RARAKAU PROGRAMME METHODOLOGY
D2.v2.0. 15 May 2018

An Improved Forest Management Carbon Project Methodology For Pre-1990 Indigenous Forest in New Zealand

INVESTING IN NATURE

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www.ekos.org.nz | ekos@ekos.org.nz | +64 27356 3601

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Author: Sean Weaver, Executive Director, Ekos.

ABOUT EKOS

A not-for-profit carbon management service provider, specialising indigenous forest carbon and zero carbon certification. We also work in environmental markets including indigenous forest carbon and sustainable land management (project development, policy and financing consulting.

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DEFINITIONS

A/R	Afforestation/Reforestation
Activity Type	Specifically defined carbon project activity combining a reference activity and a project activity to generate carbon benefits
AFOLU	Agriculture, Forestry and Other Land Uses
BAU	Business-as-Usual
Carbon balance	Sum of carbon in a system into account carbon stored in reservoirs, emissions of carbon from sources, and sequestration of carbon into sinks
Carbon benefits	Net CO_2e benefits arising from total net avoided emissions and net enhanced removals
Carbon flux	Movement of carbon through different carbon pools
Carbon pool	Component of the earth system that stores carbon
Carbon reservoir	Carbon pool that stores carbon for long time scales
Carbon sink	Carbon pool that absorbs/sequesters carbon dioxide by transforming gaseous CO_2e into a carbon-based liquid or solid
Carbon source	Carbon pool that emits carbon from a liquid or solid form into a gas
CCB	Climate Community and Biodiversity Standard
CDM	Clean Development Mechanism
CO_2e	Carbon dioxide equivalent: translation of non-CO_2 GHG tonnes into equivalent CO_2tonnes through conversion using global warming potential of non-CO_2 GHG
Compliance Space	What is contained within the GHG accounting boundary of a compliance GHG accounting regime (e.g. Kyoto Protocol, NZ ETS)
COP	Conference of Parties (to the UNFCCC)
CSR	Corporate Social Responsibility
Degradation	Reduction of carbon stocks in a forest system (that remains a forest system) arising from human management activities
DOE	Designated Operational Entity
Eligible Area	Subset of Forest Area comprising area of forest eligible for crediting
Enhanced removals	Carbon sequestration assisted by management intervention to a level above what would occur naturally
Ex ante	Before the event (referring to future activities)
Ex post	After the fact (referring to past activities)
FAA	Forest Amendment Act (1993)
Forest Area	Subset of Project Area comprising 'Pre-1990 Forest Land'

Forest Land	An area of land of at least one hectare with forest species that has, or is likely to have: o A crown cover of more than 30 percent on each hectare; and o An average crown-cover width of at least 30 meters.
GHG	Greenhouse Gas
GIS	Geographical Information System
GPG	Good Practice Guidance
HWP	Harvested Wood Products
IFM	Improved Forest Management
IFM-LtPF	Improved forest management – logged to protected forest activity type
IPCC	Intergovernmental Panel on Climate Change
ISO	International Standards Organisation
LULUCF	Land Use, Land Use Change and Forestry
MAF	Ministry of Agriculture and Forestry
Marrakesh Accords	UNFCCC global agreement reached in 2001 setting the rules for the Kyoto Protocol
MRV	Measurement/Monitoring Reporting and Verification
NZ ETS	New Zealand Emissions Trading Scheme
Operational Forest Area	Term used in sustainable forest management plans delimiting area eligible for timber harvesting
PD	Project Description Documentation
PES	Payment for Ecosystem Services
PFSI	Permanent Forest Sink Initiative
Project Area	Land ownership boundary within which carbon project will take place
Project Developer	The entity assisting the Project Owner to develop and implement the forest carbon project.
Programme Operator	The entity that owns and administers the Rarakau Programme. This entity is Ekos – a charitable trust whose mission is to safeguard the integrity of the Rarakau Programme and role is to a) govern the Rarakau Programme; b) own the IP associated with Rarakau Programme methodologies and protocols; c) be the beneficiary of the covenant on the land title of the Project Owner that protects the forest; d) own the buffer credits of the Rarakau Programme; e) administer the buffer account with the registry; and f) act as the guardian of the Rarakau Programme.
Project Owner	The owner of the forest and forest carbon rights subject to the project
Project Proponent	The Project Owner and Project Developer combined.

Project Scenario	Carbon balance arising from Project (carbon project change from BAU as usual) activities
Protected Forest	Halting or avoiding activities that would reduce carbon stocks and managing a forest to maintain high and/or increasing carbon stocks
RED	Reducing emissions from deforestation
REDD	Reducing Emissions from Deforestation and Degradation
Reference Scenario	Carbon balance arising from reference (BAU) activities
REL	Reference Emission Level: rate of GHG emissions under BAU
Removals	Carbon sequestered from the atmosphere into a carbon sink
SFM	Sustainable Forest Management
UNFCCC	United Nations Framework Convention on Climate Change
Validation	Independent audit of Project Description Documentation (PD) and/or Methodology
VCS	Verified Carbon Standard
Verification	Independent audit of Project Monitoring Reports

Introduction

RARAKAU PROGRAMME

The Rarakau Programme is a Grouped Project (programme of activities) based on this methodology (i.e. this document) 'Rarakau Programme Methodology D2.v2.0, 15 May 2018' and applicable only to pre-1990 indigenous forest lands (lying outside the carbon accounting boundary of the New Zealand Emissions Trading Scheme (NZETS)). The LULUCF baseline and project activities of the Rarakau Programme comprise of 'forests-remaining-as-forest' activities. Project activities in the Rarakau Programme therefore, are ineligible for carbon crediting under any international or domestic compliance carbon-financing instrument or GHG accounting regime.

The Rarakau Programme is validated to the Plan Vivo Standard as a 'Grouped Project' defined by the 'whole landscape' approach under 'A landscape and ecosystem services approach' on page 2 of the Plan Vivo Standard (2013).

The "initial project activity instance" for the Rarakau Programme is called the 'Inception Project'. The title of the Rarakau Programme is taken from the title of the Inception Project – the Rarakau Forest Carbon Project. 'Rarakau' is the customary name for the land contained in the Inception Project.

The purpose of the Rarakau Programme is to enable New Zealand owners of pre-1990 indigenous forest to benefit from carbon trading opportunities for forest protection through the international voluntary carbon market.

The geographical boundary of the Rarakau Programme is defined as 'New Zealand forest land that meets the eligibility criteria of the Rarakau Programme Methodology D2.1 v2.0, 15 May 2018' (this document).

Methodology

The methodology contained in this document defines the Rarakau Programme methodology and protocols. The GHG elements of the Rarakau Programme methodology are based on anthropogenic carbon stock change factors in the baseline and project scenarios. The Rarakau Programme methodology and protocols have been designed for projects with relatively small per hectare carbon credit volumes (and consequently relatively small associated carbon revenues) due to the relatively low level of baseline emissions in the New Zealand indigenous forest management context. The context for baseline activities is underpinned by New Zealand forest management law and regulation that prevents high impact logging or clear cutting and instead requires (baseline) timber harvesting operations to comply with sustainable forest management requirements of the Ministry for Primary Industries. Project

activities involve the avoidance of commercial timber harvesting and the protection of forest that would be subject to low impact logging in the absence of carbon finance.

The Rarakau Programme is owned and administered by Ekos – a charitable trust established for the purpose of safeguarding the environmental, social, economic and cultural integrity of the Rarakau Programme. Forest protection in the Project Scenario in the Rarakau Programme is undertaken by means of a legal covenant on the land title. Ekos also owns and manages the buffer account for the Rarakau Programme.

1. General Requirements

The general requirements for the Rarakau Programme include eligibility criteria, the use of good practice guidance, and the specific requirements of the Plan Vivo carbon standard.

1.1 ELIGIBILITY

All projects in this Grouped Project must meet the eligibility criteria of the Rarakau Programme as follows:

- Eligible forests will be New Zealand indigenous forests that were already classed as 'forest lands' as of 31 December 1989.
- Baseline and project activities in eligible forests comprise management of carbon stocks in forest-remaining-as-forest activities.
- Baseline and project LULUCF GHG emissions, removals, emission reductions, and enhanced removals in eligible forests must lie outside the GHG accounting boundary of the New Zealand Emissions Trading Scheme (NZETS).
- Eligible forests shall be located on lands owned by individual or communal landowners and/or community groups that have clear land user rights and stable land tenure.
- Eligible project interventions shall be designed to protect and/or enhance biodiversity and the social and economic wellbeing of landowners.
- Eligible project interventions shall not cause negative environmental impacts.

1.1.1 Forest Land

The activity type for each project of this Grouped Project will be 'Improved Forest Management – Logged to Protected Forest' (IFM-LtPF) and applies to project activities in New Zealand that protect natural forest that would be logged in the absence of carbon finance. Generally speaking, converting logged forests to protected forests reduces emissions caused by harvesting (i.e., protects carbon stocks) and increases carbon stocks as the forest re-grows and/or continues to grow.

Eligible forests for this methodology will only include forest land that:

a. Is ineligible for inclusion in the GHG accounting provisions of the New Zealand Emissions Trading Scheme with respect to LULUCF GHG emissions and removals.
b. Is unlogged forest[1], or

[1] Forest that has been logged prior to 1900 (and not since) will be deemed 'unlogged forest' in this methodology.

c. Has been previously logged between 1 January 1900 and 31 December 2009[2], or where the commercial wood harvesting operation currently occurring in these forests began prior to 31 December 2009.
d. Is subject to baseline and project activities comprising 'forest remaining as forest' activities.

Table 1.1.1: Evidence Requirement: Forest Land	
#	Description
1.1.1a	Aerial imagery demonstrating that the eligible forest land falls outside the carbon accounting boundary of the NZETS by existing as forest land as of 31 December 1989.
1.1.1b	Aerial imagery and maps that differentiate between unlogged and logged forest strata.
1.1.1c	Documentation demonstrating that any current commercial wood harvesting operation began prior to 31 December 2009.

1.1.2 Baseline Activity

Baseline activities for each project of this Grouped Project are those implemented on forest lands[3] managed for wood products such as sawn timber, pulpwood, and fuelwood and are included in the IPCC category "forests remaining as forests".

Only areas that have been designated, sanctioned or approved for such activities (e.g. where there is legal sanction to harvest timber or fuelwood) by the national and/or local regulatory bodies are eligible for crediting under this activity type.

This activity type applies only to baseline activities that involve timber and fuelwood harvesting, that result in a reduction in mean carbon stocks and an increase in associated GHG emissions. Baseline activities can also include activities that measurably reduce carbon stocks from other than timber harvesting (e.g. fire used as a management tool).

[2] The reason for restricting eligibility to forests that were logged since 1 January 1900 is due to the default value used for the 'Enhanced Removals' component of the Project Activity being the national average sequestration rate of $3tCO_2\ ha^{-1}\ yr^{-1}$ from 0 to 200 years. Given that IFM-LtPF project activities will occur during the 21st century, any 'Enhanced Removal' activities need to fall within the maximum 200-year time frame. In other words, a forest that was logged prior to 1 January 1900 will be able to claim the Avoided Emissions component of the carbon benefits in the Project Scenario, but not the Enhanced Removals component. This also serves as a 'conservativeness factor' for this activity type.

[3] The Ministry for Primary Industries definition of Forest Land is: "Forest land is defined in the Act as an area of land of at least one hectare with forest species that has, or is likely to have: a crown cover of more than 30 percent on each hectare; and an average crown-cover width of at least 30 metres. Forest land also includes an area of land that is likely to have a crown-cover of more than 30 percent, but an average crown-cover width of less than 30 metres, provided it is contiguous with an area that independently meets the primary definition of forest land. Whether an area with forest species is likely to reach a crown cover of more than 30 percent, and qualify as forest land, will depend on factors such as seedling survival rates, growth conditions, and land management practices." MAF 2010a.

Under New Zealand forestry law, timber can only be harvested from indigenous forests by means of a sustainable management plan or permit. The Forests Act defines sustainable forest management as "management of an area of indigenous forest land in a way that maintains the ability of the forest growing on that land to continue to provide a full range of products and amenities in perpetuity while retaining the forest's natural values."

Consequently, the baseline scenario for this activity type is restricted to forest management activities as defined in New Zealand forestry regulations.

Table 1.1.2: Evidence Requirement: Baseline Activity	
#	Description
1.1.2a	Documentation demonstrating that the Eligible Forest Area for the carbon project is eligible for baseline activities of commercial wood harvesting according to national and local government law and regulation. This documentation will include evidence that the central government and local government regulations (in principle) allow for the baseline activity to occur.
1.1.2b	Documentation demonstrating that the Eligible Forest Area for the carbon project contains commercially viable wood volumes capable of supporting a commercial wood harvesting operation. This information is to be provided in a timber harvesting plan in the form of a Sustainable Forest Management Plan or Permit Application, in combination with a financial additionality test undertaken as part of this methodology.

1.1.3 Project Activity

The project activity for each project of this Grouped Project involves the legal protection of the eligible forests within the Project Area, whereby this protection is afforded by means of a legal covenant on the title of the land preventing baseline activities for the duration of the Project.

Table 1.1.3: Evidence Requirement: Project Activity	
#	Description
1.1.3a	The Project Owner and Project Developer shall provide, at verification of project implementation, legal covenant documentation for each eligible forest in the project area as evidence that the project has been protected by legally binding commitment to prevent baseline activities, and to assure continuation of management practices that protect the credited carbon stocks over the length of the project crediting period.

1.1.4 Logged and Unlogged

The activity type for each project of this Grouped Project is only applicable to activities that protect either

1. Logged or degraded natural forest from further wood harvesting (timber and/or fuelwood) or
2. Unlogged natural forest that would be subjected to wood harvesting in the absence of carbon finance.

There are two main variants to this project type depending on the original condition of the forest in question:

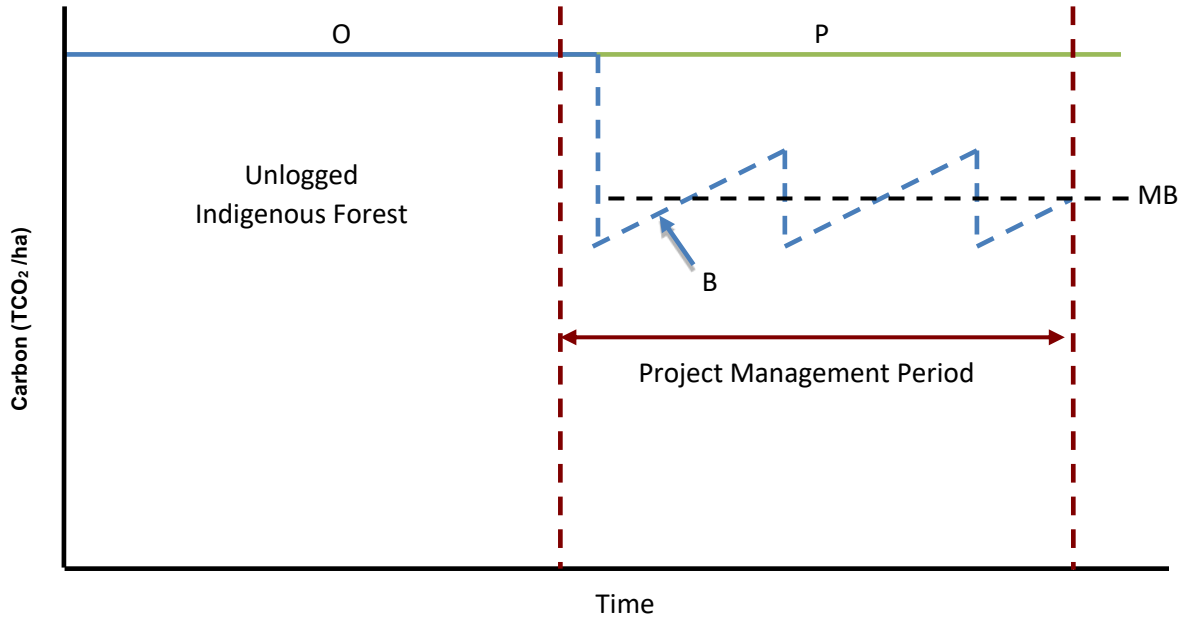
Variant 1: Avoided timber harvesting in an old growth ("climax") forest (Fig 1.1.4a).

Variant 2: Avoided timber harvesting in a regenerating forest (Fig 1.1.4b).

Under Variant 1 (Figure 1.1.4a) the project scenario involves avoiding wood harvesting emissions arising from an unlogged old-growth forest deemed under this variant of this activity type to exist as carbon reservoir only. The baseline emissions would occur as a result of wood harvesting and associated activities.

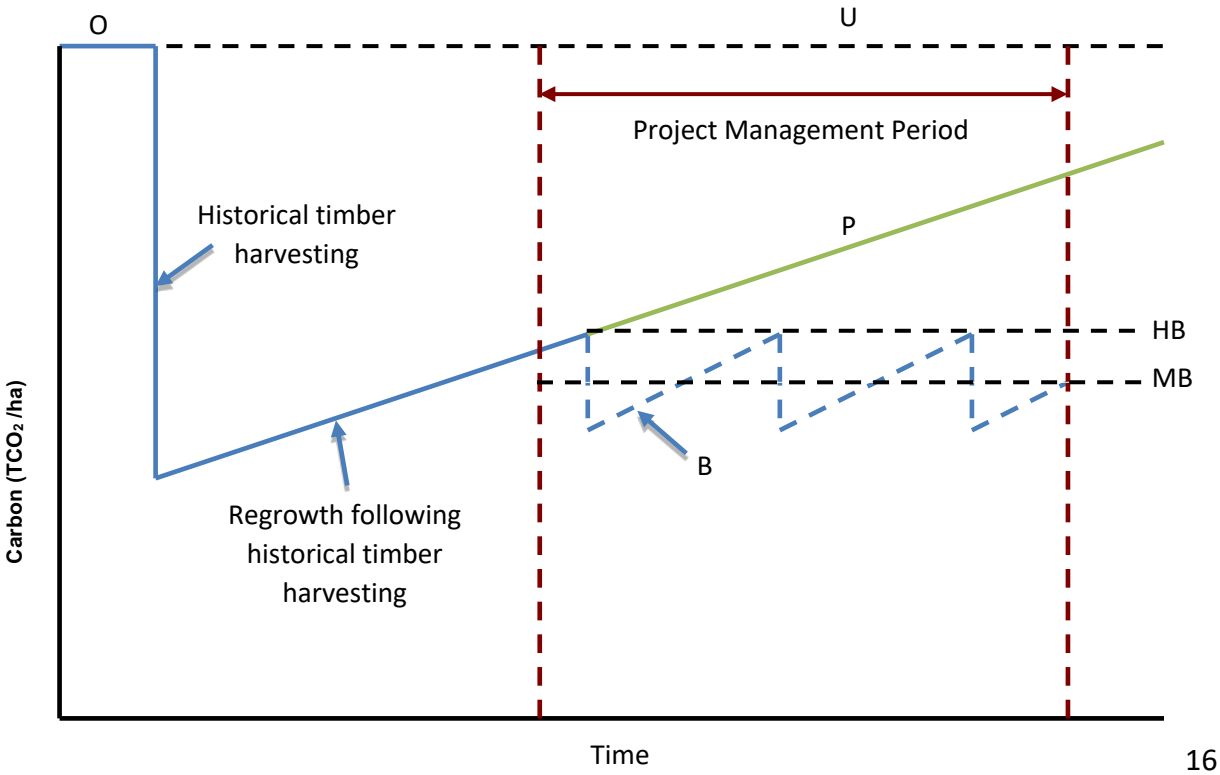
Variant 2 (Figure 1.1.4b) is slightly more complicated by the fact that the forest in question is accumulating carbon biomass annually because it is a regenerating forest system and is therefore a carbon reservoir and a carbon sink. In New Zealand forestry law, and local government regulation, there is only legal sanction to harvest wood according to Ministry for Primary Industries rules (unless special conditions apply in certain local government jurisdictions). For this reason, the baseline modelling in this methodology assumes a flat (rather than degrading) mean baseline carbon stocks for both Variant 1 and Variant 2.

Figure 1.1.4a. Concept diagram of avoided timber harvesting project type starting with an old growth ("climax") forest.



Key for Figure 1.1.4a & b:	O =	Original mean carbon stocks in old growth undisturbed forest
	B =	Baseline Scenario carbon stocks under timber harvesting regime (harvest/regrowth)
	P =	Project Scenario carbon stocks under forest protection regime (approaches asymptote U)
	HB =	Harvest Baseline carbon stocks at start of Reference Scenario
	MB =	Mean Reference carbon stocks under harvest regime
	U =	Upper limit of future mean carbon stocks

Figure 1.1.4b. Concept diagram of avoided timber harvesting project type starting with a regenerating forest.



