NEW LEAF CARBON PROJECT

Document Prepared By Forests Alive on behalf of Tasmanian Land Conservancy

Project Title	New Leaf Carbon Project
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Prepared By	Forests Alive Pty Ltd
Contact	Suite 7.03, 222 Pitt Street, Sydney, NSW, 2000, 61 282 709 908, *info@forestsalive.com, www.forestsalive.com*

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1 GENERAL

1.1 Summary Description of the Project (G3)

The project area for the New Leaf Forest Estate encompasses 12,143 ha of Native Tasmanian forest. The entire project area is within a declared 'Private Timber Reserve' through the *Forest Practices Act 1985.* In the absence of this IFM project the forest would continue to be harvested and carbon stocks would be degraded. The forest contains a significant number of high conservation values, including habitat values for endangered species such as the Tasmanian Devil, the Wedgetail Eagle and the Tasmanian Spotted Quoll. This project will allow for a change in the management of the area from on-going commercial logging to conservation.

Due to the high climate, biodiversity and community benefits of this project, it has been developed for validation and verification under both the CCBA and VCS standards.

The major project objectives are split between climate, community and biodiversity objectives and are listed below. The specific activities to achieve these objectives are listed in section 2.2 of this PDD.

Climate Objectives

- Avoid emissions by converting logged forest to protected forest.
- Protect forest to allow on-going carbon sequestration to take place.

Community Objectives

- Provide employment opportunities in rural areas to help manage and monitor the land for conservation.
- Provide research and educational opportunities to the local communities and collaborating institutions.
- Provide recreational opportunities to allow communities to enjoy the area.
- Collaborate with institutions to develop understanding of Tasmanian wildlife and conservation values.
- Engage and consult with Aboriginal communities living close to the project site to ensure management respects traditional values.

Biodiversity Objectives

- Manage the land for the conservation of flora and fauna.
- Manage the area to favour habitat connectivity and reduce the risk of landscape scale disturbances.
- Provide on-going management of the area to manage weed and pest populations.

1.2 Project Location (G1 & G3)

Below is a list of coordinates (decimal degrees) and satellite images (taken from Google Earth) to help identify the exact location of the project areas. The KML files are available to the validator.

Table 1 Project Location

Label	Latitude	Longitude	Label	Latitude	Longitude
A	-41.218204°	147.064045°	BE	-42.094349°	146.441854°
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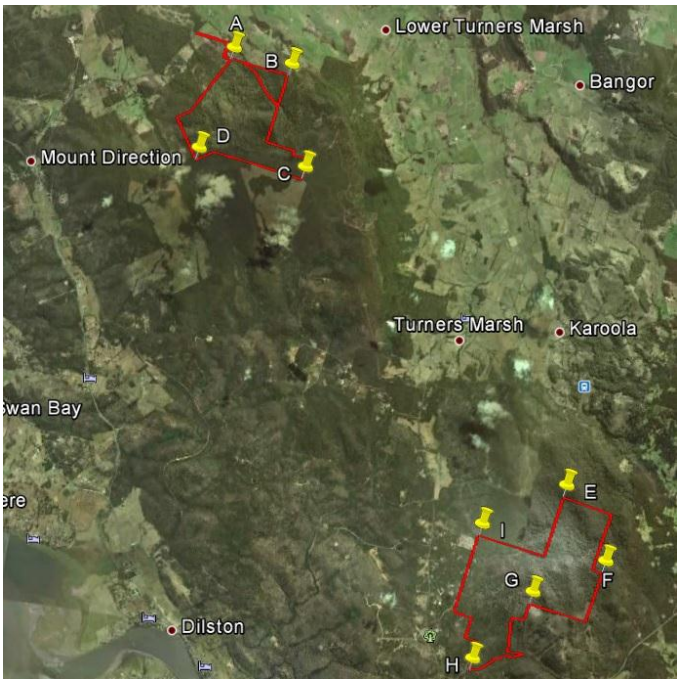
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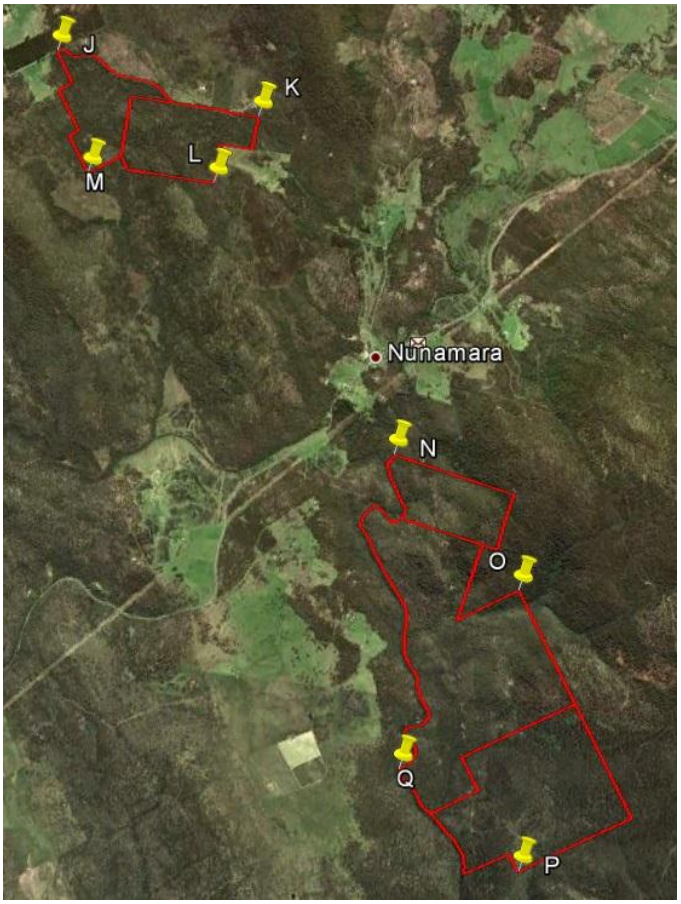
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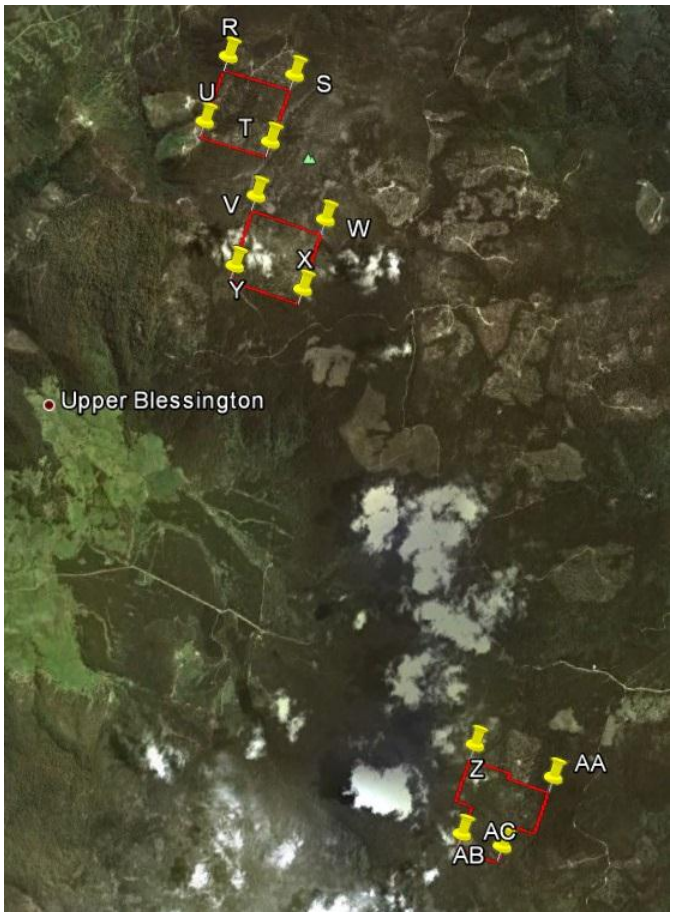
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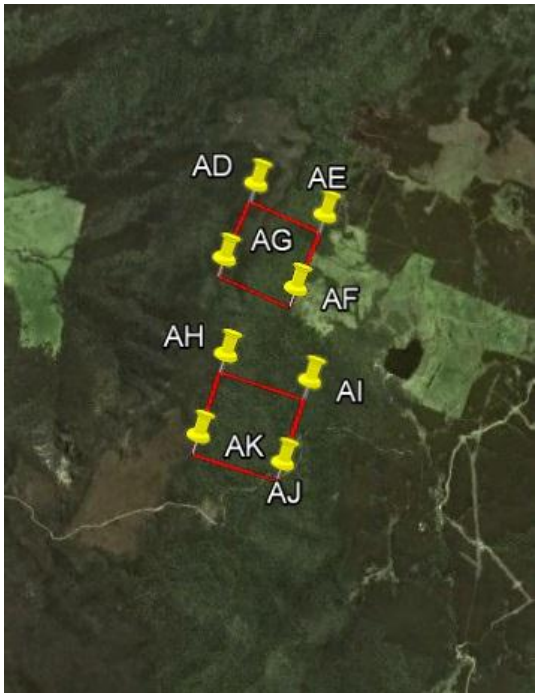
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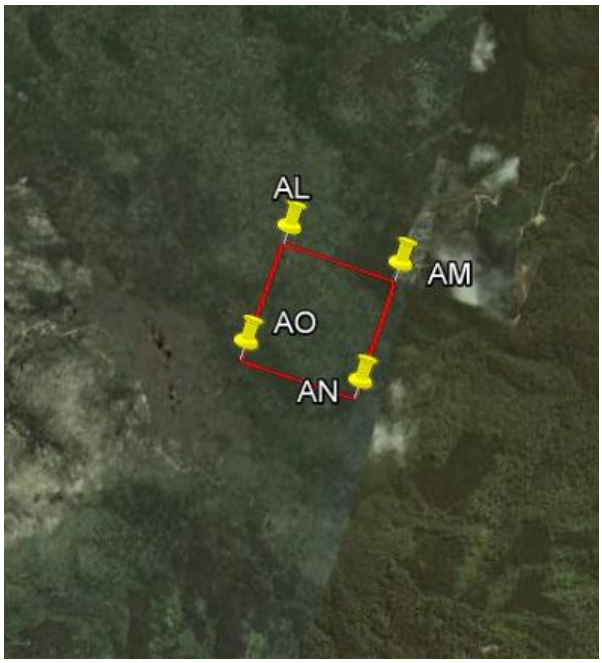
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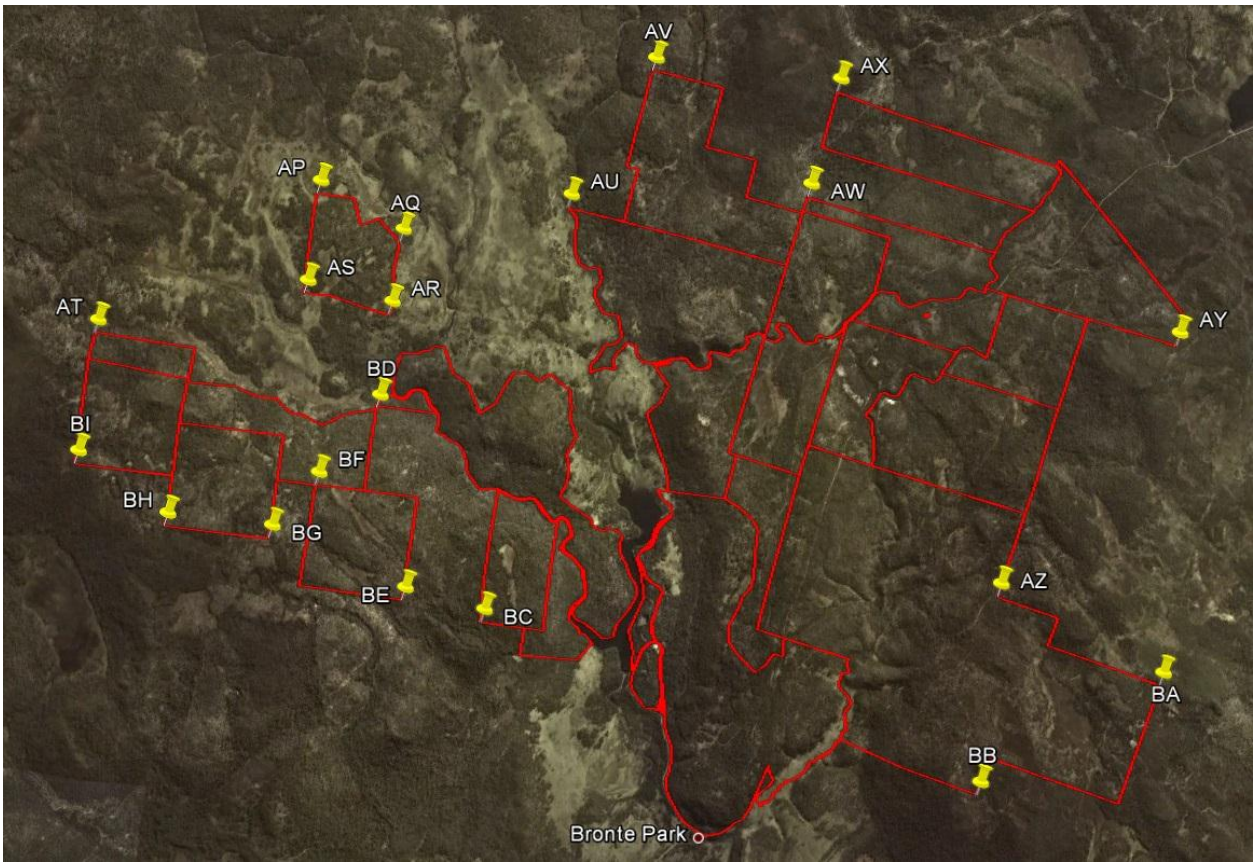
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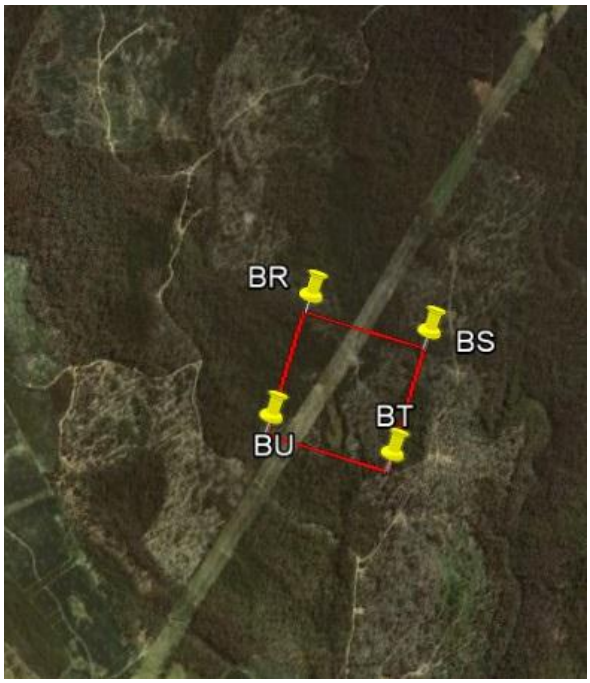
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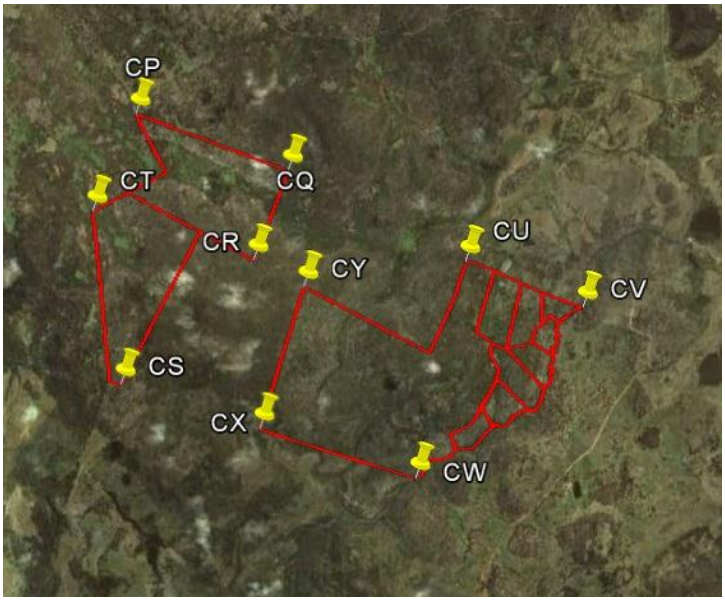
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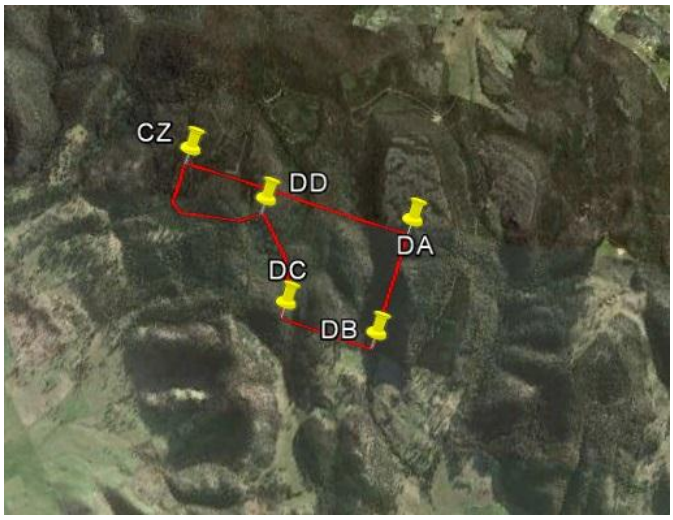
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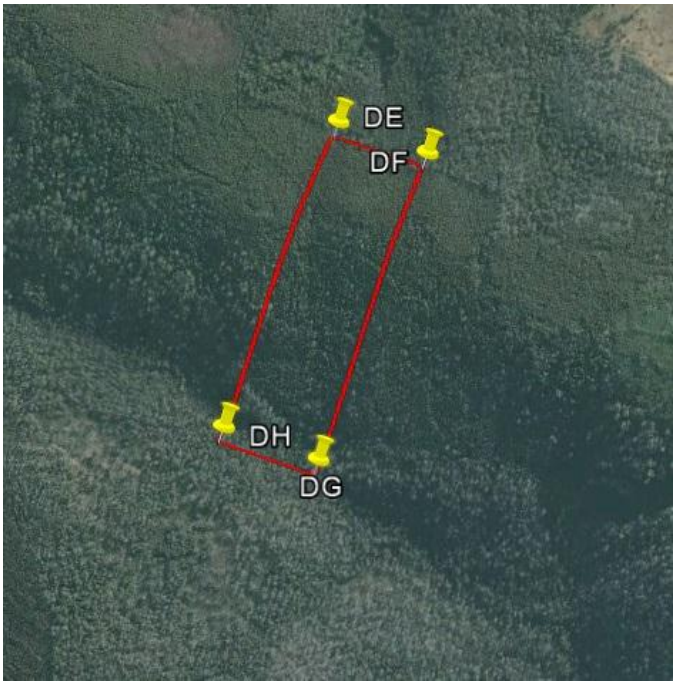
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Location and Impact Zones

The project area is contained within 29 separate properties that have a combined total area of 22,793 ha. The project is situated in the State of Tasmania. The majority of land, 20,271 ha, is in the "Central Highlands" of Tasmania, a region situated centrally on the island. 2,522 ha of land is in the North Eastern region. Together this land is known as the New Leaf estate and contains 12,143 ha of native forest which comprises the area from which avoided emissions have been calculated.

The project proponent has provided land titles for each of the properties that contain the project area. These land titles are available to the validators. A list of the land titles and the properties is as follows;

Table 2 Land Titles

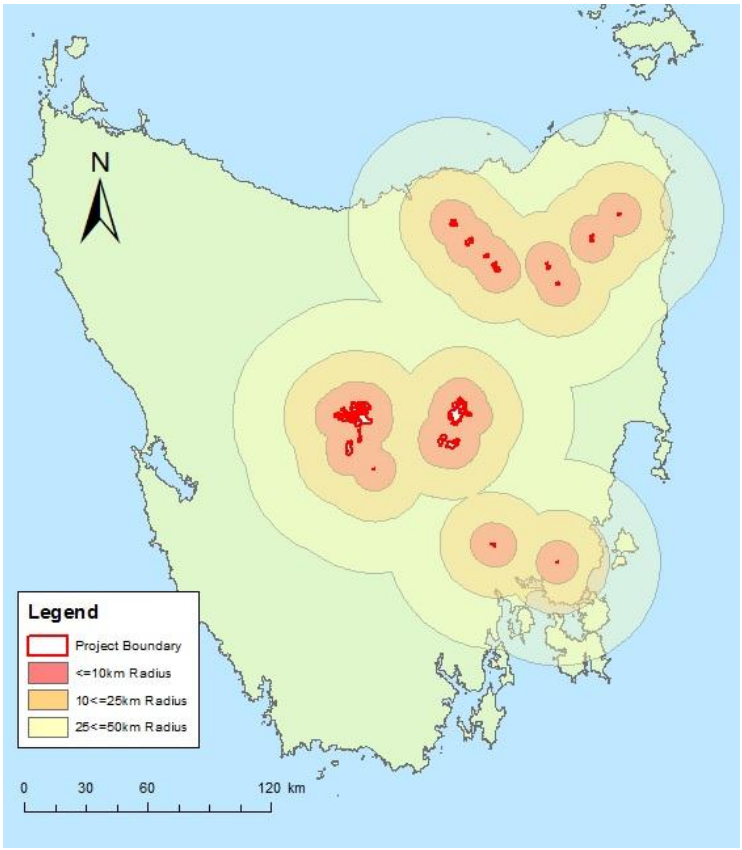
Property Name	*Registration Number (File name)*	*Property Identification (PID)*	*Area (ha)*
Archer - Nunamara	6500	273402	185.3
Archer - Nunamara	21622	273402	
Archer - Nunamara	201628	273402	
Archer - Nunamara	212935	273402	
Archer - Nunamara	238003	273402	
Archer - Nunamara	243454	273402	
Archer - Nunamara	252034	273402	
Archer - Whareham	105840	273396	604.8
Archer - Whareham	115074	273408	
Archer - Whareham	115318	273398	
Archer - Whareham	117213	273408	
Archer - Whareham	249931	273408	
Ben Nevis	246845	641708	120.1
Blue Tier	162042	680431	81.5
Cockatoo Hill	127910	186079	1,278.6
Forest Lodge	238246	680523	80.7
Hall	248756	269760	59.6
Jinks Tier	101028	500567	1,585.9
Jinks Tier	222695	500567	
Lake River	209968	255432	121.2
Lake River	225651	255432	
Lake Sorrell	43183	255432	2,142.2
Lake Sorrell	201129	255432	
Lake Sorrell	248106	255432	
Lles	228177	593768	30.2
London Marsh	164812	547502	391.5
Nook	231423	641709	120.1
Phillips Rose Tier	247609	641712	124.6
Pine Tier Lagoon	127908	183111	1,119.7
Roscarborough	29400	733325	2,579
Roscarborough	43181	733325	
Roscarborough	43181	733325	
Roscarborough	102181	733325	
Roscarborough	248105	733325	
Roscarborough	248752	733325	
Serpentine	43176	733325	3,553.6
Serpentine	43177	733325	
Serpentine	43178	733325	
Serpentine	43179	733325	
Serpentine	43180	733325	
Serpentine	227512	733325	
Sheene	9409	213825	175.9

Property Name	***Registration Number (File name)***	***Property Identification (PID)***	***Area (ha)***
Silver plains	102772	255432	4,051
Silver plains	111917	255432	
Silver plains	212215	255432	
Silver plains	240752	255432	
Silver plains	248099	255432	
Soldiers Marsh	101027	500003	922.1
Soldiers Marsh	101027	500003	
Soldiers Marsh	222696	500003	
Towns	54350	782702	707.8
Towns	217991	782702	
Towns	217992	782702	
Viormy	44971	769206	1,388.1
Viormy	102182	769207	
Viormy	122094	769206	
Viormy	122094	769206	
Viormy	122105	769206	
Viormy - Peninsula block	102184	769206	552.4
Viormy Pine Tier Lagoon	102179	769206	320.1
Viormy Pine Tier Lagoon	122105	769206	
Weeks	163247	770773	398.3
West Pyengana	240592	680529	99.5

To identify communities affected by the project activity buffers have been created surrounding the project area for 10, 25 and 50km. It is assumed that communities that would be affected greatest by the project would be those within a 10km radius of the project site. In accounting for the community benefits from the project activity, it is important to recognise that the project area is 100% private land and the benefits are largely intangible benefits associated with the broader impacts of conserving native forests and the recreational activities that can be offered.

Those communities within 25km of the project activity may see some benefits, particularly in the recreational activities proposed for the site. For those within the 50km buffer it is not unreasonable for some members of the community to make a trip to the project site for recreational activities. This analysis does not consider the road access between communities and project sites. Travel between a community and the project site could be greater than 50km, which again supports the assumption that not all the communities within a 50km radius will be affected by the proposed project activities. It is evident that many of the users of the project area travel greater than 50km in order to access the site.

In addition, a significant community benefit relates to the broader, international community of academics and NGO's who are engaged in research within the project area. This goes beyond quantifying benefits at a local, proximal scale and recognises the wider community involvement / benefit. The New Leaf carbon project will also support the potential for rediscovery of heritage sites and values.



Communities within the 10km radius have been identified below. Census data gathered in 2011 has been used to provide an indication of population but this information has not been available for all communities identified. A total of 56 communities are identified and 27 of these have population information. It is estimated that over 40,000 people belong to communities within a 10km radius of the project area.

Table 2 Local Communities

Community	Population	Community	Population
Alberton		Mount Direction	
Bagdad	996	Mowbray	3,240
Bangor		Newnham	5,930
Ben Lomond		North Lilydale	
Bradys Lake		Nugent	
Brighton	3,145	Nunamara	473
Bronte Park	16	Patersonia	
Campania	745	Pawleena	
Dee	118	Ravenswood	3,974
Deviot	7,275	Rocherlea	1,088
Dilston	335	St Leonards	1,924
Dysart	386	Steppes	
Goulds Country	210	Strickland	
Gravelly Beach	535	Swan Bay	
Hillwood	339	Swan Point	384
Interlaken	56	Tarraleah	
Karoola	690	Tea Tree	576
Lake Sorell		Tunnel	
Legana	2,500	Turners Marsh	
Lilydale	288	Underwood	494
Little Pine Lagoon		Upper Blessington	

Community	Population	Community	Population
London Lakes		Upper Esk	
Long Reach		Victoria Valley	
Lottah		Wattle Hill	
Lower Turners Marsh		Waverley	1,545
Mangalore	983	Weldborough	
Millers Bluff		White Hills	
Morass Bay		Windermere	635
No of Communities	**56**	**Total Population**	**>38,880**

Local Climate

There are climatic variations between the Central Highlands and the North East regions therefore two Bureau of Meteorology stations are utilised to provide climate statistics for this project; "Monte Heights" for the Central Highlands and "Launceston (Ti Tree Bend)" for the North East. Both regions are typical of a cool temperate climate with distinctive seasonal variation.

Monte Heights Climate Statistics[1], Latitude: 42.14 °S, Longitude: 146.49 °E, Elevation: 712 m

	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
Mean Max Temp (°C)	*20.4*	*20.4*	*18.1*	*14.2*	*10.7*	*8.7*	*7.8*	*8.7*	*11.3*	*13.7*	*15.2*	*17.7*
Mean Min Temp (°C)	*6.9*	*7.1*	*5.4*	*3.9*	*2.1*	*0.6*	*0.0*	*0.3*	*1.5*	*3.0*	*4.1*	*5.7*
Mean rainfall (mm)	*54.7*	*52.9*	*58.2*	*79.5*	*81.3*	*83.9*	*88.2*	*99.7*	*97.8*	*89.2*	*77.9*	*72.0*

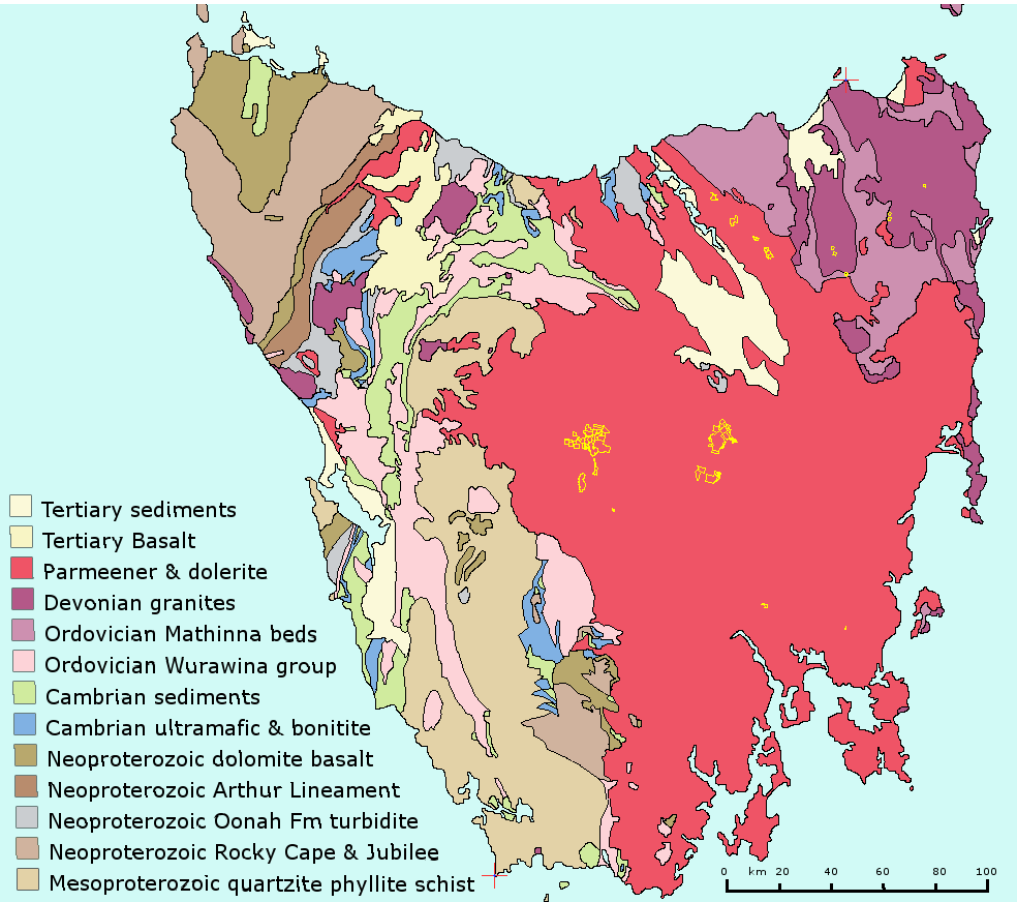
Launceston (Ti Tree Bend) Climate Statistics[2], Latitude: 41.42 °S, Longitude: 147.12 °E, Elevation: 5 m

	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
Mean Max Temp (°C)	*24.3*	*24.5*	*22.5*	*18.9*	*15.8*	*13.1*	*12.6*	*13.8*	*15.5*	*18.0*	*20.4*	*22.4*
Mean Min Temp (°C)	*12.3*	*12.1*	*10.1*	*7.6*	*5.1*	*2.9*	*2.2*	*3.7*	*5.2*	*6.9*	*9.0*	*10.7*
Mean rainfall (mm)	*45.0*	*32.3*	*36.8*	*53.2*	*62.2*	*68.9*	*74.5*	*86.4*	*66.8*	*49.8*	*51.9*	*46.9*

Geology and Soils

A simplified map of Tasmanian geology is provided with an overlay of the project area. This map shows that the majority of the project area is within a large area of "Parmeener & dolerite" minerals. A small percentage of the project area is within the "Devonian granites" and the "Ordovician Mathinna beds".

