Te Āki Tūroa
Nature+ Framework and Plan

May 2024

SOUTHERN FALCON CONSULTING

Waikato REGIONAL COUNCIL
Te Kaunihera ā Rohe o Waikato

Te Āki Tūroa | Nature+ Framework and Plan – May 2024

Contents

Glossary of technical terms

Additionality	A principal applying to GHG emissions offsetting for carbon neutrality where emissions reductions or removals are due to a specific intervention and would not have occurred under business-as-usual activity.
Biodiversity credits	A type of financial instrument that recognises in a consistent way projects or activities that provide positive outcomes for indigenous biodiversity, against which 'nature-positive' claims can be made.
Blue carbon credits	The recognition of voluntary carbon credits due to the removal and storage of carbon from the atmosphere in restored areas of seagrass meadows, mangroves and tidal marshes on the coast.
Carbon credits	A financial instrument issued and traded either via a voluntary or government regulated compliance market that recognises in a consistent way a tonne of carbon dioxide (CO_2) or equivalent GHG emissions reduced or removed from the atmosphere, from certain activities.
Carbon neutral	Describes the state of an entity (such as a company, council, city, or country) where the GHG emissions it produces are effectively balanced by actions it has undertaken or funded to remove an equivalent quantity of GHG such as CO_2 from the atmosphere.
Carbon markets	A specialized type of financial market where carbon credits can be bought and sold. There are two basic types of carbon markets: compliance and voluntary.
Compliance markets	These are established by governments or multi-government bodies that control the supply of credits and regulate their trading. (e.g. NZ Emissions Trading System NZ-ETS.)
Voluntary carbon markets	In voluntary carbon markets (VCM), carbon credits may be generated and traded voluntarily based on bespoke market principles and rules agreed by the parties and the VCM's oversight body.
Corporate GHG emissions	Includes all direct GHG emissions from corporate activities, indirect emissions from imported energy, any emissions due to business travel & freight, and emissions in relation to waste disposal and transmission and distribution of energy used by the entity.
Direct emissions	Are emissions from sources that are owned or controlled by an entity. Examples of direct GHG emissions include emissions from fossil fuels burned on site, emissions from entity-owned or entity-leased vehicles, and other direct source.
Double claimed	Where two or more parties claim the same emission reduction. (e.g. An entity claims an emissions reduction in NZ to voluntarily offset their carbon emissions (e.g., by cancelling a unit) and that same emissions reduction is used to meet NZ's international emissions reduction target (as part of accounting for the nationally determined contribution (NDC).
Indirect emissions	These are emissions from: the generation of purchased energy; other sources of transportation; and that occur in the value chain of the reporting entity including both upstream and downstream emissions.

Greenhouse gases (GHG)	Certain atmospheric gases including CO_2 that contribute to the greenhouse effect by trapping heat. Increases in the level of these gases in the atmosphere is the main cause of climate change.
Nature-based solutions	Actions to address societal challenges, such as climate change, water security, and disaster risk reduction, through the protection, conservation, restoration, sustainable use and management of natural or modified terrestrial, freshwater, coastal and marine ecosystems.
Nature +	Nature positive activities that lead to nature (indigenous biodiversity and ecosystem) being restored and regenerated, instead of declining. Nature + is an approach of actively enhancing nature. It involves measurable gains in the health, abundance, diversity, and resilience of indigenous species, ecosystems, and processes.
NDC	Nationally determined contribution (NDC) is a government's agreed action plan to cut its emissions under the Paris [Climate Change] Agreement.
Not doubled counted	Only one entity (country, corporation or person) can use the reduction or removal for achievement of their emission reduction or carbon neutrality goals. This means the reduction or removal cannot be double claimed.
NZU-FE	A category of carbon credit that recognised the removal of CO_2 by registered post 1989 forests under the NZ Emissions Trading System.
Offset	An 'offset' or "carbon offset" and 'offsetting' is a reduction in emissions or removal of carbon from the atmosphere measured in tonnes CO2e in order to compensate for equivalent GHG emissions made elsewhere. This can be achieved by cancelling the quantity of carbon credits equivalent to the emissions to be offset (see Appendix 3).
Permanence	A principle applying to GHG emissions offsetting for carbon neutrality where emissions reductions or removals of GHGs must be maintained over time and are unlikely to be reversed.
Permanent exotic forest	Refers to a forest that has been planted and is composed of exotic tree species that is intended to remain as a forest indefinitely and is not intended to be harvested by clear felling. Exotic species used in these forests are typically faster-growing species such as eucalyptus, Douglas fir, and radiata pine.
Permanent transition forests	Refers to permanent exotic forests that have been established with the stated intent of transitioning to indigenous forest species over time by either a managed or natural transition.
Removals	Also known as carbon removal or carbon sequestration - this refers to the process of removing carbon from the atmosphere and storing it in plant or geological reservoirs or in long-lived products.
Verification	A process requirement for reporting and/or offsetting emissions. The reduction and or removal of GHG's is supported by evidence from credible measurement, monitoring and reporting verified by a third party.

Kōrero Whakataki | Executive Summary

1. The Te Āki Tūroa | Nature+ Framework and Plan ('the plan') outlines a pathway to reduce the council's corporate[1] greenhouse gas (GHG) emissions and public transport emissions and generate carbon credits to offset remaining emissions by supporting the restoration of indigenous biodiversity in the Waikato region.

2. The plan seeks to leverage carbon markets and potentially the developing biodiversity credit market to achieve carbon neutrality and support nature positive (Nature+) outcomes. This would potentially also allow for income generation to contribute to planting costs via the sale of any surplus carbon credit not needed to offset emissions and any biodiversity credits the Nature+ projects might generate.

3. While this framework was initially focussed on carbon offsetting, it is apparent that it provides a useful approach to guide the restoration and reconstruction of indigenous habitat in New Zealand's most biodiversity depleted environments, including urban and peri-urban zones, where incentives would help to achieve the goal to build, expand and reconnect indigenous habitats near where the majority of New Zealanders live.

4. The plan has three phases:

   - Phase 1 - address and offset 100% of remaining direct and indirect corporate[1] GHG missions by 2050;
   - Phase 2 - reduce and offset 100% of indirect emissions from the Council's role in public transport (buses and the Te Huia train) by 2050;
   - Phase 3 - contribute (where practical and as the opportunity arises) towards reducing and/or offsetting other indirect sources of emissions, including those associated with council activities from council drainage infrastructure and its supply chain.

5. The plan will focus on Nature+ planting / restoration projects using native trees and shrubs on council owned land to generate both carbon credits and other environmental services for the region, such as indigenous biodiversity enhancements. The projects will be designed to also generate biodiversity credits for sale should this market mature.

6. Based on current modelling and assumptions (see Appendix 1) planting up to 1.4% of the 2,507 ha of land owned by the council currently in pasture in a mix of native species (between 22 and 34 ha) is likely to be sufficient to achieve carbon neutral status for corporate emissions by 2050.

7. Other indirect emissions arising from the council's role in respect of public transport and land drainage are not considered part of the councils' corporate emissions, and while it may have an influence on them, the council is not directly in control of these third-party emissions.

8. Changing the land use by planting up to 9.6% of the 2,507 ha of suitable land owned by the council in native species (between 140 and 240 ha) is likely to be sufficient to achieve carbon neutrality for both corporate and public transport emissions.

9. Planting larger areas sooner and at higher densities (stems per ha) reduces the overall area required to plant but incurs more of the establishment costs upfront and increases the costs per ha of restoration planting. Total costs over time are also determined by the extent of post planting management including pest and weed control to improve long term biodiversity outcomes.

10. Due to the much larger scale of indirect emissions linked to the council infrastructure that drains peat (organic) soils and the uncertainty of supply chain emissions, the plan is to provide leadership and look

[1] Includes all direct GHG emissions from corporate activities, indirect emissions from imported energy, emissions due to business travel and freight, and in relation to waste disposal and transmission and distribution of energy.

for opportunities as they arise to reduce some of these other indirect sources of emissions prior to 2050 in partnership with the relevant landowners and suppliers.

11. It will not be feasible to offset land drainage emissions by 2050 via planting due to the very large areas that would be required to offset this source of indirect emissions. It is not a requirement for corporate carbon neutrality status to offset all indirect sources of emissions, but as opportunities arise, they should be explored to reduce these sources of emissions where practical.

12. Case studies have been developed to highlight the costs, benefits, opportunities and challenges, for the council and stakeholders associated with planting/restoration projects on council land to offset corporate and public transport emissions. It is important to note that while this report includes case studies and indicative costings, it does not commit the council to any programme of work or expenditure.

Horopaki | Background

13. With a goal of supporting New Zealand's national target of net zero carbon dioxide emissions by 2050, and consistent with the council's strategic direction, the council is working to reduce greenhouse gas (GHG) emissions across all the council facilities, operations and activities, and through its supply chain. For emissions that cannot be reduced or removed, the council needs to work on responsible offsetting solutions where practical to achieve carbon neutral status.

14. To become carbon neutral by 2050 the council needs to account for, reduce and then offset 100% of its direct and indirect corporate emissions. The plan proposes to go further and offset remaining hard-to-reduce indirect emissions from the council's role in public transport by establishing nature-positive[2] carbon offsets using indigenous species to generate carbon credits to cancel[3] equal to remaining emissions.

15. Council corporate emissions include all direct GHG emissions from corporate activities, and indirect emissions from imported energy, business travel and freight, and in relation to waste disposal and transmission and distribution of energy.

16. All other indirect emissions such as from the council's role in supporting public transport and providing and operating land drainage infrastructure are not included within our corporate emissions, and while we may have an influence on them, we are not directly responsible for them.

17. One way for the council to be carbon neutral is to reduce and then offset corporate emissions through nature+ planting that generates carbon offsets and supports indigenous biodiversity restoration. The council's strategic direction recognises that protecting and restoring biodiversity is an investment in the future. Intact biodiverse landscapes help clean our water, recycle nutrients, reduce flooding and provide other ecosystem services. Maintaining and enhancing ecosystems is often the most cost-effective way to address the climate crisis. The more biodiversity we have and the healthier it is, the greater its capacity to absorb carbon dioxide (CO_2) and increase ecosystem and community resilience to a changing climate.

18. Another possible option available to council instead of generating its own carbon credits to be cancelled as offsets, is purchasing carbon credits from either domestic or international carbon markets. Depending on which market - either NZ-ETS or voluntary carbon market (VCM) - the council purchased the credits from and the relevant standards that apply, will likely affect both the price and credibility of any nature+ claims linked to this source of carbon credit. It is likely to be very challenging to source appropriate carbon credits domestically that also deliver clear regional biodiversity benefits.

[2] "Nature+" is an approach of actively enhancing nature. It involves measurable gains in the health, abundance, diversity, and resilience of species, ecosystems, and processes.

[3] See process to cancel carbon credits to generate offsets in Appendix 3

19. For the plan the proposal is to focus on restoring some of the land the council currently owns to native cover as there appears to be sufficient suitable land available to offset both corporate and public transport emissions from 2050 to achieve carbon neutral status.

Strategic Drivers:

Climate Action Roadmap

20. The council's Climate Action Roadmap's various pathways note the opportunities for protecting and enhancing blue (marine) carbon sinks and wetlands, and states that planting more trees and re-establishing native cover – ensuring the right tree in the right place – is the region's biggest opportunity for reducing its carbon footprint. It should also be noted that tree planting does not replace urgent efforts to reduce gross emissions where practical and cost effective, including from energy use or land drainage.

