: 210 Collins Street, Hobart, Tasmania, 7000

For each instance within the Grouped Project, the following file structure will be created to store electronic data:

• Contract
• Budget
• Ownership
    o PID data
    o Written consent from other shareholders
    o Forest Practises Plan
• Stratification
    o Satellite images
    o GIS Layers
        - PI typing
        - Strata shapefiles
        - KML Files
• Instance
• Project Area
• Property Area
    o Strata maps
    o Winrock sampling calculator

- Fieldwork
    - o Data sheets (electronic copies)
    - o FFT data
    - o GPS waypoints
- VCS PDD
    - o PDD
    - o Calculations
    - o Logging history and forecast
    - o FullCAM
        - PLO files
        - Excel output
    - o NCRs/NIRs
    - o Monitoring
        - Monitoring plan
        - Monitoring report
        - Satellite images for first verification

The accompanying documentation (signed contracts, signed Monitoring Plan, signed Monitoring Report and field data sheets) and key hard copies (the PDD, Monitoring Plan and Monitoring Report) will be stored safely at each location.

Forests Alive's procedure for handling internal auditing and non-conformities is as follows;

Project Manager is the responsible and principle contact point. Documents are prepared by the Project Manager and reviewed by Forests Alive's Technical Specialist, Lawrence Rimmer prior to issuing. Non conformities are reviewed by the Project Manager and allocated according to the following process;

- Technical / calculation non conformities are allocated for correction to the technical team member/s
- Management / procedural non conformities are allocated for correction to the Project Manager.

All documents are reviewed by a staff member independent of the project prior to issuing.

5 ENVIRONMENTAL IMPACT

The grouped project does not require an environmental impact assessment. Environmental impact assessments within Tasmania are regulated through the *Environmental Management and Pollution Control Act 1994* (EMPCA). The EPA Board's environmental impact assessment process applies to the following types of projects:

- *Level 2 activities (as listed in schedule 2 of the Environmental Management and Pollution Control Act 1994 'the EMPC Act')*[36]

The Forests Alive project does not comprise a Level 2 activity under the Act.

Within the national context, environmental impact assessments are regulated through the *Environmental Protection, Biodiversity Conservation Act 1999.* Under the Act, projects that will have a 'significant' environmental impact are required to be referred and an environmental impact assessment may be required. Significant impact is defined as:

"A significant impact is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. You should

[36] *Environmental Management and Pollution Control Act, 1994.* Available from <www.thelaw.tas.gov.au> [accessed 14/12/2010]

consider all of these factors when determining whether an action is likely to have a significant impact on the environment."

Given that the Grouped Project involves passive land management with positive environmental outcomes, and that no infrastructure or large-scale ground disturbance will be associated with this project, it does not represent a 'significant impact' and therefore does not require referral under the *EPBC Act*.

By protecting the forest from logging, environmental outcomes such as biodiversity, watershed protection and water quality are safeguarded, compared with the impacts of clearfell for conversion to pasture or ongoing selective logging.

6 STAKEHOLDER COMMENTS

The Grouped Project relates to standing, native forest on private land. Within each instance, the project proponent is exercising their legal right to continue to harvest their native forest, and not to generate income from woodchips and sawlog. There are no significant other stakeholders in this decision, and therefore no need for consultation or ongoing communications. However, all potentially relevant parties have been provided with Forests Alive's contact details. No feedback was received.

Local landowners with native forests generally benefit from the establishment of a grouped project. This provides an opportunity to diversify income as the market for low-value wood products continue to decline, while allowing their forests to recover their ecological and economic value.

Appendix 1: Carbon sequestration from forest growth on the project site, as modelled by FullCAM

Strata 1 Yr	Baseline tC/ha	m^3/ha	Project tC/ha	m^3/ha
2011	66.59	110.19	66.59	110.19
2012	67.26	111.62	67.26	111.62
2013	44.33	73.98	67.91	112.99
2014	45.75	76.78	68.53	114.31
2015	44.93	75.96	69.12	115.58
2016	46.35	78.75	69.69	116.8
2017	47.7	81.41	70.24	117.98
2018	48.97	83.96	70.77	119.12
2019	50.19	86.4	71.28	120.21
2020	44.81	77.61	71.77	121.26
2021	46.24	80.4	72.25	122.28
2022	47.58	83.07	72.7	123.26
2023	48.86	85.62	73.14	124.21
2024	50.08	88.06	73.57	125.12
2025	51.23	90.39	73.98	126
2026	52.32	92.62	74.38	126.86
2027	53.36	94.75	74.76	127.68
2028	54.35	96.79	75.13	128.48
2029	55.3	98.74	75.49	129.26
2030	56.2	100.61	75.84	130.01
2031	57.05	102.39	76.18	130.73
2032	57.87	104.11	76.51	131.44
2033	58.66	105.75	76.83	132.12
2034	59.4	107.33	77.14	132.78
2035	60.12	108.84	77.44	133.43