[1] Australian Government Bureau of Meteorology, http://www.bom.gov.au/climate/averages/tables/cw_096002.shtml [accessed 14th February, 2013]
[2] Australian Government Bureau of Meteorology, http://www.bom.gov.au/climate/averages/tables/cw_091237.shtml [accessed 14th February, 2013]



1.3 Conditions Prior to Project Initiation (G1)

The native forest that comprises the New Leaf estate has historically been harvested for woodchip and a small proportion of sawlog products. Evidence of area wide prescription harvesting has been provided for 1979 onwards with logging activities having also taken place prior to current records. The intensive harvesting practices has led to a degradation of the forest, resulting in the carbon stock being much lower than the project carbon carrying capacity for a forest of this type.

The logging of this forest is legally permitted by the State Government of Tasmania. The entire project area is subject to a Private Timber Reserve declared through the *Forest Practices Act 1985* and has been subject to a large number of approved Forest Practices Plans. Each logging event has had a double negative impact resulting in significant levels of GHG emissions. The first is the immediate release of GHG emissions from these activities and the release of GHG emissions from wood product "retirement". The second is an overall reduction in cover and density of native forest which results in a reduction of Co2 sequestration from the atmosphere.

Logging history events have been compiled using a variety of data sources. From 1979 to 1999 logging history has been compiled from forest harvesting prescriptions and information provided

on a GIS file created by GUNNs, the previous landowners. The information on the GIS files allowed logging compartments and prescriptions to be associated with each stratum. From 1999 to 2009, FPPs and Weighbridge records were available. This allowed for logging events to be correlated with logging compartments within the project area. A list of FPPs is provided below, and a list of logging history events from 1979 to 2009 can be found in the Timber Harvest Plan (Appendix 9.3).

Table 4 Forest Practices Plans (FPP's)

FPP Number	Year	Area (ha)	Volume (taken from Weighbridge records)
GRM93	1999	110	1,866
PRN18	1999	198	10,289
BWH13	2000	59	12,504
BWH14	2000	89	3,633
GRM102	2000	150	5,609
HUD21	2000	74	2,921
MAC775	2000	325	7,550
MAC818	2000	130	12,606
PRN21	2000	260	2,242
HUD45	2001	117	6,771
MAC847	2001	120	3,755
TAM343	2001	126	6,331
TAM344	2001	52	3,031
TAM359	2001	124	9,602
BWH20	2002	375	5,458
BWH22	2002	105	6,487
HRB12	2002	116	1,705
IJB204	2002	84	5,504
MAC934	2002	90	3,453
MAC936	2002	85	5,476
MAC942	2002	200	7,148
MAC946	2002	75	5,108
MAC949	2002	60	7,110
MAC951	2002	35	3,175
MAC957	2002	110	5,233
MAC961	2002	60	15,349
PRN48	2002	281	4,850
PRN50	2002	142	5,990
PRN53	2002	372	7,615
TAM403	2002	150	1,661
MAC1060	2003	34	1,583
MAC962	2003	75	5,937
TAM480	2003	147	8,975
TAM488	2003	316	2,629
TAM494	2003	326	1,875
TAM508	2003	89	1,553
TAM515	2003	115	8,995
TAM530	2003	46	3,847

TAM531	2003	38	3,397
MAC1170	2004	46	4,957
MAC1178	2004	82	2,101
MAC1207	2004	87	1,667
MAC1208	2004	85	3,951
TAM547	2004	35	1,866
TAM616	2004	196	10,289
TAM622	2004	145	12,504
TAM624	2004	219	3,633
TAM630	2004	178	5,609
TAM636	2004	149	2,921
TAM643	2004	210	7,550
TAM644	2004	106	12,606
TAM658	2004	137	2,242
MAC1236	2005	235	6,771
MAC1246	2005	115	3,755
MAC1260	2005	141	6,331
TAM747	2005	185	3,031
TAM821	2006	47	9,602
TAM827	2006	44	5,458
TAM847	2006	145	6,487
TAM860	2006	121	1,705
TAM896	2007	163	5,504
TAM934	2007	45	3,453
TAM939	2007	40	5,476
GFP159	2008	173	7,148
GFP175	2008	38	5,108
GFP188	2008	28	7,110
GFP206	2008	54	3,175
TAS306	2008	34	5,233
TAS308	2008	31	15,349
GFP362	2009	174	4,850

Vegetation Condition

The vegetation condition is typical of a forest which has been under logging regimes for the past fifty years. The current carbon stocks have been calculated at a strata level. These carbon stocks are;

Table 5 Baseline Carbon Stocks

Strata	Area (ha)	Carbon (tC/ha)
1	4334.06	89.19
2	223.12	36.62
3	52.52	45.57
4	2003.55	89.94
5	2281.67	81.28
6	895.23	109.75

7	797.47	90.55
8	254.26	51.05
9	520.74	93.65
10	575.76	94.63
11	204.63	105.32

The vegetation condition across the new estate is a consequence of climate variations and land use history. It must be acknowledged that a majority of the project area has been historically harvested, predominantly for woodchips, with the only exception to this being the small land areas identified as 'Blue Tier'.

In the context of vegetation condition, one of the consequences of past land use history is a lack of large, mature trees. The field inventory assessments provide clear evidence that a majority of trees across the project area are regrowth from past logging practices, with very few trees measuring above 100cm DBH. Field inventory assessments supported the historical presence of large trees by the large number of significant cut stumps found across the project area.

The field inventory data also indicated that the forest across the project area contains very few senescing trees, very few trees with dead of dying crowns and a high level of recruitment of smaller trees within the understory.

During the stratification process, it was evident that some areas of forest had been logged unsustainably. While these areas contain regrowth, the extent and the rate of regrowth is severely impacted by the negative impact from over logging. These areas were excluded from the project area. Some areas within the project area are relatively high altitude (>900m above sea level) and regeneration and recruitment in these areas is slow. Such areas are clearly evident in the low density strata around the Bronte Park region.

Another consideration in the context of vegetation condition is the presence and abundance of invasive species. The project area and the management by the TLC and previous landowner Gunns Ltd has seen a focus on weed control and there are very few areas of the project that have significant populations of invasive species.

In summary, overall, the project area comprises post logging, regrowth forest which in a majority of cases is regenerating well and has strong levels of recruitment of young eucalypt seedlings. In the absence of ongoing disturbance associated with logging, the overall health and condition of the forest is projected to improve.

Biodiversity and Conservation Value

The initial condition of biodiversity and conservation values has been fully explored in section 7.

Conflicts and Disputes

There are no conflicts or legal disputes over the ownership or the right of use in the project area. All the property has been acquired legally under a well-regulated land title system, governed by the state government of Tasmania, as shown in section 1.2.

1.4 Project Proponent (G4)

The Tasmanian Land Conservancy (hereby known as the TLC) is the project proponent and they are the current owners and managers of the New Leaf estate. The organisation is responsible for the implementation and the on-going monitoring obligations of this project.

Contact Name: Daniel Sprod
Role: Landscape Ecologist
Address: 827 Sandy Bay Rd, Sandy Bay, Tasmania, 7005
Telephone: (+61) 03 6225 1399
Email: dsprod@tasland.org.au

The Science and Monitoring team at TLC is led by Dr Sally Bryant – a wildlife biologist, conservation entrepreneur and professional of 35 year standing, ably supported by Daniel Sprod, an environmental planner and ecologist of 30 years standing and Matt Taylor, conservation scientist of ten years standing. Together, and with the Reserve Management team (currently 6 people) the TLC can demonstrate superb implementation and monitoring expertise. Roles will change as the project evolves, but currently Daniel takes the project manager role, Matt Taylor the monitoring role and Ian Hall, the marketing role.

In relation to project implementation, each staff member is provided with a copy of the Standard Operating Procedures, an employment contract and are trained by experienced staff members. In relation to field work, each staff member is included in a team with at least 1 experienced team member (more than 12 months employment) and where possible, staff were been employed that are close to the project areas. For example, the northern New Leaf project areas involved staff from Northern Tasmania. Almost all employees in the project implementation phase were students, recent graduates and /or, local residents.

Training associated with staff turnover is addressed by the fact that no team ever has less than at least 1 experience staff member as a team leader.

A role of Forests Alive in the project development is to establish and provide training materials and opportunities for staff within the Tasmanian Land Conservancy. All project materials, data and documents are provided to the TLC to allow them to undertake ongoing management and monitoring. The TLC have a large, experienced staff base made up of local employees. In addition, Forests Alive will continue to offer their services to support the ongoing monitoring and management requirements.

1.5 Other Entities Involved in the Project (G4)

The TLC contracted Forests Alive to assist them in the design of this project. Forests Alive has a history of designing and implementing VCS projects in Tasmania; implementing three projects that have been validated and verified under the VCS standard and cover over 36,000 ha of native forest within Tasmania.

Forests Alive conducted the field work and the calculations for this project in accordance with their validated and verified Standard Operating Procedures Importantly, this project has been undertaken in accordance with the existing validated VCS projects that Forests Alive have completed.

The project implementation will be the responsibility of the TLC.

Forests Alive acted as the main contact point for the validation agency.

Contact Name: Jarrah Vercoe
Role: Project Manager
Address: 210 Collins Street, Hobart, Tasmania, 7000
Telephone: 0417 137 751
Email: jarrah@forestsalive.com

1.6 Project Start Date (G3)

The project start date is 20th September 2010. This is the date of the land acquisition contract, and subsequently the date in which TLC took ownership and managerial responsibility of the New Leaf estate.

1.7 Project Crediting Period (G3)

In accordance with the VCS, the start date of the crediting period is the same as the project start date, 20th September 2010. The crediting period will last for 30 years. Therefore the end date of the crediting period is 20th September 2040.

Table 6 Project Implementation Schedule

Calendar Year	*Project Year*	*Description*
2010	0	Project Start date. Land and legal logging rights passed to project proponent.
2011	1	Collation of field data, species, logging history. Identification of stakeholders.
2012	2	Establishment of baseline scenario, field carbon inventory, and management plans. Implementation of community and biodiversity activities.
2013	*3*	*Validation and Verification for both VCS and CCB standards. Joint PDD, monitoring plan and monitoring report provided. Verification period to be for September 20th 2010 to 19th September 2012.*
2014	4	Bienial Report for verification period 20th September 2012 – 19th September 2014 to be published.

Calendar Year	*Project Year*	*Monitoring Reports*

Calendar Year	*Project Year*	*Description*
2015-2040	*5-30*	All VCS/CCBA activities will be implemented throughout the project lifetime. The project period and the crediting period are the same. The activities will be monitored with biennial verification periods, as outlined in the monitoring plan.

2 DESIGN

2.1 Sectoral Scope and Project Type

The New Leaf project is an AFOLU project. The project uses a VCS Improved Forest Management (IFM) methodology VM0010 V1.2. The forest has been converted from Logged to Protected forest (LtPF).

This project also implements a CCBA framework to emphasise the biodiversity and the community benefits of protecting native forest.

The project is not a grouped project.

2.2 Description of the Project Activity (G3)

2.2.1 Climate Activities

The purpose and objective of the project is to protect native forest that will be logged in the absence of carbon finance. Protecting forests from timber harvesting reduces emissions caused by harvesting and maintains the forest carbon stock. The forest will therefore be monitored regularly, with a verification period on a biennial basis and a calculation event every five years. The forest will be monitored for any signs of leakage, logging activities and natural disturbances. The biennial monitoring event will include an assessment of the non-permanence risk buffer. Full details on the monitoring schedule and activities can be viewed in the Monitoring Plan.

By implementing these monitoring activities, the avoided emissions claimed can be verified throughout the project period.

2.2.2 Community Project Activities

The community-related project activities to be undertaken under this project and related impacts are described below. Examples of the project activities are given in sections 6 and 7.

Activity	Impacts
Provide economic opportunities for the community	The community supports the project because members derive economic benefits from the project
Provide opportunities for community involvement in planning and land management	The community supports land management
Provide education and research opportunities	Community engagement and knowledge is increased

Activity	Impacts
Provide recreational opportunities	Community wellbeing and connection to the project area is increased

2.2.3 Biodiversity Activities

Activity	Impacts
Monitoring of conservation significant species	Adaptive management of conservation significant species
Monitoring of habitat condition	Adaptive management of habitat values
Monitoring of landscape scale ecological processes	Adaptive management of ecosystems
Fire management	Ecosystems are maintained in natural condition
Weed management	Impact of weeds on native ecosystems is removed
Feral animal management	Impact of feral animals on native ecosystems is reduced
Access management	Impact of human actives on native ecosystems is reduced
Livestock management	Impact of livestock on native ecosystems is prevented

2.3 Management of Risks to Project Benefits (G3)

Table 7 Project Risks

Potential Risks	Mitigation Measures
1. Fire	The TLC have fire mitigation practices in place. These management practices aim to reduce the risk of unplanned fire. The management objectives are achieved by; - Reducing fuel loads around infrastructure; - Maintaining access tracks for the purpose of fire fighting where these are required; - Co-operating with neighbours, local councils, Parks and wildlife service and the Tasmanian Fire Service to prevent the spread of bushfire; and - Working closely with relevant experts, including the Tasmanian Fire Service, fire ecologists, botanists and zoologists, to determine the fire regime prescriptions for hazard reduction and ecological maintenance.
2. Pests and Disease	Annual monitoring events and ongoing observation will determine any pest or disease outbreaks (there are no significant risks associated with this in Tasmania).
3. Extreme weather events	Severe and prolonged drought may result in tree mortality. There is really no mitigation strategy for this aside from minimising any alterations to existing drainage patters within the project area. There have not been any recorded droughts within Tasmania that have resulted in large scale tree mortality.

Potential Risks	Mitigation Measures
4. Land ownership change	The credits are owned by the TLC and any change of ownership requires the transfer or all or part of the credit allocation as well as the obligations associated with the maintenance of the carbon project. Mitigation involves the use of a legal representative to develop a transfer of title document that also transfers obligations under the IFM project to any future owner. Ensure records on land ownership are maintained. Within Tasmania, these requirements are Governed by Law.
5. Financial Failure	Future ongoing project costs include monitoring and verification. These costs comprise a fraction of the projected revenue to be generated through the sale of VCU's, even accounting for a market value decline. Moreover, annual monitoring events must be completed to ensure that credit issuance takes place. The TLC is not solely reliant upon the sale of VCU's for generating revenue.
6. Collapse of carbon markets	Markets for VCU's, while fluctuating in recent years, have maintained a relatively high value when compared to similar markets such as the CDM market. No one can predict, nor prevent a market collapse, however, by ensuring that the project maintains a high level of integrity and s strong marketing strategy, the project is likely to obtain sufficient revenue to at least recover establishment and ongoing management costs,
7. Regulatory Changes	Changes in the national and/or international regulatory frameworks may adversely affect the project. Mitigation involves staying informed in relation to international rule changes market trends and seeking expert advice when required in order to take preventive actions.

The project will enhance the climate, community and biodiversity benefits here described beyond the project lifetime by raising awareness amongst individuals and institutions with regard to the value of protecting native forests and biodiversity. This will be achieved through promoting training, research, and further institutional cooperation, recreational activities, among others. The increased understanding and knowledge among community members and institutions will remain, beyond the project lifetime, and allow long-term and sound land management practices. In addition, recreational activities are enhanced as a result of this project.

The biodiversity benefits are clear. By preventing on-going degradation of the forest, there is an opportunity for recovery of lost carbon stocks, improved habitat connectivity and a return to a forest environment with higher conservation values.

2.4 Measures to Maintain High Conservation Values (G3)

The measures to maintain the high conservation values in the project area include the following;

1. Managing potential risks including fire, pest and diseases, among others (see Management of Risks to Project Benefits G3)

2. Design and implement management plans to specific areas or species to avoid disturbances

3. Monitor the forest in the project area through the annual verification events and when required to ensure that the climate, community and biodiversity benefits are maintained.

2.5 Project Financing (G3 & G4)

The project proponent has contracted Forests Alive and funded all costs related to the project design, including fieldwork, calculations and submission of the required project documents. The present project has been supported by a grant via the Global Alliance, run by Conservation International (more information is available for the validator upon request).

The TLC will be responsible for the project implementation and all future project costs, including monitoring and verification. It is expected that such on-going costs will be covered by the sale of credits.

The TLC is in a financial position to carry out the project implementation, as observed by the financial statements provided to the validator as required.

2.6 Employment Opportunities and Worker Safety (G4)

As described in Section 2.2, the project activities will involve the employment of people from the community, including graduates, local experts and institutions to carry out activities such as fieldwork, research and surveys or recreational activities.

The TLC commits to comply with the *Australian Workplace Safety Standards Act 2005* and the *Tasmanian Workplace Health and Safety regulations 1998,* including the Forest Safety Code.

The Tasmanian Land Conservancy's, H & S policy is outlined below;

1 Occupational Health & Safety

1.1 Policy

The Tasmanian Land Conservancy is committed to a policy enabling all work activities to be carried out safely, and with all possible measures taken to remove, or at least reduce, risks to the health, safety and welfare of employees, volunteers, contractors and any others who may be affected by our activities.

The Tasmanian Land Conservancy is committed to ensuring compliance with the Workplace Health and Safety Act 1995, the Workplace Health and Safety Regulations 1998 and applicable codes of practice and Australian Standards as far as possible.

1.2 Responsibilities of Management

The Tasmanian Land Conservancy aims to provide a healthy and safe environment for employees, clients and visitors. It is committed to ensuring that all legislative requirements are met and to the achievement of excellence in its management of occupational health, safety and welfare issues.

To facilitate the implementation of this policy, the TLC will provide and maintain as far as

possible:

- Safe work areas, safe systems for work and safe equipment

- Facilities for the welfare of employees

- Information, instruction, training and supervision that is reasonably necessary to ensure that each employee is safe from injury and risks to health

- A commitment to consult and co-operate with employees in all matters relating to health and safety in the workplace

- A commitment to continually improve our performance through effective safety management.

In accordance with Standard Operating Procedures, Forests Alive follows strict safe labor practices to prevent injuries in the workplace, a particular risk for workers engaged in forestry operations. A site safety plan is prepared for each field inventory assessment and contains property specific contact details and emergency response protocols. An additional law of relevance to this project is Fair Work Act 2009. The Fair Work Act provides a safety net of enforceable minimum employment terms and conditions through the National Employment Standards (NES).

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

2.7 Stakeholders (G3)

The identification of stakeholders has been conducted with the consideration of their influence and interest in the project activities (see Section Negative Offsite Stakeholder Impacts CM2). Moreover, the identified stakeholders have been involved in the project activities in various ways, through joint research, educational and recreational activities. Examples of stakeholders involved in these activities are provided in Table 12 List of Stakeholders.

As an initial step, Forests Alive, on behalf of the TLC provided an explanatory letter to every stakeholder that had a direct interest / use of the land within the project area. This list was provided by the TLC and a copy of all correspondence is available for review by the validator.

The excerpt below is from the TLCs management plans which is available for review by the validator;

Over 20 members of the Bronte Deer Stalkers use the Roscarborough and Serpentine properties of the Bronte Reserve on an annual basis for shooting fallow deer during the recreational deer shooting season. Prior to TLC taking ownership of the Reserve the group also shot native wallaby

and possum and were allowed to gather small quantities of firewood for personal use. These activities are no longer allowed. They are encouraged to shoot feral cats and rabbits during their visits and have constructed a small shack on Roscarborough for member use.

The Bronte Reserve is a central point for recreational fishers and bushwalkers to access the Central Plateau Protected Area and the many walks and fishing lakes within the local region. Various four wheel drive clubs of Tasmania and 'Tas Trail' have also sought to cross the reserve to access destinations such as Lake Olive and Circle Marsh.

TLC's Grievance policy is:

It is the responsibility of staff to maintain good communications and to foster smooth working relationships.

It is the responsibility of the CEO to facilitate good staff relations and to act promptly when conflict arises.

It is recognised that from time to time, individual employees may have grievances which need to be resolved in the interests of good relationships. Clear, accessible and consistent mechanisms for dealing with conflict are a key part of the TLC's commitment to:

- *Resolving conflict quickly, openly and effectively;*
- *Protecting the industrial rights of staff;*
- *Fulfilling the role of TLC as a responsible and accountable employer;*
- *Maintaining good communications and collaboration within the office;*
- *Ensuring that there is transparency and participation at all levels of operation; and*
- *Ensuring that service delivery is not negatively affected.*

2.8 Commercially Sensitive Information

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

3 LEGAL STATUS

3.1 Compliance with Laws, Statues, Property Rights and Other Regulatory Frameworks (G4 & G5)

The employment of staff to assist in the project development, delivery and ongoing management are based upon merit. The selection of people to assist in the project is through an open advertising arrangement whereby anyone can apply and the final selection is based upon merit and is non-discriminatory, as specified in the Australian Fair Work Act 2009. More than half of the team involved in the project development and delivery including the field inventory process were women.

The TLC has employed local staff based upon their experience and knowledge of the land.

The TLC and Forests Alive comply with all laws in relation to equal opportunity.

The following laws and regulations are adhered to;

1. Australian Workplace Safety Standards Act 2005;

2. Tasmanian Workplace Health and Safety regulations 1998;

3. Australian Fair Work Act 2009;

4. National Employment Standards (NES);

5. ILO C100 Equal Remuneration Convention, 1951; and

6. ILO C111 Discrimination (Employment and Occupation) Convention, 1958.

Each employee is engaged through a contractual agreement that complies with these standards and informs each employee of their rights, responsibilities and entitlements. Within Australia, employment contracts must comply with these laws. If compliance is not achieved than the employer is open to being pursued for workplace discrimination and potentially compensation through the Australian Fair Work Act 2009.

3.2 Evidence of Right of Use (G5)

Within the context of the Australian and Tasmanian legal system relating to landownership and use, the New Leaf project area does not encompass land that is subject to traditional, customarily requirements. The project comprises private property within which the legal landowner has right of use. Within Tasmania land ownership is proven by registration in a title register maintained by the Recorder of Titles. Under this system the landowner is given a certificate of title. The TLC own all the land titles for the project area.

The Land Titles Office maintains the title register, plan register, power of attorney register and the Registry of Deeds.

The recordings on a Torrens title are guaranteed correct by the Recorder of Titles under the *Land Titles Act 1980*.

The project activity does not involve the involuntary relocation of people or of activities that are important for the livelihoods of the local community.

3.3 Emissions Trading Programs and Other Binding Limits (CL1)

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

3.4 Participation under Other GHG Programs (CL1)

The New Leaf Project is not seeking registration under any other GHG program.

Other Forms of Environmental Credit (CL1)

Each addition cannot and will not be registered under any other GHG program or claim any other environmental credits.

3.5 Projects Rejected by Other GHG Programs (CL1)

This project has not been submitted nor rejected from any other GHG program.

3.6 Respect for Rights and No Involuntary Relocation (G5)

The TLC owns the project area (see Section Project Location G1 & G3) and no communities live within the project area. Therefore, the project will not involve any form of relocation of people or of their relevant activities.

3.7 Illegal Activities and Project Benefits (G5)

The threat to the project area from illegal logging is negligible within Tasmania, while the threat to native forests from legally permitted logging is significant.

This was confirmed by the completion of a Preliminary Rural Appraisal. Between November 16 and 26 2010, key stakeholders in the timber industry were contacted (see Table No. 8), and absolutely ruled out any risk of illegal logging.

Table 3 Stakeholder Responses: *Is there potential for illegal extraction of trees from the project area?* Source: Interviews conducted by Forests Alive in November 2010.

Name of participant	Name of Organisation	Date	Means of Communication	Response

Mark Cornelius	Landowner TOG representative	24 – 11 – 2010	Face to face	None whatsoever – there is no illegal logging in Tasmania.
John Cameron	Landowner	25 – 11 – 2010	Telephone	No potential – not an issue in Tasmania
Roderic O'Connor	Landowner Director of Tasmanian Land Conservancy	24 – 11 – 2010	Telephone	Only firewood collection – no logging
Bric Milligan	Forestry Tasmania	16 – 11 – 2010	Face to face	No illegal logging ever recorded
Andrew Morgan	Director, SFM	26 – 11 – 2010	Telephone	Unheard of in Tasmania – no potential

4 APPLICATION OF METHODOLOGY

4.1 Title and Reference of Methodology

This project was undertaken in accordance with the VCS methodology VM0010: Methodology for Improved Forest Management: Conversion of Logged to Protected Forest Version 1.2. The methodology was updated to version 1.2, approved on 27 March 2013.

In addition, the climate project activities have utilised the following tools;

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

Other relevant guidelines utilised which have been utilised for the CCB aspect of this project include;

- Climate, Community and Biodiversity Project Design Standards, Second Edition, 2008.
- Rules for Use of the Climate, Community and Biodiversity Standards, 2010.
- Social and Biodiversity Impact Assessment (SBIA); Manual for REDD+ Projects, 2011.

4.2 Applicability of Methodology

The climate activity methodologies and tools have been chosen to suit the project activity; preventing emissions from logging and allowing the carbon stock to increase through natural regeneration of the native forest.

Carbon financing will provide the only available alternative to on-going logging that will generate revenue in order to support the on-going management of the forest. The methodology selected provides calculations to conservatively estimate the carbon emissions generated under a baseline scenario. The methodology provides the relevant conditions to demonstrate eligibility and additionality. The project has been assessed against the following eligibility criteria;

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

The baseline scenario is a continuation of historical timber harvesting in accordance with the requirements of the *Tasmanian Forest Practices Code 2000*. In some cases, legal timber harvest plans (Forest Practice Plans, FPPs) have been provided. The entire project area is located within land titles that are the subject of a *Private Timber Reserve* under the Tasmanian *Forest Practices Act 1985.* By way of summary, the intent of a Private Timber Reserve is defined as[3];

> *Private timber reserves were created by the Tasmanian Parliament in 1985 to enable landowners to have their land dedicated for long-term forest management. The legislation provides that forestry activities on the land are subject to a single, consistent, state-wide system of planning and regulation through the Forest Practices Act 1985.*

In addition, the Tasmanian Forest Practices Authority, in approving a Private Timber Reserve, must be satisfied that[4];

- the land is suitable for forestry activities (this is generally limited to an assessment of land capability);
- none with an interest in the land (such as tenants) will be disadvantaged;
- adjoining landowners, and those within 100 metres, will not be "directly and materially disadvantaged";
- the local *Planning Scheme* does not prohibit forestry activity on the land. (Note: forest practices are not prohibited just because you need a permit for the activities);
- the application is not contrary to the public interest.

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

The project scenario forbids commercial timber harvesting and forest degradation for thirty years. A monitoring plan has been submitted which provides a framework for biennial monitoring events to confirm that no timber harvest or other degrading activity has taken place.

The project scenario is protection and management of the forest for conservation.

3. **Planned timber harvest must be estimated using forest inventory methods that determine allowable off take as volume of timber (m^3/ha)**

[3] Private Forests Tasmania, http://www.privateforests.tas.gov.au/private_timber_reserve_applications [accessed 1st March 2013]
[4] Environmental Defenders Office, Chapter 8, http://www.edohandbook.org/doku.php?id=ch8 [accessed 1st March 2013]

Extensive field inventory assessment involving 187 randomly allocated, permanent field plots have been combined with locally derived allometrics. This allowed for the establishment of a detailed, species-specific timber inventory for the project area. Historical harvest trends have been determined using FPPs and extraction rates for the baseline scenario. The TLC employs the former harvesting manager for these project areas and their evidence was used to determine the extraction rates as a percentage of above ground biomass under each harvesting regime identified (Appendix 9.3). The accuracy of this process was also increased by correlating historical harvesting events with extracted volumes. The result of this process was the establishment of conservative extraction volumes for each planned timber harvesting event in m^3.

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

The New Leaf estate is wholly within the State of Tasmania. The state has strict requirements around defining land titles. This is administered through the Tasmanian Land Titles Office which maintains the title register, plan register, power of attorney register and the Registry of Deeds. The recordings on a Torrens title are guaranteed correct by the Recorder of Titles under the *Land Titles Act 1980*. The property boundaries covering the project area have been defined and documented through the following;

- KML files specifying the exact boundary of the project;
- Property cadastral boundaries showing the extent of the land area under ownership of the project proponent;
- Title documentation held by the Tasmanian Land Titles Office and which is available for review by the validator.
- Aerial imagery showing the plot locations within the boundaries of the project activity instance.

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

The project proponent has no plans or intentions to convert native vegetation into plantations. Conversion of native forest on private land within Tasmania is restricted to an area of 40 ha / year, per property. In addition, the FPPS and the historical harvesting within the project area does not involve conversion to managed plantations.

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

The stratification process ensures that wetlands and or peatlands are excluded from the project area. This project only includes standing native forest.

With the eligibility criteria as a reference, it can be demonstrated that this methodology is compatible with the goals, circumstances and activity of the New Leaf project.

4.3 Methodology Deviations

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

The same data and model parameters entered into FullCAM for Equation 9 were used to calculate the carbon stock in aboveground trees (tC/ha), the required output of Equation 15. Its inputs are based on local taxonomix-, geographic- and climatic-specific information, and allometric relationships identified in the Technical Reports prepared for the National Carbon Accounting System[5]. 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).*"[6]

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, Forests Alive is submitting a deviation from the less precise, accurate and conservative requirements of the GreenCollar IFM methodology. Equations 13-15 were therefore not required, and FullCAM used to calculate the product of Equation 15 (tC/ha). See Section 4.3 of the Grouped Project PDD for a more detailed explanation of this deviation.

