

INDICATIVE BUSINESS CASE

NATIVE FOREST BOND SCHEME

A better way to finance
continuous native forest in
Aotearoa New Zealand.

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MŌHIO

With support from:

G.I.F.T Gulf Innovation
Fund Together > A Foundation
North initiative

ABOUT

The New Zealand Government is committed to increasing forest planting through its Billion Trees Programme, funded by the Provincial Growth Fund.


This should include continuous native forest on marginal erosion-prone land to enhance the mauri and resilience of the land, and to create carbon sinks to help New Zealand meet its international emissions targets.

THE OPPORTUNITY

A 2017 analysis for the Ministry for Primary Industries puts the scale of moderate to extremely erosion-prone land suitable for afforestation at 1.131 million hectares, about 4.2% of New Zealand's total land area.

The Parliamentary Commissioner for the Environment (2016) estimated that regeneration of native forest on at least one million hectares of marginal land would offset about 17% of all the agricultural methane and nitrous oxide currently emitted annually, into the indefinite future. Through intervention and innovation, this carbon sequestration potential could be even higher.

1.1 MILLION HECTARES OF
EROSION-PRONE LAND



MŌHIO IS PASSIONATE ABOUT
RESEARCH, POLICY &
INVESTMENT SOLUTIONS THAT
REFLECT AOTEAROA: ITS
CIRCUMSTANCES, ITS VALUES &
ITS UNIQUE OPPORTUNITIES.

PROPOSAL

The Native Forest Bond Scheme (NFBS) is underpinned by a unique financing structure, guaranteed by the New Zealand Government, which provides urgently needed upfront capital for large-scale native forest establishment.

OBJECTIVE

To create a scalable, national level scheme that enables landowners to create forest carbon sinks to reduce New Zealand's net greenhouse gas emissions and enhance land resilience.

PAY FOR PERFORMANCE

The NFBS can establish forest more cost-effectively and efficiently by the private sector under environmental outcomes-based, pay-for-performance contracts that guarantee results for the Government and attractive financial returns for investors.

INTEGRATED OUTCOMES

The forest established through the NFBS creates a rich stack of social, environmental and economic benefits – both quantifiable and unquantifiable – which generates value for investors, landowners, regional communities, and the New Zealand public.

THE OUTCOMES

01

MORE TREES

Number of trees
(stems per hectare)

02

MORE CARBON

Volume of carbon sequestered
(tonnes of carbon per hectare)

03

MORE CO-BENEFITS

Avoided terrestrial erosion, reduced sediment in waterways, increased biodiversity, more regional jobs



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The authors also acknowledge AUT (Auckland University of Technology) for its ongoing support of the concept, and the impact investment movement in New Zealand more generally.

Disclaimer

This Indicative Business Case was prepared for the Foundation North with support from its GIFT fund (Gulf Innovation Fund Together) for presentation to the New Zealand Government. It is derived from literature reviews and interviews; *however, the views and opinions expressed in this document are those of the authors alone and do not necessarily reflect the official policy or position of any person or department within the New Zealand Government.* Due to the early-stage nature of the concept, there will inevitably be omissions – hence this is an indicative business case intended to orient future analysis and detailed business case development.

This document is the first a working version (Version 1). As feedback is received from relevant stakeholders, it may be updated at the discretion of the authors.

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Glossary

AAU: Assigned Amount Unit

AGS: Afforestation Grant Scheme

EIB: Environmental Impact Bond

ETS: Emissions Trading Scheme

FY: Fiscal Year

GIF: Green Investment Fund

M&E: Monitoring and Evaluation

MBIE: Ministry of Business, Innovation & Employment

MfE: Ministry for the Environment

MPI: Ministry for Primary Industries

NDC: Nationally Determined Contributions

NFBS: Native Forest Bond Scheme

NGO: Non-government Organisation

NPO: Non-profit Organisation

NZU: New Zealand Unit

PBC: Performance-based Contract

PFSI: Permanent Forest Sink Initiative

SIB: Social Impact Bond

UNFCCC: United Nations Framework Convention on Climate Change



Background

Native Forest Bond Scheme (NFBS): Indicative Business Case (henceforth Business Case) is the latest step in a longer journey.

It began in 2016 when Sam Lindsay and Dr. David Hall met over the shared idea of using impact bonds to unlock capital for native forest planting. Sam had recently returned to New Zealand from overseas where he worked as an advisor to funds, family offices and foundations on a variety of impact investment topics. David was about to publish an influential report for Pure Advantage, *Our Forest Future*, which called for 1.3 million hectares of new forest as a crucial part of New Zealand's climate change policy. He had also recently undertaken the conceptual design for a tree-planting campaign, Trees That Count, for The Tindall Foundation.

Their convergence over the impact bond concept convinced them to test the idea among potential stakeholders and to develop a richer knowledge base. In February 2017, they published a working paper, *Environmental Impact Bonds: A Case for Permanent Forest Bonds in New Zealand*, through the Institute of Governance and Policy Studies (IGPS), Victoria University of Wellington. This was followed by a report prepared for the Ministry for the Environment, *Climate Finance Landscape for Aotearoa New Zealand: A Preliminary Survey*, an analysis of domestic climate-aligned investment activity from private and public sources. These documents situate the NFBS within a wider domestic and international context.

In mid-2017, Mōhio was incorporated as a vehicle for Sam Lindsay and David Hall to develop this concept and other policy innovations. Foundation North very generously supported Mōhio to prepare the present document, *Native Forest Bond Scheme: Indicative Business Case*, through its GIFT fund (Gulf Innovation Fund Together) which seeks to improve the mauri to the Hauraki Gulf through innovation. It focuses directly on the potential for an environmental impact bond to effectively deliver climate mitigation impacts, improved land resilience, and a host of other environmental co-benefits.

Mōhio hopes that this report provides a solid knowledge base that Government can leverage as part of its afforestation and climate strategy, especially to ensure that opportunities in environmental finance innovation are part of its options analysis. The Business Case sets out Mōhio's proposed approach to piloting the scheme and includes how it could be developed and structured.

Mōhio would also like to again acknowledge the assistance by various partners, advisors and collaborators who contributed their time and expertise to help produce this Business Case.

Ngā mihi maioha,

David Hall & Sam Lindsay

Key Milestones

Within one year, Mōhio has produced a portfolio of high-quality documents, relationships and partnerships which have helped to validate the Native Forest Bond Scheme concept at an early stage. Table 1 below summarises of the key milestones:

Table 1: Summary of Key Milestones

Date	Milestone
Apr, 2016	Received a \$15,000 research grant from the Institute of Governance and Policy Studies, Victoria University of Wellington.
Feb, 2017	Published a working paper, <i>Permanent Forest Bonds: A pioneering environmental impact bond for Aotearoa New Zealand</i> , through the Institute of Governance and Policy Studies (IGPS), Victoria University of Wellington.
Apr, 2017	Published the journal article “Greening the Future: A Case for Environmental Impact Bonds” in <i>Policy Quarterly</i> . Delivered a guest lecture at the Institute of Governance and Policy Studies, Victoria University of Wellington.
May, 2017	Presented the NFBS concept to the Ministry for the Environment’s (MfE) Executive Leadership team.
Jun, 2017	Commissioned by MfE to prepare research on the current state of climate finance flows in New Zealand so as to help position the NFBS within a national context. Refer to <i>Climate Finance Landscape for Aotearoa New Zealand: A Preliminary Survey</i> .
Oct, 2017	Awarded a \$50,000 research grant from Foundation North – GIFT to develop this Business Case for the use of the impact bond model to fund planting in the Hauraki Gulf.
Nov, 2017	Selected as a finalist of the WWF Conservation Innovation Awards and WWF Forest Finance Challenge for increasing the scale and/or effectiveness of conservation in New Zealand, and globally.
Dec, 2017	Signed Letter of Intent with ANZ Bank New Zealand Limited as a commercial banking partner who will advise on product development and distribution.
Apr, 2018	Signed Letter of Intent with Ernst & Young New Zealand Limited who will advise on methodologies and execute accurate and reliable measurement of project benefits.

Preface

The purpose of this Indicative Business Case is three-fold. First, to assess whether the Native Forest Bond Scheme (henceforth, the Scheme or NFBS) would generate public value for New Zealand. Second, to develop the scope and general principles for implementing the Scheme. Thirdly, to determine whether Government should take ownership of the NFBS concept by forming a Project Team to advance the concept.

This document is guided by the principles of the Better Business Case framework, endorsed by Treasury.¹ This framework serves as the New Zealand Government's accepted good practice standard, which provides a common language and a systematic way for stakeholders and decision-makers to make investment decisions with confidence.

This Business Case may inform, but does not necessarily reflect, the Government's approach to piloting an Environmental Impact Bond in New Zealand. It represents Mōhio's current thinking at this given point of time and may be amended as the concept progresses.

It is important to clarify that certain sections of the Better Business Case framework are left deliberately incomplete by the authors, in order to create the space for the Government and other stakeholders to participate in further concept development and to input their preferred data sets (see §1.7 for further detail). It follows that a key recommendation of this Business Case is for Government to form a Project Team to lead the completion of these sections.

It should be noted that this Business Case does not attempt to identify which government agency is best positioned to perform the role of Contracting Agency. Given the Scheme's implications for multiple agencies – including Treasury, MPI, MfE, MBIE, and potentially the future Green Investment Fund – a consultation process should be considered to identify which agency should assume the lead role in the Scheme's development, and which agencies should support the initiative and for what purpose.

This Business Case takes the position that the NFBS has the potential to deliver native forest outcomes more cost effectively than existing government programmes. We emphasise that this is speculative and ought to be further tested through an in-depth options analysis, undertaken by or in collaboration with Government.

Substantial market interaction with philanthropic, investment, and commercial forest sectors has occurred throughout the formation of the Business Case. At a high-level of information, the overall response to the concept has been positive, with requests for further information as the pilot scheme becomes more detailed.

¹ NZ Treasury, 2015. *Better Business Cases: Guide to Developing the Strategic Assessment*, 30 September 2015. Wellington: NZ Government.

Executive Summary

- **The proposed Native Forest Bond Scheme (NFBS) is an eminently viable and attractive mechanism for addressing the challenge of establishing continuous native forest on erosion-prone land in pasture throughout New Zealand, thereby creating significant public value.** If the New Zealand Government commits to tackling this particular challenge, especially as part of the Billion Trees Programme within the Provincial Growth Fund, the NFBS ought to be included in its options analysis because of its virtues for cost-effectiveness, efficiency and scope for innovation (for an overview, see §1).
- **The target land for the NFBS – that is, erosion-prone land in pasture – provides a major opportunity for environmental impact, with all the economic and social benefits that are associated.** Establishing continuous native forest at this scale will create regional jobs and avoid environmental costs by reducing terrestrial erosion and sedimentation into waterways, thereby enhancing land resilience in the regions. The creation of continuous forest carbon sinks also helps New Zealand meet its emissions targets by removing carbon dioxide from the atmosphere, thereby delivering dual climate mitigation/adaptation benefits (see §2.4).
- **The scale of need for enhancing the resilience of erosion-prone land is substantial, too large for public funding alone; therefore the New Zealand Government needs to find innovative ways to “crowd in” private finance to invest in this and other climate infrastructure.** The scale of moderately to extremely erosion-prone pastoral land is 1.131 million hectares, about 4.2% of New Zealand’s total land area (see §1.6). Government needs to pioneer new thinking, new solutions, and sustained partnerships with other private and social sector stakeholders in order to address the financing gap.
- **The NFBS (the Scheme) is underpinned by the Native Forest Bond (the Bond), an example of outcome-based funding, whereby the Government reduces its risk of investing public money into unsuccessful outcomes.** This project risk is reallocated to private sector investors who purchase the Bond, who are rewarded for carrying this risk by receiving interest payments if impact targets are successfully met. Alongside other advantages (see main benefits for Government in §2.6.1), this makes the NFBS a more attractive proposition for the Government as outcome funder, whose pledge to pay for success is its cornerstone.
- **By contracting for outcomes, rather than outputs, the NFBS accommodates innovation in the way that continuous native forest outcomes are delivered.** The cost of establishing native forest can be anywhere between \$4,000 per hectare (or less) for natural regeneration, or up to \$66,000 per hectare for high-quality native restoration. The NFBS is designed to reward more cost-effective delivery, as long as impact targets are met to ensure the quality of outcomes (for a discussion of innovation, see §2.7).

- **If the New Zealand Government were to launch a NFBS pilot programme, it would be the first government in the world to guarantee a national-scale environmental intervention through an Environmental Impact Bond structure.** New Zealand would position itself as a global leader in using climate finance innovation to mobilise private sector capital in more efficient and scalable ways to solve social, economic, and environmental problems. This would also advance the understanding and adoption of impact investment, both domestically and internationally, by generating new knowledge in the measurement of integrated outcomes.
- **This document uses the New Zealand Treasury’s Better Business Cases framework to test the concept of the NFBS *a priori*, and to prepare a knowledge base for future consideration by Government and other stakeholders.** The general structure of the NFBS and accompanying financial model were drafted in partnership with senior leadership from ANZ Bank New Zealand, Mōhio’s commercial banking partner, a relationship that grounds this Indicative Business Case in deep commercial financial advice and principles.
- **Parts of this framework are left deliberately incomplete or indeterminate in order to create the space for Government and other stakeholders to take ownership of the NFBS concept, and to input its own preferred data and strategy** (see the Preface and further discussion of limitations in §1.7). This Business Case does not attempt to determine the NFBS’s eventual structure, nor to pre-empt or preclude other approaches and structures that may be more appropriate for delivering the intended environmental outcome. Rather, the framework provided should serve to provide some general parameters within which an acceptable commercial solution could be found.
- **The Introduction (Section 1) provides a standalone overview of the NFBS concept in general terms.** This section is designed to provide the reader with a rich and accessible sense of the opportunity of the NFBS. It also provides an overview of the limitations of this document, given the stage of concept development.
- **The Strategic Case (Section 2) sets out the case for change, by detailing the wider context in which the NFBS would operate.** This section describes the strategic context for the NFBS (§2.1), how it will be advanced organisationally (§2.2), how it fits into the wider regulatory ecosystem (§2.3), how the NFBS can contribute to land resilience and climate-alignment (§2.4), how the NFBS complements or competes with existing afforestation initiatives (§2.5), what are the main benefits and risks for Government and other stakeholders (§2.6), what are the key constraints and dependencies (§2.7), and finally how the NFBS could unlock innovation to deliver outcomes more cost effectively and be more impactful (§2.8).
- **The Economic Case (Section 3) sets out the financial model and an initial analysis of the market.** This section advances its preferred way forward by specifying two options for structuring the Bond (§3.1). It also provides a market analysis of two stakeholder groups:

landowners (§3.2) and investors (§3.3). This market analysis identifies that a key priority for the NFBS is to align with the aspirations and values of Māori landowners, who own a significant proportion of land available for planting. This analysis also identifies strong investor interest in the NFBS and impact investment opportunities more broadly.

- **The Financial Case (Section 4) and Management Case (Section 5) are provided in outline only, to indicate the cost and revenue implications of the preferred way forward, and to outline a feasible programme for implementing the NFBS.** These sections are necessarily speculative, given that more comprehensive analyses would require joint decision making and information sharing with Government. However, these sections outline the financial model (§4.1), the model assumptions (§4.2), the potential payment mechanisms (§4.3), and a potential management plan for advancing the Scheme (§5.1).
- **This Indicative Business Case recommends that a Project Team within Government be established to undertake an options analysis for its Billion Trees Strategy that includes the NFBS as a viable and competitive mechanism to establish continuous native forest on erosion-prone land.** The NFBS is an eminently feasible solution to financing an effective and efficient mass afforestation programme in New Zealand that would reduce the Government's forward carbon liabilities through purchasing offshore emissions reductions to meet its targets under the Paris Agreement, as well as to avoid the costs from erosion, sedimentation, soil loss and so on that derive from leaving vulnerable land un-forested. A strategic opportunity exists to explore new models for outcome-based contracting between the public, private and social sectors to accelerate commercial expertise and innovation into the sector. Accordingly, this Business Case recommends that:
 1. A Contracting Agency within Government is identified in order to lead the NFBS concept development toward a pilot programme.
 2. Mōhio will work with EY to refine its monitoring and evaluation framework, which can further communicate to Government (as Outcome Funder) the scale of the NFBS's contribution to public value and, hence, the budgetary commitment that is justified to pay for successful outcomes.
 3. A Project Team is developed within the Contracting Agency to undertake a comprehensive options analysis of existing and prospective schemes to deliver forest outcomes for the Billion Trees Programme, which includes the NFBS as one option. This options analysis could assure the Government that it is using public money responsibly in delivering environmental outcomes.
 4. Undertaking this options analysis would generate the information required to transition this Indicative Business Case to a Detailed Business Case. If the conclusions of this document are corroborated, Mōhio would work in partnership with the Contracting Agency in order to prepare the NFBS for consideration by Cabinet.

1. Introduction

Section Purpose

1. This Introduction sets out the general strategic context and structure of the NFBS as a bespoke solution to address the challenge of establishing continuous native forest on erosion-prone land throughout New Zealand.
2. This Introduction also highlights the limitations of this Business Case, given that collaboration and co-ownership with Government is necessary for successful concept development.

Key Conclusions

1. The NFBS is underpinned by a financial structure that belongs to an emerging family of debt instruments known as Environmental Impact Bonds (EIBs). The impact bond structure originated in the social sector as Social Impact Bonds (SIBs) and has subsequently been adapted to environmental outcomes.
2. The guarantee by Government to pay for outcomes, formalised through pay-for-performance contracts between the Intermediary and the Contracting Agency, provides the Intermediary with the commercial conditions required to raise investment capital from private sector investors by issuing the Bond.
3. The monitoring and evaluation framework is structured around a simple core of easily measurable *contracted outcomes*. This is supported by a broader set of *non-contracted KPIs* which do not function as payment trigger but do convey the wider value of the outcomes that the NFBS delivers.
4. Mōhio recommends that the Bond, which provides financing into the Scheme, be issued by a non-sovereign intermediary but backed by the Government through its guarantee to pay for successful continuous forest outcomes.

1.1. Overview

The Native Forest Bond Scheme (NFBS) is a way of joining people together around a common cause. That cause is to establish continuous native forest on vulnerable land throughout Aotearoa New Zealand, especially highly erosion-prone pastoral land.

The NFBS functions by bridging the distance between contracting parties. It bridges the social distance between demand and supply – that is, between the people who want to see positive environmental outcomes and the people who have the capacity (financial, practical) to make that happen. It also bridges the temporal distance between the present and the future, between the

moment an investment is made (such as planting a tree) and the moment the benefits are enjoyed (such as carbon credits accrued). The NFBS *brings forward* these positive returns, so that landowners are empowered to make the changes that they otherwise would not have the capacity to make.

What brings these parties together are the financial contracts – the *pay-for-performance contracts* – that underpin the NFBS in the form of the Native Forest Bond (the Bond). The Bond unlocks private capital that makes possible what otherwise would not be possible.

The intentionality of the NFBS, as well as its reliance on an impact bond structure, align with key domestic and international trends:

- **Outcome-based funding:** Outcome-based contracting is contracting for, and paying for, the achievement of a sustainable outcome. The NFBS is built upon pay-for-performance contracts which ensure that the outcome funder pays only for successful outcomes. This aligns with a number of state sector initiatives over recent years, particularly in the social sector, to shift towards contracting for outcomes.² Internationally and in New Zealand, this has also been referred to as *contracting for outcomes*, or more broadly as *payment by results* and *payment for success*.
- **Impact investment:** The NFBS would create opportunities for impact investment, which is defined by the New Zealand Impact Investing Network as: “Investing with the intention of generating a measurable and beneficial societal and/or environmental impact alongside a financial return”. The NFBS is designed to deliver market-rate financial returns while also delivering the outcome of continuous native forest, with all the accompanying social and environmental co-benefits.³
- **Climate finance:** The NFBS is an innovative example of *climate finance*, which can be defined as finance that “aims to reduce emissions of GHGs, and to enhance sinks of GHGs and aims at reducing vulnerability of, and maintaining and increasing the resilience of, human and ecological systems to negative climate change impacts.”⁴ In this vein, the NFBS channels capital investment into projects that contribute to *climate mitigation* by sequestering carbon through forest sinks; and *climate adaptation* by enhancing the resilience of vulnerable land.⁵

² See NZ Treasury, 2013. “Contracting for Outcomes in the Social Service Market”, Internal Discussion Paper. Wellington: NZ Government. Accessed at: <http://www.treasury.govt.nz/publications/informationreleases/socialservices>

³ See Ākina, EY & JBWere, 2017. *Growing Impact in New Zealand*, September 2017. Ākina: Wellington.

⁴ UNFCCC Standing Committee on Finance, 2014. *2014 Biennial Assessment and Overview of Climate Finance Flows Report*. Bonn, Germany: United Nations Framework Convention on Climate Change (UNFCCC), p.5.

⁵ David Hall and Sam Lindsay, 2018. *Climate Finance Landscape for Aotearoa New Zealand: A Preliminary Survey*, Report Prepared for the Ministry for the Environment. Auckland: Mōhio. Retrieved from:

To sum up, the NFBS is a means of harnessing private sector finance and management skills in order to drive efficiency and effectiveness in the delivery of climate-aligned outcomes. The NFBS strategically reallocates incentives and risks to the private sector, thereby better defining outcome definition and achievement, and driving innovation through new or improved service delivery.

1.2. Concept Background

The Native Forest Bond Scheme (NFBS) is an eminently scalable financial instrument that provides landowners with upfront capacity to establish continuous native forest. It belongs to an emerging family of instruments known as Environmental Impact Bonds (EIBs). The impact bond structure originated in the social sector as Social Impact Bonds (SIBs), then adapted to environmental outcomes by David Nicola in 2013. He describes EIBs as:

...a 'pay-for-performance' (PFP) contract that addresses an environmental issue. The PFP mechanism inherent in EIBs will be similar to that of SIBs, whereby the government (or another contracting entity) pays an agreed-upon return if impact performance targets, as specified in the investment contract, are met. EIBs tend to represent a 'monetization' of future costs savings, whereby investors are paid a return based on the amount of cost savings generated by a particular project.

The first ever EIB was issued on 29th September 2016 by Washington DC Water and Sewer Authority.⁶ It was sold to Goldman Sachs and the Calvert Foundation with the proceeds going towards establishing green infrastructure to control storm-water runoff and improve water quality. The project manager, Quantified Ventures, is providing advisory services to other cities to replicate the EIB model elsewhere, including Louisiana to restore wetlands, Atlanta to enhance flood resilience, and Baltimore to address water pollution.⁷ The proposed NFBS adapts this financing model to provide upfront capital in large-scale afforestation on erosion-prone land in New Zealand.

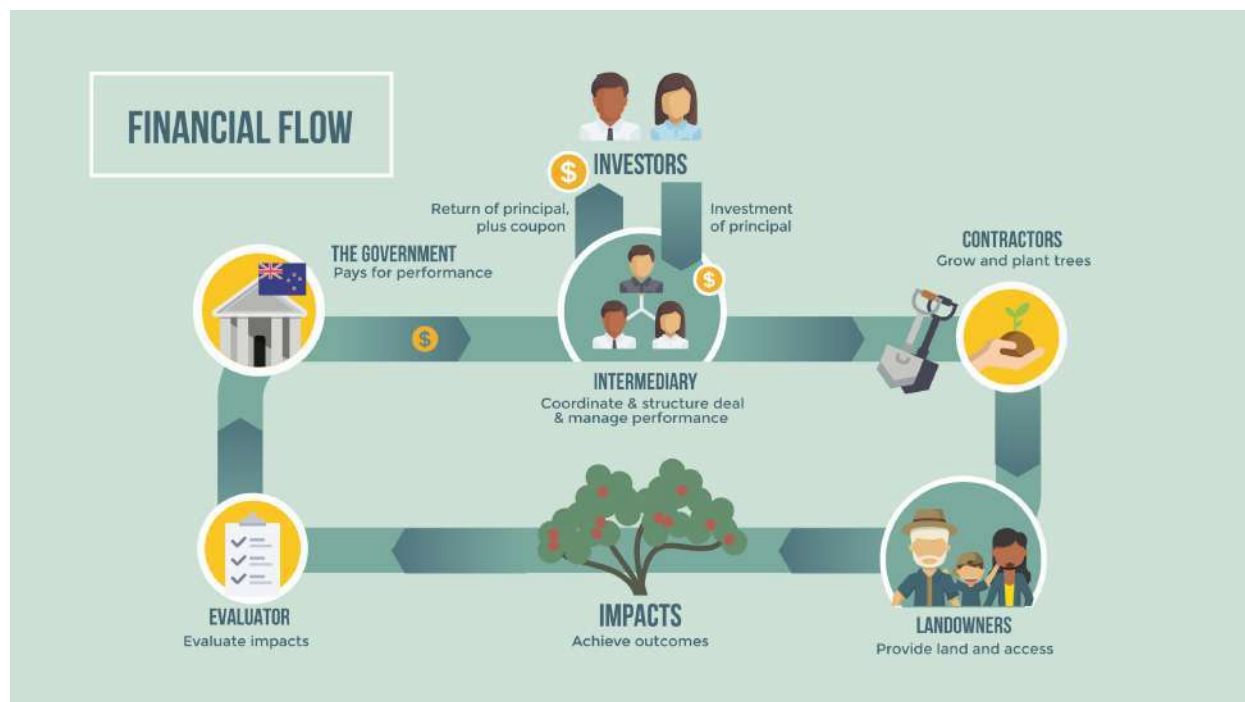
<https://www.mfe.govt.nz/publications/climate-change/climate-finance-landscape-aotearoa-new-zealand-preliminary-survey>

⁶ See DC Water, 2016. "DC Water, Goldman Sachs and Calvert Foundation pioneer environmental impact bond", Media Release, 29th September 2016. Retrieved from <https://www.dcwater.com/whats-going-on/news/dc-water-goldman-sachs-and-calvert-foundation-pioneer-environmental-impact-bond>.