Stratum 2 Year	Baseline tC/ha	m^3/ha	Project tC/ha	m^3/ha
2011	124.3	195.41	124.3	195.41
2012	125.1	197.11	125.1	197.11
2013	125.87	198.73	125.9	198.73
2014	126.61	200.3	126.6	200.3
2015	105.83	168.02	127.3	201.81
2016	107.12	170.64	128	203.26
2017	108.35	173.14	128.6	204.65
2018	109.51	175.53	129.3	206
2019	110.63	177.82	129.9	207.29
2020	111.79	180.4	130.5	208.54
2021	112.99	182.85	131	209.74
2022	114.13	185.2	131.6	210.9
2023	115.22	187.44	132.1	212.02
2024	116.25	189.59	132.6	213.1
2025	117.24	191.65	133.1	214.14
2026	118.18	193.62	133.5	215.15

2027	119.08	195.51	134	216.12
2028	79.97	131.82	134.4	217.06
2029	81.68	135.15	134.9	217.98
2030	83.31	138.34	135.3	218.86
2031	84.86	141.4	135.7	219.71
2032	86.32	144.32	136	220.54
2033	87.71	147.11	136.4	221.35
2034	89.03	149.78	136.8	222.13
2035	90.28	152.32	137.1	222.88

Stratum 3	Baseline		Project	
Year	**tC/ha**	**m^3/ha**	**tC/ha**	**m^3/ha**
2011	62.22	93.37	62.22	93.37
2012	62.26	93.44	62.26	93.44
2013	62.29	93.51	62.29	93.51
2014	62.32	93.58	62.32	93.58
2015	41.58	62.6	62.35	93.65
2016	42.08	63.66	62.38	93.72
2017	42.56	64.69	62.42	93.79
2018	43.02	65.68	62.45	93.85
2019	43.46	66.63	62.48	93.92
2020	43.89	67.54	62.51	93.99
2021	44.3	68.43	62.54	94.05
2022	44.7	69.28	62.57	94.11
2023	45.08	70.1	62.6	94.18
2024	45.45	70.89	62.63	94.24
2025	45.81	71.66	62.65	94.3
2026	46.15	72.4	62.68	94.36
2027	46.49	73.12	62.71	94.42
2028	46.81	73.81	62.74	94.48
2029	47.12	74.48	62.77	94.54
2030	47.42	75.13	62.79	94.6
2031	47.72	75.76	62.82	94.66
2032	48	76.37	62.85	94.72
2033	48.28	76.97	62.88	94.78
2034	48.55	77.54	62.9	94.83
2035	48.81	78.1	62.93	94.89

Appendix 2: Uncertainty from sampling error, as modelled in the Winrock Sampling Calculator

PLOT QUANTITY ABOVE GROUND

REQUIRED ERROR AND CONFIDENCE LEVEL			
e – level of error (%)		15.0%	
Error level (decimal)		0.150	
Z(1-a) - Confidence level		95.0%	
Sample statistic Z(1-a)		1.96	
Total project area size		850.56	hectares

SIZE AND VARIANCE OF EACH STRATA

Stratum Name	Area (ha)	Mean C/ha (tonnes)	Standard Deviation (tonnes C/ha)	Plot size (ha)	Cost C_h If no cost, put C_h =1
Stratum 1	505.25	65.01609	43.56324	0.205	1
Stratum 2	273.66	114.0076	43.32703	0.205	1
Stratum 3	71.65	53.86058	39.13941	0.205	1

Results - Aboveground Carbon - Number of plots to be used							
		Sourcebook for LULUCF Projects		AR-AM0001, AM0005, AM0006		AR-AM0003, AM0004, AM0007	
Stratum	Stratum Name	Plot Quantity	Rounded Plot Quantity	Plot Quantity	Rounded Plot Quantity	Plot Quantity	Rounded Plot Quantity
Total Sample Size		49.20	**57**	49.79	**58**	49.20	**57**
stratum 1	Stratum 1	**34**	29.88	**35**	29.53	**34**	**23**
stratum 2	Stratum 2	**19**	16.10	**19**	15.91	**19**	**31**
stratum 3	Stratum 3	**5**	3.81	**5**	3.76	**5**	**7**
TOTAL NUMBER OF PLOTS			**58**		**59**		**58**