If a regenerating indigenous forest were subject to timber harvesting, the timber harvesting activity would:

a. Generate emissions, and
b. Cause compensatory regrowth in harvest patches at a higher sequestration rate than outside the harvest patches, and
c. Interrupt the process of natural regeneration by harvesting timber on a sustainable basis starting from a harvest baseline (HB), removing annual permitted timber volumes and allowing regrowth in a harvest cycle that maintains mean carbon stocks at a lower level than if the forest were not subject to a timber harvesting cycle.

The interruption of natural forest succession towards an old-growth condition as a result of timber harvesting is subject to New Zealand forestry regulations that allow for a harvest rate that is calculated on the basis of:

a. The existing timber stocking rate of the forest as the Harvest Baseline
b. A harvesting regime that removes no more than the assessed annual increment in relation to that Harvest Baseline, where
c. The forest is not permitted to progressively degrade, but where the mean biomass of the forest under the harvest regime is allowed to be lower than the Harvest Baseline.

For this reason an activity that protected Logged Forest land parcels and prevented timber harvesting would avoid emissions, and enhance sequestration for those land parcels. The enhanced sequestration is caused by a change in management (forest protection) that allows the forest to continue to function as a net sink until it reaches an old growth ("climax") condition. The eligible carbon credits generated from the enhanced sequestration component of Variant 2 land parcels are limited to the sequestration occurring above the Harvest Baseline. This is because any sequestration occurring below the Harvest Baseline in the harvest/regrowth cycle in the Reference Scenario is deemed carbon neutral under this activity type and methodology.

In each case, the eligible crediting volume of CO_2e is restricted to the difference between the net mean projected Reference Scenario carbon stocks and the net mean Project Scenario carbon stocks, where the reference activity assumes a relatively constant (sustainable) mean carbon stock (and emissions) through time.

Table 1.1.4: Evidence Requirement: Logged and Unlogged Forest	
#	Name/Description
1.1.4a	Aerial imagery delimiting three strata as follows: (a) Non-forest land; (b) Regenerating forest land, and (c) Old growth forest land (n/a for this project)
1.1.4b	Aerial imagery-based area calculation for the three strata defined in 1.1.4a.

1.1.5 Specific Conditions

Specific conditions for all projects in this Grouped Project:

a. Project Owner exists as a suitable entity capable of entering into binding project commitments with the Programme Operator and capable of owning carbon credit assets.
b. Project Owner owns the carbon rights and management rights over the forest lands in the project area.
c. Current and planned land use: land must be legally eligible to be harvested for commercial timber or fuelwood production.
d. Forest lands eligible for crediting under this programme will only include lands that have not received financing for the same project activities from another source.
e. The boundaries of the forest land must be clearly defined and documented.
f. Under the Project Scenario forest use is limited to activities that do not result in commercial timber harvest or forest degradation. To clarify, the Project Scenario can include traditional non-commercial use of forests and forest products that do not result in commercial timber harvest or forest degradation (within a 5% *de minimis* range[4]).
g. Planned timber harvest must be estimated using forest inventory methods that determine allowable annual timber harvest volumes (m^3 ha^{-1}).
h. There may be no leakage through activity shifting to other lands owned or managed by project participants outside the bounds of the carbon project.
i. Baseline activities can include legally sanctioned timber harvesting that degrades forest carbon stocks. This applies to some local government jurisdictions where forest degradation is either permitted or where such activity is likely to get a resource consent and where there is precedent. This also potentially applies to lands covered by the South Island Landless Natives Act (1906).

Table 1.1.5: Evidence Requirement: Specific Conditions	
#	Description
1.1.5a	Project Owner exists as a legal entity capable of acting as a counter party to a sale and purchase agreement and capable of owning carbon credit assets.
1.1.5b	Project Owner owns the carbon rights and management rights over the forest lands in the project area.
1.1.5c	Current and planned land use: land must be legally eligible to be harvested for commercial timber or fuelwood production.
1.1.5d	Forest lands eligible for crediting under this programme will only include lands that have not received financing for the same project activities from another source.
1.1.5e	The boundaries of the forest land must be clearly defined and documented.

[4] I.e. Lower than 5% of the total allowable annual commercial timber harvest volume.

1.1.5f	Under the Project Scenario forest use is limited to activities that do not result in commercial timber harvest or forest degradation. To clarify, the Project Scenario can include traditional non-commercial use of forests and forest products that do not result in commercial timber harvest or forest degradation (within a 5% *de minimis* range).
1.1.5g	Planned timber harvest must be estimated using forest inventory methods that determine allowable annual timber harvest volumes (m^3 ha^{-1}).
1.1.5h	There may be no leakage through activity shifting to other lands owned or managed by project participants outside the bounds of the carbon project.
1.1.5i	Baseline activities can include legally sanctioned timber harvesting that degrades forest carbon stocks. This applies to some local government jurisdictions where forest degradation is either permitted or where such activity is likely to get a resource consent and where there is precedent. This also potentially applies to lands covered by the South Island Landless Natives Act (1906).

1.2 GOOD PRACTICE GUIDANCE

This methodology is based on the following methodological and good practice guidance/guidelines:

a. IPCC 2003 Guidance on LULUCF
b. IPCC 2006 Guidelines on National GHG Inventories
c. Plan Vivo Standard
d. The Clean Development Mechanism (CDM)
e. The Verified Carbon Standard (VCS)
f. The New Zealand (compliance) Carbon Monitoring System
g. Climate Community and Biodiversity Standard (CCB)
h. ISEAL Code of Good Practice: Setting Social and Environmental Standards v5.0 2010. Available here: http://www.isealalliance.org/content/standard-setting-code
i. Developing Social and Environmental Safeguards for REDD+: A guide for bottom-up approach. Imaflora, 2010. Available here: http://forest-trends.org/publication_details.php?publicationID=2573
j. Free Prior and Informed Consent: Principles and approaches for policy and project development. RECOFTC – The Center for People and Forests, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Sector Network Natural Resources and Rural Development – Asia. Available here: www.recoftc.org/site/uploads/content/pdf/FPICinREDDManual_127.pdf
k. The REDD+ Social & Environmental Standards (REDD+ SES) initiative. Available here: http://www.redd-standards.org/
l. United Nations Declaration on the Rights of Indigenous Peoples. Available here: http://www.un.org/esa/socdev/unpfii/en/drip.html

Table 1.2.1: Evidence Requirement: Good Practice Guidance		
#	Good Practice Guidance	How it was used in Methodology
1.2.1a	IPCC 2003 Guidance on LULUCF	Carbon accounting methods and principles were used in the development of the methodology using IPCC 2003 Guidance on LULUCF carbon accounting, resulting in a IPCC Tier 2 forest carbon accounting methodology for this project.
1.2.1b	IPCC 2006 Guidelines on National GHG Inventories	Wood density and dry wood to carbon default values used in this methodology used the default values from the IPCC 2006 Guidelines on National GHG Inventories.
1.2.1c	Plan Vivo Standard	This methodology follows the Plan Vivo standard in every respect.
1.2.1d	The Clean Development Mechanism (CDM)	• The CDM was used as the broad framework for the Programme of Activities/Grouped Project scope of this methodology. • Exclusion of emissions derived from the removal of herbaceous vegetation was based on CDM EB decision reflected in paragraph 11 of the report of the 23rd session of the board: cdm.unfccc.int/Panels/ar/023/ar_023 _rep.pdf • The Additionality test in this methodology is from the VCS, which in turn is derived from the CDM Tool for Demonstration of Additionality.
1.2.1e	The Verified Carbon Standard (VCS)	• The methodology closely followed the methodological guidance of the VCS (particularly the 2008 version as the more recent 2011 version was not available during 2010 when much of this methodological development took place. • There was a close alignment of this methodology with the Green Collar IFM methodology approved by the VCS in 2016. Variations from this methodology were developed for purposes of simplifying project carbon accounting requirements and aligning them with the New Zealand national compliance forest carbon accounting regime.
1.2.1f	The New Zealand (compliance) Carbon Monitoring System	• This methodology uses default values for carbon sequestration rates for New Zealand indigenous woody vegetation derived from the

		New Zealand compliance (Kyoto) carbon accounting system. • This methodology uses the same default value for below ground live biomass as the national compliance (Kyoto) carbon monitoring system.
1.2.1g	Climate Community and Biodiversity Standard (CCB)	• This methodology uses the CCB standard to inform the stakeholder communications component of project development and implementation. This is elaborated in Section 2.12 of this methodology.
1.2.1h	ISEAL Code of Good Practice: Setting Social and Environmental Standards v5.0 2010.	Project consultation protocol
1.2.1i	Developing Social and Environmental Safeguards for REDD+: A guide for bottom-up approach. Imaflora, 2010.	Project consultation protocol
1.2.1j	Free Prior and Informed Consent: Principles and approaches for policy and project development. RECOFTC – The Center for People and Forests, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Sector Network Natural Resources and Rural Development – Asia.	Project consultation protocol
1.2.1k	The REDD+ Social & Environmental Standards (REDD+ SES) initiative.	Project consultation protocol
1.2.1l	United Nations Declaration on the Rights of Indigenous Peoples.	Project consultation protocol; Project Period of 50 years providing indigenous communal land owners the opportunity to make informed decisions concerning the management of their forest lands every 50 years, rather be locked into an obligation in perpetuity.

2. Describing The Project

2.1 PROJECT TITLE, PURPOSE(S) AND OBJECTIVE(S)

2.1.1 Project Title

Each project of this Grouped Project must have a separate title, usually termed '[Name] Forest Carbon Project'. The Project Title must have a sub-title denoting the project type code (e.g. IFM-LtPF), denoting whether the project is an Inception Project or a Sub-Project in the Grouped Project, and the name of the Grouped Project. An example of the naming convention for this methodology is: 'Rarakau Forest Carbon Project: IFM-LtPF Sub-Project for the Rarakau Programme.'

2.1.2 Project Purpose

The purpose of all projects in this Grouped Project is to reduce GHG emissions and enhance GHG removals through a greenhouse gas project involving the protection of indigenous forests within the project boundary. Forests protected under this project would otherwise be subject to:

a. Greenhouse gas emissions arising from wood harvesting and forest degradation.
b. Arrested succession caused by activities that interrupt greenhouse gas removals to the extent possible under improved forest management practices.

2.1.3 Project Objectives

The project objectives for all projects in this Grouped Project are to change the management of the project forests to:

a. Terminate commercial wood harvesting practices and avoid future commercial wood harvesting for the duration of the project.
b. Terminate management practices that impede the rate of greenhouse gas removals and/or threaten the permanence on forest lands within the project boundary and on adjacent lands owned and controlled by the Project Owner for the duration of the project.

Project Owners must make a declaration in the PD that the objectives of the project are consistent with the objectives listed here (above) as the core objectives of the project. Project Owners also have the option of indicating any additional objectives of the project that may relate to the enhancement of certain co-benefits.

2.2 TYPE OF GHG PROJECT

The project type for all projects in this Grouped Project is Improved Forest Management – Logged to Protected Forest (IFM-LtPF). This is a forest-remaining-as-forest activity in both the baseline and project scenarios, which involves the termination of planned wood harvesting and the protection of indigenous forests by means of a legal covenant.

2.3 PROJECT LOCATION

2.3.1 Topography

All projects in this grouped project must provide a description of the topography of the Project Area.

2.3.2 Geology and Soils

All projects in this grouped project must provide a description of the geology and soils of the Project Area.

2.3.3 Climate

All projects in this grouped project must provide a description of the climate of the Project Area.

2.3.4 Forests

All projects in this grouped project must provide a description of the forests of the Project Area.

2.3.5 Geographical Boundaries

Project Owners and Project Developers for each projects in this Grouped Project are required to provide the following maps:

a. Project Location Map 1. This map depicts the approximate project location on a New Zealand map image.
b. Project Location Map 2. This map depicts the location of the project on a regional scale map image.
c. Project Area Map. This map depicts the boundary of the Project Area, the Boundary of the Forest Area, and the boundary of Eligible Forest Area within the Project Area using a contemporary remote aerial image.
d. Eligible Forest Area. The Eligible Forest Area map images shall

a. Depict the forest areas to be used for GHG accounting purposes in this methodology
b. Include forest areas no less than 0.2ha in area
c. Include an aerial image using a resolution of less than 1.0m
d. Depict the forest/non-forest boundary for all actual forest contained in the Project Area whilst also showing (e.g. in a separate map image) forest areas excluded from the project due to size (i.e. less than 0.2ha in area) or Project Owner preference (e.g. areas for whatever reason the Project Owner wishes to be excluded from the Project).
e. Depict the forest areas
f. 1990 Eligibility Map. This map depicts the Project Area and Eligible Forest Area using a remote image from 31 December 1989 to show that the Eligible Forest Area is located on land that was classed as 'forest land' as of that date.

Table 2.3.5: Evidence Requirement: Project Maps	
#	Name/Description
2.3.5a	Project Location Map 1. This map depicts the approximate project location on a New Zealand map image.
2.3.5b	Project Location Map 2. This map depicts the location of the project on a regional scale map image.
2.3.5c	Project Area Map. This map depicts the boundary of the Project Area, and the boundary of Eligible Forest Area within the Project Area using a contemporary remote aerial image.
2.3.5d	Logged and Unlogged Forest. This map depicts the Eligible Forest Area differentiated into two strata: Logged Forest and Unlogged Forest.
2.3.5e	1990 Eligibility Map. This map depicts the Project Area and Eligible Forest Area using a remote image from 31 December 1989 to show that the Eligible Forest Area is located on land that was classed as 'forest land' as of that date.
2.3.5f	Project Area Vegetation Map.

2.3.6 Project Areas

'Project areas' refers to the Project Area, Forest Area, and Eligible Forest Area. The Project Area (PA), Forest Area (FA), and Eligible Forest Area (EFA) must be clearly defined and mapped for each project in this Grouped Project, using aerial imagery that depicts the contemporary boundaries of the three strata: Non-Forest; Old Growth Forest; Regenerating Forest.

The Project Area may be composed of more than one land parcel that are aggregated to form a single project. The boundary of each land parcel must be clearly defined with a unique identifier for each land parcel, and geographic coordinates for each polygon vertex.

The Forest Area (FA) is defined as the area of 'forest land' as defined by the Ministry of Agriculture and Forestry and contained within the Project Area. The Forest Area must be clearly defined and mapped for each project in this Grouped Project.

The Eligible Forest Area (EFA) is the subset of the Forest Area (FA) comprising forest defined in the Sustainable Management Plan/Permit Application as containing timber and/or fuelwood in commercially harvestable volumes and accessible to harvesting operations in terms of terrain, topography, and economic accessibility.

Project Developers are required to include the geographic coordinates of each land polygon vertex in the project boundary description to enable unique project identification and delineation.

Table 2.3.6: Evidence Requirement: Project Areas	
#	Name/Description
2.3.6a	The geographic coordinates of each land polygon vertex for the Project Area land parcel/s.
2.3.6b	The geographic coordinates of each land polygon vertex for the Eligible Forest Area land parcel/s contained within the Project Area.

2.3.7 Reference Area

Projects using this methodology shall use reference areas (where available) to support calculations in the baseline scenario. This is particularly relevant for situations where baseline data exists in a reference area that can be used to strengthen baseline carbon accounting claims.

2.4 ORIGINAL CONDITIONS

Project Owners and Project Developers for each project in this Grouped Project must make a declaration of, and provide evidence supporting, the original condition of the forest contained in the Eligible Forest Area. Options for original conditions in this IFM-LtPF methodology are: a) Old-growth forest not currently being logged (carbon reservoir only); b) Previously logged regenerating forest (carbon reservoir and sink).

Table 2.4: Evidence Requirement: Original Conditions	
#	Name/Description
2.4a	Evidence of old growth forest areas in the Eligible Forest Area.
2.4b	Evidence of regenerating forest areas in the Eligible Forest Area

2.5 PROJECT GHG STRATEGY

Each project in this Grouped Project must use a GHG Strategy that achieves GHG emission reductions and/or sink removals through:

a. Terminating and/or avoiding commercial wood harvesting in old growth and/or regenerating forests.

b. Terminating the use of fire as a land clearance tool on adjacent non-forest lands owned and controlled by the Project Owner, and only using fire as an agricultural management tool under permit issued by the relevant Rural Fire Authority with jurisdiction over the Project Area.
c. Implementing a forest carbon management plan to ensure the protection of the GHG emission reductions and/or sink removals for the duration of the Project Period.

Table 2.5: Evidence Requirement: Project GHG Strategy		
#	Name/Description	Location
2.5a	Termination and/or avoiding commercial wood harvesting	Project Implementation Plan; Project Monitoring Report.
2.5b	Termination of the use of fire as a land clearance tool	Project Implementation Plan; Project Monitoring Report
2.5c	Implementation of Project Implementation Plan	Project Implementation Plan; Project Monitoring Reports.
2.5d	Legal protection of project forests	This methodology requires Project Owners to execute a legal covenant on the land title with respect to the protection of their forests for purposes of complying with the Rarakau Programme.

2.6 PROJECT OUTPUTS

Project Developers are required to describe project technologies, products, services and the expected level of activity. This shall include a detailed description of each of the project activities to be undertaken during project implementation.

2.7 CARBON BENEFITS

All projects in this Grouped Project will undertake a calculation of baseline and project GHG emissions and removals, and emission reductions and removal enhancements using the methodology provided in Sections 7 and 8 of this report.

Table 2.7: Evidence Requirement: Carbon Benefits	
#	Name/Description
2.7a	Emission Reductions
2.7b	Removal Enhancements

2.8 PROJECT RISKS

This methodology applies a Project Risk Rating of 0.20 or the Overall Risk Rating (ORR) arising from application of the VCS AFOLU Non-Permanence Risk Tool, v3.0 (2011) for Internal Risk – which-ever is the larger. The risk categories for internal risk assessment are:

- Internal Risk 1: Project Management Risk
- Internal Risk 2: Financial Viability Risk
- Internal Risk 3: Opportunity Cost Risk
- Internal Risk 4: Project Longevity

2.9 PROJECT ROLES & RESPONSIBILITIES

2.9.1 Project Coordinator

The Project Coordinator shall be an established legal entity that takes overall responsibility for the project and meeting the requirements of the Plan Vivo Standard for its duration. The Project Coordinator shall have must have the legal and administrative capacity to enter into *PES agreements* with participants and to manage the disbursement of payments for ecosystem services.

If coordinating functions are delegated or shared between the project coordinator and another body or bodies, the responsibilities of each body must be clearly defined and formalised in a written agreement, e.g. Memorandum of Understanding, which must be kept up-to-date as the project progresses.

The project coordinator must have the capacity to support participants in the design of project interventions, select appropriate participants for inclusion in the project, and develop effective participatory relationships including providing ongoing support as required to sustain the project.

The project coordinator must undertake a stakeholder analysis to identify key communities, organisations, and local and national authorities that are likely to be affected by or have a stake in the project. This project coordinator must take appropriate steps to inform them about the project and seek their views, and secure approval where necessary.

Project Owners and Project Coordinators for the Inception Project and each Sub-Project of this Grouped Project must provide information concerning roles and responsibilities for the project. These roles and responsibilities are also defined in the Project Consultation Protocol.

Table 2.9: Evidence Requirement: Roles and Responsibilities		
#	Name/Description	Location
2.9a	Project Roles and Responsibilities	Evidence for the assigning of roles and responsibilities must be provided in supporting documentation pursuant to the Project Consultation Protocol.

2.9.2 Key Project Stakeholders

Table 2.9.1: Project Roles And Responsibilities		
Primary Participants		
Role	Responsibility	Legal Instrument
Project Owner	Owner of carbon rights	• By default
	Project co-management	• Project Development agreement with Project Developer
	Project co-monitoring	• Project Agreement with Project Developer
Project Coordinator	Project designer and developer	• Licence Agreement with Programme Operator
	Project designer and developer	• Project Agreement with Project Owner
	Project co-management	• Project Agreement with Project Owner
	Project co-monitoring	• Project Agreement with Project Owner
	Project registry agent for carbon credits	• Registry Communications Agreement with Registry & subject to Project Agreement with Project Owner
	Credit sales and marketing agent	• Project Agreement with Project Owner
	Project insurance facilitator	• Project Agreement with Project Owner
Programme Operator	Guardian of environmental and co-benefit integrity of Rarakau Programme	• Licence Agreement with Project Developer • Programme Agreement with Project Owner • Project Owner representation on Advisory Board of Programme Operator
	Project registry agent for pooled buffer account	• Programme Agreement with Project Owner • Licence Agreement with Project Developer
	Owner of buffer credits	• Programme Agreement with Project Owner • Licence Agreement with Project Developer
	Owner of IP associated with Rarakau Programme (including methodologies)	• Licence Agreement with Project Developer
	Counter-party to carbon buyers and brokers	• VER Purchase Agreements with carbon buyers and/or VER Brokerage Agreements with brokers
	Carbon revenue disbursement agent	• Programme Agreement • License Agreement

Project Standards	• Plan Vivo	• Validation/Verification Service Agreement with Project Developer
Project Validator / Verifier	Validator and verifier	• Validation/Verification Service Agreement with Project Developer
Project Registry	• Carbon credit registry • Issuance of VERs	• Registry Terms and Conditions • Registry Communications Agreement with Project Developer • Registry Agent clause in Project Agreement between Project Developer and Project Owner • Registry Agent clause in Programme Agreement with Project Owner
Carbon Credit Buyer	Purchase carbon credits	• VER Purchase Agreements with carbon buyers and/or VER Brokerage Agreements with brokers
Secondary Participants (optional)		
Project Developer's subcontractors	Legal consultants	• Service Contracts with Project Developer
	Forest inventory contractors	• Service Contracts with Project Developer
	Mapping and remote sensing contractors	• Service Contracts with Project Developer
	Economist	• Service Contracts with Project Developer
	Sales and marketing agent	• Service Contracts with Project Developer and project Owner
Carbon Credit Broker	Carbon credit sales intermediary	• Brokerage Agreement with Project Developer and Project Owner
Insurers	Commercial insurance	• Insurance Policies with Project Owner and Programme Operator

Note that secondary participants are optional, as all of the tasks attributable to secondary participants can either be undertaken by primary participants (e.g. project development activities) or not undertaken at all (e.g. carbon brokerage, insurance).