⁷ See Dakoti Gangi, 2017. "EDF and TNC partner on new Environmental Impact Bond to fund coastal restoration", 19th July 2017. Environmental Defense Fund (EDF) website. Retrieved from <http://business.edf.org/blog/2017/07/19/edfs-new-environmental-impact-bond-to-support-coastal-restoration/>

Figure 1 below sets out a simplified overall financial flow between NFBS participants. In general terms, the NFBS works like this:

Figure 1: Financial Flow



1. **Government:** The Government makes a promise to pay the Intermediary for managing a successful intervention with agreed-upon impacts. In this case, the outcome is continuous native forest which will remove carbon dioxide from the atmosphere, enhance the mauri and resilience of erosion-prone land and associated waterways, create meaningful employment opportunities in the regions, and enhance native biodiversity.
2. **The Intermediary:** This guarantee to pay for outcomes, formalised through a pay-for-performance contract between the Intermediary and the Contracting Agency, provides the Intermediary with the commercial conditions required to raise investment capital from private sector investors through issuing the Bond. Typically, the Intermediary is also tasked with coordinating and structuring the deal and managing performance of contractors.⁸

⁸ The proposed model assumes an Intermediary with combined operational and financial roles. This need not necessarily be the case. For example, the Crown could decide that it is best placed to retain the operational roles (to perhaps help reduce government agency and monitoring costs) or some financial roles. Another example could be that the Intermediary is a consortium of companies and organisations that undertake specialist roles (debt issuance and management, planting program management etc.) under an umbrella structure with a shared vision and mission. For simplicity, this Business Case does not address these alternate structures as that would require a significant body of work outside the scope of this Business Case.

3. **The Investors:** By purchasing the Bond, the Investors provide a loan (the principal) to the Intermediary which will be used as up-front capital for establishing new forest. The Investors are exposed to the risk that the Intermediary will not achieve the agreed-upon impacts and are compensated for that risk by being paid an interest rate on the loan if the intervention is successful.
4. **Contractors & Landowners:** The Investors' capital (the principal) is used to pay the Contractors to identify and prepare planting sites, plant the trees, and maintain the sites afterwards. This enables the Landowners to make a land use conversion that they otherwise might not have had the time, resources or expertise to make.
5. **The Evaluator:** Once the forest is established, the Evaluator assesses whether the impact targets are successfully met. If the targets are met, payment is triggered from the Contracting Agency to the Intermediary, as per the pay-for-performance contract. This money is used to repay the Investors during the tenor (the lifetime) of the NFBS.

This set of relationships is illustrated in Figure 2, which outlines the work flow between NFBS participants:

Figure 2: Work Flow



Through the Bond mechanism, the Government pays only for successful continuous forest outcomes, thereby reducing its risk for failed projects involving public funds. Moreover, by enabling landowners to create carbon sinks, the Government reduces its forward liabilities by

reducing the number of international emissions reductions it needs to purchase to meet New Zealand's emissions targets. It would also accrue a range of environmental co-benefits that align with government priorities, including reduced soil loss, reduced sediment in waterways, avoided costs to private and public property from landslides, enhanced land resilience against extreme weather events, and increased biodiversity. Last but not least, the NFBS would facilitate substantial investment into the regions by creating regional job opportunities for forest planting and maintenance, and support for tangata whenua to restore mauri to deforested landscapes. These benefits are discussed in further detail in §1.5.

1.3. The Role of Each Party

The NFBS brings together a variety of public and private sector parties to participate in a mutually reinforcing and beneficial set of relationships. Each party plays an essential role in the Scheme through roles that are explained in more detail below:

Table 2: The Role of each party in the NFBS

Contracting Agency (in Government)	
Priority/Significance	Role
1.	To work with the market (Contractors, Landowners, and Investors) to enhance market capacity and capability for delivery of a successful NFBS;
2.	To work with the market through a joint development phase to establish the commercial parameters of the scheme, as well as determine the contracted outcome(s) and measures for achieving that outcome(s);
3.	To procure and contract the Intermediary to deliver continuous forest outcomes through a pay-for-performance contract, as well as work closely with the Intermediary on a monitoring and evaluation framework throughout the lifetime of the contract.

Intermediary	
Priority/Significance	Role
1.	To hold the pay-for-performance contract with the Contracting Agency and to function as the Bond issuer;
2.	To manage Investors' capital and identify Contractors who can fulfil agreed-upon impact targets, both contracted and non-contracted;

3.	To actively manage programmes aimed at achieving target outcomes and to ensure compliance with the terms of the outcome-based contract and the Bond;
4.	To receive payments from the Contracting Agency upon successful delivery of contracted outcomes, then return investment principal-plus-coupon to investors.

Investors	
Priority/Significance	Role
1.	To purchase the Bond from the Intermediary in order to provide up-front capital for the outcomes-based contract;
2.	To bring commercial expertise and due diligence insights to focus services on delivering the contracted and non-contracted outcomes, and thereby exercise control over the tree-planting programmes;
3.	To validate investor interest in planting continuous forest via the NFBS and feedback data on risk/return appetite for future interventions.

Contractors	
Priority/Significance	Role
1.	To identify and prepare (access, licences, resources) planting sites for establishment of continuous forest;
2.	To plant the forest and maintain the planting site (weeds, fencing and pests) until the date of Bond maturity;
3.	To submit qualitative and quantitative data on planting best practice standards and innovative cost cutting techniques.

Landowners	
Priority/Significance	Role
1.	To provide access to land for forest planting because of economic, cultural or personal interests in conversion to continuous forest;
2.	To ensure that the forested land remains in forest for the duration of the Bond tenor. The landowner is incentive to protect the forest because of the NZU revenue that becomes available to them after 10 years (or after the investors have been paid back principal.

3.	To interact directly with Contractors and the Intermediary on planting related business activity, but not directly with Investors or the Contracting Entity. ⁹
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Evaluators	
Priority/Significance	Role
1.	To assess whether contracted and non-contracted impact targets have been met. If they have been met, the Contracting Agency pays out the agreed fee to the Intermediary in accordance with the contract. This money is returned to the Investors, as principal-plus-coupon in an interim payment schedule over the lifetime of the NFBS.
2.	To submit qualitative and quantitative data on monitoring and evaluation best practice standards and innovative cost cutting techniques.

1.4. Assurance of Forest Longevity

A key consideration for the NFBS is how to protect the longevity of forests that are established during two crucial phases: Phase I during bond tenor and Phase II after the date of bond maturity.

The longevity of forest during Phase I is critical because a major risk to investors is that the forest will be disestablished prior to bond maturity, because the investor repayments are contractually tied to continuous forest outcomes. Furthermore, if the outcome targets are not achieved and consequently payments are not received from the Government under the outcome contract, the Intermediary's ability to sell the NZUs after 10 years of operation, provides an alternative means of repaying investors. Ensuring longevity of the forest reduces the risk of the planting programme failing, and therefore increases the likelihood that it will be successful in attracting investment capital.

In addition to Phase I assurance of the lifetime of the Bond, there is assurance required in Phase II after the Bond has matured. This is because the intended environmental outcomes of the NFBS (such as carbon storage, reduced erosion, reduced sedimentation, and so on) are maximised when

⁹ This is one way that social distance is reduced by the Bond, and also aligns well with the Crown's role as regulator and outcome funder, which restrains its capacity to advocate for one particular solution. By contrast, the parties that occupy the Intermediary and Contractor roles could engage proactively with the market, overcoming the informational and motivational deficits that prevent better land use.

the forest continues over consecutive decades. To achieve the NFBS's objectives, there needs to be some assurance that forest will endure during and beyond the lifespan of the Bond.

One option to assure the longevity of forest in both Phase I and II would be compulsory registration into a covenant scheme within the terms of the Bond contract. Traditionally, Crown covenants has been the key strategy for the protection of new forest habitat. This is the underlying mechanism for ensuring permanence through QEII National Trust covenants (which establishes QEII as a perpetual trustee) and the Permanent Forest Sink Initiative (which restricts harvesting of eligible forest for a period of 99 years; see §2.5).

However, our initial market analysis has identified that covenants are potentially problematic for landowners who do not wish to yield their autonomy over land over a long period of time. This is especially relevant for Māori landowners, given the context of historical dispossession from their land. Because the NFBS needs to unlock as much available land as possible, and because Māori landowners constitute a significant proportion of potential participants in the NFBS, it is vital that the Scheme aligns with Māori preferences for land ownership. This will not only broaden the overall target market, it will also differentiate this scheme from other schemes which are not well-aligned to Māori landowner preferences.

Therefore, it is a working assumption for this Business Case that Crown covenants are not an adequate mechanism for ensuring forest longevity, either for Phase I or Phase II assurance. This leaves two likely solutions: (1) a bespoke covenant or kawenata that is aligned with Māori landowner preferences; or (2) a wider ecosystem of revenue streams and incentives that supports native forest as a sustainable land use.

1. With regards to bespoke covenants, it is recommended that the Project Team collaborate with DOC to explore the performance and adequacy for the kawenata that underpins the Ngā Whenua Rāhui Fund. This fund provides direct contestable grants to Māori land authorities (such as Trusts and Incorporations; representatives of whānau, hapū or iwi; and Māori owners of general land) to co-fund projects for environmental restoration. It formalises arrangements between landowners and the Minister of Conservation by three kinds of agreement, but the most relevant one for the PFSB is Ngā Whenua Rāhui Kawenata (s77A Reserves Act 1977) for long-term protection.
2. The authors' recommended pathway forward is not to establish covenants, but to ensure that the NFBS delivers a wider framework of incentives and revenue streams which make native forest a financially sustainable land use option for landowners. This increases the likelihood that the landowner will protect the forest once established. These incentives include, but are not necessarily limited to, the following:
 - a. **Native Forest Benefits:** Because the NFBS focuses on continuous native forest outcomes, landowners who provide their land for planting are internally motivated

to ensure that the forest endures to benefit from the cultural, aesthetic or environmental benefits that native forest (over exotic) provides.

- b. **Opportunity Cost:** The proposed land-use for the NFBS is marginal, erosion-prone land, often also remote. The opportunity cost for keeping this land in forest is low or negligible, because deforesting this land during Phase I or Phase II creates limited economic opportunity. In some cases, continuous forest will be the most economically productive land use. Moreover, the longer the forest is established, the greater the revenue possibilities will be.
- c. **Economic Benefits:** After bond maturity (say, 10 years) and once investors have been returned the principal, the NZU revenue from the forest asset returns in perpetuity to the landowner for their benefit. This could represent a significant future revenue stream for landowners through the sale of NZUs through the ETS, or through international voluntary carbon markets, particularly because landowners do not have to pay for the forest to be established. This could be augmented with other non-carbon revenue streams, such as honey production and timber harvesting under continuous cover forestry principles.

Explainer: Continuous versus Permanent Forest

This Business Case discusses the primary objective for the NFBS in terms of “continuous forest”. This is designed to draw a subtle but important distinction with permanent forest, or at least what “permanent forest” is commonly understood to mean.

Permanent forest is commonly understood to be closely related to *conservation forest*, where the ambition is to establish forest that is permanent and protected from future land use change. The usual implication is that forest permanence derives from the protection of individual trees, where removal by human intervention is prohibited. This is typically achieved through covenants such as the Permanent Forest Sink Initiative (PFSI) or QEII National Trust covenants.

Continuous forest, by contrast, is used in this Business Case to refer to forest that is not placed within a covenant scheme (such as the PFSI or QEII), and therefore does not prohibit the removal of individual trees. However, harvesting of forest is only permitted to a degree that it does not disrupt the continuity of the forest canopy. Accordingly, it is aligned to ideas such as Dauerwald or close-to-nature forestry, or Māori forestry practices under kaitiakitanga, where harvesting is permitted if it does not radically disrupt the integrity of the forestry ecosystem.

The Permanent Forest Sink Initiative (PFSI) involves principles of both permanent and continuous forest. As described in §2.5, the PFSI involves a covenant that restricts harvesting of eligible forest for a period of 99 years. This is discouraging to certain landowners, especially Māori landowners,

who have reservations about Crown covenants due to its implications for ownership. What is less well understood is that the PFSI also permits “continuous cover forestry”, where harvesting is permitted within these first 99 years as long as a minimum of 80 per cent of the pre-harvest basal area is retained. As such, while the PFSI’s name implies permanence, which may discourage certain landowners, it also preserves the flexibility that comes with continuous cover forestry.

By contrast, this Business Case foregrounds continuous forest, in order to support the long-term sustainability of forest by accommodating various landowner motivations, preferences and potential future revenue streams, and to accommodate innovation through the potential use of exotic nursery crops to be removed at a later date (see §2.8.1).

1.5. Monitoring & Evaluation Framework

1.5.1. Defining the Process

The basis for any Environmental Impact Bond is the pay-for-performance contract that formalises the relationship between the payor of outcomes (in this case, Government), the issuer of the Bond (in this case, the Intermediary), and the purchasers of the Bond (the Investors). Supporting these pay-for-performance contracts is a monitoring and evaluation (M&E) framework that specifies the outcomes to be delivered (the impact targets), and that tracks progress towards these outcomes.

For each outcome, the scope, target, assessment criteria, measurement methodology and the chain of benefits that will flow to defined stakeholder groups needs to be considered and articulated.

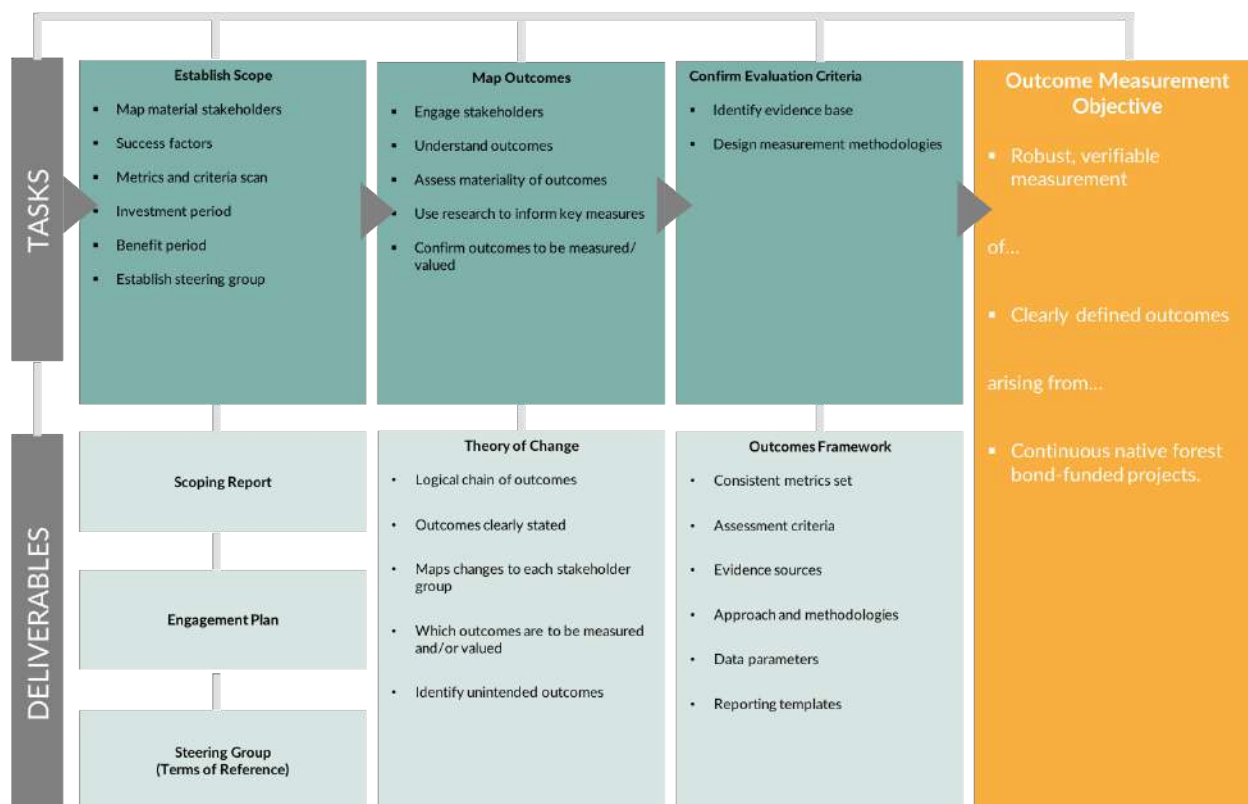
The authors suggest an inclusive approach (between all participants in the Scheme) to confirming what those outcomes are, how they will be measured, and how are those targets tied to payment trigger within the Bond’s mechanics. Documenting these relationships in an outcomes framework will provide all parties with clarity, certainty and verifiability around the outcomes being pursued.

Figure 3 below lays out a proposed process for developing a finalised M&E framework for the NFBS, as recommended by Mōhio’s outcomes measurement partner, EY.

The features of this approach include:

- **Inclusive process:** Our recommended approach will ground the M&E framework in the local context through engagement with key stakeholders, including the Contracting Agency (as outcome funder), intended beneficiaries (contractors, landowners), tangata whenua, and so on.

Figure 3: M&E Framework Process



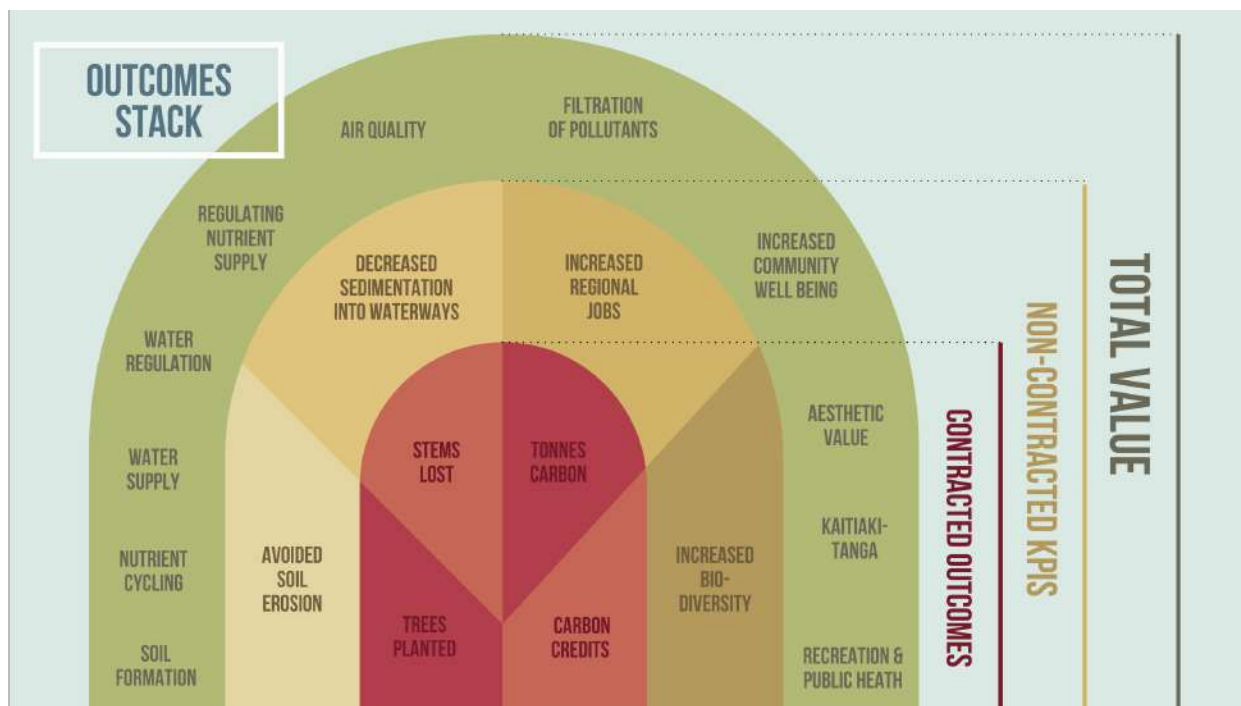
- **Materiality lens:** A key component of this process will be developing a hierarchy of the most material outcomes and stakeholders, enabling clear assessment of the importance of outcomes versus the cost of measuring those outcomes.
- **Deliverables:** A scoping report, engagement plan and Terms of Reference delivered throughout the process will enable consistent progress tracking and reporting, as well as effective stakeholder management.

The process outlined in Figure 3 above will be an important step in more fully exploring and confirming the proposed target outcomes and the metrics, KPIs, pay-out triggers, criteria, methodologies and other factors required to produce a viable bond programme. Going through such a process will help to ensure that there is clarity and certainty for the key roles for the contracting parties in the NFBS and wider stakeholders regarding the Bond's development, deployment, maturity and pay-out mechanisms. The process will also help inform the basis by which an outcome-based funding approach can be developed more generally for the New Zealand Government.

1.5.2. Measuring/Monitoring and Evaluating the Impact of the NFBS

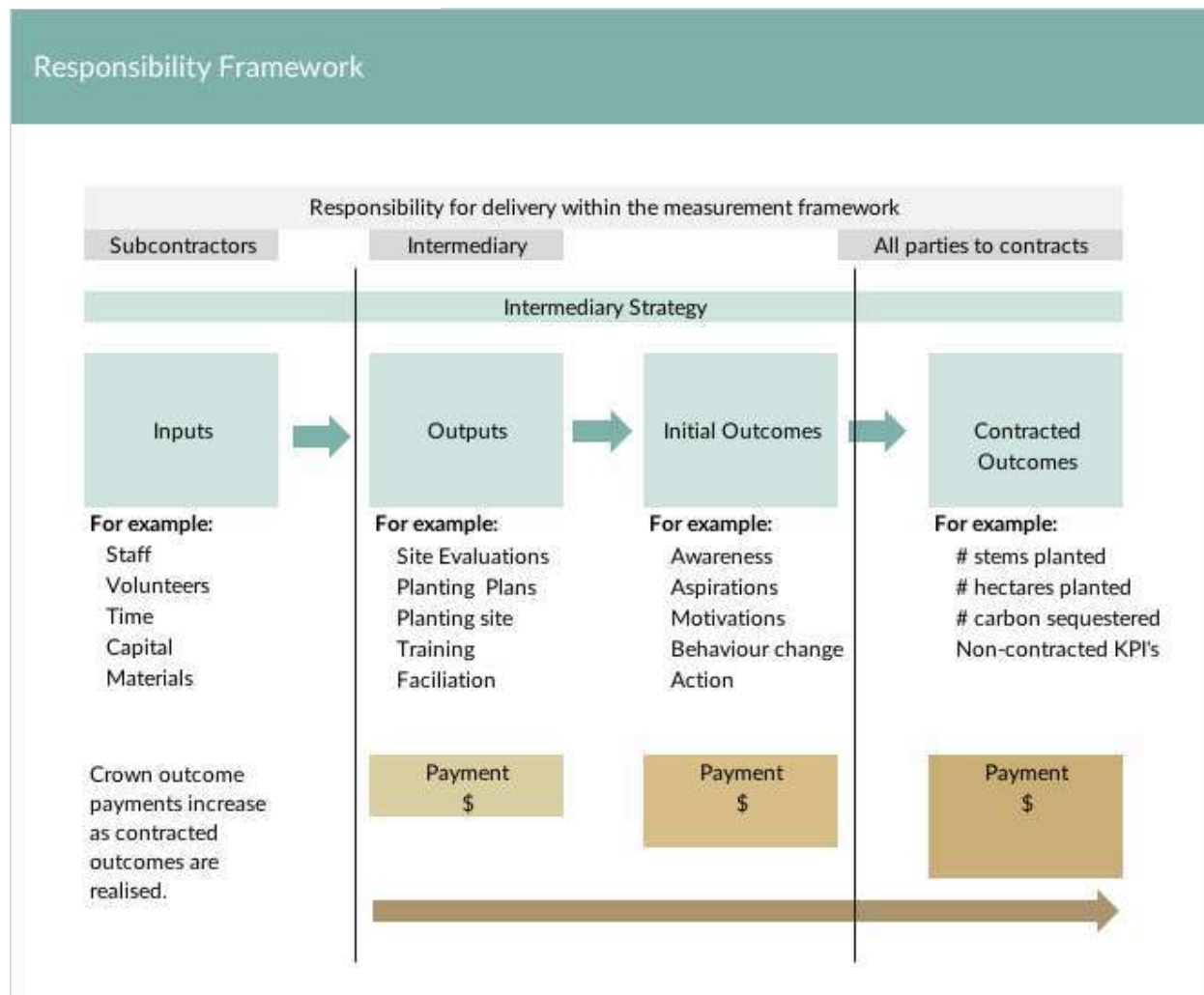
The proposed M&E framework for the NFBS (see Figure 4 below) is three-tiered and encompasses (1) *contracted outcomes*, (2) *non-contracted KPIs* (Key Performance Indicators) and (3) *total value*.

Figure 4: Outcomes Stack



Impact targets that correspond to the *contracted outcomes* are the key financial mechanism for the Bond, which trigger the payment for performance that forms the basis of any impact bond. It is important that these contracted outcomes are highly determinable and thus minimally subject to disputes. The *non-contracted KPIs* are not linked to payment, but nevertheless convey the wider value of the outcomes that the NFBS delivers; in this case, its contributions to regional employment, reduced erosion, reduced sedimentation, and enriched biodiversity. Because these are not payment triggers, these non-contracted KPIs can accommodate greater indeterminacy when it comes to measurement and evaluation. Finally, *total value* encompasses all those additional benefits – both tangible and intangible, measureable and immeasurable – that continuous native forest provides, but that it would be too costly, or time-consuming, or technically challenging, or otherwise inappropriate to measure. This is neither contracted, nor monitored and evaluated, which includes the full spectrum of direct and indirect impacts from establishing continuous native forest. This could include nutrient cycling, soil formation, water regulation, recreational opportunities, cultural values such as kaitiakitanga, and aesthetic values, and much more.

