REDD FORESTS GROUPED PROJECT: PROTECTION OF TASMANIAN NATIVE FOREST

PROJECT DESIGN DOCUMENT (PDD)

VERSION 1.20

FOR VALIDATION WITH THE VERIFIED CARBON STANDARD

MAY 2011

Acronyms and Definitions

AFOLU	Agriculture, Forestry and Other Land Uses
BCEF	Biomass Conversion and Expansion Factor
CCB	Community, Conservation and Biodiversity (Standards)
CDM	Clean Development Mechanism
CSIRO	Australian Commonwealth Scientific and Industrial Research Organisation
DPIPWE	(Tasmanian) Department of Primary Industry, Parks, Water and Environment
DPWH	Department of Parks, Wildlife and Heritage
FFIC	Forests and Forest Industry Council
FFT	Farm Forestry Toolbox
FPA	Forest Practices Authority
FPP	Forest Practices Plan
FSC	Forest Stewardship Council
FullCAM	Full Carbon Accounting Model
GHG	Greenhouse Gas
GPS	Global Positioning System
Grouped project	A project to which additional instances of the project activity, which meet pre-established eligibility criteria, may be added subsequent to project validation
Improved Forest Management (IFM)	Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood and fuelwood
Implementing partner	The individual or organization operating the project activity or activities in partnership with the project proponent
Instance	See ‘Project activity instance’.
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
Monitoring plan	The document that details how GHG emission reductions and removals generated by the project will be assessed and verified
Monitoring report	The document that records data to allow the assessment of the GHG emission reductions or removals generated by the project in accordance with the monitoring plan set out in the project description
NDSVI	Normalised difference for senescent vegetation index
PDD	Project Design Document
PRA	Participatory Rural Appraisal
Private timber reserve	Created by the Tasmanian Parliament to enable landowners to have their land dedicated for long-term forest management, and attaches to the title of the project in perpetuity. A PTR provides that forestry activities on the land are subject to a single, consistent, state-wide system of planning through the *Forest Practices Act 1985*, rather than the variable systems under the *Land Use Planning and Approvals Act 1993*.
Project	The project activity or activities implemented as a GHG project and described in the project description
Project activity	The specific set of technologies, measures and/or outcomes, specified in a methodology applied to the project, that alter the

conditions identified in the baseline scenario and which result in GHG emission reductions

Project activity instance (Instance) A particular set of implemented technologies and/or measures that constitute the minimum unit of activity necessary to comply with the criteria and procedures applicable to the project activity under the methodology applied to the project

Project area Area eligible for inclusion in the project, i.e. forested areas on private land under threat of logging within the state of Tasmania

Project crediting period The time period for which GHG emission reductions or removals generated by the project are eligible for issuance as VCUs, the rules with respect to the length of such time period and the renewal of the project crediting period being set out in the *VCS Standard*

Project proponent The individual or organisation that has overall control and responsibility for the project, or an individual or organisation that together with others, each of which is also a project proponent, has overall control or responsibility for the project

Property area Area of land owned by a single project proponent, defined by cadastral boundaries and demonstrated through ownership documentation

TASVEG Tasmanian Vegetation Map

Uncertainty Uncertainty is a parameter associated with the result of measurement that characterises the dispersion of the values that could reasonably be attributed to the measured amount

UNFCCC United Nations Framework Convention on Climate Change

VCS Verified Carbon Standard

VCU Verified Carbon Unit. A unit issued by, and held in a VCS registry representing the right of an accountholder in whose account the unit is recorded to claim the achievement of a GHG emission reduction or removal in an amount of one (1) metric tonne of CO_2 equivalent that has been verified by a validation/verification body in accordance with the VCS rules.

Contents

1.0 Description of Project

1.1 Project title

Redd Forests Grouped Project: Protection of Tasmanian Native Forest.

Please note that from this point in the PDD, the project is referred to as the 'Grouped Project'.

1.2 Type/Category of the project

The project is a grouped project. This means that discrete project activity instances (hereafter, instances) to be managed under the selected IFM methodology will be added within the project area of Tasmania. These instances will be added at monitoring events.

The Grouped Project is an Improved Forest Management (IFM) project, specifically Logged to Protected Forests (LtPF).

1.3 Estimated amount of emission reductions over the crediting period including project size

Addition 1 comprises 3249.65 hectares and is calculated to reduce emissions by 26 688 tCO2-e each year of the project. Therefore, over the twenty-five year crediting period, this project will prevent 667 206 tCO2-e being emitted.

For each additional project activity instance included within the Grouped Project, the following information will be provided within the specific project file:

- The total size of the instance, i.e. the forested area owned by the specific project proponent(s), generating carbon credits as part of the Redd Forests' grouped IFM project (hectares);
- The projected emission reductions for each project instance, calculated both as avoided emissions per annum and as a total for the project activity instance over the specified crediting period.

1.4 A brief description of the project

There is a long history of native forest logging within Tasmania on private land. To demonstrate the extent of native forest harvesting in 2008 – 2009, the Forest Practices Authority certified 838 Forest Practices Plans for native forest and plantation operations during the year ending June 2009. These plans permitted logging on a total of 48 630 ha on public and private land[1]. The conversion rate from native forest to plantations within Tasmania also increased to 7768 ha in 2008–09 from 5657 ha in 2007–08[2].

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

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.

The Grouped Project was implemented in response to the ongoing logging of native forests within Tasmania, previously the only means to generate income from native forests. The timber industry is largely dependent upon the international market for wood chips, pulp and paper, all low value products. The establishment of an IFM project is intended to maintain and enhance the carbon stocks in native forests for twenty-five years, preventing the emissions generated through business-as-usual logging practices. The project will also have the additional benefits of enhancing local biodiversity (which is undermined by harvesting events and practices), diversifying landowners' income and maintaining the aesthetic and recreational values of the Tasmanian landscape.

By reducing the significant initial cost of validation and allowing discrete project activity instances to be incorporated at monitoring events, the grouped project allows a more rapid and affordable extension of carbon finance options to landowners. The implementing partner believes that this will induce a shift away from unsustainable logging and clearfell practices, facilitating the effective conservation of biodiversity and carbon stocks in Tasmania.

Because this is a grouped project, discrete areas to be managed under the selected IFM methodology will be defined within the project area of Tasmania. These areas will be referred to as 'project activity instances' or 'instances'. They will be identifiable by the project proponent or property (depending on which is the more appropriate identifier), and provided with a unique identification number. Each instance will have an individual file which will contain all of the information required under VCS guidelines and the chosen methodology. This file will be submitted at monitoring events, without the requirement for full validation.

New project activity instances will satisfy the following criteria:

1. The project activity instance must fall within the project area, comprising the state of Tasmania, Australia (see Section 1.5).
2. The duration of the crediting period for each instance must start and finish within the Grouped Project timeframe (see Section 1.6).
3. The instance must be privately owned, with written consent for the IFM project obtained from all landowners.
4. Property Identification (PID) numbers, property names and landowners must be clearly identified.
5. Geo-referenced maps in both digital and hard copy are to be presented, clearly showing the property and project activity instance boundaries.
6. The project activity instance must contain standing native forests under threat from legal timber harvesting under Tasmanian regulation. This threat should be demonstrated by a history of logging, eligibility for Forest Practices Plans and/or a private timber reserve (see Section 1.7). Therefore, the forest in the instance should be subject to the baseline scenario outlined in Section 2.5 of this PDD, i.e. some combination of selective logging, clearfell with natural regeneration and clearfell for conversion to pasture (as permitted on private

native forests in Tasmania under the *Forest Practices Act 1985*, the Forest Practices Code 2000 and the Forest Practices Regulation 2007).

7. The project activity instance must satisfy additionality through characteristics consistent with the PDD and first project activity instance (Addition 1 – Connorville). Specifically, each project activity instance must satisfy Step 2: Investment Analysis of the VCS Tool for the Demonstration and Assessment of Additionality (see Section 2.5). This will be achieved if Criteria 6 (above) is satisfied.
8. The project activity instances must satisfy all requirements and applicability conditions as defined in the relevant VCS guidelines and the GreenCollar IFM LtPF methodology (see Section 1.8).
9. All carbon emissions and reductions must be calculated using the GreenCollar IFM LtPF methodology, with support and guidance from the Redd Forests' standard operating procedures for completing the calculations.
10. The project must be implemented and managed in accordance with this PDD and the most recent versions of the Redd Forests' standard operating procedures, including those for stratification of the vegetation, developing the forest inventory through fieldwork and data management and quality assurance. Therefore, new project activity instances must use and apply the technologies and measures specified in this document, unless improved systems become available (for example, updated versions of FullCAM or ArcGIS). In this case, a deviation must be submitted in the instance file to justify the use of different technologies or measures.
11. Each carbon credit can only be sold under one carbon accounting scheme. It is probable that domestic emission trading schemes will recognise VCS registered projects or the resulting Verified Carbon Units. The proponent cannot sell more than the total number of VCUs issued from each verification event, whether these credits are sold under the VCS, National Carbon Offset Standard (NCOS), Carbon Farming Initiative (CFI), Climate Action Reserve (CAR) or similar.
12. Each project activity instance must be suitable for the Monitoring Plan (see Section 3.0).

1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project

The Grouped Project covers the Australian state of Tasmania (Figure No. 01). Tasmania is an island located 240 km south of the eastern side of the continent, being separated from the mainland by Bass Strait. The state has an area of 68,401 square km, of which the main island covers 62,409 square km.

Tasmania is promoted as 'The Natural State' owing to its significant natural environment. Formally, almost 37% of Tasmania is in reserves, national parks and World Heritage sites. The island is 364 km long from the northernmost point to the southernmost point and 306 km from west to east.

The specific extent of the grouped project geographical area is defined by the following KMZ: [Grouped Project: Protection of Tasmanian Native Forest.kmz]

Figure No. 01. The state of Tasmania, Australia (Source: Google Earth)

1.6 Duration of the project activity/crediting period

The Grouped Project start date is 1 April 2010. The grouped project ceases 25 years after this start date on 31st March 2035.

The first project activity instance (Addition 1 – Connorville) will have a crediting period of twenty-five years. The crediting period for the other instances is a minimum of twenty years, commencing upon the signing of a contract between Redd Forests and the project proponent. The additional project proponents must sign the contract to commence the project within its first five years, and will be eligible for a maximum crediting period from this start date through to the end of the Grouped Project crediting period (31st March 2035).