2.9.3 Project Key Personnel

All projects in this Grouped Project shall list and provide a short bio for each of their key personnel corresponding to the roles and responsibilities of the project proponent.

2.10 LAWS & REGULATIONS

All projects shall identify relevant laws and regulations relating to the project and show how the project complies with these laws (where applicable specifically to project interventions). This includes the need to secure any legal or regulatory permissions required to carry out

project interventions, e.g. authorisation or a license for a community forest management plan from the local authority).

2.11 ENVIRONMENTAL IMPACT ASSESSMENT

An Environmental Impact Assessment is not required for voluntary forest projects undertaken in New Zealand. This is because voluntary forest protection is a permitted activity under New Zealand law and local government legislation (Appendix 1).

2.12 STAKEHOLDER COMMUNICATIONS

All projects in this Grouped Project must implement each component of the Project Consultation Protocol provided in Section 9.1.3 of this methodology.

2.13 PROJECT TIMELINE

All projects in this Grouped Project must define the following Project Timeline elements:

a. Project Period
b. Forest Protection Period
c. Project Crediting Period
d. Project Management Period
e. Project Monitoring Period, and
f. Project Termination.

Project Period: The Project Period is the period in which the project is being undertaken as a carbon project, whereby Baseline Activities are replaced by Project Activities. The Project Period for all projects in this Grouped Project will be 50 years, with the option (in every Project Period) to roll over the project for a subsequent Project Period of 50 years, or to undertake the project for more than one Project Period (e.g. two 50-year Project Periods) at a time.

Forest Protection Period: The Forest Protection Period is the duration of the legal protection afforded to the forests within the project. This methodology provides Project Owners with the option to protect forests for the Project Period (i.e. 50 years) with the ability to continue rolling over the Project Period for subsequent 50-year Project Periods. This methodology also provides Project Owners with the option to protect the forests in perpetuity from the beginning of the first Project Period. The legal protection of eligible forests is required by means of a legal covenant on the land title executed no later than 3 months following project registration.

Project Crediting Period: The Project Crediting Period will be 5 yearly monitoring periods starting with the start of the Project Period and will continue until the End of the Project Period.

Project Management Period: The Project Management Period comprises each annual project management cycle, starting on the Project Start Date, which marks the beginning of the

Project Period. A Project Management Workshop must follow each Project Management Period within 3 months of the end of each Project Management Period, as required in the Project Consultation Protocol defined in Section 9.1.3 of this document.

Project Termination: Project Termination is the date at which the project ends, and is not rolled over for subsequent Project Periods. Project Termination must be at the end of a Project Period.

Rationale For 50-Year Project Period Cycle: According to the IPCC (2000) (Chapter 5.3.4) there are a number of approaches to project duration for LULUCF projects: Perpetuity, 100 Years, Equivalence Based, and Variable. Two are relevant to the Rarakau Programme:

"100 Years: Under this approach, the GHG benefits of a project must be maintained for a period of 100 years to be consistent with the Kyoto Protocol's adoption of the IPCC's GWPs (Article 5.3) and the Protocol's 100-year reference time frame (Addendum to the Protocol, Decision 2/CP.3, para. 3) for calculation of the AGWP for CO2. Although this concept has limitations (IPCC, 1996), it has been adopted for use in the Kyoto Protocol to account for total emissions of GHGs on a CO2-equivalent basis."

"Equivalence Based: Under this approach, the GHG benefits of LULUCF mitigation projects must be maintained until they counteract the effect of an equivalent amount of GHGs emitted to the atmosphere, estimated on the basis of the cumulative radiative forcing effect of a pulse emission of CO_2e during its residence in the atmosphere (i.e., its AGWP) (IPCC, 1992). Variations of this concept have been developed that proposed minimum time frames of 55 years (Moura-Costa and Wilson, 2000) or 100 years (Fearnside et al., 2000)."

The intention of the Rarakau Programme is to provide for forest protection in perpetuity but in a manner that respects the rights of indigenous peoples and other private landowners in relation to the ability to make land use decisions in future generations. The Rarakau Programme provides for this by adopting a minimum Project Period of 50 years with the option to roll over the project for subsequent 50-year periods indefinitely. This 50-year Project Period cycle is designed to provide a degree of intergenerational equity that would not be available to landowners under a permanent covenant. This 50-year cycle enables future generations of Project Owners to make informed decisions concerning the management of their forests in light of a re-evaluation of the realities of forest resource management every 50 years. The Rarakau Programme has adopted this approach to demonstrate respect for future landowners (particularly indigenous peoples) under the premise:

A. That the governance rights (including strategic development decisions) over forest resources ought not to be permanently locked by past generations as a consequence of participation in carbon market activities, and
B. That there is a degree of uncertainty concerning the future existence of carbon markets beyond 50 years from the present and where an adaptive management approach would need the flexibility to change with changing circumstances.

This programme design feature is designed to enable a larger number of forest resource owners feel sufficiently empowered to participate in this programme compared with a programme that locked all future generations of landowners into a particular regime. This is of particular relevance to Maori land owners who own land communally.

2.14 PERMANENCE

The Rarakau Programme methodology requires Project Owners to undertake a legal covenant on their land title. The duration of the covenant is to be no less than the duration of the Project Period (i.e. 50 years with an indefinite option to roll over for subsequent Project Periods).

2.15 TRANSITION TO COMPLIANCE

This methodology is restricted to forest lands that lie outside the GHG accounting boundary of the New Zealand Emissions Trading Scheme (NZETS) and applies to indigenous forest established prior to 1990. If forests in the Rarakau Programme change in status from voluntary space to compliance space one of two things must occur: Either:-

A. The project continues but shifts from a voluntary carbon market activity to a compliance carbon market activity and subject to the overriding rules of that international and/or domestic compliance programme, or
B. The project continues in the international voluntary carbon market after the Rarakau Programme receives a guarantee from the New Zealand Government that the government will not include Rarakau Programme forests in the national LULUCF GHG accounting regime, and not make any domestic or international GHG claim concerning these forests.

2.16 DISBURSEMENT OF FUNDS

Projects shall identify a transparent mechanism and procedures for the receipt, holding and disbursement of PES funds must be defined and applied, with funds intended for PES earmarked and managed through an account established for this sole purpose, separate to the project coordinator‘s general operational finances.

2.17 PROJECT BUDGETS

A project budget and financial plan must be developed by the project coordinator and updated at least every three months, including documentation of operational costs and PES disbursed, and funding received, demonstrating how adequate funds to sustain the project have been or will be secured.

2.18 EQUAL OPPORTUNITY

Project participants, including women and members of *marginalised groups*, must be given an equal opportunity to fill *employment* positions in the project where job requirements are met or for roles where they can be cost-effectively trained.

2.19 TRANSFERRAL OF PROJECT COORDINATION

If coordinating functions are to be transferred at any time, it requires the approval of the Plan Vivo Foundation. For this, in addition to the new project coordinator meeting all requirements set out in this document, a plan for execution of transfer needs to be submitted, which sets out how the transfer will be managed, including by providing necessary capacity building for new organization(s) and by gaining support of stakeholders including participating communities.

3. Identifying GHG Sources, Sinks and Reservoirs

The GHG sources, sinks and reservoirs in this methodology are restricted to LULUCF sector carbon emissions and removals as follows:

Table 3a: GHG Sources, Sinks, and Reservoirs: Rarakau Programme	
Sources	CO_2e emissions from above ground woody biomass removed from the forest.
	CO_2e emissions from above ground woody biomass entering the deadwood pool in the form of discarded crown and branches of harvested (target) trees.
	CO_2e emissions from additions to the above ground deadwood carbon pool resulting from collateral damage to non-target trees due to wood harvest activities.
	CO_2e emissions from the decomposition of below ground biomass resulting from above ground wood harvesting and collateral damage.
Sinks	CO_2e sequestered in the natural background rate of natural forest regeneration.
	CO_2e sequestered in harvest patches as a consequence of the opening the forest canopy.
Reservoirs	The GHG assessment in this project measures and estimates the change in carbon stocks contained in carbon reservoirs (and associated emissions and/or removals), rather than the total content of carbon stored in the forest carbon reservoirs/pools. Accordingly, the total volume of carbon stored in the above ground and below ground carbon pools is not measured in this methodology.

The GHG sources and sinks measured in this methodology are restricted to LULUCF carbon pools that are controlled by the Project Owners and lie within the Eligible Forest Area of the project.

The carbon pools used in this methodology are:

Table 3b: Carbon Pools Used in this Methodology		
Carbon Pool	Included/ Excluded	Justification
Above ground biomass (AGB)	Included	At a minimum, the stock change in the above-ground tree biomass shall be estimated.
Below ground biomass (BGB)	Included	When you kill a tree you also kill its roots. The New Zealand national compliance (Kyoto) forest carbon accounting system uses a BGB default value of 25% of AGB. The only exception to this default rule for this methodology applies to the following species that are known to be capable of regenerating from cut stumps: *Belschmedia tawa, Weimannia racemosa, Alectyron excelsum*, and *Corynocarpus*

		laevigatis. Project Developers shall identify the proportion of the above ground biomass emitted (ABGE) attributable to these four species in the Baseline, and remove the below ground biomass emitted (BGBE) portion for these species in the baseline calculation.
Dead-wood (DW)	Included	Required under VCS Tool for AFOLU Methodological Issues.
Harvested Wood Products	Excluded	Total baseline timber harvesting volumes permitted in New Zealand are very low per hectare per year, and the harvested wood product element of the baseline carbon pool is in this methodology deemed to be *de minimis*.
Litter	Excluded	Insignificant and exclusion is conservative.
Soil organic carbon	Excluded	Exclusion is always conservative when forests remain as forests.

The inclusion/exclusion of greenhouse gases in this methodology are shown in Table 3c.

Table 3c: Emission sources other than resulting from changes in stocks in carbon pools

Gas	Sources	Included / Excluded	Justification
Carbon dioxide (CO_2)	Included in carbon pools specified in Table 3b.	Included	As stated in Table 3b.
	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Covered by Kyoto carbon accounting in New Zealand and therefore would be double counted if included.
	Removal of herbaceous vegetation	Excluded	Based on CDM EB decision reflected in paragraph 11 of the report of the 23rd session of the board: cdm.unfccc.int/Panels/ar/023/ar_023_rep.pdf
Methane (CH_4)	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Covered by Kyoto carbon accounting in New Zealand and therefore would be double counted if included.
	Burning of biomass	Excluded	Exclusion is conservative.
Nitrous oxide (N_2O)	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Covered by Kyoto carbon accounting in New Zealand and therefore would be double counted if included.
	Nitrogen based fertilizer	Excluded	No fertilizer is used in the baseline or the project scenario.
	Burning of biomass	Excluded	Potential emissions are not significant and conservatively neglected.

4. Determining The Baseline Scenario

Baseline activities under this methodology are restricted to those implemented on forest lands[5] managed for wood products such as sawn timber, pulpwood, and fuelwood and are included in the IPCC category "forests-remaining-as-forests".

Only areas that have been designated, sanctioned or approved for such activities (e.g. where there is legal sanction to harvest timber) by the national and/or local regulatory bodies are eligible for crediting under this methodology.

This methodology applies only to baseline activities that involve commercial timber and/or fuelwood harvesting, that result in a reduction in mean carbon stocks and associated emissions.

Under New Zealand forestry law, timber can only be harvested from indigenous forests by means of a Sustainable Management Plan or Permit.[6]

Consequently, the Baseline Scenario for this methodology is restricted to sustainable forest management activities as defined in New Zealand forestry regulations.

4.1 BASELINE SELECTION, ADDITIONALITY AND BASELINE MODELLING

4.1.1 Selection of Baseline

Each project in this Grouped Project must determine the Baseline Scenario as wood harvesting according to the wood harvesting plan component of a Sustainable Forest Management Plan or Sustainable Forest Management Permit Application for each land parcel in the Project Area.

[5] The Ministry for Primary Industries (MPI) definition of Forest Land is: "Forest land is defined in the Act as an area of land of at least one hectare with forest species that has, or is likely to have: a crown cover of more than 30 percent on each hectare; and an average crown-cover width of at least 30 metres. Forest land also includes an area of land that is likely to have a crown-cover of more than 30 percent, but an average crown-cover width of less than 30 metres, provided it is contiguous with an area that independently meets the primary definition of forest land. Whether an area with forest species is likely to reach a crown cover of more than 30 percent, and qualify as forest land, will depend on factors such as seedling survival rates, growth conditions, and land management practices." MAF 2010a.

[6] There is an exception to the sustainable forest management provisions of the Forest Amendment Act (1993) regarding SILNA lands (a category of Maori land ownership located predominantly in Southland). To harvest timber however, SILNA owners still need legal sanction at the local government level and this presents a regulatory barrier to unsustainable timber harvests.

Under New Zealand forestry law, timber can only be harvested from indigenous forests by means of a Sustainable Forest Management Plan or Permit. The Forests Act 1949[7] defines sustainable forest management as "management of an area of indigenous forest land in a way that maintains the ability of the forest growing on that land to continue to provide a full range of products and amenities in perpetuity while retaining the forest's natural values."

Sawmills are only permitted to mill logs of indigenous timber species sourced from forests managed under a Sustainable Forest Management Plan or Permit, or subject to other approved sources (e.g. naturally dead timber, or timber approved for the owners personal use).

Indigenous timber harvesting under a Sustainable Forest Management Plan Baseline Scenario, therefore, reduces the carbon stocks of the standing indigenous forest in comparison with a non-harvest (e.g. old growth and/or regenerating) Project Scenario. In other words, the baseline carbon stocks are lower than the project carbon stocks, and conversely, the baseline GHG emissions are higher than the project GHG emissions. The difference between these GHG emissions is the subject of this methodology.

In justifying the Baseline Activity, Project Developers must determine the most likely land use in the absence of the project, through the identification of possible land uses using the following criteria, and an assessment of land use options according to the following criteria:

a. Land suitability
b. Technical barriers
c. Economic barriers
d. Institutional constraints

4.1.2 Justification of Selected Baseline

All projects in this Grouped Project must justify the selected baseline in terms of the most likely baseline activity and scale of the baseline activity. The scale of baseline activity has a direct bearing on the volume of baseline emissions. The scale of the baseline activity is determined by:

a. Legal sanction of the baseline activity type,
b. Legal sanction of baseline activity scale, and
c. Commercial viability of the type and scale of baseline activity.

4.1.2.1 Commercially Viable Baseline

While a Sustainable Forest Management Plan or Permit Application set the maximum amount of timber that can legally be harvested from the forests, some of that permitted timber harvesting may not be economically viable to harvest. Therefore, it is important that the

[7] Definitions in the Forest Act 1949 No 19 (as at December 2009). Available here: http://www.legislation.govt.nz/act/public/1949/0019/latest/DLM255632.html

baseline activity is defined as the maximum harvest of timber that is allowed under the Sustainable Forest Management Plans and is profitable to harvest.

An economic analysis of each Sustainable Forest Management Plan or Permit Application is required for all projects in this Grouped Project. This economic analysis can be used as a basis for establishing the scale of baseline activity. There are varying degrees of diligence to which an economic assessment can be carried out, which are summarised below:

- Assumption that current situation will prevail, based solely on the previous economic analysis.
- Assumption that current situation will prevail, based on updated economic analysis.
- Recognition that economic situation will vary temporally, assessment based on best available economic forecasts.
- Use a new methodology that allows for ex-post updating of the baseline by updating parameters of economic model.

This methodology establishes the baseline on historical activities in the project and/or reference area, so is similar to making the assumption that the current situation will continue for the Project Period. Project Developers are required to update the baseline every ten years from the Project Start Date.

4.1.3 Justification for Excluding Alternative Baselines

All projects in this Grouped Project must justify the exclusion of alternative by means of an assessment of the feasibility or likelihood of alternative baselines.

4.1.4 Stratification

All projects in this Grouped Project stratify the baseline scenario into the following strata:

a. Forest composition stratification.
b. Forest management stratification.

Forest composition strata include forest type, vegetation type and/or target timber species, and must follow the guidance provided by MPI for the development of Sustainable Forest Management Plans or Permits.

The two forest management strata for this project are:

a. Logged Forest - areas of forest have been subjected to timber harvesting between 1 January 1900 and 31 December 2009.
b. Unlogged Forest - areas of forest not subject to past timber harvesting. This includes old growth forest where:
    i. There is evidence of the forest not being logged since 1 January 1900 or
    ii. Forest that may have been logged since 1 January 1900 but which is (conservatively) deemed to have not been logged since 1 January 1900. (The conservatism in the latter relates to the fact that forests or land parcels deemed

to be 'Unlogged Forest' in the Baseline Scenario are not eligible for claiming Enhanced Removals in the Project Scenario because they are deemed to be not accumulating biomass annually in their original condition.

4.1.5 Additionality

This methodology tests the additionality of the project using the most recent version of the VCS Additionality Tool.

Project Description Documentation undertaken prior to 2011 will use the following method (from the 2007 version of the VCS Additionality Tool):

Step I: Regulatory Surplus

The project shall not be mandated by any enforced law, statute or other regulatory framework.

Step II: Implementation Barriers

The project shall face one (or more) distinct barrier(s) compared with barriers faced by alternative projects.

- *Investment Barrier – Project faces capital or investment return constraints that can be overcome by the additional revenues associated with the generation of VERs.*
- *Technological Barriers – Project faces technology-related barriers to its implementation.*
- *Institutional barriers – Project faces financial, organizational, cultural or social barriers that the VER revenue stream can help overcome.*

Step III: Common Practice

- *Project type shall not be common practice in sector/region, compared with projects that have received no carbon finance.*
- *If it is common practice, the Project Developer shall identify barriers faced compared with existing projects.*
- *Demonstration that the project is not common practice shall be based on guidance in the GHG Protocol for Project Accounting, Chapter 7.*

5. Baseline Scenario GHG Sources, Sinks and Reservoirs

Criteria for Identifying GHG Sources, Sinks, and Reservoirs

The GHG sources, sinks and reservoirs in this methodology are restricted to LULUCF sector carbon emissions and removals as follows:

Table 5a: GHG Sources, Sinks, and Reservoirs: Rarakau Programme	
Sources	CO_2e emissions from above ground woody biomass removed from the forest.
	CO_2e emissions from above ground woody biomass entering the deadwood pool in the form of discarded crown and branches of harvested (target) trees.
	CO_2e emissions from additions to the above ground deadwood carbon pool resulting from collateral damage to non-target trees due to wood harvest activities.
	CO_2e emissions from the decomposition of below ground biomass resulting from above ground wood harvesting and collateral damage.
Sinks	CO_2e sequestered in the natural background rate of natural forest regeneration.
	CO_2e sequestered in harvest patches as a consequence of the opening the forest canopy.
Reservoirs	The GHG assessment in this project measures and estimates the change in carbon stocks contained in carbon reservoirs (and associated emissions and/or removals), rather than the total content of carbon stored in the forest carbon reservoirs/pools. Accordingly, the total volume of carbon stored in the above ground and below ground carbon pools is not measured in this methodology.

The GHG sources and sinks measured in this methodology are restricted to LULUCF carbon pools that are controlled by the Project Owners and lie within the Eligible Forest Area of the project.