21. The Climate Action Roadmap actively supports this work through several commitments as listed below in Table 1.

Table 1 – Climate Action Roadmap Commitments positively impacted through this framework

Pathway	#	Commitment
Coastal and Marine	2.7	Support investigation of blue carbon (sequestration) opportunities, and advocate for blue carbon to be recognised in national carbon accounting systems
Regional Resilience	4.4	Understand the full range of options available for the flood management systems in specific catchments, such as nature-based solutions (for example, wetlands and making room for the river by expanding floodways), scheme efficiency improvements, engineered solutions (for example, building higher stop banks) and retreat.
Biodiversity and Biosecurity	3.4	Support research and increase our understanding of: • The carbon impact from drainage of our wetlands and the loss of existing forests and other ecosystem-types. • Progress a prioritised strategic pathway for our region that protects and restores biodiversity out to 2050 and beyond. • Support and empower people to protect and restore the natural environment and taonga species by integrating their efforts with councils and other agencies.
Biodiversity and Biosecurity	3.8	Advocate to central government for a world-leading biodiversity credit scheme to complement and counterbalance the Emissions Trading Scheme (ETS) and to incentivise permanent indigenous forests and their related ecosystem services and benefits.
Afforestation and Planting	6.4	Investigate opportunities for the council to make use of a voluntary carbon market or incentivise additional planting as a result of such a market.
Afforestation and Planting	6.6	Promote the use of carbon calculators to raise awareness of the carbon sequestration benefits of planting indigenous tree and shrub species.
Agriculture and Soils	7.1	Support landowners and land managers by: • Collecting data and information (such as through inventories, trials, research) to provide confidence to move away from business-as-usual practices and shift towards climate resilient nature-based solutions such as paludiculture, blue carbon, wetland creation and restoration.
Agriculture and Soils	7.7	Advocate for the inclusion of non-conventional carbon sinks in the Emissions Trading Scheme, or equivalent.

22. Also important is improved management of existing areas of indigenous vegetation to reduce rates of clearance and to enhance these areas' capacity to absorb CO_2 through restoration and improved wild animal control and livestock management. Such activity may have the potential in future to also generate some carbon and/or biodiversity credits to be used to offset corporate and other emissions. This would require the activity to be additional to business-as-usual and the carbon stock improvement from enhanced management can be measured, verified and maintained over time.

23. The roadmap notes that the council could identify and spatially map areas for planting and management that will provide the best return for carbon sequestration and provide biodiversity and other benefits including erosion control, flood mitigation, emissions reduction and improved water quality co-benefits.

National Direction

24. The National Policy Statement for Indigenous Biodiversity – 2023 (NPSIB)[4] also provides relevant direction to the council:
    The NPSIB recognises amongst other things that -
    - "*health and wellbeing of people and communities are dependent on the health and wellbeing of indigenous biodiversity*"

    The NPSIB directs councils amongst other things that:
    - promote and provide for "*restoration of indigenous biodiversity*";
    - manage indigenous biodiversity "*to promote resilience to the effects of climate change";*
    - develop and implement "*regional biodiversity strategies…….to maintain and restore indigenous biodiversity at a landscape scale";*
    - consider the effects of climate change *"when making decisions on restoration proposals"* and "*maintaining and promoting the enhancement of the connectivity between ecosystems, and between existing and potential habitats, to enable migrations so that species can continue to find viable niches as the climate changes";*
    - *"involve tangata whenua (to the extent they wish to be involved) as partners in the management of indigenous biodiversity";*
    - *"include objectives, policies, and methods in their policy statements and plans to promote the restoration of indigenous biodiversity, including through reconstruction of areas."*

25. Drawing council strategies and national directions together, the plan forecasts the council's emissions reduction pathway out to 2050 and recognises opportunities and projects to reduce corporate direct and indirect emissions where practical/cost effective. The plan is to then offset remaining hard to reduce emissions by establishing restoration projects that generate carbon credits (to cancel[5]) that also protects and restores the Waikato region's indigenous biodiversity.

26. The plan's key objectives are:

    - 68% carbon reduction by 2030 against corporate emissions (excludes public transport and land drainage emissions).
    - Carbon neutrality by 2050 for both the council's corporate emissions and for public transport emissions by reducing corporate emissions and also reducing indirect public transport emissions where practical and cost effective, and by 'offsetting' remaining emissions from these two sources.
    - Use nature+ solutions to achieve the above objectives and work towards reducing other indirect sources of emissions from land drainage and from the council's supply chain where practical.
    - Capitalise on current council programmes and opportunities as relevant to help achieve these objectives.

[4] for the full text of the NPSIB see: National Policy Statement for Indigenous Biodiversity 2023

[5] See Appendix 3

Baseline data projections

Corporate emissions

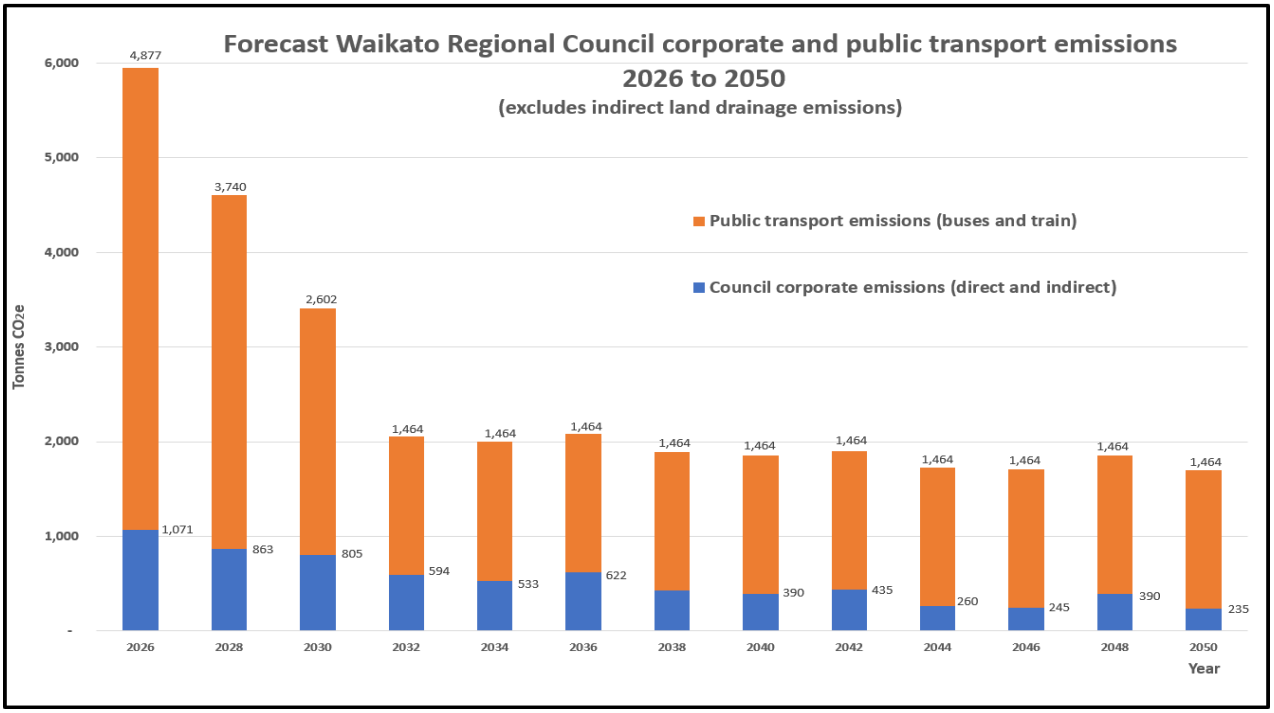
27. The council is accountable for its corporate emissions. Direct and indirect emissions are those over which the council has control, such as corporate vehicle fleet, while indirect emissions are those associated with operational activities the council does not own, such as public transport bus and train services. The council has an active programme to reduce these sources of emissions to help transition towards carbon neutrality.

28. In line with the above, the council has been measuring and reducing its corporate greenhouse gas emissions since 2016. The latest inventory indicates that the council has reduced its corporate emissions[6] by 41% since the 2016/17 base year and is still on track to meet its target of 68% CO_2e reductions compared to the base year by 2030. This assumes that 2023's higher energy emissions related to flood management is an anomaly year and that land drainage emissions from organic (peat) soils drained by council infrastructure remain outside the 2030 target.

29. Alongside reducing emissions from our corporate buildings, vehicles, and fuel consumption we are considering the emissions of our flood pump stations and how best to use energy efficiency and innovation as part of the reduction opportunities when considering pump station replacements or upgrades. This may also include extensive community engagement and decision-making with respect to considering reflooding and restoring certain areas of low-lying pasture as wetlands on peat soils where appropriate as a means of reducing both capital and operational expenditure and reducing indirect land drainage emissions associated with council infrastructure.

30. Based on the current emissions plans and other assumptions (See Appendix 4) the council's direct and indirect corporate emissions have been projected out to 2050 (See Graph 1 blue bars only – below). The forecast of remaining corporate emissions per annum as at 2050 is 235 tonnes CO_2e (an 80% reduction over 25 years).

Graph 1 – Council direct and indirect corporate emissions and public transport emissions



[6] excludes indirect public transport and land drainage emissions

Indirect public transport emissions

31. The council contracts with bus and rail companies to provide public transport services for the region. The emissions generated through this service are captured and reported as a separate inventory item as a source that the council is only indirectly responsible for. In addition to corporate emissions the plan has elected to also offset any additional public transport emissions that cannot be mitigated through electrification and other emissions reduction programmes over time and where possible.

32. Council's indirect emissions associated with public transport (operation of buses and the Te Huia train) have also been forecast out to 2050 (see Graph 1 - orange bars above). The forecast assumes the bus fleet has been fully electrified by 2031 and Te Huia continues to operate unto 2050. Based on these assumptions indirect emissions from public transport are forecast to reduce to approximately 1,462 tonnes CO_2e per annum by 2050 – a 73% reduction over 25 years with most of the reduction in the next 7 years (by 2031).

Indirect land drainage and other emissions

33. The council has statutory responsibility for managing river and catchment systems in the Waikato region, including providing significant land drainage services and infrastructure to both public and private land in the region. The indirect emissions associated with the council's land drainage services have recently been calculated and peer reviewed. They are not currently captured within the council inventory as they are not a corporate emission but will be captured in future as a separate indirect emission item, like public transport, for transparency.

34. Other indirect sources of emissions from the council's contractors and suppliers of goods and services are currently uncertain and not currently included in the inventory.