Instances within the Grouped Project will be monitored individually, approximately upon the anniversary of their start date. These annual monitoring events will assess natural disturbance, changes to project area and market leakage. Changes in the carbon stock will be calculated through modelling and extrapolation. Every five years, a more comprehensive monitoring event will be completed to assess changes in carbon stocks through fieldwork. This is in accordance with Schedule 7.0 and consistent with the Monitoring Plan.

1.7 Conditions prior to project initiation

Logging activities (harvest or clearance of a forest area greater than 1 ha) on private land within Tasmania are subject to a uniform set of laws and a standard code of practice. These are the *Forest Practices Act 1985*, the Forest Practices Code 2000 and the Forest Practices Regulation 2007.

The Grouped Project relates to private land areas that have been and will continue to be harvested in compliance with these laws. The Grouped Project activities do not contravene or inhibit compliance with any of the above regulations.

Consistent with the above statement, each additional instance must include the following information:

- Description of the land use, both current and historical, within the instance;
- Documented evidence demonstrating that:
    1. The project site is representative of other forestlands harvested in the country within the past two years;
    2. The project site is within commercially viable distance to existing transport networks and a port for timber export or a mill for timber processing.

This will demonstrate that logging of the native forests within the instance is widespread, permissible and viable, and consequently that the instance is threatened by further logging.

1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements

The project will achieve GHG emission reductions through avoiding logging events. These logging events typically create large quantities of dead wood and short-term wood products, which emit carbon dioxide as they rot or degrade. Through establishing a VCS-certified project, the landowner agrees not to harvest their forest for a minimum period of 25 years, thereby preventing these emissions.

The underlying conceptual approach of this methodology is based on the Agriculture Forestry and Other Land Use (AFOLU) Guidance Document of the Verified Carbon Standard, under the Improved Forest Management (IFM) category. Activities related to IFM are those implemented on forest lands managed for wood products such as sawn timber, pulpwood and fuelwood, and are included in the IPCC category "forests remaining forests". This project specifically satisfies the criteria 'Conversion of logged forests to protected forests (LtPF)', i.e. protecting forests eligible for logging from logging and degradation.

Project activity instances within the grouped project must satisfy all of the applicability criteria from the GreenCollar IFM methodology, including:

1. Forest management in the baseline scenario is planned timber harvest.
2. Forest use in the project scenario will not involve commercial timber harvest or forest degradation.
3. Merchantable volume (m^3) is estimated in accordance with forest inventory procedures detailed in this grouped project PDD.

4. The boundaries of the additional forest area are clearly defined through a combination of KML files and cadastral property boundaries.
5. Baseline cannot include conversion to managed plantations.
6. Instances cannot comprise peatland or wetlands.

1.9 Project technologies, products, services and the expected level of activity

This project draws on the consultancy services of Redd Forests. Each additional instance within the Grouped Project will be systematically assessed and included using the following services and technologies:

Stratification

- ArcGIS Desktop 10 and Google Earth. This software is used to map the stratification and allocate plots for fieldwork.
- SPOT Satellite Imagery. The images provide an accurate and detailed basemap for mapping and stratification.
- PI (Photo Interpretation) mapping. Because of its structural focus, with comprehensive and consistent coverage of all forests and tenures, PI-typing has become a fundamental information source for Tasmania's forest management. Typing has been widely used to assist wood inventory stratification, operational planning, vegetation and disturbance mapping, and site productivity assessment.
- GIS layers accessed through the LIST (Land Information System Tasmania), a government service that provides land information online. Information accessed includes:
  - Cadastral parcels – property boundaries
  - Hydrography information – to delineate buffer zones around water courses
  - Transport systems – so access to property areas can be assessed and fieldwork is organised accordingly, and for the creation of buffer zones around public roads.

Forest inventory:

- Clinometer. Used for measuring slope to confirm that the land is harvestable.
- Hipchain. This device is used to accurately calculate the total area of each field plot.
- Rangefinder. This device is used to collect tree heights.
- Farm Forestry Toolbox. This program is produced by Private Forests Tasmania, a statutory authority funded by the Tasmanian government and private forest owners. The allometrics in the Toolbox were provided by Forestry Tasmania, the government department responsible for managing State forests. This software is used to calculate the merchantable volume of timber for a tree from its height and diameter at breast height

Modelling:

- FullCAM. This is the Carbon Accounting Model developed by the Australian Government and CSIRO for determining carbon flows in land use, land use change and forestry projects. The software is used to calculate forest growth rates over the project's lifetime, and therefore carbon sequestration in the baseline and project scenarios.

1.10 Compliance with relevant local laws and regulations related to the project

Project proponent

Within the file for each project activity instance, an assessment of the project proponent's adherence to the following laws and regulations will be undertaken;

- *Tasmanian Forest Practices Act 1985;*
- *Tasmanian Forest Practices Code 2000;*
- *Tasmanian Forest Practices Regulation 2007;*
- *Australian Workplace Safety Standards Act 2005;*
- *Tasmanian Workplace Health and Safety regulations 1998;*
- *Australian Fair Work Act 2009*.

Implementing partner

The implementing partner adheres to all laws and regulations relevant to the project, including the *Forest Practices Act 1985*, the Forest Practices Code 2000 and the Forest Practices Regulation 2007.

The project proponents and implementing partner comply with the *Australian Workplace Safety Standards Act 2005* and the *Tasmanian Workplace Health and Safety regulations 1998*, including the Forest Safety Code. Redd Forests follows appropriate safe labour practices to prevention of injuries in the workplace, a particular risk for workers engaged in forestry operations. A site safety plan will be prepared for each instance and will contain property specific contact details and emergency response protocols.

An additional law of relevance to this project is *Fair Work Act 2009*. The Fair Work Act provides a safety net of enforceable minimum employment terms and conditions through the National Employment Standards (NES). Redd Forests employee contracts comply with the Fair Work Act 2009.

The IFM project does not contravene or inhibit compliance with any of the above regulations.

Redd Forests' field staff and full time employees maintain accurate records of work hours through a consistent timesheet. Each field worker is signatory to a casual employment contract and is provided with a safety briefing and an emergency procedure plan for all fieldwork. A minimum of one person per team is also certified in Senior First Aid. Fieldwork is undertaken in accordance with Redd Forests' standard operating procedures.

Full time employee contracts, casual employee contracts and safety plans are available for the validator to review.

1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements

The greatest risks to Improved Forest Management projects within Tasmania are from fire or disease.

There are no significant pests in Tasmania. Although browsing animals (particularly deer and wallabies) do impact on the regenerative capacity of eucalypt forests through trampling and eating of seedlings, these animals prefer to graze within open environments and to seek shelter within forest. Furthermore, these pests are controlled by shooting under property-specific game management plans. Thus, the impact from browsing animals is minimal.

Native eucalyptus forests within Tasmania are not highly susceptible to insect damage, with single-species plantations being much more vulnerable. Louise Gifedder, Senior Conservation Scientist with the Tasmanian Department of Primary Industries, Water and Environment, advised the following:

> "*From a carbon perspective, insects only consume a small percentage of individual leaves for a short period of time, with occasional localised outbreaks of moderate severity, and would not be expected to have a significant impact upon long-term carbon stocks.*"[3]

While fires are an important part of the regeneration and breeding cycles for many plant species, threatened fauna and carbon stocks may be damaged. Eucalyptus forests are typically fire prone. However, these forests are only susceptible to wildfire for a few months of the year due to the relatively cold and wet climate of Tasmania. The risk of accidental or intentional burning is further reduced on private property where access is restricted.

The risk of fire damage to carbon stocks is assessed, based on historical incidence of fire, in Equation 17 of the GreenCollar IFM LtPF methodology. Moreover, each project activity instance will be individually subjected to an assessment of the 'risk of devastating fire' using the Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination, and an appropriate number of credits allocated to the AFOLU Pooled Buffer Account. This risk assessment will be repeated with each monitoring event. A property-specific fire plan will be prepared (if not already available) and included in the project file.

The Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination has been completed in Appendix 1. Some of these risks (notably fire, timber harvest and financial failure) will be analysed individually for each instance.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction

Tasmania's extensive logging history was outlined in Section 1.4. This illustrates the long-term, state-wide precedent of carbon emissions through timber harvest on private land.

[3] Gilfedder, L., *pers. comm.*, 2010

The individual logging history of each instance will be included in the appropriate project file to demonstrate historical business-as-usual logging practices. Without the carbon finance generated by the project, the logging and associated carbon emissions will continue.

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates)

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.

1.14 Project rejected under other GHG programs (if applicable)

The grouped project has not been rejected by any other GHG programs.

1.15 Project proponents' roles and responsibilities, including contact information of the project proponent, other project participants

For each instance, the project proponent is the legal landowner and the signatory to a contract with Redd Forests. In this first instance the project proponents are, on the one hand Roderic Alan O'Connor, landowner, and, on the second part Connorville Estates Pty Ltd a private company governed by the laws of Tasmania, Australia and of which Roderic Alan O'Connor is the sole Director.

Contact person: Roderic Alan O'Connor
Title: Landowner and Director of Connorville Estates Pty Ltd
Address: 3943 Connorville Road, Cressy,TAS, 7302
Telephone number: +61 (0)3 6397 8291
Email: raoc@bigpond.com

Each subsequent instance will be subject to a separate contract indicating the consent of the additional project proponent(s), and clearly presenting all parties' contact information and responsibilities.

Redd Forests 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. Redd Forests is a leading forestry carbon project developer in Australia.

Contact person:	Stephen Dickey
Title:	Managing Director
Address:	11 Renfrew Street, St. Andrews, NSW, 2566
Telephone number:	+61 (0) 421 670 567
Email:	stephen@reddforests.com
Website:	http://www.reddforests.com

Stephen Dickey is the co-founder and Managing Director of Redd Forests. He has six years of experience on climate change issues, working with Oxfam, WWF-Australia, Redd Forests and as a consultant to Climate Friendly. His experience in senior management is extensive, including positions with TNT, British Airways and Sabre Corporation. This combination of international commercial experience and exposure to climate change issues in diverse sectors gives him a rare set of capabilities and perspectives to lead Redd Forests.

Andrew Ratcliffe is co-founder and Chairman of Redd Forests. He also holds the position of executive director of Incon China, established to assist SMEs to do business in China, and director of Sports Entertainment Asia and Smartframe Pty Ltd. Andrew spent almost twenty years working in the financial sector, including work with Price Waterhouse Coopers, ANZ Bank, First Pacific Limited and the stockbroker Dominguez Barry Samuel Montague (now UBS). Andrew has a combined Commerce/ Law degree from the University of NSW and is a qualified Chartered Accountant.