Figure 5: Responsibility Framework



The fulfilment of the contracted outcomes, and thus the triggers for payment, is determined by third-party evaluators. Accordingly, it is not necessary for the outcome funder (Government) to monitor service delivery in a detailed way prior to any assessment of whether the impact targets have been met. Instead, the Intermediary shall undertake whatever level of monitoring is prudent for the operation of each planting programme. The intervention strategy shall clearly connect inputs (what Contractors do) to outputs (trees planted and maintained) through to the outcomes achieved (the establishment of continuous native forest that stores carbon, reduces land subsidence, improves soil quality, creates regional jobs, and so on). An indicative summary of the distribution of responsibilities among contracting parties is in Figure 4 below.

For each desired outcome, a complex set of factors will need to be considered. Box 1 below illustrates that for even the relatively simpler environmental outcomes, there are some complex issues requiring discussion and consideration. Box 2 provides some guiding questions that will need to be considered when exploring the setting of social outcomes of the bond.

Box 1

Key Questions to Explore - Carbon Abatement Outcomes:

- Which of the different carbon accounting methodologies should be used, what monitoring apparatus would be required and what is considered to be an acceptable level of uncertainty?
- With whom will the rights to trade NZUs reside?
- How will the reforestation fit or contribute to New Zealand's Paris Agreement nationally determined contribution?
- How will the permanence of the forest be assured and how will intentional and accidental reversal events (such as a forest fire or similar) impact bondholders or outcome funders?
- Will the bond scheme consider leakage i.e. land use change out of forest cover in other areas?
- Are contracted outcomes so similar that double counting of (and payment for) the same benefits could occur?

Box 2

Key Questions to Explore - Social Outcomes:

- What are the desired policy and societal outcomes from the NFBS, and what impacts or constraints would those have on the structure of the bond?
- Who is likely to be impacted – positively and negatively – from the intervention?
- How should affected stakeholders be grouped or categorised for the purpose of impact assessment?
- What timeframe into the future is of interest in terms of benefit accrual?
- Which of the desired social outcomes, if any, should be valued in monetary terms?
- What are the actual outcomes that accrue from forest bonds, as evidenced from current schemes in other jurisdictions?

A notable advantage of Environmental Impact Bonds compared to Social Impact Bonds is the level of determinacy. As described elsewhere: “SIBs focus on social systems and their constituent elements, whereas EIBs focus on ecosystems and their constituent elements. This means that the specific challenges of social measurement, social explanation and social prediction are central to the design of SIBs in a way that they are not for EIBs.”¹⁰ By contrast, EIBs rely upon well-established methods and technologies for scientific measurement of physical phenomena, as well as natural laws and correlations. Accordingly, there is less indeterminacy – and hence less potential for controversy and contestability – when it comes to designing the M&E framework, negotiating the impact targets, and evaluating whether impact targets are fulfilled or not. From a contracting perspective, all these indeterminacies add to the risk of the instrument, by increasing the chance of disputes at the negotiating or evaluation stages.

1.5.3. Summary of Key Payment Triggers (Contracted)

The following information in Table 3 are overviews of potential contracted outcomes and corresponding metrics or payment triggers which the authors consider appropriate and feasible. These are high level drafts which have not yet been reviewed by legal counsel. The intention of this section is to discuss possible approaches to the NFBS structure, which would be confirmed during detailed negotiation with the Contracting Agency and other stakeholders. Finally, before any Bond structure is finalised, payment triggers would also need to be tested with potential investors for attractiveness in the marketplace.

¹⁰ David Hall, 2016. “Greening the Future: A Case for Environmental Impact Bonds”, *Policy Quarterly*, 13(2), May 2017, p.45.

Table 3: Summary of Key Payments Triggers (Contracted)

#	Valuation Benchmark	Metric	Time/Source	Baseline
1	Number of trees planted.	Number of individual stems planted matches or exceeds [750] per hectare.	Annual assessment in year 1, 365 days after planting day.	Compared the previous year planting numbers assessment.
2	Observed loss of stems during evaluation period.	Percentage of trees which are assessed 'dead' or 'highly unlikely' to survive does not exceed [10] %	Annual assessment in years 1, 2, 3, 4 for [5] years.	Total number of trees planted in original planting event(s).
3	Tonnes of carbon per hectare per year in planted forest.	Tonnes per hectare of each planted site matches or exceeds [1 million] per annum	Annual assessment beginning in year 1, 365 days after planting day.	Compared the previous year planting numbers assessment.
4	Carbon credits (NZUs/AAUs) generated each year.	Total units match or exceeds [XX] units	Annual assessment in years [5, 8, 15, 20].	Based on ETS carbon table schedule annual report for the year prior to assessment.

1.5.4. Summary of Key Performance Indicators (Non-contracted)

In addition to the above outcomes that are linked to the payment schedule, an additional suite of measures or KPIs (Key Performance Indicators) are included to capture the wider value of continuous forest outcomes. However, these KPIs are non-contracted – that is, they will not be payment triggers – because while there is reason to anticipate that these co-benefits will occur, there is scope for uncertainty and contestation that makes them inappropriate for use as payment triggers.

Each planting site will prioritise these non-contracted outcomes differently, depending on the exact location and the opportunities to modify these KPIs through intervention. Although not linked to the payment triggers, the Intermediary will ensure that a site assessment is conducted before planting to ensure that (1) an appropriate forest management plan is in place, (2) forest resilience is increased through one or some of the below KPIs, and (3) to generate a reliable estimate of the wider value of the intervention by which outcome funders can defensibly justify subsequent payments in proportion to the value of benefits accrued.

The costs of monitoring the non-contracted KPIs needs to be considered, in particular who will pay for the monitoring and evaluation of these subsidiary outcomes. The authors' are operating under a working assumption that these costs will be borne by the Contracting Agency, which is interested in long-term environmental outcomes and the effective and responsible use of public money; and/or by the Intermediary, which agrees to pay for planting site assessments at each proposed planting location in order to optimise non-contracted outcomes.

Table 4: Summary of Key Performance Indicators (Non-contracted)

#	KPI	Metric	Time/Source	Baseline
1	Increased regional job opportunities	Total weekly paid hours in delivery of NFBS outcomes	Annual assessment	Total number of regional employees at year 1 of program.
2	Avoided soil erosion on forest land.	Change in tonnes per hectare of sedimentation from bare land to forest land ¹¹	Annual assessment in years [5, 8, 15, 20].	Initial assessment of sedimentation per hectare at year 0.
3	Decreased sedimentation in nearby or downstream water sources	Changes in total particulate matter (PM) content of water samples, as measured by nephelometry (scattered light)	Annual assessment in years [5, 8, 15, 20].	Initial assessment of PM content at year 0.
4	Increased biodiversity in planted forest.	Changes in abundance of key native species (e.g. brown kiwi) ¹²	Annual assessment in years [5, 8, 15, 20].	Initial assessment of species abundance at year 0.

¹¹ For valuation purposes, the authors propose using the methodology of the Forest Investment Finder plus (FIF+) (Barry et al. 2014), developed by Scion and used to quantify ecosystem service benefits for commercial and other forests. This applies the New Zealand Empirical Erosion Model (NZEEM) (Dymond et al., 2010) which calculates the amounts of sediment generated under the planted and indigenous forests (in the catchment) in tonnes of sediment per square kilometre per year. This is then combined with avoided expenditure costs derived from discussions with regional and city councils in New Zealand, including avoided flood damage and avoided water treatment costs to consumptive water.

¹² For valuation purposes, the authors propose using the methodology of the Forest Investment Finder plus (FIF+) (Barry et al. 2014), which combines such changes with estimates of value derived from willingness-to-pay surveys of New Zealanders.

Research by organisations such as Scion and Tāne's Trees Trust seeks to quantify the non-timber values, or wider ecosystem services, from native forestry. This research is ongoing but knowledge gaps remain. The PFB is not contingent on a comprehensive national ecosystem service analysis, but existing research can be drawn upon at these early stages. Mōhio has leveraged Scion's Forest Investment Finder Plus as a preliminary source of data to populate our financial model (see Appendix One).

Mōhio has also recently secured EY (Ernst & Young) as a partner with experience in outcomes measurement and impact investing who can advise on methodologies and execute accurate and reliable measurement of project benefits.

Finally, it should be noted that a hidden virtue of the NFBS structure is that each bond project, due to its in-built M&E framework, is an active experiment that generates data as a "co-benefit" of the evaluation process, contributing to knowledge of native forest growth and associated impacts. In other words, by issuing a financial instrument based on a "best guess" in light of incomplete information, science comes along for the ride and corroborates this best guess. This inverts the conventional model of public science where impactful interventions are delayed until sufficient evidence is gathered.

1.6. Land Availability

A 2017 Landcare report commissioned by the Ministry for Primary Industries confirms that the area of erosion-prone land that is suitable for afforestation/reforestation is substantial.

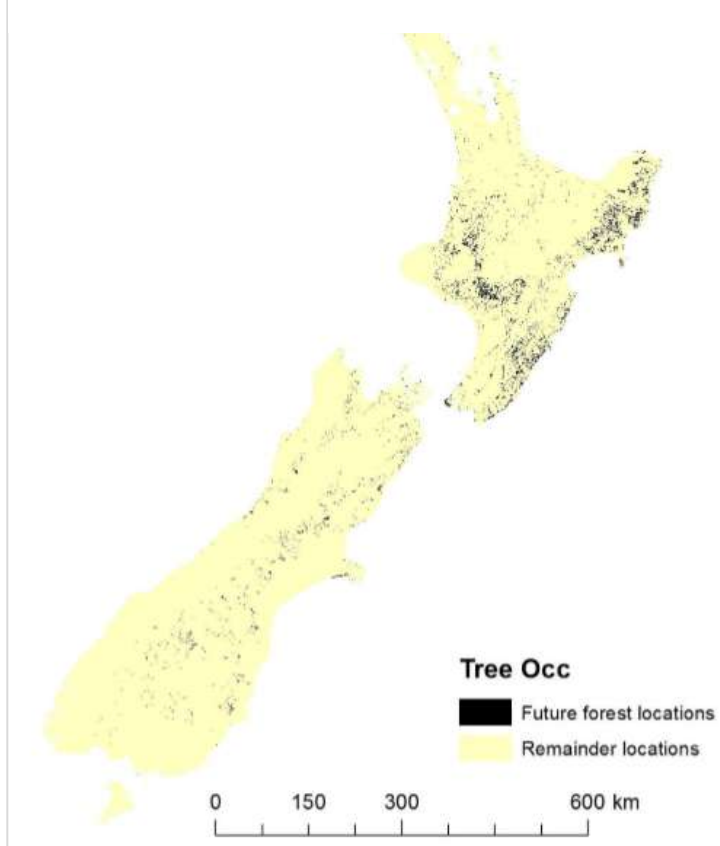
Using the New Zealand Land Cover Database (LCDB) from the 2012/2013 period, the analysis identifies the scale of suitable land for afforestation that suffers from severe to extreme erosion at 695,566 hectares. Moderate to extreme erosion was 1.131 million hectares. Slight to extreme erosion was 2.923 million hectares.¹³

This particular analysis focuses on the nearly 700,000 hectares of severe/extreme erosion (excluding those already designated as reserves), which is depicted in Figure 6.

However, government policy has tended to focus on the larger target of moderate to extremely erosion prone land, such as the Afforestation Grant Scheme, which specifies the aim to “reduce soil erosion – forest cover is the best form of erosion control. MPI estimates that 1.1 million hectares of land is at serious risk of erosion.”¹⁴ Accordingly, this is the scale of land that the authors focus on for this report.

Beyond this suitability of land, however, there is a more complicated overlay of considerations in regard to landowners’ preferences. This discussed late in §3.5, Land Availability Analysis.

Figure 6: Future forest areas on severe to extremely erosions prone land (source: Walsh et al. 2017).



¹³ Walsh et al. 2017. “Valuing the Benefits of Forests: Final Report”, Report Prepared for the Ministry for Primary Industries. Wellington: NZ Government.

¹⁴ See MPI website (last accessed 8/2/2018): <https://www.mpi.govt.nz/funding-and-programmes/forestry/afforestation-grant-scheme/>

1.7. Limitations

As demonstrated above and other publications,¹⁵ Mōhio has made significant progress toward determining what a final structure might eventually look like and how it is situated within wider climate finance developments. However, the exact structure for delivery is yet to be determined.

For example, the Bond could plausibly be issued by central or local government (as opposed to an Intermediary as proposed in this Business Case). In some cases, issuance by central or local government could be more beneficial to the structure proposed in this Business Case because it may be more palatable for international investors, as well as cheaper to both issue and finance because it can leverage lower sovereign risk. However, it is Mōhio's understanding that, at the current time, the issuance of sovereign green bonds by Government is not considered appropriate, due to various legal complexities and the creation of additional costs for no reduction in funding costs. This does not impede the development of an instrument such as the NFBS, however, that involves Government as payor for outcomes, nor does it impede the potential for local government to issue such bonds.¹⁶

Given this context, and the need for a national level policy to address erosion-prone land, Mōhio recommends that the Bond, which provides financing into the NFBS, be issued by a non-sovereign intermediary and backed by the Government through its guarantee to pay for successful continuous forest outcomes.

1.7.1. Structural Limitations

It is important to note that this Business Case does not attempt to outline some important steps that will have to be completed before the pilot can be launched. For clarity, we outline below the key aspects which will need further consideration, in partnership with the Contracting Agency and other government stakeholders. Those final aspects include, but are not necessarily limited to:

- **Commercial and contractual parameters:** This Business Case gives a preliminary assessment of commercial parameters such as financial structure, risk allocation and payment mechanisms. This is provided in order to shape the conversation. However, the granular details that would need to be present in order to “close a deal” have been intentionally left open so that Government can (and should) consider alternative structures and innovations that have not been suggested here. However, it will be imperative that, before the pilot launch, Government provides clear guidance on the commercial and contractual parameters, and the terms on which the Government is prepared to enter into a pay-for-

¹⁵ See David Hall and Sam Lindsay, 2017. *Permanent Forest Bonds: A pioneering environmental impact bond for Aotearoa New Zealand*, Working Paper, Wellington, IGPS; and *ibid.*, 2018. *Climate Finance Landscape for Aotearoa New Zealand: A Preliminary Survey*, Report prepared for the Ministry for the Environment. Auckland: Mōhio.

¹⁶ In March 2018, Auckland Council announced its intention to issue bonds under the Green Bond framework. Accessed at: <http://ourauckland.aucklandcouncil.govt.nz/articles/news/2018/3/auckland-council-exploring-green-bonds/>

performance contract. This is to ensure that potential contract bidders are cognisant of their ability or appetite to enter into the deal. Without these parameters in place, the procurement process risks becoming protracted (and may even fail) due to a mismatch of expectations between contracting parties.¹⁷

- **Financial implications of the NFBS:** Both Government, Intermediary and Investors will highly value certainty and confidence in the scheme. Providing comprehensive financial and environmental models, with validated assumptions that clearly set out the financial implications of the scheme for all parties, will help to achieve that. Attached to this Business Case in Appendix 2 is a proposed financial structure for the Bond. It is discussed in detail in Section 4. The purpose of presenting a working draft in this stage of development (i.e. not a final draft) is to demonstrate the advanced stage of preparatory thinking, and to support our confidence that with access to greater strategic direction and data from Government that a successful financial outcome can be achieved for all parties.
- **Project management arrangements:** There are various ways in which this project can achieve a robust governance and project management structure. While this Business Case sets out one possible outcome, decisions around organisational structure, project priority, human resource requirements and so on must be concluded with deep input from Government. This would likely involve workshops with key government stakeholders, particularly those agencies involved in the Billion Trees Programme; a detailed options analysis that compares the NFBS with other forest funding mechanisms; and confirmation of a Contracting Agency that can lead project implementation.
- **Benefits evaluation to the Government:** In future, a Detailed Business Case for the NFBS would set out the precise benefits to each party, including interim targets and measures. It would set out the appropriate milestones for realising these targets, a schedule for reviewing these targets, the dates by which outcomes will be achieved, any risks associated with the intended outcomes, and dependencies on other programmatic plans. This Indicative Business Case sets out much of this information; however, without concluding a deep consultation with Government, it is difficult to achieve the level of detail required to communicate precisely why the NFBS would be significantly preferable to existing forest funding mechanisms. That said, this Indicative Business Case does set out the theory for why the pilot is worth considering. At the very least, the NFBS should be regarded as complementary to existing alternative afforestation policy mechanisms, and especially

¹⁷ Fiona Mules, 2016. "Lessons Learned from the Social Bond Pilot Procurement Process", Review undertaken for NZ Treasury, 16 September 2016.

well-suited to addressing the particular problem of establishing forest on erosion-prone land that is marginal for other activities (for an indicative analysis, see \$2.5).

- **Risk management matrix:** Section 5 proposes a risk management framework based on the proposed NFBS structure. It identifies risks in advance, the allocation of risks among contracting parties, and suggests appropriate strategies and processes for mitigating those risks to each party. Ultimately, the risk management strategy that is adopted must be fit for purpose and consistent with the final structure of the NFBS. As mentioned above, the structure has been intentionally left open for consideration and, therefore, a final risk and uncertainty management strategy is still to be determined.

Because the Government will be the ultimate funder of the programme, it is prudent that input assumptions should be consistent with current Government thinking and data. Accordingly, this Business Case sets out the strategic framework for how the pilot could be implemented, but it does not attempt to outline the implementation details of the pilot (specifically, the final contractual arrangements, financial implications including net benefit to the Government, and other final decisions). Naturally, these details will be incorporated once the Contracting Agency (yet to be determined) brings this project “in-house” and decides upon the best path forward.

1.7.2. Conceptual Limitations

The conceptual limitations of this Business Case stem from the innovative nature of Environmental Impact Bonds (EIBs), as a pioneering concept both globally and in New Zealand. At the time of writing, the authors know of only one such issuance in the world: DC Water’s Environmental Impact Bond for green infrastructure which was issued in September 2016. But others are in development. The project manager for the DC Water Bond, Quantified Ventures, is providing advisory services to other cities to replicate the EIB model elsewhere, including Louisiana to restore wetlands, Atlanta to enhance flood resilience, and Baltimore to address water pollution. Meanwhile, Blue Forest Conservation (US) is designing a Forest Resilience Bond (currently in concept phase) and the Nature Conservancy is developing a Sustainable Land Bond based on results-based payments for developing countries (concept phase).

So, while EIBs are an emerging class, there is a lack of empirical evidence to prove the hypothesis that contracting for outcomes can drive more efficient and effective environmental outcomes. Any claims of this kind throughout this Business Case are necessarily indicative. Only over time will the Government be able to compare the administrative costs and environmental impacts from outcome-based contracting with existing contract procurement forms, grant schemes and subsidies.

Some baseline information is available from the Social Bonds pilot programme, led by Ministry of Health, which issued New Zealand’s first social impact bond in February 2017. However, an important caveat to using a direct comparison is that environmental impact relies upon different parameters to social impact. Indeed, it can be argued that the impact bond model is better suited

to environmental interventions than social interventions, because measurement for the former is relatively less complex and contestable.¹⁸

Accordingly, this Business Case offers a *prima facie* case for the impact bond model as more effective than existing mechanisms for establishing continuous native forest (see §2.5). Ultimately, though, it is the role of a pilot programme to generate the empirical data that could corroborate this. Given the urgent need for large-scale forest planting in New Zealand, however, there is a strong case to implement the NFBS in an experimentalist spirit to test the value of impact-aligned, outcome-oriented funding.

¹⁸ See David Hall, 2016. "Greening the Future: A Case for Environmental Impact Bonds", *Policy Quarterly*, 13(2), May 2017.

2. The Strategic Case

Section Purpose

1. The purpose of this section (Strategic Case) is to demonstrate the NFBS's alignment with wider national or sectoral priorities and goals, policy decisions, other multi-agency programmes, and with the strategic intentions of the potential sponsoring organisation(s).
2. Given that the NFBS's expected outcomes have implications for multiple organisations, and contribute to other related schemes and programmes, this section also surveys those linkages and inter-dependencies.
3. The strategic context also provides an overview of Mōhio Research and the outcomes that it is seeking to achieve, or contribute to, through this proposal.

Key Conclusions

1. In delivering the Billion Trees Programme, the public sector will need to meet New Zealanders' expectations for effective spending and measurable impact to deliver public value, whether through public, private or non-profit sector provision.
2. A key strategy to make public spending more effective is to "crowd in" private investors. The NFBS achieves this by combining public and private finance to deliver environmental outcomes; in particular, by promising to pay for established continuous native forest and thereby catalysing private finance to assist in achieving this.
3. The NFBS aligns with, or touches upon, a range of existing agreements, initiatives, schemes, programmes and objectives at the local, national and international level. Given that the NFBS sits at the nexus of land use, climate change and water catchment management, these alignments are numerous.
4. There are already a number of schemes and programmes that could be used to finance continuous native forest. However, because these schemes and programmes are not primarily driven by the challenge of establishing continuous native forest on New Zealand's erosion-prone land, the NFBS is potentially better aligned to deliver that particular outcome.
5. There are a range of environmental and social benefits for addressing the specific challenge of establishing continuous native forest on erosion-prone land throughout New Zealand, which ensure that the NFBS would deliver significant positive impact.

2.1. Strategic Context

The New Zealand Government, as a responsible manager of public funds, is continually searching for ways to increase public value by delivering social and/or environmental services in an effective and timely manner.¹⁹ In doing this, it looks to improve its funding models, its partnerships and its frameworks for evaluating whether its investments are having sustained, positive impact. Among the relevant considerations for Government are whether government agencies should leverage private sector expertise in service procurement and management to deliver better value for taxpayers, either through enhanced outcomes and/or lower overall costs.

Small-scale, one-off reforestation projects do not address the hundreds of thousands of hectares of vulnerable land that could be converted to forest sinks, nor do they warrant the time and costs of due diligence for institutional investors, some of whom manage portfolios worth hundreds of millions of dollars. Because the need for afforestation/reforestation across New Zealand involves a multi-billion-dollar proposition in terms of environmental benefits and avoided costs, the NFBS presents an unparalleled opportunity for investors seeking stable returns and environmental impact, and for the New Zealand Government to sustainably fund large-scale afforestation.

The NFBS is a valuable addition to the suite of financial instruments and schemes that the Government could use to achieve large-scale forest sinks. By utilising this model, the Government pledges to pay for outcomes, but in doing so creates the conditions by which private investors and non-governmental organisations are highly incentivised to invest in and undertake this work. This arrangement “de-risks” environmental interventions for the Government, while also encouraging innovation and fiscally rigorous management to facilitate effective service delivery.

The underlying Bond is an example of *impact investment* – that is, investments that intend to deliver measurable social and/or environmental impacts in addition to financial return.²⁰ The emphasis on measurement brings diligence and accountability to impact investment, helping contracting parties to communicate impact more effectively and to fine-tune their interventions.²¹

The rise of impact investment, globally and within New Zealand, reflects the growing recognition that unlocking private capital will be vital to achieving solutions to the systemic challenges that face humanity at both the local and global scale. With regard to climate change, a 2015 International Energy Agency report estimates that US\$900 billion annual investment into energy efficiency and low-carbon technologies is required over the next 15 years to meet the Nationally

¹⁹ Cabinet Office, 2015. “Investment Management and Asset Performance in the State Services”, Cabinet Office Circular, CO (15) 5, Wellington: NZ Government. Retrieved from <https://www.dpmc.govt.nz/publications/co-15-5-investment-management-and-asset-performance-state-services>

²⁰ Ākina, EY & JBWere, 2017. *Growing Impact in New Zealand*. Wellington: Ākina.

²¹ Ivy So & Alina Staskevicius, 2015. “Measuring the ‘impact’ in impact investing”, Report Prepared for the Harvard Business School Social Enterprise Initiative. Retrieved from: <http://www.hbs.edu/socialenterprise/Documents/MeasuringImpact.pdf>

Determined Contributions (NDCs) that parties promised for the 2015 Paris Agreement. In order to limit the global temperature increase to 2°C (which current NDCs are predicted to overshoot), annual investment required rises to US\$1.13 trillion.²² More broadly, UNCTAD's 2014 World Investment Report estimates that the annual investment shortfall for meeting the United Nations' Sustainable Development Goals (SDGs) is US\$2.5 trillion.²³ Activating finance from all sources – public and private – will be necessary to reach the scale of investment required to deliver social and environmental impacts.²⁴ (for further discussion, see the *Climate Finance Landscape for Aotearoa New Zealand: A Preliminary Survey* prepared for the Ministry for the Environment).

The current New Zealand Government has provided a clear signal that renewed afforestation is central to its strategy for the land sector, regional development, and climate policy. The Billion Trees Programme, which aims to plant 100 million trees on average over the next 10 years, will be funded through the annual \$1 billion Provincial Growth Fund. This will involve an as-yet unspecified combination of exotic plantation forest and continuous native forest on marginal land. In delivering this, the public sector will need to meet New Zealanders' expectations for effective spending and measurable impact, whether through public, private or social-sector provision.

One way to make public spending more effective is to “crowd in” private investors. The NFBS does this by creating a market-based solution for the delivery of environmental outcomes; in this case, by promising to pay for established continuous native forest and thereby catalysing private finance to assist in achieving this. Not only can this be used to reallocate risk and responsibility among contracting parties in the scheme, it also creates opportunities for private and social/environmental sector actors to participate in environmental impact, to build knowledge and expertise that will promote a cultural shift toward climate-aligned investment.

This document builds the case for an appropriate government agency to procure an EIB pilot; specifically, a NFBS that delivers continuous forest outcomes to create significant public value for New Zealanders. It concludes that there is a strong case for exploring the concept further within government, and internally resourcing a project team to progress a Detailed Business Case for the consideration of Cabinet.

