Protection of a Tasmanian Native Forest (Project 1: Redd Forests' Pilot)

Project Description Document
for verification under the Voluntary Carbon Standard
14 March 2011

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List of abbreviations

AFOLU	Agriculture, Forestry and Other Land Uses
A/R	Afforestation/reforestation
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
FullCAM	Full Carbon Accounting Model
GHG	Greenhouse Gas
GPS	Global Positioning System
IFM	Improved Forest Management
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
NDSVI	Normalised difference for senescent vegetation index
PDD	Project Design Document
PD	Project Description
PRA	Participatory Rural Appraisal
REDD	Reducing (or Reduced) Emissions from Deforestation and Degradation
RFPA	Redd Forests' Project Area
TASVEG	Tasmanian Vegetation Map
DAD	*Eucalyptus amygdalina* forest and woodland on dolerite;
DAM	*Eucalyptus amygdalina* forest and woodland on mudstone;
DAS	*Eucalyptus amygdalina* forest and woodland on sandstone;
DDE	*Eucalyptus delegatensis* dry forest and woodland;
DVS	*Eucalyptus viminalis* shrubby/heathy woodland;
FRG	Regenerating cleared land; and
NAD	*Acacia dealbata* forest.
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard

1.0 Description of Project

1.1 Project title:

Protection of a Tasmanian Native Forest (Project 1: Redd Forests' Pilot)

1.2 Type/Category of the project:

Improved Forest Management (IFM), specifically conversion of logged forests to protected forests (LtPf)

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

The project is estimated to produce 4 956 voluntary carbon units a year for the 25 year duration of the project, while preventing annual emissions of 6 946 tCO2-e. This means that the project will prevent total emissions of 173 638 tCO2-e over its lifetime.

1.4 A brief description of the project:

The project is designed to protect 865 hectares of native Tasmanian forest which would, if not for the project, continue to undergo selective logging.

This project is on the private land of a family who have owned and logged the land for over one hundred years. The site is therefore under threat of continued selective logging with natural regeneration, a land management policy implemented recently across a significant swathe of the property. The owners are seeking an alternative which will provide them with a comparable income, while protecting and improving the native forests of the region. This will support local biodiversity conservation, maintain watersheds and enhance carbon stocks.

The project is located in the Northern Midlands of Tasmania, Australia. Tasmania is globally known for its old growth native forest, endemic species, significant biological diversity and spectacular wild places. Tasmania is home to one of the world's last great temperate wilderness areas, to the world's tallest hardwood trees (often exceeding 100m in height) and to the largest tract of temperate rainforest in Australia. The exceptional ecological values of Tasmania's natural landscapes have been internationally recognized, notably by the IUCN (IUCN 1989[1]), the Tasmanian Department of Parks, Wildlife and Heritage (DPWH 1990[2]), and the Forests and Forest Industry Council's Balanced Panel of Experts (FFIC 1990[3]).

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[1] IUCN (1989) World Heritage Nomination— IUCN Technical Evaluation 507, Tasmanian Wilderness (Australia). International Union for Conservation of Nature, Gland.

[2] DPWH (1990) Annual report, Department of Parks, Wildlife and Heritage, Tasmania

[3] Forests and Forest Industry Council of Tasmania & Salamanca Agreement (1990) Key issues and principles likely to shape a forests and forest industry strategy for Tasmania, The Council, Hobart

In the area surrounding the Redd Forests pilot project, less than 30% of the original vegetation remains, much of it in scattered small remnants in poor condition. The past two decades have seen major changes in this landscape. There are serious and continuing problems of vegetation loss and degradation, soil erosion, degraded river systems, dryland salinity, rural tree decline and denuded north-facing slopes. The catchments are subject to timber harvesting operations and commercial firewood harvesting is widespread. Forest ecosystems that have been identified as threatened or old growth forest continue to be cleared.

Currently, less than 2% of the Northern Midlands bioregion is reserved in protected area networks. This is in stark contrast to the rest of the state, where 37% are national parks or other forms of public land. A total of 67,093 ha (56,786 ha forest and 10,307 ha non-forest) have been identified as rare, vulnerable or endangered ecosystems or as ecosystems with a high conservation priority. In this way, severe degradation and loss of biodiversity will continue unless new initiatives allow for improved land management practices, including forest conservation. The creation of the Redd Forests' pilot project aims to protect native forests from further logging activities and avoid the resulting GHG emissions in an area under great land-use pressure in the Northern Midlands, Tasmania.

The Redd Forests Project Area (RFPA) includes 865 ha of native forest, includes small stands of old growth. The area is dominated by *Eucalyptus delegatensis, E. amygdalina* and *E. viminalis* forest communities, interspersed with *E. obliqua*, *E. ovata* and *A. dealbata*. Some of the dominant species number among the tallest hardwood trees in the world. According to the Tasmanian Forests Practices Authority of Tasmania, 790 ha of this forest is currently available for logging. The historical baseline involves extensive selective logging and clearfelling with natural regeneration, a land use that will be continued in the absence of carbon finance.

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

The project is located within the Australian state of Tasmania (Figure No. 01). Tasmania is an island located 240 km south of the eastern side of the continent, separated from the mainland by Bass Strait. The state has a total area of 68 401 square km, with the main island covering 62 409 square km. Tasmania has an estimated population of 500,000 (December 2008), with almost half located in or near Hobart.

Tasmania is promoted as the 'Natural State' owing to its beautiful and wild environments. 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 state capital and largest city is Hobart. Other major population centers in Tasmania include Launceston in the north and Devonport and Burnie in the northwest. The sub-antarctic Macquarie Island is also under the administration of the state of Tasmania.

Figure No. 01. Tasmania, Australia (Source: Google maps).

The RFPA is located approximately 20km south of Launceston. The project zone is located close to the communities called Cressy, Poatina, and Bracknell, in the Northern Midlands bioregion of Tasmania. The site (Figure No. 2) lies between the latitudes 41º48’55.84” S and 41º51’03.02” S, and the longitudes 147º01’12.16” E and 146º57’41.47” E. The unique Property IDs for the two properties involved are 6753476 and 6753484.

The project zone is in dry, sub-humid and cool inland lowland. It lies in the Tamar Graben, an extensive plain bordered on the east and west by hilly topography. The soils are diverse and predominately sandy, lying on Jurassic and Tertiary igneous rocks and Permian mudstone.

Land use in the region is primarily agriculture (grazing and cropping) with some forestry. Much of the region’s vegetation has been converted to improved pasture, with grasslands and woodlands reduced to remnants. The RFPA southern boundary is defined by selectively logged forests, the western boundary by private land ownership with selective logging and sheep grazing on previously forested land. The northern boundary is defined by sheep grazing, oat cropping, and exotic *Pinus radiata* and *Eucalyptus nitens* plantations, and the eastern boundary by sheep grazing and exotic *Eucalyptus nitens* plantation.

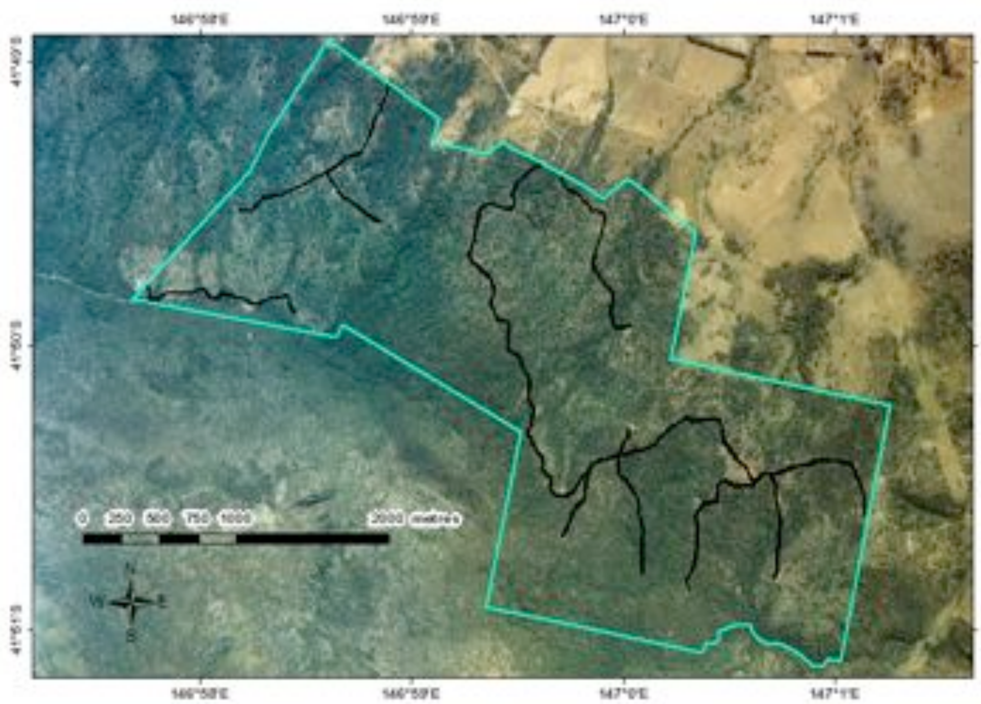

Figure No. 02. Redd Forests Project Area (Source: Redd Forests aerial photography, 2007).

1.6 Duration of the project activity/crediting period:

The contract between Redd Forests and the project proponents was signed on 13 March 2010, which therefore serves as the start date of the project.

The project development will reach financial closure after dual validation and verification in November 2010. Crediting will commence after verification. The project will be implemented and monitored for a twenty-five year period, i.e. until March 2034.

1.7 Conditions prior to project initiation:

Climate:

The RFPA has a cool temperate climate with four distinct seasons. According to Cressy Research Station, the nearest weather station, summer lasts from December to February, when the average temperature is 23°C. The winter months are between June and July and are generally the wettest and coolest months with an average maximum of 11°C. The average annual rainfall at Cressy Research Station is around 628 mm. Rainfall occurs largely in winter with summer averages reaching as low as 31 mm per month (Figure Nos. 03 and 04).[4]

[4] Tasmania & Antarctica Climate Service Centre, Bureau of Meteorology. Site name: Cressy Research Stration. Site number: 091022. Latitude: 41.72 °S, Longitude: 147.08 °E. Elevation: 148 m. Commenced: 1939. Status: Open. Latest available data: 30 June 2010.

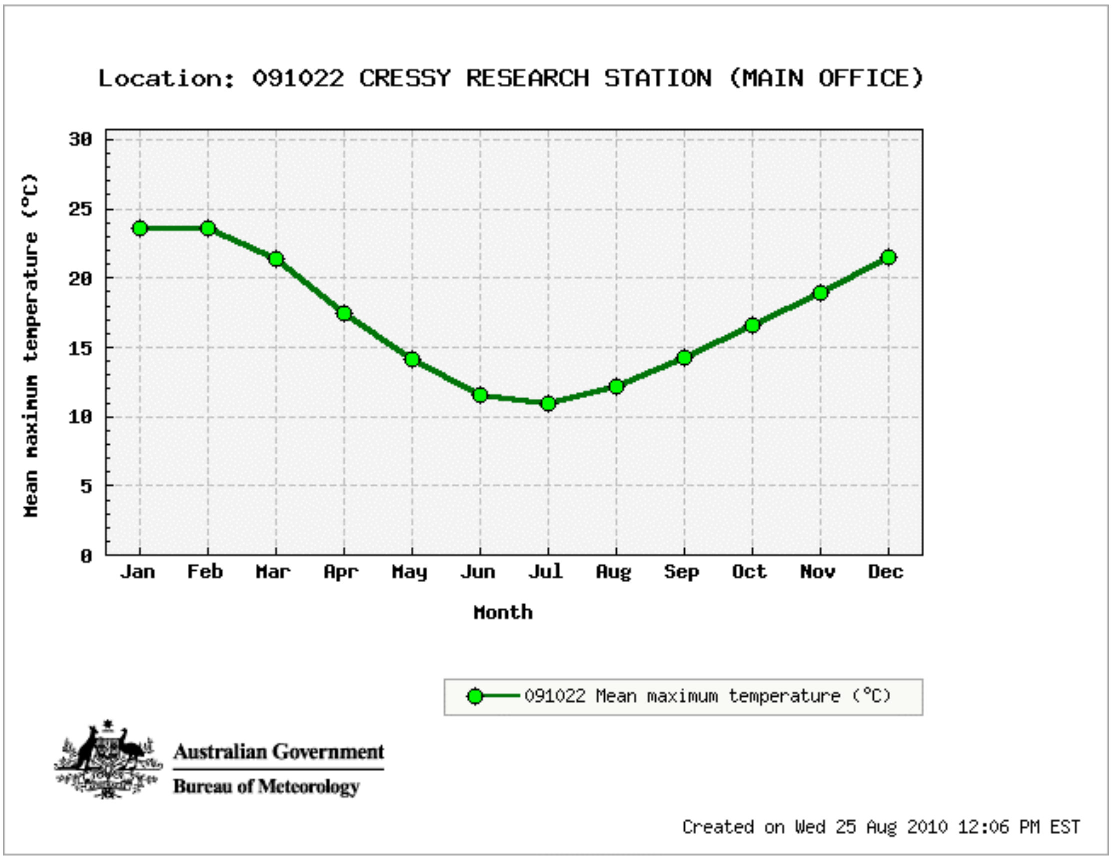

Figure No. 03. Average maximum temperature at the Bushy Park Estates weather station between 1940 and 1990. This image is the copyright of the Commonwealth of Australia (2010), Bureau of Meteorology.