Sarah Colenbrander is the Project Manager responsible for preparing the Redd Forests' Grouped Project. Sarah graduated from the University of Sydney in 2009, with a Bachelor of Science (Advanced) and Bachelor of Commerce. During her studies, Sarah held the role of NSW Projects Team Leader with the Oaktree Foundation. In this capacity, she was responsible for designing and monitoring educational projects in India, Papua New Guinea and South Africa. She was also employed by Dowse CSP to create a quantitative model to identify mechanisms through which corporate social responsibility initiatives add value to business. Sarah was the Project Manager responsible for Redd Forests' first Tasmanian projects, which were the first IFM projects in the world to be validated and verified with the VCS.

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 Redd Forests, Jarrah was the 'biodiversity coordinator' with NRM South.

Jarrah will be supported by the Redd Forests' Technical Consultant, Stephanie O'Donnell. Stephanie graduated in 2009 with a Bachelor of Science (Honours) from the University of Sydney. She continued to conduct research with the Shine Lab, one of Australia's foremost ecology centres. During her time as a Research Assistant, she produced peer-reviewed publications in leading scientific journals and was awarded the Southwood Prize (2010) by the British Ecological Society for best paper by a young author. Stephanie is responsible for vegetation stratification using GIS software, modelling carbon flows using FullCAM and calculating the voluntary carbon units generated by each project activity instance.

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

Project proponent responsibilities and capacity building

After the first verification, project management and monitoring events will be the responsibility of the project proponent. The project proponent will also be responsible for the storage of information collected in relation to monitoring events. In order to ensure that the project proponent is able to undertaken ongoing monitoring, Redd Forests will prepare a property transition folder. The contents are detailed in Section 3.4 and the Monitoring Plan.

The project proponents and/or their associates (family members, property managers, etc) are encouraged to participate in the fieldwork to allow for training in locating and measuring the field plots. A Redd Forests' Project Manager will also spend extensive time working through the calculation processes outlined in the GreenCollar IFM LtPF methodology to ensure that the landowner understands the principles and stages of the project as well as the proponent's ongoing responsibilities.

All the tasks that must be completed to maintain the project and obtain the VCUs will be identified in the monitoring plan. All information required to complete a monitoring event will be provided to the landowner. Redd Forests will continue to provide project management services for the project proponents at their request; and alternatively, these resources will enable the landowner to either independently maintain the project or contract the services of an alternative qualified organisation.

Credit registration

It is the responsibility of the project proponent to register credits. However, as the implementing partner, Redd Forests has contracted to register the project, open a VCS Registry Account in the name of each project proponent and to facilitate the issuance of the credits arising from the first verification. This will be completed in accordance with the VCS Guidance Document: VCS Project Registration and VCU Issuance Process (version 1.1).

The project proponent for each instance is responsible for co-ordinating the ongoing monitoring events and the registration of the credits in accordance with the VCS Guidance Document.

1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.)

Legislative information

As detailed above, forest harvesting on private land is regulated uniformly across land within Tasmania. All logging (clearance of an area in excess of 1ha) on private land requires a Forest Practices Plan in accordance with the Tasmanian Forest Practices Code 2000. For this reason, all additional project areas are subject to a consistent set of regulations governing past and planned timber harvesting operations.

Sectoral information:

In a business-as-usual scenario in Tasmania, native forest on private land is typically commercially harvested for woodchips and a small amount of sawlog. On average, the ratio of woodchip to sawlog from private land forest harvesting within Tasmania is 80:20 and in many instances in closer to 90:10. In addition, many landowners have a historical record of converting native forests to grass pastures as they shift their land use towards grazing to produce animal products.

While ongoing clearfell for conversion is still legal and widely practiced, recent policy announcements have created an incentive for landowners to utilise existing logging concessions and to seek additional logging concessions for clearance and conversion to plantation or pasture in the near future. The "Tasmanian Government Policy for Maintaining a Permanent Native Forest Estate" (December 2009), issued by the Department of Infrastructure, Energy & Resources, states that:

"Broad scale conversion of native forest on public land has now ceased. This revised Policy is intended to provide an orderly phase out of broad scale conversion on private land by 2015… This Policy is given effect through the Forest Practices Authority's consideration of applications for Forest Practices Plans under the Forest Practices Act 1985.*"*[4]

This policy encourages landowners to take advantage of existing Forest Practice Plans and to seek additional plans to clear and convert private forested land, before this practice is prohibited in 2015. This increases the threat to significant areas of carbon-rich native forest, particularly when the landowners have significant demand for grazing land.

The Tasmanian Forest Industry is currently the subject of political negotiations and ongoing discussions between industry and environmental groups. To date, these discussions have resulted in the establishment of a set of principles for a potential future agreement on the future of the industry. The likely policy implications of these discussions relate almost entirely to 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, stating;

"Encourage and support but not mandate to seek assistance for certification and protect, maintain and enhance high conservation value forests on their properties."[5]

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[4] Tasmanian Department of Infrastructure, Energy & Resources (2009) Tasmanian Government Policy for Maintaining a Permanent Native Forest Estate, available from <http://www.dier.tas.gov.au/__data/assets/pdf_file/0016/14506/PNFEP_final_23dec09.pdf> [accessed 28/05/10]

[5] *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)

There is no indication that harvesting of native forests will be abolished on private land. For this reason, it can be confidently assumed that the baseline deforestation drivers will continue to place heavy pressure on private, native forest. To support this baseline scenario, the Forest Practices Authority, Annual Report 2008-2009 reports that the high levels of forest harvesting, particularly on private land are a concern, stating;

"The FPA continues to record its concern that such high levels of conversion have potentially long-term ramifications for the maintenance of regional biodiversity. The FPA notes that the rate of conversion to plantation has increased from 2007–08 levels, despite cessation of conversion on State forest and by some large forestry companies which are complying with the voluntary Australian Forestry Standard. The FPA notes that conversion continued to be carried out at a high level on private land."[6]

Site stratification methods

Stratification will be conducted consistently across all project activity instances, in accordance with the latest version of the Redd Forests' Stratification standard operating procedures.

Stratification requires a number of data layers to be incorporated into a property map in the GIS program, ArcGIS 10. These include:

1. Cadastral parcels;
2. Hydrography information;
3. Transport systems;
4. Eagle nest sites;
5. Satellite Image (SPOT or equivalent);
6. Topographic Map of at least 1:100 000 scale;
7. PI (Photo Interpretation) Mapping Layer[7].

The project area boundaries are defined using the PI Mapping Layer. The structural focus of PI Mapping means it is an ideal basis for stratification; indeed, it is a fundamental information source for Tasmania's forest management and has been widely used to assist wood inventory stratification, operational planning, vegetation and disturbance mapping, and site productivity assessment[8]. The forest boundaries defined by the PI layer are then proofed against a high quality satellite image.

Buffer areas are then excluded from the project area. These include streamside reserves, roadside buffers, conservation covenants, eagle nest sites, wetlands and peatlands. The required streamside buffer areas are described in specific harvesting plans for instances. If harvesting plans are not available, the widths of buffer regions are chosen by comparing the stream classification supplied as attributes in the GIS hydrography layer (theLIST www.thelist.tas.gov.au, Department of Primary Industries, Parks, Water and Environment, Tasmania) with the buffer widths prescribed in the

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[6] Forest Practices Authority, Annual Report (2008-2009) <fpa.tas.gov.au> [accessed 15/11/10]

[7] Stone, M.G. (1998). Forest-type mapping by photo interpretation: A multi-purpose base for Tasmania's forest management. *Tasforests 10*, 15-32.

[8] Stone, M.G. (1998). Forest-type mapping by photo interpretation: A multi-purpose base for Tasmania's forest management. *Tasforests 10*, 15-32.

Forest Practices Code (2000) for Tasmania. Buffer widths were imposed either side of the stream centreline (Table 1).

Table No. 01. Stream classes and buffer widths (the buffer is applied either side of the stream centreline).

Stream Class	Stream-Type Attribute	Buffer Width (m)
1	named rivers and streams, major streams, and minor rivers	50
2	minor streams or tributaries not listed in class 1	30
3	minor tributaries not listed in classes 1 or 2	20
4	all streams not listed as class 1, 2 or 3	10

Roadside buffer areas are excluded from the project area as a precautionary measure. This is a 10m zone on either side of public roads, although not logging or fire access tracks. Eagle nest sites locations are accessed through the Tasmanian State Department database - The Natural Values Atlas. The basic requirement for nest security is a reserve of 10ha of undisturbed habitat around the nest, concentrated uphill[9]. Any areas classified as conservation covenants are identified by the landowner and excluded from the project activity instance. Areas of wetlands or peatlands are identified in the TASVEG layer. The TASVEG layer uses digital vegetation layers from the TASMAP 1:25,000 series, geology maps and vegetation/ecology texts to assist aerial photo interpretation (PI). The boundaries of peatlands and wetlands are delineated using the TASVEG layer and confirmed against satellite images of the site to permit exclusion from the project area.

The instance is then stratified for biomass sampling according to PI classifications of forest stands. The PI-type code denotes growth stage, stand height and percentage crown cover estimates: thus an instance may be stratified based on difference in these structural values. When possible, additional information about the condition class of an area, such as whether the stand is dead, severely fire damaged, over-mature, thinned, or cut-over in past selective logging, is included and gives a greater level of detail to the stratification. All areas with similar PI-type codes are grouped together and form the basis for the different strata. These areas are condensed into fewer strata after fieldwork based on the results of biomass sampling.

Before stratification is finalised, the GIS Technical Consultant and Project Manager will conduct a site visit. The purpose of this field trip is to establish accessibility to the property, to confirm road and gate locations (both of which will be recorded as tracks on the GPS), and to provide a basic site assessment for the stratification. On this trip, the landowner will also be consulted to confirm that all forested areas and properties have been included in the stratification work.

Fieldwork plots are then assigned to strata according to the requirements of the Winrock Sampling Calculator. A grid of points (a fishnet), each 45 m apart, is overlaid and cropped to each separate strata area. From this list of points, the required number of plots is randomly selected. Any plots falling within 10m of the strata boundaries are excluded: this is intended to ensure that plots fall within a contiguous area rather than overlapping separate strata, as the GPS devices are accurate to only 10m. These points are the assigned northeast corners for field plots. After each week of fieldwork, the

[9] Forest Practices Authority. Fauna Technical Note Series No. 1: Eagle nest searching, activity checking and nest management.

data collected is fed back into the Winrock Sampling Calculator and the number of plots required is adjusted accordingly. Additional plots are then selected from the same grid as necessary. Plot numbers will be representative of the specific instance and strata in which a plot is situated. Thus, all plots will have a number that comprises of 3 parts (i.e. xx:yy:zz – the first part referring to the project activity instance, the second to the strata number, and the third to the specific plot number). For example, Plot 01:02:24 would be identifiable as Addition 1 (Connorville), Strata 2, Plot 24.