4.4 Project Boundary (G1)

The greenhouse gases considered in the project calculations are carbon dioxide (CO2e) and methane, CH4 (to determine likely emissions in case of fire) which satisfies the VCS Tool for AFOLU Methodological Issues.[7] The carbon pools include carbon stocks found in aboveground biomass, dead wood and harvested wood products. The carbon sinks are the aboveground biomass and harvested wood products. Aboveground biomass stores carbon in the project scenario and the wood products in the baseline scenario. The forest type and the predominant market for native forest logging within Tasmania predominantly for pulpwood (95%) and therefore there is a higher rate of atmospheric emissions due to the short life of these products. The other carbon pools such as belowground biomass, little and soil have not been included. These sinks are typically less that de minimis (5% of total increase in carbons stock) on mineral upland soils. Organic soils are not included, 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.

These exclusions are conservative. For example, the exclusion of carbon stored in organic matter in the soil satisfies the A/R CDM Methodology "Procedure to determine when accounting for the soil organic carbon pool may be conservatively neglected in CDM A/R/ project activities.

Table 9 Carbon Pools

[5] 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> [accessed 7th March 2011]

[6] as cited by Kapambwe, M.; Keenan, R.; (2009) Biodiversity Outcomes from Carbon Biosequestration, The University of Melbourne, commissioned by The Department of Sustainability and Environment, pp 23. Available from <http://www.dse.vic.gov.au/CA256F310024B628/0/761E59489BC57A9ACA2576810079C4D4/$File/Biosequestration+and+Biodiversity.pdf> [accessed 4th March 2011]

[7] Voluntary Carbon Standard, Tool for AFOLU Methodological Issues, 2008.

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

4.5 Baseline Scenario (G2)

The baseline for the New Leaf project is the business-as-usual land-use that would have occurred in the absence of the IFM project activity. This represents the most financially viable and legally permitted land use.

The baseline scenario has been identified by the project proponent, with support from Forests Alive, as detailed in the Forests Alive's standard operating procedures for completing the IFM calculations and consistent with the AFOLU guidelines.[8] As stated in the operating procedures, the baseline scenario may be developed with the use of land use records, field surveys, data and feedback from stakeholders and information from other sources as appropriate. All Forests Alive's standard operating procedures, including SOPs on creating the baseline scenario, are available on request by the validation agency.

The New Leaf project baseline reflects relevant national and sectoral policies or circumstances, and historical practices for the project activity. As mentioned in section 1.3, FPPs were provided for historic logging events between 1999 and 2009. These FPPs can be linked to Weighbridge records and together they provide areas and volumes extracted for each event. The FPPs also provide logging compartment information which has been used to determine the location of these events.

Events prior to 1999 have been identified using information provided in GIS files by the TLC's Daniel Sprod and Bruce Hay. This information has been collated from known rotations and prescriptions of the forest areas. This additional information has been used in conjunction with the FPP data to build a reliable baseline scenario.

The full process of building the baseline scenario and modelling this using the Australian Governments Full Carbon Accounting Model (FullCAM) can be found in the Timber Harvest Plan. In summary, the prescriptions for the forests were known and provided, along with the years and areas in which the logging would take place. This information was used to provide a percentage biomass removed for each stratum each year, based on information provided by Bruce Hay of the percentage biomass typically removed for each prescription. FullCAM was used to project the forest volume at the time of harvest and therefore provide an output of the projected volume to be extracted.

The projected harvest volumes have been compared to the historic volumes provided by the FPPs and against the volumes calculated between 1979 and 1999 to ensure the harvest projections are in line with historic volumes.

The FPP volumes combined with the Weighbridge records provide a certain record of historic volumes between 1999 and 2009. The harvest events between 1979 and 1999 are a little more uncertain due to less evidence being able to support these figures. The volumes in this period are less than the 1999-2009 years despite the logging practices in this time being more intense. It is therefore assumed any projections based on the full 1979-2009 logging events will be on the conservative side.

The weighbridge records provided information of the ratio of "sawn timber: pulp" for each harvest event. This was consistent with other sites Forests Alive have worked on where the majority of wood products are pulp products. This was supported by discussions with the proponents and reflects the predominant end market for the species on each land area. Based upon the evidence

[8] Voluntary Carbon Standard, Guidance for Agriculture, Forestry and Other Land Use Projects, 2008.

provided, it was identified that 95% of the past logging was for woodchips to create paper products. It is worth noting that the woochips facilities were also owned by the prior landowner, Gunns Pty Ltd.

By way of providing evidence to support the establishment of historical logging events within the project area, all of the documentation, including past Forest Practices Plans, written evidence, weighbridge records, compartment maps and calculations of extracted volumes are available for the validator to review. FullCAM calibration graphs have also been provided.

The list of harvest event projections is provided in the Timber Harvest Plan (Appendix 9.3).

The baseline scenario proposed has been tested using the current VT0001 Tool for the Demonstration and Assessment of additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities (see Section 4.6).[9] This tool was developed and is issued by the VCSA, and approved on 21 May 2010.

Both the baseline scenarios associated with community and biodiversity activities are fully described in sections 6 and 7 respectively.

4.6 Additionality (G2)

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

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

1a: Define alternatives to the project activity:

There are 7 alternative land use scenarios to the AFOLU New Leaf activity. Options 3-6 require various forms of logging and transport machinery, as described in the *Forest Practices Code 2000*.

1. Native forest remains standing without registering as an AFOLU activity:

   This scenario fulfils one of the alternative land uses identified in the VCS Tool for Demonstration and Assessment of Additionality: i.e. the project proponent undertakes the project activity of Improved Forest Management without carbon finance. This is not a financially viable option as it prohibits the landowner from earning any income from the native forests on their land. The New Leaf forest estate is large and widely dispersed and this requires significant on-going management costs. As such, an income stream through either on-going logging or carbon finance are the only revenue generating options for the TLC. For this reason it is not a realistic baseline scenario.

2. Covenant all of the forested land:

   The landowner places the entire forest estate within a Conservation Covenant that is binding on the land title. In the past, this would generate some income, typically in the form of a lump sum payment. Today, registration of a land parcel as a Conservation Covenant is entirely voluntary and is associated with limited financial incentives. Like an IFM LtPF project, this helps to maintain and enhance ecosystem services.

[9] Verified Carbon Standard, VT0001 Tool for the Demonstration and Assessment of additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities, Version 3.0, 2012.

However, many landowners have already pursued this option, which has been available since the *Nature Conservation Act 2002*. Landowners currently are only participating in covenant programs on a voluntary basis and while the number of participants is increasing[10], these covenants are focussed upon threatened vegetation communities and more commonly, non-forest communities that are a target for Australia's Nation Reserve System. As a result, these areas cannot be commercially logged anyway. The carbon market provides an opportunity for diversification. Moreover, even when associated with financial incentives, Conservation Covenants were not competitive with the return even for low-value wood products. For this reason it is proposed that conservation covenants do not provide a viable means for protecting the carbon stocks in native, privately owned forests on a significant scale, such as that comprising the New Leaf estate.

3. Selective logging:

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

4. Clearance and native regeneration:

The landowner adopts a policy of clearfell and native regeneration. This is not a credible baseline scenario, because this does not represent the historical practice for this project area, and it is unlikely to be permitted. If this practice was permitted, it is likely to be implemented on a much smaller scale than selective logging as the long-term returns are lower, because this practice does not maximise forest regrowth rates.

5. Clearance and conversion to plantation:

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

6. Clearance and conversion to pasture:

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

7. Logging of native forests is banned in Tasmania:

It is possible that the Forest Practices Authority will, in the future, impose further restrictions on the logging of native forests in Tasmania. If logging of native forests is

[10] In Tasmania there are over 550 Private Protected Areas, involving approximately 66,000 hectares and over 750 landowners, Protected Areas on Private Land Program, "Protected Areas on Private Land Flyer, Tasmania's Department of Primary Industries, Parks, Water and Environment, http://www.dpiw.tas.gov.au/inter.nsf/Attachments/DRAR-8A84Z3/$FILE/PAPL%20Focal%20Landscape%20Flyer.pdf [accessed 1st March 2013]

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. 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 and in fact the current proposed 'Tasmanian Forest Agreement may well place increased pressure upon private native forests for logging as a result of protecting areas of public native forest. For example, with recent discussions about the future logging of publicly owned 'State Forest' which is currently managed by the Government Business Enterprise, Forestry Tasmania, specific reference is made to private land within the principles:

"Encourage and support but not mandate to seek assistance for certification and protect, maintain and enhance high conservation value forests on their properties[11]*."*

This reflects both the socio-economic acceptance of logging on private lands and the political reluctance to impose any form of regulation that prevents logging within privately owned forest. Instead, it is more likely that the need for Forest Stewardship Council or similar certifications will become a market expectation for native forest wood products, compared to plantation-sourced timber. Such regulations will still permit logging events and the accompanying greenhouse gas emissions. It must also be recognised that there is a current focus upon establishing 'biomass energy' within Tasmania, with specific focus upon burning native forests for power[12].

1b: Consistency with mandatory laws and regulations:

1. Native forest remains standing:

   This scenario is in compliance with all the applicable legal and regulatory requirements

2. Covenant all forested land:

   This scenario is in compliance with all the applicable legal and regulatory requirements

3. Selective logging:

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

4. Clearance and native regeneration:

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

[11] *Tasmanian Forest Statement of Principles to Lead to an Agreement http://www.premier.tas.gov.au/__data/assets/pdf_file/0009/134991/draft_principles.pdf* [accessed 23rd November 2010]
[12] Forestry Tasmania, Forestry Innovation Plan June 2012, http://www.forestrytas.com.au/uploads/File/pdf/pdf2012/FT_innovation_plan_230512_web.pdf [accessed 23rd April 2013]

5. Clearance and conversion to plantation:

   This scenario is currently in compliance with all the applicable legal and regulatory requirements. However, it cannot be implemented at a rate greater than 40ha per property per year and will be banned altogether after 2015, based on the 2009 policy amendments for the issuance of Forest Practices Plan. This reflects the goal of the "Tasmanian Government Policy for Maintaining a Permanent Native Forest Estate" (December 2009)[13] to end 'broad scale clearing' by 2015.

6. Clearance and conversion to pasture:

   This scenario is currently in compliance with all the applicable legal and regulatory requirements. However, it cannot be implemented at a rate greater than 40ha per property per year and will be banned altogether after 2015, based on the 2009 policy amendments for the issuance of Forest Practices Plan. This reflects the goal of the "Tasmanian Government Policy for Maintaining a Permanent Native Forest Estate" (December 2009)[14] to end 'broad scale clearing' by 2015.

7. Logging of native forests is banned in Tasmania:

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

1c: Selection of the baseline scenario:

From the above information, the most suitable baseline scenario would be option 3, Selective logging. This option has been selected for it is the most common practice, and can be foreseen to continue throughout the project lifetime. Evidence to support this choice has been provided in the form of Forest Practice Plans (FPPs), Weighbridge extracted volume records and landowner interviews.

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

2a: Determine appropriate analysis method

Given that the project is within the IFM VCS category, the project proponent will generate no financial or economic benefits from the project area other than income attained through the carbon market. For this reason and consistent with the VCS tool for additionality, this project is assessed against the simple cost analysis (Sub step 2b, option 1). This must be completed in the project file, but does not need to be repeated at monitoring events. For non-permanence a financial assessment of the project lifetime is submitted annually.

2b: Option I. Apply simple cost analysis

The most significant cost for project proponents in developing the VCS IFM project is engaging Forests Alive Pty Ltd to undertake stratification, fieldwork, calculations and prepare the Project

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

Design Documents in accordance with the Community, Climate and Biodiversity Standard and Verified Carbon Standard. The costs associated with project implementation for each instance will be available for review by the validator.

The project proponent forfeits potential income from the sale of woodchips and sawlog timber. The market for woodchips has been declining by an average of 2.4% per year over the past twenty years[15], though the price of good-quality sawlog remains high (>$30/m3).[16] The sheer volume of timber per hectare and the extent of the land area means that timber harvesting remains viable – particularly if it is the only means to generate revenue from native forests.

If the proponents were to continue the project activity without carbon finance (i.e. let the forest stand without registration as a VCS project) or register it as a conservation covenant, they would not generate any income from the land. Therefore, protecting forest without carbon finance is the least financially viable land use scenario.

The simple cost analysis for this project is summarised in the following table format. A more detailed financial assessment is available for review by the validator.

The current market price was correct on publication, in April 2013

Table 10 Simple Cost Analysis

Forestry product:	Average yield per annum:	Current market price ($):	Value to the project proponent ($):
Pulp and sawlog	2,586 tonnes of pulp 136 tonnes of sawlog	$6/tonne of pulp $30/tonne of sawlog	~$19,596 (annual)
Carbon	28,793 (VCUs)	$8/VCU	~$230,344 (annual)
Project scenario without carbon-financing	0	0	0

STEP 3: Barrier Analysis

Barriers have been considered for the implementation of this project. Due to the high level of stakeholder support in implementing this project, the technical capacity of the TLC and the financial stability, no perceived barriers could be found that prevent the proponent from conducting the project activities. This is further explored in the calculation of the non-permanence risk buffer.

STEP 4: Common Practice Analysis

Within Tasmania, there are limited opportunities for landowners to protect forest on a scale similar to the New Leaf project (over 12,000 ha) and to generate an alternative source of revenue,

[15] 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 22nd February 2011]

[16] According to the latest report of Forestry Tasmania, the timber market has been significantly impacted by the closure of the Triabunna woodship export facility, among other factors. Timber sales revenue fell by $67 million to $89.4 million, Forestry Tasmania Stewardship Report 2011-12. On the decreased demand for Tasmania's woodchip fibre, see "Strategic Review of Forestry Tasmania, prepared for the Tasmanian Government by URS Australia Pty Ltd, on February 2012, http://www.forestrytas.com.au/assets/0000/0993/Forestry_Tasmania_StrategicReview_-_Extract_of_Stage_1_Report_Redacted.pdf [accessed 22nd April 2013].

apart from current VCS approved IFM projects. Currently, Forests Alive has implemented three other IFM projects within Tasmania, covering over 36,000 ha of land in total. It is important to view this project area in the context of the total area of privately owned native forest being 885,000 ha[17]. Of this area, approximately 210,000 hectares are covered by a Private Timber Reserve.[18]

A similar process for protection does exist where-by landowners place their forest in a covenant, as mentioned in Step 1, option 2. Because there is little to no direct financial benefit to the landowner in placing a covenant on their commercial forestland, this activity is not a viable consideration. In the context of land that comprises forest of commercial value and is approved for logging, it is therefore not considered common practice.

In the absence of this project, the biodiversity benefits would not have occurred due to the main baseline activity being logging and the management plans with a focus on biodiversity conservation will not be implemented.

It is well established that on-going logging of activities within native forests degrade forest carbon stocks and negatively impact biodiversity values[19], [20].

Natural forests are the most resilient and relatively large carbon stock in the land and forest sector. Natural forests are relatively resilient to climate change and disturbances because of their genetic, taxonomic and functional biodiversity. This resilience includes regeneration after fire, resistance to and recovery from pests and diseases, and adaptation to changes in radiation, temperature and water availability (including those resulting from global climate change)[21],[22].

Thus protecting natural forests is a strong climate mitigation measure. And on a landscape scale, the protected forests will provide a continuous undisturbed habitat, allowing species to migrate and adapt in response to climate change.

Likewise, in the absence of the project the observed community benefits would not have been achieved, which are further detailed in Section 6 of this PDD. They include;

1. Enhanced economic opportunities
2. Community Engagement and institutional cooperation
3. Further education and research activities
4. Enhanced recreational activities.

[17] Private Forests Tasmania, Forest Cover, http://www.privateforests.tas.gov.au/forest_cover [accessed 23rd April 2013]
[18] Felmingham, B and Wadsley, A (2008), Measuring the Economic Value of Private Forests to the Tasmanian Economy, http://www.privateforests.tas.gov.au/files/attachments/Microsoft%20Word%20-%20Measuring%20the%20Economic%20Value%20of%20Private%20Forests%20to%20the%20Tasmanian%20Economy%20web%20version%20%28tables%20aligned%29.pdf [accessed 22nd April 2013]
[19] Mackey et al. (2008). Green Carbon: The role of natural forests in carbon storage. Part 1. A green carbon account of Australia's south-eastern Eucalypt forests, and policy implications. Australian National University Press, Canberra; p36; http://epress.anu.edu.au/green_carbon_citation.html
[20] . Roxburgh, S. H., Wood, S. W., Mackey, B. G., Woldendorp, G. and Gibbons, P. 2006, 'Assessing the carbon sequestration potential of managed forests: a case study from temperate Australia', *Journal of Applied Ecology,* 43, pp. 1149–59.
[21] Thompson, I., Mackey, B., McNulty, S., Mosseler, A. (2009). Page 7, Forest Resilience, Biodiversity, and Climate Change. A synthesis of the biodiversity/resilience/stability relationship in forest ecosystems. Secretariat of the Convention on Biological Diversity, Montreal. Technical Series no. 43, p. 7.
[22] Joern Fischer, David B. Lindenmayer, and Adrian D. Manning. 2006. Biodiversity, ecosystem function, and resilience: ten guiding principles for commodity production landscapes. *Frontiers in Ecology and the Environment* **4**: 80–86, in abstract.

5 QUANTIFICATON OF GHG EMISSION REDUCTIONS AND REMOVALS (CLIMATE)

5.1 Project Scale and Estimated GHG Emission Reductions or Removals

The New Leaf IFM-LtPF carbon project does generate over 1,000,000 credits annually and is therefore not a 'large project'.

Project	x
Large project	

Years	Estimated GHG emission reductions or removals (tCO2e)
2010	31,443
2011	47,652
2012	39,377
2013	22,655
2014	29,342
2015	65,752
2016	37,858
2017	31,084
2018	34,056
2019	51,460
2020	81,661
2021	63,452
2022	66,884
2023	33,026
2024	33,910
2025	71,810
2026	54,649
2027	16,979
2028	55,462
2029	18,107
2030	64,793
2031	11,231
2032	9,778
2033	2,013
2034	16,037
2035	34,411
2036	-1,180
2037	-763

2038	-2,820
2039	-2,430
2040	-7,405
Total estimated ERs	**1,010,284**
Total number of crediting years	30
Average annual ERs	33,676

5.2 Leakage Management (CL2)

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.

Activity Shifting:

Consistent with step 5.1, an assessment will be undertaken to examine the potential for leakage through activity shifting as a result of the project. No leakage from this cause is permitted under the VM0010 methodology.

The logging projections for all additions will be based upon the historical logging records and will be consistent with current legislation and FullCam regeneration rates. In addition, each individual proponent is required to demonstrate the absence of activity shifting leakage. In accordance with the methodology, if the proponent does not own any other forested properties in Australia, this is considered an adequate demonstration that activity shifting leakage cannot occur. In instances where the proponents do own forested land that could be logged which is not entirely included within the project there is opportunity for leakage through activity shifting. In order to address this, the proponent is required to demonstrate whether there has been any logging of any additional forested properties in their possession. At the initial verification of the property, the proponent must detail in the project file:

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

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

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

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

Market Leakage:

Step 5.2 requires a determination of a leakage factor due to market leakage.
VM0010 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[23] and in the wood supply agreements with Ta An Tasmania Pty Ltd[24]. 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." [25] State-specific quotas are detailed in Regional Forest Agreements[26]. Since state forests of Australia are harvested according to long-term quotas, there is no risk that harvesting will be shifted to native forests on public land as a result of the project.

Private native forests in Tasmania produce a minimal quantity of sawlog

The contribution of Tasmania's private native forests to the national timber industry is not significant. 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[27]. 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[28]. Tasmania's private native forests therefore contribute only 2.2% of high value wood products - a tiny fraction. 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 95% 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 for a higher proportion of sawnwood. Tasmania has a historical trend for the harvesting of private and public native forests almost exclusively for woodchips. The market for woodchip products has declined significantly in the past 5 years and it is therefore suggested that there is therefore no risk of market leakage as a result of these projects to mainland Australia because of decreased supply of timber caused by the project. The leakage factor is determined by considering where logging for low value products 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

[23] Forestry Tasmania (2008) Forest Management Plan: Sustainability Charter, p19. http://www.forestrytas.com.au/uploads/File/pdf/Charter_2008.pdf [accessed 10th May 2013]
[24] Forestry Tasmania (2010) Wood Supply Agreements. http://www.forestrytas.com.au/forest-management/wood-supply-agreements [accessed 10th May 2013]
[25] 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 [accessed 10th May 2013]
[26] Department of Agriculture, Forestry and Fisheries (2010) Regional Forest Agreements Home, Australia. Available from http://www.daff.gov.au/rfa [accessed 10th May 2013]
[27] 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.
[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.

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 the Forest Alive's pilot project, where a quarter of the property was clearfelled in 2006. Alternatively, they will log to obtain the maximum sustainable yield, which involves harvesting roughly 70% of biomass at each harvesting event, exemplified by the baseline scenario for this project area. In either situation, forests are logged according to the landowners' assessments or advice from a forest agency of the volume of merchantable timber available and the price they will obtain for the sale of the woodchips and small quantity of sawn timber. ***It is therefore not ecologically viable to increase permitted extracted volumes within existing concessions because they are already harvested at (or above) the maximum sustainable rate.***

Market demand is unable to satisfy concession requirements

Using the annual report from the Tasmanian Forest Practices Authority, figures on extraction rates and harvesting methods can be attained and compared annually. Figure No. 01 shows a steady decline in extraction rates from native forests across Tasmania (i.e. excluding the first two treatments).

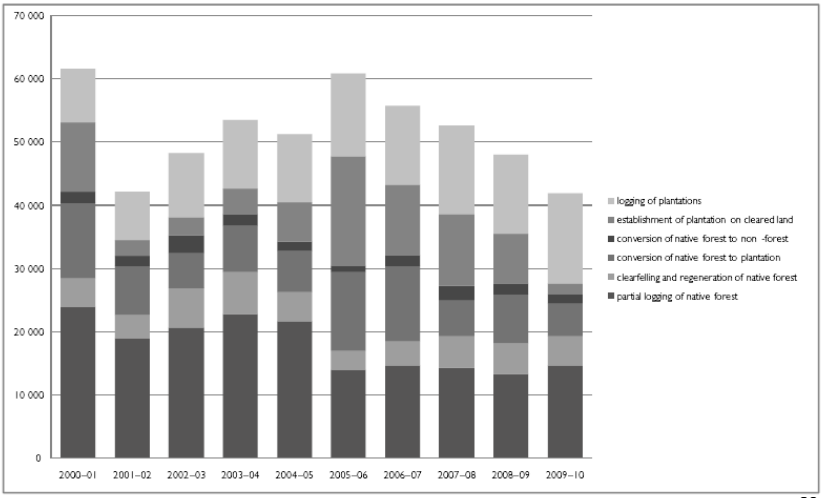


Figure No. 01. Forest area under different harvesting regimes (2000 – 2010)[29].

Data from Private Forests Tasmania further confirms that there is a downward trend in harvested volumes from native forests on private land in Tasmania. This is the most likely area for market leakage from the project to occur, due to the quota-oriented harvesting on public land and the sawlog-oriented harvesting on the mainland (see PDD for more details). Figures No. 02 and 03 demonstrate and quantify the declining timber volume extracted from private native forests in Tasmania.

Using the data from the Tasmanian Forest Practices Authority, the average area of native forest subjected to 'partial logging' on private land was 9840 hectares per annum between 2000 and 2009.

[29] Tasmanian Forest Practices Authority Annual Reports, www.fpa.tas.gov.au [accessed 10th May 2013]

Native Hardwood	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
			No fuel wood	No fuel wood	No fuel wood	No fuel wood	No fuel wood	No fuel wood	No fuel wood	No fuel wood
Harwood Sawlog, Veneer & Ply	125,923	140,972	100,970	119,551	96,816	69,837	48,765	51,980	39,435	52,343
Hardwood Pulpwood	1,912,616	1,669,348	1,792,636	1,668,762	1,628,739	944,096	955,879	1,134,116	891,641	260,343
Minor Log Products, including Fuelwood	14,550	2,551	591	814	446	5,412	470	416	912	2,420
Total	**2,053,089**	**1,812,871**	**1,894,197**	**1,789,127**	**1,726,001**	**1,019,345**	**1,005,114**	**1,186,514**	**931,512**	**315,107**

Figure No. 02. The volume of native hardwood extracted per year declined by an average of more than 15% between 2000 and 2005.[30]

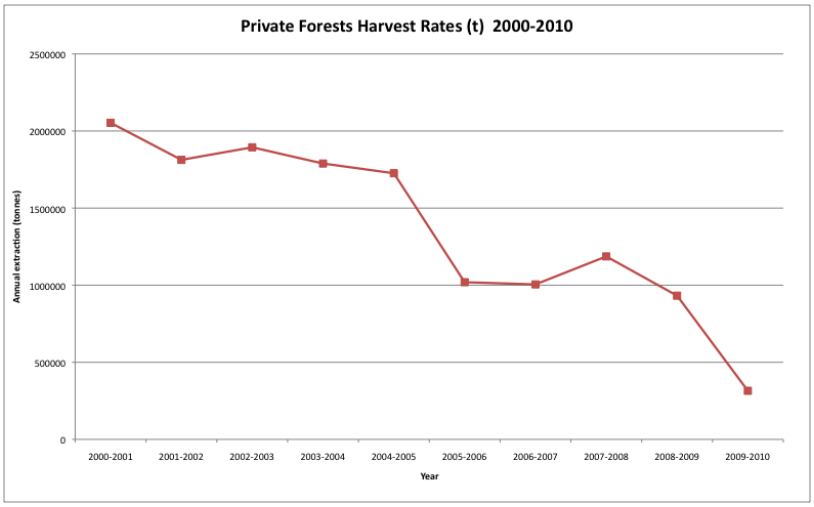


Figure No. 03. The quantity of native hardwood extracted per year has fallen steadily over the past decade.[31]

Using data from Private Forests Tasmania (Figure No. 03), the average harvest volume for native hardwood (including sawlog, veneer, ply, pulp wood and 'minor log products') was calculated by adding the private forest harvest volumes from Figure No. 03 and dividing this by the number of years. The average over the 10-year period was 1,373,233 tonnes per annum.

Using the same data the harvest volume for the year 2009-2010 shows the total volume of extracted timber as 315,107 tonnes. This reflects a 77% decline from the average volume of 1, 373, 233t per annum for the last ten years. The Private Forests Tasmania Annual report for 2010-

[30] Private Forests Tasmania, annual reports, http://www.privateforests.tas.gov.au/publications/annual_reports [accessed 10th May 2013]
[31] Private Forests Tasmania, annual reports, http://www.privateforests.tas.gov.au/publications/annual_reports [accessed 10th May 2013]

11 states, that native forest pulpwood declined again from the previous year by a further 20%[32]. Most recently, the 2011, 2012 annual report indicated that 'partial logging' occurred on an area of 1209 ha of private land during that period.[33]

All available evidence indicates that native forest harvesting within Australia is decreasing. One potential factor that may reverse this trend is a renewed focus upon pursuing biomass burning for native forests, this will be discussed below. In the context of the current trend, consider the following findings from the most recent and comprehensive research into the Australian Forestry sector:[34]

"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".

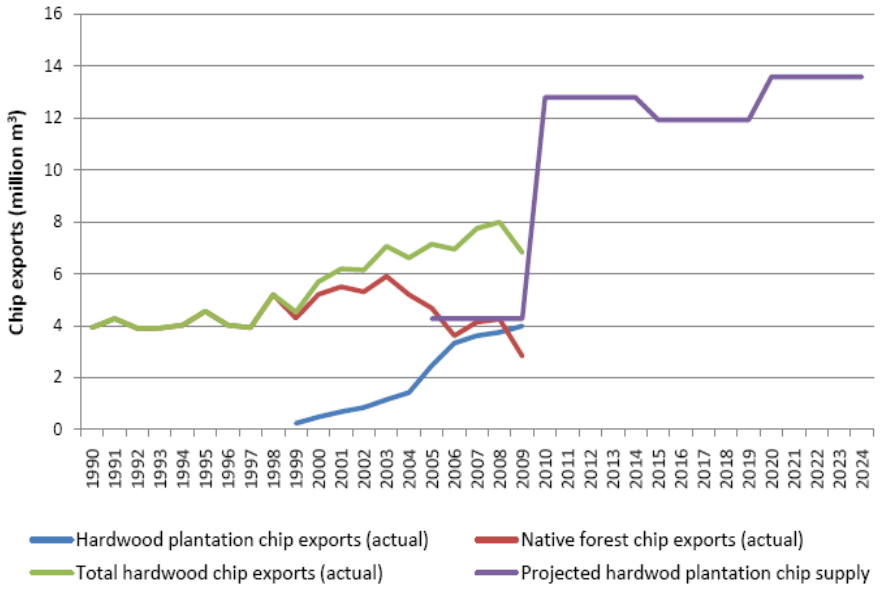


Figure No. 14. Australian hardwood chip exports and projected plantation supply

More importantly, ***in the absence of increasing market demand, annual permitted extracted volumes actually cannot be increased, nor can new concessions be issued.*** Landowners 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.

[32] Private Forests Tasmania, Annual report, http://www.privateforests.tas.gov.au/publications/annual_reports [accessed 1st May 2013]
[33] Private Forests Tasmania, Annual report, http://www.privateforests.tas.gov.au/publications/annual_reports [accessed 12th April 2013]
[34] Ajani, J. (2011) Australia's wood and wood products industry, situation and outlook, Fenner School of Environment and Society, Australian National University, Australia.

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.

Biomass Burning

There has been a renewed focus upon establishing opportunities for biomass burning in order to reverse the declining market for native forest logging within Australia. However, no such infrastructure currently exists and biomass burning is not able to generate 'renewable energy' certificates through Commonwealth legislation. This is one of the key factors in establishing the viability of biomass burning. A change of politics within Australia could see a reversal of this policy and in this instance, there is a chance that biomass burning would replace the decline in the woodchip market. This would serve to renew the pressure on native forests on private and public land and would be evident in on-going annual verification events for each project.

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[35].

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[36]. On mainland Australia, pulp is produced only as a byproduct of sawnwood[37]. In Tasmania, the pulp supply is increasing as Eucalyptus plantations across the state mature (refer to Figure No. 14). Output of plantation timber in 2004 was an estimated 2 520 000 (tonnes + m^3), but this is projected to increase to 6 640 000 (tonnes + m^3) by 2019 as these

[35] 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 22nd February 2011]
[36] 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 22nd February 2011]
[37] 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.

plantations mature, even with no new plantation establishment[38]. 80% of this output is intended to produce low-value woodchips[39]. 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[40], 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, [41] 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[42].