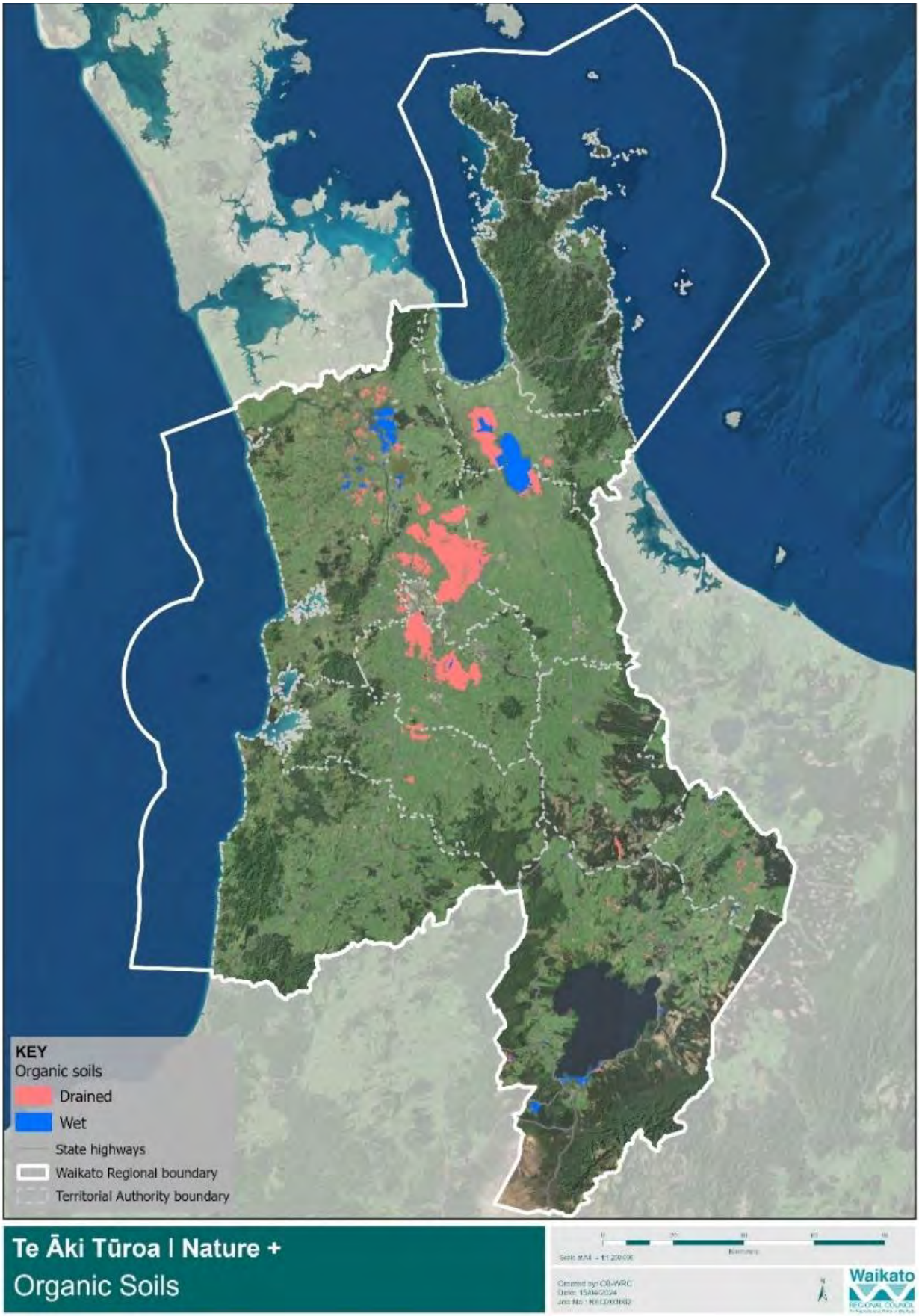
35. In addition to improving flood pump efficiencies, this plan and the council's Infrastructure Strategy, in conjunction with landowners, could help identify opportunities for reflooding and restoring wetlands and indigenous vegetation cover in certain areas of low-lying peat soils where the cost of replacing or maintaining land drainage infrastructure is no longer practical, or by contributing to offsetting some of these emissions where this is feasible.

36. Of the peat soils found in the Waikato region, approximately 65,000ha of mainly private and/or Māori land is being drained to support pastoral agriculture, cropping, horticulture and peat mining. Of this the majority (approximately 40,000ha) is drained by Waikato Regional Council owned and operated infrastructure (see Map 1 – red areas below). Council drainage infrastructure is indirectly contributing to peat subsidence and greenhouse gas emissions in the order of 0.89 million tonnes CO_2e per year (22 tonnes CO_2e /ha/yr.). This indirect source of emissions is currently around 120 times higher than all other source of emissions associated with council activities including public transport.

37. Much of the peatland in the region is utilised for dairy farming. Currently dairy farming across the region (not just on peatlands) contributes around $1.9 billion (6 percent) of the region's gross domestic product and employs 10,000 people (4 percent of jobs in the region). However climate change presents a number of threats to the industry: dairy farming may be challenged by increasing frequency of drought, and low-lying areas (which peatlands often are) may be subject to increased flood risk. Heat stress may also affect the productivity of the dairy herd. On top of this, the requirement for our export customers to take account of their indirect emissions may result in pressure to account for greenhouse gases produced from land use. If carbon border adjustment mechanisms[7] include a requirement to account for land use emissions this will have further implications for farming on peat.

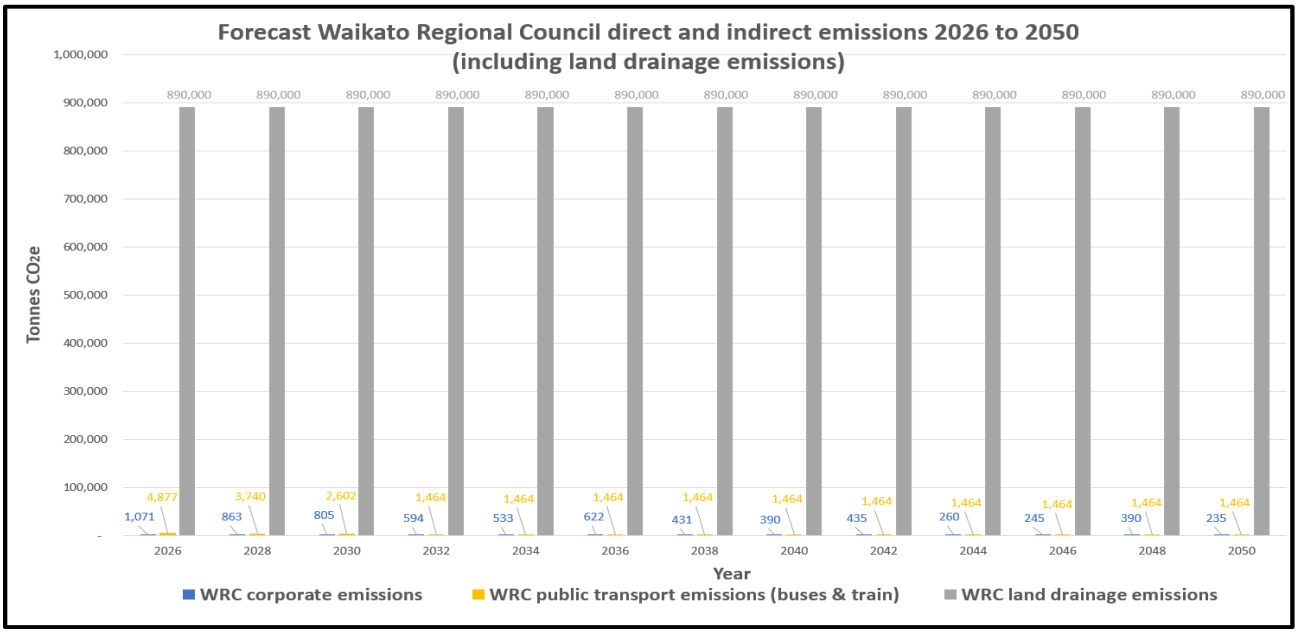
[7] Navigating Climate-Related Trade Challenges: New Zealand's Economic Imperative (dairynews.today), EU to begin implementing the Carbon Border Adjustment Mechanism - September 2023 | New Zealand Ministry of Foreign Affairs and Trade (mfat.govt.nz)

Map 1. Peat (organic) soils in the Waikato region drained by council infrastructure



38. All direct and indirect emissions associated with council activities including from its land drainage infrastructure have been projected out to 2050 assuming no change to the area currently being drained. (See Graph 2 - grey bars below – note the major increase in the scale of the Y axis compared with Graph 1 – page 9)

Graph 2 – All council direct and indirect emissions including drainage of peat soils



Council owned land that could theoretically be restored

39. In considering potential land to plant/restore to offset council emissions the obvious land to consider first is land already owned by the council. In total the council currently owns 3,850 hectares of land under a range of land covers and uses - see Table 2 and Maps 2 and 3 below.

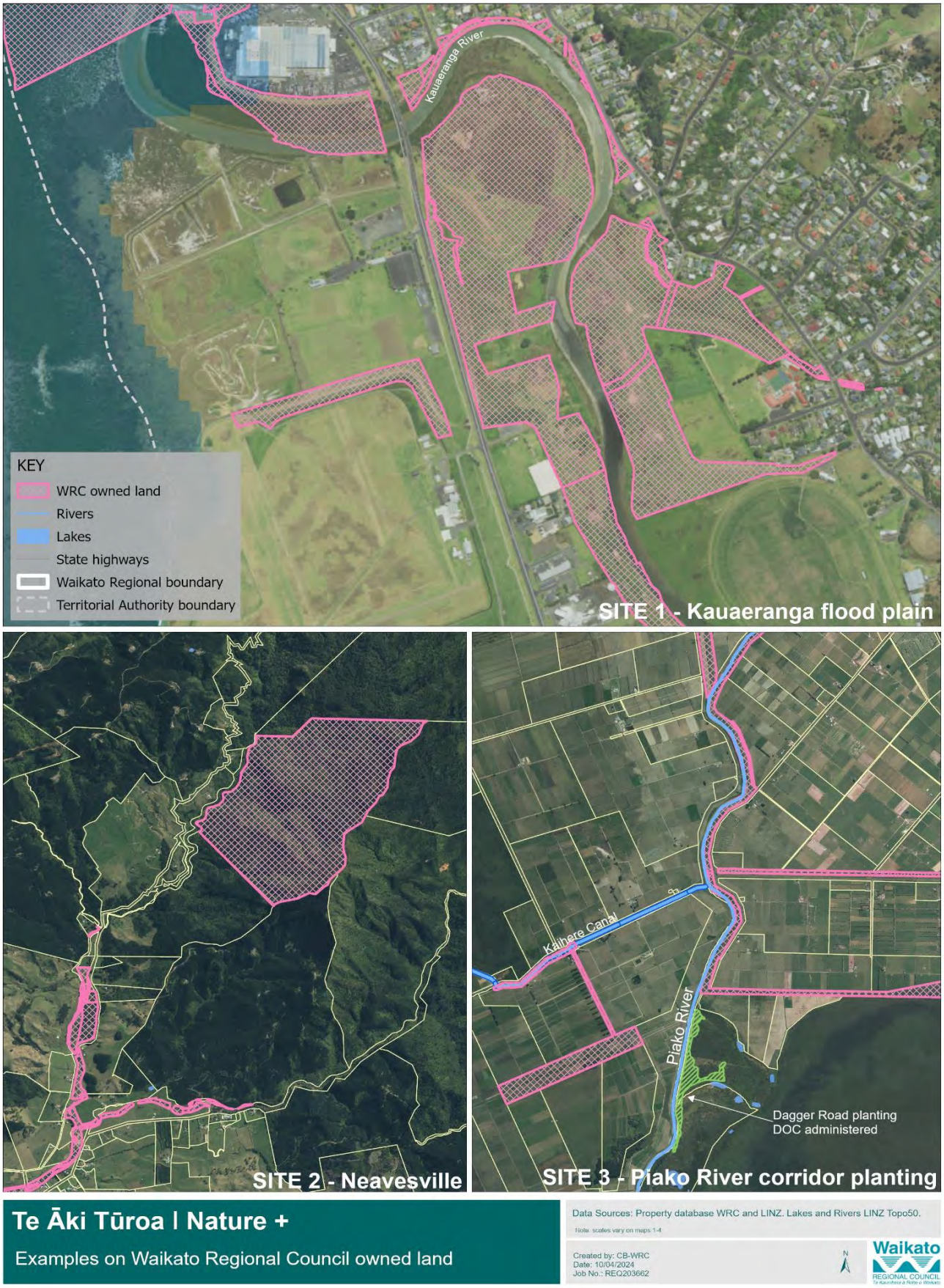
Table 2 Land owned by the Waikato Regional Council

WRC owned land hectares	**3,857**
Current land Cover as at 2018 (Landcover DB)	**Area (ha)**
Broadleaved Indigenous Hardwoods	108
Built-up Area (settlement)	15
Deciduous Hardwoods	168
Exotic Forest	202
Flaxland	1
Gorse and/or Broom	**6**
Gravel or Rock	2
Herbaceous Freshwater Vegetation	101
Herbaceous Saline Vegetation	58
High Producing Exotic Grassland	**2,473**
Indigenous Forest	316
Lake or Pond	5
Low Producing Grassland	**19**
Mangrove	18
Manuka and/or Kanuka	119
River	228
Short-rotation Cropland	**9**
Surface Mine or Dump	0
Transport Infrastructure	4
Urban Parkland/Open Space	8
TOTAL all Land owned by Council	3,857
Adjusted maximum area that could be planted?	**2,507**

Map 2 – Land owned by the council (in pink) in the Waikato region (showing potential sites 1,2,3)

40. Of all the land currently owned by council approximately 2,507 ha is land with some potential to be planted/restored back into native species to offset and reduce emissions. (see Map 3 below and Table 2 above).