2.2. Organisational Overview

This Indicative Business Case has been developed in by Dr David Hall and Sam Lindsay, partners at Mōhio Research, a hub for researchers and policy entrepreneurs who are passionate about

22 International Energy Agency, 2015. *Energy and Climate Change: World Energy Outlook Special Report*, Paris: IEA.

23 UNCTAD, 2014. *Investing in the SDGs: An Action Plan*. World Investment Report.

²⁴ David Hall and Sam Lindsay, 2018. *Climate Finance Landscape for Aotearoa New Zealand: A Preliminary Survey*, Report prepared for the Ministry for the Environment. Auckland: Mōhio. Retrieved from: <https://www.mfe.govt.nz/publications/climate-change/climate-finance-landscape-aotearoa-new-zealand-preliminary-survey>

developing solutions to social and environmental problems that reflect Aotearoa’s unique circumstances, values and opportunities.

In mid-2017, Mōhio was created as a vehicle to develop the NFBS and other policy innovations. Auckland-based community trust, Foundation North supported Mōhio to prepare the present document, *Native Forest Bond Scheme: Indicative Business Case*, through a \$50,000 grant via its GIFT fund (Gulf Innovation Fund Together). GIFT seeks to improve mauri to the Hauraki Gulf through innovation, which aligns with NFBS’s potential to effectively deliver climate mitigation impacts, improved land resilience, and a host of other integrated social/environmental co-benefits.

Review of the current and expected operating environments has identified the following key factors for the organisation:

- Mōhio is the current promoter of concept development within New Zealand and internationally. Mōhio expects that further development of the project past this Business Case will take place in partnership the Government, as the ultimate outcome funder.
- Mōhio is not currently positioned to play the role of Intermediary in the model. That said, it could play that role in a pilot phase with an appropriately designed governance structure, key human resource appointments and quality market-partnerships.
- The ultimate outcome for Mōhio in the close future, at this stage of the project development, is to partner with an appropriate Contracting Agency within Government to formalise a project team to work the idea toward implementation.

2.3. Alignment to Existing Strategies

The NFBS aligns with, or touches upon, a range of existing strategies and agreements at the local, national and international level. Given where the NFBS sits at the nexus of land use, climate change and water catchment management, these alignments are numerous. Below is a selective list of key alignments.

Table 5: Analysis of Existing Strategies, Agreements at National and International Level.

2015 Paris Agreement	
Priority/Significance	Alignment
1. 2050 Collective Target	The NFBS would contribute to aligning the land sector with the Paris Agreement’s 2050 collective target to reach net zero emissions “in the second half of this century” (Article 4) by creating secure carbon stocks in continuous forest sinks.

2. 2030 Nationally Determined Contribution (or NDC)	The NFBS could contribute to the 2030 climate change target by designing impact targets that align with optimal carbon sequestration rates.
3. Climate finance	The NFBS contributes to the expectation, specified in Article 2(1)(c), that New Zealand will make “finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.”
4. Adaptation	The NFBS is a domestic contribution to the global goal of adaptation (Article 7) for “enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change... to protect people, livelihoods and ecosystems”.

Zero Carbon Act (in development)	
Priority/Significance	Alignment
1. Climate Change Target	The NFBS would create secure carbon stocks at scale to contribute to New Zealand’s new 2050 climate change target to be enshrined in law after public consultation.
2. Climate Change Commission	The NFBS is a model of climate innovation for the independent Climate Change Commission (and Interim Climate Change Committee) to consider as a viable mechanism for accelerating dual benefits of climate mitigation/adaptation.

Living Standards Framework (in development)	
Priority/Significance	Alignment
1. Natural Capital	The NFBS would create new forest at a scale that registered on national accounting frameworks, such as the SEEA framework used by Statistics NZ, and would thereby potentially contribute to the natural capital stocks that underpin national wellbeing, as defined by Treasury’s Living Standards Framework.

Provincial Growth Fund	
Priority/Significance	Alignment
1. Billion Trees Programme	There are signals that the Billion Trees Programme will include native tree planting on erosion-prone land, as well as

	plantation forests. The NFBS is a viable mechanism for establishing continuous native forest at scale in an effective outcomes-oriented way.
2. Regional employment opportunities	The financial structure of the NFBS creates opportunities for meaningful, environmentally-aligned employment, by unlocking capital for local contractors, as well as introducing the discipline and rigour of private sector procurement.

Local government plans/strategies	
Priority/Significance	Alignment
1. Plans and strategies related to forest, climate, biodiversity, etc.	The NFBS provides an opportunity for regional councils and territorial authorities (city and district councils) to accelerate the establishment of continuous native forest as part of their objectives for climate mitigation, climate resilience, erosion control, biodiversity and so on. Aligned initiatives include the Hawke's Bay Regional Council's research into climate resilience for its Long-Term Plan, the Auckland Mayor's Million Trees Programme, the Bay of Connections' Forestry and Wood Action Group, and others.

Emissions Trading Scheme NZ ETS) / Permanent Forest Sink Initiative (PFSI)	
Priority/Significance	Alignment
1. Production of carbon credits	The NFBS unlocks private capital to establish forest that can earn carbon credits via the ETS/PFSI, in order to create carbon revenue to service the Bond. As such, the NFBS is not a substitute or competitor to the ETS/PFSI, but a complementary mechanism that would improve participation.
2. Covenanting	Although not a preferred option, the NFBS might require a covenanting mechanism to ensure the forest's semi-permanence. Mandatory registration into the PFSI covenant is one option.

Afforestation Grant Scheme (AGS)	
Priority/Significance	Alignment
1. Financing afforestation	The NFBS aligns with the aims of the AGS, which include reducing soil erosion, storing carbon and improving water

	quality. However, the NFBS is designed to achieve these outcomes more effectively than the AGS (see §2.4), so these policies are options, if not mutually exclusive.
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Erosion Control Funding Programme (ECFP)	
Priority/Significance	Alignment
1. Financing afforestation	The NFBS aligns with the aims of the ECFP by financing forest establishment on erosion-prone land. However, the NFBS is designed to be nationally scalable, as well as to deliver forest outcomes more effectively (see §2.4).

National Policy Statement for Freshwater Management	
Priority/Significance	Alignment
1. Improving water quality	It is recognised that strategic forest planting can improve water quality through reduced sediment run-off, reduced nutrient run-off, regulation of water flows, improved freshwater habitat, etc. The NFBS provides an effortless mechanism for landowners to convert to continuous forest that can be endorsed by regional councils in fulfilling their requirements.

Land and Water Forum (LAWF)	
Priority/Significance	Alignment
1. Integrated catchment management	The NFBS supports the recommendations for integrated catchment management, as discussed in LAWF's Fourth Report. The NFBS provides landowners with an effortless mechanism to convert to continuous forest when this land use aligns with catchment management plans.

2.4. Investment Objectives

The principal investment objective is to contribute to public value by re-establishing continuous native forest on at least one million hectares of highly erosion-prone, marginally productive, pastoral land. As discussed in §1.6, the scale of need could be defined more narrowly or broadly, but this median estimate of moderate to extremely erosion prone land continues to guide government policy, such as the Afforestation Grant Scheme, which specifies its objective to

“reduce soil erosion – forest cover is the best form of erosion control. MPI estimates that 1.1 million hectares of land is at serious risk of erosion.”²⁵

Continuous forest is a responsible land-use choice because, not only is this steep and often remote land marginal or minimally productive for agriculture, it is also marginal for commercial forestry due to the added transport costs and logistical challenges of removing timber. Moreover, keeping this land in pasture incurs a range of environmental, economic and cultural costs which diminish public value. These costs include (and are not limited to):²⁶

- **Avoidable costs of purchasing international emissions reductions:** (See discussion on climate change below, following the bullet points.)
- **Greater incidence of land subsidence:** The root networks of trees increase land stability and prevent the occurrence of terrestrial erosion.²⁷ The absence of vegetation on erosion-prone land leaves it vulnerable to slips, especially in the event of extreme weather events, which causes damage to public and private infrastructure.
- **Greater incidence of soil erosion:** In 2012, it was estimated that 192 million tonnes of eroded soil entered New Zealand’s rivers each year.²⁸ This reduces the productive capacity of the land and, by entering waterways, negatively affects water quality, storage capacity, and biodiversity.
- **Diminished regulation of water quantity:** The volume of surface- and ground-water is generally lower for non-forested catchments than forested because trees intercept water in the canopies and root systems.²⁹ Pastoral catchments can therefore be more susceptible to flooding and high peak flows.
- **Lost biodiversity opportunities:** The presence of forest provides habitats for native flora and fauna, as well as providing a variety of benefits such as pollination, seed dispersal and recreational opportunities.

²⁵ See MPI website (last accessed 8/2/2018): <https://www.mpi.govt.nz/funding-and-programmes/forestry/afforestation-grant-scheme/>

²⁶ For a further discussion of ecosystem services related to the proposed scheme, see David Hall and Sam Lindsay, 2017. *Permanent Forest Bonds: A pioneering environmental impact bond for Aotearoa New Zealand*, Working Paper, Wellington, IGPS, pp. 23-25.

²⁷ Blaschke P, Hicks D, Meister A. 2008. Quantification of the flood and erosion reduction benefits, and costs, of climate change mitigation measures in New Zealand. Report prepared by Blaschke and Rutherford Environmental Consultants for MfE. Wellington: Ministry for the Environment.

²⁸ Statistics New Zealand, 2017. “Estimated long-term soil erosion”. Retrieved on 17/11/2017 from: http://www.stats.govt.nz/browse_for_stats/environment/environmental-reporting-series/environmental-indicators/Home/Land/long-term-soil-erosion.aspx

²⁹ Kate G. McAlpine and Debra M. Wotton, 2009. “Conservation and the Delivery of Ecosystem Services: A Literature Review,” Science for Conservation. Wellington, NZ: Department of Conservation: pp. 15–16.

- **Loss of mauri to land and people:** In te ao Māori, the deterioration of local environments involves its mauri (or life force) being diminished, which in turn diminishes the mauri of tangata whenua. Consequently, poor environmental outcomes, like those discussed above, negatively impact on Māori wellbeing.³⁰

Climate change is a further consideration. Given that the incidence of extreme weather events is expected to increase as mean global temperature rises, so too will local damages such as erosion, soil loss and flood events.³¹ Thus, afforestation and reforestation becomes important for climate adaptation, because it enhances the resilience of land and waterways.

But future forests are also important for climate mitigation. A major 2017 report, led by Nature Conservancy and fifteen other research organisations, has estimated that natural climate solutions – that is, improved management of forests, wetlands, grasslands, and agricultural lands – could deliver 37 per cent of cost-effective mitigation required for a >66% chance of holding warming to below 2 °C.³²

In the New Zealand context, Pure Advantage's 2016 report, *Our Forest Future*, argued that reversing the current trend of net forest loss through large-scale afforestation would advance the green economy through climate-aligned prosperity.³³ Leaving marginal land in pasture creates an opportunity cost by not generating carbon units that could count towards meeting our greenhouse gas emissions targets. Under the United Nations Framework Convention on Climate Change (UNFCCC), the New Zealand Government has an international commitment through the Paris Agreement to reduce greenhouse gas emissions by 30 per cent below 2005 levels by 2030.

The New Zealand Government has made a further domestic commitment to reach net zero emissions by 2050. It plans to achieve its emissions reduction target by a three-pronged approach:

30 This is why, for instance, Māori well-being frameworks, like those designed by Sir Mason Durie, involve an environmental dimension, such as waiora. See Mason Durie 1998: *Whaiora: Māori health development*. Oxford University Press, Auckland. Durie, M. 1999: *Te pae mahutonga: a model for Māori health promotion*. See also Harmsworth, G.R.; Awatere, S. 2013: Indigenous Māori knowledge and perspectives of ecosystems. Pp. 274–286 in Dymond, J.R. (Ed.): *Ecosystem services in New Zealand—conditions and trends*. Manaaki Whenua Press, Lincoln.

31 For a review, see Ministry for Primary Industries, 2012. "Impacts of climate change on erosion and erosion control methods – A critical review – Final report", MPI Technical Paper no: 2012/45, Prepared for MPI by L Basher, Landcare Research; S Elliott, A Hughes, A Tait, NIWA; M Page, B Rosser, GNS Science; I McIvor, Plant & Food Research; G Douglas, AgResearch; H Jones, Scion, August 2012.

32 Bronson W. Griscom, Justin Adams, Peter W. Ellis, Richard A. Houghton, Guy Lomax, Daniela A. Miteva, William H. Schlesinger, David Shoch, Juha V. Siikamäki, Pete Smith, Peter Woodbury, Chris Zganjar, Allen Blackman, João Campari, Richard T. Conant, Christopher Delgado, Patricia Elias, Trisha Gopalakrishna, Marisa R. Hamsik, Mario Herrero, Joseph Kiesecker, Emily Landis, Lars Laestadius, Sara M. Leavitt, Susan Minnemeyer, Stephen Polasky, Peter Potapov, Francis E. Putz, Jonathan Sanderman, Marcel Silvius, Eva Wollenberg, and Joseph Fargione (2017), "Natural climate solutions", *Proceedings of the National Academy of Sciences of the United States of America*, 114 (44) 11645-11650.

33 David Hall, 2016. *Our Forest Future*, Report Prepared for Pure Advantage. Auckland: Pure Advantage: <http://pureadvantage.org/news/2016/04/22/our-forest-future/>.

(1) reducing greenhouse gas emissions in New Zealand; (2) growing more trees to absorb emissions; and (3) buying emissions reductions from overseas carbon markets.³⁴

Ministry for the Environment modelling estimates that meeting our 2030 target could cost \$14–\$36 billion over 10 years (assuming a \$50 carbon price), which will involve the purchasing of international emissions reductions.³⁵ It should also be noted that there remains uncertainty over access, supply, and price of overseas carbon units.³⁶ Therefore, it is prudent for New Zealand to aggressively pursue all cost-effective opportunities in the first two prongs – that is, to reduce gross emissions and to increase carbon sinks.

Analysis of New Zealand's climate mitigation options by Vivid Economics and the Royal Society of New Zealand identify the establishment of new forest as a cost-effective means of reducing net emissions.³⁷ New Zealand is unusual among developed countries in having a large “land bank” available for future forest which, because it is erosion prone and minimally productive for agriculture, would not displace more productive activities through forest conversion. One study estimated that reverting 1.45 million hectares of available land to mānuka and kānuka would sequester about 10.6 million tonnes of CO₂-e annually.³⁸ This would offset around 13% of New Zealand's current gross emissions. Moreover, by investing into the domestic production of carbon units, rather than purchasing units offshore, New Zealand would reap the rewards of the environmental co-benefits from continuous forest, a significant “added value” for climate-aligned investment.

For many land owners, however, establishing new forest has prohibitive upfront costs. The New Zealand Government does operate various schemes to financially incentivise afforestation. But these schemes do not reach the scale of the 1.1 million-hectare problem that Government identifies. The Permanent Forest Sink Initiative has seen 15,900 hectares registered since 2006.³⁹ The Afforestation Grant Scheme plans to partially subsidise 15,000 hectares of new forest

34 Office of the Minister for Climate Change Issues, 2016. “Paris Agreement on climate change – ratification and domestic action”, Cabinet Paper prepared for the Cabinet Economic Growth and Infrastructure Committee. Wellington: New Zealand Government.

35 Ministry for the Environment, 2017. “Briefing to the Incoming Minister for Climate Change: Climate Change Portfolio”. Wellington: NZ Government, p.7.

36 Suzi Kerr et al., 2017. “An effective NZ ETS: Clear price signal to guide low-emission investment”, Motu Note #28, Wellington: Motu.

37 Vivid Economics, 2017. “Net Zero in New Zealand: Scenarios to Achieve Domestic Emissions Neutrality in the Second Half of the Century: Summary Report”, Report prepared for GLOBE-NZ, March 2017; and Royal Society of New Zealand, 2016. *Climate change implications for New Zealand*. Wellington: RSNZ.

38 Trotter et al., 2005. The Parliamentary Commissioner for the Environment recently noted that “Allowing a million hectares of marginal hill country to revert to scrub could capture the equivalent of about 17% of all the biological methane and nitrous oxide currently emitted each year for 50 years.” However not all this land is likely to revert immediately, at least not without some human intervention. See Parliamentary Commissioner for the Environment, 2016. “Climate change and agriculture: Understanding the biological greenhouse gases”, p.72.

39 Ministry for Primary Industries, 2015. “The Permanent Forest Sink Initiative: Proposals for Improvement”, MPI Discussion Paper 2015/16, Wellington, NZ: Ministry for Primary Industries, p.8.

between 2015 and 2020. The Erosion Control Funding Programme has, up until 2016, funded 41,251 hectares of new forest in the East Coast. All up, this addresses only 6.5% of the 1.1 million hectares that the Ministry for Primary Industries recognises would benefit from forest.

An April 2017 report by Motu, *Facilitating Carbon Offsets from Native Forests*, described the challenges to native afforestation as including “a lack of awareness; limited access to capital; the complexity of the [Emissions Trading Scheme]; policy uncertainty; and some specific policy settings.” It concluded that: “The New Zealand business community can play an important role in solving these problems. Businesses can help influence government policy and have the capital and capacity to play a facilitating role in the market.” The NFBS is an innovative way to involve businesses in mitigating environmental problems, which addresses all of the challenges identified above.

2.5. Existing Schemes and Programmes

This section offers a light-touch survey of existing and potential Government initiatives for delivering new forest. This is not intended as a comprehensive options analysis, because this needs to be undertaken by, or in partnership with, Government. This is so that Government can take the lead in evaluating its existing schemes and programmes, and can incorporate its own data and financial information into a comprehensive options analysis. The purpose of this survey of existing arrangements is to demonstrate due diligence in understanding the relevant policy context, and to indicate potential synergies and misalignments with existing schemes and programmes.

There are a number of schemes and programmes that are complementary to the objective of establishing continuous native forest in New Zealand, such as the Emissions Trading Scheme (ETS), Permanent Forest Sink Initiative (PFSI), Afforestation Grant Scheme (AGS), and conventional output-based contracting for native forest restoration. Other initiatives are region specific, such as Erosion Control Funding Programme (ECFP) or various council-operated initiatives. There are further schemes that are hypothetical, such as the Reforest Trust’s proposal for forward contracts, which are feasible but not yet implemented.

However, these schemes and programmes are not necessarily well-designed to address *the specific objective* of continuous native forest on erosion-prone land throughout New Zealand. This is not to say that these schemes and programmes are not well-designed *in general*, only that they do not have this *specific* objective as their *primary* objective. Instead, their primary objective might be to assist New Zealand to meet its international obligations under the UNFCCC framework, or to incentivise afforestation without any preference for native versus exotic species. These objectives may overlap with the NFBS’s objectives, but these objectives are also importantly different and, as such, may be misaligned with specific features of the NFBS’s primary objective. To be specific, these other schemes and programmes may not be well-designed to manage the remoteness of planting sites, slow growth of native species, financial constraints faced by relevant landowners, landowner priorities and values, and so on.

These complementarities and misalignments are summarised in Table 6 below.

Table 6: Existing Schemes and Programmes

Emissions Trading Scheme (ETS)	
Description	Complementary to NFBS's objective
<p><i>The NZ ETS is a compliance carbon market that is intended to create a financial incentive for businesses to invest in technologies and practices that reduce emissions, and also to encourage forest planting by allowing eligible foresters to earn New Zealand emission units (NZUs) as their trees grow and absorb carbon dioxide. At the time of writing, the price of one NZU is about \$21, which is equivalent to one metric tonne of carbon sequestered.</i></p>	<ul style="list-style-type: none"> ▪ The NZ ETS establishes a market for trading emissions reductions, where landowners can sell NZUs derived from the establishment of eligible post-1989 forest; hence creating revenue opportunities for continuous forest (see also the section on carbon farming below). ▪ NZU revenue can be used to finance the NFBS, thereby potentially reducing the cost of outcomes to the Government. ▪ The NZ ETS potentially contributes to a framework of incentives that assuring the long-term continuity of NFBS by making forest land uses financially sustainable over the long term.
	Misaligned to NFBS's objective
	<ul style="list-style-type: none"> ▪ The NZ ETS has no specific priority for native trees, nor any incentives or premium value for native or permanent forest. (Only about 8% of the total 300,000 hectares of ETS-registered forest is native species.)⁴⁰ ▪ The NZ ETS incentivises maximal carbon sequestration, thereby tending to favour fast-growing exotic species that accrue large volume of NZUs swiftly. ▪ A significant proportion of forests participating in the NZ ETS are plantation forests, hence carbon flows rather than carbon stocks, because these forests will be harvested upon maturity. These harvesting schedules may misalign with international targets. ▪ The NZ ETS has various administrative barriers, especially in terms of cost and time, that deter landowners who are time- and cash-constrained. ▪ The liability for forest loss sits with landowners, which is either a risk or an additional cost through insurance payments.

⁴⁰ Thomas Carver and Suzi Kerr, 2017. "Facilitating Carbon Offsets from Native Forests", Motu Working Paper 17-01 Motu Economic and Public Policy Research, April 2017, p.7.

	<ul style="list-style-type: none"> ▪ The NZ ETS does not provide landowners with upfront capital to establish forest and maintain sites, or to contract professionals to undertake this work.
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Permanent Forest Sink Initiative (PFSI)	
Description	Complementary to NFBS's objective
<p><i>The PFSI promotes the establishment of permanent forests on private land by providing the opportunity to earn emission units (NZUs) for the carbon absorbed by their forests. Forests may be either exotic or indigenous species, including indigenous forests that have naturally regenerated since 1990. PFSI participants enter a covenant with the Crown, which is registered against their land title(s). The covenant is in perpetuity, with the right to terminate after a minimum term of 50 years. Landowners are responsible for establishing and maintaining the forest. Limited harvesting is allowed on a continuous cover forestry basis.</i></p>	<ul style="list-style-type: none"> ▪ The PFSI provides another mechanism by which landowners can earn NZUs to sell through the ETS, or voluntary carbon markets to domestic or foreign buyers. ▪ The PFSI provides a covenant system that could be used to protect forests established through the NFBS (although see below).
	Misaligned to NFBS's objective
	<ul style="list-style-type: none"> ▪ The PFSI covenant is unattractive to many landowners who wish to retain autonomy and control over their land, especially Māori landowners. ▪ The PFSI has no specific priority for native trees (although a significant proportion of PFSI forests are native). ▪ The liability for forest loss sits with landowners, which is either a risk or an additional cost through insurance payments. ▪ The PFSI does not provide landowners with upfront capital to establish forest and maintain sites, or to contract professionals to undertake this work. ▪ The dependence upon the NZ ETS for carbon revenue has resulted in unpredictable returns, which reduces confidence in the PFSI as a sustainable land use option.

Afforestation Grant Scheme (AGS)	
Description	Complementary to NFBS's objective
<p><i>The AGS provides grants of \$1,300 per hectares in order to mobilise co-funding from landowners to establish small to medium-sized forests of 5–300 hectares. In the five years between 2015 and 2020, the AGS will distribute up to \$19.5 million at up to 15,000 hectares of new forest. In return, the Government claims carbon credits for the first ten years to ensure a stable supply of AAUs for meeting its international obligations.</i></p>	<ul style="list-style-type: none"> ▪ The AGS could potentially be used to partially offset the total cost of establishing native forest on erosion-prone land.
	Misaligned to NFBS's objective
	<ul style="list-style-type: none"> ▪ The AGS does not provide upfront capital for landowners. Established forests need to meet a minimum established standard, as verified by MPI, before the grant is transferred. ▪ The AGS is not designed to upscale, because it is tied to a 15,000-hectare target. ▪ The AGS has no specific priority for native trees. ▪ The AGS has no assurance of continuous forest, because landowners have no obligations after ten years. ▪ Although erosion control is identified as an objective, the AGS is not restricted to these land types.

Erosion Control Funding Programme (ECFP, formerly the East Coast Forestry Project)	
Description	Complementary to NFBS's objective
<p><i>The ECFP was established in 1992 to address wide-scale erosion problems in the Gisborne district, with an aim to target the worst 60,000 hectares of erosion-prone land. It administers two types of grants: community projects and land treatment grants. Since 2016, the latter grants are structured around four milestones: 50% of capital delivered upfront when landowners sign a contract and prove order placement, 30% when planting or fencing is complete, 0% for establishment inspection, and 20% for maintenance inspection.</i></p>	<ul style="list-style-type: none"> ▪ The ECFP could potentially be used to partially offset the total cost of establishing native forest on erosion-prone land in the Gisborne District. ▪ The ECFP has a priority for severely erosion prone land and criteria for eligibility according to land use capability.
	Misaligned to NFBS's objective
	<ul style="list-style-type: none"> ▪ The ECFP is regionally specific, therefore not currently adequate to address the issue of erosion at a national scale. ▪ The ECFP grant is not entirely upfront; however, as a result of community feedback, 50% of the grant is upfront since late 2016.

Volunteer initiatives for native forest restoration	
Description	Complementary to NFBS's objective
<p><i>It is estimated that between 25,000 and 45,000 people belong to roughly 600 community-based environmental groups in New Zealand.⁴¹ These groups contribute to the labour force that maintain and restore New Zealand's natural heritage, either independently or in collaboration with central and local authorities, or commercial sponsors. Some larger habitat restoration projects involve afforestation/reforestation that meets New Zealand's forest eligibility criteria.</i></p>	<ul style="list-style-type: none"> Volunteer labour is motivated by concerns for social and environmental impact, therefore oriented toward delivering forest outcomes that enrich public value such as biodiversity, amenity value, and so on.
	<p>Misaligned to NFBS's objective</p> <ul style="list-style-type: none"> Volunteer labour is unpredictable from a project management perspective, especially in the event of adverse conditions such as poor weather or difficult terrain. Sometimes, professional contractors are needed on standby in case project outputs aren't achieved. Volunteer labour is inappropriate for steep and remote terrain, which is characteristic of erosion-prone land, due to health and safety of volunteers. Volunteer labour involves considerable operational expenses, given the organisation involved in coordinating and transporting people. The scale of volunteer planting, plus the subordination of climate change outcomes to local conservation outcomes, means that these projects are unlikely to meaningfully contribute to New Zealand meeting its international targets.