Additional Criteria

The carbon pools used in this methodology are:

Table 5b: Carbon Pools Used in this Methodology		
Carbon Pool	Included/ Excluded	Justification
Above ground biomass (AGB)	Included	At a minimum, the stock change in the above-ground tree biomass shall be estimated.
Below ground biomass (BGB)	Included	When you kill a tree you also kill its roots. The New Zealand national compliance (Kyoto) forest carbon accounting system uses a BGB default value of 25%

		of AGB. The only exception to this default rule for this methodology applies to the following species that are known to be capable of regenerating from cut stumps: *Belschmedia tawa, Weimannia racemosa, Alectyron excelsum,* and *Corynocarpus laevigatis*. Project Developers shall identify the proportion of the above ground biomass emitted (ABGE) attributable to these four species in the Baseline, and remove the below ground biomass emitted (BGBE) portion for these species in the baseline calculation.
Dead-wood (DW)	Included	Required under VCS Tool for AFOLU Methodological Issues.
Harvested Wood Products	Excluded	Total baseline timber harvesting volumes permitted in New Zealand are very low per hectare per year, and the harvested wood product element of the baseline carbon pool is in this methodology deemed to be *de minimis*.
Litter	Excluded	Insignificant and exclusion is conservative.
Soil organic carbon	Excluded	Exclusion is always conservative when forests remain as forests.

The inclusion/exclusion of greenhouse gases in this methodology are shown in Table 5c.

Table 5c: Emission sources other than resulting from changes in stocks in carbon pools

Gas	Sources	Included / Excluded	Justification
Carbon dioxide (CO_2)	Included in carbon pools specified in Table 6b.	Included	As stated in Table 6b.
	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Covered by Kyoto carbon accounting in New Zealand and therefore would be double counted if included.
	Removal of herbaceous vegetation	Excluded	Based on CDM EB decision reflected in paragraph 11 of the report of the 23rd session of the board: cdm.unfccc.int/Panels/ar/023/ar_023_rep.pdf
Methane (CH_4)	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Covered by Kyoto carbon accounting in New Zealand and therefore would be double counted if included.
	Burning of biomass	Excluded	Exclusion is conservative.
Nitrous oxide (N_2O)	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Covered by Kyoto carbon accounting in New Zealand and therefore would be double counted if included.
	Nitrogen based fertilizer	Excluded	No fertilizer is used in the baseline or the project scenario.

Table 5c: Emission sources other than resulting from changes in stocks in carbon pools			
Gas	Sources	Included / Excluded	Justification
	Burning of biomass	Excluded	Potential emissions are not significant and conservatively neglected.

Comparison Between Baseline & Project

The sources, sinks and reservoirs defined in the baseline scenario will be the same for the project scenario.

6. Selecting Relevant Baseline GHG Emissions and Removals

Criteria For Selecting Relevant GHG Sources, Sinks and Reservoirs

The GHG sources, sinks and reservoirs in this methodology are restricted to LULUCF sector carbon emissions and removals as follows:

Table 6a: GHG Sources, Sinks, and Reservoirs: Rarakau Programme	
Sources	CO_2e emissions from above ground woody biomass removed from the forest.
	CO_2e emissions from above ground woody biomass entering the deadwood pool in the form of discarded crown and branches of harvested (target) trees.
	CO_2e emissions from additions to the above ground deadwood carbon pool resulting from collateral damage to non-target trees due to wood harvest activities.
	CO_2e emissions from the decomposition of below ground biomass resulting from above ground wood harvesting and collateral damage.
Sinks	CO_2e sequestered in the natural background rate of natural forest regeneration.
	CO_2e sequestered in harvest patches as a consequence of the opening the forest canopy.
Reservoirs	The GHG assessment in this project measures and estimates the change in carbon stocks contained in carbon reservoirs (and associated emissions and/or removals), rather than the total content of carbon stored in the forest carbon reservoirs/pools. Accordingly, the total volume of carbon stored in the above ground and below ground carbon pools is not measured in this methodology.

The GHG sources and sinks measured in this methodology are restricted to LULUCF carbon pools that are controlled by the Project Owners and lie within the Eligible Forest Area of the project.

The carbon pools used in this methodology are:

Table 6b: Carbon Pools Used in this Methodology		
Carbon Pool	Included/ Excluded	Justification
Above ground biomass (AGB)	Included	At a minimum, the stock change in the above-ground tree biomass shall be estimated.
Below ground biomass (BGB)	Included	When you kill a tree you also kill its roots. The New Zealand national compliance (Kyoto) forest carbon accounting system uses a BGB default value of 25% of AGB. The only exception to this default rule for this methodology applies to the following species

		that are known to be capable of regenerating from cut stumps: *Beilschmedia tawa, Weimannia racemosa, Alectyron excelsum,* and *Corynocarpus laevigatis*. Project Developers shall identify the proportion of the above ground biomass emitted (ABGE) attributable to these four species in the Baseline, and remove the below ground biomass emitted (BGBE) portion for these species in the baseline calculation.
Dead-wood (DW)	Included	Required under VCS Tool for AFOLU Methodological Issues.
Harvested Wood Products	Excluded	Total baseline timber harvesting volumes permitted in New Zealand are very low per hectare per year, and the harvested wood product element of the baseline carbon pool is in this methodology deemed to be *de minimis*.
Litter	Excluded	Insignificant and exclusion is conservative.
Soil organic carbon	Excluded	Exclusion is always conservative when forests remain as forests.

The inclusion/exclusion of greenhouse gases in this methodology are shown in Table 6c.

Table 6c: Emission sources other than resulting from changes in stocks in carbon pools

Gas	Sources	Included / Excluded	Justification
Carbon dioxide (CO_2)	Included in carbon pools specified in Table 6b.	Included	As stated in Table 6b.
	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Covered by Kyoto carbon accounting in New Zealand and therefore would be double counted if included.
	Removal of herbaceous vegetation	Excluded	Based on CDM EB decision reflected in paragraph 11 of the report of the 23rd session of the board: cdm.unfccc.int/Panels/ar/023/ar_023_rep.pdf
Methane (CH_4)	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Covered by Kyoto carbon accounting in New Zealand and therefore would be double counted if included.
	Burning of biomass	Excluded	Exclusion is conservative.
Nitrous oxide (N_2O)	Combustion of fossil fuels (in vehicles, machinery and equipment)	Excluded	Covered by Kyoto carbon accounting in New Zealand and therefore would be double counted if included.
	Nitrogen based fertilizer	Excluded	No fertilizer is used in the baseline or the project scenario.

Table 6c: Emission sources other than resulting from changes in stocks in carbon pools			
Gas	Sources	Included / Excluded	Justification
	Burning of biomass	Excluded	Potential emissions are not significant and conservatively neglected.

7. Quantifying Baseline GHG Emissions and Removals

This methodology calculates the net anthropogenic GHG emissions and removals in the Baseline Scenario, and then calculates the net anthropogenic GHG emissions and removals in the Project Scenario.

7.1 BASELINE SCENARIO GHG EMISSIONS AND REMOVALS

The following table lists the baseline GHG sources and sinks modelled by this methodology:

Table 7.1: Baseline GHG Sources and Sinks	Acronym
Included in Modelling:	
The Harvest Rate is the emissions from timber extracted from the forest	HR
Emissions from the Total Wood Harvested includes the HR and the crown and branches of harvested trees left to form deadwood in the forest	TWH
Emissions from Collateral Damage to non-target trees is caused by tree felling and timber extraction (including hauling and roading) in the baseline activity	CD
Emissions from above ground biomass emitted	AGBE
Emissions from below ground biomass emitted	BGBE
Excluded from Modelling:	
Emissions from fossil fuel components of baseline activity	
Harvested Wood Products	

Calculation of Baseline Scenario carbon dioxide emissions and removals involves the application of the equations presented in this section of this methodology to complete the carbon accounting for all land parcels in the Baseline Scenario.

The equations calculate the total emissions across the crediting period for each emission source and then average across the time elapsed to give annual emissions up to year t*, time elapsed since the start of project activity.

Data for input into these carbon stock change calculations for the Baseline Scenario must be established from the same data used to create the annual allowable timber harvest in the Sustainable Forest Management Plans for the land parcels within the Project Area.

Table 7.1a: Evidence Requirement: Baseline Scenario GHG Emissions/Removals	
#	Name/Description
7.1a	Sustainable Management Plan/Permit Application data concerning the annual allowable timber harvest rate (m^3) for each land parcel.

7.1.1 Harvest Rate (HR)

The "Harvest Rate" (HR) corresponds to the component of an Annual Logging Plan (arising in conjunction with a Forest Management Plan) that specifies the annual harvest rate for the Operational Forest Area (OFA) for each land parcel within the Project Area. The HR is measured in m^3 per ha year. The HR shall be calculated using Ministry for Primary Industry rules for harvest plans or permits and separated into different forest types specific to the project.

HR is calculated using the following equation:

Equation 7.1.1: $HR = HR_{BC} + HR_{PC} + HR_{BL}$

Parameters

HR	Harvest Rate all species within OFA (m^3 yr^{-1})
HR_{BC}	Harvest Rate beech within OFA (m^3 yr^{-1})
HR_{PC}	Harvest Rate podocarp within OFA (m^3 yr^{-1})
HR_{BL}	Harvest Rate broadleaf within OFA (m^3 yr^{-1})

7.1.2 Total Wood Harvested (TWH)

'TWH' stands for the total wood harvested for target trees harvested in the baseline annual harvest regime and is measured in m^3 per year for each land parcel of the OFA. TWH represents the wood volume combining a) the log harvested (HR) and b) residual target tree above ground wood (crown and branches) left to form deadwood in the forest.

It is necessary to calculate the Total Wood Harvested (TWH) for each timber species type, and then generate an aggregated total for TWH. TWH is calculated by applying a default factor to the HR value for each timber species type corresponding to a conservative estimate of residual wood generated when harvesting trees in the three timber species types. The three default[8] conversion factors are as follows:

[8] Default conversion factors for TWH was estimated as a result of discussions with forestry and forest carbon scientists in the absence of any published or unpublished studies available on this point. These figures are conservative. For example, a harvested beech (*Nothofagus*) tree will commonly contain a considerable volume of non-commercial wood (e.g. crown, branches, and bole wood damaged by borer) as much as 66% (Wardle 1984, p346). The merchantable timber conversion rate for conifers and broadleaf timber species is greater than it is for beech, but again there are no studies available to derive a national default. In the absence of any such studies, but with the knowledge that not the entire harvested tree is recovered and turned into a commercial sawlog, it was necessary to derive a conservative default that could be logically defended on the basis of common knowledge of those in the indigenous forestry industry/sector. These default values can be updated if and when new data on this topic become available and can be incorporated into 10-yearly baseline revisions.

Table 7.1.2: Residual Target Tree Above Ground Wood Volume Defaults			
Code	Name	Default	Comment
BC	Beech	0.50	This methodology conservatively estimates that 50% of the harvested above ground wood volume from each target tree forms the (HR) sawlog. This is conservative for beech due to the relatively high proportion of decayed wood and non-merchantable timber in each standing beech tree. Projects can use a site specific conversion factor if data are available.
PC	Podocarp	0.80	Here 80% of the harvested above ground wood volume from each target tree is deemed to form the (HR) sawlog. This is conservative for podocarp species (e.g. rimu, totara, miro, matai), which tend have a significantly higher merchantable timber volume in each standing tree. Projects can use a site specific conversion factor if data are available.
BL	Broadleaf	0.80	Here 80% of the harvested above ground wood volume from each target tree is deemed to form the (HR) sawlog. This is conservative for the numerous (non-*Nothofagus*) angiosperm timber species harvested in New Zealand. Projects can use a site specific conversion factor if data are available.

The calculation of the TWH uses the HR totals for each timber species type and uses the following equation:

Equation 7.1.2a: $TWH = TWH_{BC} + TWH_{PC} + TWH_{BL}$

Parameters

TWH	Total Wood Harvested all species within OFA ($m^3\ yr^{-1}$)
TWH_{BC}	Total Wood Harvested beech within OFA ($m^3\ yr^{-1}$)
TWH_{PC}	Total Wood Harvested podocarp within OFA ($m^3\ yr^{-1}$)
TWH_{BL}	Total Wood Harvested broadleaf within OFA ($m^3\ yr^{-1}$)

The calculation of TWH for each timber species type uses the following equation/s:

Equation 7.1.2b:

$$TWH_{BC} = HR_{BC} \div 0.50$$
$$TWH_{PC} = HR_{PC} \div 0.80$$
$$TWH_{BL} = HR_{BL} \div 0.80$$

Parameters

HR_{BC}	Harvest Rate (beech) within OFA at start of Project Period ($m^3\ ha^{-1}\ yr^{-1}$)
HR_{PC}	Harvest Rate (podocarp) within OFA at start of Project Period ($m^3\ ha^{-1}\ yr^{-1}$)
HR_{BL}	Harvest Rate (broadleaf) within OFA at start of Project Period ($m^3\ ha^{-1}\ yr^{-1}$)
TWH_{BC}	Total Wood Harvested beech within OFA ($m^3\ yr^{-1}$)
TWH_{PC}	Total Wood Harvested podocarp within OFA ($m^3\ yr^{-1}$)
TWH_{BL}	Total Wood Harvested broadleaf within OFA ($m^3\ yr^{-1}$)

7.1.3 Collateral Damage (CD)

"Collateral damage" represents the deadwood caused by damage to non-target above ground live biomass resulting from the timber harvesting operation. Collateral damage is calculated as equivalent to 10% of the TWH and measured in m^3 per year. Collateral damage is justified by the fact that non-target trees are felled during logging operations (from tree felling, roading, and log extraction activities).

Equation 7.1.3: $CD = TWH \times 0.10$

Parameters

CD	Collateral damage within OFA ($m^3\ yr^{-1}$)
TWH	Total Wood Harvested within OFA ($m^3\ yr^{-1}$)

7.1.4 Above Ground Biomass Emitted (AGBE)

Above Ground Biomass Emitted (AGBE) represents the total above ground deadwood caused by logging is calculated as the sum of the total wood harvested and the collateral damage. Above ground biomass emitted is and measured in m^3 per year and is calculated using the following equation:

Equation 7.1.4: $AGBE = TWH + CD$

Parameters

AGBE	Above ground biomass emitted within OFA ($m^3\ yr^{-1}$)
CD	Collateral damage within OFA ($m^3\ yr^{-1}$)
TWH	Total Wood Harvested all species within OFA ($m^3\ yr^{-1}$)

7.1.5 Below Ground Biomass Emitted (BGBE)

Below Ground Biomass Emitted (BGBE) represents the below ground live biomass (roots) killed by logging (the roots of target and non-target trees killed in a logging operation) and is calculated by means of a default factor. The default factor used in this methodology is the same as that used for BGBE under the New Zealand Land Use Carbon Accounting System (LUCAS) is 25% of AGBE[9] and is calculated using the following equation:

Equation 7.1.5: $BGBE = AGBE \times 0.25$

Parameters

BGBE	Below ground biomass emitted within OFA ($m^3 yr^{-1}$)
AGBE	Above ground biomass emitted within OFA ($m^3\ yr^{-1}$)

[9] The LUCAS system has been validated by the UNFCCC and is considered acceptable to this methodology on that basis.

There is one exception to this default rule: When the target tree species for commercial timber harvesting in the baseline includes any of the following: *Beilschmedia tawa, Weimannia racemosa, Alectyron excelsum*, or *Corynocarpus laevigatis* Project Developers are required to:

1. Calculate the proportion of AGBE attributable to these species
2. Include the AGBE attributable to these species and remove the corresponding BGBE attributable to these species in the baseline.

7.1.6 Total Emitted Wood Volume in Cubic Metres (TM3)

Total Emitted Wood Volume in cubic meters (TM3) represents the volume of above ground and below ground live wood volume that is killed as a result of logging. TM3 is the sum of AGBE and BGBE and is calculated using the following equation:

Equation 7.1.6: $TM3 = AGBE + BGBE$

Parameters

TM3	Total emitted wood volume in cubic meters within OFA (m^3yr^{-1})
AGBE	Above ground biomass within OFA ($m^3\ yr^{-1}$)
BGBE	Below ground biomass within OFA ($m^3\ yr^{-1}$)

7.1.7 Gross Total Emissions in tCO_2e (GTCO2)

Gross Total Emissions in tCO_2e (GTCO2) is calculated by means of converting TM3 (cubic meters) to tCO_2e using the following procedure:

The amount of wood has thus far been referred to by volume in cubic meters. In order to estimate the amount of greenhouse gases that would result from the combustion or decomposition of the wood is calculated in the following three steps as specified in the methodology:

1. Convert green wood volume to dry tonnes of wood
2. Convert dry tonnes of wood to carbon
3. Convert carbon to carbon dioxide

7.1.7a Convert Green Wood Volume To Dry Tonnes Of Wood

The New Zealand average wood density for indigenous canopy tree species is 0.49 (oven dry tonnes/ moist m^3) (derived from Beets et al 2009, Appendix 2).

This methodology, therefore, specifies that the conversion moist wood volume to dry tonnes be calculated as follows:

Equation 7.1.7a: $DW_{tonnes} = TM3_{m3} \times 0.49$

Parameters

DW_{tonnes}	Dry wood biomass within OFA (dry t yr^{-1})
$TM3_{m3}$	Total emitted wood volume in cubic meters within OFA (m^3 yr^{-1})

7.1.7b Calculate Carbon Content Of Dry Wood

The carbon fraction for conversion of dry wood to carbon in the New Zealand's Land Use and Carbon Analysis (LUCAS) system is 0.5. This means that 50% of the dry weight is carbon by mass. The conversion is calculated as follows:

Equation 7.1.7b: $TC = DW_{tonnes} \times 0.50$

Parameters

TC	Total tonnes of carbon within OFA (t yr^{-1})
DW_{tonnes}	Dry wood biomass within OFA (dry t yr^{-1})

The reference cited in the New Zealand LUCAS system for the 0.5 carbon fraction for the conversion of dry wood to carbon is (Rowell 1984). The IPCC LULUCF-GPG from 2003 provides a default value of 0.5 for the carbon fraction of biomass. See IPCC 2003 section 3.2.1.1.1.1, p. 3.25.

7.1.7c Convert Carbon To Carbon Dioxide

The mass of carbon dioxide equivalent is calculated by multiplying the mass of carbon by the ratio of the mass of carbon dioxide equivalent to the mass of carbon, which is 44/12 or 3.66:

Equation 7.1.7c: $TCO2 = TC \times 3.66$

Parameters

TCO2	Total CO_2e emissions within OFA (t yr^{-1})
TTC	Total tonnes of carbon within OFA (t yr^{-1})

7.1.7d Summary: Convert m^3 Of Moist Biomass To Total CO_2e Emissions

In summary, the default equation for the conversion of tree volume to mass of carbon dioxide equivalent is:

Equation 7.1.7d: $GTCO2 = ((TM3_{m3} \times 0.49) \times 0.5) \times 3.66$

Parameters

TCO2	Total CO_2-e emissions within OFA ($tCO_2e\ yr^{-1}$)
$TM3_{m3}$	Total emitted wood volume in cubic meters within OFA ($m^3\ yr^{-1}$)
0.49	Density (t/m^3)
0.5	Carbon proportion of dry biomass
44/12	Mass ratio of CO_2e to C

7.1.8 Gross Baseline Emissions (GBE)

Gross baseline emissions (GBE) is calculated by subtracting the removals sequestered into the long-term Wood Products pool (ltWP) from GTCO2 and is represented in the following equation:

Equation 7.1.8: $GBE = GTCO2 - ltWP$

Parameters

GTCO2	Gross Total CO_2e emissions within EFA ($tCO_2e\ yr^{-1}$)
ltWP	Sequestration into long term Wood Products pool ($tCO_2e\ yr^{-1}$)

7.1.9 Sequestration into Long Term Wood Products for Rotation 1 (ltWP)

Removals sequestered into the long-term Wood Products pool for Rotation 1 (ltWP) is calculated *ex ante* in the baseline case. This accounts for carbon stored in wood products for more than 100 years and uses the simplifying and conservative assumption that the proportion remaining after 100 years is "permanent". This methodology uses the approach similar to that in the VCS REDD Methodology Modules module for commercial inventory estimation to account for carbon stock in harvested wood products[10], using the following steps:

Step A: Calculate the biomass carbon of the commercial volume extracted prior to or in the process of timber harvesting as follows:

i. Calculating the recoverable sawlog volume extracted in a commercial logging baseline for a time period (HR = Harvest Rate) (see 4.1.1 above)

[10] VCS VMD0005 version 1.0. REDD Methodology Module: estimation of carbon stocks in the long-term wood products pool (CP-W), Sectoral Scope 14.

ii. Adding the above ground waste wood (crown and branches) by multiplying the Harvest Rate by a residue factor (default) to derive the Total Wood Harvested (TWH) (see 4.1.2 Step 2 above).
iii. Adding a Collateral Damage (CD) factor (another default) to account for damage to non-target trees (see 4.1.3 Step 3 above).
iv. Dividing the total biomass carbon from (i), (ii) and (iii) by the area of the stratum to convert to on a per hectare basis ($AGBE_{ha}$) (m^3ha^{-1})

This calculates the volume of Above Ground Biomass Emitted (AGBE) per hectare for the eligible forest area for Rotation 1. This biomass volume ($AGBE_{ha}$) is then used for determining $C_{XB,ty,i}$ in Step E (Equation 4.1.9) below.