Map 3 – Examples of potential planting sites on council owned land



41. Of the land with potential only a subset is likely to be both suitable and available in the short to medium term (next 5 to 20 years) to plant/restore due to a range of limiting factors including:
    - land suitability;
    - cost/benefit considerations (cost to plant and manage for restoration land relative to its carbon uptake potential and potential loss of current income such as from grazing licenses);
    - size and width of area to plant efficiency and to be eligible to generate carbon credits;
    - operational requirements (e.g. no planting on stop banks and restrictions on how much of the flood plain could be planted to allow water flows during floods);
    - existing encumbrances (e.g. council land with 5-year grazing licences with neighbouring farmers);
    - biosecurity considerations (e.g. risk of creating pest animal or weed corridors);
    - local political/neighbour considerations;
    - risks from sea level rise;
    - resources and capacity of the council to operate such a programme.

42. Most land owned by council is narrow strips of pasture between the flood banks and rivers as part of flood protection/drainage schemes as shown in Map 2 and Map 3 above.

43. Based on current modelling and assumptions (Appendix 1):

    - planting up to 1.4% of the 2,507 ha of suitable land owned by the council in native trees and shrubs (between 22 and 34 ha) is likely to be sufficient to achieve carbon neutrality for corporate emissions by 2050 and out years;

    - planting up to 9.6% of the 2,507 ha of land owned by the council in native tree and shrub species (between 140 and 240 ha) is likely to be sufficient to achieve carbon neutrality for corporate emissions and offset indirect public transport emissions.

44. The actual area in total needed to achieve 'carbon neutrality' by 2050 will depend on the emissions required to be offset, timing and rate of planting (area planted per annum) and density of planting (stems per ha) and the site conditions and management of the areas planted.

45. However, this rate and area of planting would not come anywhere close to offsetting indirect emissions from land drained by council infrastructure. The latter would require planting somewhere in the order of 80,000 ha over a 20-year period (31 times the area of all suitable land the council currently owns). This indicates it would be impractical to offset the current level of organic soil emissions indirectly associated with the councils' land drainage infrastructure. It is not a requirement of corporate carbon neutral certification to offset all indirect sources of emissions including from land drainage or associated with our suppliers. However, as a council we would want to show leadership and support and assist those entities who have these as direct sources of emissions to work toward reducing these emissions where practical.

Toolbox Options

Land choices for Nature + offsets

46. For the plan the proposal is to focus on restoring suitable land the council currently owns as there appears to be sufficient land available and suitable to offset both corporate and indirect public transport emissions from 2050. Other options were assessed and considered to be more challenging or expensive to implement in the short term. The range of options are detailed in Appendix 2.

Spectrum of Nature+ offset types

47. There is a spectrum of land treatment options available to council to establish a carbon offset through a land use change (see Figure 1 – below). For planting/restoration options, there is a trade-off between

the cost of establishment, carbon sequestration rates and income generating potential from other forest products and services relative to the initial and longer-term biodiversity benefits of the land use change.

48. Some planting options and their associated management regimes and costs are well understood and tested such as pine planting regimes for rotational harvest or to create permanent exotic carbon forests, Manuka management to maximise high value manuka honey production on larger blocks (<100ha blocks of mainly manuka) or planting native trees and shrubs to reestablish permanent native cover.

49. Some of the biodiversity and/or carbon benefits for other options are less certain or proven. These include biodiversity benefits of permanent transition forests starting with pine, or the carbon offsets provided by restoring wetlands or establishing blue carbon projects (by restoring seagrass beds or mangroves) on the coast.

50. In the case of wetland restoration on peat soils the major carbon benefit is likely to be reducing emissions associated with peat subsidence (oxidation) and not its modest carbon offset benefits given the assumed relatively slow annual rate of carbon sequestration of peat wetlands.

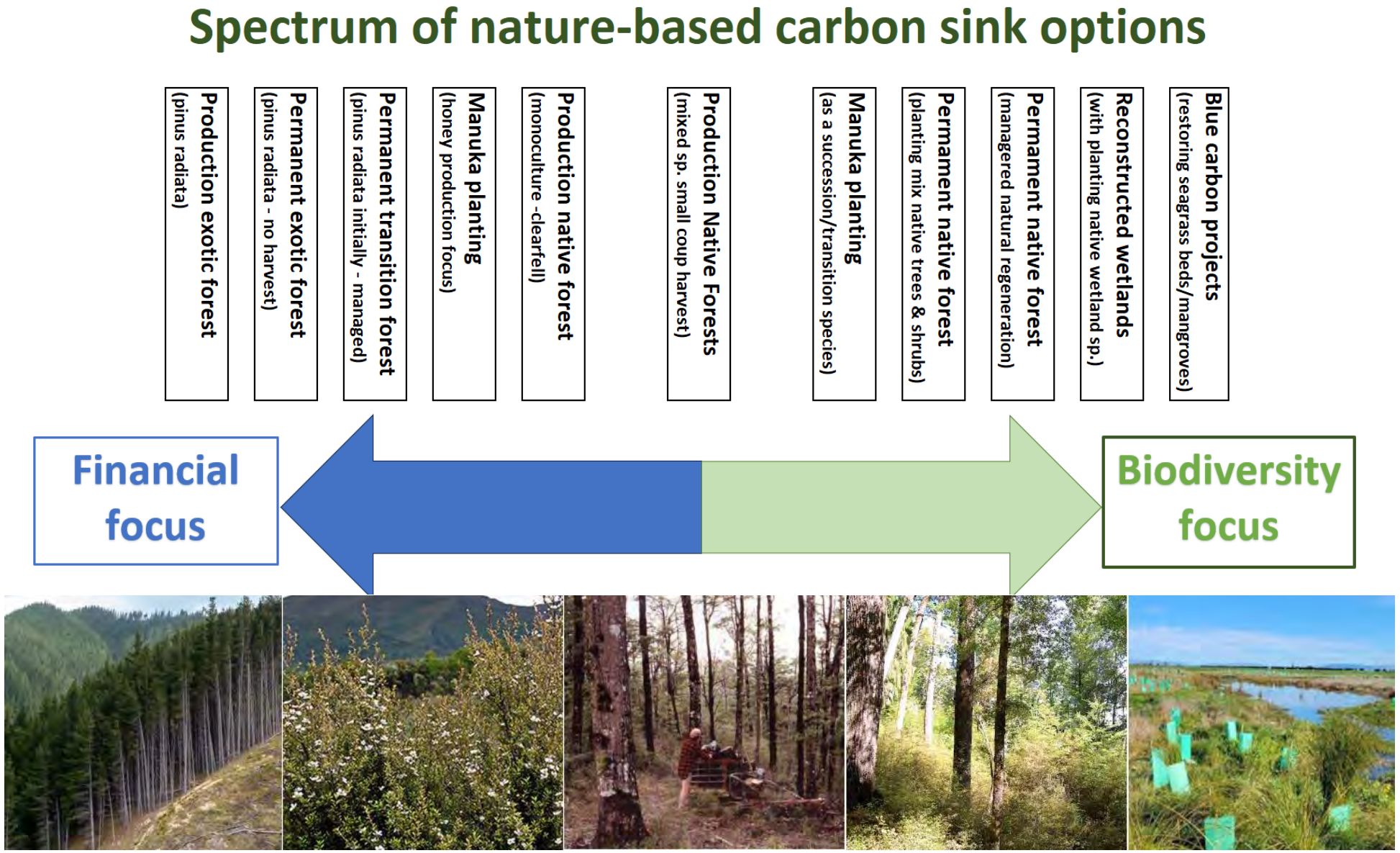
51. Most planting / restoration regimes that have primarily a financial return or carbon uptake focus are unlikely to also generate biodiversity credits. This is due to the likely requirements of potential buyers of such credits and the generally accepted integrity principles that apply to such markets including additionality, no double claiming and permanence. This assumes that the emerging domestic biodiversity credit market reaches sufficient scale to fund restoration projects.

52. For the initial stages of the plan the proposal is to focus on establishing Nature+ projects to generate carbon credits to be used as offsets using well established restoration methods with known carbon and biodiversity restoration benefits via restoration planting and assisted regeneration through enrichment planting, using a mix of native trees and shrubs.

53. If larger contiguous blocks (>100ha) for planting become available, consideration could be given to incorporating high value Manuka honey production into the planting regime to help offset costs. Due to current market conditions and a glut of lower grade honey larger contiguous areas of certain manuka varieties are generally needed to be economically viable.

54. We have found only unreliable estimates for the likely carbon uptake associated with rewetting peat soils and restoring wetlands and no New Zealand estimates for the likely carbon uptake from blue carbon restoration projects. The likely major benefit of restoring wetlands is not as a carbon offset but as a means of reducing land drainage emissions from peat soils – currently estimated at approximately 22 tonnes CO_2e per ha per annum. Blue carbon projects may also become viable in future as the science improves and a better understanding develops of the methodologies required and the costs and benefits of such projects.

Figure 1


Spectrum of nature-based carbon sink options
Production exotic forest (pinus radiata)
Permanent exotic forest (pinus radiata - no harvest)
Permanent transition forest (pinus radiata initially - managed)
Manuka planting (honey production focus)
Production native forest (monoculture -clearfell)
Production Native Forests (mixed sp. small coup harvest)
Manuka planting (as a succession/transition species)
Permanent native forest (planting mix native trees & shrubs)
Permanent native forest (managered natural regeneration)
Reconstructed wetlands (with planting native wetland sp.)
Blue carbon projects (restoring seagrass beds/mangroves)
Financial focus
Biodiversity focus

Options to support investment decision making

55. The council has in its document – 'Takatū Waikato - Making a stand for the Waikato' stated its strategic direction and priorities. The council's priorities are also directly influenced by its statutory functions and responsibilities under both resource management and local government legislation. As such there can be a broad range of drivers for council investment in nature-positive plantings.

56. The weight the council wishes to place on individual drivers is likely to have a material impact on the type of projects that will be considered and selected to provide carbon offsets depending upon what other co-benefits they also provide. The Nature Positive Priority Matrix, Figure 2 on the next page, lists some of these potential drivers that could be considered as part of project selection but makes no judgement on how these drivers should be prioritised.