Output contracting for native forest restoration	
Description	Complementary to NFBS's objective
<p><i>This refers to conventional contracting for the restoration of native forest habitats, where contractors are paid by outputs (i.e. hours worked) rather than successful outcomes. This is a catch-all category for public and private entities paying contractors to establish new forest (such as government departments, local councils or wealthy private landowners</i></p>	<ul style="list-style-type: none"> Output contracting of professional contractors can be deployed to establish whatever forest the payor is willing to pay for, including on remote and inaccessible land. Contracting enables professional delivery of services, hence greater likelihood of forest survival, because professional contractors have the expertise and equipment that landowners and volunteers often lack.

⁴¹ Monica Peters, David Hamilton and Chris Eames, 2015. "Action on the ground: A review of community environmental groups' restoration objectives, activities, and partnerships in New Zealand", *New Zealand Journal of Ecology*, 39(2): pp.179-189.

with strong preferences for native forest).	<p>Misaligned to NFBS's objective</p> <ul style="list-style-type: none"> ▪ Output contracting requires the payor to be willing to carry the costs of planting work as well as the risks of project failure. This sole responsibility is manageable for particular projects, but not national scale schemes. ▪ Output contracting may lack an adequate incentive framework for reducing input costs, inviting innovation, or improving project management.
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Carbon farming	
Description	Complementary to NFBS's objective
<p><i>Carbon farming involves establishing forests in order to sell subsequent NZUs, either through the NZ ETS or directly to emitters. There are a number of providers in New Zealand who undertake carbon farming to sell NZUs to emitters to meet their surrender obligations under the NZ ETS.</i></p>	<ul style="list-style-type: none"> ▪ Carbon farming “locks in” forest as continuous, because the sale of NZUs means that the future removal of forest would require the carbon farmer to surrender equivalent units, which would be prohibitively expensive if the carbon price increases over time. ▪ Carbon farming is optimally incentivised to contribute to meeting international climate targets, by providing a strong supply of carbon credits to emitters. ▪ Carbon farming has access to upfront investment capital, through debt or equity, because it is a solid economic proposition. ▪ The establishment of forests and subsequent maintenance is undertaken by professional contractors.
	<p>Misaligned to NFBS's objective</p> <ul style="list-style-type: none"> ▪ Carbon farming incentivises maximal carbon sequestration and low establishment costs, thereby tending to favour inexpensive fast-growing exotic species that accrue large volume of NZUs swiftly. ▪ Carbon farming is unlikely to prioritise erosion-prone land, even though such land will be cheaper, because carbon farming also needs maximal carbon yields, which may tend to favour land at lower altitudes with more fertile soils. ▪ Carbon farming may not result in sustainable forests over the long-term, because the value of these forests will diminish once carbon yield has slowed,

	and the priority for fast-growing exotics may undercut forest resilience and social license.
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Forward contracts for carbon farming	
Description	Complementary to NFBS's objective
<p><i>Forward contracting has been proposed in New Zealand by the Reforest Trust. Emitters with obligations under the NZ ETS pay for carbon credits in advance, while the Reforest Trust sells a forward contract that secures a supply of NZUs into the future. This contract provides a hedging strategy, eliminating price risk while helping emitters to manage their obligations under the NZ ETS. The Reforest Trust, meanwhile, uses the proceeds to purchase land and establish permanent forest.</i></p>	<ul style="list-style-type: none"> ▪ Forward contracting provides capital upfront for forest establishment, because emitters are paying in advance for future emissions reductions. ▪ Forward contracting is strongly incentivised toward continuous forest, because a secure supply of future carbon credits is vital to the product being sold to emitters. ▪ Forward contracting is optimally incentivised to contribute to meeting international climate targets, by providing a supply of carbon credits to emitters. ▪ Forward contracting is likely to target marginal land, perhaps also erosion-prone land, because the economic structure favours the least expensive land to purchase. ▪ The establishment of forests and subsequent maintenance is undertaken by professional contractors.
	Misaligned to NFBS's objective
	<ul style="list-style-type: none"> ▪ Forward contracts incentivise maximal carbon sequestration and low establishment costs, thereby tending to favour inexpensive fast-growing exotic species that accrue large volume of NZUs swiftly. Although native forest outcomes are acknowledged as desirable, the Reforest Trust does not expect these to occur until after 300 years from natural reversion. ▪ Forward contracting is unlikely to reach national scale, because its scale is constrained by demand from emitters. ▪ Although forward contracting will tend to focus on marginal land, this is driven by considerations of cost, not outcomes. It is possible that erosion-prone marginal land will be avoided, because this may increase the cost of establishment.

In light of this survey of alternative schemes and programmes, we can summarise the potential virtues of the proposed NFBS thus:

- **Upfront capital:** A key advantage of the NFBS is that the underlying Bond creates upfront capital in order to undertake forest establishment. This is absent from most schemes or programmes, although the shift toward upfront capital in the ECFP demonstrates that this is highly desirable for landowners.
- **Native intentionality:** The NFBS has a clear intention to deliver native forest outcomes in the lifetime of landowners. This will unlock land that other schemes cannot (i.e. exotic forests under the NZ ETS for carbon farming or forward contracts), because the preference for native forest will be decisive for some landowners.
- **Carbon sequestration:** The NFBS is not the optimal scheme for carbon sequestration (the optimal is carbon farming and forward contracts), however it tracks a pragmatic course between this and other functions. Because the forest is continuous, it performs well in terms of creating permanent carbon stocks, not merely carbon flows that reflect the 25–30-year rotation cycle of a harvestable forest. However, because the NFBS invites and rewards innovation, it is likely to result in higher carbon sequestration rates than, say, volunteer-driven habitat restoration.
- **Professionalism:** By involving contractors, the NFBS brings professionalism into the afforestation challenge. Professional contractors bring expertise, local experience, access to adequate equipment, and sufficient time and labour to forest establishment. Schemes which provide a subsidy or future revenue stream (NZ ETS, PFSI, AGS, ECFP) still rely on landowners to undertake the planting and maintenance, which they may lack the time, labour or knowledge to do effectively. Professionalising forest establishment increases the likelihood of successful outcomes.
- **Innovation:** The NFBS involves contracting for outcomes, thus it accommodates innovation in a way that contracting for outputs may not. The setting of outcome targets and the potential to finance repayments through carbon revenue further incentivises innovation toward maximising positive outcomes. We would expect innovation also to emerge in carbon farming and forward contracts, because profitability is increased through maximising carbon yield and reducing input costs. However, the NFBS redirects the role of innovation toward other forest functions, such as erosion control and biodiversity.
- **National scale:** The NFBS is limited only by the outcome funder's commitment to pay for successful outcomes. It is not restricted to a certain region, or to a particular target, and is eminently replicable in different settings.

2.6. Main Benefits

2.6.1. Main Benefits for Government

The purpose of this section (Main Benefits) is to identify the benefits to Government for using this particular funding structure, especially when compared to alternative structures.

As discussed in §2.4, the implementation of the NFBS would generate significant public value for New Zealand through its intended impacts – which would benefit the environment, regional economies, and local communities. This section narrows in on the public value derived from the effective service delivery, where the NFBS promises to facilitate the provision of better environmental outcomes by recognising that environmental assets (such as continuous native forest) enable the effective and efficient provision of public services as ecosystem services.

The NFBS model utilises a pay-for-performance contract to incentivise high-quality performance by placing private sector capital at risk for non-performance. Through its focus on service outcomes, the NFBS provides flexibility for private sector participants to apply their expertise and experience to deliver innovative and effective solutions for the benefit of the Contracting Agency within Government.

General benefits to the Contracting Agency can be described as follows:

- **Transferred risk:** The NFBS requires the Intermediary to identify specific performance outcomes relating to the desired environmental outcomes of the project, with detail of the design and execution of the forest asset used to deliver those outcomes by the intermediary. As payment by the Contracting Agency to the Intermediary is contingent upon the quality of the outcomes achieved throughout the contract, the NFBS incentivises the delivery of the highest quality outcomes within the project budget.
- **More innovation:** Importantly, specification of the scope of the project on the basis of the quality of outcome provision allows the Intermediary to introduce and implement international best practice and innovation (see NFBS-related innovation in §2.8). It also enables the exploration of alternative delivery models that may provide the same or higher quality outcomes. An important caveat here is that learnings from various Social Impact Bond (SIB) programmes both nationally and internationally found that SIBs have the potential to deliver innovation in services that have been provided in new combinations, to new populations, or in new settings.⁴² However, there is not yet conclusive evidence to suggest that more innovation in fact occurs as a result of this particular funding model being employed; rather there is scope for it to occur.

⁴² A Brookings Institute survey of 38 Social Impact Bonds found that although none deployed an unprecedented method of service delivery, many applied methods in new and different settings, or in unique combinations. Refer: Gustafsson-Wright and Gardiner, “The Potential and Limitations of Impact Bonds,” 43

- **Potential cost reduction:** By attracting national contractor service providers, and private sector investors to the New Zealand forestry market, the NFBS will offer the Contracting Agency access to a wide variety of sources of best practice and innovation which may not otherwise be readily accessible. These subcontractors compete on the basis of their experience and ability to deliver those outcomes sought by the Contracting Agency, resulting in focused, well-developed and cost effective, outcome proposals.
- **Integrated environmental solutions:** Forestry projects delivered through conventional models often have limited scope for defining and maximising the non-contracted co-benefits (water quality, sediment control, biodiversity) of the environmental intervention. This may result in a project viability being influenced by overall cost and ease of execution rather than the other outcomes that could be optimised for each particular planting site. For instance, a site which is close to water should be maximised for water quality outcomes. A site which has a high degree of biodiversity, should be planted in a way which will attract birds, animals and insects into the planted area. This not only ensures the long-term resilience of the planting site (it is less likely to be subjected to land use conversion in the future), but it also improves the design and usability of the project (for instance, maximising the site for public recreational use). This benefit is driven by the non-contracted co-benefits which are described in the Intermediary's articles of incorporation, terms of reference and contractor agreements.
- **Effective risk management:** Because the Intermediary is accountable to both the Contracting Agency and the Investors, it must identify risk related to all aspects of the project execution (such as operating costs or capacity to raise further rounds of capital) and ensure that those risks are effectively valued, managed and mitigated. Importantly, each stakeholder in the model is incentivised to reduce risk or transfer risk to parties who are best able to manage or mitigate that risk. In other words, risk still exists in the NFBS, but it is likely to be reduced as long as solid due diligence is conducted before entering contracts. For a more detailed analysis of where risk lays between the Contracting Agency and the Intermediary in the NFBS, refer to §2.6.2.
- **Forestry industry benefits:** In the NFBS, the Intermediary is highly incentivised to adopt innovative and efficient planting practices brought by the Contracting partners. These methods can be shared and replicated across the wider industry to help reduce project cost and time scale. For example, if one contractor is able to reduce monitoring and evaluation costs by using drones to fly over the planting site and to take images of the forest, then that knowledge can easily be adopted and transferred to the other contracting parties to ensure they remain price competitive and time efficient.
- **Measurement of outcomes are reliable and uncontroversial:** Due to the complexity of problems that traditional environmental interventions tend to address, it can be difficult to

isolate confounding variables and their causal effects on outcomes. In the NFBS, however, the proposed contracted outcomes are (1) stems planted per hectare, (2) survival rate, (3) volume of carbon sequestered, and (4) carbon credits accrued. Those outcomes are proposed because they are measurable and there are existing frameworks for determining measurement. This results in increased certainty that the Intermediary can achieve the conditions set out in the contractual agreement, making it more likely that it will be able to raise investment capital on the basis on that contract.

- **Performance management:** The NFBS will drive performance management, which in turn will drive better environmental outcomes. Performance management systems will help ensure that the Intermediary is on track to deliver the components of its contractual obligations. The NFBS will bring in private sector management expertise and enable the Intermediary to adapt its performance management strategies along the way. Naturally, given the early-stage development of the NFBS, the extent to which performance management techniques are actually adopted by the Intermediary have yet to be determined. The authors will not labour this point, except to anticipate that the recruitment process will aim to strike an ideal balance between finance and ecosystem services expertise; and that, in combination with a very strong data management system within the Intermediary, will allow for a great deal of flexibility, learning, and adaptation in the outcome process.

2.6.2. Main Risks for Government

Contracting for environmental outcomes is a significant change to past contracting models in terms of risk allocation, the capability needed inside and outside Government, and associated measurement and data requirements. However, the Public Private Partnership programme within Government provides a reliable knowledge base that addresses risk allocation. There is also a growing body of information available to help project managers guide the NFBS to a successful pilot launch. To a useful degree, the NFBS can “piggy back” on research and learnings from Social Impact Bond programmes both in New Zealand and overseas, and use that information to its advantage during the concept development stages.

Substantial market interaction with the investment, philanthropic and NGO sectors has occurred throughout the formation of this Business Case. In addition, a market sounding exercise was run during the publication of *Environmental Impact Bonds: A Case for Permanent Forest Bonds in New Zealand* (2017). This working paper introduced the environmental bonds concept and the authors collected feedback from over 20 market participants, including forestry and commercial experts, and investors. Below is a discussion of some general risks that could occur within the NFBS.

- **Complexity:** The complexity of the NFBS creates novel dimensions of risk. The NFBS involves multiple contracts that connect together multiple stakeholders. Although many risks are re-allocated onto the private sector and away from public funds, the model potentially introduces a further risk that the lengthy and laborious establishment process

will be prematurely aborted because relevant parties cannot agree on the various attributes of the NFBS. These attributes include acceptable levels of risks and returns, what outcomes should be contracted for, how outcomes will be measured, and the establishment of mutual confidence among the multiple contracting parties.

- These risks can be mitigated, however, by ensuring a simple structure and especially simple measurement metrics for payment triggers; by ensuring trust and transparency between contracting parties; and by striving for wide political endorsement. A key design principle in the NFBS has been to ensure the minimal level of complexity that the Contracting Agency is willing to pay for, because this will enhance its commercial attractiveness.
- **Mission ‘creep’:** Because the Intermediary and Investors are contracted to establish continuous carbon sinks, there exists a risk that the Intermediary management or its Investors may exert pressure to not optimise a planting site for non-contracted outcomes (increased biodiversity, water quality) in favour of getting faster, cheaper planting sites to get “trees in the ground”, thereby eroding potential ecological value that could be achieved through the forest planting.
 - This risk can be mitigated through a variety of tools that are available to the management team, and that can be evaluated by the Contracting Agency. For example, before each planting site is approved for planting, management will ensure that all sites have a planting plan drafted which optimises for the non-contracted outcomes. Another mitigation example, is to embed the mission of integrated outcomes into the Intermediary’s Terms of Reference. This will help ensure that management decisions are guided by its mission statement, and Investors have understood the Intermediary’s mission during the due diligence process.

The following Figure 7 aims to clarify where risk sits within the model and the degree of criticality each risk item represents to the success of the model. Generally, the reader will note that many of the risks pass to the Intermediary (which is a hallmark of the EIB model and a key benefit to the Contracting Agency). As mentioned previously, risk reallocation in the NFBS is, in some ways, a moving target until the details within each contract are finalised. The below Figure 7 outlines the risk reallocation that may occur as we currently anticipate it.

Figure 7: Pilot Project Risk Allocation.

Pilot Project Risk Allocation				
				<div> <div></div> Critical Risk <div></div> Moderate Risk <div></div> Low Risk </div>
	Pilot Risk Allocation between Participants			Risk Mitigation Strategy
Type of Risk	Contracting Agency	Shared	Intermediary	Intermediary
Pre-planting Planning Risk				
Coordination b/w Government Agencies				Robust communication strategy with Government
Coordination w/ Landowners				Effective internal resourcing (HR, communications)
Coordination w/ Commercial Partners				High level of pilot team sophistication
Pre-planting Financing Risk				
Investor Outreach				Well networked investment relations team
Bond Distribution				Capital markets partner with National & International reach
Investor Due Diligence				Quality legal support
Term Sheet Execution				Quality investment banking support
Commercial Partners Fees				Financial model must reflect fees
Planting Delivery Risk				
Outcome Delivery Planning				Delivery plan is vetted by all stakeholders prior to launch
Internal Resourcing (HR, legal, compliance)				Financial model must reflect adequate resourcing
External Resourcing (Equipment, Materials)				Financial model must reflect adequate resourcing
Landowner Engagement & Management				Deep Maori and Rural connections in pilot team
NGO Engagement & Intergration				Deep NGO networking present in pilot team
Subcontractor Engagement & Management				Deep forestry network present in pilot team
Subcontractor Capacity				Accurate assessment of sub-contractor history of delivery
Subcontractor Default				Background finance checks, staggered process payments
Effectiveness of Subcontractor Services				Internal monitorings at each critical milestone
Substantial Changes in Delivery Costs				Effective margin built into financial model
Overhead Costs & Cash Flow				Detailed & accurate financial model
Post-planting Risk				
Ongoing Maintenance (Re-planting, Pest, Fence)				Accurate & validated cost assumptions in model
Evaluator Management				High level of pilot team sophistication
Stakeholder Management & Communications				Effective internal communications resourcing
Insufficient Information to Measure Outcomes				Quality framework design by experienced assurance partner
Failure to Achieve Contracted Terms				Robust RFP design and validation process
Long-term Impact on Land				N/A
Negative Impact on Land & Landowners				Regular land evaluation reporting
Force majeure (Acts of God)				N/A
Post Planting Financing Risk				
Default of Contracting Agency				N/A
Default or insolvency of Intermediary/Contractors				Cash flow review during RFB applications
Cost Overruns				Six monthly annual budget review
Delay in Payment for Outcomes				Access to alternative financing channel
Insurance Costs				N/A
Change in Government Policy				N/A
Negative Change in Law				N/A

Note, this list does not attempt to be exhaustive, but it does reflect the underpinning assumptions in this Business Case (especially the financial model and key commercial terms), which have been drafted to reflect this transfer of risk from Government to the private sector (Intermediary and Investors).

2.7. Key Constraints and Dependencies

As defined by Treasury's Better Business Cases framework: "Constraints are limitations imposed on the investment proposal from the outset. These can include constraints on available resources. Dependencies are external influences on the success of the project, where project success is contingent on the future actions of others."

Table 7 below identifies a series of relevant constraints and dependencies, which will be carefully monitored during the project.

Table 7: Key Constraints and Dependencies.

Constraints	Notes
Forest definition eligibility	<ul style="list-style-type: none"> ▪ In order for carbon revenue to service the Bond by accruing NZUs, the forest that is established through the Bond will need to meet the definition for post-1989 forest land. Specifically, the forest will need to be: <ul style="list-style-type: none"> ▪ at least a hectare in size; ▪ with an average width of at least 30 metres; ▪ have (or will have) tree crown cover of more than 30% in each hectare; ▪ constituted by forest species that can reach at least 5 metres in height at maturity. ▪ Additionally, this forest will need to be established on land that either: <ul style="list-style-type: none"> ▪ wasn't forest land on 31 December 1989; ▪ was forest land on 31 December 1989, but was deforested between 1 January 1990 and 31 December 2007, or; ▪ was pre-1990 forest land that was deforested on or after 1 January 2008, and any ETS liability has been paid.
Land ownership	<ul style="list-style-type: none"> ▪ Different ownership categories have different implications for the NFBS. For example, these include: <ul style="list-style-type: none"> ▪ The challenges of implementing a bond on leasehold land; ▪ Crown-owned land cannot earn NZUs, therefore using an EIB to finance forest on such land would require a different EIB structure to the structure laid out in this Business Case.
Land use	<ul style="list-style-type: none"> ▪ Not all land is appropriate for the NFBS, given that it requires retiring the land from conventional commercial uses, such as pastoral agriculture and clear-cut forestry. Some landowners will be guided by the highest NPV and benefit-cost ratio. ▪ Nevertheless, highly erosion-prone land will often be marginal or minimally productive for conventional commercial uses, so continuous forest will be the optimal land use. Also, cultural, aesthetic and ethical reasons can tip the balance for cost/benefit considerations.
District plans and local regulations	<ul style="list-style-type: none"> ▪ Specific zoning rules could affect the appropriateness of the NFBS; for example, land that is zoned for non-forest purposes.

Dependencies	Notes and Management Strategies
Successive Government Support	<ul style="list-style-type: none"> Due to the long-term nature of the scheme, it will contract-in successive Governments to meet obligations entered into by the previous Government. If a change of Government occurred before the outcome payment contract was signed, this could negatively impact the pilot from commencing.
Successful Capital Raise	<ul style="list-style-type: none"> The model critically relies on private sector investment in order to provide upfront capital to the scheme. If the capital cannot be raised from the private sector, the pilot will not move into operations and fail. Comprehensive investor engagement throughout concept development will help to mitigate that outcome.
A Proficient and Experienced Intermediary	<ul style="list-style-type: none"> The model is highly dependent on the motivation and ability of an Intermediary (or consortium of organisations that cooperate as the Intermediary) to enter into an outcome payment contract with Government and execute the contract within agreed parameters to a high degree of success. If the Government procurement process is unable to identify an Intermediary that meets that general criteria, then the model will fail.
Motivated Landowners	<ul style="list-style-type: none"> As the model is currently structured, it relies on a large number of motivated landowners who wish to participate in the scheme for commercial, cultural or aesthetic reasons. They also have to be landowners who have ownership criteria as discussed above in the Constraints section.
Functioning Emissions Trading Scheme (ETS)	<ul style="list-style-type: none"> As the model is currently proposed, carbon revenue from the forest becomes available to the Intermediary, for distribution to both the investors and landowners, after 10 years. That revenue stream relies on a functioning and highly liquid ETS market for NZUs. That said, it is important to note that the NFBS <i>would function</i> without an active carbon market, because even though the carbon revenue stream would cease, the Intermediary would still receive outcomes payments from the Government if it was achieving its performance targets. However, if the outcome targets are not achieved and consequently payments are not received from the Government under the outcome agreement, the Intermediary's ability to sell the NZU's after 10 years of operation, provides an alternative means of repaying investors. This reduces the risk of the programme and potentially lowers funding costs.

2.8. Innovation Strategy

The costs of establishing native forest are potentially very high, but also widely spread. A recent survey of New Zealand forest experts and associated literature found that the costs of native forest establishment are estimated at \$4,000 per hectare (or less) for assisted regeneration, or as high as \$66,000 per hectare for high-grade native restoration or native plantation forest.⁴³ Within this price range, there are multiple variables that bear upon the final cost, including management strategy (i.e. natural regeneration or active restoration), labour costs (i.e. voluntary versus professional labour), species mix, economies of scale, transport costs, fencing requirements, presence of herbivorous pests, and so on. All these variables could be exploited through more innovative delivery to deliver successful outcomes more cost-effectively.

The NFBS could foster innovation in the delivery of carbon outcomes – something that the Contracting Agency may be unable or unwilling to do because of considerations of risk, funding, or political constraints. There are two main ways by which the NFBS could incentivise innovation: (1) through a new delivery model that provides desired outcomes from the outset; and/or (2) the ability to adapt and innovate throughout the term of the outcome delivery. The latter we will discuss in §5.1, Project Management Planning.

With regards to new ways to provide the contracted outcomes, a positive attribute of the NFBS is that many aspects of the model (outcome delivery, target land, and target landowner) are not innovative. This, therefore, helps to reduce execution risk to the Investors because there is existing evidence of success in achieving positive outcomes already. In other words, the bones of the model are not entirely new. However, there are a number of ways in which the NFBS can be innovative so as to encourage more efficient or effective delivery of its contracted outcomes. The below sections explore some examples of how the Intermediary could optimise its operations to achieve innovative outcomes.

2.8.1. Use of Mixed Native/Exotic Forest Systems

A key trade-off in afforestation/reforestation is between carbon sequestration and forest species, particularly the choice between native and exotic tree species. Mixed native/exotic forest systems are a promising way to strike a balance between different expectations for future forest, especially between biodiversity and carbon mitigation outcomes. There is, however, limited empirical knowledge about the efficacy of such systems, hence the potential for innovation.

The trade-off arises from there being significant public interest in native species and, in certain quarters, a strong aversion to exotic species, especially *Pinus radiata*. When considering the establishment of *continuous* forests, this preference for natives is likely to be amplified. Such

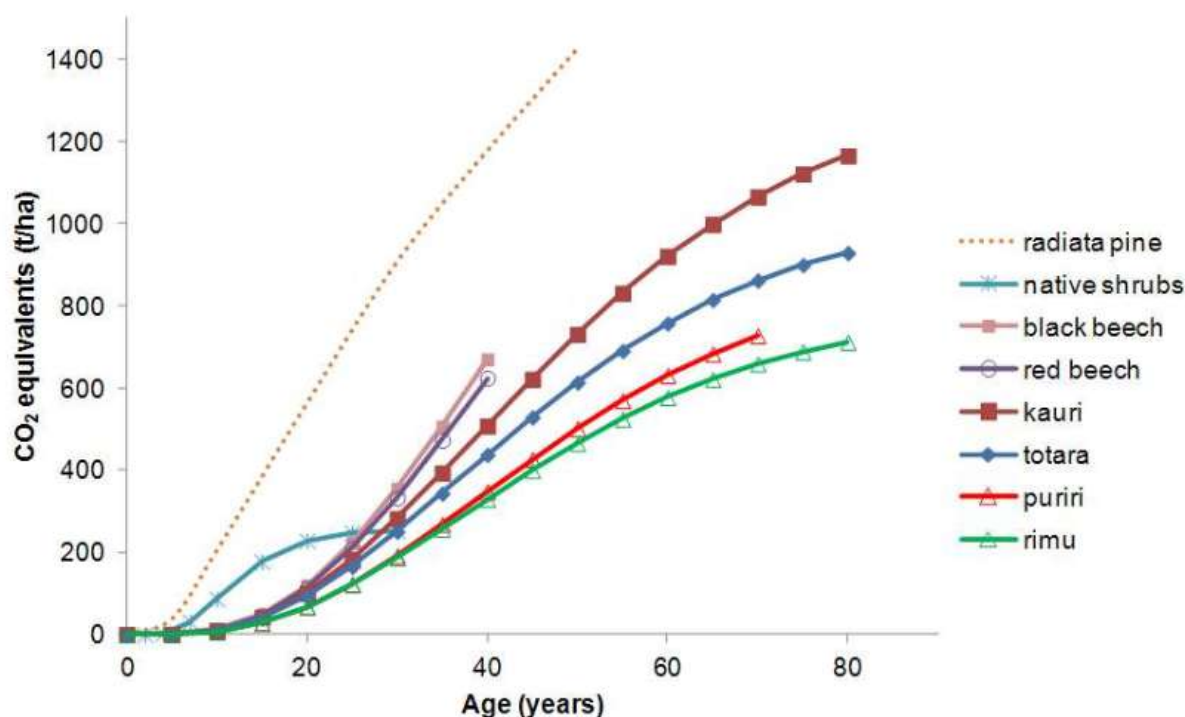
⁴³ Carver, Thomas and Suzi Kerr (2017), “Facilitating Carbon Offsets from Native Forests”, Motu Research Working Paper 17-01, Wellington NZ: Motu Economic and Public Policy Research, p. 9, 14–15.

preferences are also present among many (but not all) landowners, including many Māori landowners. Any large-scale afforestation policy that depends upon landowner consent for forest conversion needs to be responsive to these preferences. By contrast, establishing forest that is misaligned with landowner preferences will require either very costly financial incentives, or very heavy-handed regulation and/or intervention by government. Consequently, there are sound reasons for including native species as a component or option for any large-scale afforestation initiative such as the Billion Trees Programme, because this might be more likely to get uptake where exotic species can't.