Forest inventory methods

These methods will be applied consistently for each project activity instance, and are in accordance with the Redd Forests' standard operating procedures for fieldwork.

The individual plot dimensions are 45 by 45 m (0.2025 ha). The sides of the plots are aligned with the magnetic compass directions (N, S, E and W) in the field, and determined in the field with compasses and measuring tapes. The corners of each plot are marked with a stake and flagging tape, with the NE corner marked with a more permanent metal pole. Thus the plots and their locations can be retrieved during the project period.

Data collected for each plot is recorded on waterproof paper in the field. It includes the following:

- Topographic slope and aspect (in degrees);
- Property name;
- Plot number;
- Date, time, staff involved;
- Easting and northing of the NE plot corner;
- GPS waypoints for each corner of the plot;
- Diameter at breast height (to the nearest 0.5cm) of all trees above 20cm (including those threshold trees rounded up from 19.75cm);
- Tree hollows.

In addition to the plot-level data, the height of ten trees is obtained for each merchantable species found on the project activity instance. This is used to calibrate the Farm Forestry Toolbox.

Processing and managing data

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 Redd Forests' standard operating procedures for quality assurance and version control are available for review by the validator.

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

- Redd Forests Sydney office: Unit 36, 75 Buckland Street, Chippendale, NSW 2008
- Redd Forests, Tasmanian Office: Level 1 – 148 Elizabeth Street, Hobart, 7000

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

- Contract
- Budget
- Ownership
    - PID data
    - Written consent from other shareholders
    - Forest Practises Plan
- Stratification
    - Satellite images
    - GIS Layers
        - PI typing
        - Strata shapefiles
        - KML Files
            - Instance
            - Project Area
            - Property Area
    - Strata maps
    - Winrock sampling calculator
- Fieldwork
    - Data sheets (electronic copies)
    - FFT data
    - GPS waypoints
- VCS PDD
    - PDD
    - Calculations
    - Logging history and forecast
    - FullCAM
        - PLO files
        - Excel output
    - NCRs/NIRs
    - 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 in a safe at each location.

1.17 List of commercially sensitive information (if applicable)

N/A

2.0 VCS Methodology

2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices

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

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

2.2 Justification of the choice of the methodology and why it is applicable to the project activity

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 (m^3/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

(m^3/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, any wetlands and or peatlands are excluded from an instance. The grouped project therefore incorporates only standing forest.

2.3 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project

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

[10] CDM Executive Board (2007) Annex 15: Procedure to determine when accounting of the soil organic carbon pool may be conservatively neglected in CDM A/R project activities <http://cdm.unfccc.int/EB/033/eb33_repan15.pdf> [accessed 19/10/10]

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.

2.4 Description of how the baseline scenario is identified and description of the identified 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 baseline scenario will be identified by the project proponent, with support from the implementing partner, as detailed in the Redd Forests' standard operating procedures for completing the IFM calculations. The baseline scenario may be developed with the use 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 process for establishing the baseline scenario is detailed in the Redd Forests' standard operating procedures for IFM calculations.

2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality)

For each instance within the Grouped Project, the carbon stock change is determined from the difference between the base year carbon stock and projected growth in the forest, minus stock change due to harvest, plus stock change due to regrowth after harvest. When iterated for each year of the harvesting plan, this sequence delivers the net change in carbon stock in the baseline. There is a net reduction in GHG emissions because the existing carbon stock (aboveground biomass and dead wood) is protected from the clearance that would have occurred under a business-as-usual scenario.

In the baseline scenario (continuation of logging), a fraction of the carbon currently in the standing biomass would have been stored in harvested wood products. However, the younger a forest, the lower the carbon stock in the biomass and soil. Preventing ongoing logging enhances the carbon stock on each of the additional project areas because of ongoing sequestration in the native Eucalyptus forests.

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 Redd Forests' standard operating procedures for conducting IFM calculations.

1. <u>Native forest remains standing without registering as an AFOLU activity:</u>
   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. <u>Covenant all of the forested land:</u>
   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. <u>Selective logging:</u>
   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. <u>Clearance and native regeneration:</u>
   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[11]*."*

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

[11] *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)

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)[12] 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 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

[12] *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}*

Permanent Native Forest Estate" (December 2009)[13] 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

The 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 Redd Forests Pty Ltd to undertake stratification, fieldwork, calculations and prepare the Project Design Documents in accordance with the Community, Climate and Biodiversity Standard and Verified Carbon Standard.

The 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[14], 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 is a viable alternative scenarios and cheaper than the CDM/VCS project activity. Therefore, the project activity satisfies the investment analysis for additionality.

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[13] *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}*

[14] 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]

The simple cost analysis for the project activity instance can be summarised in the following table format.

Forestry product:	Average yield per hectare:	Current market price ($):	Net value ($):
Pulp and sawlog	37.92 tonnes of pulp 7.62 tonnes of sawlog[15]	$15/tonne of pulp $30/tonne of sawlog[16]	*Revenue – harvesting costs.*
	Yield = $797.59 per ha		$797.59 per ha[17]
Carbon	183.14 VCUs[18]	$10/VCU	*Revenue less development and monitoring costs*
	Yield = $1831.40 per ha		$1691.40 per ha[19]

STEP 3: Barrier analysis.

This step does not need to be completed. If the simple cost analysis in Step 2 reveals a less costly alternative land use (i.e. allowing the native forest to remain standing without either harvesting or establishing an IFM project), then Step 3 can be by-passed and the analysis move directly to Step 4: common practice analysis.

STEP 4: Common practice analysis.

4a: Analyse other activities similar to the proposed project activity.

The Grouped Project has two precedents in Australia: IFM LtPF projects implemented on 790ha on the Archers' property in the Northern Midlands of Tasmania (the Redd Forests' pilot project) and on 7 666ha on Peter Downie's property in the Central Highlands if Tasmania.

4b: Discuss any similar options that are occurring

As outlined above, there are two comparable projects to the grouped project in Tasmania. However, even if the establishment of the Grouped Project allows improved forest management practices to become widespread in Australia, any discrete instance that conform to the eligibility criteria outlined in Section 1.5 will satisfy the VCS Tool for the Demonstration and Assessment of Additionality. Specifically, they satisfy the investment analysis in Step 2 because the landowners forfeit potential income from pulp and sawlog with no alternative revenue except for carbon finance. For this reason, the proposed project activity would not be implemented without the incentive of VCS

15 Private Forests Tasmania, annual reports, http://www.privateforests.tas.gov.au/publications/annual_reports <accessed 11/3/2011>. In 2009-10, Forestry Tasmania reported 260,343 tonnes of pulp 52,343 tonnes of sawlog were taken from 6,865 ha.

16 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

17 Harvesting costs are paid by the buyer and are not applicable to the landowner.

18 Source: First two Redd Forest validated and verified projects (Pilot and Downie). In these projects, 1,562,369 VCUs were generated from 8,531 ha.

19 Based on development costs of $100,000 and 25 monitoring and verification events at $10 000 per event on an average property of 2500 ha.

approval and subsequent sale of carbon credits. Every instance within the Redd Forests' Grouped Project is therefore additional.

3.0 Monitoring

3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices

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.

3.2 Monitoring, including estimation, modelling, measurement or calculation approaches

The purpose of monitoring a VCS project is to ensure that the carbon credits issued by VCS provide an accurate representation of the carbon emissions avoided through improved forest management. The monitoring techniques should assist the project proponents in establishing a credible and transparent schedule for these carbon credits, meeting accepted standards for data collection, recording and quantification.

Project area

Task number	Activity description	Indicator	Frequency
1	Determination of uncertainty in the project activity instance area. Calculated by assessing forested area in satellite images.	Change in instance area	Every year

The geographic position of the project boundaries and the consequent project area are recorded as KML files. This will be used to measure the parameter 'area covered by stratum i (A_i))'.

Where possible, a satellite image taken during the monitoring period will be purchased to assess any variations in the forested area. This will be used to measure the parameter 'area covered by stratum i (A_i))'. This task will be subject to the availability of a recent and reasonably costed image. Differences between the original and new files will be calculated as a percentage of total area, and added to the uncertainty calculations in Equations 25-26 of the methodology. This also provides a preliminary indication of any damage to or loss of aboveground biomass in the project area.

A suitable satellite image should be obtained at a maximum interval of every three years.

For those years when a satellite image is not available, alternative monitoring steps must be undertaken. In particular, the site visit should include comparing the boundaries of the forested area to the original KML files. Any loss of forested area within the boundaries will be checked when assessing natural disturbance by driving through the forested area.

Carbon stocks

Task number	Activity description	Indicator	Frequency
2	Determination of uncertainty in the forest inventory. Calculated using the Winrock sampling calculator.	Sampling error	Every 5 years
3	Determination of carbon stock in aboveground trees per unit area per stratum. Calculated from fieldwork data.	Carbon stock	Every 5 years
4	Determination of carbon stock change in aboveground trees. Calculated from fieldwork data.	Carbon stock change	Every 5 years
5	Determination of uncertainty in carbon sequestration projections.	Difference (as a percentage) between FullCAM projections and field measurements	Every 5 years
6	Determination of carbon stock in aboveground trees per unit area per stratum. Calculated from extrapolating FullCAM models.	Carbon stock change	Annually

The data relating to the standing carbon stock shall be assessed through repeat sampling of permanent field plots in each stratum. The same plots shall be sampled at a monitoring event every five years to reduce variables and gain a more accurate idea of growth rates between monitoring events. The resulting forest inventory should be extensive enough to permit an estimate of average biomass accumulation (m^3/ha).

20% of the original plots in each stratum will be selected using a random number generator[20]. This should be enough permanent plots to assess carbon stock changes to 15% variance within a 95% confidence interval: if not, more of the original sampling plots must be identified at the monitoring event – again using a random number generator – and measured as required.

This monitoring task – the plot re-measurement – will be completed every five years. In between each of these comprehensive monitoring events, annual monitoring events will be completed, approximately upon the anniversary of the instance's start date. These will involve a site visit and comparison of satellite imagery to ensure that no deforestation has occurred. To determine the number of carbon credits generated at this point, forest growth will be extrapolated from past sampling and FullCAM models, as permitted in the methodology.