Potential for significant changes to Government Policy

57. The coalition government has signalled some key legislative changes. This includes the likely extent of potential changes to the NZ-ETS, resource management legislation and in regards the content and implementation of current national direction including national policy statements (NPS) and national environmental standards (NES). Relevant NPS and NES include for freshwater management, indigenous biodiversity, highly productive lands, and plantation forestry. Changes to some of these policies and national direction could have a material effect in future on the approach the council should adopt, or methods used to achieve carbon neutrality.

Figure 2 - Nature+ priority matrix

NATURE POSITIVE PRIORITY MATRIX		Location of nature positive activity					
		WRC owned or aquired land			Other Land in partnership with landowner (not WRC)		
		Current WRC land (where practical and cost effective)	Strategically purchased land (prioritised) retained	Strategically purchased land that is onsold after planting using a revolving fund (carbon biodiversity credit sharing agreement)	Public land (conservation land, unallocated Crown land, foreshore/seabed, river/lake bed) (carbon biodiversity credit sharing agreement)	Private Freehold land (carbon biodiversity credit sharing agreement)	Maori land (te Ture Whenua land Act), settlement land and customary land (carbon biodiversity credit sharing agreement)
Driver for WRC investment in nature positive: planting and/or restoration and/or improved management	WRC carbon neutrality benefit (emissions offsets or reductions)						
	Regional sustainable low emissions economy benefit (emission offsets or reductions)	Note - based on regional priorities	Note - based on WRC priorities	Note - based on WRC priorities	Note - based on regional priorities	Note - based on regional priorities	Note - based on regional priorities
	Regional biodiversity benefit - (land, freshwater, coastal, marine)	Note - based on regional priorities	Note - based on regional priorities	Note - based on regional priorities	Note - based on regional priorities	Note - based on regional priorities	Note - based on regional priorities
	WRC / iwi Te Tiriti partnership benefit including WT claim settlement Act priorities	Note - based on iwi priorities - Waikato Settlement	Note - based on iwi priorities - Waikato Settlement		Note - based on iwi priorities	Note - based on iwi priorities	Note - based on iwi priorities
	Regional community resilience benefits	Note - based on regional priorities	Note - based on regional priorities	Note - based on regional priorities	Note - based on regional priorities	Note - based on regional priorities	Note - based on regional priorities
	WRC sustainable infrastructure benefit	Note - based on infrastructure priorities	Note - based on infrastructure priorities	Note - based on infrastructure priorities			
	Freshwater quality improvement benefits	Note - based on regional priorities			Note - based on regional priorities	Note - based on regional priorities	Note - based on regional priorities
	Financial co-benefits either through grant funding / coinvestment /additional income						

Key	Impact
Very High	
High	
Medium	
Low	

Required process to 'offset' emissions using carbon credits

58. The required process steps to generate then cancel carbon credits via the NZ-ETS to offset corporate or other emissions for carbon neutrality certification are detailed in Appendix 3. This uses the methodology required to generate then retire forestry carbon credits (NZUs) from post 1989 forestry activity using native species. A similar process would be required if carbon credits from the voluntary carbon market are generated and cancelled for carbon neutral certification.

Financial Requirements

59. For each nature+ planting projects that will generate carbon offsets there will be costs incurred to assess site suitability prior to planting approval.

60. As the plan is to plant areas of land already owned by the council the council is assumed to not incur the expense of acquiring land.

61. Once approved the total costs of planting to generate sufficient carbon credits to offset council emissions (and when those costs) will be incurred will depend on a range of generic and site-specific factors including:
    - Site preparation and initial planting rate per ha and the ratio of tree species vs shrub species e.g.
        - basic planting rates of 1,600 stems per ha or
        - higher density planting rates of 2,500 stems or more per ha;
    - Species and size/grade selection of nursery grown native trees and shrubs selected to be planted at each site (e.g. coastal forest species vs hill country species – and size grade of nursery grown plants);
    - Requirements (if any) for stock proof fencing;
    - Requirements for pest and weed control prior to planting;
    - Requirements (if any) for release of plants after establishment;
    - Site specific pest management requirements and choices (e.g. minimum management to support plant establishment versus ongoing management to support enhanced biodiversity outcomes);
    - Periodic monitoring and carbon certification costs to verify the carbon credits being generated from planting;
    - Other unforeseen or potential costs (such as re-establishment after wildfire or flood).

Indicative costs to offset corporate emissions by 2050

62. The following represents a desktop assessment of indicative costs to achieve carbon neutrality for corporate emissions by Nature+ planting projects on lands owned by the council. The area needed to be planted has been estimated at between 22 and 34 hectares (depending on planting density spread over 3 sites). The planting regime assumes planting a 20/80 mix of suitable native tree and shrub species at a density of either 2,500 stems per ha (22ha option) and 1,600 stems per ha (34ha option) both using smaller grade nursery stock. The area's management has been optimised for biodiversity outcomes and assumes periodic ungulate, possum and rat control.

63. The table below is indicative of the costs of establishment, management and verification to generate sufficient carbon credits to offset council corporate emissions. These indicative costs would be incurred over 25 years up to 2050 and are in 2024 - $NZ. Actual costs will be very site dependent, including the areas planted and the extent of active management for biodiversity outcomes post planting.

Table 3 – Indicative costs of Nature+ projects to achieve corporate carbon neutrality

Basic planting regime (34ha – 1600 stems per ha) – biodiversity focus

Basic planting regime	Hectares needed	34	Stems per ha	1,600			
Activity	**Specification**	**Cost per Day**	**Sites**			**Cost**	**Contingency**
Pre planting pest animal control	Site assessment & hare control 4 days per site	$1000 per day	site 1 site 2 site 3		$ $ $	4,000 4,000 4,000	15%
				Total	$	12,000	$ 13,800
Activity	**Specification**	**Cost per Ha**	**Area planted per yr**				
Native Planting (plant purchase and initial planting costs)	1,600 native sp. per ha (ratio 20% trees/80% shrubs)	$ 6,725.00	11.33 11.33 11.33	Year 1 year 2 year 3	$ $ $	76,217 76,217 76,217	30%
			34.00	Total	$	228,650	$ 297,245
		Cost per metre	**Metres**				
Contingency for fencing (if needed)	Stock proof post and batten fence	$ 27.10	800 800 800	Year 1 year 2 year 3	$ $ $	21,680 21,680 21,680	15%
Total			2,400	Total	$	65,040	$ 74,796
Post planting pest control - biodiversity focus							
possums /rats trap specificiation	traps at 100x100m grid	**cost per trap** $ 500	**no. of traps** 34	**for all sites**	**Trap Purchase** $	17,000	15%
Annual trap service costs		**Cost per ha** $ 30	**No of ha** 34	**No of years** 25	**Cost over 25 years** $	25,500	
Hare/deer control annual	2 days per site	**Cost per day** $ 1,000	**Days annually** 6	**no. of years** 24	$	144,000	
				Total	$	186,500	$ 214,475
Registration of site in NZ-ETS	per site (assumes 3 sites)	**Cost per site** $ 30.25	**no. of site** Site 1 Site 2 Site 3	**Costs over 25 years** 25 yrs 24 yrs 23 yrs	$ $ $	756 774 696	15%
				Total	$	2,226	$ 2,560
Carbon plot establishment	1 plot per 2 ha of planting	**Cost per plot** $400	**no. of plots** 6 5 6	year 1 year 2 year 3	$ $ $	2,400 2,000 2,400	15%
Total			17	Total	$	6,800	$ 7,820
Monitoring / carbon verification	Plots measured every five years	**Cost per plot** $ 400.00	**No of plots measured** 17 17 17 17 17	year 5 year 10 year 15 year 20 year 25	$ $ $ $ $	6,800 6,800 6,800 6,800 6,800	15%
			85	total	$	34,000	$ 39,100
				Indicative total costs over 25 years	**$**	**535,216**	**$ 649,796**

Table 4 – Indicative costs Nature+ projects for corporate carbon neutrality

Denser planting regime (22ha – 12,500 stems per ha) – biodiversity focus

Higher density planting	**Hectares needed**	22.00	**Stems per ha**	2,500			
Activity	**Specification**	**Cost per Day**	**Sites**			**Cost**	**Contingency**
Pre planting pest animal control	Site assessment & hare control 4 days per site	$1000 per day	site 1 site 2 site 3		$ $ $	4,000 4,000 4,000	15%
				Total	$	12,000	$ 13,800
Activity	**Specification**	**Cost per Ha**	**Area planted per yr**				
Native Planting (plant purchase and initial planting costs)	2,500 native sp. per ha (ratio 20% trees/80% shrubs)	$ 18,125.00	7.33 7.33 7.33	Year 1 year 2 year 3	$ $ $	132,917 132,917 132,917	30%
			22.00	Total	$	398,750	$ 518,375
Contingency for fencing (if needed)	Stock proof post and batten fence	**Cost per metre** $ 27.10	**Metres** 600 600 600	Year 1 year 2 year 3	$ $ $	16,260 16,260 16,260	15%
Total			1,800	Total	$	48,780	$ 56,097
Post planting pest control - biodiversity focus							
possums /rats trap specificiation	traps at 100x100m grid	**cost per trap** $ 500	**no. of traps** 21	**for all sites**	**Trap Purchase** $	10,500	
Annual trap service costs		**Cost per ha** $ 30	**No of ha** 22.00	**No of years** 25	**Cost over 25 years** $	16,500	15%
Hare/deer control annual	1.5 days per site	**Cost per day** $ 1,000	**Days annually** 5	**no. of years** 24	$	108,000	
				Total	$	135,000	$ 155,250
Registration of site in NZ-ETS	per site (assumes 3 sites)	**Cost per site** $ 30.25	**no. of site** Site 1 Site 2 Site 3	**Costs over 25 years** 25 yrs 24 yrs 23 yrs	$ $ $	756 774 696	15%
				Total	$	2,226	$ 2,560
Carbon plot establishment	1 plot per 2 ha of planting	**Cost per plot** $400	**no. of plots** 4 3 4	year 1 year 2 year 3	$ $ $	1,600 1,200 1,600	15%
Total			11	Total	$	4,400	$ 5,060
Monitoring / carbon verification	Plots measured every five years	**Cost per plot** $ 400.00	**No of plots measured** 11 11 11 11 11	year 5 year 10 year 15 year 20 year 25	$ $ $ $ $	4,400 4,400 4,400 4,400 4,400	15%
			55	total	$	22,000	$ 25,300
				Indicative total costs over 25 years	**$**	**623,156**	**$ 776,442**

Counterfactual costs of instead purchasing equivalent carbon credits (now or later)

64. These levels of planting (either 22ha at 2,500 stems per ha or 34ha at 1,600 stems per ha) planted over 3 years starting in 2026 have both been estimated to generate sufficient carbon credits (approximately 10,900 tonnes CO_2e) starting in 2026 to offset some of the current corporate emissions prior to 2050 and achieve full carbon neutrality from 2050 and outyears to at least 2075.

65. At current NZU prices ($53 tCO_2e) the cost to purchase equivalent carbon credit now would be $577,500 (10,900t x $53 tCO_2e)

[Note – the NZU price has dropped to $53 from a high of $88.50 in November 2022 due to current market uncertainty]

66. At the highest recent price of NZUs ($88.50 tCO_2e) the cost to purchase equivalent carbon credit would be $964,650 (10,900t x $88.50 tCO_2e)

67. The NZU price was modelled by the Ministry for the Environment to increase to NZ$144 by 2030 and to NZ$260 by 2050. At these prices the cost of purchasing equivalent carbon credits at 2030 or 2050 respectively would be between
    - $1,569,600 (10,900t x $144 tCO_2e)

    and
    - $2,834,000 (10,900t x $260 tCO_2e)

Case Studies

68. The following case studies have been developed and run through step 1 of the Nature + process framework based on real world possibilities as a mechanism to assess and demonstrate the likely costs and benefits (direct and indirect) and complexities of planting council land.