However, native species are not optimally aligned to carbon mitigation outcomes (see Figure 8 below). On average, exotic species grow significantly faster than native species, and therefore sequester carbon at higher rates. A common rule-of-thumb is that *Pinus radiata* sequesters carbon at three times the rate of native species (although this heuristic is complicated by a number of variables and knowledge gaps). Accordingly, *Pinus radiata* is predominant not only for plantation forestry but also carbon farming, because these rapid growth rates make it more economically viable. So, if the primary objective of afforestation is carbon sequestration, especially for near-term climate change targets like 2030, then this would appear to recommend establishing forest sinks of fast-growing exotic species like *Pinus radiata* (although there are complicating considerations here also – see the discussion of forest resilience and longevity below). The obstacle to national-scale adoption is identifying enough land available for planting, especially when many landowners will be strongly disinclined to establish continuous forests of exotic species.

Mixed native/exotic systems seek to strike a balance between carbon sequestration and native forest outcomes. A nursery crop of fast-growing exotic hardwoods is established, then interplanted with slower growing native trees. Not only will these native species eventually come to dominate the forest ecosystem over the mid- to short-term, they will also benefit from the shelter of the nursery crop, growing up with better structure. In the meantime, the exotic nursery crop makes the forest more economically viable by generating more carbon revenue sooner, and potentially also creating additional revenue streams if the exotic trees are selectively felled and extracted for timber.

Figure 8: Predicted carbon sequestration rates on average sites for several native tree species, a mixed species shrub planting, and a typical pine stand (Tāne's Tree Trust).



Source: Mark Kimberley, David Bergin and Peter Beets (2014), "Carbon Sequestration by Planted Native Trees and Shrubs", Technical Article no. 10.5, Rotorua: Tāne's Tree Trust.

A basic financial model for a mixed system, based on carbon revenue alone, is provided in the case study below:

Case Study: Sean Weaver (Ekos), Hawke's Bay Climate Resilience Programme, 15th November 2017.

"Preliminary investment analysis of a [mixed native/exotic] scenario delivering 200,000 ha of carbon-financed permanent afforestation by 2030 indicates a net investment burden of \$385m (gross investment of \$700m) spread over 12 years, with an internal rate of return of 13.9% for a project modelled to 2040. In other words, a net investment of \$385m (i.e. net of revenues) paid in instalments between 2018 and 2030 will:

1. Afforest 200,000 hectares of erosion-prone land by 2030 (assuming willing farmer uptake at that rate) with forest that become indigenous forest when the nursery crop dies,
2. Pay for itself by 2035,
3. Generate a return for investors (e.g. Hawkes Bay Regional Council, central government, and private investors),
4. Fund conservation management.

In contrast, running the same project with indigenous forest plantings requires a net investment of \$620m (same gross investment), an internal rate of return of 0%, and a net present value of -\$200m. So, by 2040 an indigenous afforestation programme will still be in debt by \$200m and will provide no funds for conservation management.”⁴⁴

Not only can these mixed native/exotic systems deliver forest outcomes that better align with landowner’s preferences, there is a strong argument that these systems will also better align with climate adaptation outcomes (in contrast to climate mitigation). Mixed native/exotic systems deliver diverse forests – diverse in both age and species – which reduces the risk of catastrophic forest loss in the event of a pest or disease outbreak, or extreme weather event. As ecologists have long argued, a key attribute for ecosystem resilience is heterogeneity – that is, the presence of diversity and redundancy in the ecosystem system – because this enhances its capacity to adapt to change and disruption.⁴⁵ By contrast, even-aged monocultures, such as pine plantations under a clear-cut system or even carbon farms using *Pinus radiata*, are far more vulnerable to a collapse.

The other key factor for forest resilience is social license. A forest that is deemed legitimate and attractive to local communities is less likely to face future land use change, and more likely to be well-maintained and protected, than a forest that doesn’t. The authors speculate that future generations will value more highly native forests on erosion-prone land than exotic forests, because the former will continue to provide a wide range of cultural and biodiversity values, whereas the primary value of fast-growing exotic forests (that is, rapid carbon sequestration) will reduce over successive decades.

2.8.2. Reduction of Seed and Seedling Costs

In November 2015, the Department of Corrections (Corrections) and the Department of Conservation (DOC) entered into the ‘Good to Grow’ partnership in order to pursue mutually beneficial social and environmental outcomes. The agreement provides for the increased delivery of work opportunities and native plant species on DOC sites for offenders on community-based sentences, especially undertaking habitat restoration work.

Corrections’ motivation for partnership is that rehabilitation and reintegration outcomes for offenders will potentially improve as they contribute to the conservation of interests of their community, learn new skills, and earn NCEA credits which will better equip the offenders in future employment opportunities.

DOC’s interest is for offenders to help maintain the sites and tracks that it manages. It is also

⁴⁴ Weaver, S.A. 2017. *Hawke’s Bay Climate Resilience Programme: A framework for the climate change component of the Hawke’s Bay Long-Term Plan*. Consulting report to the Hawke’s Bay Regional Council. Ekos Consulting Reports 2017/008. Takaka, New Zealand, pp.81-83.

⁴⁵ Levin S.A., et al. 1998. “Resilience in natural and socioeconomic systems”. *Environ Dev Econ*. 3:225–36.

looking to cultivate a range of native plants in prison nurseries at Christchurch, Remutaka, Whanganui and Auckland prisons. These various initiatives combined will help reduce the overall cost of conservation work to DOC through the provision of free labour in prisons and community services programs.

The benefits of leveraging the intentionality behind such initiatives such as the Good to Grow partnership are worth highlighting here. Any mass afforestation initiative in New Zealand will require a large number of trees to realise this land use conversion. Current capacity is well below the level needed to effectively plant over one-million hectares of erosion-prone land in New Zealand.⁴⁶ By incorporating social outcomes – in this example, the reduction of recidivism rates – into an environmental investment decision, the New Zealand Government can potentially build a stronger case for action by looking at systems benefits that may accrue domestically as a co-benefit of that investment.

2.8.3. Reduction of Planting Costs

In recent years, hundreds of companies have entered the landscape restoration industry, forming an emerging “restoration economy”. They represent a wide range of business models that deliver financial returns for investors while restoring forests and agricultural lands. One sector which is forging ahead with new opportunities for forest restoration is technology. Technology companies develop and deploy technology to facilitate restoration, often by improving efficiency and lowering costs.

Because the Intermediary is a private sector participant in the NFBS, it is able to engage other private sector actors as partners or service suppliers in a way that a traditional Government grant making scheme could not. One potential service provider is BioCarbon Engineering based in the United Kingdom, which uses specialised drone technology to reforest remote landscapes.⁴⁷ This happens in five phases:

- **Phase 1: Mapping** - The aim of the mapping phase is to gather as much information about the area of interest as possible. This includes data such as: Surface topology and slope angles, Surface composition and obstructions, Vegetative indices, Soil type and moisture.
- **Phase 2: Planting Plan** - The information gathered from the mapping phase is processed to create an optimised planting pattern over the area of the interest. The new trajectory will avoid the known obstructions, unplantable soil areas and existing trees. Analysis of the soil nature, moisture and density will help decide which seeds should be planted. Since it is generally advantageous to have a heterogeneous mix of tree species planted in the same

⁴⁶ Taupo Native Plant nursery, for example, is New Zealand's largest native plant producer and grows approximately 200,000 plants per year for both private and public projects.

⁴⁷ For more information refer to the company website: <https://www.biocarbonengineering.com>

area, the planting UAV is capable of carrying a mix of seeds and control their planting pattern.

- **Phase 3: Planting** - Fully biodegradable pods, designed to ensure high germination rates and customised to application. The pod degradation time is matched to germination rate and can carry multiple seed types and sizes.
- **Phase 4: Monitoring** - The monitoring phase is very similar in operation to the mapping phase. The UAV gathers similar data several times after planting and monitors the evolution of the site compared to the previous monitoring flight's information recorded.
- **Phase 5: Data Collection** - The data from the monitoring and mapping phases is then crunched by BioCarbon's machine learning algorithms, which analyse the data before the next round of planting.

An examination of BioCarbon's information reveals some interesting value propositions for the NFBS:

1. **Land type:** The primary type of land for the NFBS is highly-erodible hill country land. Planting this land by drone could yield the benefits such as: planting to occur on land without direct road access, planting can take place on logistically challenging landscapes typically unsuitable for manual planting, risk to human life is reduced through use of remote devices.
2. **Precision planting:** Planting practices under the NFBS will have to be tightly defined and managed in order to ensure that payment conditions are met. By utilising drone planting, the Intermediary can ensure a high accuracy planting mechanism that allows for contractual, regulatory or optimum spacing of trees. High resolution aerial mapping provides highly accurate tree crown analysis and health analysis.
3. **Efficient Monitoring:** Low-cost, long-term monitoring by drone ensures ongoing accurate planting site intelligence from the project.
4. **Large-scale planting management:** Multiple drones per site multiplies planting efficiency and increases time/cost savings. Fully automated mapping and planting reduces logistics chain.

New business models will continue to emerge. The authors expect the business landscape to look very different in the next few years. BioCarbon's innovations is a small sample of the broader industry trends. The point of this § is to highlight the opportunity for the Intermediary for engage in other private sector partners to deliver outcomes in a more effective and efficiency way, relative to passive grant making programs currently in place.

3. The Economic Case

Section Purpose

1. The purpose of this section (Economic Case) is to identify the investment option that optimises value for money. Typically, this section should generate a wide-ranging long-list options analysis, initial options Assessment and a preferred way forward.
2. As discussed in §1.7, Mōhio is limited in its ability to accurately assess all the possible options for government to consider. This is primarily because it does not have access to detailed financial information like operational expenses that would determine value-for-money relative to other existing or hypothetical schemes.
3. As such, this section discusses the preferred way forward by detailing two options that the Government could consider for structural design.
4. This section also identifies the scheme's critical success factors – that is, the attributes essential to successful delivery of the project. One of the key success factors is access to available land via different landowner types and motivations for participation in the scheme.

Key Conclusions

1. A proposed structure has been developed in partnership with ANZ Bank New Zealand and is considered appropriate and feasible. A detailed financial model has been prepared which follows the key terms described. Before any Bond structure is finalised, it would also need to be tested with potential investors for attractiveness in the marketplace.
2. The NFBS is not designed to compete for land that is economically profitable for agriculture, horticulture or commercial forestry. The aim of the NFBS is to broaden the land use options available to landowners by making continuous forest more attainable, especially where (a) the land is marginal or minimally productive for agriculture and forestry; or (b) the land is not marginal, but landowners nevertheless plan to convert to continuous forest.
3. This Business Case pursues a rationale that Māori land owners should be a key target market for the NFBS, because any viable scheme of national scale needs to align with the expectations and capabilities of Māori landowners in the first instance. However, other landowners (non-Māori, DOC, etc.) could also participate in the NFBS and would be serviced, resources permitting.
4. Despite indications from Māori landowners that forest sinks are a highly favourable land use choice, observed investment behaviour from this investor class concludes that existing Government schemes are not addressing Māori interests.

3.1. The Preferred Way Forward

The following sections are overviews of potential NFBS structures which the authors consider appropriate and feasible. They are high level drafts which have not yet been reviewed by legal counsel. The intention of this section is to discuss possible approaches to the NFBS structure, which would be confirmed during detailed negotiation with the Contracting Agency and other stakeholders. Finally, before any Bond structure is finalised, it would also need to be tested with potential investors for attractiveness in the marketplace. To this end, option 1 below has been shared with a variety of potential investors for feedback on the general structure. For more information on that feedback, refer to §3.3 on investor engagement.

3.1.1. An Outcome Agreement Provided by the Government – Option 1

This is the recommended structure by the authors, with guidance by ANZ Capital Markets. A detailed financial model has been prepared which follows the key terms described below and is attached as Appendix 2. Note, any words or figures which are present between [brackets] are placeholder text which will form the basis of discussion with the Contracting Agency.

- A [10] year expected maturity bond to be issued by a special purpose vehicle (the “Issuer”). Two classes of bonds will be issued: senior bonds (Class A) and subordinated bonds (Class B).
- The Issuer will enter into an outcome agreement in the Contracting Agency under which it will be required to plant continuous forest to an agreed standard in agreed areas. The Issuer will subcontract all its obligations under the outcome agreement to subcontractors agreed with the Contracting Agency. The Issuer will have the ability to replace the subcontractor for a breach of the subcontract which is not cured within any applicable grace period.
- The amount raised through the issue of bonds will be sufficient to cover the establishment costs of the bond and the project expenses and service interest payments up to the date by which the Government is expected to start making payments under the outcome agreement.
- Under the outcome agreement, the Government will make outcome payments depending on the actual performance of the project. No payments will be made unless minimum agreed performance is achieved.
- The outcome payments will comprise 2 components:
 - A payment per healthy tree which will commence in month [45] and step up as the healthy trees mature and carbon sequestration capacity increases; and
 - A payment per [unit of carbon sequestered] which will commence in month [66].

- The outcome payments will cease in month [120].
- The Government will be entitled to retain the AAUs from planting until month [120]; thereafter the AAU's will become NZU's and revert to the issuer for the benefit of the bondholders.
- The proceeds of the bond and the outcome agreement payments will be deposited into a cash reserve and released periodically to pay agreed expenses in relation to the project including paying interest and scheduled principal payment amounts in respect of the bonds.
- At maturity of the outcome agreement, subject to the bondholders having been fully repaid any surplus balance in the reserve would be released to the Government as a reimbursement of previous outcome payments.
- If the outcome payments are not sufficient to fully repay the bonds, after month [120], the issuer will apply the proceeds of sale of the NZUs until the date by which the bond principal is fully repaid.

3.1.2. An Outtake Agreement Provided by a Contracting Party – Option 2

The NFSB model may attract contracting agencies other than the Crown. The following is an example of an alternative structure where an investment grade rated company becomes the contracting agency. The key terms of the structure are as follows:

- The issuer will enter into a long-term outtake agreement with a party (or parties) [with at least investment grade ratings] to purchase an agreed quantity of NZUs for agreed prices over a specified term (the “NZU Purchaser”);
- The issuer will subcontract its obligations under the outtake agreement to plant trees to a specified standard to an agreed subcontractor for an agreed project cost and fees. The performance of the subcontractor would be measured periodically, and the issuer would have the ability to replace the subcontractor if there was any breach of the subcontract which was not cured within an agreed timeframe;
- One class (or multiple classes) of bonds would be issued [with ratings equivalent to ratings of the relevant parties under the outtake agreement];
- The issue amount of the bonds would equal the net present value of sufficient future payments under the outtake agreement discounted at the minimum rate required to cover the interest on the bonds and the other expenses of the Issuer (excluding the costs of the project) to cover the costs of the project (excluding the bond servicing costs);

- The amount raised under bonds would be held on deposit with a bank with a short-term rating equivalent to the highest rating under the bonds and could only be released to pay agreed project expenses;
- The Issuer would apply the outtake agreement payments to pay interest on the bonds and repay principal according to a principal amortisation schedule and pay other agreed expenses;
- If the NZU Purchaser defaulted under the outtake agreement, the issuer would have the ability to enter into another outtake agreement with a similarly rated party during an agreed timeframe or would be able to sell the NZUs to another party or would be able to sell the trees;
- The term of the bonds would equal the shorter of the term of the outtake agreement and the date by which the bonds were fully repaid.

3.2. Market Analysis: Landowners

The NFBS is not designed to compete for land that is economically profitable for agriculture, horticulture or commercial forestry. The aim of the NFBS is to broaden the land use options available to landowners by making continuous native forest more attainable, especially where (a) the land is marginal or minimally productive for agriculture and forestry or (b) the land is not marginal, but landowners nevertheless plan to convert to continuous forest.

3.2.1. Opportunity

As discussed earlier in §1.6, an active government objective for existing afforestation programmes, such as the AGS, is to establish forest on ~1.1 million hectares of pastoral land at moderate to extreme risk of erosion.

Depending on the severity of the erosion, this scale of target land can be revised to a greater or lesser scale. A recent analysis by Landcare Research for MPI, using the New Zealand Land Cover Database (LCDB) from the 2012/2013 period, identified the scale of suitable land for afforestation that suffers from severe to extreme erosion at 695,566 hectares. Moderate to extreme erosion was 1.131 million hectares. Slight to extreme erosion was 2.923 million hectares.⁴⁸

The removal of native forest throughout New Zealand, cleared for farming and timber, has resulted in increased erosion rates. According to Basher, “Erosion rates in New Zealand are very high by

⁴⁸ Walsh et al. 2017. “Valuing the Benefits of Forests: Final Report”, Report Prepared for the Ministry for Primary Industries. Wellington: Ministry for Primary Industries.

world standards, with about 200 megatonnes of soil delivered to the ocean each year”.⁴⁹ Many parts of the country are prone to mass movement soil erosion (i.e., extreme landslip, tunnel gully, gully, and earth-flow forms of soil erosion), but the impacts of erosion (flooding and sedimentation) in the Gisborne region are considered greater than in other areas of New Zealand, particularly for the southern part of the region, the Waipoa catchment. Other regions that have erosion-prone hill country include Waikato, Bay of Plenty, Hawke’s Bay, Taranaki, Manawatū–Wanganui, Wellington, Tasman, and Marlborough.

3.2.2. Structure

The intended market for the NFBS application can be generally characterised by three main landowner groups. (a) Department of Conservation (DOC) Estate, (b) Private Landowners (non-Māori), and (c) Private Māori Landowners. The exact breakdown of erosion-prone land by ownership type is not well known and requires more research. However, a 2008 report by Landcare Research⁵⁰ found that most land which would benefit from natural regeneration – and therefore also be target land for the NFBS – is in private ownership.

Each of these landowner groups face a lack of upfront capital to establish continuous forest on their land as existing funding sources are insufficient to cover the scale of required application. Below are fictional vignettes which represent the interests of potential participants in the NFBS:

Department of Conservation (DOC) Estate: A Craigieburn Valley DOC estate block in the Canterbury high country has recently been cleared of wilding conifers. DOC now wishes to establish continuous beech forest on that site to prevent the wilding conifers from taking hold again, at significant cost to the Government. Due to budget restrictions, DOC has limited upfront financial and human resources to execute the task, but the longer they leave the site unforested, the greater the chance of invasive, exotic species taking hold.

Private Landowners (non-Māori): A Manawatū sheep farming family who recognise that large blocks of their erosion prone land should be retired, following the damage caused by the 2015 storm. However they want forest conversion to occur more rapidly than by natural regeneration, so to generate carbon credits within their lifetimes. They are time-poor as well as cash-poor, their wealth tied up in the family farm, so they would need upfront capital to activate afforestation. Their applications to other funds, such as local council erosion control funds or QEII covenants, haven’t been successful.

Private Māori Landowners: A Māori land trust on the East Coast that wants to replace old plantation forest land (cleared and free of carbon liabilities) with continuous native forest, to be managed as

⁴⁹ Basher L R, 2013. “Erosion processes and their control in New Zealand”. In Dymond JR ed. *Ecosystem services in New Zealand – conditions and trends*. Manaaki Whenua Press: Lincoln, New Zealand, p.363.

⁵⁰ Shepherd et al. 2008. Note, according to Motu the estimates for the amount of land that is the least productive, and thus the most likely to respond to a carbon price, need to be redone.

a continuous cover forestry regime in line with kaitiakitanga values. However the trust lacks the upfront capital to establish native forest, and also prefers not to enter into a covenant with the Crown, two reasons that weigh against the Permanent Forest Sink Initiative. The trust is also keen to trial out transitional regimes which strike the best balance between timber and carbon revenue with a long-term plan for native conversion.

3.2.3. Target Landowner & Outlook

This Business Case pursues a rationale that Māori landowners should be the priority market for the NFBS. This is not to exclude other landowners (i.e. DOC and non-Māori) from the target market, but it is to recognise that any scalable mechanism for establishing native forest on erosion-prone land needs to accurately meet Māori landowner interests as one of the key sources of potential land for the scheme. This Business Case recognises that there exist other non-Māori landowners who could participate in the NFBS and should be identified during a through landowner pipeline analysis.

Of the 1.1 million hectares of erosion-prone land or Target Addressable Market (TAM), 600,000 hectares is in Māori land ownership and was not forest land in 1990 and is therefore eligible under the ETS forest definition to generate carbon credits. Of this 600,000 hectares, 56% or 336,000 hectares is owned by 6051 Māori Land Trusts. Of the 6051 Māori Land Trusts, 6303 blocks are owned by two types of trusts: Ahu Whenua Trusts and 108 Whanau Trusts, respectively.⁵¹

Ahu Whenua Trusts, under the Te Ture Whenua Act (1993) encourage the formation of incorporations, where shareholders remain owners, while day-to-day management activities remain in the hands of an elected committee of management or of a Māori trustee. The Māori trustee is therefore given either legal responsibility to look after assets and liabilities for the benefit of the owner, or “equitable obligation”— the trustee manages the land on behalf of the Māori landowners.

Te Tumu Paeroa, led by the Māori Trustee, manages \$100 million of client funds and administers 100 Māori Land Trusts that oversee 100,000 hectares of land representing 7% of total Māori land throughout New Zealand.

The role of Te Tumu Paeroa, is to support land owners in protecting and enhancing their land. The role is governed by the Māori Trustee Act 1953. Te Tumu Paeroa is independent of the Crown and is accountable to landowners and the Māori Land Court. The Māori Trustee is also responsible for:

⁵¹ Climate change business opportunities for Māori land and Māori organisations, MPI Technical Paper No: 2012/43, Ministry for Primary Industries

- investing trust monies;
- collecting and paying rent and other income to owners;
- keeping landowners informed about how their land is managed.

By collaborating with this specific type of landowner, potentially with Te Tumu Paeroa, a pilot programme would have three key advantages versus alternate land ownership:

- A consistent legal structure for scalable solution across different individual owners;
- An investment manager providing a single entry point;
- Over 106,000 hectares of immediately addressable land;
- Motivated participants who also seek the contracted outcome (and regeneration) and non-contracted outcomes (whanau employment, improved water, improved biodiversity) in NFBS management objectives;
- A target market that exceeds capital requirements of \$2 billion allowing cost of capital efficiency.

3.2.4. Landowner Mind-sets & Behaviours

With many settlements complete or in process, many Māori landowners have been concerned with establishing acceptable forms of governance structures to receive and manage a settlement on behalf of iwi members after the settlement is ratified by the iwi. Until this is done, Trustees may be wary of approving any investment initiatives, particularly novel schemes such as the NFBS initiative.

However, when concerning forest investments specifically, a 2012 survey⁵² of Māori landowners by Ministry for Primary Industries (MPI) found that Māori landowners displayed the following positive market characteristics:

- Forestry sinks ranked #1 in investment priority against 17 alternatives;
- A high degree of awareness of climate-aligned forestry investment opportunities;
- A high need for certainty on the investment opportunity and policy direction;
- A high need for autonomy and flexibility of land use change.

In addition to a high preference for climate-aligned forestry investments, the owners also identified the following Critical Success Factors (CSFs), which if present in a scheme, would contribute to positive uptake of the program. The CSFs included:

- A low degree of uncertainty;

⁵² Landcare Research & 37 Degrees South Aotearoa, 2010. "Climate change business opportunities for Māori land and Māori organisations", MPI Technical Paper No: 2012/43, Ministry for Primary Industries. Wellington: NZ Government.

- A high degree of iwi/hapū buy-in;
- A high degree of Government and industry backing.

Other success factors for climate-aligned investments included:

- An incorporation of Māori values, philosophy and aspirations;
- Consistency across other policies, including the Emissions Trading Scheme;
- A preference for Māori as key beneficiaries and scheme promoters.

Despite indications from Māori landowners that forest sink investment opportunities are a highly preferable, observed investment behaviour from this investor class concludes that existing Government schemes are not addressing Māori interests.⁵³ These factors may include misalignment with Māori governance structures (e.g., Ahu Whenua Trusts, Māori Trustee), Māori aspirations on control and ownership, appropriate models for kawenata (covenants), customary use, perpetuity, and Māori economic development.