The GPS coordinates of the NE corners of each plot have been electronically stored, and the corners marked in the fields with stakes and flagging tape. In the new forest inventory, data and information to be reported and stored will include:

- Date, time, staff involved;
- The DBH of live trees and standing, solid dead trees (as described above). Trees measured in the plots must be of DBH $\geq$ 20 cm, in

[20] For example, the random function in Microsoft Excel or Haahr, M. (2011) Random.org, Trinity College, Ireland Available from <http://www.random.org/>

accordance with recommendations for forest inventory fieldwork from FAO (United Nations Food and Agriculture Organisation)[21]. Diameters were measured at 1.3m with DBH tapes using the Australian Forestry Standard (which matches IPCC guidelines). Tree basal hollows were recorded, approximated as either a cone or cylinder

- Photographs to record vegetation and disturbance characteristics;
- Any other noteworthy changes.

The data will be recorded on waterproof paper, using pencil, in the field. The data will then entered into an Excel spreadsheet, and checked independently to ensure consistency with the field data. Hard and electronic copies of the data will be stored in two locations.

The forest inventory data will be converted from tree heights and diameters at breast height to merchantable volume of timber for each individual tree 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 managing 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 data on individual trees in the sample plots is extrapolated, using Equations 13-15 of the VCS-approved GreenCollar IFM methodology, to determine the standing carbon stock at each monitoring event. Changes in this value reflect the increment in merchantable biomass and ultimately carbon sequestration (tCO_2-e), as calculated by Equation 16. The product of fieldwork and subsequent calculations at each monitoring event can be compared to the FullCAM projections developed at the project's establishment. FullCAM is international best practice in modelling carbon flows. Moreover, for each strata, FullCAM's output was consistent with fieldwork estimates of aboveground trees (m^3/ha) in 2010, and consistent between the baseline and project scenarios until the first harvest. If the variation between FullCAM's estimates and the monitoring results is greater than 15% (within a 95% confidence interval), the calculations of verified carbon units shall be revised in accordance with the new data.

In addition, the mean and standard deviation of the field data collected (converted to tC/ha in accordance with Equation 3) will be run through the Winrock sampling calculator. This will determine any uncertainty with respect to sampling error. If the outcome is different from the projections, the adjusted uncertainty is to be factored into Equations 25-26.

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[21] Branthomme, A; Saket, M; Altrell, D; Viorinen, P; Dalsgaard, S; Andersson, LGB (2004) National Forest Inventory: Field Manual Template (Working Paper 94E), FAO Forestry Department, Rome. <ftp://ftp.fao.org/docrep/fao/008/ae578e/ae578e00.pdf> [accessed 08/11/2010]

Redd Forests can and will coordinate the process if requested by the project proponent. Data collected through these monitoring events will be stored through the same process as the original data sheets. Field data sheets will be scanned, photocopied and stored in hard copy form by the project proponent, while electronic copies are held at:

- Redd Forests Sydney office: Unit 36, 75 Buckland Street, Chippendale, NSW 2008 and
- Redd Forests, Tasmanian Office: Level 1 – 148 Elizabeth Street, Hobart, 7000

Or at the offices of the entity performing the monitoring if not Redd Forests. For each monitoring event, the storage site for the new data collected will be specified in the monitoring report.

Natural disturbance

Task number	Activity description	Indicator	Frequency
7	Site visit to assess natural disturbances and illegal logging.	Deforestation in hectares	Annually
8	Determination of carbon stock change in the carbon pools by natural disturbances and illegal logging.	Carbon stock change.	Annually (if required)

The first option for assessing the extent of natural disturbance will be using satellite imagery to detect any changes in aboveground biomass. The SPOT or comparable image will have been obtained, if available, to assess changes in forested area (above). Changes to vegetation coverage will be determined by comparing images taken at the start of the project and as close to the monitoring event as possible. The images will be analysed using an [ISOCLASS] unsupervised classification into 30 classes. This classification will be based on a composite imaged formed from all four SPOT bands plus the digital elevation model (DEM), topographic aspect and topographic slope. The topography is included to counteract differentiation due to, for example, sun angle, while still allowing topographic effects on biomass or vegetation type to be differentiated through the SPOT radiances. Of the thirty classes, trees are typically in classes < 9, bare soil in classes > 25 and grass cover between these two. Classes greater than nine are therefore removed from the data array for clarity. The total area covered by the included classes will then be compared between the images to determine if there was any loss of biomass across the project area. These images must be included in the monitoring report for reference.

Any areas concealed by cloud cover must be identified with KML files. These areas must be examined in more depth during the site visit.

If a recent image cannot be obtained, monitoring of natural disturbance will require more extensive groundtruthing. The most probable causes of natural disturbance are wind/storm damage and mudslides: these are highly visible from the roads, as damage is concentrated on forest boundaries and steep slopes. For this reason, monitoring of natural disturbance can be achieved with a comprehensive site visit to the property to assess any deforestation or forest degradation in the forested area. Track logs must be kept to demonstrate the extent of the field monitoring.

Should any damage to the forest carbon stocks be observed, the area in which these impacts occur will be mapped using GIS delineation and multiple transects covering at least 1% of the project area. The data collected will be used to assess carbon stock losses in the project scenario, according to the chosen methodology.

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 calculated the risk and likely extent of damage from fire, based on historical incidence of wildfire. The average area lost to fire every twenty-five years (based on records lasting fifty years) is multiplied by the difference between aboveground trees 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 19 provides an ex-post means to measure carbon loss from non-fire natural disturbance. Equation 20 allows projections of illegal logging, although this is not considered a plausible risk for IFM projects in Tasmania.

Fire plan

A property-specific fire plan must be submitted along with the file for each project activity instance. This fire plan should include agreements with the local fire service, neighbouring properties, the creation of firebreaks, the maintenance of fire equipment, etc.

Illegal logging

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.

According to the 2008-2009 Annual Report, the Forest Practices Authority has established three levels to monitor compliance with the FPPs:

1. Routine monitoring of operations by Forest Practices Officers employed by forest managers. This level of monitoring is often undertaken as part of formal environmental management systems and the Australian Forestry Standard, which also involve third- party audits.
2. Formal reporting on compliance is required for all FPPS under s.25(A) of the *Forest Practices Act, 1985*.
3. Independent monitoring is carried out across a representative sample of FPPs in accordance with s.4(E)(1)(b) of the Forest Practices Act.

Given the requirement that all forest harvesting must be undertaken through a certified forest practices plan which, in the case of private land, must be initiated by the landowner, ‘illegal logging’ within Tasmania would constitute logging that involves breaches of the Forest Practices Code rather than logging that occurs with no forest practices plan. The FPA reports that there were five instances where fines for breaches were imposed during the financial year 2008-2009.

During the year ending June 2009, the FPA certified 838 Forest Practices Plans for native forest and plantation operations, totaling 48 630 hectares on public and private land[22]. It is also noted that the rate of conversion of native forest to plantations within Tasmania increased (7768 ha in 2008–09 compared with 5657 ha in 2007–08)[23].

These high rates of native forest clearance represent forest harvesting that is endorsed through existing legislation. Within Tasmania, the legal instrument through which private forest harvesting is established is called a Private Timber Reserve (PTR). PTR's were created by parliament in 1985 to enable landowners to have their land dedicated for long-term forest harvesting. The legislation provides that forestry activities on private land are subject to a single, statewide system of planning and regulation through the *Forest Practices Act 1985*[24].

Firewood extraction within Tasmania does occur but the impact upon forest carbon stocks is negligible. This is because large, dead, hollow-bearing trees and fallen timber are the two timber types most targeted by wood cutters[25]; and because firewood collection tends to occur within public roadsides mainly within proximity to residential areas. The Redd Forests' project area contains 10m buffers along public roadsides, since these areas are excluded from forest harvesting through the Tasmanian Forest Practices System. Private access to properties is severely restricted by locked gates and vehicular barriers. In addition, there are firewood collection permits issued for public forests within Tasmania and this reduces the demand for illegally sourced firewood from roadsides

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 Redd Forests' Project Areas from illegal logging is negligible within Tasmania, while the threat to native forests from legally permitted logging is significant.

A Participatory Rural Appraisal (PRA) will be undertaken every two years to determine if there is potential for illegal logging to occur. The PRA will obtain from key stakeholders and authorities a yes/no answer to the question '*Is there potential for illegal extraction of trees from the project area?*'

Task number	Activity description	Indicator	Frequency
9	Complete a Participatory Rural Appraisal	Risk of illegal logging	Every two years

[22] Forest Practices Authority, Annual Report, 2008 – 2009.
[23] Forest Practices Authority, Annual Report, 2008 – 2009.
[24] Forest Practices Authority, Annual Report, 2008 – 2009.
[25] Resources Planning and Development Commission (2003) State of Environment Report Tasmania <http://soer.justice.tas.gov.au/2003/bio/4/issue/10/ataglance.php> <accessed 15/11/2010>

If >10% of respondents answer ‘yes’ at any PRA, other illegal logging parameters identified in the Green-Collar IFM methodology will be assessed in accordance with the methodology. Specifically, these parameters are ‘area potentially impacted by illegal logging in stratum *i* ($A_{DIST\_IL,i}$)’ and ‘total area of illegal logging sample plots in stratum *i* ($A_{P,i}$)’).

Leakage

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.

<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.

<u>Market Leakage:</u>

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[26] and in the wood supply agreements with Gunns Ltd and Ta An Tasmania Pty Ltd[27]. 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."[28] State-specific quotas are detailed in Regional Forest Agreements[29]. 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 the start of the decade[30]. 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[31]. 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.

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[26] 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]

[27] Forestry Tasmania (2010) Wood Supply Agreements. Available from <http://www.forestrytas.com.au/forest-management/wood-supply-agreements> [viewed 18/02/2011]

[28] 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]

[29] Department of Agriculture, Forestry and Fisheries (2010) Regional Forest Agreements Home, Australia. Available from <http://www.daff.gov.au/rfa> [viewed [18/02/2011]

[30] 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.

[31] 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.

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 Redd Forests' 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:[32]

> *"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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[32] Ajani, J. (2011) Australia's wood and wood products industry, situation and outlook, Fenner School of Environment and Society, Australian National University, Australia.