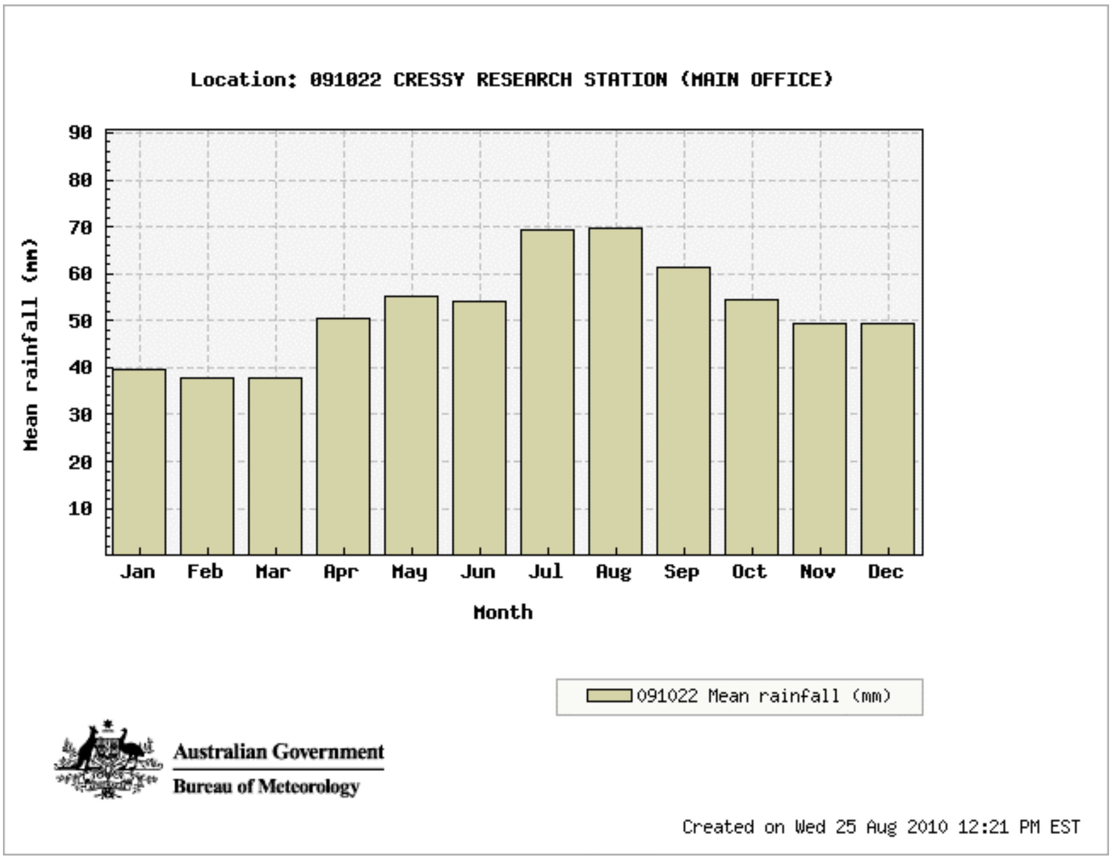

Figure No. 04. Average rainfall at the Bushy Park Estates weather station between 1939 and 2010. This image is the copyright of the Commonwealth of Australia (2010), Bureau of Meteorology.

Soil and geology:

Since the RFPA lies in the rain shadow of the Central Highlands and western mountains, it is one of the driest regions of Tasmania. Low rainfall and subsequent periods of drought are limiting factors on the vegetation, particularly on the basalt hills.

Soils formed on Quaternary deposits and sand dunes are common. The relatively dry climate and high soil fertility is conducive to grasslands and grassy woodlands[5]. The RFPA and its surroundings present a different story from the rest of the state. Owing to a relatively dry climate and alkaline (mostly dolerite) parent material, these soils are relatively unleached and contain lime in the deeper subsoil. They are mostly classified as “prairie soils” or “brown earths” due to their resemblance to the chernozems of Russia and North America, although they are much lower in available phosphorus and somewhat acidic in the surface levels. However, their higher nutrient levels in comparison with other Tasmanian soils allows them to support productive pasture, grazing, grain crops and carbon rich forests.

Vegetation Communities:

[5] Harris, S. & Kitchener, A. 2005. From Forest to Fjaeldmark: Descriptions of Tasmania’s Vegetation. Department of Primary Industries, Water and Environment, Printing Authority of Tasmania. Hobart.

In the RFPA, vegetation is predominantly dry sclerophyll forest, dominated by *Eucalyptus amygdalina, E. delegatensis* and *E. viminalis* forest communities, with *E. obliqua* and *E. ovata* occurring in small patches. There is also a small community of wet sclerophyll forest and open woodland, with some *Acacia dealbata* (silver wattle) on the lower slopes amongst partially grazed land. Communities are identified according to the dominate eucalypts in the canopy, which are usually found in combination with a specific understory type and environmental conditions. According to TASVEG 2.0, the main vegetation communities within the RFPA are (Figure No. 05):

- DAD: *Eucalyptus amygdalina* forest and woodland on dolerite;
- DAM: *Eucalyptus amygdalina* forest and woodland on mudstone;
- DAS: *Eucalyptus amygdalina* forest and woodland on sandstone;
- DDE: *Eucalyptus delegatensis* dry forest and woodland;
- DVS: *Eucalyptus viminalis* shrubby/heathy woodland;
- FRG: Regenerating cleared land; and
- NAD: *Acacia dealbata* forest.

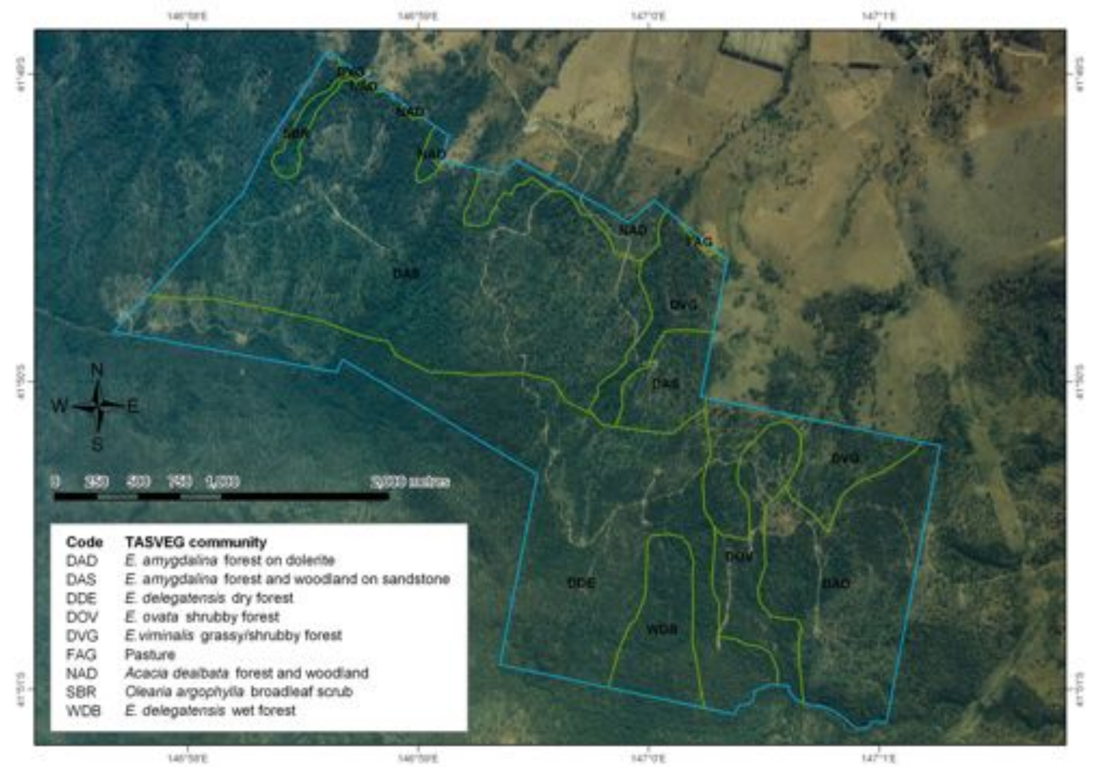

Figure No. 05. Vegetation categories within the RFPA are outlined above (Source: Tasmania Department of Primary Industries and Water, Natural Values Atlas Report). Field sampling identified significant inaccuracies in this TasVEG layer, which could consequently not be used for stratification.

- *Eucalyptus amygdalina* forest and woodland on dolerite (DAD)[6]:

[6] Harris, S; Kitchener, A (2005) From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation. Department of Primary Industries, Water and Environment, Printing Authority of Tasmania. Hobart.

This community tends to have an uneven-aged open structure, with the dominant *E. amygdalina* trees rarely exceeding 25m in most areas, but grading into ash dominated tall open forest at higher elevations. It is often associated with *E. viminalis* at lower elevations or *E. delegatensis* at higher elevations, as reflected in the vegetation gradients in the RFPA.

The understory is variable, ranging from grassy to shrubby. At the lower elevations of the RFPA, tall shrubs or small trees such as *Bursaria spinosa*, *Acacia dealbata* and *Banksia marginata* are characteristic, with the ground layer dominated by tussock grasses and low shrubs.

This community occurs mainly on dolerite and to a lesser extent, on basalt. It is generally found in areas of low rainfall on sites subject to occasional to frequent drought stress, such as ridges and tier surfaces and slopes with a northern or western aspect. The main altitudinal range is 300-600 m. Sites tend to be well-drained with shallow to medium soil depth. Surface rock cover can be high.

- *Eucalyptus amygdalina* forest and woodland on mudstone (DAM)[7]:

  This community is typically dominated by *E. amygdalina*, but *E. viminalis* is a widespread subdominant or minor species. *E. obliqua* (lower altitudes) and *E. delegatensis* (higher altitudes) are also common co-occurring species, particularly on sites with higher fertility or moisture availability. Most stands have more than one eucalypt species and a range of age classes.

  The trees are typically less than 30 m tall, but may be taller on more humid or protected sites. On more isolated or infertile sites (e.g. parts of the Meehan Range), trees of less than 20 m tall are common, particularly where there has been a history of frequent fires. The community is strongly associated with relatively dry sites of Permian mudstone (mainly in south-east Tasmania) or mudstone-derived sediments and metasediments of the Mathinna series (Devonian origin) in the north-east of the State.

  The understorey is relatively species-poor, compared to that of most Tasmanian dry sclerophyll forest communities. This may reflect the exposure or infertility of many sites, fire history, land use, or a combination of these. Secondary trees and tall shrubs include *Allocasuarina littoralis*, *Acacia dealbata*, *Exocarpos cupressiformis* and regenerating eucalypts. Lower to mid-height shrubs can be reasonably dense, particularly on infrequently burnt sites. The cover and diversity of grasses and forbs are typically sparse, though orchids and other seasonal herbs can be conspicuous when conditions are favourable. Many sites are characterised by high exposure of mineral soil.

- *Eucalyptus amygdalina* forest and woodland on sandstone (DAS)[8]:

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[7] Harris, S; Kitchener, A (2005) From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation. Department of Primary Industries, Water and Environment, Printing Authority of Tasmania. Hobart.
[8] Harris, S; Kitchener, A (2005) From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation. Department of Primary Industries, Water and Environment, Printing Authority of Tasmania. Hobart.

The community, usually dominated by *E. amygdalina*, occurs as uneven-aged stands of open forest or woodland, with tree height generally less than 25 m. It is a dry sclerophyll community with tall shrubby understory and a shrubby, sedgy or sometimes grassy ground layer. *E. amygdalina* forest on mudstone may be similar, but occurs on finer grained sedimentary substrates and has a less diverse and generally sparser understorey.

E. obliqua is often co-dominant or subdominant, especially in gullies or on shaded slopes. *E. viminalis* is generally present as a minor or subdominant species (on deeper soils it can even be locally dominant), while *E. ovata* may be present where the community is on more poorly–drained sites. *Acacia dealbata* is a common understorey tree species. The ground stratum varies with soil type.

- *Eucalyptus delegatensis* dry forest and woodland (DDE)[9].

  This community is dominated by *E. delegatensis*, with *E. amygdalina* as the most widespread peppermint subdominant species. *E. delegatensis* typically forms open forests, though on exposed sites trees may often have a low, spreading, woodland form.

  The composition and structure of the understory vary greatly, depending on fire frequency. The shrub layer is typically sparse in areas of high fire frequency, with the most frequent species being *Acacia dealbata* and the ground layer dominated by tussock-forming grasses. As fire frequency decreases, the prominence of the grasses decreases, with a corresponding increase in abundance and/or diversity of shrub and fern species.

  This community occurs mainly in association with dolerite, but also on basalt, sandstone and granite. The sites are typically well-drained. The surface rock can be continuous on talus slopes, boulder-fields and outcropping rock platforms. The altitude range of this community is about 500 m to 900 m (1,050 m on the Central Plateau), although in areas that receive cold-air drainage, it will extend downslope to below 300 m.

- *Eucalyptus viminalis* shrubby/healthy woodland (DVS)[10]:

  The dominant canopy species in this forest community is *Eucalyptus viminalis*, which attains around 20 m in height, less on poorer sites. *E. ovata* and *E. amygdalina* may be present as subdominants.

  On drier slopes, grasses and herbs generally dominate the understory, but on moister sites, *E. viminalis* forest has an understory of *Acacia dealbata*, *Pteridium esculentum* and an herb-rich, grassy ground cover.

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[9] Harris, S; Kitchener, A (2005) From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation. Department of Primary Industries, Water and Environment, Printing Authority of Tasmania. Hobart.
[10] Harris, S; Kitchener, A (2005) From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation. Department of Primary Industries, Water and Environment, Printing Authority of Tasmania. Hobart.

This forest community is established below 700 m on well-drained sites (ridges, hills, saddles and slopes), generally on dolerite or basalt (occasionally on sandstone) in the low-rainfall regions. It is well adapted to dry conditions and is found on free-draining sites, which are often susceptible to drought.

- Regenerating cleared land (FRG)[11]:

  The community is characterised by an invasion of native species including graminoid species such as *Lomandra longifolia*, *Isolepis nodosa* and *Juncus* species. This category may include insignificant amounts of *Austrodanthonia* or *Austrostipa* species, and includes small native shrubs during later colonisation.

- *Acacia dealbata* forest (NAD)[12]:

  This canopy is most often composed purely of *A. dealbata* although other species may sometimes be present as a minor component. Trees can reach 20m in height, but typically the community is short-lived and replaced by other wet forest communities (e.g. rainforest or wet eucalypt forest). Canopy cover can vary from dense in younger stands to sparse in more disturbed or older stands.

  The understories are variable and range from *Pteridium esculentum* and shrub species, representative of disturbed sites, to regenerating wet forest species such as *Olearia lirata* and *O. argophylla*, to rainforest species such as *Nothofagus cunninghamii*. The understory often reflects the vegetation present before the disturbance. Except in riparian corridors subject to regular floods, the community reverts to the predisturbance community (e.g. wet eucalypt forest, rainforest) if left undisturbed and appropriate seed sources are present.

  This community is most common on sites disturbed by fire, past vegetation clearing or floods. Generally, stands are less than 5 ha in size but are occasionally more extensive. The community occupies sites from flats to steep slopes and ridges on a variety of substrates, but most often is found on relatively fertile areas.