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

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

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

Summary

The pressure on native forests fluctuates, particularly on private land where landowners log in response to market shifts. Forest practice plans can last for a period of 7 years and as such, permits can be obtained to ensure future income is not constrained by the shift in demand towards plantation-sourced timber and because of high-level discussions about constraining logging of native forests, albeit on public land. It is worth noting that constraints on public land may in fact increase the pressure on private native forests. This is inducing landowners to obtain concessions for logging native forests: 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[43]. 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 establish carbon finance as a competitive land use. This will deter landowners from either ongoing selective

[38] 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]
[39] 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> [accessed 22nd February 2011]
[40] (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 22nd February 2010]
[41] 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 22nd February 2011]
[42] Schirmer J (2010) 'Tasmanian Forest Industry, Trends in Forest Industry Employment and Turnover, 2006–10.' CRC for Forestry. (CRC for Forestry: Hobart)
[43] Forest Practices Authority, Annual Report, 2008 – 2009.

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.

5.3 Baseline Emissions (G2)

The forest area has been stratified using PI classification layers. This stratification process has been undertaken in order to reduce the sampling error that could be introduced due to the variation of different forest, vegetation types and land use history. Native forest has been stratified according to Forests Alive's standard operating procedure of stratification. In summary, native forest has been included in the project area if it conforms to the following;

- It adheres to the United Nations Framework Convention on Climate Change (UNFCCC) definition for forest;
- The forest is not already in a covenant or other mechanism of forest protection;
- The forest can feasibly and legally be logged under standard Tasmanian practices (ie. Areas close to water courses, roads and Wedge-Tailed Eagle nests etc. are excluded).

The native forest is then stratified according to PI native vegetation classification definitions. Eleven strata in total have been identified and the PI classification codes that relate to these strata are listed below;

Table 4 Project Strata

Strata Number	Strata Name (PI code)	Definition	Area (ha)
1	E-3	Dominated by Mature Eucalypt of average height 27-34 m.	4334
2	E-3f	Dominated by Mature Eucalypt of average height 27-34 m with 1-10% crown cover, and dense eucalypt regeneration understory	223
3	E2*f	Dominated by Mature Eucalypt of average height 41-55 m with 1-10%	53

Strata Number	Strata Name (PI code)	Definition	Area (ha)
		crown cover, and dense eucalypt regeneration understory	
4	E2,+3	Dominated by Mature Eucalypt of average height of 34--55 m.	2004
5	E4	Mature Eucalypt of average height 15-27 m.	2282
6	ER1	Regrowth Eucalypt of average height <15 m.	895
7	ER1.E-3	Mixture of Regrowth Eucalypt of average height <15 m and sparse Mature Eucalypt of average height 27-34 m.	797
8	ER2*	Regrowth Eucalypt of average height 15-27 m.	254
9	ER2*.E-3	Mixture of Regrowth Eucalypt of average heigh 15-27 m and sparse Mature Eucalypt of average height 27-34 m.	521
10	ER2*.E2*	Mixture of Regrowth Eucalypt of average heigh 15-27 m and sparse Mature Eucalypt of average height 41-55 m.	576
11	MYR	Myrtle rainforest	205
		TOTAL	**12,143**

Future references to the above strata will involve the stratum number but not the name.

The Winrock International Sampling calculator has been used to determine the number of plots required to sample each strata to ensure sampling error is below 15%. The readings from the Winrock calculator have been provided in the appendix section. All datasheets from the fieldwork process are available for review by the validator who selects sites to visit and cross check these.

The aboveground biomass has been calculated using species-specific allometrics and wood densities where possible. In some cases, allometrics of equivalent species or general forest-types are used where allometrics are not available. The IPCC-recommended carbon fraction and Biomass Conversion and Expansion Factor has also been used to determine volumes of trees and their carbon content.

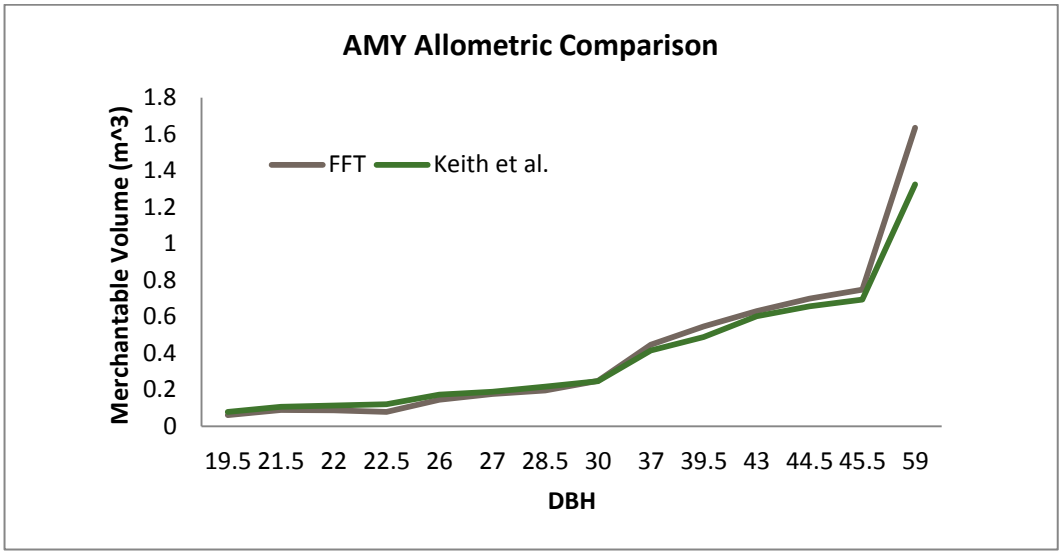
Field surveys provided DBH for each tree in sample plots of 0.2025 km^2. Height curves were constructed for a number of species specific to strata. In cases where heights could not be taken, height curves were calculated using data gathered from other strata within the project area.

The volume of merchantable timber per tree was derived from the DBH measured for each individual tree, combined with the height estimated from an instance-specific height curve, using the Farm Forestry Toolbox v5.0. This program was developed by Private Forests Tasmania, a statutory authority funded by the Tasmanian government and private forest owners. The allometrics in the Toolbox were developed from an extensive collection of field data by Forestry

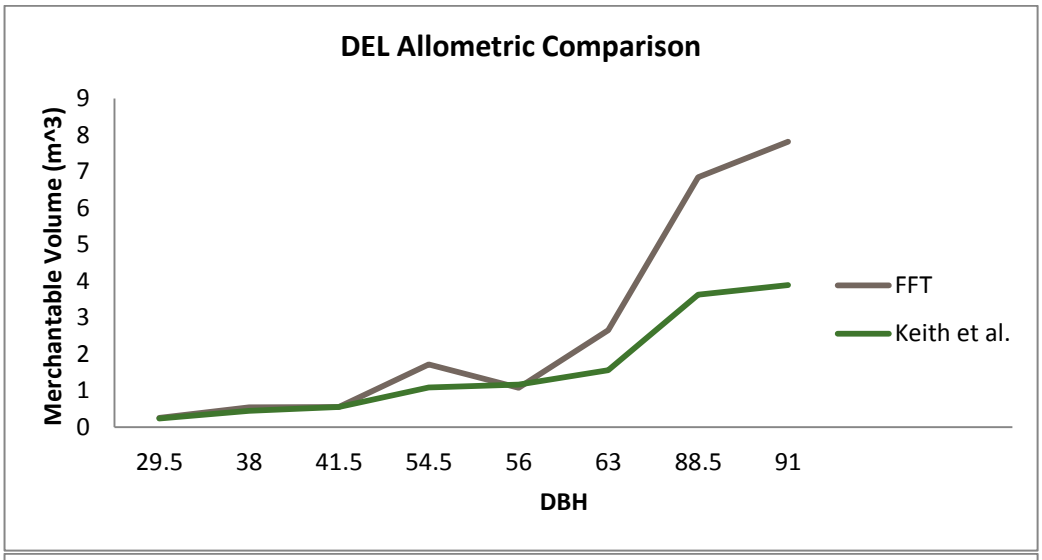
Tasmania, the government department responsible for measuring State Forests. They were therefore developed from Tasmanian tree species growing locally, i.e. in climatic and geographic conditions typical of the species and state. Unfortunately, the measurements used for the FFT were conducted in the 1970s and 1980s, and there are no records or published papers from that time (confirmed by Bric Milligan, Forestry Tasmania). Therefore, it was not possible to find out the specific boundary conditions or error margins used in developing the allometrics. However, the fact that the FFT comprises allometrics derived from species-specific data in Tasmania and remains the primary tool (within a commercial application) for calculating merchantable timber volume is reflective of its accuracy.

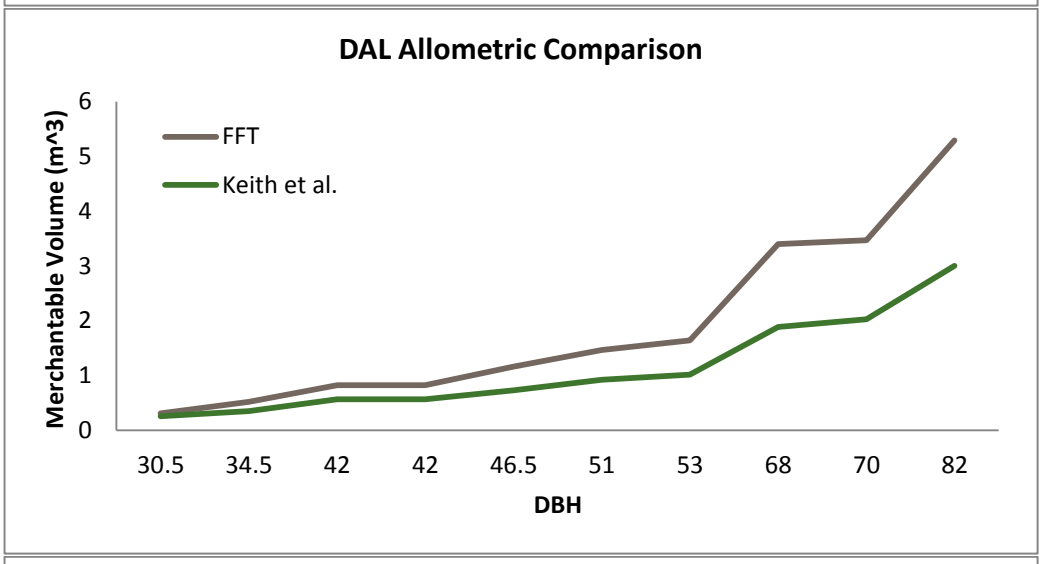
Neither the species-specific allometrics nor a suitable equivalent was available for a few forest species (specifically those of neither the Eucalyptus nor Acacia genera) found in the project site. For these species, a general allometric for Australian native sclerophyll forest was utilised. This allometric was derived from 135 trees, and had an R^2 value of 0.963[44].

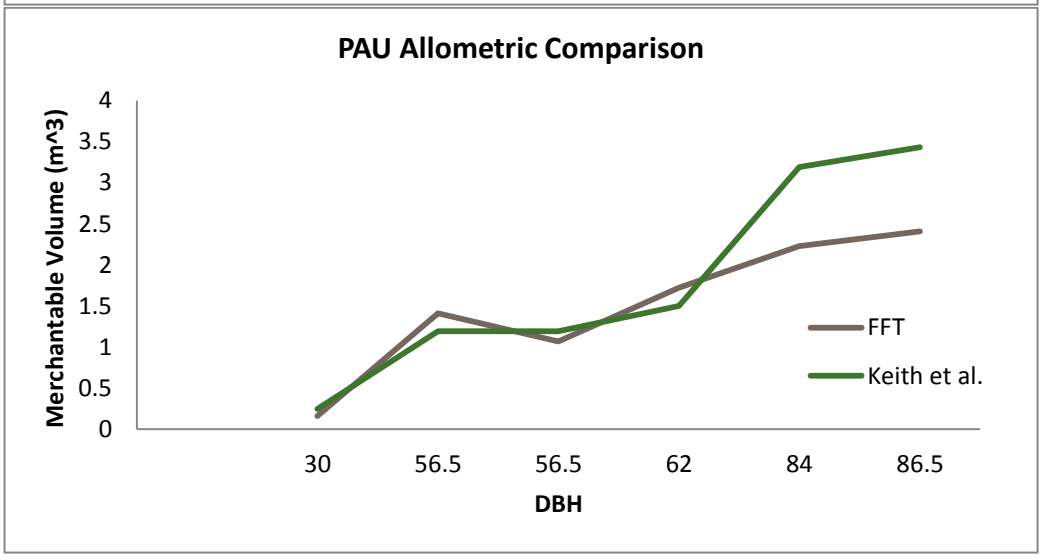
This general equation, from Keith *et al.* (2000), was also used to test the FFT results. The DBH and height of 10 larger trees of each species was measured, and the merchantable volume of timber calculated using the Farm Forestry Toolbox and Keith *et al.*'s allometric equations. Since the Keith *et al.* allometric calculates the aboveground biomass in kilograms, this figure was converted into the merchantable timber volume (m^3) by dividing it by the BCEF (1.17) and the wood density (t/m^3). The wood density figures are extracted from the manual for the Farm Forestry Toolbox. The outputs of the FFT and those obtained through applying the allometric equations from Keith *et al* are compared below. These outputs show some variation in the FFT readings compared to Keith et al. allometrics. This is to be expected due to the heights being sampled from specific strata in each case, and the allometrics being processed in the FFT on a stratum by stratum basis.



[44] 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


DEL Allometric Comparison
Merchantable Volume (m^3)
9
8
7
6
5
4
3
2
1
0
29.5
38
41.5
54.5
56
63
88.5
91
DBH
FFT
Keith et al.

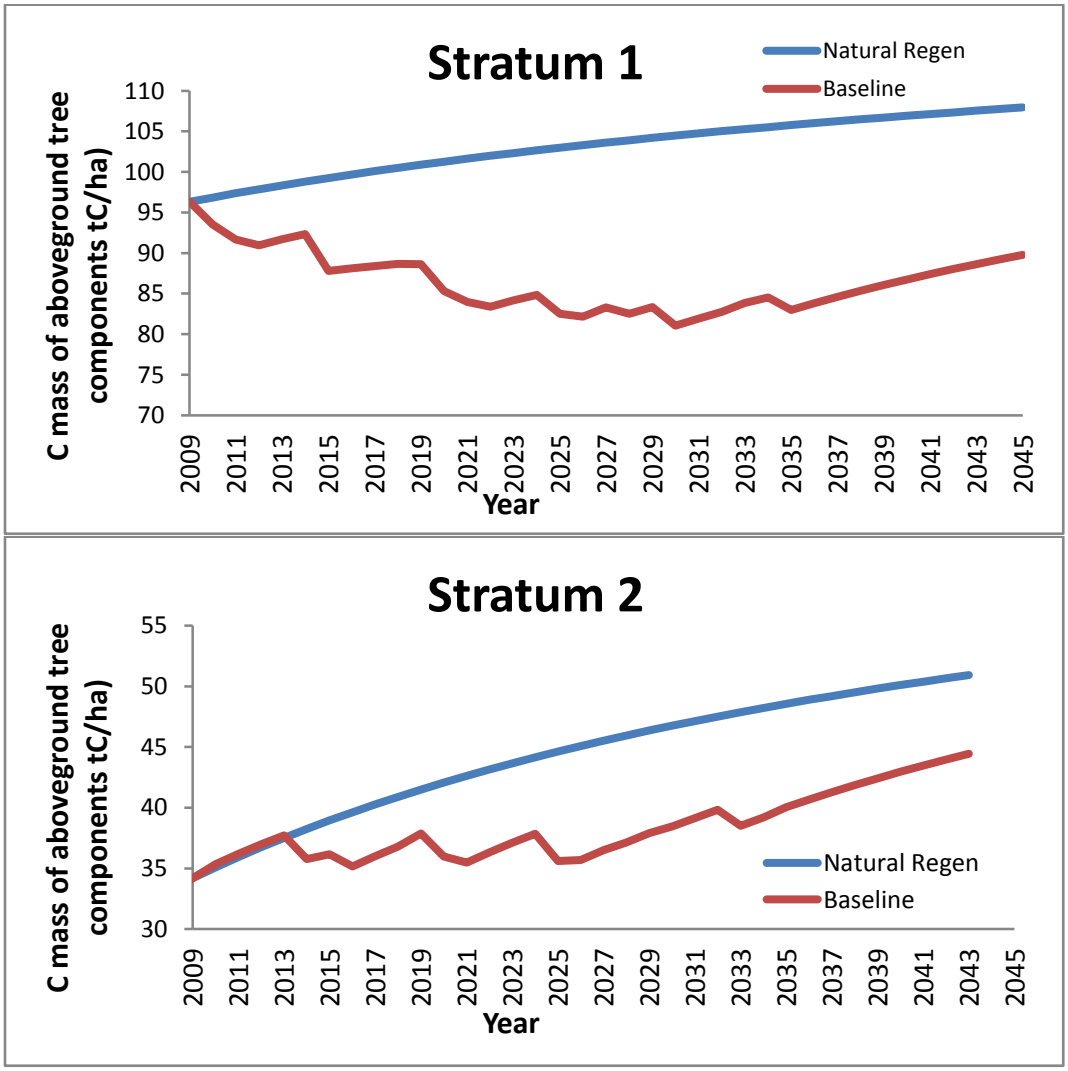

DAL Allometric Comparison
Merchantable Volume (m^3)
6
5
4
3
2
1
0
30.5
34.5
42
42
46.5
51
53
68
70
82
DBH
FFT
Keith et al.

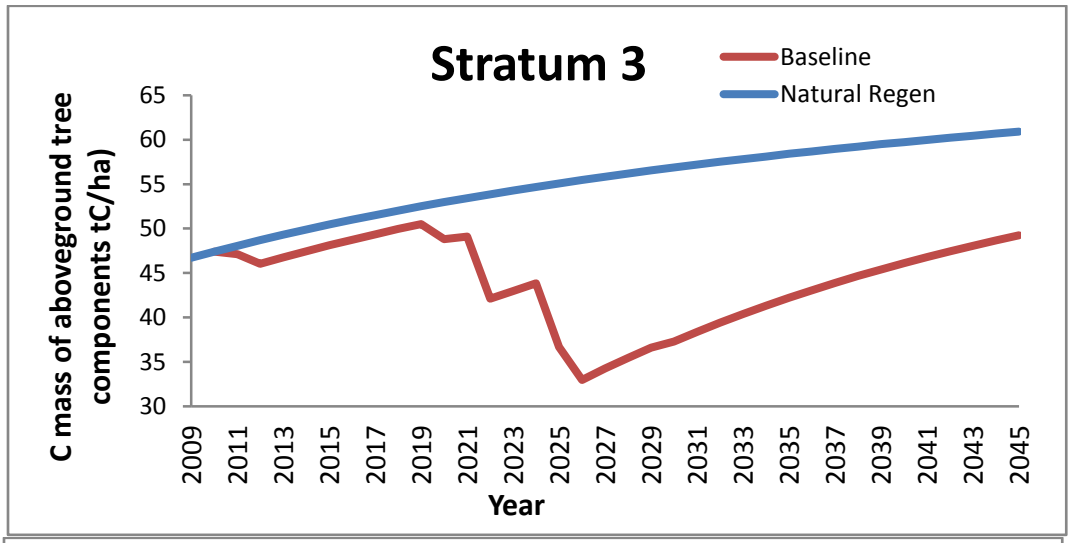

PAU Allometric Comparison
Merchantable Volume (m^3)
4
3.5
3
2.5
2
1.5
1
0.5
0
30
56.5
56.5
62
84
86.5
DBH
FFT
Keith et al.

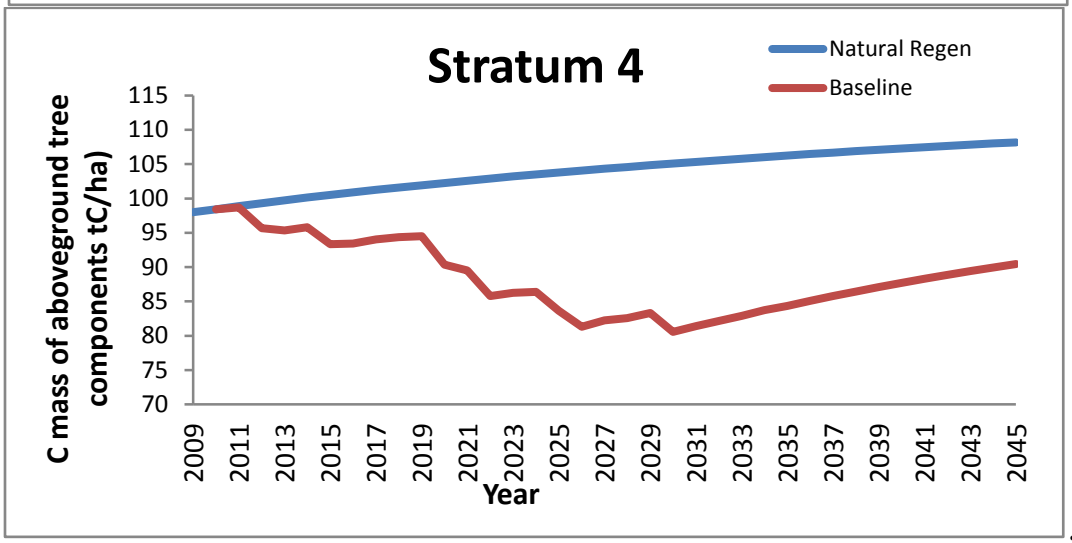
The field survey work and the FFT calculations provide a carbon stock for each stratum. The results of this are;

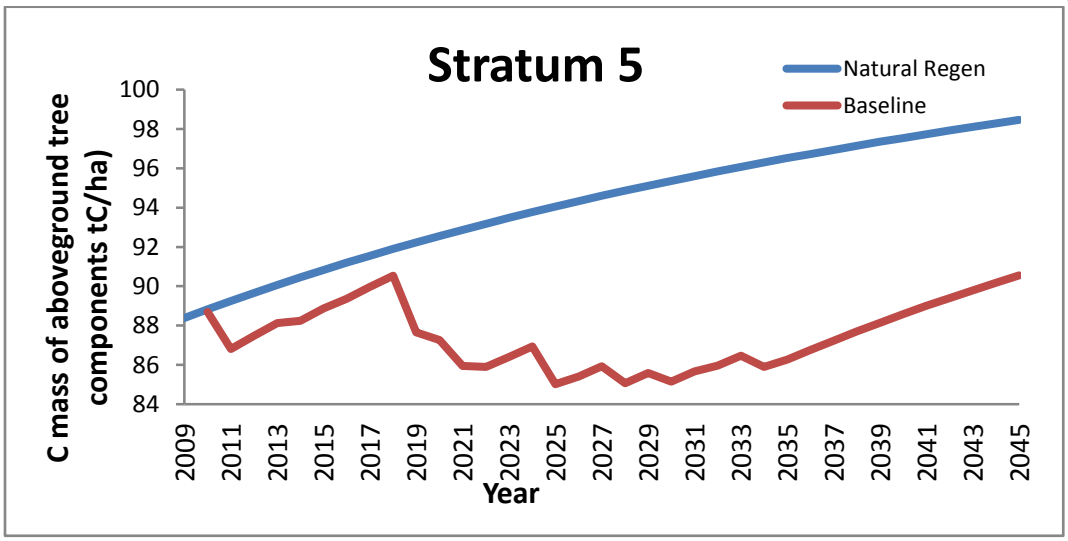
Stratum number	Required Plots for an error level of less than 15%	Plots Sampled	Mean carbon tonnes / ha	Standard deviation carbon tonnes / ha
1	46	51	89.19	73.67
2	1	6	36.62	18.84
3	1	3	45.57	31.66
4	19	34	89.94	63.81
5	24	36	81.28	70.27
6	12	16	109.75	85.51
7	8	12	90.55	64.63
8	2	6	51.05	31.56
9	6	7	93.65	78.32
10	8	14	94.63	89.77
11	1	2	105.32	3.26

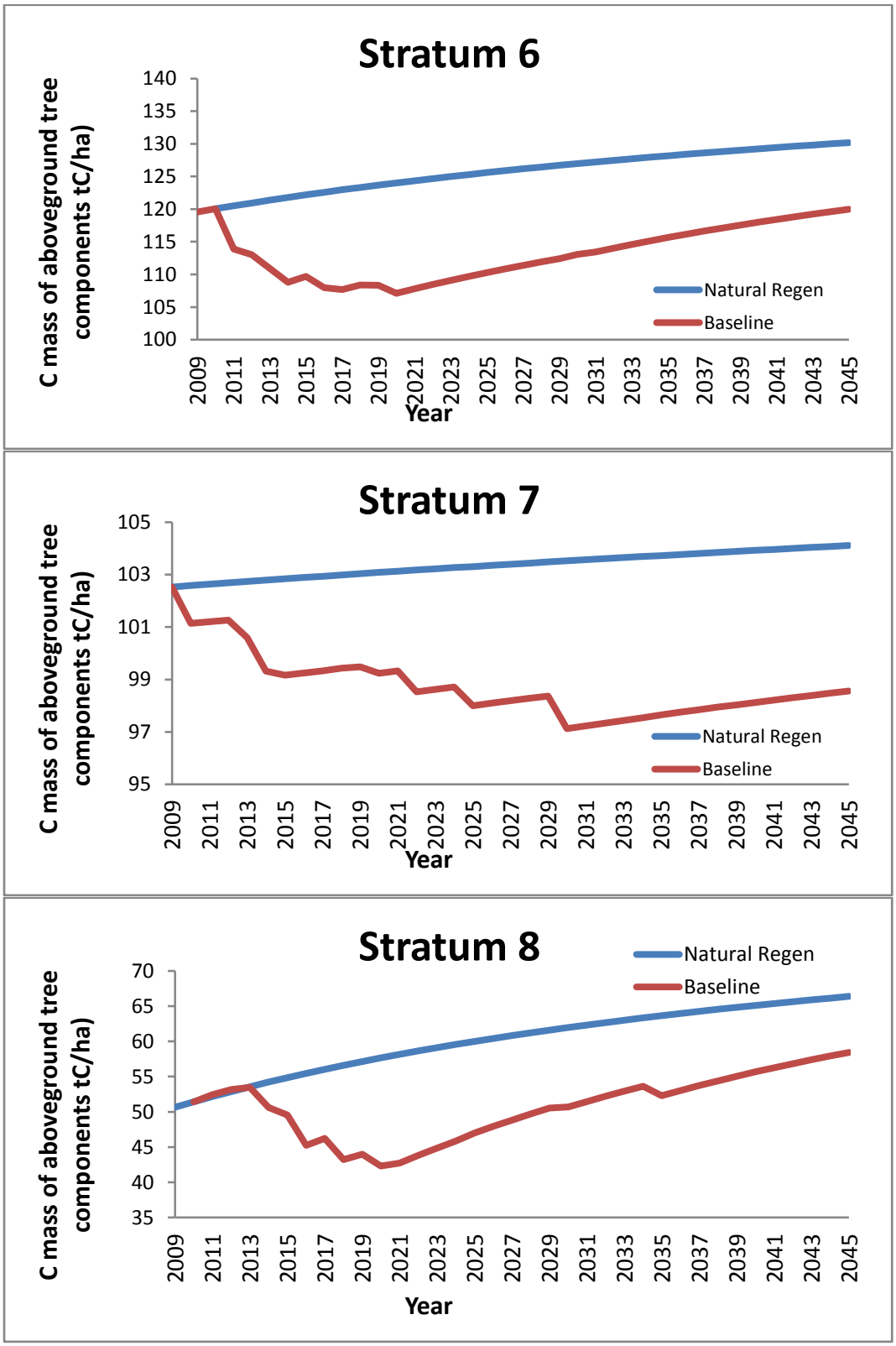
The logging event projections have been explained in section 4.5. The results of using FullCAM to model these projections have been graphed for each strata;

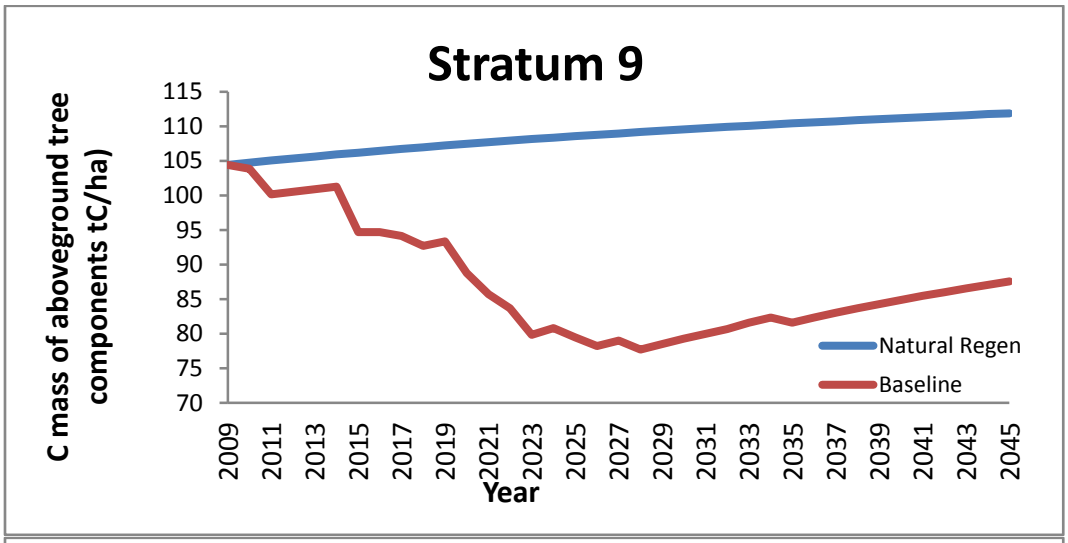


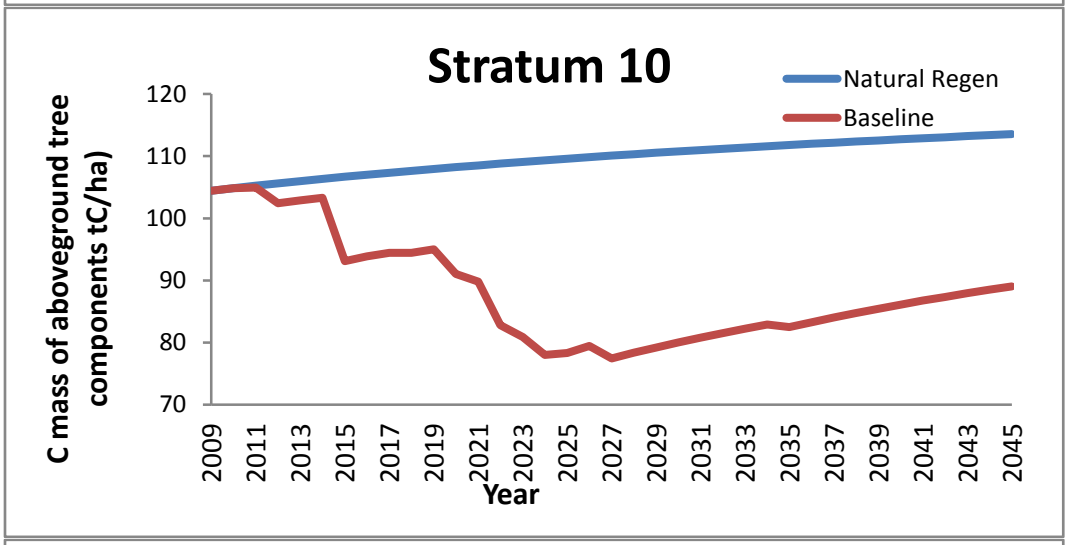

Stratum 3
Baseline
Natural Regen
C mass of aboveground tree components tC/ha)
65
60
55
50
45
40
35
30
2009
2011
2013
2015
2017
2019
2021
2023
2025
2027
2029
2031
2033
2035
2037
2039
2041
2043
2045
Year