Step B: Identify the wood product class(es) (*ty*; defined here as sawnwood (s), wood-based panels (w), other industrial roundwood (oir), paper and paper board (p), and other (o)) that are the anticipated end use of the extracted carbon calculated in Step A. For each wood product type, assign a fraction representing the different proportions of biomass volume attributed to each wood product type ($\%WP_{ty}$) (dimensionless).

Step C: For each wood product type, multiply $AGBE_{ha}$ by the relevant fraction ($\%WP_{ty}$) to calculate the proportional wood product type biomass volume ($AGBE_{\%WPty}$) (m^3ha^{-1}).

Step D: Convert each proportional wood product type biomass volume ($AGBE_{\%WPty}$) to tCO_2 using Equations 4.1.7(a-d) to derive $C_{XB,ty,I}$ ($tCO_2e\ ha^{-1}$).

Step E: For each wood product type apply each subsequent step of Equation 4.1.9 using defaults provided in VCS VMD0005 (Data and Parameters not monitored). This calculates the sum of CO_2 stored in the long-term wood product pool for Rotation 1 ($C_{WP,i}$).

Equation 7.1.9:

$$C_{WP,i} = \sum_{ty=s,w,oir,p,o} C_{XB,ty,i} * (1 - WW_{ty}) * (1 - SLF_{ty}) * (1 - OF_{ty})$$

Parameters

$C_{WP,i}$	Carbon stock in long-term wood products pool (stock remaining in wood products after 100 yrs) from stratum *i* post harvest in Rotation 1; ($tCO_2e\ ha^{-1}$)
$C_{XB,ty,i}$	Mean stock of extracted biomass carbon by class of wood product *ty* from stratum *i*; ($tCO_2e\ ha^{-1}$)
WW_{ty}	Wood waste. The fraction immediately emitted through mill inefficiency by class of wood product *ty*; dimensionless
SLF_{ty}	Fraction of wood products that will be emitted to the atmosphere within 5 years of timber harvest by class of wood product *ty*; dimensionless
OF_{ty}	Fraction of wood products that will be emitted to the atmosphere between 5 and 100 years of timber harvest by class of wood product *ty*; dimensionless
ty	Wood product class – defined here as sawnwood (s), wood-based panels (w), other industrial roundwood (oir), paper and paper board (p), and other (o)
i	*1,2,3,...M*strata

7.1.10 Net Baseline Emissions Avoided (NBEA)

Net Baseline Emissions Avoided (NBEA) is equal to the carbon stock change as a result of a) emissions from baseline timber harvests minus b) removals from enhanced forest regrowth in harvest patches after harvest.

Net Baseline Emissions Avoided (NBEA) is equal to the carbon stock change as a result of:

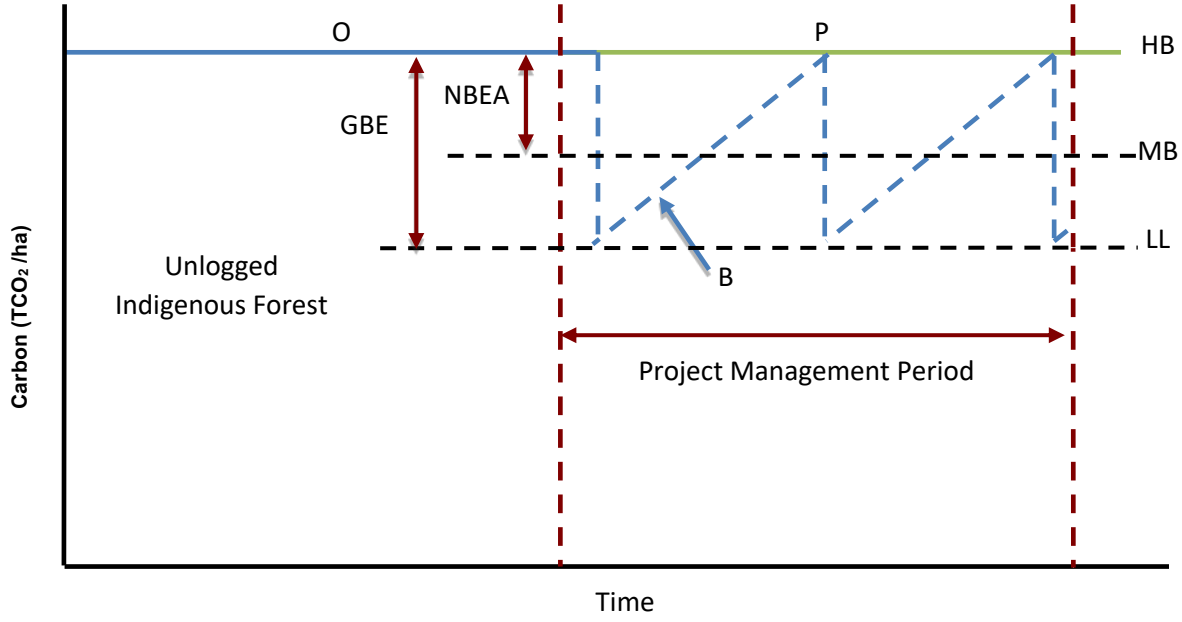
a. Baseline emissions from timber harvests (Gross Baseline Emissions – GBE)

   Minus

b. Baseline Removals (BR) from enhanced forest regrowth in harvest patches for each rotation in the baseline.

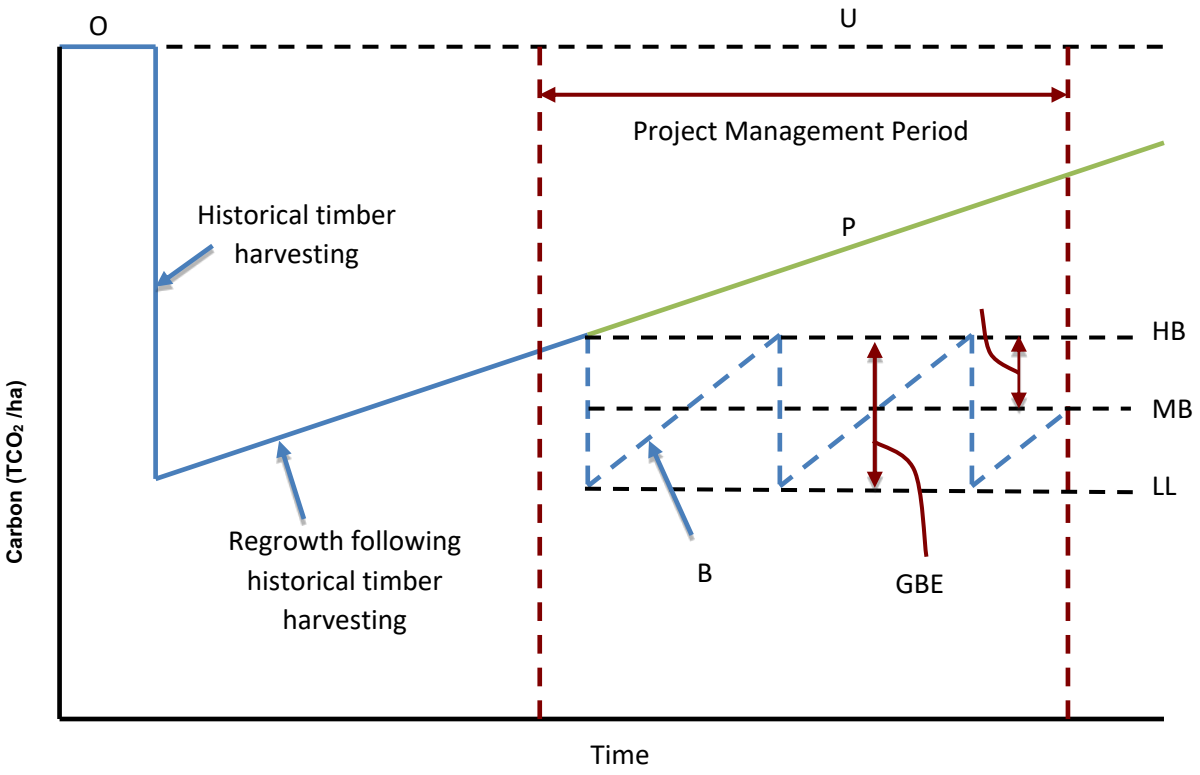
The volume of emissions in the baseline is calculated as GBE ÷ 2. NBE takes into consideration baseline emissions and baseline removals.

Figure 7.1.10a. Concept diagram for calculating NBE starting in unlogged forest.



Key:
- O = Original mean carbon stocks in old growth undisturbed forest
- B = Baseline Scenario carbon stocks under timber harvesting regime (harvest/regrowth)
- P = Project Scenario carbon stocks under forest protection regime (approaches asymptote U)
- HB = Harvest Baseline (upper limit of regrowth carbon stocks in Baseline Scenario)
- MB = Mean Baseline carbon stocks under harvest regime
- U = Upper limit of future mean carbon stocks
- LL = Lower limit of harvested carbon stocks
- GBE = Gross baseline emissions (TCO2 minus carbon sequestered into long-term harvested wood products)
- NBE = The difference between mean baseline carbon stocks and the harvest baseline (= GBE/2)

Figure 7.1.10b. Concept diagram for calculating NBE in logged forest.



Net Baseline Emissions (NBE) is calculated by the following equation:

Equation 7.1.10: $NBE = GBE \div 2$

Parameters

NBE	Net baseline emissions within OFA ($tCO_2e\ yr^{-1}$)
GBE	Gross baseline emissions within OFA ($tCO_2e\ yr^{-1}$)

7.2 PROJECT REMOVALS

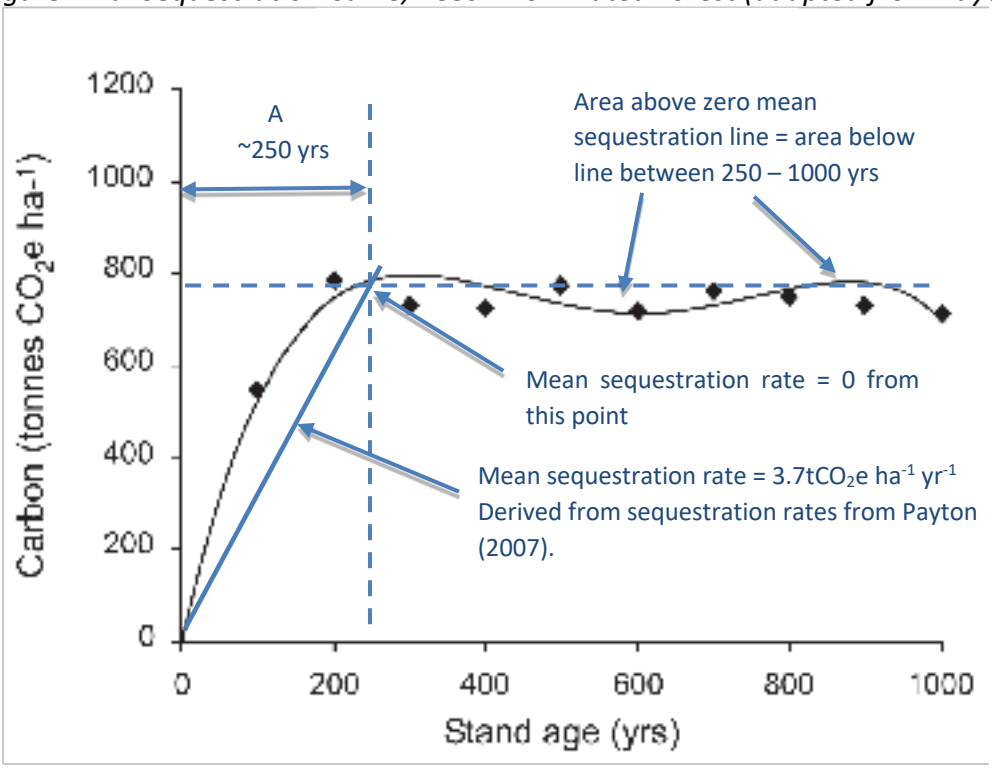
Net Project Removals (NPR) is equal to Enhanced Removals minus Project Activity Emissions. Project Activity Emissions are accounted for in the New Zealand Emissions Trading Scheme and the Kyoto Protocol, and are not counted here. Accordingly, Net Project Removals (NPR) = Enhanced Removals (ER).

Enhanced Removals are calculated for annual forest growth in Logged Forest land parcels for the Project Period. The rate of Enhanced Removals is set at the New Zealand national average sequestration rate for the three different indigenous forest types (beech-dominated; conifer-dominated, and broadleaf-hardwood-dominated) (Payton 2007).

The next step is to determine the period for which projects can claim ER for Logged Forest land parcels. This will depend on the timing of historical logging for each Logged Forest land

parcel and the sequestration curve for that forest type. Sequestration curves are presented below for the three major New Zealand indigenous forest types.

Figure 7.2a. Sequestration Curve, Beech-Dominated Forest (adapted from Payton 2007).



Key: A = 250-year period where the sequestration rate is positive.

Figure 7.2b. Sequestration Curve, Conifer-Dominated Forest (Adapted from Payton 2007)

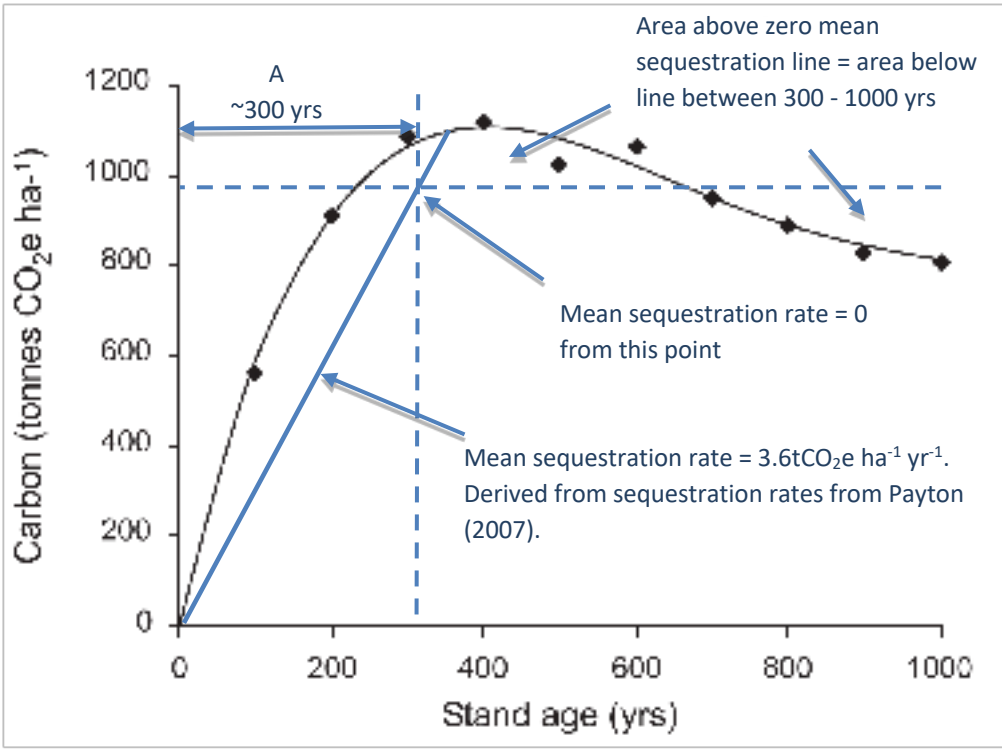
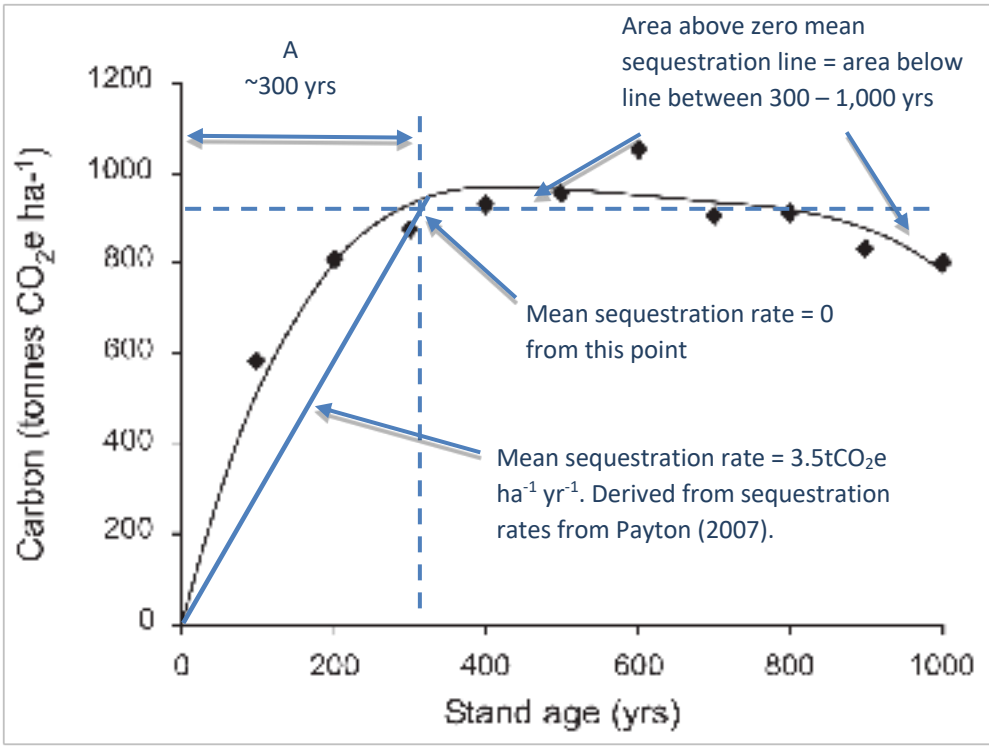


Figure 7.2c. Sequestration Curve, Broadleaf-Dominated Forest (from Payton 2007)



7.2.1 Net Project Removals (NPR)

Net Project Removals (NPR) is calculated by multiplying the total area (ha) of Logged Forest in the Operational Forest Area (OFA) by the mean sequestration rate ($tCO_2e\ ha^{-1}\ yr^{-1}$) for the Removals Period for the three forest types in this methodology (beech-dominated, conifer-dominated, and broadleaf-dominated forest.

The mean sequestration rate (MSR) for each of these forest types is as follows:

- Beech-dominated: 3.7 ($tCO_2e\ ha^{-1}\ yr^{-1}$) (Payton 2007)
- Conifer-Dominated: 3.6 ($tCO_2e\ ha^{-1}\ yr^{-1}$) (Payton 2007)
- Broadleaf-hardwood-Dominated: 3.5 ($tCO_2e\ ha^{-1}\ yr^{-1}$) (Payton 2007)

Net Project Removals (NPR) is calculated by the following equation:

Equation 7.2.1: $NPR = \sum NPR_{BC} + \sum NPR_{PC,} + \sum NPR_{BL}$

Parameters

NPR	Net Project Removals within OFA ($tCO_2e\ yr^{-1}$) = Sum of Net Project Removals for each forest type within OFA = OFA_{LF} x MSR_{BC} ($tCO_2e\ yr^{-1}$)
$\sum NPR_{BC}$	Net Project Removals for beech-dominated land parcel within OFA = OFA_{LF} x MSR_{PC} ($tCO_2e\ yr^{-1}$)
$\sum NPR_{PC}$	Net Project Removals for podocarp-dominated land parcel within OFA = OFA_{LF} x MSR_{PC} ($tCO_2e\ yr^{-1}$)
$\sum NPR_{BL}$	Sum of Net Project Removals for broadleaf-dominated land parcel within OFA = OFA_{LF} x MSR_{BL} ($tCO_2e\ yr^{-1}$)
MSR_{BC}	Mean sequestration rate for beech-dominated forest ($tCO_2e\ yr^{-1}$)
MSR_{PC}	Mean sequestration rate for podocarp-dominated forest ($tCO_2e\ yr^{-1}$)
MSR_{BL}	Mean sequestration rate for broadleaf-dominated forest ($tCO_2e\ yr^{-1}$)

7.2.2 Enhanced Removals Window (ERW)

Enhanced Removals applies only to eligible forest in Logged Forest land parcels. For this methodology the Removals Period (RP) begins with the end date for historical logging (between 1 January 1900 and 31 December 2009) and continues until the time at which modelled mean sequestration rate shifts from positive to zero (as specified in Figures 7.2a, 7.2b, and 7.2c above). The length of the Removals Period (RP) for the different forest types is as follows:

- Beech-dominated forest: 250 years
- Conifer-dominated forest: 300 years
- Broadleaf-dominated forest: 300 years

For this methodology the Removals Window (RW) for Logged Forest land parcels is a finite period beginning with the end date for historical logging (between 1 January 1900 and 31 December 2009) and continues until the time at which the modelled mean sequestration rate shifts from positive to zero (as specified in Figures 7.2a, 7.2b, and 7.2c above) minus 120 years (beech) and 150 years (conifer and broadleaf).