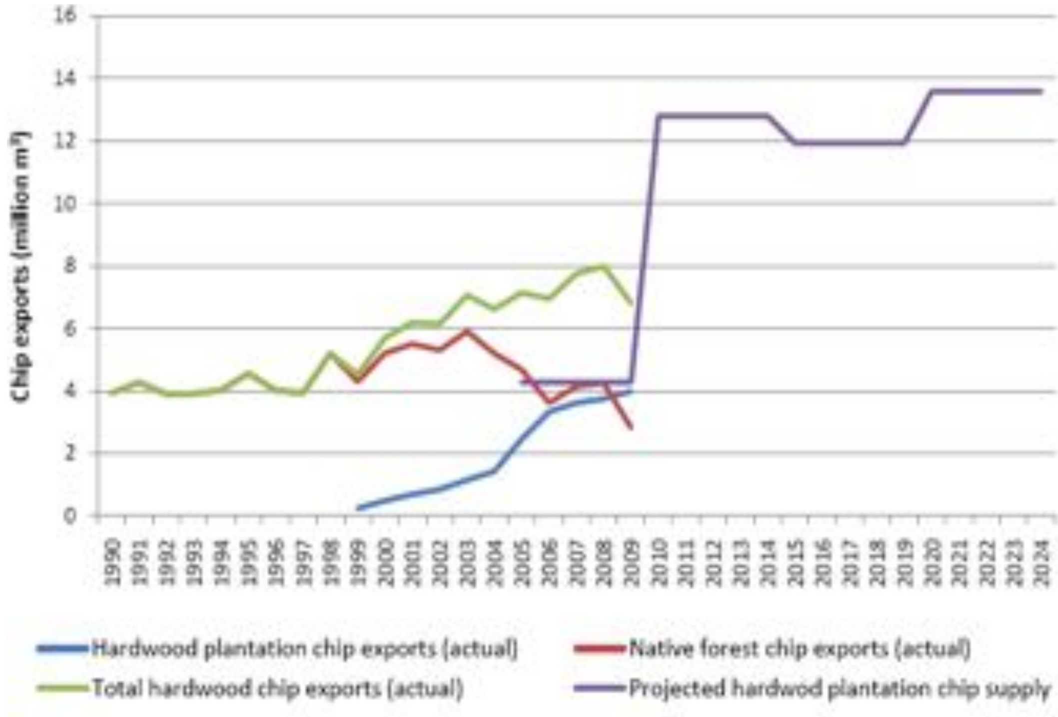

Figure No. 14. Australian hardwood chip exports and projected plantation supply

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.

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[33].

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[34]. On mainland Australia, pulp is produced only as a byproduct of sawnwood[35]. In Tasmania, the pulp supply is increasing as Eucalyptus plantations across the state mature (refer to Figure No. 14). 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[36]. 80% of this output is intended to produce low-value woodchips[37]. 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[38], 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,[39] 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

[33] 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]

[34] 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

[35] 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.

[36] 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]

[37] 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]

[38] (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]

[39] 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]

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[40].

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.

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[41]. 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, 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

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

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

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.

Task number	Activity description	Indicator	Frequency
10	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

Uncertainty

The main source of uncertainty in the baseline scenario derives from the accuracy of projected harvest levels. The uncertainty associated with this will, for each project activity instance, be estimated based on the proponent's understanding of the land's productivity (based on discussion with the implementing partner); the extent and quality of their timber records; and their degree of involvement in planning and supervising past harvesting operations. The GreenCollar IFM LtPF methodology states:

"*Baseline projections are calculated* ex-ante *and are not adjusted throughout the project lifetime*." (p18)

Therefore, the estimate of uncertainty for the baseline scenario is constant throughout the project's lifetime.

The key sources of uncertainty in the project scenario derive from project area and sampling error.

GIS programs will be used to truth the area of project activity instance, as defined by KML files, against a recent satellite image, cadastral parcels and the PI layer. Any change in area will not be a product of uncertainty, but of deforestation: this is accounted for under monitoring of 'Natural disturbance' and 'Carbon stocks'. Assuming truthing is completed, there will be minimal uncertainty with respect to area.

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, as detailed above under 'Carbon stocks'. 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.

Using the updated inputs, the total uncertainty for the project will be calculated in accordance with the process described in Section 4.4 of the PDD.

Adding project activity instances

At each monitoring event, new instance may be added to the grouped project. These must satisfy the eligibility criteria and project processes identified in the PDD.

The new instances will be submitted as individual files. Each file will contain:

- A signed contract between Redd Forests and the project proponent;
- Contact details of the project proponent;
- Property ownership details and relevant documentation in the VCS PDD format;
- Written consent for the IFM project from any other shareholders;
- KML files outlining the forested area being added to the grouped project;
- Electronic maps illustrating the strata within the project activity instance;
- Waypoints for all sampling plots;
- Fieldwork data;
- An overview of the baseline scenario, prepared by the project proponent;
- PLO files outlining the FullCAM model of carbon sequestration in the project and baseline scenarios;
- Calculations from standing volume of merchantable timber to VCUs generated through IFM project activities, in accordance with the GreenCollar LtPF methodology;
- A copy of the Monitoring Plan, signed by the project proponent.

3.3 Data and parameters monitored / Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals

Data / Parameter:	$A_{burn,i,t}$
• Data unit:	Ha
• Description:	Area burnt in stratum *i* at time *t*
• Source of data to be used:	GPS coordinates and/or remote sensing data
• Value of data applied for the purpose of calculating expected emission reductions	
• Description of measurement methods and procedures to be applied:	Area burnt shall be monitored at least every five years.
• 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
• Any comment:	

Data / Parameter:	*PMP*
• Data unit:	%
• Description:	Merchantable biomass as a proportion of total aboveground tree biomass for stratum *i* within the project boundaries
• Source of data to be used:	Field measurements in sample plots
• Value of data applied for the purpose of calculating expected emission reductions	
• Description of measurement methods and procedures to be applied:	Within each stratum, divide the summed merchantable biomass by the summed total of aboveground biomass. Must be

	done at least every five years at the time of verification.
• 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
• Any comment:	*Ex ante* a time zero measurement shall be made of this factor. The timber harvest plan sets the allowable mean extracted volume from the merchantable volume of timber in the forest inventory based on legal limits.

Data / Parameter:	A_i
• Data unit:	Ha
• Description:	Area covered by stratum *i*
• Source of data to be used:	GPS coordinates and/or remote sensing and/or legal parcel records
• Value of data applied for the purpose of calculating expected emission reductions	
• Description of measurement methods and procedures to be applied:	
• 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
• Any comment:	In 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.

Data / Parameter:	*DBH*
• Data unit:	Cm
• Description:	Diameter at breast height of a tree
• Source of data to be used:	Field measurements in sample plots
• Value of data applied for the purpose of calculating expected emission reductions	
• Description of measurement methods and procedures to be applied:	Typically measured 1.3m aboveground. Measure all trees above the minimum DBH of 20cm in the sample plots. Must be measured at least every five years.

• 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
• Any comment:	The minimum DBH selected for measurement on plots must be compatible with the required minimum DBH for the selected BCEF factor.

3.4 Description of the monitoring plan

Each instance within the Grouped Project will be subject to the Monitoring Plan, developed in accordance with the GreenCollar IFM Methodology. The project proponents will each sign a copy of the Monitoring Plan to demonstrate and confirm their understanding of the responsibilities and requirements.

The Monitoring Plan is attached, and provides the following information:

a) Technical description of the monitoring tasks (also outlined in Section 3.2 of this PDD;
b) A list of data and parameters to be collected to fulfil those tasks;
c) Overview of data collection procedures;
d) Quality control and quality assurance procedure;
e) Data archiving; and
f) Organisation and responsibilities of the parties involved in all the above.

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	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 projections.	Difference (as a percentage) between FullCAM projections and field measurements	Every 5 years	Project proponent
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.	Every 2 years.	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

Monitoring events will be conducted annually, approximately upon the anniversary of the instance's start date. Every year, the project proponent will be responsible for assessing changes in the project area; determining the presence and extent of any natural disturbance (including fire); and extrapolating forest growth trends to determine carbon sequestration rates in the project scenario. Every five years, a more comprehensive monitoring event will be organized, involving fieldwork to evaluate carbon stock changes. The nature and schedule of these tasks is laid out below, and corresponds to the technical descriptions in Section 3.2 of the PDD.

Monitoring and verification for each project activity instance is the responsibility of the project proponent. Redd Forests will provide the proponent with all of the necessary information and advice to allow them to manage the monitoring events, or to seek support for those tasks that they are unable to undertake. This information will comprise a 'property transition folder' and will include:

- Paper and electronic copies of their project specific file;
- Paper and electronic copies of the signed monitoring plan, including:

    - The monitoring and verification schedule
    - Guidelines for forest inventory techniques
    - Data management and quality control procedures
    - Guidelines for relevant parameters for using the relevant VCS methodologies
- KML files of the instance;
- Paper and electronic property maps identifying strata, plot locations and their proximity to access points;
- Electronic copes of original fieldwork data sheets;
- GPS coordinates for the permanent monitoring plots including waypoints for each of the plot boundaries;
- A copy of the following tools:
    - The GreenCollar IFM LtPF Methodology
    - 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 Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination
    - The Winrock Sampling Calculator (to apply the CDM Tool for the Calculation of the Number of Sample Plots for Measurements within A/R CDM Project Activities)
- Contact details of Redd Forests and a proposal to provide ongoing support in relation to undertaking the required monitoring tasks;
- Contact details of accredited VCS validators; and
- Details of the established the VCU account for the project activity instance.

The project proponents or their associates (family members, property managers, etc) are encouraged to participate in the fieldwork to allow for training in locating and measuring the field plots. A Redd Forests' Project Manager also spends extensive time working through the calculation processes outlined in the GreenCollar IFM LtPF methodology to ensure that the landowner understands the principles and stages of the project as well as the proponent's ongoing responsibilities.

Data collection and storage

Data collected through these monitoring events will include;
- Aerial and / or satellite imagery;
- Forest inventory data; and
- Revised IFM calculations (if necessary).

The project proponent is responsible for data storage from these monitoring events. The data must be stored in both electronic and hard copy in two separate locations until at least two years after the project's completion.

4.0 GHG Emission Reductions

4.1 Explanation of methodological choice

The "VCS Methodology for Improved Forest Management: Conversion of Logged to Protected Forests" has been used. The project scenario involves protecting native and calculating any possible emissions from natural disturbance or reductions from sequestration. The baseline scenario involves projecting the carbon emissions generated through timber harvest through clearance, the retirement and conversion of wood products and subsequent sequestration in the project activity instance.

Calculating the carbon emissions from the baseline scenario requires an assessment of the standing carbon biomass. This methodology uses standard forest inventory procedures to assess the carbon stock in the aboveground biomass and dead wood. This data is then used to determine the avoided carbon dioxide emissions.

4.2 Quantifying GHG emissions and/or removals for the baseline scenario

For each instance, the following calculations must be undertaken and the results clearly presented within the PDD.

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 Redd Forests' 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[42], and their allometrics were accordingly used to

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

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[43].

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 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.