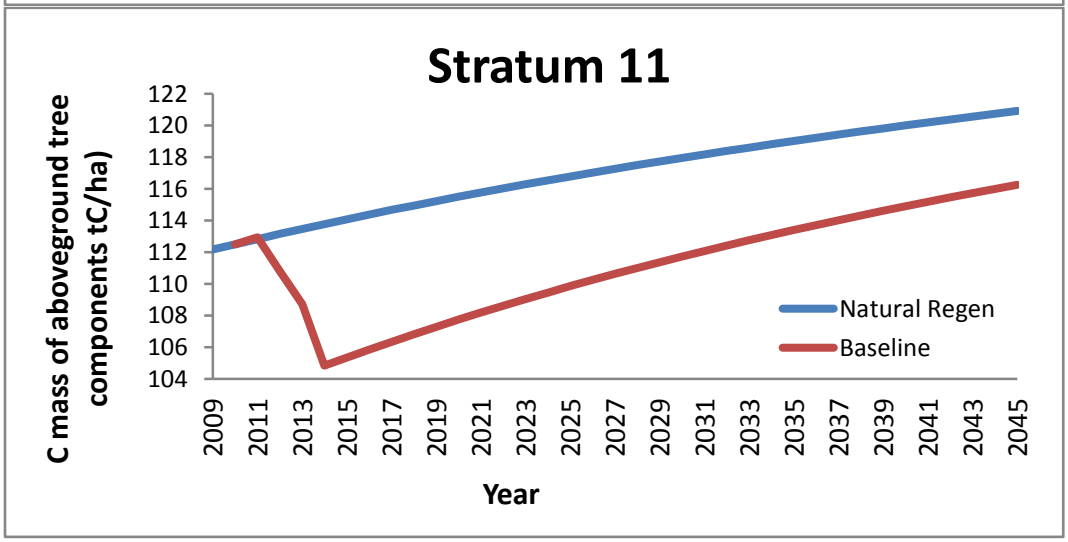

Stratum 4
Natural Regen
Baseline
C mass of aboveground tree components tC/ha)
115
110
105
100
95
90
85
80
75
70
2009
2011
2013
2015
2017
2019
2021
2023
2025
2027
2029
2031
2033
2035
2037
2039
2041
2043
2045
Year


Stratum 5
Natural Regen
Baseline
C mass of aboveground tree components tC/ha)
100
98
96
94
92
90
88
86
84
2009
2011
2013
2015
2017
2019
2021
2023
2025
2027
2029
2031
2033
2035
2037
2039
2041
2043
2045
Year


Stratum 6
C mass of aboveground tree components tC/ha)
140
135
130
125
120
115
110
105
100
2009
2011
2013
2015
2017
2019
2021
2023
2025
2027
2029
2031
2033
2035
2037
2039
2041
2043
2045
Year
Natural Regen
Baseline
Stratum 7
C mass of aboveground tree components tC/ha)
105
103
101
99
97
95
Year
Natural Regen
Baseline
Stratum 8
C mass of aboveground tree components tC/ha)
70
65
60
55
50
45
40
35
Year
Natural Regen
Baseline


Stratum 9
C mass of aboveground tree components tC/ha)
115
110
105
100
95
90
85
80
75
70
2009
2011
2013
2015
2017
2019
2021
2023
2025
2027
2029
2031
2033
2035
2037
2039
2041
2043
2045
Year
Natural Regen
Baseline


Stratum 10
C mass of aboveground tree components tC/ha)
120
110
100
90
80
70
2009
2011
2013
2015
2017
2019
2021
2023
2025
2027
2029
2031
2033
2035
2037
2039
2041
2043
2045
Year
Natural Regen
Baseline


Stratum 11
C mass of aboveground tree components tC/ha)
122
120
118
116
114
112
110
108
106
104
2009
2011
2013
2015
2017
2019
2021
2023
2025
2027
2029
2031
2033
2035
2037
2039
2041
2043
2045
Year
Natural Regen
Baseline

Equations 1 to 16 from the methodology described in section 4 have been utilised to determine the baseline emissions. These calculations are available for the validator to review and the baseline emissions have been displayed in section 5.6.

5.4 Project Emissions (CL1)

The merchantable volume of individual trees, collated from DBH using the Farm Forestry Toolbox for Equation 1, is used to calculate GHG emissions and/or removals for the project scenario. This data is already extrapolated to produce an estimate of mean merchantable volume (m^3/ha) for each stratum, and entered into FullCAM to calculate carbon sequestration in the baseline scenario (satisfying Equation 10).

The same data and model parameters entered into FullCAM for Equation 10 were used to calculate the carbon stock in aboveground trees (tC/ha), the required output of Equation 19. Specifically, the box for 'belowground biomass' was unchecked when running the FullCAM model. Therefore, the carbon stock in the belowground biomass was not calculated as part of the FullCAM outputs.

The inputs for FullCAM are based on local taxonomic-, geographic- and climatic-specific information, and allometric relationships identified in the Technical Reports prepared for the National Carbon Accounting System [45]. 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).*"[46]

Moreover, for each stratum, FullCAM's output was calibrated according to fieldwork estimates of aboveground trees (m^3/ha) in 2011, and consistent between the baseline and project scenarios until the first harvest. Because FullCAM was available as a best practice option, Forests Alive is submitting a methodology deviation from the less precise, accurate and conservative requirements of the GreenCollar IFM methodology. Equations 17-19 were therefore not required, and FullCAM used to calculate the product of Equation 19 (tC/ha).

5.5 Leakage (CL2)

As described in section 5.2, the market leakage factor at time of validation is 0 and this is expected throughout the project lifetime. However, leakage is addressed in every verification period to ensure that this remains the case.

5.6 Summary of GHG Emission Reductions and Removals (CL1 & CL2)

Equations 21-24 are used to calculate potential damage or degradation of the carbon stock in aboveground trees in the project scenario. Equation 21 and 22 calculate the risk and likely extent of damage from fire, based on historical incidence of wildfire in the stratum. The *ex-ante* estimate

[45] 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> [accessed 7th March 2011]

[46] as cited by Kapambwe, M.; Keenan, R.; (2009) Biodiversity Outcomes from Carbon Biosequestration, The University of Melbourne, commissioned by The Department of Sustainability and Environment, pp 23. Available from <http://www.dse.vic.gov.au/CA256F310024B628/0/761E59489BC57A9ACA2576810079C4D4/$File/Biosequestration+and+Biodiversity.pdf> [accessed 4th March 2011]

uses the average area lost to fire every twenty-five years (based on records lasting fifty years). The *ex-ante* estimates or the *ex-post* area burnt is multiplied by the difference between aboveground biomass in the project and baseline scenarios. This figure is in turn multiplied by standard IPCC combustion factors (0.63), emission factors (4.7) and the global warming potential (GWP) for methane (21).

A total of 2,775 ha have been affected by fire in the last 50 years and appropriate carbon emission reductions have been made in equation 21.

Illegal logging can be accounted for in equation 24 although illegal logging is not considered to be a plausible risk for IFM projects in Tasmania.

Years	Estimated baseline emissions or removals (tCO2e)	Estimated project emissions or removals (tCO2e)	Estimated leakage emissions (tCO2e)	Estimated net GHG emission reductions or removals (tCO2e)
2010	11,223	-20,220	0	31,443
2011	28,033	-19,619	0	47,652
2012	20,638	-18,739	0	39,377
2013	4,489	-18,166	0	22,655
2014	11,749	-17,592	0	29,342
2015	48,742	-17,010	0	65,752
2016	21,368	-16,490	0	37,858
2017	15,336	-15,748	0	31,084
2018	18,552	-15,505	0	34,056
2019	36,550	-14,909	0	51,460
2020	67,318	-14,343	0	81,661
2021	49,477	-13,976	0	63,452
2022	53,198	-13,686	0	66,884
2023	19,885	-13,141	0	33,026
2024	21,038	-12,872	0	33,910
2025	59,529	-12,281	0	71,810
2026	42,440	-12,208	0	54,649
2027	5,357	-11,622	0	16,979
2028	44,008	-11,454	0	55,462
2029	7,056	-11,051	0	18,107
2030	54,030	-10,763	0	64,793

2031	875	-10,356	0	11,231
2032	-580	-10,358	0	9,778
2033	-7,924	-9,938	0	2,013
2034	6,323	-9,714	0	16,037
2035	24,911	-9,500	0	34,411
2036	-10,329	-9,150	0	-1,180
2037	-9,852	-9,089	0	-763
2038	-11,528	-8,708	0	-2,820
2039	-11,094	-8,664	0	-2,430
2040	-15,551	-8,146	0	-7,405
Total	**605,267**	**-405,017**	**0**	**1,010,284**

A non-permanence risk buffer has been calculated for this project using the guidelines provided by the VCS. This risk buffer is currently 14.5% but is reviewed annually in the verification periods to take into account changing circumstances.

Total project GHG emission reductions: 1,010,284 tCO2e
Project Lifetime: 30 years
Annual GHG emission reductions: 33,676
Non permanence risk buffer: 14.5%
Total VCU issuance for first year: 28,793 VCUs

5.7 Climate Change Adaptation Benefits (GL1)

By protecting areas of native forest on a landscape level, this project will help forest dependent species migrate across the landscape in their response to climate change. This is further discussed in section 7.1.

6 COMMUNITY

6.1 Net Positive Community Impacts (CM1)

As shown in section 1.2, the New Leaf Estate covers a total of 22,793.57 ha including the 12,143.01 ha of native forest. Although there are no communities within the project boundary, there are 56 communities within a 10 km radius of the project sites, with a population greater than 40,000 people. There are a number of community groups, these are listed below;

Table 5 Stakeholders

Types of Communities/Stakeholders	Individual Entities
Communities	Community members located at the surroundings of the project site (e.g. Local Bronte community among others) Recreational and supporters communities (spread throughout Tasmania and beyond) Aboriginal Community members (e.g. Tasmanian community) Firewood Collectors (on Viormy, Serpentine, Roscarborough) Silver Plains Management Group
Government	Australian Department of Climate Change and Energy Efficiency Parks Australia Australian Department of Agriculture, Forestry and Fisheries Tasmania Department of Primary Industries, Parks, Water and the Environment Tasmanian Heritage Council Tasmanian Parks and Wildlife Services Tasmania Fire Services Inland Fisheries Service Liawenee Police Station
Academia/Science	Universities around the world (eg Stanford, Montana, Minnesota (all USA), Wageningen (NE), The University of Tasmania Local Schools and Education Institutions (eg BookEnd Trust)
Non-Governmental Organizations	International NGOs (eg Conservation International, TNC), National Trust of Australia (Tasmania) Environment Tasmania

	The Wilderness Society Tasmanian Conservation Trust Tasmanian Trail Association Highland Pacific Exports 4WD Tasmania Bronte Park General Store Bronte Deer Stalker's Association

The TLC also collaborates with a few international organizations. These partnerships will also benefit from the project (further details of these can be provided upon request.)

6.1.1 Creating Economic Opportunities

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

Within Tasmania, native forest logging provides a source of revenue and employment within rural and regional areas. However, the native forest industry has always required substantial public funding in order to continue and to remain viable during periods of market downturn. VCS and CCBA projects represent an important diversification of rural and regional areas by providing alternative employment and revenue making opportunities within the native forest sector while also providing the dual benefit of protecting native forests and their carbon stocks.

The native forest logging industry has a business model that is based upon high volume, low value output, such as woodchips for short-lived paper and wood products. The Timber Workers For Forests (TWFF) released an update to the Tasmanian Timber Industry Jobs report showing an analysis of employment trends in the Tasmanian timber industry[47]. This report highlighted a trend of increasing areas of state forest being logged and the jobs per hectare declining (Figure 4**; The number of jobs per hectare for logging and timber manufacturing roles (left axis) and the area of state forest logged (right axis).** Simply, the logging industry has shifted its focus away from job intensive, high-value-adding processes such as saw milling. Wood chipping now dominates the industry and, as a low-value, high-volume process based on destructive logging and low value flooring veneer practices that are highly mechanised.

[47] Timber Workers For Forests, 2004. Tasmania's Timber Industry Jobs, http://www.twff.com.au/documents/research/jobsreport0904.pdf [accessed 18th March, 2013]

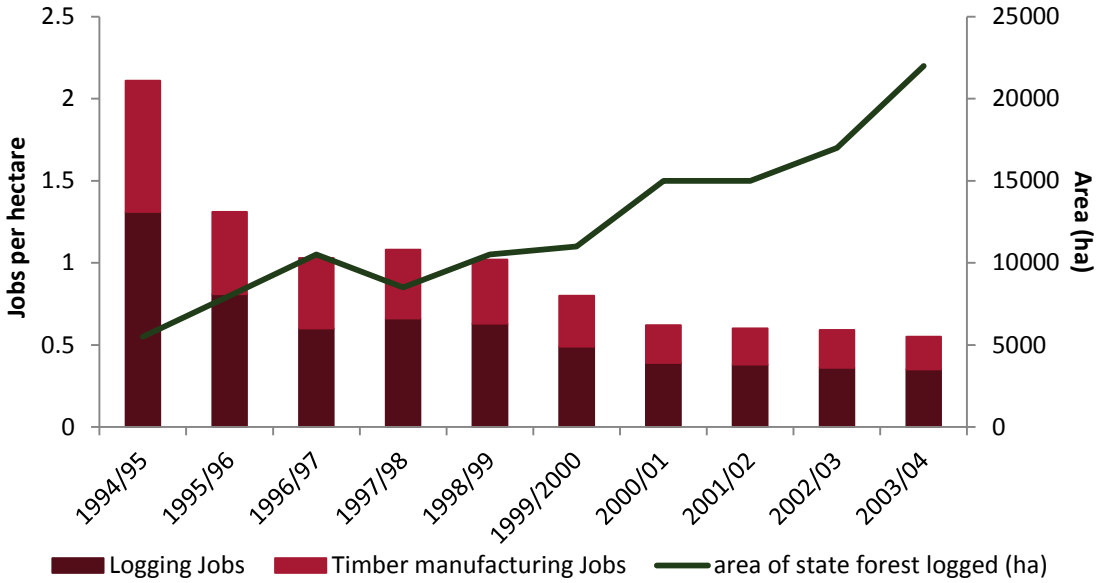


Figure 4; The number of jobs per hectare for logging and timber manufacturing roles (left axis) and the area of state forest logged (right axis).

VCS-IFM projects have provided an alternative to existing logging practices in Tasmania. Forests Alive has been recruiting local botanists and field workers to conduct the assessments required for VCS projects. Typically it has been a range of staff including highly qualified botanists, students, and graduates who have been employed. The TLC has similar commitments and seeks to employ local staff in the ongoing management of their forest estate, including the land that has been purchased for this project. This provides another benefit. Ecology and environmental students gain field survey skills, a real opportunity to practice the knowledge gained at university. The continued need to monitor this project will allow TLC to increase these opportunities to the community. For example, as a direct result of the project and to support the project implementation, the TLC has employed a land manager based in Tasmania's Central Highlands.

6.1.2 Promoting Community Engagement & Institutional Cooperation

This project promotes the engagement and cooperation of aboriginal communities in land management, developing conservation strategies and preserving cultural heritage. The involvement of aboriginal communities is considered to be an exceptional community benefit and is explored further in section 6.3.

The TLC has engaged and will continue to work with local communities and conservation organisations to raise awareness and understanding, share data and knowledge resulting from this project and the management of their land more broadly. This co-operation with local institutions enhances the opportunity for developing projects that will deliver environmental services in Tasmania. The TLC has established a range of research partnerships with communities, schools, as well as local and international research institutions (see table 12).

6.1.3 Encouraging Education and Research

The project offers research and educational opportunities to individuals and institutions. Students and graduates engaged by TLC gain essential fieldwork skills. The project also enables school visits to the project area and other educational activities to showcase the value of protecting

native forests and biodiversity. The TLC has also conducted a number of monitoring, land management and scientific research in collaboration with partner organizations. Examples of research conducted in the project area include species surveys, weed eradication, fire control plans, and soil analysis among others.[48] The research and knowledge generated as a result of the project will help inform land-sector policies, regulations and other similar projects in Tasmania. A few illustrative examples from activities conducted in a site also acquired by the TLC but nominated for world-heritage listing and therefore not in the project are listed in the Tables below.[49]

Table 6 Research Activities, (2010-12) [50]

Date	Activity	Stakeholders
Mar 2011	Preliminary weed map prepared	TLC, Marlborough Estate
Feb – May 2011	6 Field visits for flora and fauna inventory and GIS mapping	TLC
Oct - Nov 2011	Miena Cider Gum Surveys	TLC, Dhal Trust, NRM South
Sept 2011	Wedge-tailed Eagle Nest activity checks	DPIPWE and Forest Practices Authority
Nov 2011	Set up monitoring sites for the dwarf conifers	DPIPWE and TLC
Dec 2011	2 Planning meetings for weed eradication	TLC, Marlborough Estate
Jan 2012	Miena Cider Gum surveys	2 staff, 2 researchers (see report)
Feb-Mar 12	National Bushblitz Survey	20 scientists (see report)
Mar 2012	Weed control	2 TLC staff, 4 volunteers
April 2012	PIRE Mapping of Fire boundaries	2 researchers, 2 staff (see report)
Sep 2012 -	Weed management and eradication work – 6 days	TLC, Whispering Landscapes
Sep 2012	Wedge-tailed Eagle Nest activity check on Viormy overlooking Skullbone Plains	TLC - see report
16 Nov 2012	Field trip to undertake sphagnum peat coring and aging	DPIPWE, TLC, ANU – see report
Dec 2012	Tasmanian Devil impact assessment for tent platforms	TLC, DPIPWE
Dec 2012	Miguel deSalas weed and flora surveys post Bushblitz	Herbarium TMAG
14 Dec 2012	Macro-invertebrate surveys of Skullbone wetlands. AusRivers PhD project	Toni Furlong NRM North
Jan 2013	Soil Sampling for microbial diversity	TLC, CSIRO Canberra – see report

[48] TLC Skullbone Plains Progress Report No. 2, Prepared for the Purves Environment Fund and Purryburry Fund, 2013 (hereinafter: Skullbone Plains Progress 2013).
[49] For a complete list of activities see Biannual Report 2012 and Skullbone Plains Progress 2013.
[50] Biannual Report 2012

The TLC works with various education agencies[51] and runs supporter trips, retreats, and schools expeditions. For example, the TLC has encouraged artists to experience and draw inspiration from their properties and hosted both an Artists Retreat and a photographic intensive for the Nature Photographers of Tasmania on the Skullbone Plains.[52] A few other illustrative examples are listed in the Table below.

Table 7 Examples of Education and Promotion Activities 2010-2013[53]

Date	Activity	Contact/Involved
Ongoing	2 TLC Supporter trips	3TLC staff, 10 supporters
Ongoing	Riverfly Tasmania –use of site and camp	TLC, Riverfly Tasmania
Nov - Jan 2013	Site assessment, planning and installation of the tent platforms for the Artists Retreat – 8 days	TLC Reserve management Update next report
Nov - Jan 2013	Event planning and regular meetings for Artists Retreat Feb 2013	TLC, Update next report
Sep - Nov 2011	Bookend Trust Expedition Classes	Bookend Trust & 30 high school students
Oct 2011	Inspiring Place consultancy - science & education centre	TLC, Inspiring Place

6.1.4 Enhancing Recreational Activities

Protecting native forests is a crucial element in maintaining landscape function. Intact, native forests are also a place of great natural beauty and provide unique and varied recreational opportunities. The project area contains some areas within a highly visible location and avoiding on-going logging will preserve the aesthetics of the landscape and surrounding areas. For example, the adjacent land to the west and north of Skullbone Plains was gazetted as the Central Plateau Conservation Area in 2001, and this land have been nominated to form part of the Tasmanian Wilderness World Heritage Area.[54]

The protection of native forests will enhance recreational opportunities within the project area and adjacent land. It is well known that the major attraction for visitors to Tasmania is the scenery and more broadly, there are significant tourism opportunities associated with eco-tourism, site seeing, and recreation (walking, cycling, camping etc.).

Recreational activities that are not considered deleterious to the environment (including bushwalking, bird watching) are permitted on the land. Other recreational activities (including but not confined to, trail bike riding, horse riding and shooting) which are or may be considered deleterious are permitted on the land unless approved by the Minister and through collaboration with the TLC.[55] This project does restrict any recreational activities (such as 4WDing) which are deemed to have a detrimental effect on the project activities. Community, recreational groups, organizations and individuals who wish to use the project area for recreation include for example authorised hunters, fishing operators, walkers who are granted access.[56] The main high

[51] Further information available at http://www.tasland.org.au/newblog/project-skullbone/ and http://www.tasland.org.au/newblog/pirates-of-debris/ Contacts can be supplied.
[52] Further information available at http://www.tasland.org.au/newblog/nature-photographers-tasmania-visit-skullbone-plains
[53] Skullbone Plains Progress 2013 and Biannual Report 2012.
[54] Biannual Report 2012, p. 15
[55] Skullbone Plains Progress 2013, p. 18.
[56] The TLC can provide the contact details of such groups if required.

conservation values to community well-being, which the project aims to maintain and enhance, include the following:

1) Protection of aboriginal communities' traditional sites and values
2) Providing sites for recreation
3) Protection of native forests with great ecological and aesthetical values
4) Preservation of biodiversity and native species' natural habitats

The project activities, described in Section 2.2., were proposed to ensure that not high conservation values would be negatively affected, but rather maintained. The recreational activities, which are the only ones among the community project activities proposed that could potentially have a negative impact, will take into account environmental regulations and best practices and will be closely monitored.

6.2 Negative Offsite Stakeholder impacts (CM2)

Stakeholders whose primary industry is logging native forest are projected to be the ones who have negative impacts from the project activities. This project is to convert logged forest to protected forest and research into logging practices has shown that not only is there a loss of carbon stock, there is a loss of biodiversity through habitat disturbance and the reduction of vegetation condition.

A common argument to the logging industry debate is that the logging industry can provide jobs to local communities in Tasmania. While this is true, research suggests that employment opportunities have declined in the timber sector, particularly over a time of considerable growth in the late 1990's, early 2000's. A 2003 report in the Australian Financial Review revealed that more than 1,200 jobs had been lost from the timber industry since 1997. In a separate report, published in 2010 similar concerns of the level of employment in the timber industry are displayed. Even after a time of self-described "growth", the employment rate of those working in the forestry industry in Tasmania in 2008 was less than 3%[57]. By 2010 it was less that 2% of Tasmania's population- a loss of over 10,000 jobs.

The first forest carbon projects in Tasmania were implemented in 2010 by Forests Alive (then Redd Forests). Therefore, the declining employment opportunities in the Tasmanian timber industry cannot be attributed to forest protection projects; it is merely following longer term trends observed in the timber industry and trends in the timber market.

Nevertheless, the project activities suggested in this report are constructed to reflect the interest of the project proponent to provide employment opportunities to local communities in Tasmania and opportunities to explore alternative opportunities to derive an income from the forested land.

[57] Tasmania's Forest Industry, CRC for Forestry, http://www.crcforestry.com.au/publications/downloads/Schirmer-Tas-forest-industry-WEB.pdf [accessed 25th February 2013]

6.3 Exceptional Community Benefits (GL2)

The project areas in the Bronte Park vicinity fall within a well-known migratory route, once used by Aboriginal tribes.[58] The Central Highland properties contain a wide range of important cultural sites for Aboriginal people, for example, artifact scatters and traditional campsites are scattered across the reserve.[59] Protecting these cultural sites is an important component of managing this reserve for the Tasmanian community. Further landscape surveys by Tasmania's aboriginal people are likely to identify a range of aboriginal values that previously were poorly understood.

One of the aims of the project is to further engage aboriginal communities in land management activities, conservation strategies and the protection of cultural heritage. In the absence of this project, this engagement would probably not occur and significant cultural heritage could be lost if these forest sites are not appropriately protected. For example, TLC is currently setting up joint field survey protocols, in order to create a collaborative learning experience where aboriginal communities can learn and teach their indigenous and cultural knowledge and combine western science in the management of the land areas.

7 BIODIVERSITY

7.1 Net Positive Biodiversity Impacts (B1)

7.1.1 Monitoring of conservation significant species

Results of desktop assessments and many years of species surveys from within the project area have identified a wide range of species, many of which are listed as threatened or endangered. Within the project area, many species endemic to Tasmania can be found. This includes, but is not limited to;

Fauna

- **Birds**
  - Tasmanian Wedge-tailed Eagle, *Aquila audax feayi,* **Endangered**
  - Tasmanian native hen, *Gallinula mortierii*
  - Green rosella, *Platycercus caledonicus*
  - Dusky robin, *Melanodryas vittata*
  - Tasmanian thornbill, *Acanthiza ewingii*
  - Tasmanian Scrubwren, *Sericornis humilis*
  - Yellow wattlebird, *Anthochaera paradoxa*
  - Yellow-throated honeyeater, *Lichenostomus flavicollis*
  - Black-headed honeyeater, *Melithreptus affinis*
  - Strong-billed honeyeater, *Melithreptus validirostris*
  - Black currawong, *Strepera fuliginosa*

- **Mammals**
  - Tasmanian Devil, *Sarcophilus harrisii,* **Engangered**
  - Tasmanian Spotted Tail Quoll, *Dasyurus maculatus maculatus,* **Endangered**
  - Eastern Quoll, *Dasyurus viverrinus*
  - Tasmanian Pademelon, *Thylogale billardierii*
  - Eastern Bettong, *Bettongia gaimardi*

[58] The Bronte Reserve Management Plan (2013 – 2018), 2013, p. 10 (hereinafter: Bronte Reserve Management Plan 2013).
[59] Bronte Reserve Management Plan 2013, p. 27

- **Fish**
  - *Clarence galaxias,* **Critically Endangered.**

- **Invertebrates**
  - Simsons Stag beetle, *Hoplogonus simsoni*, **Vulnerable**
  - Ptunarra Brown Butterfly, *Oreixenica ptunarra*, **Endangered**

Flora

- **Eucalypts**
  - Cider gum, *Eucalyptus gunni*
  - Snow peppermint, *Eucalyptus coccifera*

- **Conifers**
  - *Phyllocladus aspleniifolius*
  - *Diselma archeri*
  - *Pherosphaera hookeriana*

- **Cushion Plants**
  - *Pterygopappus lawrencei*
  - *Abrotanella forsteroides*
  - *Donatia novae-zelandiae*
  - *Dracophyllum minimum*
  - *Phyllachne colensoi*

- **Richea**
  - *Richea dracophylla*
  - *Richea scoparia*

- **Other species of interest**
  - *Tasmannia lanceolata*
  - *Telopea truncata*

In 2012 an adjoining site known as Skullbone Plains (put forward for the inclusion in a world heritage nomination) undertook a "Bush Blitz"[60] (an initiative ran by the Australian Government and several partners) survey. This survey involved the cooperation of nine individuals from three different institutions; the TLC, the Tasmanian Museum and Art Gallery and the Queensland Museum. During this survey seven habitats have been sampled from including *Eucalyptus gunnii* woodland, *Eucalyptus delgatensis* dry forest and *Eucalyptus coccifera* forest. As a result, 254 faunal species were identified. These species span across eleven classes. Most interestingly, the survey described 39 species never before described in science. This includes 6 Chrysomelidae

[60] Bush Blitz, http://www.bushblitz.org.au/reserves.php [accessed 13th March, 2013]

(leaf beetles), 2 Geometridae (geometer moths), 8 land snails, 21 spiders and 2 trichoptera (caddisfly).

Due to the proximity of this site to the project area, this study provides an incentive to conduct similar surveys in the project area. These surveys can result in both community and biodiversity benefits, by way of facilitating collaborative research and providing a greater understanding of the wealth of biodiversity they contain.

Some species residing in these habitats are globally rare and endangered. The project area is home to the largest marsupial carnivore, the Tasmanian Devil and other important marsupial species including the Tasmanian Spotted Quoll. The protection of habitat which includes rare and endangered species is considered to be an exceptional biodiversity benefit and has been discussed above.

Due to the large natural value of this area it has been suggested that one project activity can seek to place a permanent covenant over the land to ensure the project area is protected after the crediting period. At this time, this is not a financially viable option due to the cost of maintaining the land and it is hoped that sales from carbon credits can provide the financial mechanism to make this a reality. Without carbon financing, areas of this project are likely to be sold to landowners without the protection that would conserve the carbon and biodiversity values.

The monitoring of conservation of significant species is one suggested activity. This activity will cover threatened flora and fauna monitoring and will help to understand population viability of rare species and the imposing threats. By conducting this monitoring, an adaptive management plan for conservation of significant species can be implemented.

7.1.2 Monitoring of habitat condition

The VCS project activity is “conversion from logged to protected forest”. By stopping the logging activities the disturbance of the habitat, on-going degradation of carbon stocks and changes to the forest microclimate are prevented. In the absence of the project, the most realistic and financially viable baseline scenario is continued selective logging which will lead to a loss of the biodiversity value within the project area.

As part of monitoring the habitat condition, vegetation condition and extent will be monitored. The prevention of logging means the habitat condition should be maintained, and in some cases improved, as the forest recovers from destructive logging practices. The habitat condition will be monitored by measuring changes in floristic diversity, structural complexity and the recruitment of canopy species.

Another activity will be the monitoring of vegetation extent. This will involve measuring the changes in extent of vegetation types in both the project area and the surrounding area.