Logging History:

The history of the RFPA includes a combination of selective and clearfell harvesting. There are patches of old growth forest where past clearing has been limited to a few individual trees. One large patch of contiguous, mostly unlogged old growth remains, measuring ~40ha, in the upper elevations of the central zone between the two recently logged sides of the RFPA. This is predominantly a north-facing slope covered by dry sclerophyll forest, with lower potential biomass than of the remainder of the RFPA. Smaller patches of old growth are dotted across the upper elevations of the RFPA. These areas were selectively logged without chainsaws (pre-1945), a labour-intensive

[11] Harris, S; Kitchener, A (2005) From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation. Department of Primary Industries, Water and Environment, Printing Authority of Tasmania. Hobart.
[12] Harris, S; Kitchener, A (2005) From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation. Department of Primary Industries, Water and Environment, Printing Authority of Tasmania. Hobart.

and therefore highly selective process. However, it was conducted even in presently designated streamside reserves and rarely involved any attempts at specific stand regeneration. Nonetheless, in these mid- and upper-elevation zones, there was significant natural eucalypt regeneration. Accordingly, the growth form of the canopy is that of forest trees, not woodland trees.

The lower elevation portions of the RFPA have been subject to timber extraction over a number of decades, mostly lumber and firewood. Broad-scale clearing was not enforced and so many large eucalypts remain. Many of these lower elevation areas were not given any silvicultural prescription for forest regeneration, but have been used to produce pasture grass for grazing. Consequently, many clearings and the general understory have become thickened with *Acacia dealbata* (silver wattle) and bracken, local pioneer species. The eucalypt canopy in these areas takes the growth form of woodland trees, rather than forest.

Biodiversity:

The project site has 29 endangered species on site and/or within a 5km radius (see Table No. 01).

Table No. 01. Endangered flora and fauna within 5,000 m of Redd Forests Project Area included as threatened in Tasmania Department of Primary Industries and Water (DPIW) [13] and IUCN Red List status*[14]

Latin Name	Common Name	DPIW Status**	IUCN Status
	Flora		
Arthropodium strictum	Chocolate lily	R	
Austrodanthonia induta	Tall wallabygrass	R	
Brunonia australis	Blue pincushion	R	
Carex longebranchiata	Drooping sedge	R	
Epacris acuminate	Claspleaf heath	R	
Epilobium willisii	Carpet willowherb	R	
Glycine latrobeana	Clover glycine	V	
Glycine microphylla	Small-leaf glycine	V	
Hovea longifolia		R	
Hypoxis vaginata var. vaginata	Sheathing yellowstar	R	
Isoetes humilior	Veiled quillwort	R	
Pellaea calidirupium	Hotrock fern	R	
Stellaria multiflora	Rayless starwort	R	
Taraxacum aristum	Mountain dandelion	R	
Triptilodiscus pygmaceus	Dwarf sunray	V	
Viola cunninghamii	Alpine violet	R	
	Fauna		

[13] DPIW. 2010. Natural Values Atlas Report No. 38909. Issued on 20 April 2010

[14] IUCN 2008. 2008 IUCN Red List of Threatened Species. <www.iucnredliset.org> [downloaded 21 April 2010]

Accipiter novaehollandiae	Grey goshawk	E	
Aquila audax	Wedge-tailed eagle	E	
Dasyurus maculatus maculates	Spotted-tail quoll	R	
Glaxias fontanus	Swan galaxias	E	Critically Endangered
Haliaeetus leucogaster	White-bellied sea-eagle	V	
Litoria raniformis	Growling grass frog	V	
Paragalaxias dissimilis	Shannon galaxias	V	
Paragalaxias eleotroides	Great lake galaxias	V	
Paragalaxias mesotes	Arthur's galaxias	E	
Perameles gunnii	Eastern barred bandicoot	V	
Sarcophilus harrisii	Tasmanian Devil	E	Endangered
Tasniphargus tyleri	Great lake amphipod	R	
Tyto novaehollandiae	Masked Owl	E	

* IUCN Red List of Threatened Species.
** (E) Endangered: Those species in danger of extinction because long term survival is unlikely while the factors causing them to be endangered continue operating. (V) Vulnerable: Those species likely to become endangered while the factors causing them to become vulnerable continue operating. (R) Rare: Those species with a small population in Tasmania that are at risk.

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

The project will protect a combination of unlogged forest and previously logged forest that has the regenerative capacity to reach a mature, 'old growth' state. This area will be logged in the absence of carbon finance. Protecting forest from timber harvesting reduces emissions through maintaining and increasing the forest carbon stock.

The underlying conceptual approach of this methodology is based on the Agriculture Forestry and Other Land Use (AFOLU) Guidance Document of the Voluntary 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 sawtimber, pulpwood and fuelwood, and are included in the IPCC category "forests remaining forests".

This site is eligible for crediting under the VCS IFM category because it has been approved for logging concessions under a current Forest Practices Plan issued by the state regulatory body, the Tasmanian Forest Practices Authority. The owner of the right to harvest is acting as the project proponent and undertaking forest protection as an alternative to harvesting. The project is specifically eligible under the VCS-approved "Methodology for Improved Forest Management: Conversion of Logged to Protected Forests".

This project satisfies all the applicability criteria from the GreenCollar IFM methodology, including:

1. Forest management in the baseline scenario is planned timber harvest as outlined in Table No. 03. No areas have the baseline condition of conversion to managed plantations.

2. The merchantable volume (m^3/ha) extracted in the planned timber harvest is estimated using international forest inventory methods and Tasmanian allometrics.
3. In the project scenario, forest use will not involve commercial timber harvest or forest degradation.
4. The boundaries of the forest land are clearly defined using cadastral parcels and KML files.
5. The project does not include wetland or peatland.

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

This project draws on the consultancy services of Redd Forests Pty Ltd and its contractors. Apart from this cost, there are limited technologies, products or activities involved. This is because the project activity seeks to reduce business-as-usual carbon emissions through improved forest management: it requires no additional activity beyond preventing the clearance and conversion planned by the landowner.

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

The project developers and landowners adhere to all laws and regulations relevant for the project, including the *Forest Practices Act 1985*, the Forest Practices Code 2000 and the Forest Practices Regulation 2007. The project does not contravene or inhibit compliance with any of the above.

The project follows all the Tasmania Workplace Authority Standards, including the Forest Safety Code. Redd Forests follows safe labour practices to prevention injuries in the workplace, a particular risk for workers engaged in forestry operations. Additionally, Redd Forests complies with all other applicable local, state, and national workplace standards.

The project does not just satisfy local regulation but demonstrates best practice. This is demonstrated by its validation under the Climate, Community and Biodiversity (CCB) Standard.

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

The greatest risks to an Improved Forest Management project in Australia are from pests or fire.

There are no significant pests in this area. Browsing animals (particularly deer and wallabies) may have a minor effect on regeneration, though in practice the animals have little impact as they largely remain in pastured areas rather than forests. These pests are controlled by shooting under a game management plan: the annual pest control program involves up to 200 people.

Native eucalyptus forests within Tasmania are not highly susceptible to insect damage: single species plantations are much more susceptible than native forests. The forests within the RFPA are even less susceptible given that insect damage to native eucalypts are most susceptible in 'edge' environments where they adjoin cleared lands. The RFPA comprises large tracts of mixed native forests that rarely adjoin cleared farm lands. Louise Gilfedder, Senior Conservation Scientist with the Tasmanian Department of Primary Industries Water and Environment advised the following with regard to insects;

"*From a carbon perspective, insects only consume a small percentage of individual leaves for a short period of time and would not have a significant impact upon long term carbon stocks.*" (Gilfedder, *pers comm*, 2010).

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, but the Central Highlands are only susceptible to wildfire for a few months of the year due to the relatively cold and wet climate of Tasmania. The risk is further reduced on private property, such as the project area, which is not accessible to the public. In addition, the landowner has established strategic fire breaks through the roading system, conducts low scale burning off along the roads and keeps four fire trucks stationed on the farm. There is ongoing monitoring by organised recreation groups and all employees.

The effectiveness of these precautions is demonstrated by the fact that this property has experienced only one wildfire in the past fifty years, from an escaped logging fire in 1969. This burnt 50ha, but killed no mature Eucalypts.

Redd Forests has conducted a risk assessment using the Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination (Appendix 2), which determined that the risk level of this project is low. This determines the number of credits placed in the AFOLU Pooled Buffer Account to be 10% of total credits, a reserve established to address non-permanence. This risk assessment will be repeated with each verification.

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.

The listed Forest Practices Plans (Table No. 02) and historical use of the site demonstrate that the landowner has the legal right to use a combination of selective harvesting and clearfell on the project site, followed by natural regeneration.

The landowners have an extensive logging history, as outlined above. Most recently, 256 ha were clearfelled in 2006 and a further 261 ha selectively logged in the same year. This demonstrates that the forest has historically faced – and will continue to face – intensive logging pressure unless the land can be used to generate alternative income streams. The logging history is demonstrated by the Forest Practices Plans (Table No. 02) and from intensive site assessment.

Table No. 02. Details of the most recent Forest Practices Plans for the Redd Forests' project site.

FPP Reference No.	Plan valid until:	Applicant	Area (ha)	Estimated timber volume (t):
TAM0805	31/12/2010	Gunns Ltd	219	12 200
TAM0537	30/06/2007	Gunns Ltd	41	4 120
TAM0411	30/04/2005	Marcus and Heidi Archer, John Archer	26.5	4 250
TAM263	31/12/2002	North Forest Products	75	5 500
TAM129	31/12/2000	Marcus and Fiona Archer	65	5 300

As of July 2009, the landowners planned to clear the land to sell the timber. They also had an offer from Gunns Pty Ltd to purchase the land for the same purpose, or for clearing and converting the site to an *E. nitens* plantation (the document is not available because it is Commercial in Confidence). Both clearfell with natural regeneration and clearance for conversion to plantation are permitted under current Tasmanian legislation: indeed, only the year before, the neighbouring property shifted their land use from selective logging to complete forest conversion by establishing an *E. nitens* plantation. The native forests of the RFPA have only been protected for the past fourteen months because the landowner aims to protect his land by seeking alternative income from the carbon market.

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

This project has not created any other form of environmental credit.

1.14 Project rejected under other GHG programs (if applicable):

This 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:

Marcus, Heidi and Fiona Archer are the project proponents and landowners. They have owned and managed several properties for over 30 years, and have continued to expand their farming and forestry operations over recent decades.

The project proponent is responsible for the ongoing monitoring of the project, in accordance with the Monitoring Plan (14 March 2011 version) prepared by Redd Forests.

Contact person: Marcus, Heidi and Fiona Archer

Title: Landowners
Address: 4792 Poatina Road, Cressy, TAS 7302
Telephone number: 61 (3) 6397 8228

Redd Forests Pty Ltd is acting as project developer on behalf of the landowner, and is responsible for the development, validation and first verification of the project. 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: 61 421 670 567
Fax: 61 (2) 8798 5090
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.

Stephen and Andrew will be responsible for ensuring that Redd Forests maintains the financial strength and technical expertise to maintain, monitor and verify the pilot IFM project during its twenty-five year lifetime.

Jarrah Vercoe is the Project Manager primarily responsible for the implementation and management of IFM projects in Tasmania. He will support the project proponent with monitoring and verification as required. He has a Bachelor of Science with first class (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 the international consulting firm 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 Sarah Colenbrander, Project Manager with Redd Forests. Sarah graduated in 2009 with a Bachelor of Science (Advanced) and Bachelor of Commerce from the University of Sydney. During her studies, Sarah held the role of

NSW Projects Team Leader with the Oaktree Foundation. In this capacity, she was responsible for designing, monitoring and evaluating educational projects in India, Papua New Guinea and South Africa. She was also employed by Dowse CSP to research corporate social responsibility initiatives.

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.):

Political environment:

The project baseline situation is clearance of native forest with natural regeneration. The original forest includes remnants of rare and ecologically valuable old growth, while much of the site has only been selectively logged and therefore has the capacity to return to its old growth state. While ongoing clearfell with native regeneration is still legal and widely practiced, recent legislative changes have created an incentive for landowners to utilise logging concessions for clearance and conversion to plantation 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: [15]

"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.*"*

This policy change encourages landowners to take advantage of existing Forest Practice Plans, and immediately seek approval for future plans to clear and convert forested land before 2015. This increases the threat to native forests under existing concessions or in legally permitted logging areas, such as the project site.

Stratification:

Redd Forests obtained a Landsat image from the Department of Climate Change, which was used to enable mapping of the spatial distribution of biomass across the RFPA (Figure No. 06).

[15] 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]

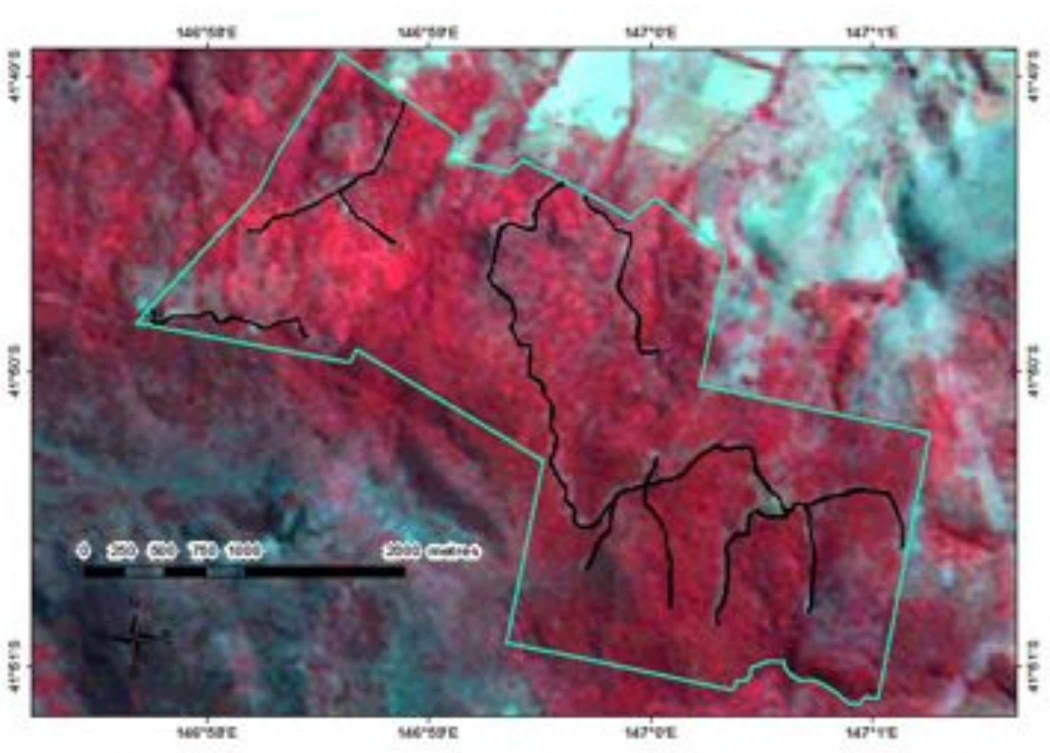

Figure No. 06. False colour Landsat image (bands 4, 3, 2). Red corresponds to more photosynthetic vegetation. Note that with an acquisition date in late summer the grass in paddocks on lower elevations is dry and showing as unhealthy vegetation.