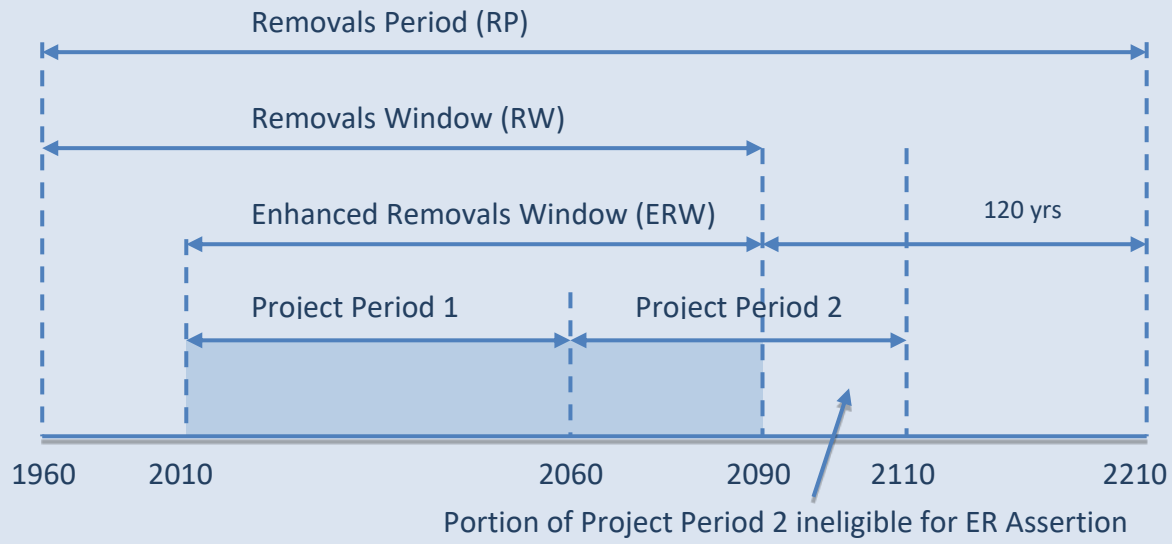
For this methodology the Enhanced Removals Window (ERW) for Logged Forest land parcels is the finite period beginning with the start of the Project Period until the end of the Removals Window (RW). The ERW may encompass more than one Project Period.

Projects can claim Enhanced Removals (ER) (an Enhanced Removals Assertion) for Logged Forest land parcels for the portion of the Enhanced Removals Window (ERW) contained in the Project Period.

Example: Enhanced Removals Window For Beech-Dominated Forest

- *Historical Logging End: 1960*
- *Project Periods: 2010 – 2059; 2060 – 2109; 2110 – 2159)*
- *Removals Period: 1960 + 250yrs (beech) = 2,210*
- *Removals Window: 250 – 120 (beech) = 130 yrs starting in 1960 (1960 – 2090)*
- *Enhanced Removals Window: 2010 – 2090*

Enhanced Removals Assertion: Project Period 1 (2010 – 2060); and part of Project Period 2 (2060 – 2090).



The Removals Window (RW) is 120 years (beech) and 150 years (conifer and broadleaf) shorter than the Removal Period (RP) to account for historical logging intensities that do not reset the regeneration clock to zero. This methodology conservatively assumes that historical logging resets the "sequestration clock" to no more than the half of the Removals Period.

7.3 PROJECT LEAKAGE

This methodology requires Project Developers to address both activity shifting and market leakage based on the VCS AFOLU leakage requirements. This enables the derivation of Total Leakage (TLK).

7.3.1 Total Activity Shifting Leakage (TAL)

Total Activity Shifting Leakage (TAL) is calculated following the GreenCollar IFM LtPF v1.3 VCS approved methodology VM0010 (2016) for leakage due to activity shifting.

7.3.2 Total Market Leakage (TML)

Leakage due to market effects is equal to the net emissions from planned timber harvest activities in the baseline scenario multiplied by an appropriate leakage factor:

Equation 7.3.2: $TML = NBE \times LF$

Parameters

TML	Total market leakage ($tCO_2e\ yr^{-1}$)
NBE	Net baseline emissions ($tCO_2e\ yr^{-1}$)
LF	Leakage factor

The leakage factor (see Box 1) is determined by considering where in the country logging will be increased as a result of the decreased timber supply caused by the project.

If the ratio of merchantable biomass to total biomass is higher in the project area, it is likely that additional logging will be performed in these areas as a result of reduced logging in the project area in the project scenario.

The leakage factor is thus defined as a dimensionless number with values between 0 and 1 assigned *ex ante* on the basis of a comparison between the ratio of merchantable biomass to total biomass across all strata in the base year, and the ratio of merchantable biomass to total biomass of the country's forest estate where harvesting would likely be displaced to.

Box 1. Leakage Factor Determination

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. If the areas liable to be logged have a higher ratio of merchantable biomass to total biomass higher than the project area it is likely that the proportional leakage is higher and vice versa:

Therefore, $LF_{ME} = 0$
if it can be demonstrated that no market-effects leakage will occur within national boundaries, that is if no new concessions are being assigned AND annual extracted volumes cannot be increased within existing national concessions AND illegal logging is absent (or *de minimis*) in the host country.

The amount of leakage is determined by where in the country's forest estate harvesting would likely be displaced. If harvesting is displaced to forests where a lower proportion of forest biomass is merchantable material from harvestable species than in the project area, then in order to extract a given volume higher emissions should be expected as more trees will need to be cut to supply the same volume.

In contrast if a higher proportion of the total biomass of commercial species is merchantable in the displacement forest than in the project forests, then a smaller area would have to be harvested and lower emissions would result.

Therefore, each project must calculate within each stratum the ratio of merchantable biomass to total biomass (PMP_i). This shall then be compared to the ratio of merchantable biomass to total biomass for each forest type (PML_{FT}).

The following deduction factors (LF_{ME}) shall be used:
PMLFT is equal (± 15%) to PMPi $LF_{ME} = 0.4$
PMLFT is > 15% less than PMPi $LF_{ME} = 0.7$
PMLFT is > 15% greater than PMPi $LF_{ME} = 0.2$

Where:

PML_{FT} = mean merchantable biomass as a proportion of total aboveground tree biomass for each forest type, %; and

PMP_i = merchantable biomass as a proportion of total aboveground tree biomass for stratum *i* within the project boundaries, %; and

MLF = Leakage factor for market-effects calculations; dimensionless.

Where sufficient variation exists in PMP_i relative to PML_{FT} that multiple values of LF_{ME} result, then an area weighted final value for LF_{ME} shall be calculated. The area of stratum I as a proportion of the total project area shall be multiplied by LF_{ME}. All values are then summed to arrive at the area weighted final value of LF_{ME}.

7.3.3 Total Leakage (TLK)

Total Leakage (TLK) is the combination of Total Activity Shifting Leakage (TAL) and Total Market Leakage (TML). Total Leakage (TLK) is calculated as:

Equation 7.3: $TLK = TAL + TML$

Parameters

TLK	Total leakage ($tCO_2e\ yr^{-1}$)
TAL	Total activity shifting leakage ($tCO_2e\ yr^{-1}$)
TML	Total market leakage ($tCO_2e\ yr^{-1}$)

8. Project GHG Emission Reductions and Removal Enhancements

8.1 NET GREENHOUSE GAS EMISSION REDUCTIONS

Greenhouse gas emission calculations undertaken through Steps 1 to 13 in Section 7 above allows an *ex-ante* estimation of the net GHG Emission Reductions brought about by replacing the Baseline Scenario with the Project Scenario. This involves the calculation of Net Baseline Emissions Avoided (NBEA), Net Project Emissions (i.e. Enhanced Removals) and accounting for leakage.

This provides a basis to calculate Net Project Benefits (NPB). NPB is calculated by: a) converting Net Project Emissions (NPE) into a positive number (i.e. to represent the benefits of Enhanced Removals), and then, b) subtracting Total Leakage.

8.1.1 Net Project Benefits

Net Project Benefits (NPB) is calculated as:

Equation 8.1: $NPB = NPR - TLK$

Parameters

NPB	Net project benefits within OFA ($tCO_2e\ yr^{-1}$)
NPR	Net project removals within OFA ($tCO_2e\ yr^{-1}$)
TLK	Total leakage ($tCO_2e\ yr^{-1}$)

Net Project Benefits (NPB) is used to calculate Net Carbon Credits for the project period. But first the buffer must be calculated in Section 8.3.

8.2 NON-PERMANENCE RISK

This methodology applies a Project Risk Rating of 0.20 or the Overall Risk Rating (ORR) arising from application of the VCS AFOLU Non-Permanence Risk Tool, v3.0 (2011) for Internal Risk – which-ever is the larger. The risk categories for internal risk assessment are:

- Internal Risk 1: Project Management Risk
- Internal Risk 2: Financial Viability Risk
- Internal Risk 3: Opportunity Cost Risk
- Internal Risk 4: Project Longevity

8.3 BUFFER CREDITS

The most recent VCS AFOLU Pooled Buffer Account guidelines, contained in the *VCS Registration and Issuance Process* document, provide the framework for the operation of the pooled buffer account under this methodology.

8.3.1 Buffer Account Attributes

The key features of the buffer account for this project include:

Table 8.3.1: Buffer Account Attributes	
Assignment	When credits are issued to a project, a portion of the net change in the project's carbon stocks are deposited as buffer credits into the AFOLU pooled buffer account.
	The volume of buffer credits is calculated based on a multiple of a project's non-permanence risk rating and the net change in the project's carbon stocks for the relevant period, with a minimum of 20% net carbon benefits assigned to the buffer.
Administration	The Programme Operator administers the pooled buffer account.
Title	Title to the buffer credits remains with the Programme Operator and does not pass to the Project Owner, unless the Programme Operator elects to do so.
Change to Risk Rating	Where a project's risk rating reduces at a subsequent verification, the volume of buffer credits to be held against that project is adjusted based on the new risk rating and total carbon stock changes for the project. Excess buffer credits must be released and issued as saleable credits.
	Where a project's risk rating increases at a subsequent verification, no release of buffer credits may occur.
Netting Off	The deposit and release of buffer credits will be netted off to provide a single transaction.
Cancellation	Where a verification report indicates a negative net change in GHG emissions, no credits may be issued to the project until a further verification report indicates the deficit is remedied. Where credits were previously issued to the project, buffer credits equivalent to the negative net change in GHG emissions must be cancelled from the buffer account.
	Buffer credits are cancelled for negative net changes in GHG emissions in unavoidable reversals only. This is consistent with the Climate Action Reserve forest carbon protocols.
	Where the reversal is avoidable, buffer credits are left untouched and the Project Owner is responsible for retiring carbon credits of a standard equivalent to saleable credits issued to the project and volume equivalent to the reversal.
Suspension	Where a project fails to submit a verification report within seven years of the last report, 50% of the buffer credits associated with the project will be put on hold. After a further three years, all remaining buffer credits will be put on hold. Where no subsequent verification report is presented, buffer credits

	equivalent to the total number of live credits issued to the project will be cancelled (including buffer credits put on hold).
	Where buffer credits are put on hold for failure to submit a verification report, the project may reclaim the buffer credits on submitting a new verification report.
Final Cancellation	The remaining balance of buffer credits associated with a project will be managed by the Programme Operator for the benefit of the Programme.

8.3.2 Buffer Calculation

8.3.2.1 Buffer Credits For Net Baseline Emissions Avoided

Buffer Credits associated with Net Baseline Emissions Avoided (NBEA) in the baseline timeline for the Project Scenario are calculated using the following equation:

Equation 8.3.2.1: $BUFNBEA = NBEA \times PBR$

Parameters

BUFNBEA	Buffer Credits associated with Net Baseline Emissions Avoided ($tCO_2e\ yr^{-1}$)
NBEA	Net Baseline Emissions Avoided within EFA ($tCO_2e\ yr^{-1}$)
PBR	Project Buffer Rating (dimensionless)

8.3.2.2 Buffer Credits For Net Project Removals

Buffer Credits associated with Net Project Removals (NPR) for each rotation in the baseline timeline for the Project Scenario are calculated using the following equation:

Equation 8.3.2.2: $BUFNPR = NPR \times PBR$

Parameters

BUFNPR	Buffer Credits associated with Net Project Removals ($tCO_2e\ yr^{-1}$)
NPR	Net Project Removals within EFA ($tCO_2e\ yr^{-1}$)
PBR	Project Buffer Rating (dimensionless)

Total Buffer Credits (BUFTOT) is calculated as:

Equation 8.3.2.3: $BUFTOT = BUFNBEA + BUFNPR$

Parameters

BUFTOT	Total Project Buffer Credits ($tCO_2e\ yr^{-1}$)
BUFNBEA	Buffer Net Baseline Emissions Avoided within OFA ($tCO_2e\ yr^{-1}$)
BUFNPR	Buffer Net Project Removals within OFA ($tCO_2e\ yr^{-1}$)

8.4 NET CARBON CREDITS

Net Carbon Credits for each rotation in the baseline timeline (NCC) are calculated in three steps:

Step A: Subtracting the Buffer Credits associated with Net Baseline Emissions Avoided for (BUFNBEA) from Net Baseline Emissions Avoided (NBEA).

Step B: Subtracting the Buffer Credits associated with Net Project Removals (BUFNPR) from Net Project Benefits (NPR).

Step C: Sum the result of Step A and Step B.

Net Carbon Credits for each rotation is calculated using the following equation:

Equation 8.4.1: $NCC = (NBEA - BUFNBEA) + (NPR - BUFNPR)$

Parameters

NCC	Net Carbon Credits ($tCO_2e\ yr^{-1}$)
NBEA	Net Baseline Emissions Avoided ($tCO_2e\ yr^{-1}$)
BUFNBEA	Buffer Credits associated with Net Baseline Emissions Avoided ($tCO_2e\ yr^{-1}$)
NPR	Net Project Removals for Rotation x ($tCO_2e\ yr^{-1}$)
BUFNPR	Buffer Credits associated with Net Project Removals ($tCO_2e\ yr^{-1}$)

8.5 MANAGING LOSS EVENTS

This methodology uses the most recent version of the VCS 'AFOLU Guidance: Example for GHG Credit Accounting Following a Loss Event' for addressing loss events during the Project Period.

9. Ancillary Impacts

9.1 COMMUNITY BENEFITS

9.1.1 Description of Project Owner Community

Project proponents must provide a description of the Project Owner community.

9.1.2 Description of Past and Current Land Use

Project proponents must provide a description of current and past land use in the Project Area.

9.1.3 Project Consultation Protocol

All projects in this Grouped Project must follow this Project Consultation Protocol to enabling free, prior informed consent by Project Owners for all aspects of project development and implementation. The Project Consultation Protocol is required to provide a transparent starting point for addressing social and cultural safeguards associated with project implementation.

The Project Consultation Protocol shall involve a sequence of meetings/workshops undertaken by the Project Owner and the Project Developer (including other key/relevant stakeholders where appropriate), through the project cycle as follows:

Table 9.1.3: Project Consultation Process

#	Meeting Title	Recurrence	Key Decision	Purpose
0	Project Scoping Meeting	Single	Mandate to proceed to Project Scoping Workshop	Clarify the potential to undertake a project
1	Project Inception consultation	Single	Mandate to develop project	Formal meeting to determine project process and content
2	Project Description consultation	Single	Mandate to proceed to validation	Review and approval of PD
3	Project Implementation consultation	Single	Mandate to implement project	Review and approval of Project Implementation Plan
4	Project Management consultation	Annual	Mandate for ongoing project management	Review and approval of Project Management and Project Business Reports

5	Project Monitoring consultation	5 Yearly	Mandate to proceed to verification	Review and approval of Project Monitoring Reports

9.1.4 Project Dispute Resolution Framework

Each project in the Rarakau Programme is required to prepare a Project Dispute Resolution Framework to guide the process of dispute resolution should it occur during the course of the project. There is provision for dispute resolution in the Programme Agreement and the Project Agreement, but the Project Dispute Resolution Framework is designed to help avoid resorting to contractual or legal remedies.

Project Owners together with Project Developers are required to co-design the Dispute Resolution Framework based on principles of conflict resolution and non-violent communication.

Project Owners and Project Developers are required to incorporate the Project Dispute Resolution Framework into the Project Description Documentation (PD). Any revisions of the Project Dispute Resolution Framework will be incorporated into PD Revisions. Any dispute resolution events shall be recorded in Dispute Resolution Reports. The Inception Project for the Rarakau Programme is required to supply the Dispute Resolution Framework as part of the first Monitoring Report for first verification.

9.1.5 Inception Project Consultations

The Inception Project for the Rarakau Programme is required to undertake a Simplified Project Consultation Protocol until first verification and then follow the Project Consultation Protocol thereafter for Project Management Workshops and Project Monitoring Workshops.

The Simplified Project Consultation Protocol requires the Project Owner and Project Developer to cover the same content and undertake the same decisions specified in Meetings 1-3 of the Project Consultation Protocol, but allows these meetings to occur in a different structure than that required in the Project Consultation Protocol. The structuring of meetings in the Simplified Project Consultation Protocol allows Project Owners and Project Developers in the Inception Project to undertake several different meetings to cover the content and decisions of Meeting 1-3.

The Inception Project for the Rarakau Programme is not required to undertake Meetings 4 and 5 prior to first verification but is required to undertake meetings 4 and 5 for each subsequent verification. The approval of the first Project Management Report and first Project Monitoring Report by the Project Steering Committee can be undertaken by means of a virtual meeting whereby reports are circulated by email, and approval met remotely with records kept and presented at the first verification. Meetings 4 and 5 are required to follow the Project Consultation Protocol following first verification.

9.1.6 CM2 Offsite Stakeholder Impacts

Projects using this methodology shall assess offsite stakeholder impacts by considering any likely knock-on effects on non-participating communities living in surrounding areas (Section 7 Plan Vivo standards 2013). Any negative off-site stakeholder impacts shall be mitigated by the project.

9.1.7 CM3 Community Impact Monitoring

Community impact monitoring is required by the Plan Vivo standard. Projects in the Rarakau Programme shall undertake community impact monitoring once the project has become financially sustainable. Community impact monitoring will include low resolution baseline and project status of community impact KPIs directly and indirectly attributable to the project, with the option to include higher resolution measurement though time. During any period in which the project is not financially self-sustaining, community impact monitoring can involve a simplified community impact monitoring regime.

9.2 BIODIVERSITY BENEFITS

Biodiversity impact monitoring is required by the Plan Vivo standard. Projects in the Rarakau Programme shall undertake biodiversity impact monitoring once the project has become financially sustainable. Biodiversity impact monitoring will include low resolution baseline and project status of biodiversity impact KPIs directly and indirectly attributable to the project, with the option to include higher resolution measurement though time. During any period in which the project is not financially self-sustaining, biodiversity impact monitoring can involve a simplified biodiversity impact monitoring regime. A simplified biodiversity monitoring regime shall include a minimum of site inspections associated with project boundary change and noting any changes to biodiversity habitat visible during site visits (e.g. pest and weed issues).

10. Managing Data Quality

10.1 DATA MANAGEMENT PROCEDURES

10.1.1 Project Description Information Platform

This methodology requires that project description data input fields correspond to all project description elements required for the PD. These project description elements are presented in Table 10.1.1.