These activities will be essential for the adaptive management of the habitat to ensure that habitat condition of rare and threatened species, listed above in Section 7.1.1., can improve and threats to the habitat condition can be mitigated.

7.1.3 Monitoring of landscape scale ecological processes

Climate change and habitat loss and fragmentation have been acknowledged as "key pressures" on biodiversity[61]. It is argued that conserving biodiversity requires a broader focus and scope towards the landscape level which considers the dynamics of a population. Studies of land use patterns and forest migration[62] and models created to assess forest species migration[63] have both suggested that fragmented habitats will inhibit the ability of species to migrate in response to human-induced climate change. Studies have shown that species migration within a forest environment is already happening amongst birds, plants, butterflies[64][65][66] and invertebrates[67]. Significantly this project is of sufficient scale and proximity to existing reserved forest environments that these landscape level benefits can be realised.

The consensus is that the key to species survival is to ensure habitats are connected so species can move freely without the risk of disturbance. For many countries, conservation activities are gearing towards habitat creation as a means of increasing habitat connectivity[68]. The New Leaf estate offers an opportunity for improved habitat and connectivity by protecting the forest from on-going degradation associated with logging. The composition, structure, function and evolutionary potential of biodiversity can be conserved.

The management of areas in the New Leaf estate property that is not a forest habitat but adjoins the project area is equally important. Important habitats in the entire New Leaf estate include highland grasslands, highland marshland, wetlands and watercourses. The project proponent is responsible for the management of the whole estate and has management plans in place to ensure the conservation values of the whole estate are maintained. These plans are available for review by the validation agency.

It is important to mention that science papers have discussed the over-importance of connectivity, stating that other metrics should also be considered such as habitat quality and habitat area[69]. This project addresses these concerns. In total 12,143.01 ha of forest is being protected in the state of Tasmania. The land will be managed to increase its resilience to natural disturbance and through protection from logging it is hoped that the forest will increase in quality as it regenerates over time.

In relation to climate change, this is a threat that can affect most goals for this project. The Tasmanian climate is likely to become warmer and drier, increasing the risk of fire, and the risk of losing wet habitats. The impacts of climate change on a microscale such as on the project area for this project are difficult to identify, however, there is a broad consensus that the area known as

[61] Opdam, P., & Wascher, D., 2004. Climate change meets habitat fragmentation: linking landscape and biogeographical scale levels in research and conservation, *Biological Conservation*, 117 (3) pp.285-297.
[62] Dyer, J.M., 1994. Land use pattern, forest migration, and global warming, *Landscape and Urban Planning*, 29 (2-3) pp.77-83
[63] Dyer, J.M., 1995. Assessment of climatic warming using a model of forest species migration, *Ecological Modelling,* 79 (1-3) pp.199-219
[64] Walther G.R., *et al.*, 2002. Ecological responses to recent climate change, *Nature,* 416 pp.389-395
[65] Parmesan, C., & Yohe, G., 2003. A globally coherent fingerprint of climate change impacts across natural systems, *Nature*, 421 pp.37-42
[66] Root, T.L., *et al.,* 2003. Fingerprints of global warming on wild animals and plants, *Nature,* 421 pp.57-59
[67] Hickling, R., *et al.*, 2006. The distributions of a wide range of taxonomic groups are expanding polewards, 12 pp.450-455
[68] Hodgson, J.A., *et al.*, 2011. Habitat re-creation strategies for promoting adaptation of species to climate change, *Conservation Letters,* 00 pp.1-9. The scientific basis and importance of habitat connectivity is discussed by Mackey B, Watson J and Worboys GL of ANU Enterprises Pty Ltd 2010, *Connectivity conservation and the Great Eastern Ranges corridor,* an independent report to the Interstate Agency Working Group (Alps to Atherton Connectivity Conservation Working Group) convened under the Environment Heritage and Protection Council/Natural Resource Management Ministerial Council. The Australian government also acknowledges the "growing recognition that in order to rebuild connected, functioning landscapes and maximise the benefits provided by the system of protected areas it is necessary to strategically link protected areas with areas of remnant habitat and ecological value," *National Wildlife Corridor Plan: a Framework for Landscape-scale Conservation, 2012,* p. 3
[69] Hodgson, J.A., *et al.*, 2009. Climate change, connectivity and conservation decision making: back to basics, *Journal of Applied Ecology*, 46 pp.964-9693

the 'Central Highlands' within Tasmania which includes a majority of the project area will experience a trend toward drying, while the North and eastern areas are likely to experience an overall increase in wet years.

Native forests represent one of the most resilient environments in the face of climate change.[70] Biodiversity in the form of flora and fauna species diversity provides for a resilient environment when compared with environments containing fewer species.[71]

Significantly, the land within the project area is subject to a management plan that identifies the management procedures for the land in order to monitor and manage changes caused by this threat. Project activities will be enforced through these management plans and reported through the monitoring reports annually. The research activities will help better understand the threat of climate change and help mitigate its affects in future management decisions.

The activities relating to biodiversity in the project area include the surveying, monitoring and low impact management of the project site to promote its high conservation value. There will be no active planting of trees, native or otherwise. The management and protection of native flora will involve the monitoring of pests, in particular weed species, fallow deer and rabbits.

7.1.4 Management Effectiveness Monitoring

The project proponent has provided a list of management plans to act as "Management effectiveness monitoring". An example includes the "Weed management strategies" for review by the validator. The documents highlight two aims; 1) To prevent the introduction and/or establishment of new weed species to 2017; and 2) To reduce the populations of high priority weed species to low density infestations by 2020. The plan also identifies five intermediate objectives which are targeted at achieving these aims. The plan will be in continual review throughout the project activity. Weed control methods include "hand-pulling, grubbing and hoeing", "spraying" and "burning". Potential risks to biodiversity and the overall project activities are identified and significant considerations have been made to ensure the best management plans are implemented specific to each area.

Invasive species known to be in the project area, or in neighbouring properties, have been identified and will be monitored in the weed management strategies. These invasive species include;

- Scotch thistle, *Onopordum acanthium*
- Ragwort, *Senecio jaconaea*
- Mullen, *Verbascum Thapsus*
- Gorse, *Ulex urapaeus*
- Canary broom, *Genista monopessulana*
- Yorkshire fog, *Holcus lanatus*
- Californian thistle, *Cirsium arvense*
- Spear thistle, *Cirsium vulgare*
- Aquatic sedge, *Juncus articularis*

Other management plans include the management of feral animals. Fallow deer and rabbits have both been introduced to Tasmania after European settlement in the 1850's and 1780's

[70] Thompson, I., Mackey, B., McNulty, S., Mosseler, A. (2009). Page 7, Forest Resilience, Biodiversity, and Climate Change. A synthesis of the biodiversity/resilience/stability relationship in forest ecosystems. Secretariat of the Convention on Biological Diversity, Montreal. Technical Series no. 43, p. 7.
[71] Joern Fischer, David B. Lindenmayer, and Adrian D. Manning. 2006. Biodiversity, ecosystem function, and resilience: ten guiding principles for commodity production landscapes. *Frontiers in Ecology and the Environment* **4**: 80–86, in abstract.

respectively. Their presence in Tasmania has added extra pressure on the native vegetation up to a point where they are both considered a pest in Tasmania. It has been common practice to reduce the deer population through the employment of local hunting groups and deer stalkers. These groups will be granted access to some areas within the project where deer could provide a negative impact on the biodiversity in the project. The use of hunting groups in the area has some benefits. Their presence in the estate provides an opportunity to monitor the areas and report on illegal activities, maintain the buildings and the access tracks and share knowledge on conservation species observed whilst on the land. As a comparison, no control activities have been taken on rabbits. The management of deer and rabbits in the project area is an activity that will continually be monitored throughout the project lifetime to ensure the best practices are maintained at a level suitable to the pest threat.

This project will not involve the introduction to non-native species to the project site, nor genetically modified organisms.

7.2 Negative Offsite Biodiversity Impacts (B2)

The proponent will manage the forest areas for conservation and in accordance with management plans, including management of introduced invasive weed species, pests and fire.

By managing the project area in this way it is expected that the project will provide a net biodiversity benefit. Furthermore, these benefits will have no adverse effects on the outside of the project boundary. On the contrary, this project is expected to deliver positive offsite biodiversity impacts through its role in promoting habitat connectivity.

7.3 Exceptional Biodiversity Benefits (GL3)

The Independent Verification Group released a forest conservation report[72], and in particular number 7a[73] addresses the importance of forest conservation in Tasmania to scientifically important, globally rare marsupial carnivores. Species like the Tasmanian devil, spotted-tailed quoll and eastern quoll all share forest habitats. These endangered or threatened species rely on a healthy, intact habitat to harbour a healthy population. The populations of these species need to be monitored and continually studied to ensure the best management practices are being done to ensure their survival. This project is no different, and protecting the forest is the first step in the on-going battle to protect these species. These species are at sites of global significance.

For example, the neighboring land which includes Skullbone Plains and the Central Plateau Conservation Area forms part of the Tasmanian Wilderness World Heritage Area.

The Tasmanian government's "Department of Primary Industries, Parks, Water and Environment" provides a service called the "Natural Values Atlas"[74]. This service has been used to provide information regarding rare and endangered species within a 500m radius of the project site. Many species listed in the NVA reports will benefit directly from the protection of native forest. Non-forest species will still benefit from the management plans generated from this project.

[72] Independent Verification Group, 2012. Forest Conservation Technical Report, http://www.environment.gov.au/land/forests/independent-verification/report.html [accessed 12th March, 2013]

[73] Independent Verification Group, 2012. Report 7A: Distribution of large marsupial carnivores, http://www.environment.gov.au/land/forests/independent-verification/pubs/ivg_conservation_7a_carnivores.pdf [accessed 12th March, 2013]

[74] Tasmanian Government, Department of Primary Industries, Parks, Water and Environment, https://www.naturalvaluesatlas.tas.gov.au

A summary of the NVA reports can be found in Appendix, section 9.2. A list of all species found on these reports and their location in the project can be found.

These species have been identified as vulnerable, rare or endangered in the Tasmanian Threatened Species Protection act from 1995[75]. The project area includes the habitat of globally rare species including the large carnivorous marsupials such as the Tasmanian Devil and the Tasmanian Spotted Quoll.

Tasmania is the only island in the world where the Tasmanian Devil exists and their populations have been severely declining due to increasing rates of a non-viral transmissible parasitic cancer called "Devil facial tumour disease"[76] and a decrease in habitat quality[77]. The process required to control and treat the disease is largely unknown. Disruption to habitats such as logging can expose the dens of Tasmanian Devils which is particularly damaging if the female is raising young. The benefit from this project will ensure that the Devil populations in the project area are not impacted by logging activities decreasing habitat quality. A second benefit, which could become more apparent as the project moves forward, could be the co-operation with institutions to help research and control this epidemic and to protect healthy breeding populations. Healthy Devil populations in the project area could be used in plans to retain genetic diversity, which is currently limited and declining[78]. As a consequence, project activities will be aligned to promote the recovery of devil populations, not just their conservation.

Tasmanian Wedge Tailed Eagles, an endangered sub-species in Tasmania, depend on native old-growth forest. Although it is illegal to log a tree with an occupied nest of a wedge tailed eagle, the surrounding habitat can still be logged and this disturbance can still affect the occupied nests[79]. This decreases the habitat available for nesting Eagles, and it impacts the habitat within the typical Eagle range. The Eagle population has been declining due to disturbances of nests, loss of habitat and un-natural mortality (shooting, poisoning, collision with aircraft etc)[80].

The other species listed depend on forest or forest-border habitats. The perceived risk to these species is not just logging activities. Other factors can include changing climate, decrease in water quality and land conversion to monoculture. The prevention of logging activities and carefully implemented management strategies supported by this project have the potential to reduce the risks imposed by these, and other factors.

By implementing this project, key forest habitat with globally significant species can be protected and managed to favour their conservation.

[75] Tasmanian Threatened Species Protection act 1995 http://www.austlii.edu.au/au/legis/tas/consol_act/tspa1995305/ [accessed 1st May, 2013]
[76] Loh, R., *et al.*, 2006. The Pathology of Devil Facial Tymor Disease (DFTD) in Tasmanian Devils (*Sarcophilus harrisii*). *Veterinary Pathology,* 43 (6) pp.890-895
[77] McCallum, H., Jones, M., 2006. To Lose Both Would Look Like Carelessness: Tasmanian Devil Facial Tumour Disease. *PLoS Biol* 4 (10): e342.
[78] Jones, M.E., *et al.*, 2004. Genetic diversity and population structure of Tasmanian devils, the largest marsupial carnivore. *Molecular Ecology,* 13 (8) pp.2197-2209
[79] Australian Government Department of Sustainability, Environment, Water, Population and Communities, 2013. *Aquila audax fleayi* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat. [Accessed 11th Mar 2013]
[80] Berkessy, S.A., *et al.*, 2009. Modelling human impacts on the Tasmanian wedge-tailed eagle (*Aquila audax fleayi*). *Biological Conservation,* 142 (11) pp.2438-2448

8 MONITORING

8.1 Description of the Monitoring Plan (CL3, CM3 & B3)

A separate monitoring plan has been submitted with this PDD.

8.2 Data and Parameters Available at Validation (CL3)

Data Unit / Parameter:	Area potentially impacted by illegal logging in stratum i (ADIST_IL, i);
Data unit:	ADIST_IL, i
Description:	Participatory Rural Appraisal
Source of data:	According to the Monitoring Plan, there is no further need for additional PRAs at future monitoring events.
Value applied:	Zero
Purpose of the data:	To determine the potential risk for illegal logging
Any comment:	The threat to the project area from illegal logging is negligible within Tasmania, while the threat to native forests from legally permitted logging is significant. This was confirmed by the completion of a Preliminary Rural Appraisal. Between 16 and 26 November 2010, key stakeholders in the timber industry were contacted and absolutely ruled out any risk of illegal logging. The results are provided for review by the validator.

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

Data Unit / Parameter:	Area burnt in stratum i at time t (Aburn,i,t);
Data unit:	Aburn,i,t

Description:	
Source of data:	SPOT imagery and site assessment
Value applied:	Zero
Purpose of the data:	Determination of area burnt
Any comment:	The project proponent regularly visits the forested area included within the project area. Fire (specifically the parameter 'area burnt in stratum *i* at time *t*'), pests and disease are therefore monitored through ongoing surveillance.

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

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

8.3 Data and Parameters Monitored (CL3, CM3 & B3)

- Project area;
- Carbon stock;
- Illegal logging rates;

- Natural disturbance; and
- Leakage.

Data Unit / Parameter:	Project Area A_i
Data unit:	Ha
Description:	Project Area
Source of data:	GPS coordinates and/or remote sensing and/or legal parcel records
Description of measurement methods and procedures to be applied:	Property boundary overlay
Frequency of monitoring/recording:	Biennially
Value monitored:	Property boundaries
Monitoring equipment:	Arc GIS, Google Earth, Land Title Documentation, www.thelist.tas.gov.au
QA/QC procedures to be applied:	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied
Calculation method:	*N/A*
Any comment:	the baseline scenario, strata shall not change with time. The *ex ante* assumption with the project scenario is that the strata will not change with time: modifications can be made *ex post* in the wake of disturbance.

Carbon stock changes:

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

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

Data Unit / Parameter:	Carbon stock
Data unit:	tC/ha
Description:	Carbon stock in aboveground biomass.

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

Illegal logging:

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

The methodology states:

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

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

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

QA/QC procedures to be applied:	N/A
Calculation method:	N/A
Any comment:	N/A

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

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

Calculation method:	Comparison of annual harvesting native forest harvesting rates using Microsoft Excel
Any comment:	

9 APPENDICES

9.1 Winrock Sampling Calculator Outputs

REQUIRED ERROR AND CONFIDENCE LEVEL		
e - level of error (%)	15.0%	
Error level (decimal)	0.15	
Z(1-a) - Confidence level	95.0%	
Sample statistic Z(1-a)	1.96	
Total project area size	12143.01	hectares

SIZE AND VARIANCE OF EACH STRATA

Stratum	Stratum Name	Area (ha)	Mean C/ha (tonnes)	Standard Deviation (tonnes C/ha)	Plot size (ha)	Cost C_h If no cost, put C_h =1
stratum 1	E-3	4334.06	89.19	73.67	0.2025	1
stratum 2	E-3f	223.12	36.62	18.84	0.2025	1
stratum 3	E2*f	52.52	45.57	31.66	0.2025	1
stratum 4	E2,+3	2003.55	89.94	63.81	0.2025	1
stratum 5	E4	2281.67	81.28	70.27	0.2025	1
stratum 6	ER1	895.23	109.75	85.51	0.2025	1
stratum 7	ER1.E-3	797.47	90.55	64.63	0.2025	1
stratum 8	ER2*	254.26	51.05	31.56	0.2025	1
stratum 9	ER2*.E-3	520.74	93.65	78.32	0.2025	1
stratum 10	ER2*.E2*	575.76	94.63	89.77	0.2025	1
stratum 11	MYR	204.63	105.32	3.26	0.2025	1

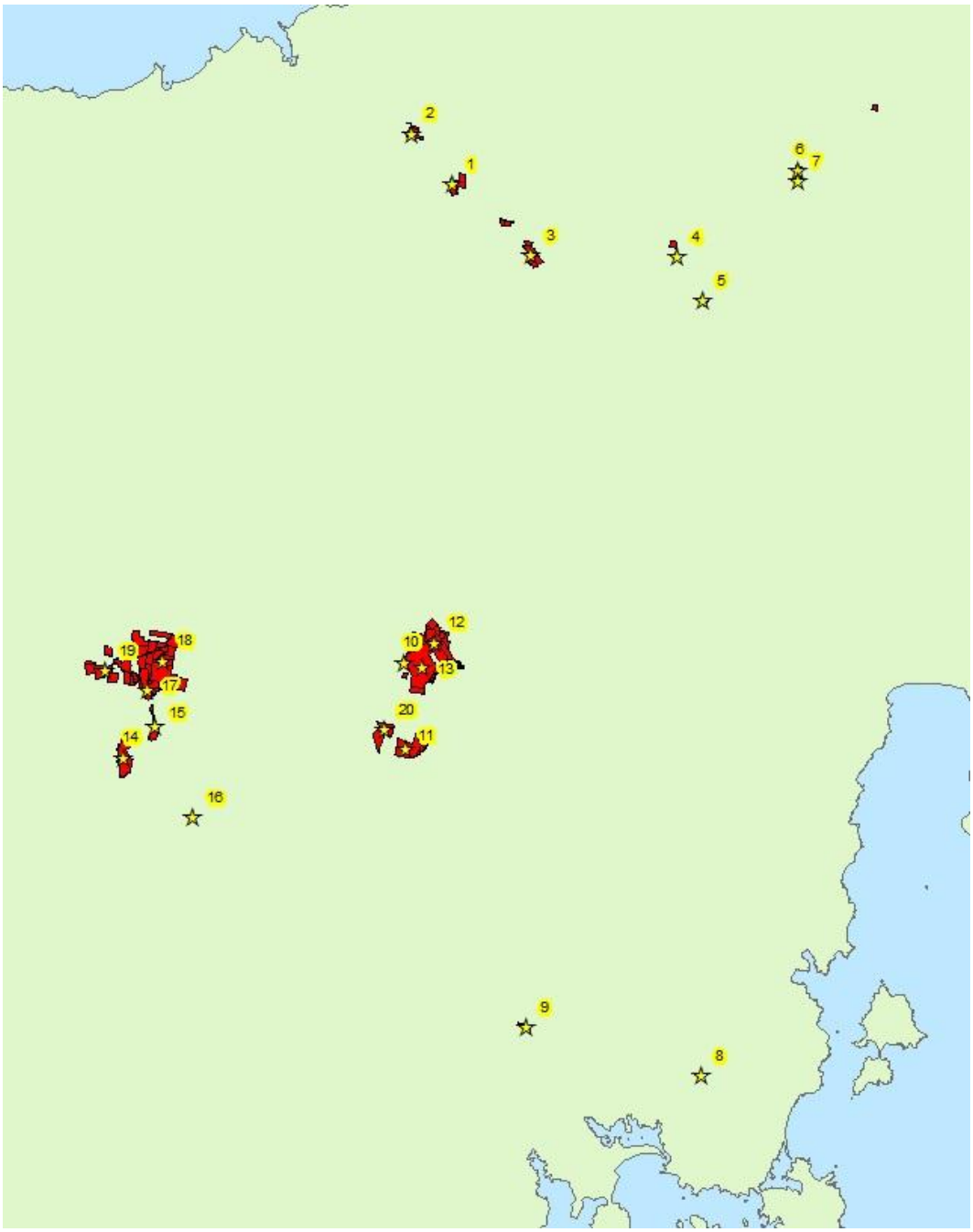
Results - Aboveground Carbon - Number of plots to be used

		Sourcebook for LULUCF Projects		AR-AM0001, AM0005, AM0006		AR-AM0003, AM0004, AM0007	
Stratum	Stratum Name	Plot Quantity	Rounded Plot Quantity	Plot Quantity	Rounded Plot Quantity	Plot Quantity	Rounded Plot Quantity
Total Sample Size		105.47	**122**	105.67	**122**	105.39	**122**
stratum 1	E-3	39.97	**46**	40.04	**47**	39.97	**46**
stratum 2	E-3f	0.53	**1**	0.53	**1**	0.53	**1**
stratum 3	E2*f	0.21	**1**	0.21	**1**	0.21	**1**
stratum 4	E2,+3	16.00	**19**	16.03	**19**	16.00	**19**
stratum 5	E4	20.07	**24**	20.11	**24**	20.07	**24**
stratum 6	ER1	9.58	**12**	9.60	**12**	9.58	**12**
stratum 7	ER1.E-3	6.45	**8**	6.46	**8**	6.45	**8**
stratum 8	ER2*	1.00	**2**	1.01	**2**	1.00	**2**
stratum 9	ER2*.E-3	5.11	**6**	5.11	**6**	5.11	**6**
stratum 10	ER2*.E2*	6.47	**8**	6.48	**8**	6.47	**8**
stratum 11	MYR	0.08	**1**	0.08	**1**	0.08	**1**
stratum 12							
stratum 13							
stratum 14							
stratum 15							
stratum 16							
stratum 17							
stratum 18							
stratum 19							
stratum 20							
TOTAL NUMBER OF PLOTS			**128**		**129**		**128**

9.2 Natural Values Atlas Reports Summary

9.2.1 Map of NVA location

The numbers correspond to the properties listed in the table in section 9.2.2.



9.2.2 Species by Location

TTSPA = Tasmanian Threatened Species Protection Rating
v = Vulnerable
r = Rare
e = Endangered

Species found from survey after 1990 within 500 m of the property
Habitat Mapping highlights the potential for this species to be present
Species found within 5 km of the property

	Species	Common Name	TTSPA Rating	Map Reference 1 Whareham	2 Weeks	3 Towns	4 Ben Nevis	5 Phillip Rose Tier	6 Forest Lodge	7 West Pyengana	8 Lles	9 Sheene	10 Lake River	11 Jinks Tier	12 Lake Sorell	13 Silver Plains	14 Cockatoo Hill	15 London Marshes	16 Hall	17 Pine Tier Lagoon	18 Serpentine	19 Viormy	20 Soldiers Marsh
Flora	Acacia axillaris	Midlands Wattle	v												■								
	Amphibromus neesii	Southern swampgrass	r																				■
	Barbarea australis	Riverbed wintercress	e														■						
	Caladenia congesta	Blacktongue finger-orchid	e														■						■
	Carex longebrachiata	Drooping sedge	r	■																			
	Colobanthus curtisiae	Grassland cupflower	r										■			■							
	Corunastylis nuda	Tiny midge-orchid	r	■					■														
	Epacris acuminata	Claspleaf heath	r									■					■			■			
	Eucalyptus gunnii subsp. divaricata	Miena cider gum	e													■				■	■		
	Glycine latrobeana	Clover glycine	v													■				■	■		
	Grevillea australis var. planifolia	Flatleaf grevillea	r		■																		
	Hovea tasmanica	Rockfield purplepea	r												■	■	■			■		■	
	Juncus vaginatus	Clustered rush	r	■																			

	Species	Common Name	TTSPA Rating	Map Reference	1 Wharehan	2 Weeks	3 Towns	4 Ben Nevis	5 Phillip Rose Tier	6 Forest Lodge	7 West Pyengana	8 Lles	9 Sheene	10 Lake River	11 Jinks Tier	12 Lake Sorell	13 Silver Plains	14 Cockatoo Hill	15 London Marshes	16 Hall	17 Pine Tier Lagoon	18 Serpentine	19 Viormy	20 Soldiers Marsh
	Muehlenbeckia axillaris	Matted lignum	r																					
	Pellaea calidirupium	Hotrock fern	r																					
	Pherosphaera hookeriana	Mount Mawson pine	v																					
	Pimelea curviflora var. gracilis	Slender curved riceflower	r																					
	Poa mollis	Soft tussockgrass	r																					
	Pomaderris intermedia	Lemon dogwood	r																					
	Pterostylis grandiflora	Superb greenhood	r																					
	Ranunculus pumilio var. pumilio	Ferny buttercup	r																					
	Rumex bidens	Mud duck	r																					
	Sclerantus brockiei	Mountain Knawel	r																					
	Spyridium vexilliferum var. vexilliferum	Helicopter bush	r																					
	Thismia rodwayi	Fairy lanterns	r																					
	Uncinia elegans	Handsome hooksedge	r																					
	Viola cunninghamii	Alpine violet	r																					
	Westringia angustifolia	Narrowleaf westringia	r																					
Fauna	Accipiter novaehollandiae	Grey goshawk	e																					
Fauna	Aquila audax subsp. Fleayi	Wedge-tailed eagle	e																					
Fauna	Astacopsis gouldi	Giant freshwater crayfish	v																					
Fauna	Beddomeia tasmanica	Hydrobiid Snail (Terry's Creek)	r																					
Fauna	Charopidae sp. "Skemps"	Skemps snail	r																					
Fauna	Dasyurus maculatus subsp. Maculatus	Spotted-tailed quoll	r																					
Fauna	Engaeus orramakunna	Arthur burrowing crayfish	v																					
Fauna	Galaxias auratus	Golden galaxias	r																					

Species	Common Name	TTSPA Rating	Map Reference	1 Wharehan	2 Weeks	3 Towns	4 Ben Nevis	5 Phillip Rose Tier	6 Forest Lodge	7 West Pyengana	8 Lles	9 Sheene	10 Lake River	11 Jinks Tier	12 Lake Sorell	13 Silver Plains	14 Cockatoo Hill	15 London Marshes	16 Hall	17 Pine Tier Lagoon	18 Serpentine	19 Viormy	20 Soldiers Marsh
Galaxias johnstoni	Clarence galaxias	e																					
Galaxias tanycephalus	Saddled galaxias	e																					
Galaxias fontanus	Swan galaxias	e																					
Haliaeetus leucogaster	White-bellied sea-eagle	v																					
Hoplogonus simsoni	Simson's stag beetle	v																					
Hoplogonus vanderschoori	Vanderschoor's stag beetle	v																					
Lathamus discolor	Swift Parrot	e																					
Lissotes latidens	Broad-toothed stag beetle	e																					
Litoria raniformis	Green and golden frog	v																					
Oreixxenica ptunarra subsp. ptunarra	Ptunarra brown butterfly	pv																					
Oreixxenica ptunarra subsp. Roonina		pv																					
Paragalaxias dissimilis	Shannon galaxias	v																					
Paragalaxias eleotroides	Great lake galaxias	v																					
Paragalaxias mesotes	Arthur's galaxias	e																					
Pasmaditta jungermanniae	Cataract gorge snail	v																					
Perameles gunnii	Eastern barred bandicoot																						
Prototroctes maraena	Australian grayling																						
Pseudemoia pagenstecheri	Tussock skink	v																					
Pseudemoia rawlinsoni	Glossy grass skink	r																					
Sarcophilius harrisii	Tasmanian Devil	e																					
Tyto novaehollandiae subsp. Castanops	Tasmanian masked owl	e																					
Tasmanipatus barretti	Giant velvet worm	r																					

9.3 Timber Harvest Plan

9.3.1 Identifying Historic Logging Events

Forest Practice Plans and Weighbridge Records (1999-2009)

Forest Practice Plans (FPPs) have been provided by the proponent for the years 1999-2009 along with Weighbridge records for these events. The FPPs provide years and areas for each logging event. The FPPs also include the Logging Compartment number which can be used to link the logging events to the appropriate properties in the project area. Weighbridge records provide the volumes extracted from each event, the proportions that went to pulp and sawlog, and where the timber was processed. This information has been combined to develop the historic logging events for the years 1999-2009. All of these records represent commercial documents from the prior owner, Gunns Pty Ltd.

The FullCAM model is calibrated on a strata basis. For this reason an assumption is establish in order to relate the extent of each strata that has been affected by each logging event. The compartments were broken into strata to form the proportion of compartment area in each stratum. These percentages were then used to determine the percentage of the volume and area that should be allocated to each stratum for each logging event in that compartment. The assumption is that the strata are affected proportionally by the logging event. For calibration of FullCAM, re-measurement of the sample plots happens every five years and this will allow further calibration to happen and calculations regarding carbon sequestration in the project scenario can be modified accordingly.