69. Case Study 1 – Kauaeranga Flood Plain - Nature positive planting of council owned riparian areas – Planting 16.7 ha proposed in this one case study by 2027 using higher density planting rates is estimated to be sufficient to offset 75% of corporate emissions by 2050. The potential for this site to generate carbon credits may be affected by future sea level rise and this will need to be further assessed. (see Appendix 4 - for full case study)

70. Case Study 2 - Neavesville Case Study – Nature positive planting of hill country land held for soil conservation purposes. Planting up to 70 ha (best case scenario) on a slow or fast track using either basic or higher density planting rates in a best-case scenario would be more than sufficient to fully offset corporate emissions by 2050 by itself and if combined with case study 1 would go a long way towards achieving carbon neutrality for both corporate and public transport emissions. Staff are seeking an emissions ruling from the Ministry of Primary Industries to resolve the question about how much (if any) of this site is eligible to generate carbon credits under the current rules of the NZETS (see Appendix 5 - for full case study)

71. Case study 3 - Piako River planting where the council has already planted 160k plants as riparian planting alongside the margin of the Piako River. This case study of current planting was assessed as ineligible to generate carbon credits under the current NZETS rules as the average width of planting is significantly less than 30 metres required to meet the definition of a post 1989 forest and as it would also fail the ‘additionality’ test for carbon offsets. (see Appendix 6 - for full case study)

Table 5 - Case study summaries

No	Case Study Name & area	Corporate Carbon Emissions Offset Opportunity	WRC Cost (Est over 25 years)	Counterfactual costs of buying equivalent NZU carbon credits at Nov 2022 price	Positives	Needs
1	Kauaeranga Flood Plain Near Thames 16.7 ha of 50 ha	**Basic regime** 1600 stems / ha = 50% of corporate emissions offset and biodiversity outcomes **Higher density planting** 2500 stems / ha = 75% of corporate emissions offset and biodiversity outcomes	**Basic regime cost (NZ$)** = $377,300 Carbon credits generated over 50 years = 5,403 tCO2e **Higher density Planting cost** = $624,794 Carbon credits generated (50yrs) = 8,441 tCO2e	(At NZU price $88.50 = $478,166 = $747,029	- Potential to offset majority of corporate emissions - Planned to be replanted 20 years ago - Likely community support - Council owned land - Biodiversity restoration and enhancement - Community recreation benefits - Longer term biodiversity credit opportunity	- Site visit to ground truth information and available planting area outside flood zone - Updated flood modelling required - Diversity of planting required - mix of riparian and saltmarsh planting, which will reduce the carbon offsets
2	Neavesville Road Near Thames 70 ha of 178 ha (best case scenario (likely less)	**Basic regime** 1600 stems / ha - 70 ha = all corporate emissions and 30% of corporate and public transport emissions combined offset and biodiversity outcomes **Higher density planting** 2500 stems / ha – 70ha = all corporate emissions and 50% of corporate and public transport emissions combined offset and biodiversity outcomes	**Basic regime cost NZ$** = $1,269,820 Carbon credits generated over 50 years = 21,446 tCO2e **Higher density Planting cost NZ$** = $2,307,220 Carbon credits generated (50 years) = 33,509 tCO2e	(At NZU price $88.50) = $1,897,970 = $2,965,550	- Potential to offset all corporate emissions and some public transport emissions - Council owned land - Soil and water protection - Linkage with Coromandel Forest Park - Biodiversity restoration and enhancement - Longer term biodiversity credit opportunity	- Site visit to ground truth information - ETS emissions ruling to verify eligibility required as some uncertainty of how much land would be eligible - Assessment of extent of enrichment planting needed to support natural regeneration - Decision on extent of ongoing pest management specifications for biodiversity outcomes
3	Piako River Green Corridor	None as less than 30 meters wide and would fail both NZETS eligibility and 'additionality' test for emissions offsets for carbon neutrality	Already Budgeted		- Planting already completed - On WRC land	- Completed and shared to show most WRC potential stop bank land and previous planting will not be eligible as carbon offsets unless scheme land is wider than 30 meters and planting is not BAU

Carbon neutrality verification

72. To ensure environmental credibility, organisations seeking carbon neutral certification are expected to be assessed by an independent third party that applies appropriate methodologies and carbon reporting standards. Currently the council's GHG emissions inventory is certified by Toitū–Envirocare.

73. Certification by Toitū in the run up to 2050 as part of the Council's Carbon Neutral framework would require the council to have a programme to report direct and indirect emissions over time and offset any remaining hard to reduce emissions to 2050 through the retirement of equivalent verified carbon credits that are recognised by Toitū as being of sufficient quality/integrity.

74. Council is currently registered with the Toitū Carbon-reduce programme and will need to move to the Carbon Net Zero programme when council has achieved carbon neutrality. This would become the long-term verification programme to uphold the council's carbon neutrality.

75. Once carbon neutrality has been achieved, council will be able to register any future generated carbon credits within the ETS scheme or Voluntary Carbon Market (depending on Toitu and MfE direction) whereby credits may be banked or sold in the future, creating an additional income to offset scheme planting costs.

76. When the biodiversity credit market becomes more established (see paragraph 104 below) council will look to register biodiversity credits from any viable schemes accordingly. EKOS are currently developing a platform to work within biodiversity credits market and council will investigate this further as an option for registering future biodiversity credits.

Other areas of complexity and uncertainty

77. Through the development of the plan and associated modelling, several other areas of complexity and uncertainty were identified, some of which required resolution to ensure the framework works efficiently and effectively. These are described in greater detail at Appendix 2.

Whakakapinga | Conclusion

78. The project team has developed a suitable framework and plan that provides a viable path for the council to achieve carbon neutrality by 2050. This includes its emissions reduction pathway out to 2050 and in investigating opportunities and projects that would if implemented enable the council to mitigate its more difficult emissions while also achieving other nature positive environmental co-benefits.

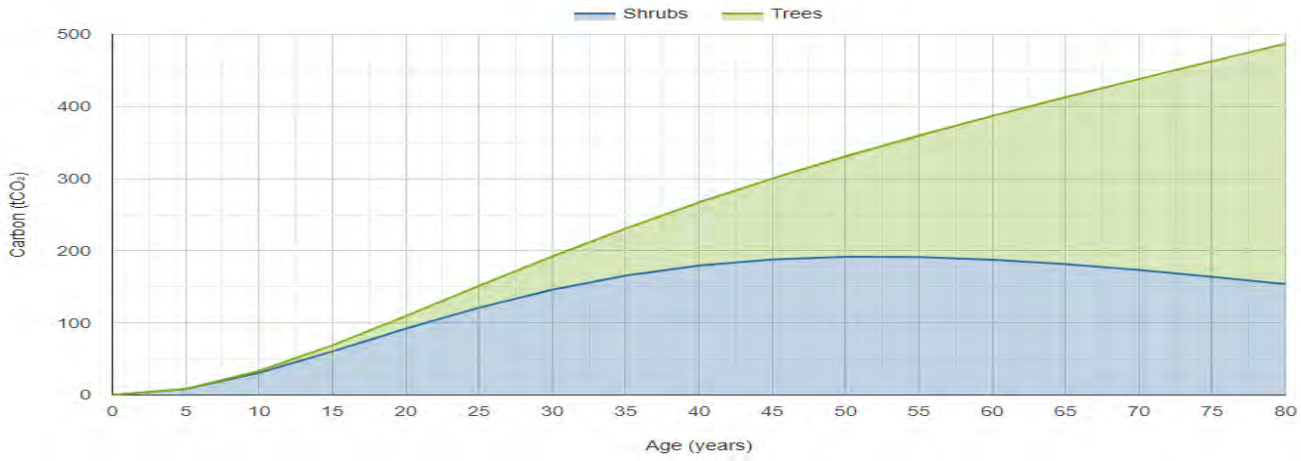
79. This is likely to require ongoing involvement of councillors and stakeholders as the framework and plan is implemented to help choose which projects to implement to achieve carbon emissions neutrality in a nature positive and financially sustainable way.

Appendix 1 - Modelled carbon sequestration rates

80. Carbon sequestration estimates for Nature+ carbon offsets have been modelled using carbon uptake tables derived from the Tāne's Tree Trust Planted Native Forests Carbon calculator. The calculator draws on scientifically robust data from Tāne's Tree Trust Indigenous Plantation Database to provide realistic expectations for plantings native species.

81. Modelling to date has assumed either one of two planting regimes:
    - basic restoration planting regime of 1,600 stems per ha of a ratio of 20% native trees and 80% native shrubs planted on average sites generating an average of 6.6 tonnes/ha/yr. (see graph 3 below); or
    - a higher density planting regime of 2,500 stems per ha of a ratio of 20% native trees and 80% native shrubs planted on average sites generating an average of 10.3 tonnes/ha/yr. (see graph 4 below)

Graph 3 – Basic Nature + Planting Regime (1,600 stems per ha)
cumulative carbon removals after 50 years = 331.0 tonnes CO_2e per ha
carbon removals per year (averaged over first 50 years) = 6.6 tonnes CO_2e per ha per year



Graph 4 – Higher Density Nature+ Planting Regime (2,500 stems per ha)
cumulative carbon removals after 50 years = 517.2 tonnes CO_2e per ha
carbon removals per year (averaged over first 50 years) = 10.3 tonnes CO_2e per ha per year

82. We have found only unreliable estimates for the likely carbon uptake associated with rewetting peat soils and restoring wetlands and no NZ estimates for the likely carbon uptake from blue carbon restoration projects. The likely major benefit of restoring wetlands is not as a carbon offset but as a means of reducing land drainage emissions from peat soils – currently estimated at approximately 22 tonnes CO_2e per ha per annum. Blue carbon projects may become viable in future as the science improves and a better understanding develops of the methodologies, costs and benefits of such projects.

Planting requirements to offset council direct and indirect emissions from 2050

83. A carbon neutrality model (the model) has been developed to estimate the likely area of planting needed to offset annual emissions from 2050 depending on the timing, rate and density of native planting, and which emissions the council targets to offset.

Modelled results - carbon neutrality for core corporate emissions

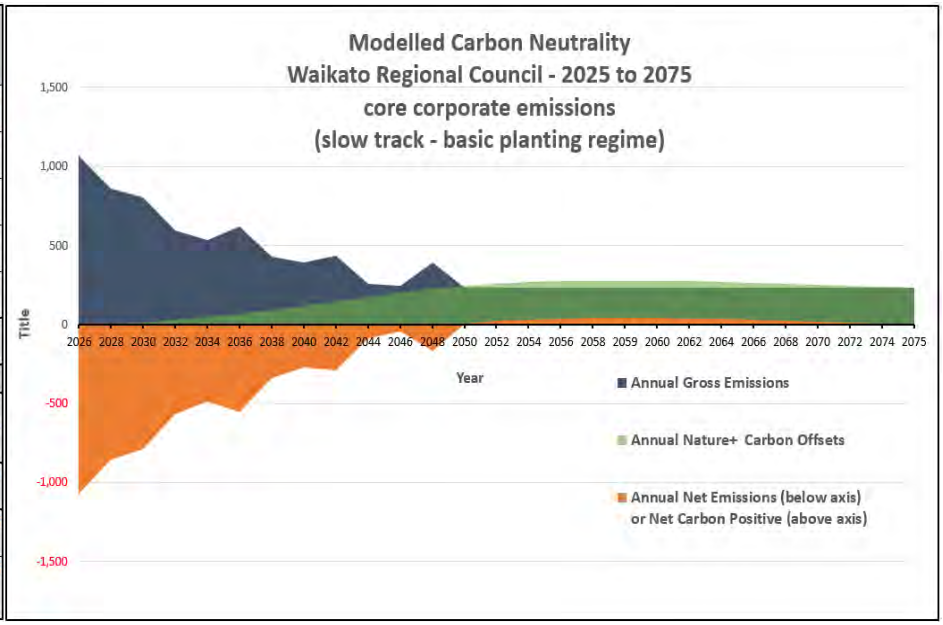
84. Current corporate emissions (excluding public transport and land drainage) have been projected to decline by 80% from approximately 1,175 tonnes CO_2e in 2025 to approximately 235 tonnes CO_2e in 2050. (See emissions projections in Graph 1 page 10.)