Throughout the RFPA the nature of logging has been mainly ‘high-grading’, both in the choice of location of logging coupes and the individual trees and patches of trees felled within individual coupes. Four logging coupes have been harvested in the RFPA within the last 5 years (Figure No. 07). Although the registered plans for the coupes cover the major part of the RFPA, often less than the coupe area is harvested in each case. This is significant because it means that the harvested volume cannot be worked back to provide an estimate of aboveground trees per unit hectare.

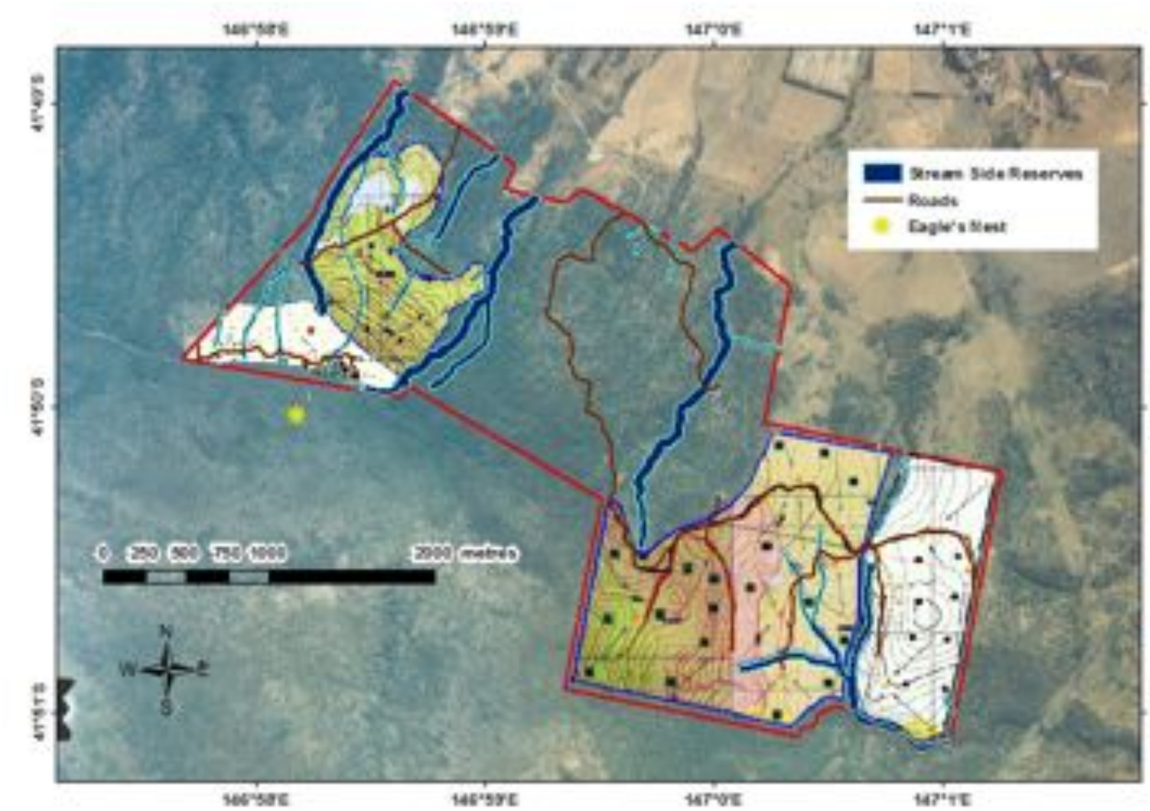

Figure No. 07. Roads, buffered streamside reserves, and timber harvesting plan for four separate coupes.

There are four reasons for not stratifying the data collection on the basis of the major influence on spatial heterogeneity (timber harvesting):

1) The harvesting of coupe C05CB142C, the largest coupe in recent years at a plan area of 219 ha, had only just begun when the aerial photography and satellite imagery were acquired (Figure No. 08). Therefore, stratification could not be based on logging history as determined by remote sensing.
2) Within a coupe, the area harvested is not necessarily clearly delineated.
3) Although areas within coupes have not been harvested, in the RFPA they still contain a network of tracks with large variations in age, width, reduced biomass and regenerative capacity.
4) Successive harvests (over many decades) have overlapping boundaries, thus creating a wide and virtually indeterminate variety of logging histories across the estate.

Therefore, while timber extraction and logging have been the major influence on the spatial distribution of biomass, there is a gradual change in stand density across the RFPA. Any trends in this graduation were not discernible at a level that would justify stratification. Consequently, for the purpose of locating sampling sites before fieldwork, the RFPA was treated as a single stratum.

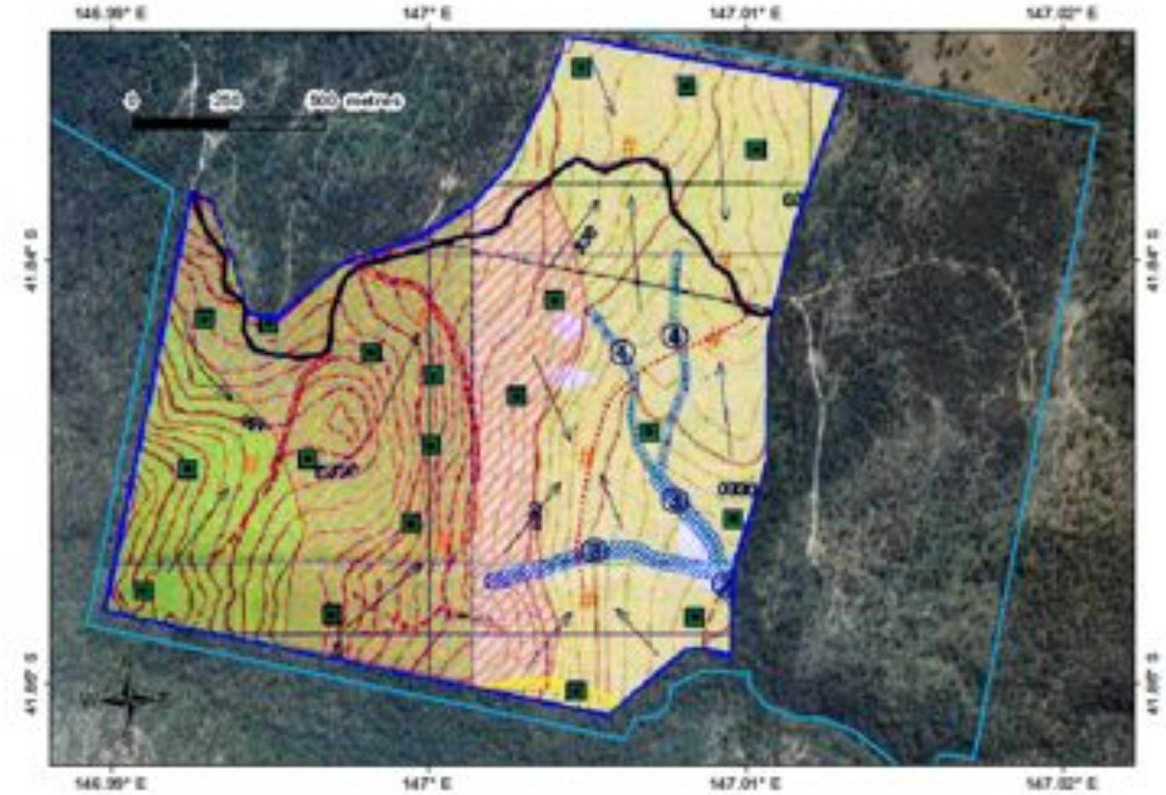

Figure No. 08. Timber harvesting plan for coupe C05CB142C and neighboring logged coupe LZ142B. In practice, a substantial portion (at least half) of this area was not logged in this operation.

An unsupervised classification was performed on the normalised difference for senescent vegetation index (NDSVI) image to allow modeling of specific categories of the standing carbon stock. The number of classes was limited to 4 (Figure No. 09), and the split between the two projects is shown in Table No. 03.

The history of the four classes is the following:

- Class 2: 235.52 hectares. Selective logging of 20% in 1940, selective logging of 50% in 1975, and selective logging of 100% in 2006; or the land subject to heavy logging in the early history of the farm and not regenerated, in the lower elevations of the central portion of the RFPA.
- Class 3: 239.47 hectares. Selective logging of 20% in 1940, selective logging of 50% in 1975, and selective logging of 51% in 2006. This latter logging is mostly the periphery of the more heavily logged areas, adjoining the land not logged in 2006.
- Class 4: 190.9 hectares. Selective logging of 20% in 1940, and selective logging of 50% in 1975, with no further logging.
- Class 5: 123.82 hectares. Selective logging of 20% in 1940, with no further logging.

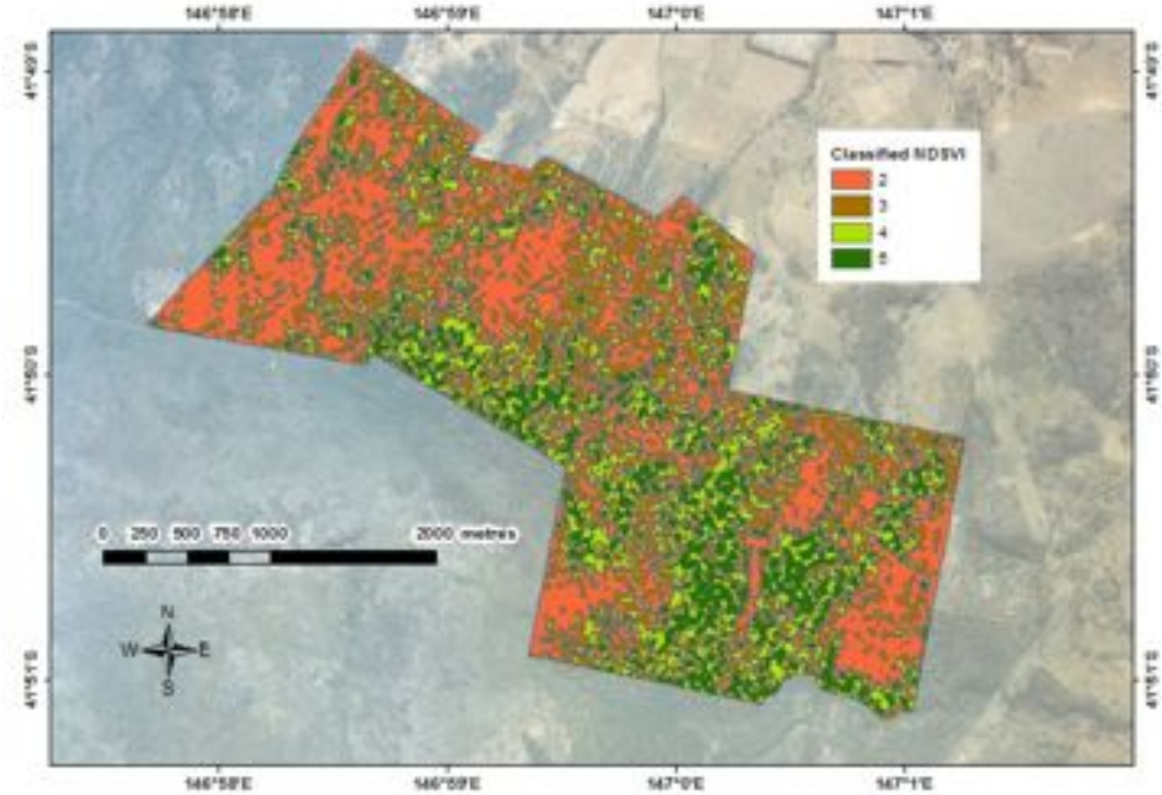

Figure No. 09. Classified normalised difference for senescent vegetation index (NDSVI) image. The streamside buffers were subtracted from this image to yield the area that can be selectively logged or clearfelled.

Table No. 03. The loggable area in each class (ha) in each of the two properties, identified by their PID.

	PID: 6753476	PID: 6753484
Class 2	149	36
Class 3	182	79
Class 4	164	45
Class 5	113	22
Total:	608	182

Forest inventory methods:

The field measurements involved standard forest inventory procedures, applicable to most forests worldwide. These techniques are commonly used to establish standing carbon stock (e.g. Zheng *et al.*, 2004).

62 permanent square sampling plots were established on a grid, separated by 375 m between each pair of adjacent plots (Figure No. 10). The number of plots needed was determined using the CDM Tool for the "Calculation of the number of sample plots for measurements within A/R CDM project activities", as specified in the chosen methodology (Appendix 3).

The individual plot dimensions are 45x45 m (0.2025 ha). The sides of the plots are aligned with the magnetic compass directions (N, S, E and W) in the field. The locations of plot corners are recorded using GPS. The sides of the plots are determined in the field with compasses and measuring tapes. The corners of each plot are marked with stakes, GPS waypoints and flagging tape, with the plot sides marked with flagging tape. Thus the plots and their locations can be retrieved during the project period for monitoring.

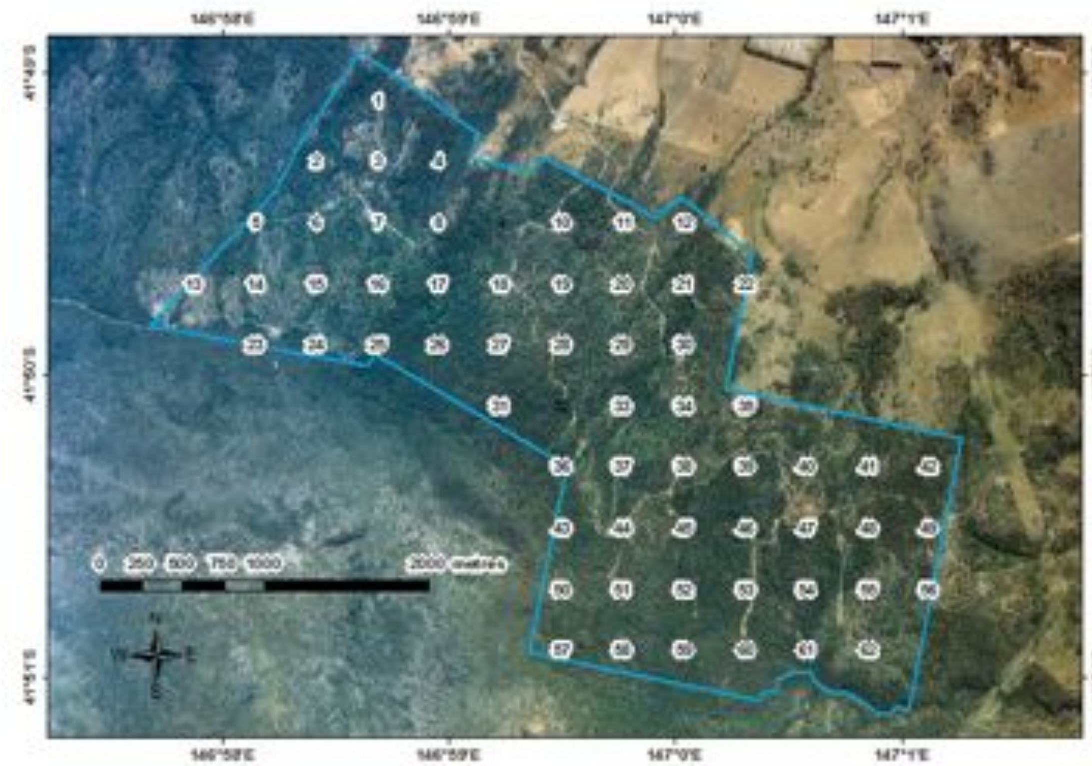

Figure No. 10. Regular array of sampling points. Numbers are the assigned plot numbers, which were used to index field data collection.