Table 10.1.1: Project Description Information Platform

1.	GENERAL REQUIREMENTS	2.5	Project GHG Strategy
1.1	Eligibility	2.6	Project Outputs
1.1.1	Forest Land	2.7	Carbon Benefits
1.1.2	Baseline Activity	2.8	Project Risks
1.1.3	Project Activity	2.9	Project Roles & Responsibilities
1.1.4	Logged and Unlogged	2.9.1	Project Owner
1.1.5	Specific Conditions	2.9.2	Project Developer
1.1.6	Specific Project Eligibility	2.10	Eligibility
1.2	Good Practice Guidance	2.11	Environmental Impact Assessment
2.	DESCRIBING THE PROJECT	2.12	Stakeholder Communications
2.1	Project Title, Purpose(s) and Objective(s)	2.12.1	Project Consultation Protocol
2.1.1	Project Title	2.12.2	Climate Community and Biodiversity Standard
2.1.2	Project Purpose	2.13	Timeline
2.1.3	Project Objectives	2.13.1	Project Period
2.2	Type of GHG Project	2.13.2	Forest Protection Period
2.2.1	Context	2.13.3	Project Crediting Period
2.3	Project Location	2.13.4	Monitoring Periods
2.3.1	Geographical Boundaries	2.13.5	Project Termination
2.4	Original Conditions		

10.1.2 GHG Information Platform

The GHG Information Platform includes data input fields for Sections 3 to 8 of this document as follows:

Table 10.1.2: GHG Information Platform			
3.	IDENTIFYING GHG SOURCES, SINKS AND RESERVOIRS	7.1.8	Step 8 – Net Baseline Emissions (NBE)
4.	DETERMINING THE BASELINE SCENARIO		
4.1	Baseline Selection, Additionality and Baseline Modelling	7.2	Project GHG Emissions and Removals
4.1.1	Selection of Baseline	7.2.1	Step 9 – Net Project Emissions (NPE)
4.1.2	Modelling the Baseline Scenario		
4.1.3	Stratification	7.3	Project Leakage
4.1.4	Additionality	7.3.1	Step 11 – Total Activity Shifting Leakage (TAL)
5.	BASELINE SCENARIO GHG SOURCES, SINKS AND RESERVOIRS	7.3.2	Step 12 – Total Market Leakage (TML)
6.	SELECTING RELEVANT BASELINE GHG EMISSIONS AND REMOVALS	8.	PROJECT GHG EMISSION REDUCTIONS AND REMOVAL ENHANCEMENTS
7.	QUANTIFYING BASELINE GHG EMISSIONS AND REMOVALS	8.1	Net Greenhouse Gas Emission Reductions
7.1	Baseline Scenario GHG Emissions and Removals	8.2	Non-Permanence Risk
7.1.1	Step 1 – Sustainable Harvest Rate (HR)	8.2.1	Internal Risk
7.1.2	Step 2 – Total Wood Harvested (TWH)	8.2.2	External Risks
7.1.3	Step 3 – Collateral Damage (CD)	8.2.3	Natural Risks
7.1.4	Step 4 – Above Ground Biomass Emitted (AGBE)	8.3	Overall Non-Permanence Risk Rating and Buffer Determination
7.1.5	Step 5 – Below Ground Biomass Emitted (BGBE)	8.3.1	Overall Risk Rating
7.1.6	Step 6 – Total Biomass in Cubic Meters (TBM)	8.3.2	Buffer Credits
7.1.7	Step 7 – Total Emissions in tCO_2e (TCO2)		

10.1.3 Ancillary Impacts Information Platform

The Ancillary Impacts Information Platform includes data from Section 9 of this document as follows:

Table 10.1.3: Ancillary Impacts Information System			
9.1.1	General Community Requirements	9.2.1	General Biodiversity Requirements
9.1.2	CM1. Net Positive Community Impacts	9.2.2	B1. Net Positive Biodiversity Impacts
9.1.3	CM2. Offsite Stakeholder Impacts	9.2.3	B2. Offsite Biodiversity Impacts
9.1.4	CM3. Community Impact Monitoring	9.2.4	B3. Biodiversity Impact Monitoring

10.1.4 Project Administration Information Platform

The Project Administration Information Platform contains data input fields arranged in the following categories:

Table 10.1.4 Project Administration Information System	
1	PROJECT REGISTRY INFORMATION
	Project registration status
	Carbon credit account
	Pooled AFOLU buffer account
	Cancellation/retirement of credits
	Credit transfers
2	PROJECT LEGAL INFORMATION
	Legal status of Project Owner
	Contracts between Project Owner and the Project Developer
	Contracts between Project Owner and Programme Operator
	Contracts between Project Owner and third parties
	Contracts between the Project Developer and third parties
	Evidence of land and forest ownership rights of Project Owner
	Evidence of legal sanction for baseline activities
3	INSURANCE
	Commercial insurance cover
	Insurance claims
4	FINANCE
	Project expenditure
	Project income
	Project financial balance

10.1.5 Project Monitoring Information Platform

This methodology requires project monitoring to be conducted in two forms:

- Project Management Reporting
- Project Monitoring Reporting

Project Management Reporting involves annual completion of Project Management Reports. This functions by means of a Project Management Report template (a checklist) and data input fields.

Project Monitoring Reports are completed every 5 years and are used for verification reporting and crediting purposes. They comprise an aggregation of Project Monitoring Update Reports automatically imported and collated into the Project Monitoring Reports, with additional data input fields to match project monitoring and verification requirements.

The functionality of Project Monitoring Reports consists of the replication of each of the Information Platforms listed above, and an option to record any changes to those data fields required in Project Monitoring Reports.

10.2 DATA STORAGE AND SECURITY

All data collected as part of PD development and monitoring will be archived electronically and be kept at for at least 2 years after the end of the Project Period. All measurements will be conducted according to relevant standards.

Data archiving will take both electronic and paper forms, and copies of all data shall be provided to each project participant.

All electronic data and reports will also be copied on durable media such as CDs and copies of the CDs are to be stored in multiple locations.

The archives will include:

- Copies of all original field measurement data, laboratory data, data analysis spreadsheets;
- Estimates of the carbon stock changes in all pools and non-CO_2 GHG and corresponding calculation spreadsheets;
- GIS products; and
- Copies of the measuring and monitoring reports.

All projects in the Rarakau Programme shall prepare a Standard Operating Procedure (SOP) for data storage and security arrangements.

The Inception Project for the Rarakau Programme is required to have copies of project data for first verification as follows:

Project Owner

- Electronic master copy of all final documents
- Electronic off-site backup of all final documents
- Hard copy of final documents

Programme Operator

- Electronic master copy of all final documents and supporting documents and data
- Electronic on-site backup of all final documents and supporting documents and data
- Electronic off-site backup of all final documents and supporting documents and data

Following first verification the Inception Project is required to follow the SOP for data storage and security arrangements.

10.3 DATA OUTPUTS AND REPORTING

Data outputs and reporting is covered in Sections 12 and 14 of this document.

10.4 ASSESSMENT OF UNCERTAINTY

10.4.1 Uncertainty in Baseline GHG Emissions and Removals

10.4.1.1 Harvest Rate (HR)

The core of the avoided emissions component of the baseline calculation is based on a conservative estimate of the timber volume to be logged in the baseline activity. The HR is calculated conservatively as 60% of the assessed annual increment into the harvestable boles (excluding branches and crown) for each timber species for which there is sufficient standing volume to justify commercial harvesting (MAF 2002).

The HR is calculated as a percentage of gross volume increment but is also sometimes assigned by Ministry for Primary Industries (MPI) rules. When calculating the HR using detailed on-site data, the gross volume increment is calculated using a size class model for each forest type. The gross volume size increment per hectare for each size class is determined by multiplying the mean stem volume by the density change, then multiplied by the total area hectare figure to give the total gross volume increment per year for each size class. The total is then reduced by 40% to:

a. Allow for the proportion of natural mortality that is unlikely to be recovered through harvesting in a mixed-aged natural forest.
b. Allow for some trees to grow through the size classes to reach maturity and allows for the retention of habitat trees.
c. Take sufficient account of terrain and topography that would impede timber harvesting in the forest even when such terrain and topography has been accounted for in the delimiting of the Operational Forest Area (OFA – equivalent to the Eligible Forest Area).

10.4.1.2 Total Wood Harvested

Uncertainty in the calculation of TWH is addressed by applying conservative New Zealand-specific default factors to the empirical (conservative) Harvest Rate (HR) value for each timber species type corresponding to a conservative estimate of residual wood generated when harvesting trees in the three timber species types. The three default conversion factors for TWH are as follows:

- Beech: 0.50; Conifer: 0.80; Broadleaf-hardwood: 0.80

Uncertainty is addressed in this calculation by means of conservatism in the following way:

The HR value for each land parcel is calculated conservatively to generate the volume of recoverable sawlog derived from above ground tree volume once harvested. Then it is conservatively assumed that only 50% (beech) and 20% (conifer, broadleaf-hardwood) of the total above ground harvested wood volume is discarded (i.e. crown, branches and rotten wood) and enters the dead wood pool. This leaves 50% (beech) and 80% (conifer, broadleaf-hardwood) of the above ground tree volume to form the sawlog calculated as the harvest rate (HR). The Rarakau Programme will endeavour to improve (through time) the accuracy of the TWH default values used in this methodology by seeking to discover/support/collaborate on future research that can generate residual biomass data from forest management timber harvesting operations.

10.4.1.3 Collateral Damage

"Collateral damage" represents the non-target trees and tree limbs killed as a consequence of timber harvesting operations (including felling target trees, roading, log hauling, and skid sites). Collateral damage is conservatively calculated as equivalent to 10% of the HR and measured in m^3 per year. This estimation is not based on published literature on this topic because no published literature was discovered during methodology development that made this calculation for sustainable forest management timber harvesting in New Zealand. The Rarakau Programme will endeavour to improve the accuracy of this default value in this methodology through time by seeking to discover/support/collaborate on future research that can generate Collateral Damage data from sustainable forest management timber harvesting operations.

10.4.1.4 Below Ground Biomass Emitted

Uncertainty in the calculation of Below Ground Biomass Emitted (BGBE) is addressed in this methodology by applying the conservative default value for below ground biomass used in the New Zealand Land Use Carbon Accounting System (LUCAS). LUCAS calculates BGBE as 25% of above ground biomass (AGBE).[11] There is one exception to this default rule: When the target tree species for commercial timber harvesting in the baseline includes any of the following: *Beilschmedia tawa, Weimannia racemosa, Alectyron excelsum,* or *Corynocarpus laevigatis* Project Developers are required to:

1. Calculate the proportion of AGBE attributable to these species
2. Include the AGBE attributable to these species and remove the corresponding BGBE attributable to these species in the baseline.

The only NZ indigenous tree species known to be capable of regenerating from stumps are: *Cordyline australis, Aristotelia serrata, Melicitus ramiflorus, Fuscia excorticata, Alectyron excelsum, Carpodetus serratus, Corynocarpus laevigatis, Griselenia littoralis, Hohiria*

[11] The LUCAS system has been validated by the UNFCCC and is considered acceptable to this methodology on that basis.

sexstylosa, Myrsine australis, Pesudopanax crassifolius, Schefflera digitata, Sophora microphyla, Beilschmiedia tawa, and *Weinmannia racemosa* (Burrows 1994). Of these, *Beilschmedia tawa, Weimannia racemosa, Alectyron excelsum*, and *Corynocarpus laevigatis* could be considered commercial timber species. Removing the BGBE component attributable to these species by default is conservative because these species do not always regenerate from stumps but this methodology assumes that they do.

10.4.1.5 Total Emissions in tCO_2

Uncertainty in the calculation of Total Emissions in tCO_2e (TCO2) is addressed in this methodology by:

a. Following the IPCC procedure for converting moist wood volume to carbon dioxide, and
b. Using a New Zealand wood density default value derived from a national average wood density figure calculated from indigenous canopy tree species (Beets et al 2009).

10.4.2 Project GHG Emissions and Removals

10.4.2.1 Enhanced Removals

Conservative estimates are incorporated in the calculation of Enhanced Removals (ER) in two ways.

The first is the stratification of the Eligible Forest Area into Logged and Unlogged Forest. Only Logged Forest is eligible to claim the Enhanced Removals component of the Project Scenario carbon benefits even though unlogged forest land parcels may be carbon sinks due to the cycle of natural disturbance. To be classified as 'Logged Forest' in this methodology the forest must have been logged between 1 January 1900 and 31 December 2009. This is a period of 109 years. Indigenous forest in New Zealand takes approximately 250-300 years to reach a stage where Net Biome Production is zero and mean annual increment shifts to zero. This means that forests logged prior to 1 January 1900 (although still with potentially up to 100 years of further annual growth in biomass) are deemed ineligible for claiming the Enhanced Removal component of the Project Scenario.

The second conservativeness factor built into the calculation of Enhanced Removals is the use of a conservative default value for the sequestration rate. This value is the national mean sequestration rate for the three forest types calculated from year zero to the point where the mean long-term sequestration becomes zero.

11. Monitoring The GHG Project

11.1 PURPOSE OF MONITORING

The purpose of monitoring is to provide evidence to demonstrate that project implementation adheres to the PD and methodology, to ensure that project benefits are delivered, and to make GHG assertions for verification.

Project monitoring focuses on the following activities:

- Continued prevention of baseline activities
- Continued implementation of Project Activities
- Eligible Forest Area inspections
- Monitoring *De minimis* timber harvesting
- Monitoring Activity Shifting Leakage inspections

11.2 ELIGIBLE FOREST AREA INSPECTIONS

All projects are required to prepare an Eligible Forest Area Inspection Plan.

11.3 REVERSAL RESPONSE PROCEDURE

Reversal events are subject to reversal clauses in the SOP D3.P1.17 v1.0, 2012, the Memorandum of Encumbrance, the Programme Agreement, the Buffer Account Attributes, and the Project Monitoring Plan, as follows:

11.3.1 SOP – Reversal Procedure

See the latest version of the SOP D3.P1.17 for details for each reversal risk event category.

11.3.2 Memorandum of Encumbrance – Reversal Procedure

The Memorandum of Encumbrance shall contain the following text:

> *The Encumbrancer agrees to notify the Encumbrancee as soon as reasonably practicable on becoming aware of:*
>
> *a. Any Reversal in the Project Area.*
> *b. Any breach of its obligations under this Encumbrance.*

11.3.3 Programme Agreement – Reversal Procedure

The Programme Agreement shall contain the following text:

You must notify the Programme Operator as soon as reasonably practicable on becoming aware of a Reversal. Your notification must include a written description and explanation of the Reversal.

Following a Reversal, we will determine whether the Reversal was Avoidable or Unavoidable.

Any Reversal will be accounted for in the monitoring report at the Project's next Verification Event.

If, on a Verification Event, the GHG Reduction Balance is lower than the GHG Reduction Balance at the last Verification Event, then:

> *If we determined that the Reversal was Unavoidable, we may Retire a quantity of Buffer Credits from the Pooled Buffer Account equivalent to the negative net change in the GHG Reduction Balance, capped at the number of Carbon Credits issued in respect of the Project, including Buffer Credits.*
>
> *If we determined that the Reversal was Avoidable, then you must:*
>
> *(a) Within 2 months of the Verification Event, deliver to us for Retirement, a quantity of Eligible Credits equivalent to the negative net change in the GHG Reduction Balance, capped at the number of Carbon Credits issued in respect of the Project, including Buffer Credits; and*
>
> *(b) Reimburse us on demand for all reasonable costs incurred by us in enforcing your commitments under this clause and the Encumbrance.*

Following a Reversal, you must take all action necessary to re-establish, restore or maintain, in accordance with the Project Implementation Plan, the project's GHG Reductions.

11.3.4 Reversal Definitions In Encumbrance And Programme Agreement

The Memorandum of Encumbrance and the Programme Agreement shall contain the following definitions relating to reversals:

> ***Reversal*** *means an event that materially reverses GHG Reductions in the Project Area.*
>
> ***Avoidable Reversal*** *means a Reversal arising from your negligence, your willful breach of the Programme Documents or from a third party properly exercising rights under an agreement or a legal interest in the Project Area.*
>
> ***Unavoidable Reversal*** *means a Reversal that is not an Avoidable Reversal.*

11.3.5 Reversals In Table 8.3.2: Buffer Account Attributes

Buffer Account Attributes in this methodology contains the following procedure relating to reversals:

> *Where a verification report indicates a negative net change in GHG emissions, no credits may be issued to the project until a further verification report indicates the deficit is remedied. Where credits were previously issued to the project, buffer credits equivalent to the negative net change in GHG emissions must be cancelled from the buffer account.*
>
> *Buffer credits are cancelled for negative net changes in GHG emissions in unavoidable reversals only. This is consistent with the Climate Action Reserve forest carbon protocols.*
>
> *Where the reversal is avoidable, buffer credits are left untouched and the Project Owner is responsible for retiring carbon credits of a specified standard and volume equivalent to the reversal.*

11.3.6 Reversals in the Monitoring Plan

See the details for the treatment of reversals in the following components of the Monitoring Plan:

- Eligible Forest Area
- Net Project Removals

11.4 *DE MINIMIS* TIMBER HARVEST INSPECTION

Timber harvesting is permitted inside the Eligible Forest Area within a *de minimis* threshold of 5% of the total allowable timber harvest in the baseline. *De minimis* timber harvesting (if any) shall be reported in Project Monitoring Reports.

Information required for *de minimis* timber harvesting activities is as follows:

a. Purpose of harvest (e.g. fuelwood, customary timber use)
b. Volume of harvest (m^3 above ground biomass)
c. Location of harvest sites (specific locations within relevant Forest Management Areas).

11.5 ACTIVITY SHIFTING LEAKAGE INSPECTION

Description: Descriptive survey of Total Activity Shifting Leakage TAL within lands owned and controlled by the Project Owner.

Purpose: Monitor any activity shifting leakage.

Method:

Site visit of forest lands owned and controlled by the Project Owner to assess commercial timber harvesting activity in comparison with the Baseline Activity and Project Activity as stated in the PD.

Where commercial indigenous timber harvesting is occurring on lands owned and controlled by the Project Owner but lying outside the Eligible Forest Area, and where such harvesting has been declared in the PD, the following assessment will be undertaken:

- Records of timber harvesting activity are inspected and verified against the timber harvesting plan stated in the PD.
- Timber harvesting sites are inspected to verify that they are occurring in the areas specified in the PD.
- 2nd and/or 3rd party documentation of timber harvesting volume (e.g. contracts, receipts, invoices from contractors, sawmillers, buyers) is inspected and verified against timber harvesting plan stated in PD.

Where there is evidence of a breach of the timber harvesting plan as stated in the PD, the following actions are taken by the Programme Operator:

- The volume of non-compliant timber harvesting is estimated using methods from Section 7 of this methodology to calculate emissions from Activity Shifting Leakage.
- Activity Shifting Leakage volumes are incorporated into the calculation of Total Leakage in the Monitoring Report at next verification.
- The Project Owner is notified of the consequence of any continuation of Activity Shifting Leakage in terms of the reduction in Net Carbon Credits for the Project.
- The Project Owner is instructed to terminate Activity Shifting timber harvesting or risk suspension or termination from the Rarakau Programme.

Where commercial indigenous timber harvesting is occurring on lands owned and controlled by the Project Owner but lying outside the Eligible Forest Area, and where such harvesting has not been declared in the PD (i.e. and by definition constitutes Activity Shifting Leakage in total), the following assessment will be undertaken:

- Timber harvesting sites are inspected to determine area of harvesting activity.
- The volume of non-compliant timber harvesting is estimated using methods from Section 7 of this methodology to calculate emissions from Activity Shifting Leakage.
- Activity Shifting Leakage volumes are incorporated into the calculation of Total Leakage in the Monitoring Report at next verification.
- The Project Owner is notified of the consequence of any continuation of Activity Shifting Leakage in terms of the reduction in Net Carbon Credits for the Project.
- The Project Owner is instructed to terminate Activity Shifting timber harvesting or risk suspension or termination from the Rarakau Programme.

Recurrence: Annual Leakage Inspection and results incorporated into the 5-yearly 3rd party verification of Project Monitoring Report.

11.6 PROJECT MANAGEMENT REPORTS

Project Owners are required to prepare Project Management Reports in the year following the annual Project Management Period in question. The Project Consultation Protocol requires each Project Management Report to be approved by the Project Steering Committee prior to being submitted to the Programme Operator. The Project Steering Committee is required to provide evidence of such approval upon submitting each Project Management Report to the Programme Operator (e.g. minutes of a Project Steering Committee meeting).

11.6.1 Directors Certificate

The Project Steering Committee shall sign a Directors Certificate to indicate that the approved Project Management Report is true and accurate and submit this certificate along with relevant Steering Committee Minutes, and the Project Management Report to the Programme Operator within 6 months of the end of the relevant Project Management Period.

11.6.2 Project Management Report Methodology

The Project Management Report will contain the following information:

- Map of the Eligible Forest Area using aerial imagery generated in the same year as the first verification.
- Statement by the Project Owner and Project Developer that:
    - Describes the Project Activities that have been undertaken between the Project Start Date and the end of the first Monitoring Period.
    - Records of any *de minimis* timber harvesting that has occurred since the Project Start Date
    - Notes any issues relating to the risk of reversals.

11.6.3 Standard Operating Procedure: Project Management

All projects in the Rarakau Programme are required to develop a Standard Operating Procedure (SOP) for Project Management. This SOP shall cover the following management themes:

a. Project Risk Management
    i. Day-To-Day Risk Management
    ii. Fire Response
    iii. Illegal Logging Response
    iv. Natural Hazards Response

b. Project Implementation Activity

The Inception Project for the Rarakau Programme is required to establish a simplified SOP for Project Management for first two verifications and then follow the full SOP thereafter. The simplified SOP for Project Management is required to include a detailed SOP for Day-To-Day risk management, and fire response, with the Day-To-Day risk management SOP used for illegal logging, natural hazard response, and project implementation activity.

11.7 PROJECT MONITORING PLAN

Credits are issued to each project in the Rarakau Programme as a result of 3rd party verification of each Project Monitoring Report, which contains data sufficient to provide evidence to support a GHG assertion for the Project Monitoring Period in question.

Project Monitoring Reports are produced *ex post* in the year following the Monitoring Period in question. Project Monitoring Periods comprise a 5-year (maximum) period starting at the Project Start Date and continuing until Project Termination. Projects can exceed the 5-yearly maximum timeframe in any given project monitoring period if project cash flows from carbon credit sales prevent the accumulation of sufficient funds to enable verification events. Key data for the Project Management Reports are reversals picked up by monitoring and forest inspections. The occurrence of reversal events triggers reversal response procedures.