3.3. Market Analysis: Investors

Given that the NFBS is a pioneering financial instrument in New Zealand, it is imperative that potential investors are engaged throughout the development process. Positive feedback, concerns, investor preference, mandate, indications of interest should all be understood at the beginning of the process. By incorporating investors into the development process, the project team will significantly reduce the risk that investor needs are not met or that investor expectations are misaligned with the needs of the Government. For this reason, as soon as a general structure, financial model and key commercial terms can be agreed as something the Government would guarantee “in principle”, that information should be shared with potential investors and interested parties be engaged in a meaningful way so that their wishes are properly understood, and any feedback incorporated into future revisions. Investor willingness to purchase the Bond is also likely to de-risk the project for the Government as investors will bring an extra layer of project due diligence to the investment case, as well as ongoing investment management and monitoring that private sector investors will provide.

It is important to recognise the fungible nature of this investment vehicle, insofar as it will compete with other social and financial investment opportunities in the New Zealand market. Impact investors will be actively assessing the risk/return profile of a range of opportunities at any one time. If the intended positive outcomes are too difficult to assess or there exists no clear intervention logic between investment and outcome, and the corresponding expected return is

⁵³ Landcare Research & 37 Degrees South Aotearoa, 2010. “Climate change business opportunities for Māori land and Māori organisations”, MPI Technical Paper No: 2012/43, Ministry for Primary Industries. Wellington: NZ Government.

not representative of the risk involved, then closing the investment round will be difficult (leading to the entire scheme to fall over).

3.3.1. Domestic Investors

The year 2017 was an exciting year for impact investment in New Zealand. The investment landscape has progressed dramatically over the preceding six months, signalling an increased level of awareness and education about the merits and disadvantages of impact investment. Some notable progressions in the domestic market include the successful first close (NZ\$8 million) of the NZ\$10-15 million Impact Enterprise Fund in December 2017, the establishment of a National Advisory Board for Impact Investment in December 2017, and the launch of the Impact Investment Network, an initiative led by Ākina Foundation and launched at the end of the Social Enterprise World Forum in September 2017 with over 200 members.

Prior to the NFBS being launched, a market testing and building exercise will need be undertaken to ensure that investors have sufficient understanding, interest and expertise to invest in the Bond. The authors anticipate that the launch of the three aforementioned initiatives will significantly reduce the engagement process timeline and dissemination of programme material.

Ultimately, whether the NFBS is attractive to investors depends fundamentally on the rate of return that it will generate, relative to the perceived risk in the project and as compared with other investments in the market at the time. This Business Case does not set out to determine the rate of return, or even a range of returns which could be available to investors. This is because rates of return should be developed in partnership with the Contracting Agency, once the value of the scheme has been agreed and the Contracting Agency can formulate a view about what it is willing to pay for that value. However, this Business Case can, and has, gathered a view from various investors on the overall attractiveness of the proposition versus other impact investment opportunities currently available in New Zealand.

To that end, the authors have completed some preliminary marketing sounding to validate the Scheme's core value proposition with impact-orientated investors. In general, the feedback has been largely positive, with each investor expressing an interest to learn more about the concept as more details develop. Investors have been quick to recognise that the link between outcomes measured and outcome payments by the Government are relatively tight. In other words, the contracted outcomes (stems planted per hectare etc.) are relatively easy to measure. Therefore, the likelihood of the scheme securing appropriate commercial and financial terms and conditions for the Government, Intermediary and Investors to contract on is potentially easier than, say, interventions in the social sector (where positive social outcomes are harder to measure and the timeline to success is longer).

The authors would like to thank the following investors and investment advisors for their feedback on the model and continued enthusiasm to progress the concept:

Table 8: Domestic and International Investment Feedback.

Name	Title	Organisation	Role
Product Development & Distribution (National & International)			
Dean Spicer	Head	ANZ Capital Markets	Development
Mike Faville	Head	BNZ Capital Markets	Development
Dr Richard Yao	Economist	Scion Research	Development
Simon Ngawhika	Senior Consultant	EY - Ernst & Young	Development
Craig Patrick	CEO	JBWere	Distribution (NZ)
Charlotte Kaiser	Managing Director	NatureVest	Distribution (Global)
Impact Investors			
John McCarthy	Manager	The Tindall Foundation	Foundation
Bill Kermode	CEO	Next Foundation	Foundation
Derek Handley	Founder & Partner	Aera Venture Capital	Fund
David Woods	Chairman	Impact Enterprise Fund	Fund
Sam Morgan	Founder	Jasmine Social Investments	Family Office
Pablo Sosa	Portfolio Manager	New Zealand Super Fund	Fund
Jamie Newth	CEO	Soul Capital	Fund
Carl Vink	Investment Strategy	Wilberforce Foundation	Foundation
Dave Allison	Investment Manager	Ākina Foundation	Foundation
Media, Events and Presentations			
Jamie Morton	Science Reporter	NZ Herald	Media
Kathryn Ryan	Journalist	Radio NZ	Media
Scion	Forest economists	Scion Research	Seminar
IIN	Investors	Impact Investment Network	Seminar

4. The Financial Case

Section Purpose

1. The purpose of this section (Financial Case) is to determine the cost and revenue implications of the preferred option and to plan for funding requirements, including driving value from existing finances.
2. The Financial Case focuses on the affordability and funding implications of the proposal for the Government. It also considers the risks and uncertainties that could affect the affordability of the project.
3. This section also describes in detail the various sections of the NFBS's proposed financial model, developed in partnership with Mōhio's commercial banking partner, ANZ Bank New Zealand. The purpose is not to communicate the exact return on investment for Government, but to discuss the various elements of how the model could be structured.
4. The pay-for-performance contracts that underpin the NFBS model are a new and innovative way for Government to contract for environmental outcomes, yet nevertheless consistent with Treasury's long-standing work on contracting for outcomes. This section provides further detail on these potential payment mechanisms with regards to payment type, timing and key milestones that would trigger payment.

Key Conclusions

1. Because the NFBS pilot will sit under and work toward the Billion Trees Programme, it is important that the pilot is developed in partnership with the Contracting Agency. This will maximise the outcomes for the Government, while highlighting areas of cost reduction.
2. The key cost components to the Government are administrative costs and transactional costs. Administrative costs could total NZ\$1 million for development of the NFBS from pilot to launch (Government project team, advisors, consultants, legal and financial services). For transactional costs, it is anticipated that an "in principle" amount of funding could be allocated at several million in order to achieve a large enough scale, and to attract experienced bidders for the contract delivery, then to raise the investment capital to achieve the contracted outcomes.
3. Once a Project Team has been established within the Contracting Agency to advance a pilot, the Project Team ought to have access to internal information from the Social Bonds pilot programme, which will help the Business Case to generate more accurate cost estimates.

4.1. The Financial Costing Model

4.1.1. Financial costing approach

There is some uncertainty with determining the precise costs to the Government at this stage. This is due to three factors:

- Because any NFBS pilot would likely sit with the Billion Trees Programme, it is important that the pilot is developed in partnership with the relevant Contracting Agency, so as to maximise the outcomes for the Government while highlighting areas of cost reduction. As such, the final features of the NFBS will likely look moderately different from that which is proposed in this Business Case, and that final form will impact the final costs and accounting treatment.
- Under the NFBS structure, the Government pays for environmental outcomes in contrast to outputs or services delivered. However, the Government will have to pay some interim payments to the outcome provider in order to provide cash flow to the outcome provider during the course of the outcome delivery. The proposed payment structure set out in §4.3 indicates that the largest payment will be weighted toward the final payment (consistent with the achieved outcome milestone. However, the precise timing and amount of these interim payments, final payment and weighting are to be determined in negotiation with the Government, and therefore are difficult to confirm in this section.
- This Business Case does not have access to cost information for the fixed operations costs for the Government (overheads, administration, advisors etc.). Therefore, it is difficult to determine precisely what that cost structure looks like at this time. Once a Project Team has been established within the Contracting Agency, this team will have access to internal information from the past social impact bond pilots, which will help the Business Case land on more accurate numbers.

That said, this Business Case does have access to past documents created for Ministry of Health's Social Bonds pilot programme with indicated numbers and timelines.⁵⁴ Where available, it will cross reference this data to provide accurate estimates of the cost to Government for administering the NFBS pilot.

⁵⁴ See KPMG, 2013. *Social Impact Bonds: Business Case for the Ministry of Health*; Treasury, 2016. *Social Bonds Pilot Procurement: Lessons Learned, Review*, 23 September 2016; The Treasury Social Bonds Information Release Document November 2016: <www.treasury.govt.nz/publications/informationreleases/socialbonds>; The Treasury Social Bonds Information Release Document April 2017: <www.treasury.govt.nz/publications/informationreleases/socialbonds>; The Treasury Social Bonds Information Release Document April 2017 <www.treasury.govt.nz/publications/informationreleases/socialbonds>

The key cost components to the Government are as follows:

Administrative Costs: These costs include fixed costs which will be incurred by the Contracting Agency to co-develop, procure and manage the pilot to launch (Government project team, advisors, consultants, legal and financial services). Administrative costs will be incurred during the project start and procurement phase. They should be able to be estimated with a high degree of accuracy before approval by Cabinet is sought. An illustration of the estimated costs is provided in Figure 9 below. While the costs of these activities are likely to be substantial, given the early-stage of the concept, it is worth noting that Government can leverage learnings from the Social Bonds programme to help reduce process management costs; and because the NFBS relies upon existing frameworks for environmental monitoring and evaluation, the costs of undertaking this design is likely to be much less than in the social impact space.

Transactional Costs: These costs relate to the performance-based payments, size and timing. Because the Contracting Agency will not be approaching the market with a detailed project plan for service delivery, there will need to be an in-principle amount of funding allocated to the Intermediary so that the market can respond with concepts to be jointly developed with the Contracting Agency. The nature of the pilot is to test whether the NFBS concept works for driving more effective and efficient outcomes, rather than large-scale environmental change. Also, the market for raising this type of capital is not yet tested. Therefore, it is anticipated that an in-principle amount of funding could be allocated at several million in order to achieve a large enough scale and experienced bidders for the contract delivery, and then raise the investment capital to achieve the contracted outcomes.

Figure 9: Administrative Costs to the NZ Government⁵⁵

Administrative Costs to Government					
	FTE	Unit Cost (000s)	Months	Unit Cost/Month (000s)	Total Cost (000's)
COST TYPE					
Pilot Development					
Project Manager	0.5	\$ 130	6	\$ 11	\$ 33
Associate	1	\$ 80	6	\$ 7	\$ 40
Analyst	1	\$ 65	6	\$ 5	\$ 33
Procurement Period					
Project Manager	1	\$ 130	12	\$ 11	\$ 130
Associate	1	\$ 80	12	\$ 7	\$ 80
Analyst	1	\$ 65	12	\$ 5	\$ 65
Legal Advisors	-	-	-	-	\$ 200
Commercial Advisors	-	-	-	-	\$ 200
Strategy Advisors (Intervention logic)	-	-	-	-	\$ 50
Service Delivery Advisors	-	-	-	-	\$ 50
Operation Period (5 years)					
Service Delivery Manager	1	\$ 130	12	\$ 11	\$ 130
Pilot Evaluation (Consultant)	1	-	-	-	\$ 40
Total Transaction Costs					\$ 1,050.00

In collaboration with ANZ Bank New Zealand, a draft financial model (refer to Appendix 2) has been prepared. The model sets out the overall structure for the Bond. This structure follows the description which is explained in detail in §4.2 below. The purpose of this section is not to communicate the value proposition to the Government, as the total costs will be determined during the co-development stage once a Project Team within the Contracting Agency has been assigned to pursue the NFBS. In the meantime, we describe the main sections of the model so as to form the basis for a proposed structure, and future discussions.

⁵⁵ Inputs to Figure 9 are drawn from cost estimates within Social Bonds, Business Case for Ministry of Health, 8 July 2013 KPMG. That report estimated \$2 million in set up costs for the Social Impact Bond pilot, comprising of 4 pilot bonds. The authors estimate that costs will be significantly less than this as (a) process learnings are available from the social impact bond program which will speed this process and (b) forest outcomes are easier to evaluate and measure meaning pilot design, bond pricing and contract negotiations will take less time.

4.2. Assumptions

The assumptions tab in the financial model details the key inputs that are relevant for consideration.

4.2.1. Reforestation Project Assumptions

The first section between cells D15 to D161 'Reforestation Project Assumptions' assumes that the pilot will include up to 5 planting locations. The exact location, size and planting plans for each site will be developed in partnership with the Contracting Agency (and potentially other supporting Agencies) to ensure that the site meet testing requirements for all stakeholders. What is outlined in this section forms a framework for how each planting site would be costed taking into account key information like Project Development and establishment costs, the method of planting, operational costs, monitoring and evaluation costs, contracted outcomes and non-contracted KPIs, and finally a schedule of events in which each task (and corresponding cost) will take place. The framework has been derived from a number of different sources⁵⁶ and aims to present a comprehensive view of all costs considered in a planting site.

4.2.2. Bond Assumptions

Beginning at cell U148, the key inputs for the bond are summarised. This section assumes that the bond will be offered in two distinct classes: Class A senior bonds are Class B subordinated bonds. If the Intermediary achieves the target outcomes, the payments under the outcome agreement will be sufficient for both Class A and Class B bondholders to receive their full interest and principal on a timely basis. If the targets under the outcome agreement are not achieved, payments under the outcome agreement will be lower or will not be made. As payments received by the Intermediary will be applied to pay Class A bondholder interest and principal in priority to Class B bondholders, Class B bondholders bear a higher risk and consequently require a higher rate of interest. In order to reflect this increased risk, holders of Class B notes are paid a higher interest rate than holders of Class A notes. This section also assumes a three-tiered pay-out structure, whereby holders of both Classes of notes are paid out a different interest rate depending on the overall success of the project. This means that the overall pilot, which includes different planting sites, can have a variable levels of planting success but the investors will not face the risk of losing all their money. Note that the exact level of interest paid (or coupon rate) for achieving each payment tier will be determined in consultation with both the Contracting Agency and the potential investors.

⁵⁶ In particular, Davis et al. 2009. "Establishing indigenous forest on erosion-prone grassland: land areas, establishment methods, costs and carbon benefits", June 2009. Rotorua: Scion.

4.2.3. Sensitivity Analysis

Beginning at cell B201 is a sensitivity analysis which various positive and negative scenarios from the Base Case scenario. This section is helpful to the Contracting Agency for determining the effect that escalating carbon prices or different planting success rates will have on the model, including payment amounts and net benefits accruing to the Government.

4.2.4. Carbon Table

The figures set out in Carbon Table tab form the basis of the key contracted outcome which the Intermediary has undertaken to achieve. That being, to establish carbon sinks across New Zealand. The information in the tables inform of the financial model to determine the amount of carbon sequestered per hectare (carbon stock) which would “accrue” as a benefit to the Government. The information flows through to the Assumptions tab in cell E95 and is determined by the Type of forest which is selected by clicking on that cell and selecting forest type from the drop-down menu. The information is derived from MPI’s 2017 *ETS Carbon Look-Up Tables*. The *Look-Up Tables* are for estimating carbon yield for forests under 100 hectares. For forests which are larger than 100 hectares, the MPI Field Management Approach (FMA) is used to calculate carbon stock. Motu notes that both sources of data points are relatively consistent and that while the default *Look-Up Tables* could be improved, there was not an urgent need to do so at this time.⁵⁷

4.2.5. Bond Pro-Forma

A pro-forma financial calculation looks at present and projected figures. In this case, the tab serves to forecast the anticipated results of the bond issuance, with emphasis on net revenues and cash flows. It indicates the projected status of the Intermediary in the future based on current financial assumptions. The majority of the information presented on this tab is drawing from the Assumptions Tab. However, there are inputs to be considered from cell C47 ‘Structured Amortisation Profile’ which determines the timing and amount of each principal payment to the Investors, as well as a cash reserve held back to fund future expenses.

4.2.6. Projects Tabs 1-5

The project tabs 1-5 model the total project costs (cash outflows), total projects cash flows and project implied return on investment (IRR). There are no assumptions inputs on this page. All information is drawing from the assumptions page and should not be adjusted here.

⁵⁷ Thomas Carver and Suzi Kerr, 2017. “Facilitating Carbon Offsets from Native Forests”, Motu Working Paper 17-01, April 2017. Wellington: Motu Economic and Public Policy Research.

4.2.7. Government Payments and Benefits

This section will be the most relevant from the Contracting Agencies perspective as it sets out the payment schedule to the Intermediary for achieving contracted targets. It also projects the aggregate net benefit to the Government. The net benefit to the Government being total project avoided costs and cash proceeds (adjusted for inflation) minus total outcome payments (adjusted for inflation). Cell O72 summarises the net present value (NPV) of future net benefits to the Government in exchange for funding the scheme. All of this information is summarised again on the Summary Tab cells E133–137.

4.3. Potential Payment Mechanisms

The payment mechanism is the formula against which payment for the contracted services will be made. The underlying aim of the payment mechanism and pricing structure is to reflect the optimum balance between risk and return in each contract. As a general principle, the approach should be to relate the payment to the delivery of service outputs and the performance of the supplier.

The NFBS relies upon pay-for-performance contracts whereby payment is triggered solely by the successful measurement of agreed-upon outcomes. This is an example of outcome-based contracting, which involves contracting for, and paying for, achievement of a social and/or environmental outcome. In this model, Government pulls back from specifying *how* a service will be delivered or the key inputs required for that delivery and focuses on the final outcome. The benefit of selecting forest sinks and carbon as the outcome is that there exist clear project milestones which can be easily tied to payment. Moving to a contract which manages, and rewards outcomes involves a reallocation of project-level risk away from Government, because Government can defer final payment until the outcome is measured.

4.3.1. Payment Type – Interim Payment on Key Milestones

It is proposed that the payment mechanism is interim payments, made by the Contracting Agency, based on achievement of interim milestones of outcome success. This provides the Contracting Agency with a level of certainty that the Intermediary is achieving milestones which are very likely to create the final outcome (carbon sequestration).

This payment type is consistent with commercial principles in that (1) the Government has a reduced risk of failure; (2) the Government assumes some role as guarantor of the outcome which reduces the risk for the Intermediary and therefore makes it more likely that the Intermediary can raise capital; and (3) reduces the working capital requirements of the Intermediary, thereby also increasing the chance of successfully raising external capital and increasing the amount of capital that can be deployed towards efficient outcome realisation. Note that this payment type is proposed for the pilot project and can be reconsidered at a later stage should the pilot prove

successful.

4.3.2. Interim Payment Details

- Total funding available from Contracting Agency is agreed during contract negotiation.
- Payment triggers, distribution timing & weighting is agreed during contract negotiation.
- The majority of the payment (20% weighting) will relate to the final outcome.
- The measures and sources of supporting data will be agreed during contract negotiation.

4.3.3. Interim Milestones and Weightings

On successful achievement of each interim milestone, or the final outcome the Intermediary will issue an invoice to the Contracting Agency for the agreed sum, with the associated GST and supporting documentation. The proposed interim milestones are the following:

- Number of trees planted.
- Observed loss of stems during evaluation period.
- Tonnes of carbon per hectare per year in planted forest.
- Carbon credits (NZUs/AAUs) generated each year.

For more information on the payment triggers, refer to §1.4 on the Monitoring and Evaluation Framework.

5. The Management Case

Section Purpose

1. The purpose of this section (Management Case) is to develop the project management strategy, framework and plans to ensure successful delivery of the investment.
2. This section demonstrates that the project management methodology is suitable for this proposal. It includes a project governance diagram to illustrate the key governance bodies together with their role and membership.
3. This section outlines the project structure and plan, including the points at which progress will be monitored, controlled and reviewed.

Key Conclusions

1. The NFBS is an eminently feasible solution to financing an effective and efficient large-scale afforestation programme that targets New Zealand's most vulnerable and often remote land. Because significant contextual and background work has already been completed, it is estimated that a pilot could begin planting by Winter/Spring 2019.
2. The first, and potentially most critical step, is to nominate the definitive owner of the Scheme within Government. This owner may be different from the ultimate Contracting Agency, as outlined in the NFBS overview model.
3. Once a Project Team has been recruited within the Contracting Agency, the roles and responsibilities between the Contracting Agency and Treasury should be well defined and formally agreed.
4. Generally, feedback from investors should (and has been) included in all aspects of the pilot design and procurement process. This is to ensure that the Project Team understands what potential issues or concerns investors might have about the NFBS's structure (key commercial terms, risk allocation, financial return, etc.).
5. The Management Case confirms that the proposal is achievable and details the arrangements needed to both ensure successful delivery and to manage project risks.

5.1. Project Management Planning

The NFBS is an eminently feasible solution to financing an effective and efficient mass afforestation programme in New Zealand. Based on information available, the proposed timeline for implementation is represented below in Figure 9. As significant contextual and background

work has already been completed, it is estimated that a pilot could begin planting by Winter/Spring 2019.

The first, and potentially most critical step, is to nominate the definitive owner of the NFBS within Government. This owner may be different from the ultimate Contracting Agency, as outlined in the NFBS overview model. It is likely that the Contracting Agency is the ultimate owner of the environmental outcomes intended to be produced by the scheme. However, it could also be the agency that brings commercial advice to the programme. Noted in the Treasury review of the New Zealand's first cohort of social bonds, the most critical recommendation for future "impact bond" programmes is to embed sound commercial advice into the process. Thus, it may be logical that the owner of such bonds is Treasury. As the review notes: "Treasury will provide assurance that commercial advice to the programme is sufficient, with Commercial Operations to be the lead contact within Treasury and part of the negotiating team. The delegations within Treasury have been made clearer with the Commercial Advice Team becoming the Treasury lead for social bonds, and the Fiscal and State Sector Management Team providing policy and Vote support."⁵⁸

The second step is to select and recruit senior level Steering Group for the Environmental Impact Bond programme and ensure that its high priority is well communicated within relevant Government Agencies. Membership to the Steering Group should be at least Tier 2 managers or above. Membership to the Environmental Impact Bonds Steering Group should explicitly include the agencies from the environmental sector that could potentially inherit the management of the contracts for pilot programs. The agencies that could be represented in the Steering Group are: Ministry for the Environment, Ministry for Primary Industries, Ministry of Business, Innovation and Employment, Department of Conservation, Environmental Protection Authority, Te Puni Kōkiri, and the Parliamentary Commissioner for the Environment.

The Steering Group is charged with providing oversight, guidance and advice to the Project Team within the Contracting Agency. The Group would meet as required, regarding any key milestones that might be occurring, and bi-monthly at a minimum.

Generally, feedback from impact investors should be included in all aspects of the pilot design and procurement process. This is to ensure that the Project Team understands what potential issues or concerns investors might have about the NFBS structure (key commercial terms, risk allocation and financial return, etc.).

Once a Project Team has been recruited within the Contracting Agency, the roles and responsibilities between the Contracting Agency and Treasury should be well defined and formally agreed. A Memorandum of Understanding signed between Treasury and the Contracting Agency should clarify that (a) the Contracting Agency is responsible for delivery of the pilot programme and (b) Treasury will provide assurance that commercial advice to the programme is sufficient and

⁵⁸ NZ Treasury, 2016. "Social Bonds Pilot Procurement: Lessons Learned Review", Release Document, p.8. retrieved from: <https://treasury.govt.nz/sites/default/files/2016-11/sb-3580541.pdf>

is responsible for broader policy work on social bonds. In the social impact bond program, the roles and responsibilities of the agencies were clarified in a Memorandum of Understanding as follows:⁵⁹

Table 9: Roles and Responsibilities Between the Contracting Agency and Treasury.

Contracting Agency	Treasury
<ul style="list-style-type: none"> ▪ Delivery of a robust and fair pilot procurement process ▪ Leading negotiations and communications on pilot. ▪ Managing consultants and expert advice as required. ▪ Documenting lessons learned and preparing an evaluation at the conclusion of the pilot. ▪ Day-to-day management of the programme, including Official Information Requests (OIA) requests, parliamentary questions and media. ▪ Ensuring that Ministers are sent regular updates on the progress of the pilot program. 	<ul style="list-style-type: none"> ▪ Provide assurance that commercial advice to the programme is sufficient, through a high level of commercial advice to the programme. ▪ The Commercial Operations team are to be the lead contact within Treasury, and to be part of the negotiating team. ▪ Provide broader policy advice on the future of the Environmental Impact Bond model in New Zealand, as well as emerging policy and vote issues (as they arise). ▪ Provide input into the Schemes consistency with other complimentary policy instruments that Treasury is pursuing or managing (The Green Investment Fund, for example).

⁵⁹ NZ Treasury, 2016. "Social Bonds Pilot Procurement: Lessons Learned Review", Release Document, p.11.

Figure 10: Implementation Plan for Native Forest Bond Scheme



6. Frequently Asked Questions

What is the Native Forest Bond Scheme (NFBS)?

- The NFBS adopts the financing structure of an Environmental Impact Bond (EIB). It is an innovative financial solution applied to the problem of establishing large-scale continuous native forestry in Aotearoa New Zealand.

What is an Environmental Impact Bond (EIB)?

- An EIB is a financial instrument that pays a return based on the achievement of agreed environmental outcomes.
- Private investors provide upfront capital to cover the cost of delivering a service to achieve a particular environmental outcome.
- Achievement of this outcome should reduce the need for, and therefore government spending, on future services or liabilities.
- Part of the resulting public-sector savings are then used to repay investors' principal investment and provide a financial return. The repayment of the principal and the level of return is performance-based, which means it depends on how much outcomes have improved.

Why would the New Zealand Government consider implementing EIBs?

- The New Zealand Government, as a responsible manager of public funds, is continually searching for ways to increase public value by delivering social and/or environmental services in an effective and timely manner
- EIBs can encourage innovation in payment structures and service delivery and provide service providers with the opportunity to develop holistic programs that have more impact in the longer term.
- Accountability and transparency are potentially improved by defining the impact model, measuring outcomes, and ensuring that there is clarity about what exactly public funding is achieving.

How do EIBs fit into the broader global investment agenda?