Data collected for each plot are:

- Date, time, staff involved;
- GPS coordinates for the corner edge of plots;
- Vegetation community type (according to the Tasmanian vegetation classification system);
- Topographic slope and aspect (in degrees);
- Brief description of logging and fire history;
- The DBH of live trees and standing, solid dead trees (as described above). Trees measured in the plots were of DBH ≥ 20 cm, in accordance with recommendations for forest inventory fieldwork from FAO (United Nations Food and Agriculture Organisation)[16]. Diameters were measured at 1.3m with DBH tapes using the Australian Forestry

[16] 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]

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 features.

In addition, the height of at least 10 large trees per species was measured using a LaserAce Hypsometer.

Processing the data:

The complete set of DBH and height data were recorded on waterproof paper, using pencil, in the field. The data was then entered into an Excel spreadsheet, and checked independently to ensure consistency with the field data. Electronic copies of this data are stored in two locations.

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 project will use the VCS-approved 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 on 11 February 2011. It is available from http://www.v-c-s.org/docs/VM0010%20Methodology%20for%20IFM%20LtPF%20v1.0%20-%2011FEB2011.pdf.

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 CDM Tool for the Calculation of the number of sample plots for measurements within A/R CDM project activities
- The VCS Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination

These methodologies fulfil the project proponent's goal of preventing logging of a forest and associated emissions by using carbon finance to protect the project area.

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

This methodology is designed for areas that have been approved for timber harvesting activities. The project site satisfies this requirement because of the historical logging activities and recent concession for selective logging held by the landowner.

The project proponent is seeking to use carbon finance to protect a forest from further logging, particularly the clearfelling that was recently implemented on much of the project site. The methodology provides the means to conservatively estimate the carbon emissions generated under the baseline scenario of ongoing logging, 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 project proponent.

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 trees, dead wood and harvested wood products. Aboveground trees 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 trees, 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 storied 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"[17]: the project area does not include organic soils, erosion is reduced by retaining the forest and fine litter remains on-site. The exclusion of vehicular emissions from logging is similarly conservative; while nitrous oxide does not need to be considered as no nitrogen fertilisers are used nor nitrogen-fixing species planted.

2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

The baseline scenario will be extensive selective logging of the standing native forest, followed by natural regeneration. The specific harvests are outlined in Table No. 04.

[17] 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]

This scenario was identified in July 2009 from the stated intention of the landowner (operating within their legal rights), and the offer from Gunns to purchase the land, outlined in a Commercial in Confidence document. This is in accordance with both historical and common practice. Indeed, historical logging of the project site, recent logging concessions and ongoing logging in the region demonstrate that the risk of deforestation is real, legal and imminent.

The baseline scenario therefore involves the selective logging of aboveground carbon stocks and clearance of the dead wood on site. In each harvest, around 70% of the merchantable volume will be extracted.

Although a fraction of the sawlog timber will be converted into long-lasting wood products, most of the timber extracted will be used for pulp or wood products with a short lifespan, therefore producing carbon emissions over the next hundred years. The greenhouse gas emissions generated in the baseline scenario will be calculated from carbon accounting using scenario modelling of the legal land use change described in the concession for the project area.

Table No. 04. Logging projections for the project site, which form the baseline scenario. This is drawn from the landowners' stated intentions, historical practices and FullCAM modelling of forest regeneration rates on previously logged land.

Year	Class	Area (ha)	Logging history	Land use
2009	5	135	Selective logging in the 1940s	Selective logging
2013	4	209	Selective logging in the 1940s and 1975	Selective logging
2019	3	261	Selective logging in the 1940s, 1975 and 2006	Selective logging
2029	5	135	Selective logging in the 1940s	Selective logging of Class 5 regrowth
2033	4	209	Selective logging in the 1940s	Selective logging of Class 4 regrowth

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):

The carbon stock change is determined from the difference between the base year carbon stock and any growth in the forest, minus stock change due to harvest plus, stock change due to regrowth. 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 trees) is protected from clearance that would have occurred without carbon finance.

Under the baseline scenario, a fraction of the carbon currently in the aboveground trees would have been stored in harvested wood products. However, logged forests or clearfelled sites have low carbon stock in the aboveground trees compared with the carbon stock in the aboveground trees and dead wood of a native Eucalypt forest.

Initial data for input into these carbon stock change calculations for the baseline scenario is established from forest inventory data and from species-specific allometric and growth data for the relevant Eucalypt species.

The project satisfies 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.

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

1a: Define alternatives to the project activity:

The project activity in this scenario involves the continuation of the pre-project land use, i.e. the native forest on site remains standing, using carbon finance to generate revenue from improved forest management.

There are five alternative land use scenarios to the AFOLU project activity. The first requires no additional technologies or inputs, but options 2-5 require various forms of logging and transport machinery, as described in the Forest Practices Code.

1. <u>Native forest remains standing:</u>
   This scenario fulfils one of the alternative land uses identified in the VCS Tool for Demonstration and Assessment of Additionality: it describes the project activity without registering the project as an AFOLU activity. In this scenario, the landowner generates no income from the property. Given the landowner's intentions and legal right to continue forest harvesting, the continuation of the pre-project activity is only plausible when supported by carbon finance. Therefore, this is not a credible or realistic scenario.

2. <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 plausible scenario, and indeed the projected land use for the project site. The property has a long history of selective logging because there is a high proportion of good quality timber trees with relatively high regrowth rates (notably *E. delegatensis*, but also *E. pulchella*, *E. amygdalina*, *E. viminalis*, *E. obliqua*, *E. pauciflora*, *E. tenuiramis*, *E. ovata*, *E. rodwayi*, *E. gunnii* and *E. dalrympleana*). It would be financially attractive to log these properties at a sustainable rate to maintain a flow of revenue: in short, the financial incentives support a sustainable selective logging approach.

3. <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 scenario because a) it is permitted under the existing legislation; b) because it generates high returns with low costs; and c) because it is a widely adopted land use in Tasmania. However, this scenario does not generate equally high revenues for the landowner in the longer run because many smaller Eucalyptus trees are felled before they are a viable size. In this open, dry sclerophyll forest, it is more attract to selectively log a forest than to clearfell.

4. 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 approach is permitted under the established Forest Practices Plan, and has been adopted by the landowners in the past. However, the landowner is not seeking to expand his plantations due to the uncertain demand and falling prices for pulp in the international market. It is therefore not a credible baseline scenario.

5. 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 very plausible scenario for landowners who are increasing their animal stocks or trying to avoid exhausting the land by reducing stock density. The landowners have a history of clearfelling native forests for conversion to grassland.

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

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

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

1b: Consistency with mandatory laws and regulations:

The land use scenarios identified above are in compliance with all the applicable legal and regulatory requirements: the *Forest Practices Act 1985*, the Forest Practices Code 2000 and the Forest Practices Regulation 2007. These were not developed to avoid greenhouse gas emissions, but to regulate harvesting practices. Moreover, selective logging with limited clearfell for conversion conforms to historical practice, and therefore provides the baseline scenario for this project.

The clearance of native forests for plantation or pasture is only legally permitted at a rate of 40ha per year per property until 2015. This is based on the 2009 policy amendments for the issuance of Forest Practices Plans and illustrates the goal of the "Tasmanian Government Policy for Maintaining a Permanent Native Forest Estate" (December 2009) to end 'broad scale clearing' by 2015. This land use could therefore not be implemented across the whole project site.

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 for pasture planned on Downie's scenario over the next five years is a very viable baseline scenario for most Tasmanian native forests, at least until 2015." It also worth noting that the current policy relating to 2015 is not certain, ie. It may or may not result in actual legislative change.

As outlined above, Option 6 – the abolition of logging on private land – is not regarded as a plausible policy shift.

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

Since the project activity generates no financial or economic benefits other than

[18] *Tasmanian Forest Statement of Principles to Lead to an Agreement* http://www.premier.tas.gov.au/__data/assets/pdf_file/0009/134991/draft_principles.pdf {accessed 23/11/2010)

carbon-related income, the simple cost analysis can be used.

2b: Option I. Apply simple cost analysis

An overview of the project costs is available for review by the validator.

The project activity only generates income from the sale of carbon credits. The most significant cost involved in developing the VCS IFM project is hiring Redd Forests Pty Ltd to undertake fieldwork and prepare the Project Design Documents in accordance with the Community, Climate and Biodiversity Standard and Voluntary Carbon Standard.

The proponent incurs the cost of project implementation and forfeits income from the sale of pulp and sawlog timber. However, they also have the option of letting the forest stand without any logging or carbon-financed protection. While this generates no income, it is a viable alternative scenario and cheaper than the CDM/VCS project activity.

Therefore, the project activity satisfies the investment analysis for additionality.

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, then Step 3 can be by-passed and the analysis move directly to Step 4: common practice analysis.

STEP 4: Common practice analysis.

This will be the first project of its type in Tasmania. Activities similar to the proposed project are consequently not common practice or widely implemented in Australia. However, the project proponent and developer hope that successful projects will encourage the use of VCS and carbon finance by landowners, thereby protecting the biodiversity and carbon sinks of native and old growth forests in Tasmania.

The project activity of improved forest management is not a financially competitive land use without carbon finance, since it generates no other revenue; nor is this type of project common practice in the region. The project therefore satisfies the three criteria of the VCS Tool for the Demonstration and Assessment of Additionality.

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:

This project will use the monitoring schedule and plan 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 specific 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 offsets generated through improved forest management. The monitoring techniques should assist the project proponent in establishing a credible and transparent schedule for these carbon credits, meeting accepted standards for data collection, recording and quantification.

The recorded project boundaries (in KML files) shall be examined against recent satellite images (where available) to ensure that deforestation has not occurred to reduce the project area. Any variations in the forested area will be calculated as a percentage of that strata's total area, and incorporated into the uncertainty calculations.

In conformance with Step 8 of the methodology for this project activity, monitoring requires ongoing assessment of carbon stock changes on the project site compared with those that would have been generated under the selected baseline scenario. Data and information to be reported and stored will include:

- the geographic position of the project boundaries;
- the GPS coordinates of permanent sample plots and transects;
- forest inventory from field sampling throughout the project's lifespan; and
- the stock assessment equations and greenhouse gas assessment equations used to estimate net anthropogenic GHG emission reductions (detailed in the identified methodology)

The data relating to the standing carbon stock shall be assessed through repeat sampling of permanent field plots established within the project area. 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 twelve plots that will be repeatedly measured are Plots 6, 10, 17, 23, 28, 30, 32, 40, 43, 46, 47 and 53. These plots were selected using a random number generator[19]. 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 – again using a random number generator – and measured as required.

The data generated during fieldwork must be run through Equations 13-16 of the GreenCollar IFM Methodology. The results will be compared to the projected growth, as modelled by FullCAM. The plots will be sampled using a DBH measuring tape, using the standard operating procedures for forest inventory utilized during the initial assessment. The mean and standard deviation of the field data collected will be run through the Winrock sampling calculator. This will determine any uncertainty with

[19] Haahr, M. (2011) Random.org, Trinity College, Ireland Available from <http://www.random.org/> [viewed 07/03/2011]

respect to sampling error, and accordingly the extrapolation from carbon stocks to emissions for the baseline and project case. The project proponent will be responsible for implementing monitoring events every year, with fieldwork to assess changes in carbon stocks required at a maximum interval of every five years.

The annual monitoring events will involve a comparison of cadastral parcels to check whether project boundaries have changed; a comparison of recent and original satellite imagery to identify the presence and scope of any natural disturbance; and the extrapolation of forest growth trends, based on past field sampling and FullCAM modelling.

In the case of disturbance such as fire, calculations of carbon emissions shall be based on Equations 17-19 from the methodology.

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. 25A 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 5 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[20]. 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)[21].

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

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

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*[22].

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[23]; and because firewood collection tends to occur within public roadsides and within proximity to residential areas. The RFPA 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.

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. If this is confirmed by the Participatory Rural Appraisal at the first monitoring event, there will be no need for this task to be replicated annually. 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?*'

Activity description	Indicator	Frequency
Complete a Participatory Rural Appraisal	Risk of illegal logging	At first verification event. If >20% of respondents answer 'yes', task must be repeated annually.

Quality of both field data collection and data management will be managed by using the standard operating procedures and quality control procedures of the Forest Practices Authority of Tasmania (http://www.fpa.tas.gov.au/). All data will be archived both electronically and in paper form, and stored in multiple locations for at least two years after the crediting period. The project proponent will be responsible for data archiving and quality control.

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.

22 Forest Practices Authority, Annual Report, 2008 – 2009.

23 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>

Activity Shifting:

Consistent with step 5.1, an assessment was undertaken to examine the potential for activity shifting as a result of the project.

The logging projections for the property do not deviate from the historical logging records (as demonstrated in Table No. 02) and are consistent with current legislation.

In addition, the landowners do not hold any other forested properties in Australia, and therefore there is no opportunity for leakage through activity shifting. At each monitoring and verification event, the landowner will provide documentation on the land use of any additional forested properties in their possession, to demonstrate that leakage has not occurred from activity shifting.

Market Leakage:

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

The GreenCollar IFM LtPF methodology states:

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

Public forests are harvested to satisfy quotas

State forests (i.e. those on public land) in Tasmania are managed by the government business enterprise, Forestry Tasmania. Specifically, these native forests are managed to meet set quotas of high quality sawlog (300 000m^3 per annum from 2010 to 2030) with pulp and other wood products produced as byproducts of the sawlog harvesting process. This is recorded both in their Sustainability Charter[24] and in the wood supply agreements with Gunns Ltd and Ta An Tasmania Pty Ltd[25]. 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."[26] State-specific quotas are detailed in Regional Forest Agreements[27]. 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.