The Inception Project of the Rarakau Programme is required to produce a Simplified Project Monitoring Report for its first two verifications, covering the years between the Project Start Date and the end of the first and second Monitoring Periods. The methodology for the Simplified Project Monitoring Report is presented in Section 11.7.6 of this methodology.

The Project Monitoring Report will include data from the annual Project Management Reports and data gathered as part of the 5-yearly project monitoring cycle.

11.7.1 Monitored And Non-Monitored Parameters

Some data parameters are derived from default values or are measured at one time only. These are non-monitored parameters. Other data parameters are monitored during each Monitoring Period.

Monitored and non-monitored data are listed in Table 11.7.1 below and presented in the sequence in which measurement of GHG emissions and emission reductions are calculated.

Table 11.7.1 Monitored and Non-Monitored Parameters (monitored parameters in green)

Notation	Parameter	Unit	Equa-tion	Origin	Monitored
EFA (OFA)	Eligible Forest Area (Operational Forest Area)	ha	-	PD	Monitored

LF/ULF	Forest stratification (logged/unlogged forest)	ha	-	PD	Area calculated in PD
TSV	Total Standing Volume	m^3	-	Forest Management Plan/PD	Calculated in PD
HR	The Harvest Rate	$m^3\ yr^{-1}$	7.1.1a 7.1.1b	Forest Management Plan/PD	Monitored Updated each Baseline Revision
TWH	Total Wood Harvested	$m^3\ yr^{-1}$	7.1.2a 7.1.2b	Forest Management Plan	Not monitored Updated each Baseline Revision
CD	Collateral Damage	$m^3\ yr^{-1}$	7.1.3	Default value derived from a proportion of the TWH	Not monitored Updated each Baseline Revision
AGBE	Above Ground Biomass Emitted	$m^3\ yr^{-1}$	7.1.4	Sum of TWH and CD	Not monitored Updated each Baseline Revision
BGBE	Below Ground Biomass Emitted	$m^3\ yr^{-1}$	7.1.5	Root-shoot ratio (proportion of AGBE)	Not monitored Updated each Baseline Revision
TM3	Total Emissions in m^3	$m^3\ yr^{-1}$	7.1.6	Sum of AGBE and BGBE	Not monitored Updated each Baseline Revision
TCO2	Total Emissions in tCO^2e	$tCO_2e\ yr^{-1}$	7.1.7a 7.1.7b 7.1.7c 7.1.7d	Conversion factors from wood volume to emissions	Not monitored Updated each Baseline Revision
NBE	Net Baseline Emissions	$tCO_2e\ yr^{-1}$	7.1.8	TCO2 ÷ 2	Not monitored Updated each Baseline Revision
ER	Enhanced Removals	$tCO_2e\ yr^{-1}$	7.2.1	Default values derived from mean sequestration rates for NZ forest types and subsequently derived from project-specific data	Not Monitored Updated each Monitoring Period
NPE	Net Project Emissions	$tCO_2e\ yr^{-1}$	7.2.1	Equal to ER	Not Monitored Updated each Monitoring Period
TAL	Total Activity Shifting Leakage	$tCO_2e\ yr^{-1}$	7.3.1	Derived from Activity Shifting Leakage Analysis	Monitored Updated each Monitoring Period
TML	Total Market Leakage	$tCO_2e\ yr^{-1}$	7.3.2	Derived from Market Leakage Analysis	Not monitored Updated each Baseline Revision

11.7.2 Monitored Parameters

Monitored data and parameters are summarized in the tables below.

Data Unit / Parameter:	**Eligible Forest Area (Operational Forest Area)**
Data unit:	ha
Description:	Forest area included in baseline and project scenario, and area upon which crediting is based (OFA_{LF} &/or OFA_{ULF})
Source of data:	Aerial imagery and Project Boundary Inspection
Description of measurement methods and procedures to be applied:	Aerial imagery (sub-meter accuracy) to define Eligible Forest Area boundary; boundary survey inspections (sub-meter accuracy) using GPS. Measure any reversals occurring in the Eligible Forest Area. Monitored by means of Eligible Forest Boundary Inspections that record any reversal incident occurring within the Eligible Forest Area. The area of any reversal above and beyond the *de minimis* threshold is measured using GPS units set up for sub-meter accuracy and measuring tapes. Area subject to reversal is removed from the Eligible Forest Area until the reversal has recovered the carbon volume lost in the reversal. This is calculated by means of sequestration rates and the estimate of the forest age for the area subject to the reversal. Forest age of the area subject to the reversal is calculated by: • Dendrochronology on stumps in the case of a timber harvest reversal • Dendrochronology on adjacent living trees of equivalent size of burnt stumps
Frequency of monitoring/recording:	Aerial imagery: 5-yearly Eligible Forest Boundary inspections: annually
Value monitored:	Area
Monitoring equipment:	Aerial imagery/satellite data to sub-meter accuracy Hand held GPS unit, photography
QA/QC procedures to be applied:	5-yearly verification 3rd party verification of Project Management Reports by 3rd party verifier. Annual calibration of monitoring equipment where applicable.
Calculation method:	Subtract reversal area from the Eligible Forest Area and recalculate the Net Carbon Credits by means of the most recent version of the Rarakau Programme Methodology.

Data Unit / Parameter:	**Total Activity Shifting Leakage**
Data unit:	tCO_2e/yr
Description:	Leakage caused by activity shifting
Source of data:	Project Area Inspection (outside Eligible Forest Area)
Description of measurement methods and procedures to be applied:	Site visit of indigenous forest lands owned and controlled by the Project Owner to assess commercial timber harvesting activity in

	comparison with the Baseline Activity and Project Activity as stated in the PD. Where commercial indigenous timber harvesting is occurring on lands owned and controlled by the Project Owner but lying outside the Eligible Forest Area, and where such harvesting has been declared in the PD, the following assessment will be undertaken: • Records of timber harvesting activity are inspected and verified against the timber harvesting plan stated in the PD. • Timber harvesting sites are inspected to verify that they are occurring in the areas specified in the PD. Where commercial indigenous timber harvesting is occurring on lands owned and controlled by the Project Owner but lying outside the Eligible Forest Area, and where such harvesting has not been declared in the PD (i.e. and thereby constitutes Activity Shifting Leakage), the following assessment will be undertaken: • Records of timber harvesting activity are inspected and annual timber harvesting volumes and species are recorded. • Timber harvesting sites are inspected to determine area of harvesting activity. • Calculations are made using the baseline GHG emissions measurement methodology in this methodology to determine the volume of Activity Shifting Leakage. • Net Carbon Credits are recalculated to account for Total Activity Shifting Leakage (TAL) • The Project Owner is notified of the consequence of any continuation of Activity Shifting Leakage in terms of the reduction in Net Carbon Credits for the Project. The Project Owner is instructed to terminate Activity Shifting timber harvesting or risk suspension or termination from the Rarakau Programme.
Frequency of monitoring/recording:	Annual Leakage Inspection and results incorporated into the annual Project Management Reports and 5-yearly Project Monitoring Reports
Value monitored:	m^3 yr^{-1}
Monitoring equipment:	GPS unit, measuring tape, photography
QA/QC procedures to be applied:	5-yearly verification 3rd party verification of Project Management Reports by 3rd party verifier.
Calculation method:	Activity Shifting Leakage method specified in Section 7.3.1 of this methodology.

11.7.3 Monitoring Roles And Responsibilities

Specific project monitoring roles for projects in the Rarakau Programme are summarised in Table 11.7.3. Project Owners and Project Developers are required to assign specific roles to

specific stakeholders in the PD and use this convention in the implementation and monitoring of the Project Activity.

Table 11.7.3 Project Monitoring Roles/Responsibilities	
Task	Responsibility
Project Management	
Project management activities	Implement project management activities
Eligible Forest Area Boundary Inspections	Undertake Boundary Inspections
Eligible Forest Area Inspections	Undertake Area Inspections
Project Management Reporting	Drafting Project Management Report
Project Monitoring	
Aerial imagery/mapping	Coordinate & manage aerial imagery sub-contracting on behalf of the Project Owner
Project Monitoring data management	Coordinate & manage Project Monitoring data management

11.7.4 GHG Information Management Systems

All projects in the Rarakau Programme will use the GHG information management system described in Section 10.1 through 10.3 of this methodology.

11.7.5 Simplified Project Monitoring Report Methodology

The Inception Project for the Rarakau Programme is required to prepare a Simplified Project Monitoring Report for its first two verifications, but thereafter is required to prepare a full Project Monitoring Report using the full project Monitoring Methodology specified in this methodology.

In place of a full set of monitoring data generated from monitoring activities the Project Owner will supply a Director's Certificate to assert that the Project Activity has taken place according to the requirements of this methodology and the PD between the Project Start Date and the end of the first two Monitoring Periods.

11.7.6 Standard Operating Procedure: Project Monitoring

All projects in the Rarakau Programme are required to develop a Standard Operating Procedure (SOP) for Project Monitoring. The Inception Project for the Rarakau Programme is required to establish a simplified SOP for Project Monitoring for first two verifications and then follow the full SOP thereafter. The simplified SOP for Project Monitoring requires the Project Developer to prepare the first two Project Monitoring Reports based on the requirements of the Rarakau Programme Methodology (this document).

11.7.7 Direct Measurement Of Forest Carbon Stock Change

This methodology is based initially on the use of conservative default values for carbon stock change measurement, empirical measurement of the total standing volume as part of the timber harvest plan for the baseline calculation, a series of conservative conversion factors, and defaults derived from national data sets.

All projects are required to use locally specific data for baseline and project carbon stock change calculations as sub-national (locally specific) and project-specific data becomes available.

Each project in the Rarakau Programme is required to use carbon stock change data derived from the relevant strata and forest type, specific to the ecological district within which that project is located. Until default data is available for the ecological district in which the project is located, each project is required to generate data from the establishment of Permanent Sample Plots (PSPs). This project-specific data will contribute to the generation of defaults specific to that ecological district.

Until defaults specific to the relevant ecological district is available, projects are required to establish PSPs in three strata:

1. Canopy gaps
2. Closed canopy regenerating tall forest (where applicable)
3. Old-growth forest patches (if present)

Parameters to be measured are those specified in the carbon pools used by this methodology (excluding below ground live biomass which will continue to use default values).

The specific methodologies for measuring project-specific carbon sequestration rates will be consistent with the requirements of IPCC Tier 3 forest carbon stock measurement.

Note: This methodology was designed for relatively low per hectare baseline emissions. This is because baseline timber harvesting in New Zealand indigenous forest is restricted to low impact timber harvesting methods under license to the Ministry for Primary Industries. Consequentially, carbon revenues per hectare are destined to be relatively small on a global scale. As such, the commercial viability of projects (and therefore their ability to compete with baseline activities) is dependent on balancing project development and on-going monitoring costs with the highest practicable carbon accounting methods and standards. It is for this reason that this methodology uses national defaults initially, and then moves toward defaults relevant to the ecological district in question (by means of project-specific data if none other exist). The movement towards the generation of local site-specific data (from permanent sample plots) is able to be undertaken as project cash flows allow.

12. Documenting The GHG Project

This methodology requires the establishment of a Project Document Database stored electronically and in hard copy. Electronic and hard copy documents shall be stored securely as described in Section 10 of this document.

12.1 RARAKAU PROGRAMME DOCUMENTS

All projects in this Grouped Project will use the following numbering convention:

Table 12.1: Rarakau Programme Documents

Document Name	Document Number
Programme Documents	
Rarakau Programme Description	D1.1 v1.0, date
Programme Agreements	D1.2 v1.0, date
Project Agreements	D1.3 v1.0, date
License Agreements	D1.4 v1.0, date
Memorandum of Encumbrance	D1.5 v1.0, date
Methodologies	
Rarakau Programme Methodology	D2.1 v1.0, date
Project Documents	
[Project Title] Project Description Documentation/PD	D3.x.1 v1.0, date
[Project Title] Project Idea Note/PIN	D3.x.2 v1.0, date
[Project Title] Summary	D3.x.3 v1.0, date
[Project Title] Scoping Workshop Report	D3.x.4 v1.0, date
[Project Title] Inception Workshop Report	D3.x.5 v1.0, date
[Project Title] Overview Report	D3.x.6 v1.0, date
[Project Title] Description Workshop Report	D3.x.7 v1.0, date
[Project Title] Implementation Plan	D3.x.8 v1.0, date
[Project Title] Implementation Workshop Report	D3.x.9 v1.0, date
[Project Title] Management Reports	D3.x.10 v1.0, date
[Project Title] Management Workshop Reports	D3.x.11 v1.0, date
[Project Title] Business Reports	D3.x.12 v1.0, date
[Project Title] Monitoring Report/s	D3.x.13 v1.0, date
[Project Title] Monitoring Workshop Reports	D3.x.14 v1.0, date
[Project Title] Dispute Resolution Framework	D3.x.15 v1.0, date
[Project Title] Dispute Resolution Reports	D3.x.16 v1.0, date
[Project Title] Standard Operating Procedures	D3.x.17 v1.0, date
[Project Title] Steering Committee Minutes	D3.x.18 v1.0, date
[Project Title] Termination Report	D3.x.19 v1.0, date

Validation/Verification Documents	
[Project Title] Validation Service Agreement/s	D4.x.1 v1.0, date
[Project Title] Validation Report/s	D4.x.2 v1.0, date
[Project Title] Validation Statement/s	D4.x.3 v1.0, date
[Project Title] Verification Service Agreement/s	D4.x.1 v1.0, date
[Project Title] Verification Reports	D4.x.2 v1.0, date
[Project Title] Verification Statements	D4.x.3 v1.0, date
Registry Documents	
[Project Title] Credit Issuance Deed	D5.x.1 v1.0, date
Carbon Buyer Documents	
[Project Title] Brokerage Agreements	D6.x.1 v1.0, date

x = Project Number (P1, P2, …)

An example of the document numbering convention can be seen in the header of this page.

The content and purpose of these documents is described in Section 9.1 of this document. A copy of all Rarakau Programme Documents is stored in the Document Database of the Programme Operator and the Project Developer where appropriate.

12.2 DOCUMENT DATABASE

This methodology requires project documents to be stored electronically and in hard copy.

The electronic document database for the Rarakau Programme is described in Section 10 of this document.

13. Validation / Verification Of The GHG Project

This methodology is validated to the Plan Vivo carbon standard. The validation/verification entity is required to be a third party that is an approved validator/verifier of the Plan Vivo standard.

The Rarakau Programme is a Grouped Project and is validated by means of the validation of the Inception Project PD. The Inception Project PD is validated to the Plan Vivo carbon standard. The validation/verification entity is required to be a third party that is an approved validator/verifier of the Plan Vivo standard.

The GHG assertion for each Project within this Grouped Project is verified to the Plan Vivo standard. The verification entity is required to be a third party that is an approved verifier of the Plan Vivo standard. Verification is based on the GHG assertion contained in Project Monitoring Reports.

14. Reporting The GHG Project

All projects in the Rarakau Programme shall follow the reporting requirements of the Plan Vivo standard.

15. Adding Subsequent Projects To The Grouped Project

The Rarakau Programme is a Grouped Project with the following elements:

- Geographical Areas
- Temporal Scope
- Baselines, Additionality, Eligibility
- GHG Information System
- Activity Type
- Validation/verification of Sub-Projects
- Legal Instrument

15.1 GEOGRAPHIC AREAS

The geographic area of the Rarakau Programme will be restricted to indigenous forest in New Zealand that is excluded from the New Zealand Emissions Trading Scheme (NZETS) (i.e. lies outside the carbon accounting boundary of the NZETS). This applies to indigenous forests established prior to 1 January 1990.

15.2 TEMPORAL SCOPE

Should New Zealand include pre-1990 indigenous forest in a domestic compliance regime, forests currently eligible for participation in the Rarakau Programme would consequently fall under an international and/or domestic compliance carbon accounting regime. Under these conditions projects in the Rarakau Programme would either:

a. Cease to engage with the international voluntary carbon market and shift to a compliance activity, or
b. Continue with the voluntary carbon market but only if the New Zealand Government provides a guarantee that the carbon in the forests subject to the Rarakau Programme will not be included in the national compliance carbon accounting regime and no climate benefit or GHG claim will be made domestically or internationally by the Government relating to these forests.

15.3 BASELINES, ADDITIONALITY AND ELIGIBILITY

The baseline activity, additionality criteria, and eligibility criteria will remain unchanged for the activity type Improved Forest Management – Logged to Protected Forest (IFM – LtPF).

There is one possible exception to the unchanging baseline activity, and this relates only to the SILNA Maori land ownership category. 'SILNA' stands for 'South Island Landless Natives Act' of 1906 and the SILNA Maori land category is a special case in Maori land ownership in New Zealand. The SILNA lands were awarded to individual landless Maori whose lands were illegally alienated from them during the 19th century. In 1906 the New Zealand Government passed the SILNA Act to award lands to SILNA Maori in compensation for lands illegally lost decades before. It was the intention that these lands be used by SILNA beneficiaries for purposes of economic development equivalent to that occurring on lands lost to these people. The intention and expectation, therefore, was that SILNA lands would become farms.

To become a farm the indigenous forest first has to be removed. However, in 1993 the New Zealand Government (The Crown) passed the Forest Amendment Act (1993) that effectively prevented clear felling of indigenous forests on any privately-owned land. SILNA lands were exempted from the provisions in this law due to the expectation that their compensation lands would have the value of farms or plantation forestry. In 1991, however, the New Zealand Government passed the Resource Management Act (1991) (RMA), which after 1993 has been used by local government in Southland to deny SILNA land owners legal sanction to deforest or harvest timber beyond the requirements of the Forest Amendment Act (1993).

Should SILNA landowners ever regain legal sanction to execute their exemption from the Forest Amendment Act (1993) they may adjust the baseline activity (e.g. from low to high impact logging or clear felling, and the baseline scenario.

The only other circumstance leading to a change in the baseline scenario is if there is a change in forestry law or regulations relating to the rate of allowable timber harvests.

15.4 GHG INFORMATION SYSTEM

The GHG Information System will remain unchanged with any Sub-Projects added to the Grouped Project.

15.5 ACTIVITY TYPE

The Rarakau Programme is restricted to the activity type: 'Improved Forest Management – Logged to Protected Forest' (IFM-LtPF) as defined by the Verified Carbon Standard.

The Rarakau Programme may expand in scope in future to include other activity types such as:

- Improved Forest Management – Low Carbon to High Carbon Forest (IFM-LCtHC)
- Improved Forest Management – Low Carbon to Sustainable Forest Management (IFM-LCtSFM)
- Improved Forest Management – Plantation Harvest Forest to Permanently Protected Forest (IFM-PHtPF)

15.6 VALIDATION/VERIFICATION OF SUB-PROJECTS

Each sub-Project of the Rarakau Programme (Grouped Project) will enter into the Rarakau Programme by means of a Programme Agreement with the Programme Operator. The Programme Agreement includes terms and conditions that bind new Project Owners to the Rarakau Programme Methodology and Protocols.

Each Sub-Project will follow the following process:

1. Each new Project Owner enrols their forest in the Rarakau Programme (Programme Agreement between Project Owner and Programme Operator).
2. Project Owner undertakes project development (Project Agreement with Project Developer).
3. Each Sub-Project PD is 2nd party validated by means of a 'Rarakau Programme Validation Report' prepared by the Programme Operator.
4. Each Sub-Project is registered with Rarakau Programme Registry through (either)
    a. Opening a new Registry account for new Project Developers entering the Rarakau Programme, or
    b. Opening a Registry sub-account of the Project Developer's Registry account for Project Developers already operating with the Rarakau Programme and who already have a Registry account.
5. Sub-Projects shall undertake verifications according to the Rarakau Programme monitoring and verification cycle.

15.7 LEGAL INSTRUMENT

All projects in this Grouped Project are required to legally protect the forests for at least the duration of each 50-year Project Period. This legal protection shall safeguard project activities and prevent the occurrence of baseline activities.

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Appendices

APPENDIX 1: EVIDENCE OF NO EIA REQUIREMENT

Pdf document supplied separately in Meth Appendix Folder.

Document file name: Meth Appendix 1 EIA Confirmation MFE.

Document title on title page: Appendix 1: Evidence of no EIA requirement.

APPENDIX 2: NATURAL FOREST CARBON

Pdf document supplied separately in Meth Appendix Folder.

Document file name: Meth Appendix 2 2009 Beets et al Natural forest carbon.

Document title on title page: Appendix 2: Natural forest plot data analysis: Carbon stock analyses and re-measurement strategy.

APPENDIX 3: CARBON SEQUESTRATION RATES

Spreadsheet supplied separately in Meth Appendix Folder.

Document file name: Meth Appendix 3 Carbon Sequestration Rates.

Document title on title page: Appendix 3.