The FPPs reviewed are as follows;

FPP Number	Year	Area (ha)	Volume (taken from Weighbridge records)
GRM93	1999	110	1,866
PRN18	1999	198	10,289
BWH13	2000	59	12,504
BWH14	2000	89	3,633
GRM102	2000	150	5,609
HUD21	2000	74	2,921
MAC775	2000	325	7,550
MAC818	2000	130	12,606
PRN21	2000	260	2,242
HUD45	2001	117	6,771
MAC847	2001	120	3,755
TAM343	2001	126	6,331
TAM344	2001	52	3,031
TAM359	2001	124	9,602
BWH20	2002	375	5,458
BWH22	2002	105	6,487
HRB12	2002	116	1,705
IJB204	2002	84	5,504
MAC934	2002	90	3,453
MAC936	2002	85	5,476
MAC942	2002	200	7,148
MAC946	2002	75	5,108
MAC949	2002	60	7,110
MAC951	2002	35	3,175
MAC957	2002	110	5,233
MAC961	2002	60	15,349
PRN48	2002	281	4,850
PRN50	2002	142	5,990
PRN53	2002	372	7,615
TAM403	2002	150	1,661
MAC1060	2003	34	1,583
MAC962	2003	75	5,937
TAM480	2003	147	8,975
TAM488	2003	316	2,629

TAM494	2003	326	1,875
TAM508	2003	89	1,553
TAM515	2003	115	8,995
TAM530	2003	46	3,847
TAM531	2003	38	3,397
MAC1170	2004	46	4,957
MAC1178	2004	82	2,101
MAC1207	2004	87	1,667
MAC1208	2004	85	3,951
TAM547	2004	35	1,866
TAM616	2004	196	10,289
TAM622	2004	145	12,504
TAM624	2004	219	3,633
TAM630	2004	178	5,609
TAM636	2004	149	2,921
TAM643	2004	210	7,550
TAM644	2004	106	12,606
TAM658	2004	137	2,242
MAC1236	2005	235	6,771
MAC1246	2005	115	3,755
MAC1260	2005	141	6,331
TAM747	2005	185	3,031
TAM821	2006	47	9,602
TAM827	2006	44	5,458
TAM847	2006	145	6,487
TAM860	2006	121	1,705
TAM896	2007	163	5,504
TAM934	2007	45	3,453
TAM939	2007	40	5,476
GFP159	2008	173	7,148
GFP175	2008	38	5,108
GFP188	2008	28	7,110
GFP206	2008	54	3,175
TAS306	2008	34	5,233
TAS308	2008	31	15,349
GFP362	2009	174	4,850

Forest Prescriptions and Rotations (pre 1999)

FPPs and Weighbridge records were unable to be retrieved for logging events pre 1999 due to Gunns, the previous owner of the land, going into administration. A GIS layer created by Gunns has been utilised which provides knowledge of the prescriptions of the forest that were put in place and information as to when the forest has been logged previously. This information has been used to form a conservative estimate of logging events between 1979 and 1999. The events are considered conservative because the project wide average annual extraction is 75% of the average in the years between 1999 and 2009 which is compared with known logging trends over the last fifty years.

Historic Logging Events Modelled in FullCAM

Below is a list of all logging history events modelled in FullCAM. Part of the FullCAM calibration was to ensure that the modelled volumes matched the extracted volumes from the FPP/Weighbridge calculations. These figures have been portrayed in the list below. Differences will undoubtedly occur due to FullCAM also modelling sequestration in the same time step as the harvest and the complexity around aligning the forest volume in 2012 to the forest volume calculated from the fieldwork calculations (the second point of calibration). Consistent with the required uncertainty calculations, the difference of these two values must not be greater than 10%.

Strata	***Strata Area (ha)***	***Date***	***Area to be logged (ha)***	***% Biomass of Strata Removed***	***Volume extracted FullCAM Reading (m^3/ha)***	***Volume extracted FPP Calculations (m^3/ha)***
Stratum 1 (E-3)	*4334.06*	1980	11.8	0.18	1,754	

Strata	*Strata Area (ha)*	*Date*	*Area to be logged (ha)*	*% Biomass of Strata Removed*	*Volume extracted FullCAM Reading (m^3/ha)*	*Volume extracted FPP Calculations (m^3/ha)*
Stratum 1 (E-3)	*4334.06*	1982	74.4	1.06	10,535	
Stratum 1 (E-3)	*4334.06*	1984	209.5	2.42	23,389	
Stratum 1 (E-3)	*4334.06*	1985	72.1	1.05	10,038	
Stratum 1 (E-3)	*4334.06*	1986	2.2	0.03	316	
Stratum 1 (E-3)	*4334.06*	1987	126.1	1.89	17,785	
Stratum 1 (E-3)	*4334.06*	1988	46.3	0.16	1,504	
Stratum 1 (E-3)	*4334.06*	1989	127.7	1.91	17,660	
Stratum 1 (E-3)	*4334.06*	1991	52.5	0.79	7,211	
Stratum 1 (E-3)	*4334.06*	1992	94.9	1.42	12,863	
Stratum 1 (E-3)	*4334.06*	1993	321.0	2.81	24,764	
Stratum 1 (E-3)	*4334.06*	1994	226.9	3.19	27,266	
Stratum 1 (E-3)	*4334.06*	1995	505.1	7.11	56,660	
Stratum 1 (E-3)	*4334.06*	1996	261.8	3.38	26,176	
Stratum 1 (E-3)	*4334.06*	1997	81.6	1.17	8,970	
Stratum 1 (E-3)	*4334.06*	1998	93.6	1.14	8,731	
Stratum 1 (E-3)	*4334.06*	1999	143.1	0.26	1,986	1,917
Stratum 1 (E-3)	*4334.06*	2000	395.5	2.04	15,327	14,816
Stratum 1 (E-3)	*4334.06*	2001	230.6	3.03	22,193	22,039
Stratum 1 (E-3)	*4334.06*	2002	1008.5	6.38	43,988	46,409
Stratum 1 (E-3)	*4334.06*	2003	663.2	3.35	22,468	24,361
Stratum 1 (E-3)	*4334.06*	2004	907.4	4.78	30,816	34,745
Stratum 1 (E-3)	*4334.06*	2005	267.1	1.79	11,459	13,013
Stratum 1 (E-3)	*4334.06*	2006	244.4	1.54	9,817	11,191
Stratum 1 (E-3)	*4334.06*	2007	143.4	0.48	3,080	3,504
Stratum 1 (E-3)	*4334.06*	2008	142.8	1.16	7,443	8,402
Stratum 2 (E-3f)	*223.12*	1979	39.0	11.35	2,290	
Stratum 2 (E-3f)	*223.12*	1982	1.4	0.41	83	
Stratum 2 (E-3f)	*223.12*	1987	3.0	0.88	176	
Stratum 2 (E-3f)	*223.12*	1989	10.1	2.93	574	
Stratum 2 (E-3f)	*223.12*	1991	0.8	0.24	47	
Stratum 2 (E-3f)	*223.12*	1993	27.3	1.83	358	
Stratum 2 (E-3f)	*223.12*	1994	4.2	1.23	238	
Stratum 2 (E-3f)	*223.12*	1995	31.8	9.25	1,630	
Stratum 2 (E-3f)	*223.12*	1996	49.0	12.07	1,894	
Stratum 2 (E-3f)	*223.12*	1997	3.9	1.14	179	
Stratum 2 (E-3f)	*223.12*	1998	0.8	0.24	39	
Stratum 2 (E-3f)	*223.12*	1999	1.7	0.19	31	23
Stratum 2 (E-3f)	*223.12*	2000	15.2	4.19	662	527
Stratum 2 (E-3f)	*223.12*	2001	12.5	8.63	1,269	1,086
Stratum 2 (E-3f)	*223.12*	2002	36.3	17.73	2,213	2,231
Stratum 2 (E-3f)	*223.12*	2003	13.8	6.34	767	799
Stratum 2 (E-3f)	*223.12*	2004	21.2	9.71	1,115	1,222
Stratum 2 (E-3f)	*223.12*	2005	16.4	7.36	830	927
Stratum 2 (E-3f)	*223.12*	2006	7.5	3.80	437	478
Stratum 2 (E-3f)	*223.12*	2007	1.7	0.33	40	41
Stratum 2 (E-3f)	*223.12*	2008	5.1	2.93	363	369
Stratum 3 (E2*f)	*52.52*	1987	1.9	2.33	146	
Stratum 3 (E2*f)	*52.52*	1994	2.4	2.92	178	
Stratum 3 (E2*f)	*52.52*	1996	2.7	3.39	200	
Stratum 3 (E2*f)	*52.52*	1997	1.6	1.98	115	
Stratum 3 (E2*f)	*52.52*	1999	0.89	0.17	10	8
Stratum 3 (E2*f)	*52.52*	2000	4.49	4.73	261	214
Stratum 3 (E2*f)	*52.52*	2001	4.04	7.46	383	338
Stratum 3 (E2*f)	*52.52*	2002	13.30	15.29	670	693
Stratum 3 (E2*f)	*52.52*	2003	5.70	5.87	245	266
Stratum 3 (E2*f)	*52.52*	2004	6.19	8.01	314	363
Stratum 3 (E2*f)	*52.52*	2005	4.65	6.16	232	279
Stratum 3 (E2*f)	*52.52*	2006	3.89	4.84	179	219
Stratum 3 (E2*f)	*52.52*	2007	1.36	0.73	28	33
Stratum 3 (E2*f)	*52.52*	2008	2.06	3.12	118	141
Stratum 4 (E2,+3)	*2003.55*	1979	19.5	0.63	2,827	
Stratum 4 (E2,+3)	*2003.55*	1982	46.7	1.52	6,672	
Stratum 4 (E2,+3)	*2003.55*	1984	42.2	1.02	4,434	
Stratum 4 (E2,+3)	*2003.55*	1985	21.3	0.69	2,991	

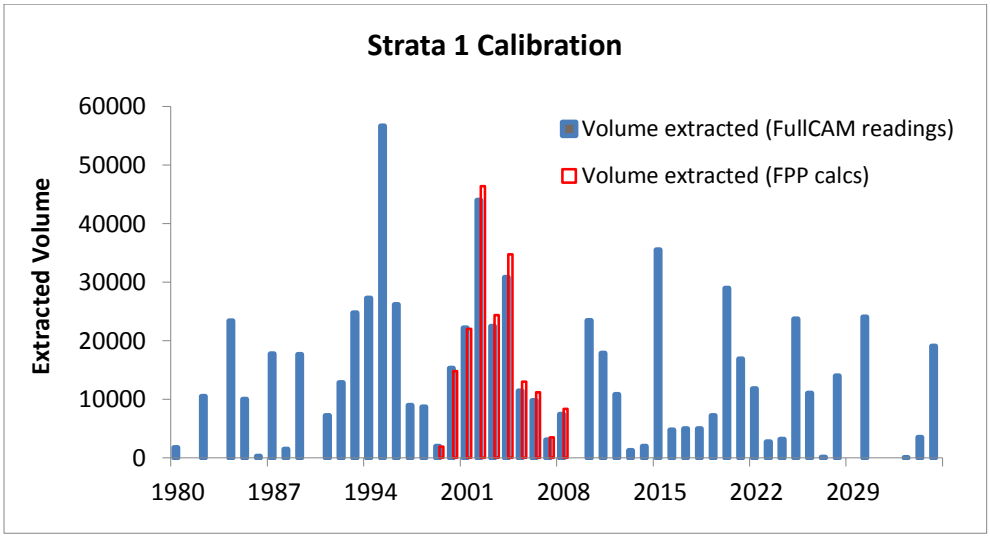
Strata	*Strata Area (ha)*	*Date*	*Area to be logged (ha)*	*% Biomass of Strata Removed*	*Volume extracted FullCAM Reading (m^3/ha)*	*Volume extracted FPP Calculations (m^3/ha)*
Stratum 4 (E2,+3)	*2003.55*	1986	8.7	0.28	1,214	
Stratum 4 (E2,+3)	*2003.55*	1987	220.2	6.11	24,769	
Stratum 4 (E2,+3)	*2003.55*	1988	0.4	0.01	47	
Stratum 4 (E2,+3)	*2003.55*	1989	127.7	4.14	16,117	
Stratum 4 (E2,+3)	*2003.55*	1991	2.8	0.09	354	
Stratum 4 (E2,+3)	*2003.55*	1992	32.0	1.04	4,003	
Stratum 4 (E2,+3)	*2003.55*	1993	11.0	0.22	850	
Stratum 4 (E2,+3)	*2003.55*	1994	36.4	1.18	4,509	
Stratum 4 (E2,+3)	*2003.55*	1995	15.1	0.30	1,150	
Stratum 4 (E2,+3)	*2003.55*	1996	91.0	2.95	10,940	
Stratum 4 (E2,+3)	*2003.55*	1997	46.6	1.51	5,536	
Stratum 4 (E2,+3)	*2003.55*	1998	18.9	0.46	1,666	
Stratum 4 (E2,+3)	*2003.55*	1999	94.8	0.46	1,676	1,512
Stratum 4 (E2,+3)	*2003.55*	2000	204.6	2.36	8,417	7,826
Stratum 4 (E2,+3)	*2003.55*	2001	94.4	2.52	8,792	8,359
Stratum 4 (E2,+3)	*2003.55*	2002	457.6	6.99	22,772	23,230
Stratum 4 (E2,+3)	*2003.55*	2003	240.9	2.76	8,786	9,173
Stratum 4 (E2,+3)	*2003.55*	2004	357.8	4.19	12,871	13,918
Stratum 4 (E2,+3)	*2003.55*	2005	111.2	1.65	5,027	5,476
Stratum 4 (E2,+3)	*2003.55*	2006	111.3	1.54	4,660	5,108
Stratum 4 (E2,+3)	*2003.55*	2007	68.0	0.50	1,519	1,662
Stratum 4 (E2,+3)	*2003.55*	2008	113.2	2.63	7,852	8,735
Stratum 5 (E4)	*2281.67*	1979	0.7	0.02	89	
Stratum 5 (E4)	*2281.67*	1980	57.5	1.64	7,194	
Stratum 5 (E4)	*2281.67*	1982	117.3	2.63	11,257	
Stratum 5 (E4)	*2281.67*	1984	431.8	5.89	23,767	
Stratum 5 (E4)	*2281.67*	1985	91.3	2.40	9,467	
Stratum 5 (E4)	*2281.67*	1986	52.9	1.51	5,858	
Stratum 5 (E4)	*2281.67*	1987	9.6	0.27	1,059	
Stratum 5 (E4)	*2281.67*	1988	0.0	0.00	11,410	
Stratum 5 (E4)	*2281.67*	1989	106.1	3.02	366	
Stratum 5 (E4)	*2281.67*	1991	3.4	0.10	976	
Stratum 5 (E4)	*2281.67*	1992	9.1	0.26	6,665	
Stratum 5 (E4)	*2281.67*	1993	102.0	1.79	7,433	
Stratum 5 (E4)	*2281.67*	1994	71.3	2.03	331	
Stratum 5 (E4)	*2281.67*	1995	3.5	0.09	7,004	
Stratum 5 (E4)	*2281.67*	1996	68.1	1.94	9,413	
Stratum 5 (E4)	*2281.67*	1997	93.7	2.67	1,653	
Stratum 5 (E4)	*2281.67*	1998	21.4	0.47	865	
Stratum 5 (E4)	*2281.67*	1999	50.1	0.24	9,810	12,027
Stratum 5 (E4)	*2281.67*	2000	362.5	2.85	9,217	11,559
Stratum 5 (E4)	*2281.67*	2001	136.2	2.74	18,534	24,519
Stratum 5 (E4)	*2281.67*	2002	396.1	5.81	4,702	6,274
Stratum 5 (E4)	*2281.67*	2003	100.5	1.49	8,377	11,384
Stratum 5 (E4)	*2281.67*	2004	217.0	2.70	7,967	11,007
Stratum 5 (E4)	*2281.67*	2005	207.4	2.61	3,397	4,695
Stratum 5 (E4)	*2281.67*	2006	76.3	1.11	177	242
Stratum 5 (E4)	*2281.67*	2007	9.9	0.06	2,190	2,987
Stratum 5 (E4)	*2281.67*	2008	39.9	0.71	1,097	0
Stratum 6 (ER1)	*895.23*	1984	112.8	8.19	18,473	
Stratum 6 (ER1)	*895.23*	1985	25.4	0.43	957	
Stratum 6 (ER1)	*895.23*	1987	2.5	0.04	95	
Stratum 6 (ER1)	*895.23*	1991	117.2	1.96	4,332	
Stratum 6 (ER1)	*895.23*	1992	136.1	6.08	12,604	
Stratum 6 (ER1)	*895.23*	1994	118.4	8.60	16,333	
Stratum 6 (ER1)	*895.23*	1996	166.9	12.12	20,388	
Stratum 6 (ER1)	*895.23*	1997	83.3	6.05	9,630	
Stratum 6 (ER1)	*895.23*	1999	7.0	0.01	16	15
Stratum 6 (ER1)	*895.23*	2000	17.7	0.28	455	453
Stratum 6 (ER1)	*895.23*	2002	50.3	0.71	1,160	1,163
Stratum 6 (ER1)	*895.23*	2003	60.1	2.28	3,663	3,728
Stratum 6 (ER1)	*895.23*	2004	31.4	0.67	1,078	1,103
Stratum 6 (ER1)	*895.23*	2005	11.7	0.29	469	481
Stratum 6 (ER1)	*895.23*	2006	21.1	0.52	845	851

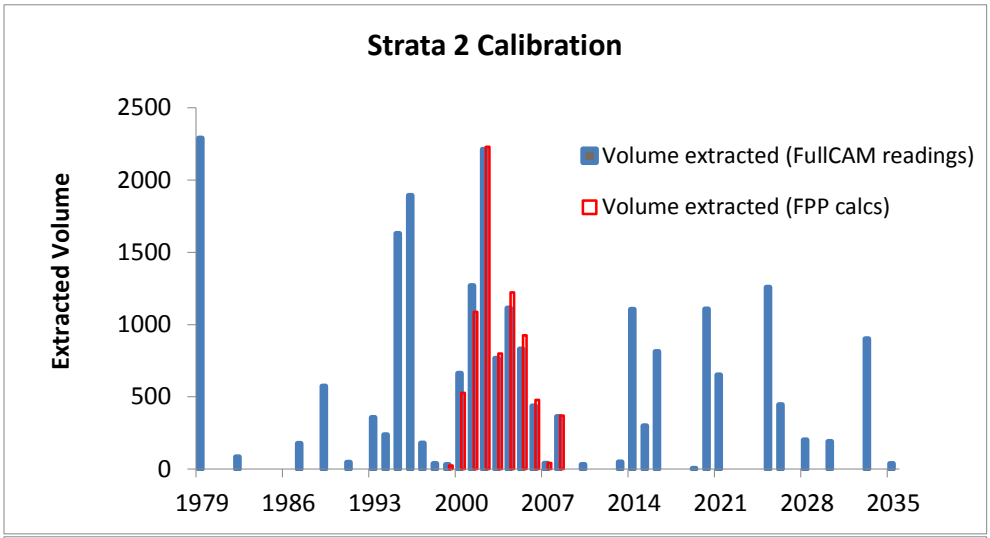
Strata	*Strata Area (ha)*	*Date*	*Area to be logged (ha)*	*% Biomass of Strata Removed*	*Volume extracted FullCAM Reading (m^3/ha)*	*Volume extracted FPP Calculations (m^3/ha)*
Stratum 6 (ER1)	*895.23*	2007	15.7	0.23	376	383
Stratum 6 (ER1)	*895.23*	2008	10.9	0.35	575	569
Stratum 7 (ER1.E-3)	*797.47*	1982	2.6	0.21	291	
Stratum 7 (ER1.E-3)	*797.47*	1983	27.4	2.24	3,025	
Stratum 7 (ER1.E-3)	*797.47*	1984	3.2	0.16	217	
Stratum 7 (ER1.E-3)	*797.47*	1985	55.9	1.05	1,405	
Stratum 7 (ER1.E-3)	*797.47*	1991	25.7	0.48	643	
Stratum 7 (ER1.E-3)	*797.47*	1993	52.2	4.26	5,425	
Stratum 7 (ER1.E-3)	*797.47*	1997	2.6	0.05	61	
Stratum 7 (ER1.E-3)	*797.47*	1998	14.5	0.61	779	
Stratum 7 (ER1.E-3)	*797.47*	1999	1.6	0.02	20	21
Stratum 7 (ER1.E-3)	*797.47*	2000	6.6	0.43	547	565
Stratum 7 (ER1.E-3)	*797.47*	2001	0.5	0.03	42	44
Stratum 7 (ER1.E-3)	*797.47*	2002	51.1	2.87	3,528	3,752
Stratum 7 (ER1.E-3)	*797.47*	2003	19.4	0.33	409	436
Stratum 7 (ER1.E-3)	*797.47*	2004	18.7	0.37	452	483
Stratum 7 (ER1.E-3)	*797.47*	2005	1.2	0.04	45	48
Stratum 7 (ER1.E-3)	*797.47*	2006	4.5	0.13	157	168
Stratum 7 (ER1.E-3)	*797.47*	2007	1.6	0.03	36	38
Stratum 7 (ER1.E-3)	*797.47*	2008	1.1	0.04	53	56
Stratum 8 (ER2*)	*254.26*	1982	0.4	0.11	38	
Stratum 8 (ER2*)	*254.26*	1985	1.3	0.32	115	
Stratum 8 (ER2*)	*254.26*	1988	6.3	1.62	563	
Stratum 8 (ER2*)	*254.26*	1991	18.7	4.79	1,593	
Stratum 8 (ER2*)	*254.26*	1993	40.9	7.77	2,386	
Stratum 8 (ER2*)	*254.26*	1994	45.0	11.51	3,138	
Stratum 8 (ER2*)	*254.26*	1995	16.9	4.31	1,133	
Stratum 8 (ER2*)	*254.26*	1996	63.0	7.85	1,922	
Stratum 8 (ER2*)	*254.26*	1998	23.2	5.93	1,395	
Stratum 8 (ER2*)	*254.26*	2000	5.6	0.84	201	184
Stratum 8 (ER2*)	*254.26*	2001	15.8	7.84	1,759	1,716
Stratum 8 (ER2*)	*254.26*	2002	42.0	12.37	2,488	2,705
Stratum 8 (ER2*)	*254.26*	2003	17.5	9.81	1,825	2,145
Stratum 8 (ER2*)	*254.26*	2004	15.7	3.53	657	771
Stratum 8 (ER2*)	*254.26*	2005	8.3	1.77	336	388
Stratum 8 (ER2*)	*254.26*	2006	1.2	0.33	65	73
Stratum 8 (ER2*)	*254.26*	2008	1.8	0.51	105	113
Stratum 9 (ER2*.E-3)	*520.74*	1982	0.5	0.06	70	
Stratum 9 (ER2*.E-3)	*520.74*	1984	12.9	1.60	1,839	
Stratum 9 (ER2*.E-3)	*520.74*	1985	12.0	1.50	1,692	
Stratum 9 (ER2*.E-3)	*520.74*	1988	1.1	0.03	34	
Stratum 9 (ER2*.E-3)	*520.74*	1989	11.7	1.46	1,628	
Stratum 9 (ER2*.E-3)	*520.74*	1991	14.3	1.78	1,945	
Stratum 9 (ER2*.E-3)	*520.74*	1992	2.9	0.36	392	
Stratum 9 (ER2*.E-3)	*520.74*	1993	0.8	0.02	24	
Stratum 9 (ER2*.E-3)	*520.74*	1995	2.7	0.29	321	
Stratum 9 (ER2*.E-3)	*520.74*	1996	34.9	3.40	3,573	
Stratum 9 (ER2*.E-3)	*520.74*	1997	32.5	2.27	2,336	
Stratum 9 (ER2*.E-3)	*520.74*	1998	49.7	3.42	3,396	
Stratum 9 (ER2*.E-3)	*520.74*	1999	5.6	0.11	109	95
Stratum 9 (ER2*.E-3)	*520.74*	2000	54.8	3.63	3,479	3,254
Stratum 9 (ER2*.E-3)	*520.74*	2001	15.9	1.73	1,633	1,551
Stratum 9 (ER2*.E-3)	*520.74*	2002	93.6	7.94	6,922	7,116
Stratum 9 (ER2*.E-3)	*520.74*	2003	34.9	2.20	1,883	1,967
Stratum 9 (ER2*.E-3)	*520.74*	2004	61.2	3.14	2,616	2,817
Stratum 9 (ER2*.E-3)	*520.74*	2005	33.9	1.75	1,441	1,569
Stratum 9 (ER2*.E-3)	*520.74*	2006	19.5	0.93	763	830
Stratum 9 (ER2*.E-3)	*520.74*	2007	3.3	0.09	74	79
Stratum 9 (ER2*.E-3)	*520.74*	2008	13.4	1.13	928	1,012
Stratum 10 (ER2*.E2*)	*575.76*	1979	0.5	0.06	75	
Stratum 10 (ER2*.E2*)	*575.76*	1982	2.9	0.33	444	
Stratum 10 (ER2*.E2*)	*575.76*	1984	10.0	1.13	1,508	
Stratum 10 (ER2*.E2*)	*575.76*	1985	7.6	0.86	1,145	
Stratum 10 (ER2*.E2*)	*575.76*	1987	5.8	0.15	201	

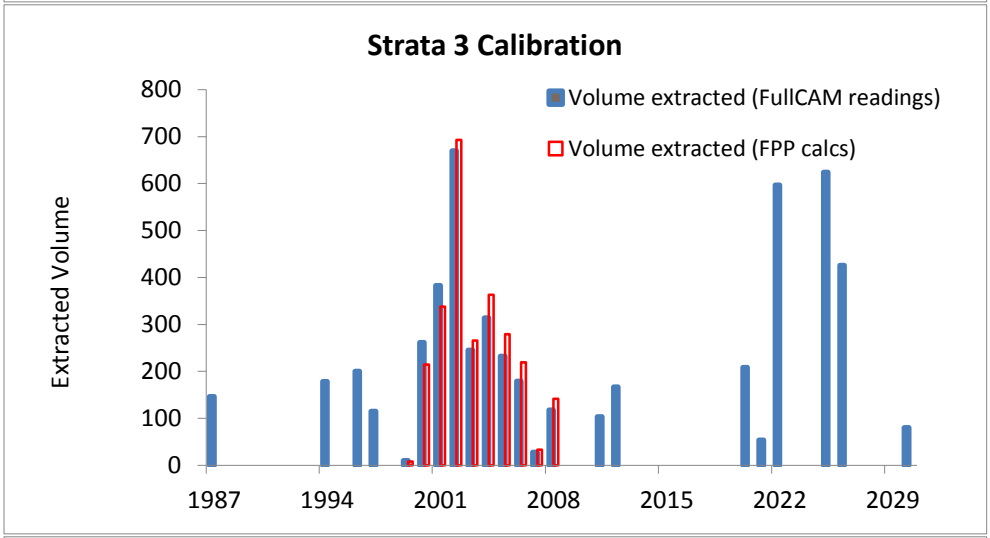
Strata	*Strata Area (ha)*	*Date*	*Area to be logged (ha)*	*% Biomass of Strata Removed*	*Volume extracted FullCAM Reading (m^3/ha)*	*Volume extracted FPP Calculations (m^3/ha)*
Stratum 10 (ER2*.E2*)	*575.76*	1989	35.9	2.49	3,225	
Stratum 10 (ER2*.E2*)	*575.76*	1990	26.2	0.68	877	
Stratum 10 (ER2*.E2*)	*575.76*	1993	4.2	0.11	140	
Stratum 10 (ER2*.E2*)	*575.76*	1995	48.2	3.35	4,162	
Stratum 10 (ER2*.E2*)	*575.76*	1996	2.5	0.18	217	
Stratum 10 (ER2*.E2*)	*575.76*	1998	90.4	6.99	8,073	
Stratum 10 (ER2*.E2*)	*575.76*	1999	3.3	0.05	58	46
Stratum 10 (ER2*.E2*)	*575.76*	2000	20.1	1.81	2,056	1,798
Stratum 10 (ER2*.E2*)	*575.76*	2001	25.6	2.82	3,119	2,798
Stratum 10 (ER2*.E2*)	*575.76*	2002	191.2	15.13	14,255	15,009
Stratum 10 (ER2*.E2*)	*575.76*	2003	29.9	2.29	2,120	2,269
Stratum 10 (ER2*.E2*)	*575.76*	2004	38.3	1.70	1,558	1,684
Stratum 10 (ER2*.E2*)	*575.76*	2005	14.1	0.62	569	616
Stratum 10 (ER2*.E2*)	*575.76*	2006	12.4	0.48	442	480
Stratum 10 (ER2*.E2*)	*575.76*	2007	3.0	0.07	65	74
Stratum 10 (ER2*.E2*)	*575.76*	2008	27.7	2.60	2,364	2,581
Stratum 11 (MYR)	*204.63*	2002	3.6	2.85	394	398

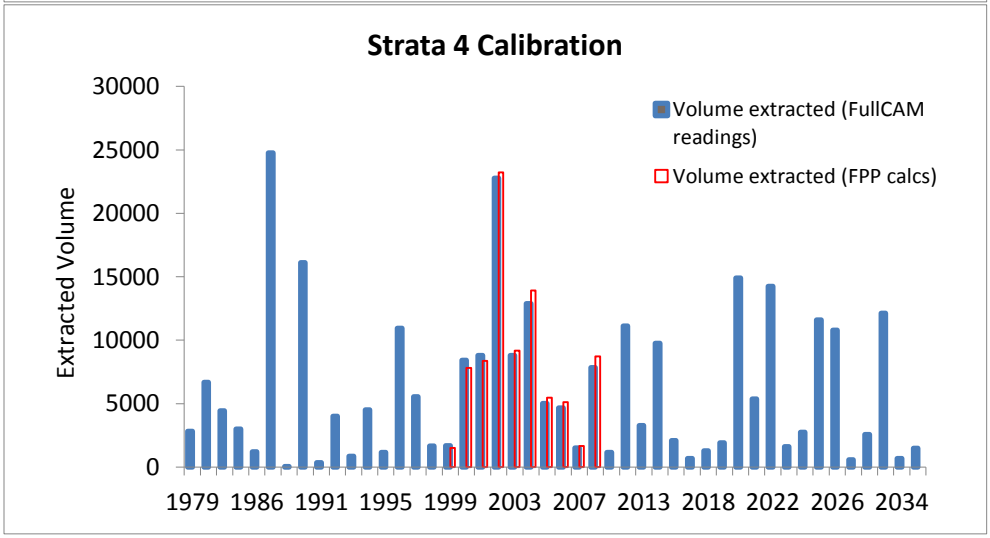
9.3.2 FullCAM Calibration

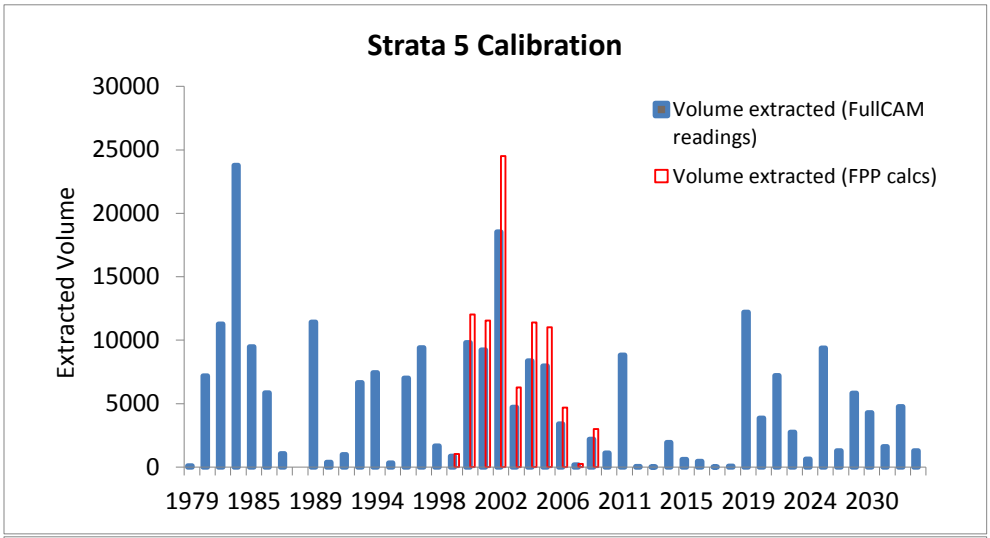
FullCAM Calibration with FPP/Weighbridge Data