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[24] 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]

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

[26] 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]

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

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[28]. 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[29]. 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 (113t per year) is minimal: this low volume ensures that it could have no impact on Australian prices, without even considering it is competing on an international market. Private native forests across Tasmania (let alone the project area) do not produce enough sawlog timber to affect price. The marginal reduction in available timber resources will not affect prices and therefore does not encourage market leakage.

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

Ecological constraints on forest growth

Logging of private lands in Australia is managed on a property-specific basis. Harvesting on private land is currently conducted according to individual landowners' intentions and needs, rather than to satisfy quotas from government or processing agencies. Forest Practices Plans (or the state equivalent) are organised by landowners or their representatives. Those landowners who choose to log their native forests (rather than pursue conservation covenants) will continue to do so at one of two maximums. They will either clearfell their land and allow natural regeneration, which generates the highest possible immediate return: this was historical practice on much of 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***

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[28] 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.

[29] 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.

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:[30]

> *"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".*

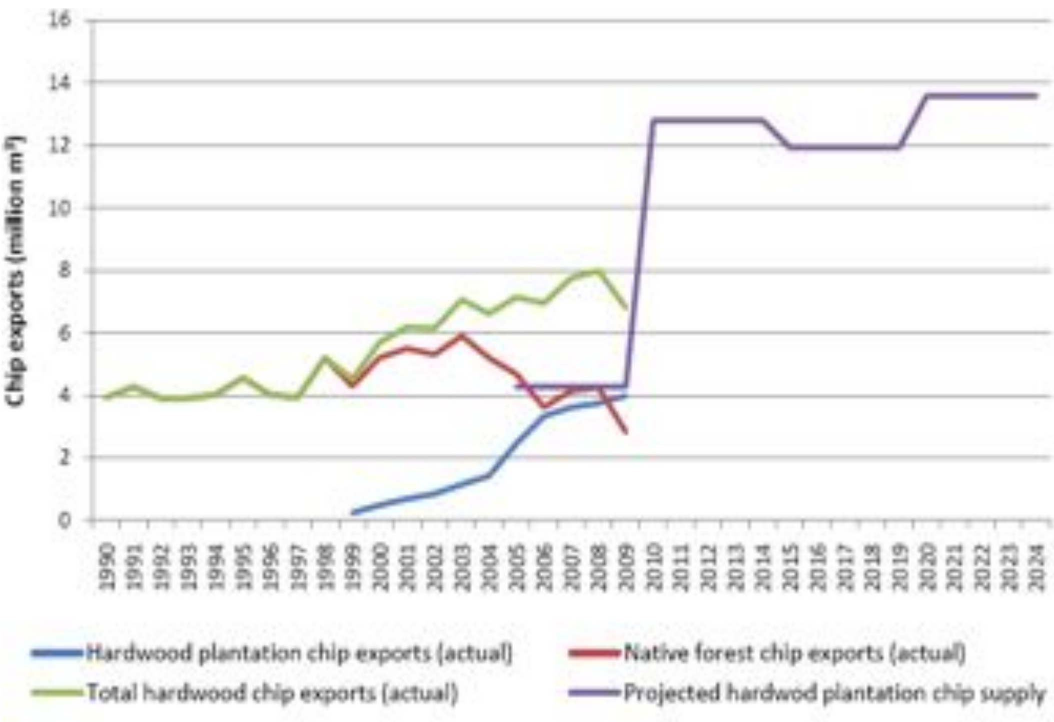

Figure No. 11. Australian hardwood chip exports and projected plantation supply.

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.***

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

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[31].

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[32]. On mainland

[31] 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]

[32] 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

Australia, pulp is produced only as a byproduct of sawnwood[33]. In Tasmania, the pulp supply is increasing as Eucalyptus plantations across the state mature (refer to Figure No. 11). 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[34]. 80% of this output is intended to produce low-value woodchips[35]. 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[36], 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,[37] is driven partially by market preferences and partially by costs. The cost effectiveness of harvesting plantation for pulp far exceeds that for native forests. Harvesting plantation is a largely mechanised operation due to the consistency of tree size and distribution whereas native forests require expensive machinery, manpower and infrastructure. The trend towards plantation-sourced wood is only confirmed by the closure of these woodchip mills. To support this, a 2010 study into trends within the Tasmanian Forest Industry reports that the downturn in the industry has had the greatest impact in the native forest sector, where 41% of jobs have been lost since 2006, compared to 26% of jobs dependent on hardwood plantations and 18% of those dependent on softwood plantations[38].

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

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[33] 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.

[34] 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]

[35] 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]

[36] (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]

[37] 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]

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

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[39]. 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 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.

Activity description	Indicator	Frequency
Compare the annual extracted volume to the long-term average volume of extracted timber from private native forests in Tasmania.	Market leakage factor.	Annually

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

Data / Parameter:	$A_{burn,i,t}$

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

1. Data unit:	Ha
2. Unit:	Area burnt in stratum *i* at time *t*
3. Source of data to be used:	GPS coordinates and/or remote sensing data
4. Value of data applied for the purpose of calculating expected emission reductions	
5. Description of measurement methods and procedures to be applied:	Area burnt shall be monitored at least every five years.
6. 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
7. Any comment:	

Data / Parameter:	$A_{DIST\_IL,i}$
1. Data unit:	Ha
2. Description:	Area potentially impacted by illegal logging in strata *i*
3. Source of data to be used:	GIS delineation and groundtruthing
4. Value of data applied for the purpose of calculating expected emission reductions	
5. Description of measurement methods and procedures to be applied:	$A_{DIST\_IL,i}$ shall be composed of a buffer from all access points (‘access buffer’) such as roads, rivers and previously cleared areas. The width of the buffer shall be determined by the depth of degradation penetration as defined as a PRA output. Repeated each time the PRA indicates a potential for degradation.
6. QA/QC procedures to be applied:	
7. Any comment:	*Ex ante* a limited survey can be used to determine the depth of degradation penetration.

Data / Parameter:	AP_i
1. Data unit:	Ha
2. Unit:	Total area of illegal logging sample plots in stratum *i*
3. Source of data to be used:	Ground measurement

4. Value of data applied for the purpose of calculating expected emission reductions	
5. Description of measurement methods and procedures to be applied:	A sampling plan must be designed using multiple sample plots systematically placed across the buffer zone so that they sample at least 3% of the buffer zone.
6. 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
7. Any comment:	

Data / Parameter:	*PMP*
1. Data unit:	%
2. Description:	Merchantable timber as a proportion of total aboveground trees for stratum *i* within the project boundaries
3. Source of data to be used:	Field measurements in sample plots
4. Value of data applied for the purpose of calculating expected emission reductions	
5. Description of measurement methods and procedures to be applied:	Within each stratum, divide the summed merchantable timber by the summed total of aboveground trees. Must be done at least every five years at the time of verification.
6. 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
7. 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
1. Data unit:	Ha
2. Description:	Area covered by stratum *i*
3. Source of data to be used:	GPS coordinates and/or remote sensing and/or legal parcel records

4. Value of data applied for the purpose of calculating expected emission reductions	
5. Description of measurement methods and procedures to be applied:	
6. 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
7. 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*
1. Data unit:	Cm
2. Description:	Diameter at breast height of a tree
3. Source of data to be used:	Field measurements in sample plots
4. Value of data applied for the purpose of calculating expected emission reductions	
5. Description of measurement methods and procedures to be applied:	Typically measured 1.3m aboveground. Measure all trees above the minimum DBH of 15cm in the sample plots. Must be measured at least every five years.
6. 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
7. 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

Monitoring of the project area and natural disturbance (including fire) will be undertaken every year. In addition, carbon stock changes will be measured through fieldwork every five years. In between fieldwork, changes in carbon stocks from forest growth will be extrapolated from FullCAM modelling and previous fieldwork results.

Since the project is characterised by the creation and implementation of a protected forest in an area that would otherwise be logged, the following monitoring provisions will be adopted.

- Monitoring of carbon stocks:
  The project proponent will organise a detailed forest inventory inside the project boundaries. The plots measured as part of the initial carbon stock quantification are permanent plots, with their NE corners recorded using GPS, and the boundaries defined by stakes and flagging tape.

  The monitoring fieldwork will be identical to that outlined below, and specified in the relevant VCS methodology. This allows the carbon stocks in each plot to be assessed as a function of time. 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 $\geq$ 15 cm. Australian governments recommend measuring DBH $\geq$ 10cm in a standard forest inventory (e.g. Queensland[40], Tasmania[41]): however, this was considered impractical in the field due to the high number of very trees with such a low diameter, while using a higher minimum DBH provides a conservative estimate of standing biomass. Diameters are measured at 1.3m with DBH tapes using the Australian Forestry Standard (which matches IPCC guidelines). Tree basal hollows will be 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 should be stored in two locations.

The mean and standard deviation of the field data collected will be run through the Winrock sampling calculator. This will determine any uncertainty with respect to sampling error, and accordingly the extrapolation from carbon stocks to emissions for the baseline and project case.

The sequestration from forest growth (tC/ha) will be calculated from field data using Equations 13-16. This will be compared to the plot-specific (point modelling)

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[40] Miller, R. (2006) National Forest Inventory <http://www.cqfa.com.au/documents/1231124274_native_forest_inventory.pdf> Australian Department of Agriculture, Forestry and Fisheres; Queensland Department of Primary Industries and Fisheries [accessed 5/11/2010]

[41] Brack, C. L. (2004) Projecting native forest inventory estimates from public to private tenures, *Australian Forestry* **67**(4) 230-235

FullCAM projections (which generate the product of Equation 15) to determine uncertainty associated with regrowth projections. It is worth noting that the increases in accumulated biomass between monitoring periods are not expected to be significant owing to the relatively slow growth rates of eucalypts.

Activity description	Indicator	Frequency
Determination of carbon stock in aboveground trees per unit area per stratum. Calculated from plot data.	Carbon stock	Every 5 years
Determination of carbon stock change in aboveground trees. Calculated from plot data.	Carbon stock change	Every 5 years
Determination of carbon stock change in aboveground trees. Extrapolated from FullCAM modelling and past plot data.	Carbon stock change	Annually
Determination of uncertainty in the forest inventory. Calculated using the Winrock sampling calculator.	Sampling error	Every 5 years
Determination of uncertainty in forest growth and regrowth projections. Calculated by comparing fieldwork results to FullCAM models.	Regrowth estimate errors	Every 5 years

- <u>Monitoring of natural disturbances:</u>

  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. Tracklogs must be kept to provide a record of the longitude, latitude and dates of the site visit to demonstrate the extent of 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.

Activity description	Indicator	Frequency
Site visit to assess natural disturbances (including fire)	Deforestation in hectares from natural disturbances	Every two to three years
Determination of carbon stock change in the carbon pools by natural disturbances	Carbon stock change	Every two to three years, if required

The landowner will be responsible for coordinating all monitoring tasks (fieldwork, ensuing calculations and the documentation). Redd Forests has prepared a Monitoring Plan (14 March 2011 version) outlining all necessary tasks and has obtained the signature of the project proponent on the monitoring plan confirming their understanding of the responsibilities and requirements. Redd Forests can and will coordinate the process if requested by the project proponent.

To support the landowner in fulfilling their monitoring responsibilities, a handover folder will be prepared by Redd Forests to provide to the project proponent after the first verification. This will enable an effective transition. This folder will contain:

- Paper and electronic copies of this PDD;
- KML files of the land parcels;
- Paper and electronic property maps identifying strata, plot locations and their proximity to access points;
- Paper and electronic copes of original fieldwork data sheets;
- GPS coordinates for the permanent monitoring plots including waypoints for each of the plot boundaries;
- An electronic 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 the offer to provide ongoing support in relation to undertaking the required monitoring tasks; and
- Contact details of accredited VCS validators.

In each case the field data sheets will be scanned, photocopied and stored as follows;

- The landowner will store a photocopy of each data sheet;
- Scanned copies of the datasheets will be stored on a computer and an external hard drive at the following locations;

  Either

    - 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.

- The original data sheets are stored within a property file in a safe at Redd Forests, Tasmania Office.

4.0 GHG Emission Reductions

4.1 Explanation of methodological choice:

GreenCollar Solution's VCS-approved "Methodology for Improved Forest Management: Conversion of Logged to Protected Forests" has been used. The project scenario involves protecting native forest. The baseline scenario involves projecting the carbon emissions generated through timber harvest through clearance, and subsequent sequestration during natural regeneration.

Calculating the carbon emissions from the baseline scenario requires an assessment of the merchantable volume of timber in the project area. The methodology uses standard forest inventory procedures (as outlined above) to assess the carbon stock in the aboveground trees and dead wood.

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

<u>Calculating the carbon stock harvested and extracted:</u>

The merchantable volume of timber 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 thus 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 above 20cm DBH, combined with the height estimated from a project-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 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 Farm Forestry Toolbox included allometrics for the main species harvested in Tasmania. In the Redd Forests' project area, this included *E. obliqua*, *E. delegatensis*, *E. viminalis*, *E. amygdalina*, *A. dealbata* and *A. melanoxylon*. There were no specific allometrics for *E. ovata*. However, a Tasmanian botanist[42] identified that *E. amygdalina* has a similar stature and growth form, and its allometrics were accordingly used to calculate the merchantable volume of *E. ovata* in the project area.

Neither a species-specific allometric nor a suitable equivalent was available for a range of understorey species found in the project site, including *O. argophylla*, *E. cuprea* and *B. marginata*. For these species, a general allometric for Australian native sclerophyll forest was utilised. This allometric was derived from 135 trees, and had an R2 value of 0.963[43].