[43] 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

$$V_{j,i,BSL} = \frac{1}{SP} * \sum_{sp=1}^{SP} \frac{V_{j,i,sp}}{A_{sp}} \quad (2)$$

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[44]. Typically, the instances will be on soils with moderate erodibility[45]. 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 excluded using GIS programs prior to stratification to determine the area available for logging within each strata. The

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[44] 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]

[45] 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]

exclusion of areas that cannot be harvested is undertaken in accordance with the most recent version of Redd Forests' standard operating procedures for stratification. The areas excluded are a reflection of the requirements stated within the Tasmanian Forest Practices Code 2000[46].

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 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 Redd Forests' 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:

Stratum	**Standing merchantable volume (m^3/ha) at the project start date**	**Year of harvest**	**Years in a post-harvest state**	**Harvesting regime:**	**Annual operating areas (ha)**	**Mean extracted volume per unit area (m^3/ha)**

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.

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

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

Where:

$C_{HB,j,i,BSL}$	mean carbon stock of harvested biomass per unit area for species j in stratum i, $tC \cdot ha^{-1}$;
$V_{EX,j,i,BSL}$	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; [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. Redd Forests 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[47], which provided an estimate for temperate hardwoods. The precise BCEF varies depending on the growing stock level (see Table No. 02).

Table No. 02. Choice of BCEF relative to growing stock level.

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

[47] 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]

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

Where:

$C_{EX,j,i\|BSL}$	mean carbon stock of extracted timber per unit area for species j in stratum i; $tC \cdot ha^{-1}$;
$V_{EX,j,i\|BSL}$	mean volume of extracted timber per unit area for species j in stratum i; in $m^3 \cdot ha^{-1}$;
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.

Carbon emitted from the conversion and retirement of wood products:

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.

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

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 Redd Forests' projects, it is projected that 0-30% of the extracted timber will be sawnwood quality, and the remaining 70-100% for pulp and paper[48]. 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)[49] and the Climate Action Reserve (2009)[50]. 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.

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

Where:

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

[49] 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

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

$C_{WP,i\|BSL}$	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. Redd Forests 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 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.

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

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.

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

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}.

4.3 Quantifying GHG emissions and/or removals for the project scenario

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[51]. 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).*"[52]

Moreover, for each stratum, FullCAM's output was calibrated according to fieldwork estimates of aboveground trees (m^3/ha) in 2010, and consistent between the baseline and project scenarios until the first harvest. Because FullCAM was available as a best practice option, Redd Forests 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.

Equation 14.

[51] 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]

[52] 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]

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

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.

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

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, $tCO_2e \cdot tC^{-1}$.

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.

4.4 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 Redd Forests' 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[53].

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

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.

[53] 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]

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.

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.

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

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.

5.0 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')*[54]

The Redd Forests 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 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. The Redd Forests' Grouped Project will also be submitted for certification under the Climate, Community and Biodiversity Standards.

6.0 Stakeholders' comments

The Grouped Project relates to standing, native forest on private land. Within each instance, the project proponent is exercising their legal right 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 Redd Forests' contact details.

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

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.

The local community benefits from the conservation of the native forest. This ecosystem provides key services, such as pollination for the local crops, pest control by native bird species and the purification of water used by many of the neighbouring properties. A healthy and mature forest also creates a more attractive landscape, which is economically important in an area seeking to expand ecotourism income and employment opportunities.

7.0 Schedule

Each instance must contain a table outlining the project schedule for each year of the project in accordance with the following structure:

Year	Baseline scenario	Project scenario	Responsibilities	Annualised verified carbon units:

In addition, the monitoring events for each project activity instance will conform to the following 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	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 projections.	Difference (as a percentage) between FullCAM projections and field measurements	Every 5 years	Project proponent
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.	Every 2 years. If >10% of respondents answer 'yes' at any PRA, other illegal logging parameters identified in the GreenCollar IFM methodology must be assessed.	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

8.0 Ownership

8.1 Proof of Title

Each instance within the Grouped Project requires the following evidence:

- Land title documentation showing the cadastral parcel boundary, PID and the name of the legal landowner for the project area. This documentation must contain evidence of approval from the Tasmanian Land Titles Office.
- Written approval for the IFM project to be implemented on the instance from all shareholders.

The proof of land ownership and shareholders' consent and the contractual agreement with Redd Forests will be available for review by the validator.

The implementing partner will work with the project proponent to acquire this information. All documentation will be stored with the project proponent and implementing partner as identified in Section 1.16 of this PDD.

8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable)

The Grouped Project does not reduce GHG emissions under an emissions trading scheme, to meet binding limits or similar.

Appendix 1: Project risk analysis

The risk analysis below was developed in accordance with the VCS Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination. It identifies and assesses those elements with a uniform level of risk across all project activity instances within the Grouped Project.

The following elements of the risk analysis will require an individual assessment for each instance at validation and at all verification events, and will be included within the relevant file:

- Risk of financial failure (Sub-step 1a)
- Risk of devastating fire (Sub step 1a)
- Risks of high timber value (Sub-step 1b)
- Risk of technical failure (Sub-step 1a)
- Risk of management failure (Sub-step 1a)

Sub-step 1a: Risk factors applicable to all project types

Risk factor	Risk rating for AFOLU project	Comments
Project risk:		
Risk of unclear land tenure and potential for disputes	Very low	Land ownership and property boundaries are clearly defined and protected under Australian law. Land tenure within Tasmania is managed under the Tasmania *Land Titles Act 1980.* This Act relates to all land within the grouped project and provides that Land ownership is proven by registration in a title register maintained by the Recorder of Titles. Under this system the land owner is given a certificate of title[55].
Risk of financial failure	Low	The project has minimal ongoing costs from monitoring and verification, compared to the initial costs of project implementation. Moreover, the monitoring costs should be amply covered by the revenue generated by the sale of credits. This risk factor will be assessed separately for each project proponent, compare the projected cost of a monitoring event relative to the yield of carbon credits from that instance. Refer to Appendix 1 of the file for each relevant project activity instance.
Risk of technical failure	Low	There is limited risk of technical failure during implementation of the IFM project activities on new instances. The capabilities of the Redd Forests' team are detailed in Section 1.15, and

[55] DPIW, Land Tenure in Tasmania http://www.dpiw.tas.gov.au/inter/nsf/WebPages/JGAY-53F3TT?open< accessed> 7/2/2011

consistent practices are maintained according to the company's standard operating procedures.

The project has limited technical requirements following validation. No advancements in technologies or maintenance of technical systems are required for the project's success.

The project proponents will each be provided with the resources and guidelines to assume responsibility for the project. (see Section 1.15 and the Monitoring Plan) through training and the provision of a property transition file. This contains all of the necessary information, instructions, tools and contacts to allow the proponent to undertake the technical requirements associated with their obligations for verification and monitoring. This file contains;

- Paper and electronic copies of their project specific PDD;
- Paper and electronic copies of the signed monitoring plan, including:
  - The monitoring and verification schedule
  - Guidelines for forest inventory techniques
  - Data management and quality control procedures
  - Guidelines for relevant parameters for using the relevant VCS methodologies
- KML files of the instances;
- Paper and electronic property maps identifying strata, plot locations and their proximity to access points;
- Electronic copes of original fieldwork data sheets;
- GPS coordinates for the permanent monitoring plots including waypoints for each of the plot boundaries;
- A copy of the following tools:
  - The GreenCollar IFM LtPF Methodology
  - 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 Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination
  - The Winrock Sampling Calculator (to apply the CDM Tool for the Calculation of the Number of Sample Plots for Measurements within A/R CDM Project Activities)

		• Contact details of Redd Forests and a proposal to provide ongoing support in relation to undertaking the required monitoring tasks; and • Contact details of accredited VCS validators. The proponents will benefit from an increasingly educated network as more landowners adopt carbon financed Improved Forest Management as a mechanism to generate revenue while enhancing privately owned native forests. Finally, Redd Forests and its external staff will also remain available to undertake any technical work, should they be required. This will grant the landowners ongoing access to staff with relevant qualifications and suitable experience.
Risk of management failure	Low	Due to the stable political and social environment, and the clearly established and communicated future requirements of the project, management of the project from this point has limited risk of failure. The allocation of responsibilities and revenue are clearly delineated in all contracts. The nature of these responsibilities and the necessary resources are provided to the project proponent within the 'property transition file' specific to the project activity instance. See also 'Risk of Technical Failure'.
Economic risk:		
Risk of rising land opportunity costs that cause reversal of sequestration and/or protection	Low	Since the project is intended to protect (rather than grow) forest, reversal of sequestration is not a risk (compared to, for example, afforestation/reforestation projects). The main consideration is therefore reversal of protection. Likely land opportunity costs will arise from high prices for animal products (creating a risk of conversion to pasture) or high demand for timber (creating a risk of either conversion to plantation or a resumption of logging). Until 2015, the landowner can only convert land to plantation or pasture at a rate of 40ha per year. There are unlikely to be significant changes in land opportunity costs between now and 2015, and the landowner will thereafter not be permitted to clearfell the native forests for conversion. This provides protection against rising land opportunity costs if meat, wool or plantation timber significantly increase in value. The risk of an increasing value of native forest timber is addressed in sub-section 1b, under

		'high timber value'.
Regulatory and social risk:		
Risk of political instability Risk of social instability	Very low Very low.	Australia has a long history of political and social stability. The main source of contention in Tasmania has been between the logging industry and environmental groups. Logging has historically provided a major source of employment and income, and environmental campaigns for forest conservation have arguably not recognised the socio-economic impact of banning logging of native forests. Carbon financed IFM projects arguably provide a synthesis between these two positions, providing comparable employment to foresters and income to landowners while protecting the carbon stocks and biodiversity of Tasmania's native forests. This should help ameliorate any political and social tension associated with land use management in Tasmania.
Natural disturbance risk:		
Risk of devastating fire	Low	This risk factor is assessed separately for all instances. Refer to Appendix 1 of the file for each relevant project activity instances.
Risk of pest and disease attacks	Very low	There are no significant pests within the grouped project area. Insect damage has no impact on long-term carbon stocks in Eucalyptus forests, according to the Senior Conservation Scientist with the DPIPWE. Browsers (such as deer and wallabies) may have a minimal effect on regeneration, but preferentially feed in pastures. Populations are typically controlled by shooting under a game management plan, which will be detailed in the individual project file.
Risk of extreme weather events	Very low	Tasmania is not located within a cyclone area. The main contributing factor to cyclones is an ocean surface temperate above 26.5 degrees[56]. Tasmania is located at a latitude of 40 degrees south from the equator and ocean temperatures do not permit cyclonic activity. Tasmania does experience cold winter conditions including ice and snow. Ice and snow is experienced predominantly within the mountainous, western portion of the island although snow seldom lies for more than a few weeks [57]. There are no records of ice storms such as those experienced within the northern hemisphere. Furthermore, the frequency of cold outbreaks with snow declined over the 40-year period to 1996, the most marked

[56] Atlantic Oceanographic and Meteorological Laboratory: Hurricane Research Division. "Frequently Asked Questions: How do tropical cyclones form?", National Oceanic and Atmospheric Administration. <http://www.aoml.noaa.gov/hrd/tcfaq/A15.html> <accessed 21/02/2011>

[57] Parks and Wildlife Service, Tasmania, <http://www.parks.tas.gov.au/index.aspx?base=3216> [accessed 21/02/2011]

decline being during the 1980s[58]. The frequency of cold occurrences of the lower troposphere as measured by the above parameters also declined to 1990, but then increased again during 1992 to 1996. The decline in cold outbreaks with snow may be associated with this reduction in cold occurrences of the lower troposphere as well as reduced precipitation[59].