85. The model estimates that to offset corporate emissions by 2050 would require planting
- (slow track) – 20 years of annual planting of small areas using native species at a rate of 1.1 to 1.7 ha of suitable land annually (22 to 34 ha in total) starting in 2025 (see Graph 5 for model projections below)

  or
- (quick start) – initial planting of much larger areas with native species – 20 to 30 ha planted in total by end of 2027.

Graph 5 - Offsetting Corporate Emissions – basic planting regime

Carbon neutrality model	
Projected annual gross emissions at 2050 (tCO2e)	235
Projected annual net emissions or net carbon + at year 2050	8
Ha needed to be planted annually starting 2025	1.7
Years of planting required	20
Total Ha planted	34
Annual emissions neutrality achieved from year	2050
Assumptions:	
Planting regime	20% native trees 80% native shrubs average site
Stems per Ha	1,600
% carbon offsets used annually from 2050	100%
% of available carbon offset used annually prior to 2050	100%



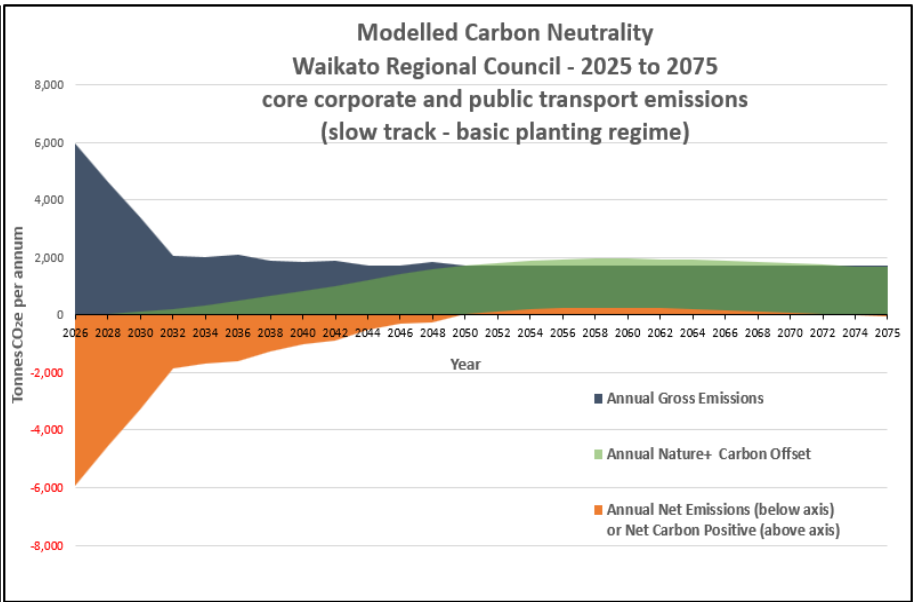
Modelled results - Carbon neutrality for both corporate and public transport emissions

86. Combined current corporate emissions and public transport emissions have been forecast to decline 74% from approximately 6,621 tonnes CO_2e in 2025 to approximately 1,699 tonnes CO_2e in 2050. (See emissions projections in Graph 1 page 9.)

87. The model estimates that to offset both corporate and public transport emissions by 2050 would require planting
    - (slow track) – 20 years of planting smaller areas using native species at a rate of 7.7 to 12 ha of suitable land annually (154 to 240 ha in total) starting in 2025 (see Graph 6 below);
      or
    - (quick start) – initial planting of much larger areas with native species – 140 to 220 ha planted in total by end of 2028.

Graph 6 - Offsetting Corporate and Public Transport Emissions – basic planting regime

WRC Carbon neutrality model (gross WRC direct and indirect emissions including Public Transport but excluding Land Drainage)	
Projected annual gross emissions at 2050 (tCO2e)	1,699
Projected annual net emissions or net surplus at year 2050 (tCO2e)	16
Ha needed to be planted annually starting 2025	12.0
Years of planting required	20
Total Ha planted	240
Annual emissions neutrality achieved from year	2050
Assumptions:	
Average planting regime assumed	20% native trees 80% native shrubs Average site
Stems per Ha	1,600
% of available carbon offset used annually prior to 2050	100%
% carbon offsets used annually from 2050	100%



88. At these planting rates annual carbon neutrality for both these sources of emissions are modelled to be achieved from 2050 (the year when the model indicates annual net emissions represented by the orange area on Graph 6 rises above the x axis representing a change to a net surplus of carbon credits over emissions).

Modelled results - Carbon neutrality for council corporate, public transport and land drainage emissions

89. To offset by 2050 all council linked emissions including the major emissions arising from the drainage of peat soils by council infrastructure would require an order of magnitude greater area of planting. Even with enriched planting the carbon model indicates necessary planting rates in the order of 4,000 ha annually over 20 years (80,000 ha in total) starting in 2025 to offset these types of emissions. This is equivalent to 2 ha of land converted to forest for every ha of peat soils drained.

90. This modelling clearly identifies the major challenge it would be to try and offset current rates of land drainage emissions linked to council drainage infrastructure by 2050, but the more realistic prospect of offsetting both corporate emissions and emissions arising from the council's corporate functions and role

in public transport. It is not a requirement for council to offset all indirect sources emissions, just direct and indirect corporate emissions, to be recognised as carbon neutral.

Appendix 2 - Areas of complexity and uncertainty

Data limitations.

91. Both emissions projections, financial modelling, and the potential for different planting regimes to sequester carbon over time are influenced by a range of key assumptions and uncertainties including how much and what type of land is available, future climate conditions, the mix of planting options adopted, future carbon and biodiversity credit prices and other costs like the cost of labour to plant, manage and verify planting/restoration outcomes.

92. There are also a range of uncertainties in any modelled projections both in relation to emissions reductions and carbon sequestration. To claim carbon offsets at scale the outcome of planting would need to be verified by appropriate ground truthing using accepted methodologies and not just rely on modelled estimates.

Likely barriers/risks to land use change

93. In the case of planting trees species in flood plains owned by the council the barriers could also relate to operation restrictions on how flood plains are required to operate, and which parts can't be planted with tree species so as not to interrupt flood flows or cause problems downstream.

94. Many of the pasture areas within flood plains owned by the council have five yearly grazing leases with neighbouring farmers. These and other possible encumbrances may also complicate or delay any planting projects in such areas in the short to medium term as well as affect the costs and benefits of such planting.

95. There may also be concerns about converting pasture to forest cover if this takes land out of agriculture production or increases biosecurity concerns over the possibility of weeds and pest animal numbers building up or transiting through the planted areas.

Financial vs economic modelling – capex vs opex / costs vs benefits

96. The mix of planting on future potential acquired land or in partnership with other landowners will have a major influence on the extent to which the projects would require both capital and operating funds or just operating expenditure. Financial modelling will allow forecasting of expected financial costs and potential income streams but won't value the non-market economic benefits of some options.

97. In principle, the decisions about whether and how to undertake projects are not dissimilar to the type of projects that the council's Infrastructure Strategy and Sustainable Infrastructure Decision-making Framework (SIDF) are intended to assist with. A dynamic relationship is required between the SIDF process whereby the Nature + framework can be incorporated and used to help calculate where nature-based solutions are feasible, and the carbon and biodiversity credits can be assessed and accounted for.

Finding funding partners

98. Some of the future potential carbon offset projects may require additional funding partners. Depending upon the funding partners motivations for financially supporting council projects on their land and the benefit sharing arrangement negotiated, this may dilute the carbon benefits that projects generate for council. This downside might still be balanced by a wider range of public benefits such as improved water quality and biodiversity.

99. However, this may be less of an issue if the funding support is philanthropic in nature e.g. grant funding or is intended to deliver other outcomes for the partner such as protecting Crown infrastructure, or to

support managed retreat, or to retire land that is no longer viable for its current use because of other considerations.

Finding land partners for carbon sharing agreements

100. In the future where council might partner with landowners, the challenge may be identifying appropriate landowners and negotiating agreement with those owners on planting regimes and benefit sharing arrangements that provide sufficient motivation and a value proposition to the landowner to agree to the land use change away from pasture and which also delivers sufficient carbon and biodiversity benefits to council.

101. There is also the added uncertainty about lack of control over the long-term management of planted areas in non-council ownership and how that might affect the projects potential to sequester carbon and deliver other environmental services including biodiversity restoration.

Toolbox - land choice options to establish carbon offsets (or to reduce emissions)

102. The categories of land considered that could potentially be planted / restored by the council alone or in partnership with others to generate carbon (and biodiversity) credits included:

- land currently owned by the council, which is the preferred option.
- blocks of land strategically purchased by the council or gifted to the council for the purpose of retiring/planting or acquired by the council for another reason (e.g. to avoid the need to replace, maintain or install flood protection/drainage infrastructure.) Once planted the council would retain long term ownership and receive the full carbon and biodiversity credit benefits of any planting regime.
- land acquired using a revolving land protection fund for on-sale after planting (with credit sharing and protection covenants as a condition of resale with the future owner).
- other lands in partnership with its owner such as the Crown, Territorial Authorities, private or Māori owners - with carbon credit benefit sharing agreements (and potentially biodiversity credit agreements).

Likely barriers/risks to land use change

103. Generally, most types of significant land use change require either regional and/or district council consent depending upon the operative land use rules in play at the regional and district level as well as relevant national policy statements. The extent to which this is likely to be a significant barrier or risk (due to time delays or cost) will depend on the location and scale of the project, the nature of its environmental and other effects and how any negative effects can be avoided, remedied, or mitigated. The views of interested/affected parties with 'standing' to support or object to the granting of any needed consent may also have an influence on how significant a barrier this could be.

Immaturity of the biodiversity credits market in New Zealand

104. The international markets and standards for biodiversity credits are still at a relatively early stage of development. While there have been a very small number of sales of biodiversity credits in the voluntary biodiversity credit market in New Zealand this market is still relatively unproven. The previous Government released a discussion document exploring the potential for a government to influence the development of a biodiversity credit system in New Zealand prior to the 2023 election. https://consult.environment.govt.nz/biodiversity/nz-biodiversity-credit-system/

105. Both the Waikato Regional Council and Te Uru Kahika made submissions on this discussion document supporting the development by Government of a biodiversity credit system for New Zealand.

106. The incoming Government has yet to release the results of consultation on that document and its position on supporting the development of this market either via funding, policy, or regulation. As such there remains considerable uncertainty how important this market may become over time and the role it could play to support land use change involving nature-positive planting regimes.

Appendix 3 - process to offset emissions using carbon credits

Below are the steps required for the council to generate and then use NZUs (carbon credits generated from post 1989 forestry activities under the New Zealand emissions trading scheme (NZ-ETS) to offset emissions to achieve carbon neutral status.

Step 1. Create an account in the NZ-ETS Register.