This 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

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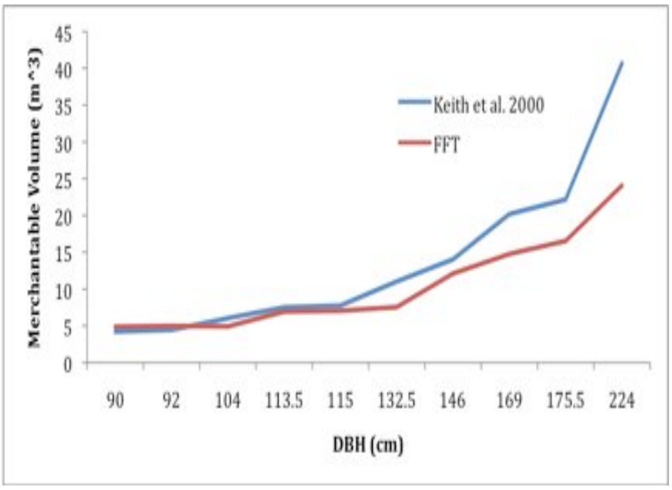
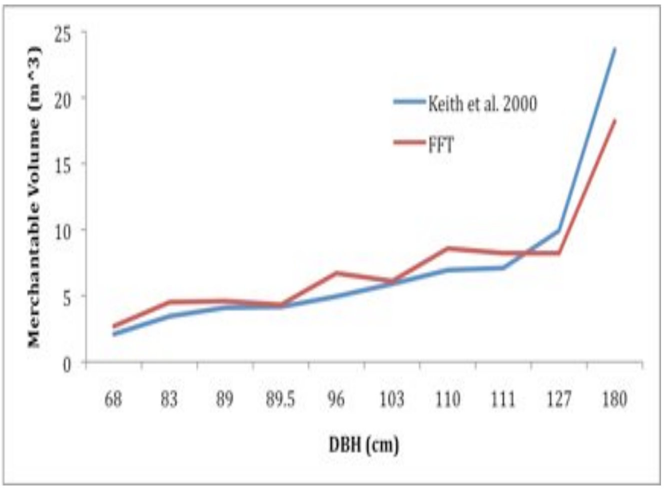
[42] Fitzgerald, N. *pers. comm*

[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

timber volume (m^3) by dividing it by the BCEF (1.17) and the wood density (t/m^3). The results were very comparable, as illustrated by Figure No. 12, but overall the FFT offered a slightly more conservative estimate of merchantable volume.

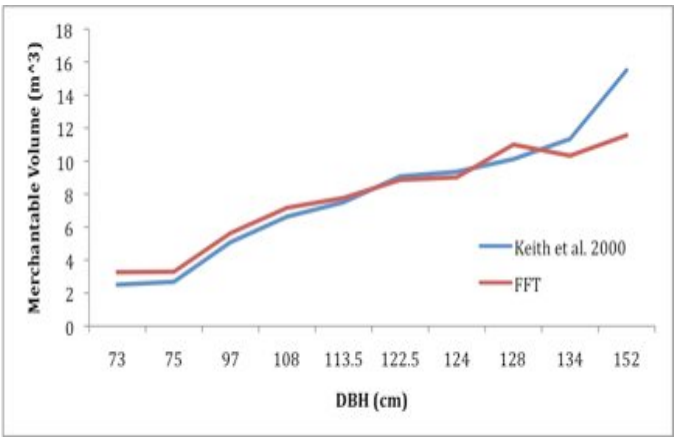


a) E. ovata *and* E. amygdalina



b) E. delegatensis

Figure No. 12. The difference between estimates of the merchantable volume using the species-specific allometrics in the Farm Forestry Toolbox (red line), and the native sclerophyll forest allometric equation developed by Keith et al. (2000) (blue line). This was based on ten trees for a) E. ovata and E. amygdalina, b) E. delegatensis and c) E. viminalis.



c) E. viminalis

These allometrics determined the merchantable volume of timber for individual trees measured in the 62 sample plots. These formed the basis for calculating the total merchantable volume per species per hectare, as extrapolated from each sample plot (Equation 1), and then calculating the mean merchantable volume per species per hectare by averaging the results of Equation 1 (Equation 2). This information provided the yield and waste generated under a timber harvest plan of clearfelling with native regeneration.

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

The necessary harvest and transport machinery are described in the Forest Practices Code 2000[44]. The RFPA is 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 practiced using this infrastructure. In all cases, the projected output of timber products would be 94% paper and paperboard products and 6% sawnwood products.

All non-harvest forested areas within the project area (conservation covenants, streamside buffers, swamp areas, etc) were excluded using GIS programs prior to stratification to determine the area available for logging within each strata.

On this project area, the species that would be harvested are *E. amygdalina*, *E. delegatensis*, *E. ovata* 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. These are typically smaller trees (<30cm DBH). Table No. 05 provides the details for each harvest, based on the standing volume of merchantable timber. This correlates to the logging projections in the baseline scenario (see Table No. 04).

Table No. 05. The timber harvest plan developed for each stratum, based on a standing merchantable volume of 149m^3/ha at the project's 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)
0	(re-logged)	Selective logging by area	135	102
5	(re-logged)	Selective logging by area	209	103
11	14	Selective logging by area	261	117
20	5	Selective logging by area	135	56
25	0	Selective logging by area	209	61

[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]

The mean extracted volume per unit area (m^3/ha) is detailed in the final column for each harvest. This is recorded per species in the accompanying calculations.

The carbon stock of harvested aboveground trees is then calculated using Equation 3. The parameters include the results of Equation 2, combined with the standard IPCC carbon fraction value (0.47) and a Biomass Conversion and Expansion Factor of 1.17. In the absence of a species-specific or regional BCEF, this figure was drawn from the 2006 IPCC AFOLU Guidelines[46], which provided an estimate for temperate hardwoods with a merchantable volume between 100 and 200m^3/ha. The carbon stock of extracted timber, by comparison, is calculated using the result of Equation 2 multiplied by species-specific wood densities and the carbon fraction (Equation 4) to determine the mean carbon stock extracted from the forest.

The wood density figures were based on the species-specific, air dry density values provided in the manual for the Farm Forestry Toolbox, i.e. a mean density of 0.7g/cm^3 was used for *E. obliqua*, 0.68 g/cm^3 for *E. delegatensis*, 0.8 g/cm^3 for *E. viminalis* and 0.75 g/cm^3 for *E. amygdalina*. Since there were no values for *E. ovata*, we used the wood density of *E. amygdalina* as this was the allometric equivalent. 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 understorey species (*O. argophyllia* and *Banksia spp*).

According to this methodology, dead wood is considered only when it is a byproduct 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.

<u>Carbon sequestered in wood products:</u>

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

The relevant wood product classes were identified as sawnwood and paper and paperboard. The gross percentages of volume extracted for each wood product class was assigned based on the historical Forest Practices Plans. The proportion used for sawlog varied from 1.6% to 5.8%, with the remainder committed to pulp. The proportion of timber extracted that remains sequestered in long-term wood products after 100 years was calculated using Equation 7 and data from Winjum *et al.* (1997)[47] and the Climate Action Reserve (2009)[48]. This value was subtracted from the annual

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[46] 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]

[47] 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

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

change in carbon stocks in the baseline scenario (Equation 8), using the simplifying assumption that all extracted carbon not retained is emitted in the year harvested.

Change in carbon stocks due to re-growth:

Carbon sequestration in the baseline scenario (after planned timber harvest) is based on site-specific growth rates of local species, as modelled using FullCAM. FullCAM 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. For this project, FullCAM was used to calculate regeneration rates in the baseline scenario before and after the specified logging events, and growth rates in the project scenario with no logging. The latter was subtracted from the former to determine the net re-growth rate, as modelled in Figure No. 13 (see also Appendix 1).

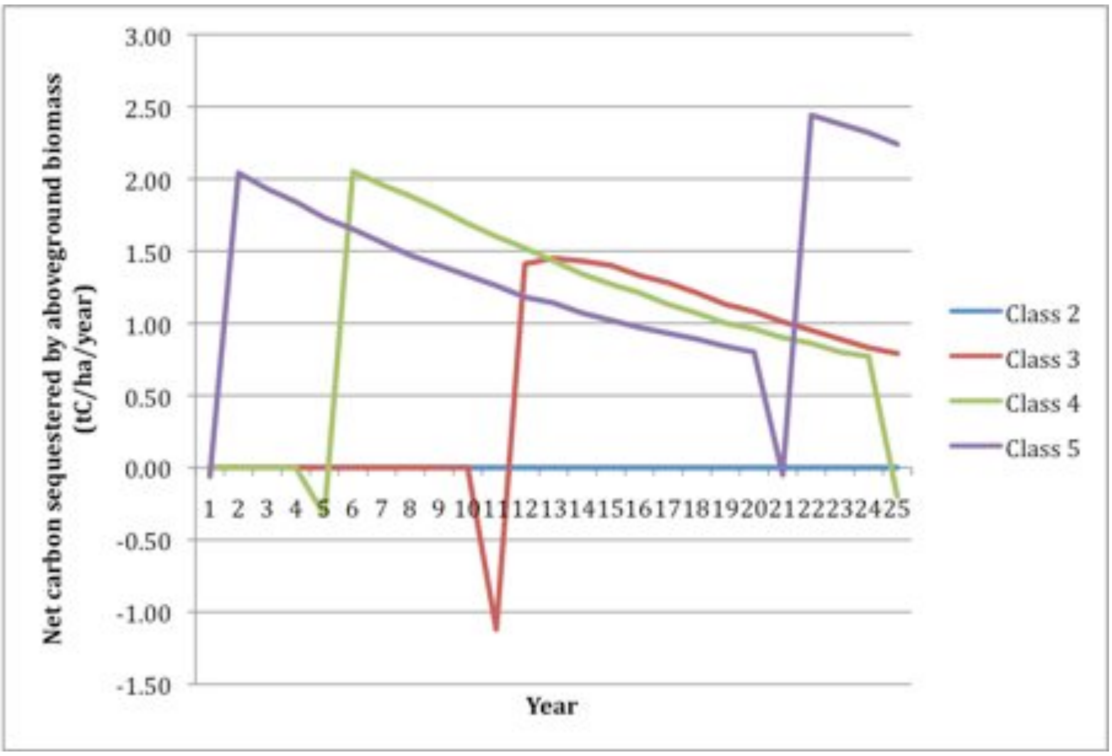

Figure No. 13. Net carbon sequestration rates in aboveground trees in the baseline scenario, i.e. once sequestration from ongoing growth in the project scenario has been subtracted.

In Figure No 13, carbon sequestration is greater in the baseline scenario than the project scenario when the curves are above zero. Correspondingly, growth rates and carbon sequestration are higher in the project scenario when the curves are below zero.

Net carbon sequestration is zero on Class 2 land. This area was clearfelled in 2006, so there would be no possible logging over the next twenty-five years: sequestration from regrowth is accordingly the same in both the project and baseline scenario. Classes 3 would face a single logging event in 2019; Class 4 would be logged in 2013 and 2033; and Class 5 in 2009 and 2029 (see Table No. 02 for the detailed logging projections). Consequently, for a short period after these events, we see higher regrowth rates in the project scenario and accordingly negative sequestration in the baseline scenario. This is most pronounced in Class 3 land, where a young forest is being re-logged and therefore misses its peak growth period, and correspondingly, highest carbon sequestration rate.

The graph illustrates the net regrowth figures used for each class in the carbon calculations.

Calculating changes in carbon stocks:

The total annual change in carbon stocks in all pools in the baseline scenario is therefore equal to the stock change from planned timber harvest, less the carbon stored through the conversion and retirement of wood products. We also subtract the carbon sequestered during regrowth that follows harvest. This was calculated using Equation 10, and annualized 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) in Equation 12.

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

The merchantable volume of individual trees, collated from DBH using the Farm Forestry Toolbox for Equation 1, was used to calculate GHG emissions and/or removals for the project scenario. This data was already extrapolated to produce an estimate of mean merchantable volume (m^3/ha) for each strata, 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. Its inputs are based on local taxonomix-, geographic- and climatic-specific information, and allometric relationships identified in the Technical Reports prepared for the National Carbon Accounting System[49]. 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).*"[50]

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[49] 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]

[50] 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]

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 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 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.

Equations 17-20 were 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.

Equations 21 and 22 sum the net projected greenhouse gas emissions and reduced emissions in the project scenario, including the products of Equations 13-20.

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 in Equation 23. Therefore, the net greenhouse gas emissions for each strata, calculated in Equation 24, are the sum of the baseline scenario greenhouse emissions, less the project scenario greenhouse gas emissions.

There are no meaningful errors in the assessment of the project area, 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). Error margins are not available from the FullCAM regeneration estimates. However, this modelling system is considered international best practice in both the logging and carbon industries. The software is used in both the baseline and project scenarios, so any errors (whether overly conservative or generous estimates of carbon sequestration) are minimal and offset.

The main source of uncertainty is from sampling error. Using the Winrock sampling calculator, based in turn on the CDM Tool for the "Calculation of the number of sample plots for measurements within A/R CDM project activities", the pilot was determined to have a variance of 16.5% at a 95% confidence interval. This is calculated using the Winrock sampling calculator, based on the number of plots, the area of the project and the standard deviation in tonnes of carbon (extrapolated to hectare area) between plots. This encompasses error in biomass extrapolations and the Farm Forestry Toolbox allometrics, as the accuracy of both of these averages derives from sampling error[51].

Project 1: Redd Forests' Pilot was implemented and submitted under the 2007.1 VCS Guidelines, before the 2011 Guidelines had been introduced. The fieldwork was therefore conducted with the purpose of achieving less than 10% variance with a 90% confidence interval. Using these parameters in the Winrock sampling calculator indicates that the project has an uncertainty of 13.5% at a 90% confidence interval. Redd Forests is therefore submitting this project with a deviation from the GreenCollar IFM methodology. A confidence interval of 90% has been used, and credits deducted for uncertainty greater than 10%, i.e. 13.5% of potential voluntary carbon units are deducted from the Redd Forests' pilot.

This uncertainty is taken into account using Equations 25-26. The voluntary carbon units are calculated by subtracting the VCS buffer (15% of credits), producing the totals outlined in Table No. 06.

Table No. 06. Carbon emissions prevented and voluntary carbon units claimed from the Redd Forests' pilot IFM project.

Time period:	Avoided emissions (tCO2-e/year):	Voluntary carbon units issued per year:
Annual	6 946	4 956
Project's lifetime	173 638	123 895

5.0 Environmental Impact:

The Redd Forests project does not involve a material environmental impact. The project does not require an environmental impact assessment. The requirement and the content of environmental impact assessments within Tasmania is 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')[52]

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,

[51] Private Forests Tasmania (2008) Farm Forestry Toolbox version 5.0: The Manual, Hobart, 43-44

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

projects that will have a ‘significant’ environmental impact must 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 project represents passive land management and 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 conservation, watershed protection and water quality are safeguarded, compared with the impacts of ongoing selective logging or clearfell for conversion (which is legally permitted, if not the most plausible baseline scenario). The Northern Midlands bioregion comprises one of the least protected and most degraded bioregions within Australia. Through avoiding continued forest harvesting and associated destruction of habitat, this project will help alleviate the dire pressure on a unique and vulnerable ecosystem.

The Redd Forests’ project area has already been validated under the Climate, Community and Biodiversity Standard. This demonstrates the proponents’ commitment to achieving broader environmental and social goals than prescribed under the Voluntary Carbon Standard.

6.0 Stakeholders’ comments

The landowners are exercising their legal right continue to harvest their native forest, and not to generate income from timber sales. 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.