The Tasmanian State Emergency Services recorded a detailed history of flood events from 2000 to 2009[60]. During this period, no floods were reported on or near the project area. Owing to the size of Tasmania and the topography, flood events within Tasmania are typically short in duration and low in intensity. The documented flooding history below supports this, with almost of the historical references referring to *minor* flooding events. Moreover, flooding typically occurs in floodplains, which are largely cleared of forests for agricultural use.

Tasmania enjoys for the most part a "temperate maritime" climate with the sea, never more than 115 km distant, suppressing temperature extremes. The prevailing westerly airstream leads to a West Coast and highlands that are cool, wet and cloudy and an East Coast and lowlands that are milder, drier and sunnier. Annual rainfall varies markedly across the state, averaging less than 600 mm in the Midlands but over 3500 mm in some part of the mountainous west. Therefore, droughts have not plagued Tasmania to the same degree or severity as the mainland states of Australia[61]. Drought in Tasmania is generally not widespread: it is not unknown for one part of the state to be suffering very low rainfall, while in another the rainfall is considerably above normal[62]. Few significant droughts have been recorded in the project area.

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58 M. C, Jones (2003) Climatology of cold with outbreaks of snow over Tasmania *Australian Meteorological Magazine* **9** Tasmania and Antarctica Region, Bureau of Meteorology, Australia Antarctic Cooperative Research Centre, University of Tasmania, Australia

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60 Tasmanian State Emergency Services (2009) Floods and You <www.ses.tas.gov.au/.../Floods%20and%20You%20-%20Final%20Report.pdf> [accessed 21/02/2011]

61 Australian Bureau of meteorology (2010) Services for Agriculture in Tasmania. <http://www.bom.gov.au/lam/agment/agtas.shtml> [accessed 21/02/2011]

62 Australian Bureau of Statistics (2008) Droughts in Tasmania 1384.6 - Statistics - Tasmania <www.abs.gov.au> <accessed 21/02/2011>

Geological risk (e.g. volcanoes, earthquakes, landslides)	Very low	There are no active volcanoes in Tasmania, or indeed on the Australian continent[63]. There was one earthquake of significant size recorded in Tasmania in the late 1800s, which caused some damage to buildings in Launceston. The probability of another such quake is considered possible but unlikely[64]. The main consequence of such a quake for the projects would be landslides. Firstly, there are no slopes over 22º included in the project as logging is not permitted on such land. Secondly, the risk of landslides is considerably lower on forested areas because tree roots hold the soil structure in place more effectively. Therefore, the IFM projects reduce the risk to Zero, i.e. the project scenario is only as likely or less likely to cause a loss of carbon stocks than the baseline scenario. Please see attached sheet for further information on earthquakes and volcanoes.

Sub-step 1b: Determination of the risk factors associated with specific project types

Risk factor	VCS-designated risk rating for IFM projects	Comments
Devastating fire potential	Low	This risk factor is assessed separately for all additional instances. Refer to Appendix 1 of the project file for each relevant project activity instances.
High timber value	Medium	For the majority of the project's lifetime, the main opportunity cost for the land is the loss of income from harvesting the native forest. The majority of extracted timber (80-94%) is used for pulp and paper. This is a very low-value product: prices have hovered around $8-10/ton over recent years[65], and are continuing to decline as international markets demand plantation-sourced wood products. Forest carbon prices historically compare favourably:

[63] Australian Bureau of Agricultural and Resource Economics (2010) Australian Energy Resource Assessment: Geothermal Energy, Australia. Available from <http://www.abare.gov.au/publications_html/energy/energy_10/ch_7.pdf> [viewed 18/02/2011]
[64] Tasmanian Department of Infrastructure, Energy and Resources: Mineral Resources Tasmania (2010) Earthquakes, Australia. Available from <http://www.mrt.tas.gov.au/portal/page?_pageid=35,869828&_dad=portal&_schema=PORTAL> [viewed 18/02/2011]
[65] Private Forests Tasmania (2002) Tasmanian Market Information Update for Farm Forestry: Number 4 < http://www.privateforests.tas.gov.au/files/active/0/marketreportpft4.pdf > p12

in 2009, the average price in compliance markets was over US$10/ton[66].

As the forests are allowed to recover from years of logging, the opportunity cost of not logging will increase. This is because a growing proportion of the merchantable timber will consist of sawlog rather than pulp or paper. At roughly $35/ton[67], prime sawlog has a much higher value than either alternative wood products or – historically – carbon. However, since the proportion of sawlog will only increase over the project's lifetime and since the landowner is under contract to complete the project, there is little risk of reversal of protection during the project's lifetime.

After completion of the project, it is probable that most landowners will resume logging of the land. For this reason, this issue has been assigned a risk factor of 'Medium'. However, three factors should be taken into account.

Firstly, after twenty-five years without logging, most of the native forests will have changed their condition. A higher proportion of the merchantable timber will be sawlog quality, or approaching that state. Selective logging for sawlog allows landowners to extract a significantly lower fraction of the biomass for the same return. This will maintain the carbon stocks at a higher level than the present period, so the project will yield a net benefit in emission reductions.

Secondly, it is possible that carbon credits will continue to increase in value, particularly those with biodiversity and socioeconomic premiums like Redd Forests' projects. They may therefore be competitive not just with pulp, but also sawlog.

Finally, there is a high probability of a policy shift towards the end of the project's lifetime, as social and cultural norms tend towards environmental conservation. Should this occur, this risk rating will be reduced to 'Low' as the forests will be protected regardless of their increasing timber value.

Due to the variations in landowners' intentions and history, this risk factor is assessed separately for all instances. Refer to Appendix 1 of the project file for each relevant project

[66] Hamilton, K; Chokkalingam, U; Bendana, M (2009) State of the Forest Carbon Market, Ecosystem Marketplace <http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page_id=7525&section=our_publications&eod=1> [accessed 16/11/10]

[67] Private Forests Tasmania (2002) Tasmanian Market Information Update for Farm Forestry: Number 4 < http://www.privateforests.tas.gov.au/files/active/0/marketreportpft4.pdf > p12

		ctivity instances.
Illegal logging potential	Zero	Illegal logging is *de minimis* in Tasmania (refer to section 3.2). The grouped project relates entirely to forest on private property. Provide property firewood extraction within Tasmania does occur but the impact upon forest carbon stocks is negligible for the following reasons: 1. Large dead hollow-bearing trees and fallen timber are the two timber types most targeted by wood cutters[68]. 2. Firewood collection tends to occur within public roadsides. The Redd Forests' project area contains 10 metre buffers along public roadsides given that these areas are excluded from forest harvesting through the Tasmanian Forest Practices System. Private access to properties is severely restricted by locked gates and vehicular barriers. In addition, there are firewood collection permits issued for public forests within Tasmania and this reduces the demand for illegally sourced firewood from roadsides. Illegal logging therefore poses no risk to the permanence of the carbon emission reductions. Furthermore, as part of ongoing monitoring and verification, the project proponent is required to report any loss of standing timber resource from within the instance.
Unemployment potential	Very low	Only 5.6% of the Tasmanian population are employed in agriculture, forestry and fishing[69]. More specifically, between 2006 and 2010, the number of people employed in harvesting and processing timber (the affected industries) declined from 4528 to 3216 people. Among those forestry workers working with native forests, employment declined from 3459 to 2033. In short, logging of native forests employs only a tiny proportion of the 200 000 strong Tasmanian workforce, and the industry is declining rapidly due to mechanisation, poor demand and a shift towards plantations[70]. By

[68] Resources Planning and Development Commission (2003) State of Environment Report Tasmania <http://soer.justice.tas.gov.au/2003/bio/4/issue/10/ataglance.php> <accessed 15/11/2010>
[69] Australian Bureau of Statistics (2006) Employment by Industry, Australia. Available from <http://www.censusdata.abs.gov.au/ABSNavigation/prenav/ViewData?&action=404&documentproductno=6&documenttype=Details&tabname=Details&areacode=6&issue=2006&producttype=Community%20Profiles&&producttype=Community%20Profiles&javascript=true&textversion=false&navmapdisplayed=true&breadcrumb=PLD&&collection=Census&period=2006&producttype=Community%20Profiles&#Working%20Population%20Profile> viewed 18/02/2011
[70] CRC for Forestry (2010) Trends in Forest Industry Employment and Turnover, Australia. Available from <http://www.crcforestry.com.au/publications/downloads/Schirmer-Tas-forest-industry-WEB.pdf> [viewed 18/02/2011]

	contrast, tourism employs 6.1% of workers (some 13 600 people) and the professional, scientific and technical sector employs 4.5% of the workforce[71]. Both these areas frequently offer higher wages and more scope for skill development. They will be encouraged by the Redd Forests' IFM projects, which enhance the aesthetics of the countryside through forest protection and generate demand for environmental expertise. Declining unemployment will not threaten the permanence of the emission reductions because the project is on private property: the landowner’s decision to implement an Improved Forest Management regime using carbon finance will therefore not be negotiable according to changing employment conditions. Moreover, these projects create alternative sources of employment, including fieldwork to assess and monitor forests protected under VCS IFM projects.

Sub step 1C

At the conclusion of the risk assessment, the file for each project activity instance will establish the highest risk rating established within substep 1a and substep 1b and clearly state the required VCS credit buffer.

[71] Tourism and Transport Forum (2010) Tourism in Tasmania: Industry Update, Australia. Available from <www.ttf.org.au/DisplayFile.aspx?FileID=776)> [viewed 18/02/2011]