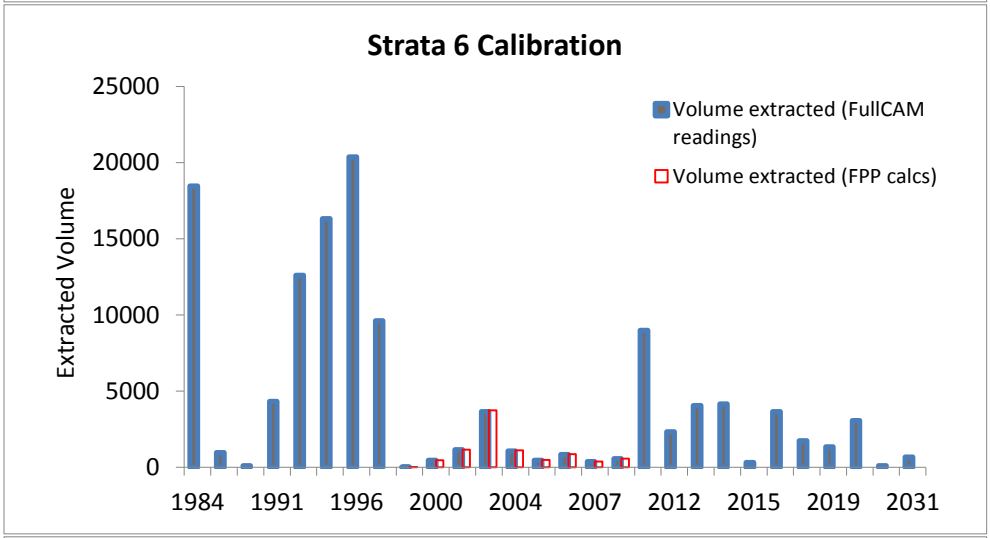


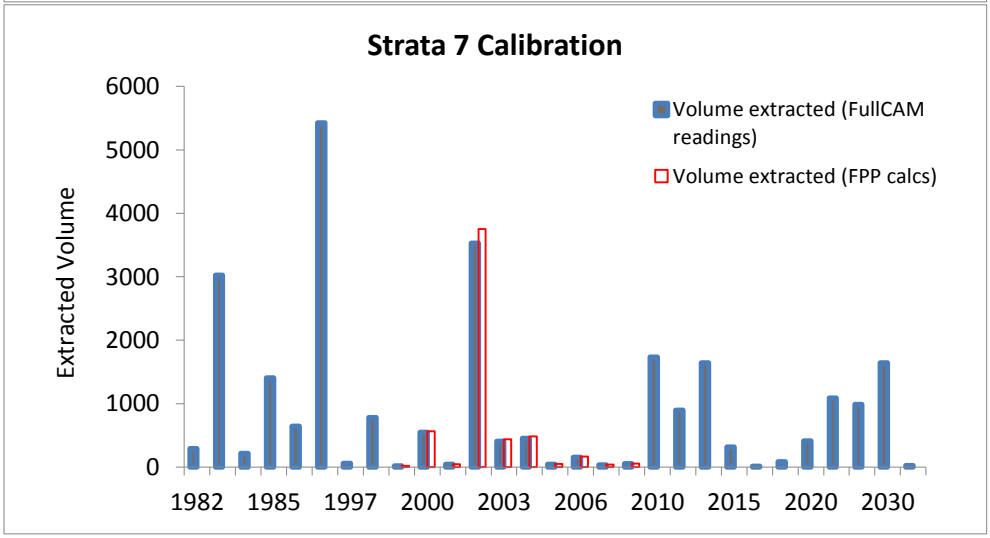

Strata 2 Calibration
Extracted Volume
2500
2000
1500
1000
500
0
1979
1986
1993
2000
2007
2014
2021
2028
2035
Volume extracted (FullCAM readings)
Volume extracted (FPP calcs)

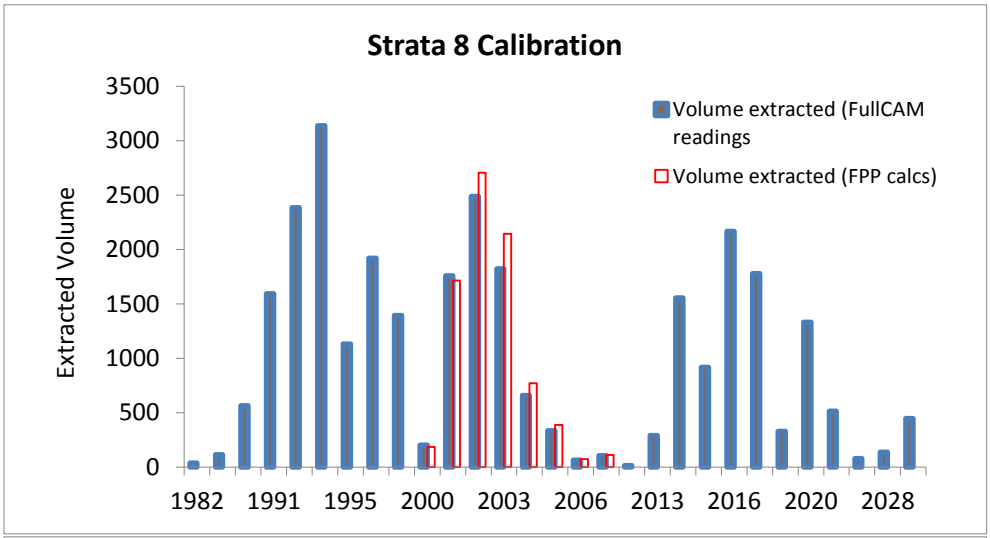

Strata 3 Calibration
Extracted Volume
800
700
600
500
400
300
200
100
0
1987
1994
2001
2008
2015
2022
2029
Volume extracted (FullCAM readings)
Volume extracted (FPP calcs)

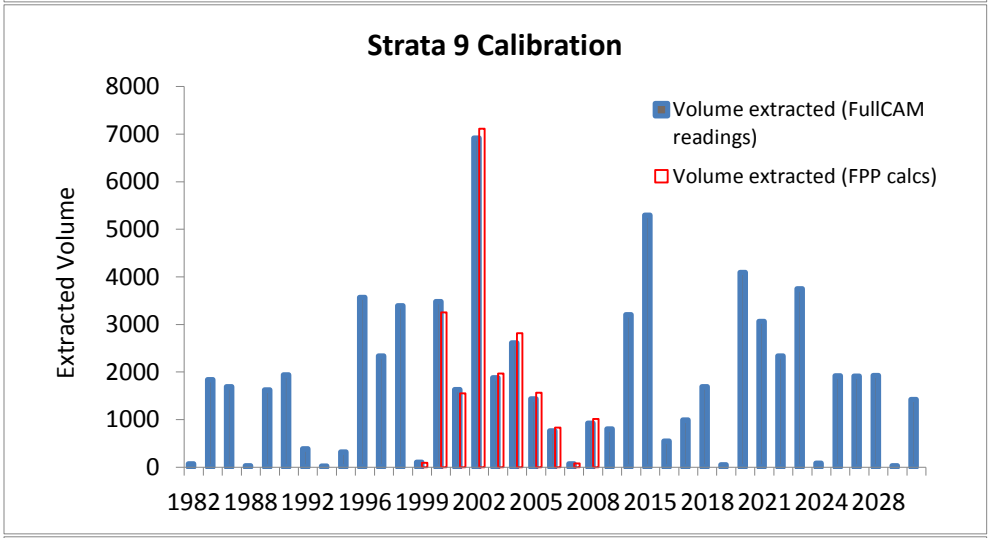

Strata 4 Calibration
Extracted Volume
30000
25000
20000
15000
10000
5000
0
1979
1986
1991
1995
1999
2003
2007
2013
2018
2022
2026
2034
Volume extracted (FullCAM readings)
Volume extracted (FPP calcs)

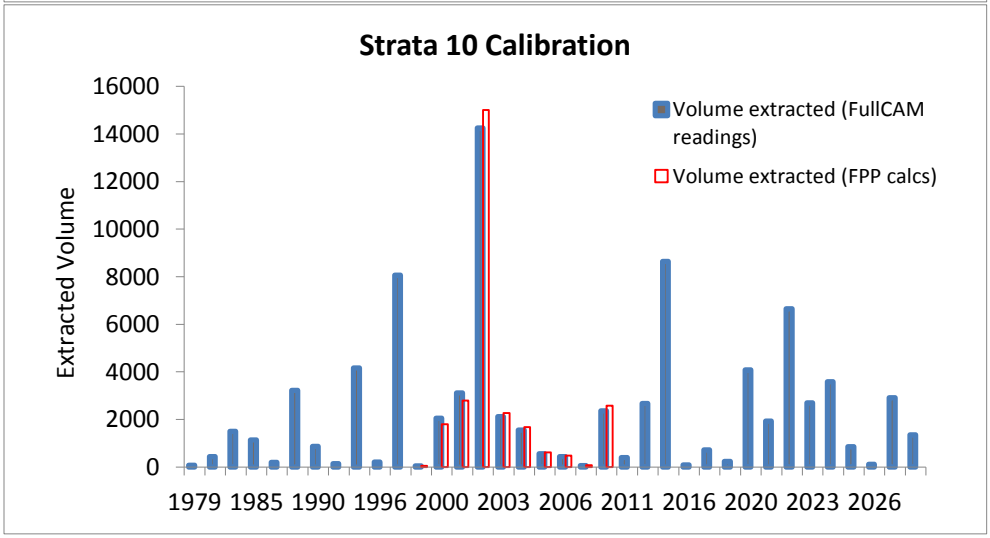

Strata 5 Calibration
Extracted Volume
30000
25000
20000
15000
10000
5000
0
1979 1985 1989 1994 1998 2002 2006 2011 2015 2019 2024 2030
Volume extracted (FullCAM readings)
Volume extracted (FPP calcs)

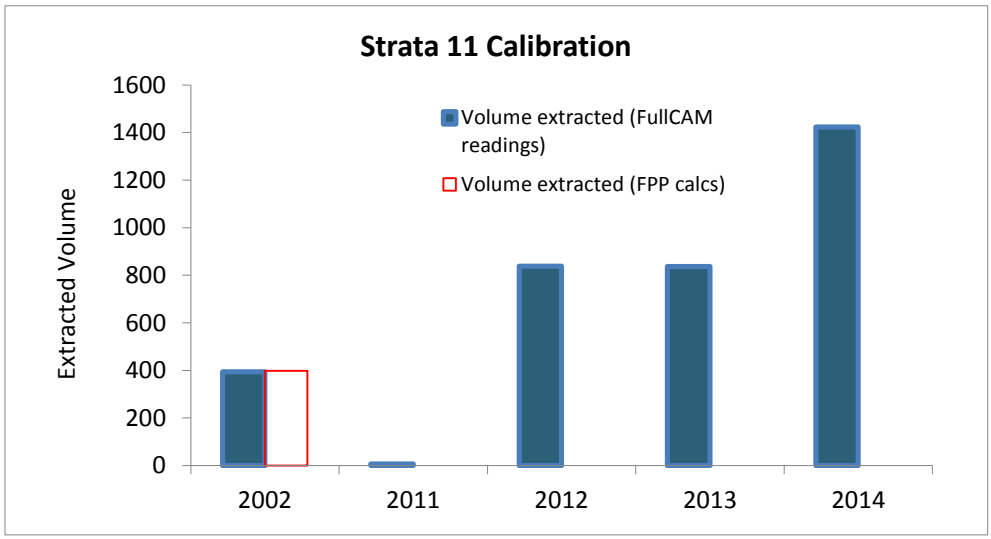

Strata 6 Calibration
Extracted Volume
25000
20000
15000
10000
5000
0
1984 1991 1996 2000 2004 2007 2012 2015 2019 2031
Volume extracted (FullCAM readings)
Volume extracted (FPP calcs)


Strata 7 Calibration
Extracted Volume
6000
5000
4000
3000
2000
1000
0
1982 1985 1997 2000 2003 2006 2010 2015 2020 2030
Volume extracted (FullCAM readings)
Volume extracted (FPP calcs)


Strata 8 Calibration
Extracted Volume
3500
3000
2500
2000
1500
1000
500
0
1982 1991 1995 2000 2003 2006 2013 2016 2020 2028
Volume extracted (FullCAM readings
Volume extracted (FPP calcs)


Strata 9 Calibration
Extracted Volume
8000
7000
6000
5000
4000
3000
2000
1000
0
1982 1988 1992 1996 1999 2002 2005 2008 2015 2018 2021 2024 2028
Volume extracted (FullCAM readings)
Volume extracted (FPP calcs)


Strata 10 Calibration
Extracted Volume
16000
14000
12000
10000
8000
6000
4000
2000
0
1979 1985 1990 1996 2000 2003 2006 2011 2016 2020 2023 2026
Volume extracted (FullCAM readings)
Volume extracted (FPP calcs)


Strata 11 Calibration
Extracted Volume
1600
1400
1200
1000
800
600
400
200
0
2002
2011
2012
2013
2014
Volume extracted (FullCAM readings)
Volume extracted (FPP calcs)

FullCAM Calibration with Field Survey Data

Stratum	Average Volume of Timber m^3/ha (From Field Survey)	Calculated Volume of Timber for 2012 (From FullCAM Reading)	Percentage Difference (10% maximum allowed)
1	152.47	152.53	0.04
2	62.59	62.72	0.20
3	77.91	77.72	0.24
4	153.74	152.87	0.57
5	138.94	139.43	0.35
6	187.61	187.49	0.06
7	154.79	154.08	0.46
8	87.26	87.55	0.33
9	160.09	160.37	0.18
10	161.76	161.36	0.25
11	180.04	179.65	0.22

Results of FullCAM Calibration

The percentage difference for the total extracted volume modelled in FullCAM and the extracted volume in the FPP/Weighbridge files is 9.5%, complying with the uncertainty requirements.

The percentage difference in field survey and FullCAM volumes is less than 1% again complying with the uncertainty requirements.

9.3.3 Identifying Projected Logging Events (Baseline Scenario)

The years for each logging projection in each stratum were known from the forest prescriptions available within the GIS layer provided. The prescriptions were also available allowing a reasonable projection of percentage biomass removed for each event based on past logging practices.

On first analysis, the projected percentages of biomass removed appeared too high and these have been revised down to coincide with the historic trends of volume extracted. As a rule, the project thirty year extracted volumes should be less than 75% of the previous thirty years' volumes. As an additional consideration, it was ensured that the total projected extraction volume is less that 150% of the total extracted volume between 1999 and 2009. The main reason for this is that the evidence provided is substantial for those ten years of harvest and volumes removed are highly certain. The projected harvest is therefore conservatively based on these volumes alone but does not ignore logging events pre 1999.

Prescriptions and biomass extracted

The following list shows the forest prescriptions and the percentage of biomass typically removed in a logging event;

Code	Description	% Biomass Removed
AGR	Advance Growth Retention	40
GRP	Group Selection	40
OVS	Overstorey Removal	40
SED	Seed Tree Retention	65
SEL	Selective Logging	15
SLR	Potential Sawlog Retention	60
SWF	Shelterwood First Cut	65
SWS	Shelterwood Second Cut	65
T0	Unthinned	0
THN	Thinning	60

Projected Logging Events

The logging events modelled in FullCAM are as follows;

Strata	*Strata Area (ha)*	*Date*	*Area to be logged (ha)*	*% Biomass of Strata Removed*	*Volume extracted (m^3/ha)*
Stratum 1 (E-3)	4334.06	*2010*	294.09	3.73	23,471
Stratum 1 (E-3)	4334.06	*2011*	276.82	2.88	17,867
Stratum 1 (E-3)	4334.06	*2012*	137.38	1.75	10,813
Stratum 1 (E-3)	4334.06	*2013*	16.53	0.20	1,269
Stratum 1 (E-3)	4334.06	*2014*	24.33	0.31	1,957
Stratum 1 (E-3)	4334.06	*2015*	507.15	5.90	35,515
Stratum 1 (E-3)	4334.06	*2016*	61.33	0.78	4,744
Stratum 1 (E-3)	4334.06	*2017*	64.36	0.82	5,016
Stratum 1 (E-3)	4334.06	*2018*	68.5	0.82	5,014
Stratum 1 (E-3)	4334.06	2019	114.76	1.17	7,205
Stratum 1 (E-3)	4334.06	2020	520.87	4.86	28,987
Stratum 1 (E-3)	4334.06	2021	236.3	2.87	16,899

Strata	Strata Area (ha)	Date	Area to be logged (ha)	% Biomass of Strata Removed	Volume extracted (m^3/ha)
Stratum 1 (E-3)	4334.06	2022	174.84	2.01	11,802
Stratum 1 (E-3)	4334.06	2023	36.2	0.46	2,748
Stratum 1 (E-3)	4334.06	2024	45.21	0.53	3,205
Stratum 1 (E-3)	4334.06	2025	335.83	4.03	23,707
Stratum 1 (E-3)	4334.06	2026	155.22	1.88	11,039
Stratum 1 (E-3)	4334.06	2027	1.58	0.02	122
Stratum 1 (E-3)	4334.06	2028	184.53	2.35	13,999
Stratum 1 (E-3)	4334.06	2030	337.19	4.09	24,039
Stratum 1 (E-3)	4334.06	2033	0.64	0.01	47
Stratum 1 (E-3)	4334.06	2034	48.14	0.57	3,518
Stratum 1 (E-3)	4334.06	2035	265.14	3.12	19,075
Stratum 2 (E-3f)	223.12	2010	0.82	0.24	32
Stratum 2 (E-3f)	223.12	2013	1.13	0.33	48
Stratum 2 (E-3f)	223.12	2014	27.47	8.00	1,105
Stratum 2 (E-3f)	223.12	2015	7.4	2.13	299
Stratum 2 (E-3f)	223.12	2016	20.31	5.92	813
Stratum 2 (E-3f)	223.12	2019	0.37	0.03	4
Stratum 2 (E-3f)	223.12	2020	38.31	7.71	1,106
Stratum 2 (E-3f)	223.12	2021	17.81	4.59	652
Stratum 2 (E-3f)	223.12	2025	50.43	8.69	1,259
Stratum 2 (E-3f)	223.12	2026	11.23	3.05	444
Stratum 2 (E-3f)	223.12	2028	4.54	1.32	202
Stratum 2 (E-3f)	223.12	2030	4.11	1.20	191
Stratum 2 (E-3f)	223.12	2033	38.37	5.60	901
Stratum 2 (E-3f)	223.12	2035	0.83	0.22	38
Stratum 3 (E2*f)	52.52	2011	2.12	2.62	103
Stratum 3 (E2*f)	52.52	2012	3.5	4.31	167
Stratum 3 (E2*f)	52.52	2020	3.96	4.90	208
Stratum 3 (E2*f)	52.52	2021	1.01	1.25	54
Stratum 3 (E2*f)	52.52	2022	13.01	16.10	597
Stratum 3 (E2*f)	52.52	2025	15.37	19.02	625
Stratum 3 (E2*f)	52.52	2026	11.68	14.29	426
Stratum 3 (E2*f)	52.52	2030	1.88	2.33	80
Stratum 4 (E2,+3)	2003.55	2011	19.34	0.38	1,156
Stratum 4 (E2,+3)	2003.55	2012	177.61	3.76	11,113
Stratum 4 (E2,+3)	2003.55	2013	34.27	1.11	3,285
Stratum 4 (E2,+3)	2003.55	2015	446.24	3.36	9,768
Stratum 4 (E2,+3)	2003.55	2016	21.93	0.71	2,079
Stratum 4 (E2,+3)	2003.55	2017	6.98	0.23	669
Stratum 4 (E2,+3)	2003.55	2018	13.39	0.43	1,282
Stratum 4 (E2,+3)	2003.55	2019	55.85	0.65	1,926
Stratum 4 (E2,+3)	2003.55	2020	248.53	5.21	14,894
Stratum 4 (E2,+3)	2003.55	2021	58.13	1.89	5,359
Stratum 4 (E2,+3)	2003.55	2022	266.35	5.21	14,235
Stratum 4 (E2,+3)	2003.55	2023	18.05	0.59	1,616
Stratum 4 (E2,+3)	2003.55	2024	31.43	0.99	2,745
Stratum 4 (E2,+3)	2003.55	2025	190.57	4.30	11,591
Stratum 4 (E2,+3)	2003.55	2026	134.31	4.10	10,781
Stratum 4 (E2,+3)	2003.55	2027	6.51	0.21	566
Stratum 4 (E2,+3)	2003.55	2028	29.51	0.96	2,580
Stratum 4 (E2,+3)	2003.55	2030	264.4	4.58	12,115
Stratum 4 (E2,+3)	2003.55	2034	8	0.24	667
Stratum 4 (E2,+3)	2003.55	2035	17.79	0.53	1,484
Stratum 5 (E4)	2281.67	2010	24.51	0.35	1,097
Stratum 5 (E4)	2281.67	2011	201.09	2.86	8,823
Stratum 5 (E4)	2281.67	2012	1.26	0.02	56
Stratum 5 (E4)	2281.67	2013	0.6	0.01	28
Stratum 5 (E4)	2281.67	2014	43.14	0.61	1,940
Stratum 5 (E4)	2281.67	2015	13.23	0.19	601
Stratum 5 (E4)	2281.67	2016	9.73	0.14	447
Stratum 5 (E4)	2281.67	2017	0.45	0.007	21
Stratum 5 (E4)	2281.67	2018	1.41	0.02	67
Stratum 5 (E4)	2281.67	2019	271	3.84	12,210
Stratum 5 (E4)	2281.67	2020	115.94	1.22	3,860
Stratum 5 (E4)	2281.67	2021	179.67	2.30	7,199

Strata	*Strata Area (ha)*	*Date*	*Area to be logged (ha)*	*% Biomass of Strata Removed*	*Volume extracted (m^3/ha)*
Stratum 5 (E4)	2281.67	2022	62.58	0.87	2,743
Stratum 5 (E4)	2281.67	2024	14.72	0.19	619
Stratum 5 (E4)	2281.67	2025	227.79	3.00	9,389
Stratum 5 (E4)	2281.67	2026	30.11	0.41	1,279
Stratum 5 (E4)	2281.67	2028	129.35	1.84	5,812
Stratum 5 (E4)	2281.67	2030	130.7	1.35	4,296
Stratum 5 (E4)	2281.67	2032	34.91	0.50	1,601
Stratum 5 (E4)	2281.67	2034	103.78	1.47	4,755
Stratum 5 (E4)	2281.67	2035	29.13	0.40	1,292
Stratum 6 (ER1)	895.23	2011	288.93	5.69	8,993
Stratum 6 (ER1)	895.23	2012	66.2	1.48	2,325
Stratum 6 (ER1)	895.23	2013	117.23	2.62	4,052
Stratum 6 (ER1)	895.23	2014	112.83	2.73	4,157
Stratum 6 (ER1)	895.23	2015	27.95	0.20	305
Stratum 6 (ER1)	895.23	2016	99.45	2.41	3,659
Stratum 6 (ER1)	895.23	2017	47.09	1.14	1,734
Stratum 6 (ER1)	895.23	2019	35.93	0.87	1,338
Stratum 6 (ER1)	895.23	2020	83.31	2.02	3,075
Stratum 6 (ER1)	895.23	2030	2.34	0.06	93
Stratum 6 (ER1)	895.23	2031	16.77	0.41	670
Stratum 7 (ER1.E-3)	797.47	2010	54.79	1.44	1,736
Stratum 7 (ER1.E-3)	797.47	2013	27.44	0.75	898
Stratum 7 (ER1.E-3)	797.47	2014	570.65	1.38	1,642
Stratum 7 (ER1.E-3)	797.47	2015	12.02	0.27	317
Stratum 7 (ER1.E-3)	797.47	2018	2.12	0.01	16
Stratum 7 (ER1.E-3)	797.47	2019	4.55	0.07	84
Stratum 7 (ER1.E-3)	797.47	2020	19.62	0.35	415
Stratum 7 (ER1.E-3)	797.47	2022	33.8	0.92	1,088
Stratum 7 (ER1.E-3)	797.47	2025	33.42	0.84	989
Stratum 7 (ER1.E-3)	797.47	2030	55.9	1.40	1,643
Stratum 7 (ER1.E-3)	797.47	2035	0.76	0.02	23
Stratum 8 (ER2*)	254.26	2011	11.35	0.06	13
Stratum 8 (ER2*)	254.26	2013	5.01	1.28	290
Stratum 8 (ER2*)	254.26	2014	28.19	7.21	1,555
Stratum 8 (ER2*)	254.26	2015	19.98	4.32	918
Stratum 8 (ER2*)	254.26	2016	63.02	11.11	2,168
Stratum 8 (ER2*)	254.26	2018	37.09	9.45	1,781
Stratum 8 (ER2*)	254.26	2019	6.67	1.71	329
Stratum 8 (ER2*)	254.26	2020	39.34	7.13	1,334
Stratum 8 (ER2*)	254.26	2021	10.76	2.71	514
Stratum 8 (ER2*)	254.26	2025	1.47	0.38	80
Stratum 8 (ER2*)	254.26	2028	2.39	0.61	139
Stratum 8 (ER2*)	254.26	2030	12.15	1.92	447
Stratum 8 (ER2*)	254.26	2035	16.84	4.31	1,048
Stratum 9 (ER2*.E-3)	520.74	2010	24.8	0.98	807
Stratum 9 (ER2*.E-3)	520.74	2011	32.4	4.04	3,208
Stratum 9 (ER2*.E-3)	520.74	2015	82.26	7.00	5,297
Stratum 9 (ER2*.E-3)	520.74	2016	5.81	0.73	550
Stratum 9 (ER2*.E-3)	520.74	2017	10.52	1.31	993
Stratum 9 (ER2*.E-3)	520.74	2018	27.14	2.27	1,695
Stratum 9 (ER2*.E-3)	520.74	2019	0.58	0.07	55
Stratum 9 (ER2*.E-3)	520.74	2020	63.9	5.70	4,097
Stratum 9 (ER2*.E-3)	520.74	2021	35.35	4.40	3,064
Stratum 9 (ER2*.E-3)	520.74	2022	40.53	3.42	2,336
Stratum 9 (ER2*.E-3)	520.74	2023	45.88	5.73	3,749
Stratum 9 (ER2*.E-3)	520.74	2024	1.17	0.14	90
Stratum 9 (ER2*.E-3)	520.74	2025	24.12	2.92	1,921
Stratum 9 (ER2*.E-3)	520.74	2026	84.37	2.95	1,916
Stratum 9 (ER2*.E-3)	520.74	2028	23.8	2.97	1,932
Stratum 9 (ER2*.E-3)	520.74	2033	0.38	0.04	30
Stratum 9 (ER2*.E-3)	520.74	2035	17.77	2.05	1,428
Stratum 10 (ER2*.E2*)	575.76	2011	20.9	0.44	403
Stratum 10 (ER2*.E2*)	575.76	2012	26.2	2.96	2,669
Stratum 10 (ER2*.E2*)	575.76	2015	125.83	10.48	8,647
Stratum 10 (ER2*.E2*)	575.76	2016	0.98	0.11	93

Strata	*Strata Area (ha)*	*Date*	*Area to be logged (ha)*	*% Biomass of Strata Removed*	*Volume extracted (m^3/ha)*
Stratum 10 (ER2*.E2*)	575.76	2018	8.29	0.86	730
Stratum 10 (ER2*.E2*)	575.76	2019	4.75	0.29	243
Stratum 10 (ER2*.E2*)	575.76	2020	54.68	4.99	4,087
Stratum 10 (ER2*.E2*)	575.76	2021	22.62	2.38	1,933
Stratum 10 (ER2*.E2*)	575.76	2022	191.02	8.86	6,655
Stratum 10 (ER2*.E2*)	575.76	2023	32.5	3.67	2,706
Stratum 10 (ER2*.E2*)	575.76	2024	48.24	5.03	3,591
Stratum 10 (ER2*.E2*)	575.76	2025	11.05	1.20	863
Stratum 10 (ER2*.E2*)	575.76	2026	1.54	0.16	118
Stratum 10 (ER2*.E2*)	575.76	2027	35.88	4.05	2,914
Stratum 10 (ER2*.E2*)	575.76	2035	16.61	1.73	1,356
Stratum 11 (MYR)	204.63	2011	3.44	0.019	7
Stratum 11 (MYR)	204.63	2012	52.92	2.33	839
Stratum 11 (MYR)	204.63	2013	53.72	2.3628	837
Stratum 11 (MYR)	204.63	2014	94.55	4.1585	1,423

Volume Comparisons

Year	Volume extracted (m^3/ha)	Description	Details
1979	5,282	Based on forest	**Annual Average**
1980	8,948	prescriptions	30,002
1981	0	and years.	
1982	29,390		**Total**
1983	3,025		600,047
1984	73,626		
1985	27,810		
1986	7,388		
1987	44,231		
1988	2,149		
1989	50,615		
1990	877		
1991	16,490		
1992	30,837		
1993	40,610		
1994	59,095		
1995	65,386		
1996	72,315		
1997	36,240		
1998	25,732		
1999	4,771	Based on FPP	**Annual Average**
2000	41,216	and	39,869
2001	48,408	Weighbridge	
2002	116,924	records	**Total**
2003	46,868		394,563
2004	59,855		
2005	28,375		
2006	20,762		
2007	5,395		
2008	21,990		
2009	0		
2010	27,144	Projections	**Annual Average**
2011	40,574	based on above	22,408
2012	27,982		
2013	10,707		**Total**
2014	13,779		582,608
2015	61,667		
2016	14,553		
2017	8,433		
2018	10,584		
2019	23,393		
2020	62,063		
2021	35,675		
2022	39,456		

Year	Volume extracted (m^3/ha)	Description	Details
2023	10,819		
2024	10,251		
2025	50,422		
2026	26,004		
2027	3,602		
2028	24,664		
2029	0		
2030	42,904		
2031	670		
2032	1,601		
2033	978		
2034	8,941		
2035	25,743		

The annual average for projected harvesting is 56% of the annual average of harvests between 1999 and 2009, and 75% of the annual average between 1979 and 1999.

The total projected harvesting figures are 148% of the figures between 1999 and 2009, and 59% of the total extracted volume modelled between 1979 and 2009.