The landowners’ decision to use carbon finance to convert logged forests to protected forests has generated considerable interest across Tasmania. Since this project was commenced, three additional landowners have engaged Redd Forests to establish IFM projects. This is helping to diversify income sources, providing important financial security as the demand for native timber declines, while improving the environmental integrity of the region.

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 unlogged 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:

The following table presents the project schedule in relation to projected logging events, validation / verification and monitoring.

Year	Baseline scenario	Project scenario	Responsible agent
2009	Selective logging of 70% of merchantable timber on 135ha ("Class 5") forest).	Project initiated and validated by CCB	Redd Forests
2010			Redd Forests
2011		Project validated and verified by VCS.	Redd Forests
2012		Monitoring	Project proponent
2013	Selective logging of 70% of merchantable timber on 209ha ("Class 4" forest)	Monitoring	Project proponent
2014		Monitoring (including fieldwork)	Project proponent
2015		Monitoring	Project proponent
2016		Monitoring	Project proponent
2017		Monitoring	Project proponent
2018		Monitoring	Project proponent
2019	Selective logging of 70% of merchantable timber on 261ha ("Class 3 forest")	Monitoring (including fieldwork)	Project proponent
2020		Monitoring	Project proponent
2021		Monitoring	Project proponent
2022		Monitoring	Project proponent
2023		Monitoring	Project proponent
2024		Monitoring (including fieldwork)	Project proponent
2025		Monitoring	Project proponent
2026		Monitoring	Project proponent
2027		Monitoring	Project proponent
2028		Monitoring	Project proponent
2029	Selective logging of 70% of merchantable timber on 135 ha ("Class 5 forest" regrowth)	Monitoring (including fieldwork)	Project proponent
2030		Monitoring	Project proponent
2031		Monitoring	Project proponent
2032		Monitoring	Project proponent
2033	Selective logging of 70% of merchantable timber on 209ha ("Class 4 forest" regrowth)	Monitoring (including fieldwork). Project completed subsequent to final verification.	Project proponent

Monitoring events specifically require assessing the following indicators at the specified dates:

Activity description	Indicator	Frequency	Responsibility

Determination of uncertainty in project area. Calculated by comparing cadastral parcels.	Change in project 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

8.0 Ownership

8.1 Proof of Title:

The proof of ownership of the properties, and the contractual agreement between the landowner and the project developer (Redd Forests), are available for review by the validator.

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

This project does not reduce GHG emissions under an emissions trading scheme, to meet binding limits or similar.

Appendix 1: Carbon sequestration from forest growth on the project site

Carbon sequestration rates at the project site, as modelled by FullCAM v3.13.8 on 25 October 2010.

	Carbon sequestered in the project scenario (tC/ha/year)			
YEAR:	**Class 2**	**Class 3**	**Class 4**	**Class 5**
2009	0.00	1.87	0.36	0.06
2010	0.00	1.77	0.36	0.06
2011	0.00	1.69	0.34	0.06
2012	0.00	1.59	0.34	0.06
2013	0.01	1.51	0.33	0.06
2014	0.03	1.44	0.31	0.06
2015	0.06	1.36	0.31	0.05
2016	0.13	1.29	0.3	0.06
2017	0.22	1.23	0.29	0.06
2018	0.32	1.17	0.29	0.05
2019	0.43	1.12	0.28	0.05
2020	0.54	1.06	0.27	0.06
2021	0.67	1.01	0.26	0.05
2022	0.77	0.97	0.26	0.05
2023	0.89	0.92	0.25	0.06
2024	0.98	0.89	0.24	0.05
2025	1.07	0.84	0.24	0.05
2026	1.14	0.81	0.23	0.05
2027	1.22	0.78	0.23	0.05
2028	1.27	0.74	0.22	0.05
2029	1.32	0.72	0.22	0.05
2030	1.37	0.68	0.21	0.04
2031	1.39	0.66	0.21	0.05
2032	1.43	0.64	0.2	0.05
2033	1.44	0.61	0.2	0.04

	Carbon sequestered in the baseline scenario (tC/ha):			
YEAR:	**Class 2**	**Class 3**	**Class 4**	**Class 5**
2009	0.00	1.87	0.36	0
2010	0.00	1.77	0.36	2.1
2011	0.00	1.69	0.34	1.99
2012	0.00	1.59	0.34	1.9
2013	0.01	1.51	0.00	1.79
2014	0.03	1.44	2.36	1.71
2015	0.06	1.36	2.27	1.61
2016	0.13	1.29	2.18	1.53
2017	0.22	1.23	2.08	1.46
2018	0.32	1.17	1.98	1.38
2019	0.43	0.00	1.88	1.31
2020	0.54	2.47	1.79	1.24
2021	0.67	2.46	1.69	1.19
2022	0.77	2.40	1.60	1.12

2023	0.89	2.32	1.52	1.08
2024	0.98	2.22	1.45	1.02
2025	1.07	2.12	1.37	0.98
2026	1.14	2.02	1.30	0.94
2027	1.22	1.91	1.23	0.89
2028	1.27	1.82	1.18	0.85
2029	1.32	1.73	1.12	0
2030	1.37	1.63	1.07	2.48
2031	1.39	1.55	1.01	2.43
2032	1.43	1.47	0.97	2.37
2033	1.44	1.4	0.00	2.28

		Net regrowth (tC/ha)		
YEAR:	**Class 2**	**Class 3**	**Class 4**	**Class 5**
2009	0.00	0	0.00	-0.06
2010	0.00	0	0.00	2.04
2011	0.00	0	0.00	1.93
2012	0.00	0	0.00	1.84
2013	0.00	0	-0.33	1.73
2014	0.00	0	2.05	1.65
2015	0.00	0	1.96	1.56
2016	0.00	0	1.88	1.47
2017	0.00	0	1.79	1.4
2018	0.00	0	1.69	1.33
2019	0.00	-1.12	1.60	1.26
2020	0.00	1.41	1.52	1.18
2021	0.00	1.45	1.43	1.14
2022	0.00	1.43	1.34	1.07
2023	0.00	1.4	1.27	1.02
2024	0.00	1.33	1.21	0.97
2025	0.00	1.28	1.13	0.93
2026	0.00	1.21	1.07	0.89
2027	0.00	1.13	1.00	0.84
2028	0.00	1.08	0.96	0.8
2029	0.00	1.01	0.90	-0.05
2030	0.00	0.95	0.86	2.44
2031	0.00	0.89	0.80	2.38
2032	0.00	0.83	0.77	2.32
2033	0.00	0.79	-0.20	2.24

Appendix 2: Risk analysis

This project risk analysis was developed in accordance with the VCS Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination.

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. The project proponent or his family members are the sole or dominant shareholders in all properties, and have obtained written support for the project from all other shareholders.
Risk of financial failure	Low	After the first verification, the project is estimated to generate over 4 000 VCUs per year for the duration of the project. With estimated monitoring cost of $3000 per year, or a higher rate of $6 000 with fieldwork monitoring events every five years, the credits would have to be valued at less than $0.75 for the landowner to be unable to cover costs. Based on historical and projected carbon credit prices, these costs will be more than covered by revenue generated from the sale of carbon credits. Moreover, the proponent has independent wealth and alternative means to generate income from his property. This will provide a buffer if the carbon market performs poorly.
Risk of technical failure	Very low	The project has limited technical requirements from this point. 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 through 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 (14 March 2011 version), including: o The monitoring and verification schedule o Guidelines for forest inventory techniques o Data management and quality control procedures o Guidelines for relevant parameters for using the relevant VCS methodologies • KML files of the land parcels; • 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: o The GreenCollar IFM LtPF Methodology o The VCS Tool for AFOLU Methodological Issues o The Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities o The VCS Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination o 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 simple future requirements of the project, management of the project

		from this point is not complex. The allocation of responsibilities and revenue are clearly delineated in all contracts.
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	Eucalyptus forests are typically fire prone, but the Central

		Highlands are only susceptible to wildfire for a few months of the year due to the relatively cold and wet climate of Tasmania. The risk is further reduced on private property, such as the project area, which is not accessible to the public. In addition, the landowner has established strategic fire breaks through the roading system, conducts low scale burning off along the roads and keeps four fire trucks stationed on the farm. There is ongoing monitoring by organised recreation groups and all employees. Only one fire in the past fifty years has had more than a *de minimis* impact on the carbon stock of any strata[53]: approximately 50ha were burnt following an escaped fire from logging operations in 1969. This fire did not kill any mature eucalypts, having no measurable impact on carbon stocks in the aboveground trees. If events occur once every twenty to fifty years, the VCS Tool assigns them a likelihood (L) of 0.0286. It is unlikely that more than 100ha would be burnt (due to the extensive fire monitoring and response systems in place), and even a very intense fire would leave only 30% of the trees as standing dead. This is in agreement with the fire history on the property. Risk mitigation efforts on the property are best practice, conforming to the recommendations of the Tasmanian Fire Service. The monitoring and response procedures are clearly outlined, with regular reviews. The on-site efforts are supplemented by training and support provided by the Tasmanian Fire Service. Both mitigation efforts (C) and mitigation managements systems (M) would therefore be rated as 4 under the VCS Tool. Risk (L x S x (1-(C*M)/16) is therefore 0, or low.
Risk of pest and disease attacks	Very low	There are no significant pests in the area. Browsers (such as deers and wallabies) may have a minimal effect on

[53] M. Archer, *pers. comm.*, 10/9/2010

		regeneration, as they preferentially feed in pastures.
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[54]. 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 [55]. 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 decline being during the 1980s[56]. 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[57]. A detailed history of flood events from 2000 to 2009 was recorded by the Tasmanian State Emergency Services[58]. 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

[54] 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>

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

[56] 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

[57] 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

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

		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[59]. 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[60]. Few significant droughts have been recorded in the project area.
Geological risk (e.g. volcanoes, earthquakes, landslides)	Zero	There are no active volcanoes in Tasmania, or indeed on the Australian continent[61]. 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[62]. The main consequence of such a quake for the projects would be landslides. However, 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.

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

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

[61] 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]

[62] 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]

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	Fire prevention measures in place throughout the area including fire breaks, back burning and fire monitoring systems.
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 (+90%) is used for pulp and paper. This is a very low-value product: prices have hovered around \$8-10/ton over recent years[63], and are continuing to decline as international markets demand plantation-sourced wood products. Forest carbon prices historically compare favourably: in 2009, the average price in compliance markets was over US\$10/ton[64]. Typically, as the forests recover from logging, the opportunity cost of not logging increases. This is because a growing proportion of the merchantable timber will consist of sawlog rather than pulp or paper. At roughly \$35/ton[65], prime sawlog has a much higher value than either alternative wood products or – historically – carbon. However, this property has limited capacity to produce sawlog, due to the heavy logging of the past. Therefore, almost all of the timber harvest would be used for low-value pulp and paper. There is therefore little risk to the long-term carbon stocks from high timber value on this property. After completion of the project, it is probable that most

[63] 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
[64] 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]
[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

		landowners will resume logging of the land. For this reason, this issue has been assigned a risk factor of 'Medium'. However, two factors should be taken into account. Firstly, it is possible that carbon credits will continue to increase in value, particularly those with biodiversity and socioeconomic premiums like Redd Forests' projects. They are already competitive with pulp and paper products: the disparity in their value will probably only increase in favour of carbon. Secondly, 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.
Illegal logging potential	Zero	Illegal logging is *de minimis* in Tasmania. 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. There is routine monitoring by Forest Practices Officers, formal reporting on compliance and additional independent monitoring across a representative sample of FPPs. High clearance rates within the FPPS indicates that the main threat to native forests in Tasmania is legal rather than illegal logging. 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[66]. 2. Firewood collection tends t occur within public roadsides. The RFPA contains 10 metre buffers along

[66] 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>

		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.
Unemployment potential	Zero	Only 5.6% of the Tasmanian population are employed in agriculture, forestry and fishing[67]. 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[68]. By contrast, tourism employs 6.1% of workers (some 13 600 people) and the professional, scientific and technical sector employs 4.5% of the workforce[69]. Both these areas frequently offer higher wages and more scope for skill development. They will be encouraged by the Redd Forests' IFM projects, which enhances 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

[67] 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

[68] 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]

[69] 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]

		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.

There is a very low risk of significant damage to the carbon stocks in the native forest from disturbance such as pests, fire or natural disasters; socio-political conditions such as low unemployment, poorly defined land rights or instability; or from a financial, technical or managerial failure on the part of the project proponents. These are the advantages of avoiding carbon emissions in a developed nation with well-established legal and physical infrastructure, an educated population and absent or well-managed ecological risks.

The main risk to the project does not arise during the project's lifetime. Rather, there is a risk that the forest will be logged after the project is completed, as outlined above under 'high timber value'. This is the only factor to have been assigned a 'medium' risk in the project.

This risk requires only the minimal medium risk buffer of 15% of VCUs.

Firstly, the risk lies outside the project's lifetime: we can be confident that the carbon stocks will be protected for the twenty-five years of the project's duration.

Secondly, the legality and extent of logging after the project is not certain. The project proponents' future capacity to log their native forests may be constrained by policy shifts. Already there are proposals to require FSC certification of timber from private native forests: if such requirements are imposed and extended during the project's lifetime, the long-term value of the carbon stocks will have been enhanced by the establishment of this project.

Thirdly, the forest carbon markets are already proving an attractive and competitive alternative to low-value wood products. The downward trend in the price of pulp, paper and woodchip has been evident for a decade, while carbon credits are likely to increase in value with the expansion of the voluntary market and implementation of emissions trading schemes. It is therefore very plausible that the project proponents will seek to continue protecting their forests using forest carbon projects, rather than resume logging.

For these reasons, 15% of VCUs is a more than adequate buffer for the risk of this IFM project.

Appendix 3: Output of the Winrock Sampling Calculator

REQUIRED ERROR AND CONFIDENCE LEVEL		
e - level of error (%)	13.5%	
Error level (decimal)	0.135	
Z(1-a) - Confidence level	90.0%	
Sample statistic Z(1-a)	1.645	
Total project area size	790	hectares

Stratum	Stratum Name	Area (ha)	Mean C/ha (tonnes)	Standard Deviation (tonnes C/ha)	Plot size (ha)
stratum 1	Stratum 1	790	78.25	47.7	0.2025

Results - Aboveground Carbon - Number of plots to be used							
		Sourcebook for LULUCF Projects		AR-AM0001, AM0005, AM0006		AR-AM0003, AM0004, AM0007	
Stratum	Stratum Name	Plot Quantity	Rounded Plot Quantity	Plot Quantity	Rounded Plot Quantity	Plot Quantity	Rounded Plot Quantity
Total Sample Size		52.67	**61**	53.39	**62**	52.67	**61**
stratum 1	Pilot project	52.67	**61**	53.39	**62**	52.67	**61**