- The world is currently working toward a set of ambitious targets for addressing global challenges—Sustainable Development Goals (SDGs) and the Paris Climate Agreement. The cost of implementing these agreements, however, are enormous.

- Over the next decade, the United Nations⁶⁰ estimates that implementing the SDGs will cost between \$50 trillion and \$70 trillion; the Paris Climate Agreement will cost over \$12 trillion over 25 years. Private capital is urgently needed in order to fill this gap and address pressing global challenges.
- To attract more private capital, governments and the private sector are pursuing innovative finance solutions, especially the use of blended financing mechanisms to mobilise private sector capital in new and more efficient and scalable ways to solve social, economic, and environmental problems globally.
- EIBs are an example of an innovative financial solution and could be a useful way to tackle some of the most difficult problems that are faced by governments by allowing service providers to explore new approaches to achieve the environmental outcomes agreed with government.

Are EIBs being used in other jurisdictions?

- We are entering new territory. Globally, one EIB has successfully launched.
- In September 2016, the District of Columbia Water and Sewer Authority (DC Water) raised \$25 million from institutional investors Goldman Sachs Urban Investment Group and Calvert Foundation to finance the construction of green infrastructure projects that will reduce the volume of storm water runoff entering the sewer system, thereby reducing combined sewer overflow events.
- We know of five other EIBs that are in the concept phase: the Forest Resilience Bond being led by Blue Forest Conservation; the three EIBs being led by Quantified Ventures in Louisiana, Atlanta and Baltimore; and the Sustainable Land Bond being led by The Nature Conservancy for developing countries.
- An EIB is an adaptation of the Social Impact Bond (SIBs) to environmental outcomes. There are over 80 SIBs globally at last count with a number at various stages of development and implementation. Many SIBs have been implemented in the United Kingdom and the United States in particular. Social sector investment themes include criminal justice, employment, social welfare and education.

Why use an EIB structure over a payment-for-result contract?

- The EIB structure provides not-for-profit agencies with upfront capital, and incentives to better manage efficiencies.
- Most environmental service providers do not have the financial capacity to deliver services, wait several years for performance to be assessed, and only then receive

⁶⁰ UN Conference on Trade and Development (UNCTAD), 2014. *Investing in the SDGs: An Action Plan*, World Investment Report.

repayment for the services that were delivered. And most are not positioned to absorb the risk associated with a large portion of reimbursement being based on performance.

- An EIB allows innovation in environmental intervention design to be tested, while reducing the project risks to the service provider.
- There are also advantages to private investor involvement in an EIB – investor due diligence brings an additional rigor in evaluations and a focus on meeting outcomes, which in turn improves the evidence base and availability of robust data for policy makers.

What kinds of investors are or could be attracted to EIBs?

- Impact investing, a way of investing that seeks both financial and social and/or environmental return, has become increasingly popular over the past decade. In 2014, according to a JP Morgan commissioned survey of 125 investors, the global market was estimated to be valued at \$46 billion, of which \$32 billion was invested in developing countries.⁶¹
- Many types of investors are entering the growing impact investing market. Here are a few common investor motivations:
 - Banks, pension funds, financial advisors, and wealth managers provide client investment opportunities to both individuals and institutions.
 - Institutional investors, community and family foundations can leverage greater financial assets to advance their core social and/or environmental goals, while maintaining or growing their overall endowment.

Beyond government, what are the motivations of other stakeholders?

One of the stated strengths of impact bonds is that they bring to the table a multitude of stakeholders, each of whom have different motivations for participating.

- **Service providers** could be motivated to join a EIB because it provides them with a stable, long-term revenue stream, allowing them to achieve outcomes, and because a EIB might allow them to scale a program.
- **Investors** in EIBs are motivated by environmental and financial return, with some variation across the spectrum in finance-first vs impact-first motivation. Investors could experience a loss of principal, a return of principal, or a return of principal plus interest. Finance-first investors include commercial investors that prioritise a return on their investment, impact investors that are looking for a balance of social and financial returns, and philanthropic investors that are willing to risk their capital completely for

⁶¹ This includes only investors with assets under management of \$10 million or above

environmental impact. Each of these investors has different motivations, which can lend itself to a layered capital structure with different risk/return profiles.

- The **Intermediary**, as transaction and project manager, could be paid for its contribution through grants external to the EIB, from a philanthropic entity, or it might earn a success fee in the EIB if the programme achieves its target outcomes. It is important to note that, like investors, various types of organisations could serve as the Intermediaries and their motivations are influenced by the mandate of the organisation.

Will the EIB catalyse more private capital into environmental interventions?

- As discussed above, this is the ultimate goal of impact investment, to pull private capital across and into the world's most intractable problems. Because EIBs are a new financial instrument, most senior investors into the programme are likely to be motivated by the opportunity to demonstrate and test how the scheme might achieve an equal measure of environmental and financial return.
- Therefore, the most likely senior investors into the EIB are the same private investors (foundations, family offices, funds, individuals) that already contribute to environmental services through grants and donations. In other words, this is not new money into the sector. It is traditional money in a different form.
- EIBs could bring in new types of private investors who typically do not invest in environmental services. In order to do that, the investment will have to be attractive to traditional, more commercially-minded investors who can fit the risk/return profile within their investment mandate.
- Learnings from the Social Bonds programme in New Zealand show that while traditional investors such as a NZ Super Fund can be attracted to Impact Bonds from a market leadership point of view, most of the other investors were already contributing to the social sector via grants and donations. Only time will tell but there is certainly more scope to bring in additional funding – under the right conditions.

Will the EIBs reduce risk for the New Zealand Government?

- In theory, yes, because the Government – as outcome funder – is paying for successful outcomes, rather than services. As such, it avoids several types of risk, such as execution risk that it might otherwise be exposed to in other environmental services initiatives. Advocates of impact bonds endorse them as a way to ensure taxpayer money is achieving its intended outcome.
- In reality, the situation is a little murkier and a much more nuanced perspective on government risk should be considered instead so that all stakeholders can design a programme that serves as the bench-mark for future deals.

- For example, if the underlying environmental asset that the EIB is funding takes a long time (10 years) to realise any positive outcomes, then under a strict EIB structure the Intermediary will not have any cash flow from the Government for 10 years. That is a long time to fund operations and service delivery. In this case, the Government may have to agree to pay for inputs into the service delivery at certain key operational milestones, thereby taking some of the risk that the end outcome may not be achieved.
- Interestingly, a recent survey of SIBs indicated that the transfer of risk was not actually the primary driver for governments to get involved in SIBs.⁶² Some governments in the study cited the possibility of circumventing rigid government budget silos and procurement processes and the ability to overcome politics, while most said that the opportunity to scale was the primary driving factor.

Is the NFBS entirely or partially weighted towards native tree-planting? If the latter, where does the weighting lie?

- Yes, the NFBS is weighted toward native forest.
- More specifically, the NFBS is designed with the intention of delivering a long-term outcome of native forest, while recognising that exotic species could play a role in delivering this outcome effectively and optimally. We anticipate that mixed exotic/native regimes will be one area for innovation that the NFBS structure can accommodate.
- The precise ratio we will determine through further market research but could be managed by a metric that determines, say, a proportion of no more than 30:70 for exotic to native stems.

Does the NFBS support other programmes that are designed to boost native forest planting and habitat restoration in New Zealand, such as Trees That Count (TTC) and Million Metres Streams (MMS)?

- Yes, especially TTC. The NFBS is a credible long-term solution for upscaling forest planting to potentially hundreds and thousands of hectares, by drawing on blended public/private investment. The NFBS would provide a long-term investment into the aspirations of TTC to increase the number of native trees being planted nationally by looping in Government support through a more attractive, less risky proposition. Basically, the NFBS would fund social sector groups to become expert “service deliverers” in continuous native forest, with wider social benefits for regional communities in terms of meaningful employment opportunities.
- The benefits for MMS would be more limited, most likely determined by the specifics of the site. Riparian planting typically involves the creation of ecosystems that do not

⁶² Emily Gustafsson-Wright et al., 2015. *The Potential and Limitations of Impact Bonds: Lessons from the First Five Years of Experience Worldwide*, Global Economy and Development Program at Brookings Institute, July 2015.

meet the forest definition for the ETS, because sites are often less than 30 metres wide and use species that will not exceed five metres in height. While ETS participation is not a prerequisite for the NFBS, it is a strong incentive for Government as outcome funder, because carbon revenue could be deployed to finance repayment to Investors, thereby reducing the fiscal liability for the outcome funder. The Government *could* commit through the NFBS to pay for successful riparian forest outcomes, even when these were not ETS-eligible, but the Government would need to be willing to bear the additional burden created by the absence of carbon revenue.

Are there existing organisations who could provide the Intermediary role now (e.g. financial institutions), or will it require the establishment and development of specialist intermediaries?

- A potential Intermediary is an organisation that is successful in contracting with the Government during the procurement process. Generally, that organisation would have to display a proven ability to execute the terms of the outcome agreement, and successfully raise the investment capital from the private sector. Our feeling is that there are multiple, existing forestry companies who would be in a good position to fulfil these general criteria. There is also some potential for a consortium of interested parties to work together to achieve the pilot contract. This arrangement may increase the execution risk for the investors due to the complexity of having multiple new groups working together, but could be one outcome worth considering.

Appendix One: Key Ecosystem Services in the Ōhiwa Catchment

Table 3. Indicative values (in \$ per ha per year) of key ecosystem services in the Ōhiwa catchment.

Ecosystem service		Land use ¹							Total
Type	Details	Productive				Natural			
		Dry stock	Exotic forestry	Dairy	Horticulture	Indigenous forest	Scrub	Wetlands and mangroves	
Provisioning	Food, wool, wood, pulp	158	483	1,686	8,810				11,137
Regulating	Carbon sequestration/ emission and GHG regulation	-16	48	-41					-9
	Avoided erosion and flood/disturbance regulation		121			166	166	12,737	13,190
	Regulating nutrient (nitrogen) supply (e.g. avoided leaching)	-3,200	2,800	-12,000	10,000	2,800	2,800		-16,800
	Pollination	69	206	69	233	206	206		989
	Water regulation ²	8	6	8		6	6	42	76
	Waste treatment		244			244	244	11,721	12,453
	Pest and disease regulation/ Biological control	164	11	105	65	11	11		367
	Water supply		8			8	8	10,664	
	Social	Recreation		900			1,800		1,978
Species conservation			257			414		494	1,165
Supporting	Nutrient cycling		994			994	994		2,982
	Soil formation	3	14	3	6	28	28		82
Net ES Value (\$/ha/yr)		-2,814	6,092	-10,170	-885	6,677	4,463	37,636	40,990
Area (ha)		4,914	3,201	2,854	51	3,576	2,380	316	17,292
TOTAL VALUE (\$ per land use per year)		-13,827,996	19,500,492	-29,025,180	-45,145	23,876,952	10,621,940	11,892,976	22,993,580

¹ Blank cells indicate that there were no appropriate data found to represent those values. A blank space does not necessarily mean that the ecosystem service has no value. It is very likely the non-market of that particular ecosystem service can be estimated because that value had already been estimated for other land uses.

² Water regulation is defined in the MEA (2005) as "The timing and magnitude of runoff, flooding, and aquifer recharge can be strongly influenced by changes in land cover, including, in particular, alterations that change the water storage potential of the system, such as the conversion of wetlands or the replacement of forests with croplands or croplands with urban areas."

Appendix Two: Potential Planting Sites

7.1. Onetangi Sports Park

Onetangi Sports Park, 133-165 O'Brien Road, Waiheke Island.

Category	Detail
Description	3 hectares planting area.
Ownership	Auckland Council.
Geology	Gentle, open slopes near golf course. Not prone to slips or erosion.
Access	Highly accessible. Adjacent to a large car park.
Impact	Limited environmental co-benefits, but high recreational and biodiversity benefits.
Additionality	Low because Auckland Council already has plans to restore forest habitat, to be undertaken with existing Council capacity and budgetary allocation.
Conclusion	Easy to initiate but low.



7.1.1. Stakeholder engagement

Mōhio spoke with Gary Wilton of Auckland Council who identified the site as a potential pilot site for planting. It is highly accessible, with little need for site preparation, because it is already well-maintained as park grasslands.

Establishing forest on this site would have limited environmental co-benefits, because the site is not prone to erosion or sediment loss. However, for the purposes of populating the NFBS financial model with data about input costs and carbon revenue, the site would be adequate. Also, the site would have significant social impacts because it is a public park area and adjacent to a golf course.

Auckland Council already has plans to restore forest habitat on this site, by expanding existing restoration planting in the surrounds. Although this diminishes the additionality of new forest, it reduces the operational barriers to implementing a pilot, because the pilot could be

integrated into existing plans. It also provides opportunities to build working relationships with Council and other stakeholders, to test the financial model and to build collaborative protocol. Finally, as a pilot site, it supports the opportunity for “safe failure” because there is little to be lost in the event of project failure.

7.1.2. Site Maps

Figure 12: Potential Planting Site for Onetangi Sports Park.



7.2. Ngāti Paoa Trust Farm

Ngāti Pāoa trust farm block, 32 Man O'War Bay Road, Waiheke Island.

Category	Detail
Description	Around 90 hectares of marginal pastoral land along Puke Range on eastern Waiheke Island.
Ownership	Māori land trust for Ngāti Paoa
Geology	Steep, erosion-prone, marginal land. According to NZ Land Resource Inventory, this land unit has moderate soil slip and slight tunnel gully erosion (see Figure 6 below).
Access	Road accessible to lower slopes, then walkable to the top of the Puke Range.
Impact	High potential environmental impact given the potential for erosion and sediment control, plus the size of the carbon sink that would result. Also, strong social impact by enabling the fulfilment of aspirations of tangata whenua.
Additionality	High additionality because Ngāti Paoa is constrained in resources and capacity to plan and finance forest planting, so there are no immediate plans to restore forest habitat.
Conclusion	High integrated social/environmental impact and also strong alignment with the NFBS's long-term objective of targeting highly erosion-prone marginal land in pasture at the national scale.



7.2.1. Stakeholder engagement

Mōhio has met with Hauāuru (Hau) Rawiri, Kaihautū of Ngāti Paoa Iwi Trust, to discuss aspirations for this land. It was confirmed that conversion to native forest is a live option for this site, as well as potentially others within their rohe.

The general principle of establishing native forest on erosion-prone land was seen as a “no-brainer”, in recognition of the local environmental benefits as well as the wider context of climate change.

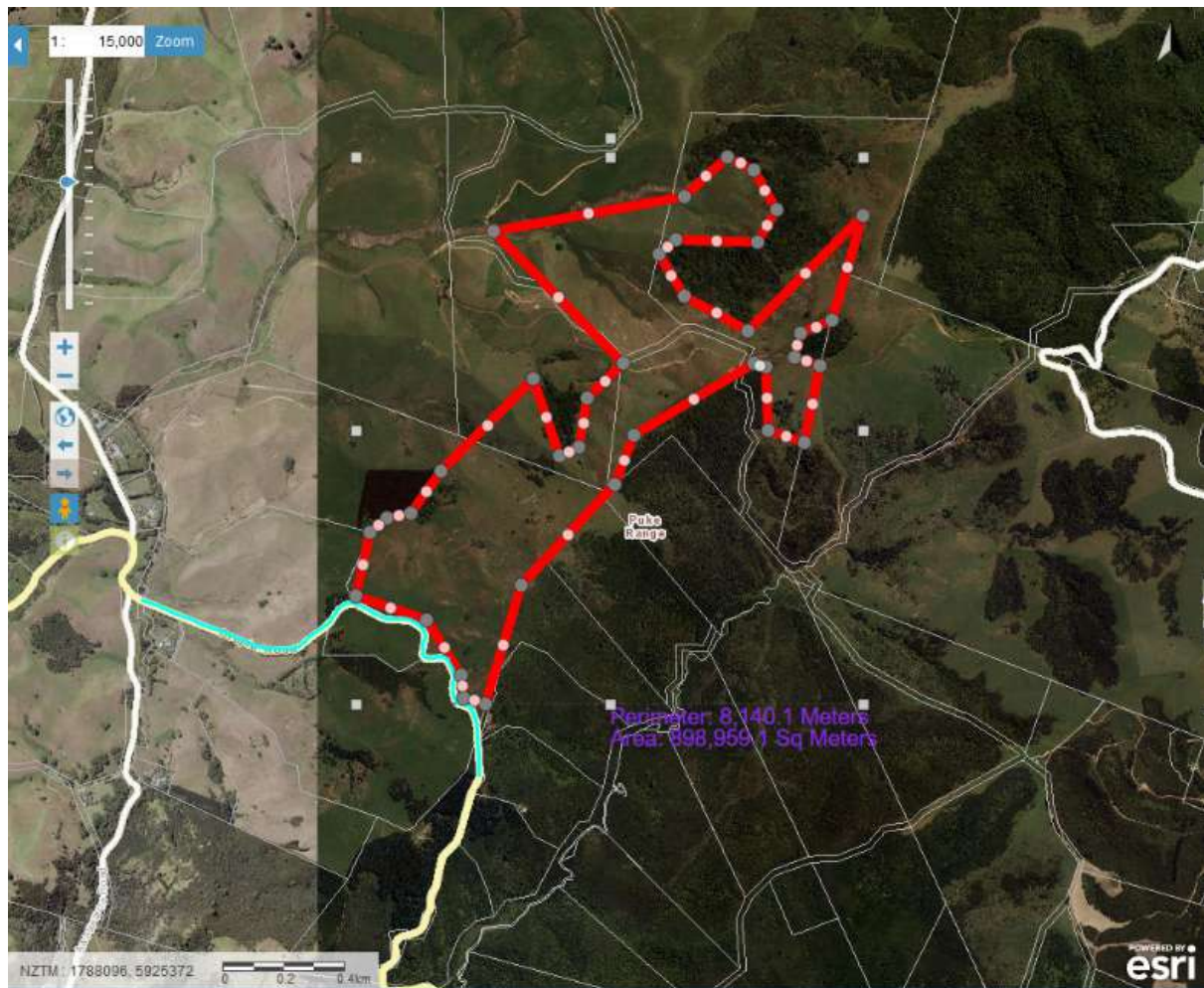
At a high-level, Hau understood the NFBS structure and financial model and recognised its merits. He was interested in the particular implications, risks and liabilities that might arise from implementing the NFBS but appreciated that this granular detail would emerge at a later date, once the project entered pilot phase. He was open to the benefits of the NFBS being redistributed in order to manage the interests of stakeholders – specifically, the possibility that carbon credits could be allocated to Government or Investors until the date of NFBS maturity – because he recognised that any investment or agreement involves some give and take.

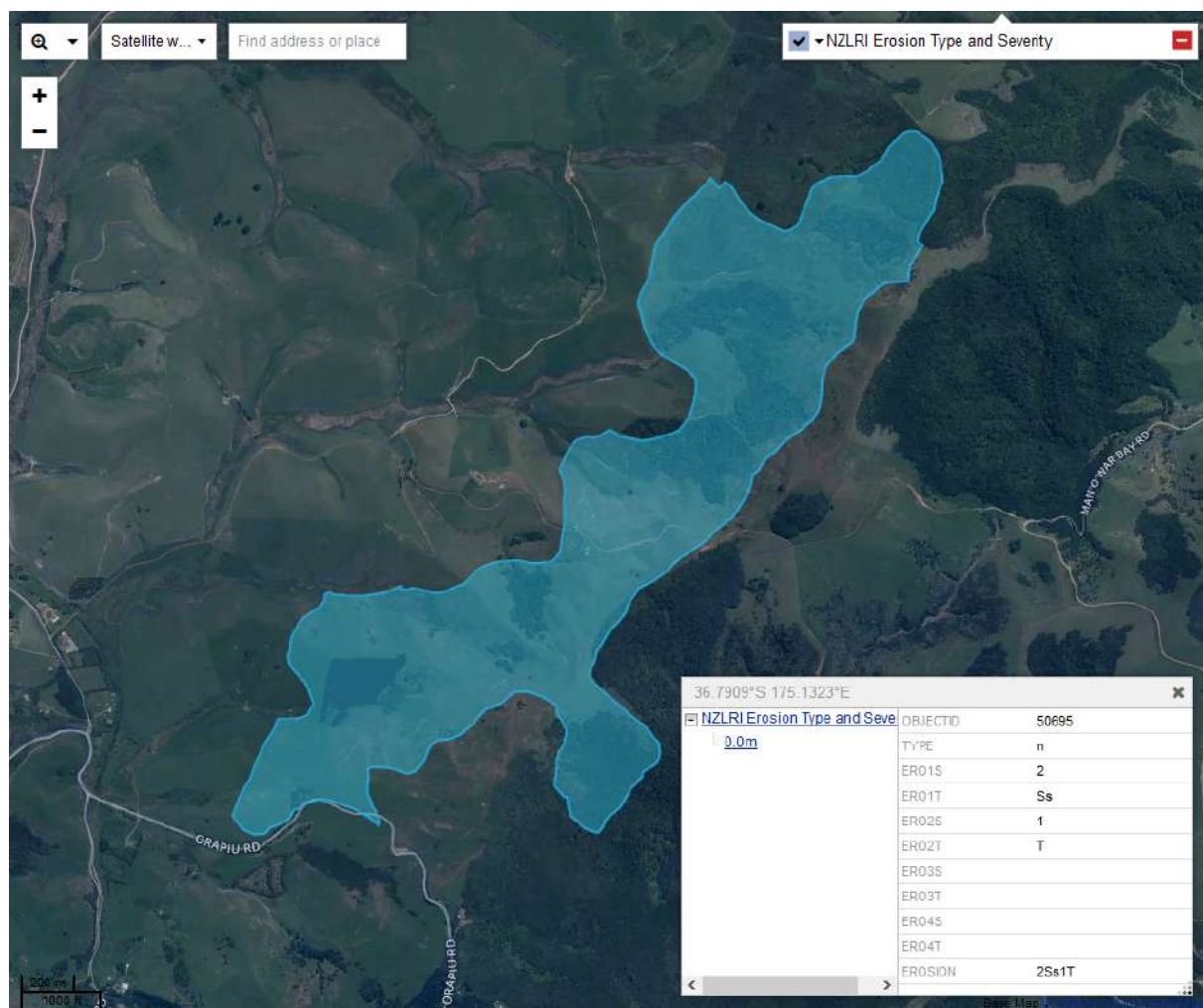
For him, the absence of a covenant was a *necessary attribute* because any covenant that would undermine Māori ownership and control of the land, especially in favour of the Crown, was regarded as a no-go. This position rules out the Permanent Forest Sink Initiative or QEII covenants but leaves open the NFBS model as long as a covenant is not required.

Speaking personally (that is, not for Ngāto Paoa as a whole, nor for other iwi), Hau was open to a role for exotic species in the NFBS. He recognised that exotic species deliver some functions that native species cannot, and that it is acceptable to use exotic species to deliver these functions where this benefits the community. What was crucial was intentionality: as long as the NFBS had an intention to deliver permanent native forest outcomes, then there was an openness to using exotic species to achieve this more effectively.

7.2.2. Site Maps

Figure: Potential Planting Site for Puke Range. Source: Auckland Council GeoMaps.





Erosion type and severity for Puke Range site. Source: New Zealand Land Resource Inventory (NZLRI), Land Use Capability (accessed 14/3/2018).

The erosion code <2Ss1T> means *moderate soil slip and slight tunnel gully erosion*. The descriptions below come from Lynn et al. (2009):¹

Soil slips are shallow, rapid slides and flows involving soil and regolith. Movement rates are typically 0.5–5 m/s, or fast walking to running pace. They comprise a scar (source area), and a debris tail. The failure surface is planar and parallel to the ground surface and <1 m deep. The slip plane or shear surface is often above relatively impermeable material. Movement is initially by sliding or a combination of sliding and flowing, but where the failed mass becomes saturated with water, it forms a chaotic mix of debris which can flow down slope for a considerable distance (10s to 100s of metres, or >10 times the scar length). The scar surface is slow to revegetate (often 10+ years), and the rate is influenced by such factors as hardness, weathering rate, fertility, water holding capacity and rainfall/drought conditions. The debris tails revegetate more quickly (usually several years). Typical shallow soil slips in pastoral hill country are <1 m deep and have a volume of between 150 and 500m³. They are triggered by a variety of natural agents, most commonly intense and/or prolonged

¹ Lynn et al. (2009), *Land Use Capability Survey Handbook*, AgResearch Ltd, Hamilton; Landcare Research New Zealand Ltd, Lincoln; Institute of Geological and Nuclear Sciences Ltd, Lower Hutt.

rainfall, earthquakes, and undercutting of slopes by stream or wave action. Soil slips are also induced by human activities, especially slope modifications for roads, tracks and buildings.

Tunnel gully erosion (aka pipe/shaft erosion, under-runners, tomos) is initiated by the subsurface concentration and flow of water, resulting in eluviation and scouring, and the formation of narrow conduits, tunnels or pipes. Soluble, dispersive or low strength material is removed, ultimately resulting in collapses, visible either as holes in the land surface or as gullies when sufficient collapses coalesce to form continuous linear features (after Lynn & Eyles 1984). Tunnel gullies form in a range of regoliths where subsurface water concentrates above a relatively impervious layer. Land susceptible to tunnel gully erosion includes loess-mantled (typically >50 cm thick) moderately steep sandstone, mudstone, and weakly consolidated conglomerate hill country with Pallic Soils, on colluvial footslopes, and where coarse thick tephra deposits overlie consolidated rock types.

CONTACT INFORMATION



MISSION

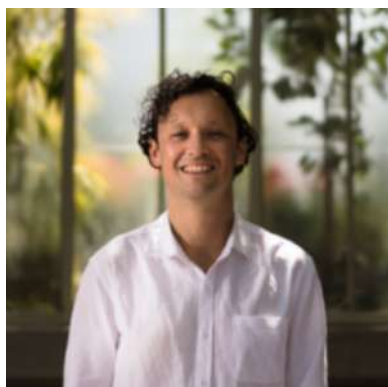
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