Step 2. Determine eligibility - assess whether the land to plant/restore is eligible to generate forest removals as a post-1989 forest. May require MPI ruling.

Step 3. If eligible register the land for the NZ-ETS and map the land to be planted/restored.

Step 4. Undertake forest activities on the land – planting/restoration to generate carbon credits.

Step 5. Data collection – measure and verify carbon removals periodically (e.g. every 1 to 5 years) by plot field measurement or other approved approaches.

Step 6. Seek issuance of NZUs for the verified removals to the councils ETS account.

Step 7. Determine level of emissions to be offset (Tonnes CO2e) annually from a specified date.

Step 8. Voluntary cancel equivalent NZUs from the councils account to claim the carbon offset. (This means these NZUs cannot be sold or used again, ensuring the emissions reduction is permanent.)

Step 9. If needed – ensure that either cancelled NZUs cannot still be 'double claimed' by the New Zealand Government as a contribution towards New Zealand's NDC – to avoid double counting or disclose that the units are still counted by the New Zealand Government against its NDC[8] when seeking carbon neutral certification.

Step 10. Record and report - keep records of the retirement of NZUs and report it as part of the council's sustainability efforts or carbon footprint reduction / carbon neutral strategy.

Step 11. Hold or sell remaining surplus NZUs not needed to retire to offset emissions.

For carbon credits generated via the voluntary carbon market the process is likely to be similar although eligibility, measurement and verification rules will be determined by the relevant market requirements.

[8] Interim guidance for voluntary climate change mitigation – Ministry for the Environment - 2022

Appendix 4 – Case Study 1 -Kauaeranga flood plain

Disclaimer

The following desktop case study is a concept only and is assumption driven due to information limitations and has not been ground-truthed for practicality, affordability, or fatal flaws.

Proposal

Planting of scheme land owned by Waikato Regional Council on the flood plain at the mouth of the Kauaeranga River by Thames.

Background

A planting proposal for flood control scheme land alongside the margin of the Kauaeranga River was first put forward in 2006 by community interests under the umbrella of the wider project "Biodiversity implementation on Scheme Land". The proposal was intended to capitalise on the opportunities for significant biodiversity and recreational gains to be made by utilising land already owned and managed by council (principally as leased grazing land). The genesis of the earlier project was driven principally by the local branch of the Royal Forest and Bird Protection Society on behalf of the Thames community and with the support of the Thames Community Board and Thames Coromandel District Council. The original proposal did not progress beyond the original concept. The original project is being reassessed in the context the council's current push to develop nature positive carbon offsets.

Primary Opportunities/Benefits

Provision for Carbon Offsets	Medium	Assumes average growing conditions
Potential for regional biodiversity benefits	Medium	Connects to estuarine and coastal biodiversity
Potential for biodiversity credits	Uncertain	Dependent on development of the market.
Potential for community recreation opportunities	Medium	Near Thames

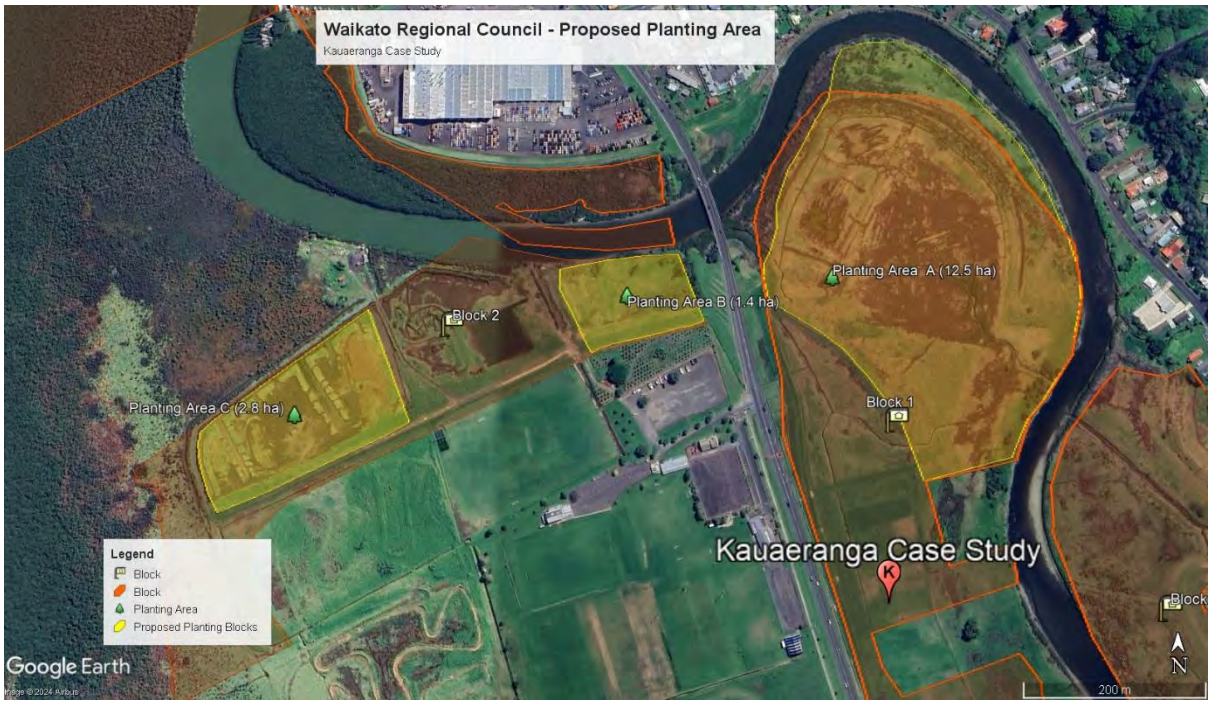
Location

The Waikato Regional Council owns approx. 50 ha near the mouth and straddles the true left and right banks of the Kauaeranga River at Thames as part of scheme land (see Maps 1 and 2 – Site 1). The potential planting site lies on river terraces/flood plains and riparian margins along the lower reaches of the Kauaeranga River.

Map 1 - Site 1 Kauaeranga

Map 2 – Site 1 Kauaeranga flood plain

Map 3 – Land blocks currently and soon to be owned by the Council



Ownership

Block 1 (Map 3) below is registered as owned by the Waikato Regional Council

Block 2 (Map 3) below will be owned by the Council and is awaiting transfer of the Land title to the Council.

As part of scheme land for flood protection the Waikato Regional Council owns blocks of land on both sides of the Kauaeranga River and will have a further block transferred to it soon. The total area including the new block is approximately, 50 hectares. Large areas of these blocks are bare land except for areas of mangrove at the river mouth (see map 3).

Land available to plant

Planting on parts of this scheme land is likely to be constrained by flood flow requirements, maintenance of access to neighbouring properties and location of flood protection berms/embankments.

For the purposes of this case study planting has been restricted to bare Council land either under poor or good pasture and saline vegetation within the embankment area at the sites originally proposed for planting in 2006. Three areas could be planted for a total of 16.7 ha as shown on Map 4 below.

Area A = 12.5 ha
Area B = 1.4 ha
Area C = 2.8 ha

There may also be opportunities to plant further areas of the 50 hectares owned by council subject to design and operational considerations.

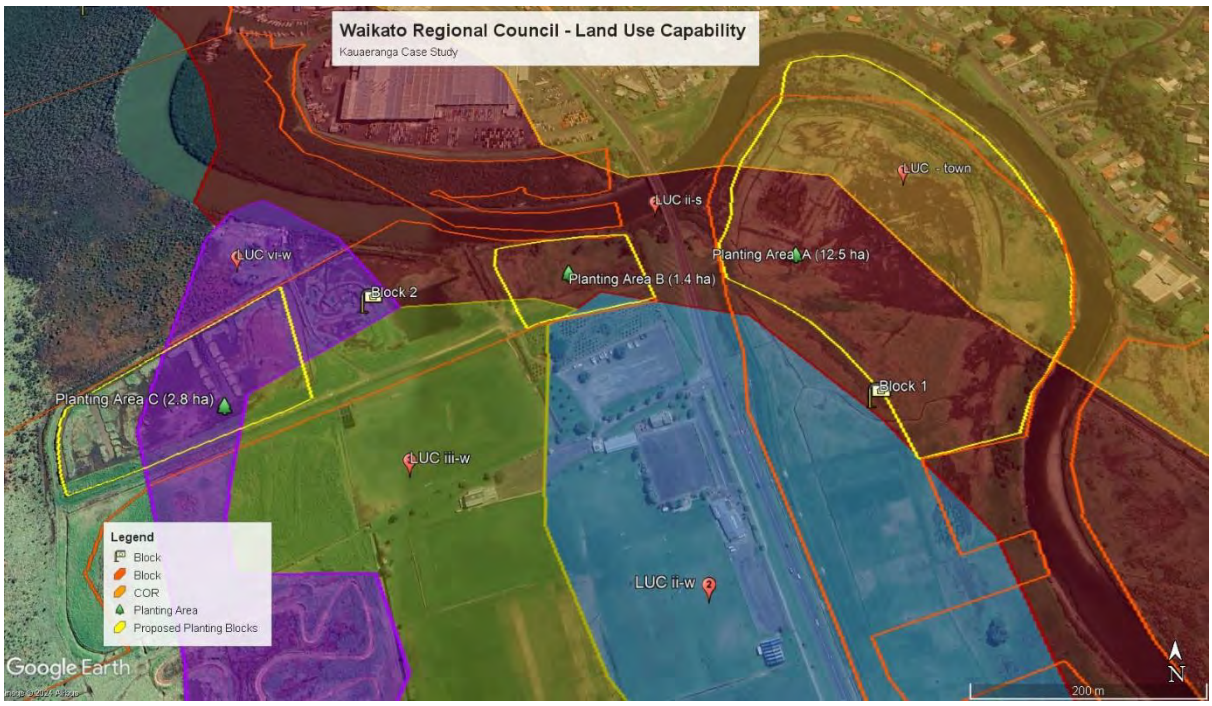
Map 4 – Potential planting areas (as originally proposed in 2006)

Current land use and suitability

Map 5 – current land cover (Land Cover Database LCDB version 5)

- Herbaceous Saline vegetation (Blocks 1 & 2)
- Low producing exotic grasslands (Block 1)
- High producing exotic grasslands (Block 2)

Map 6 – current land use capability



Land Use Category
LUC – ii-w (wetness limitation)
LUC – ii-s (soil limitation)
LUC – iii-w (wetness limitations)
LUC - 6 w (wetness limitations)
LUC – town

SMAP (soils type):

The property comprises primarily gley soils.

Current vegetation cover

Block 1 - wetland areas contain a mix of native-dominated and exotic vegetation types. The larger wetland area (A) west of the road is a mosaic of fen, marsh, and swamp (MW Landcare Research 2020) (refer images below).

Figure 1 ICM Priority Biodiversity Site WhPk-022 which covers the largest proposed planting site (A) in this Case Study. (TOP photo Biospatial_20170224_S2969; BOTTOM photo ARCPro NZ Imagery basemap)

Figure 2 Planting Areas B and C (Biospatial_20170226_U2657)

Key Risks

	Prep treatment score	**Post Treatment Score**	**Treatment**
Fire risk	Medium	Medium	
Flood risk	Medium/High	Medium/High	
Planting failure	Medium	Low	
Impact of animal pests	High	Low	
Fails eligibility test for carbon credits	Low	Low	
Groundwater salinity risk from sea level rise	Medium/High	Medium/High	Monitor and plant selection
Lack of community and iwi support	Medium	Low	Requires proper engagement and consultation

Regulatory Restrictions on changing land use

- Resource consent is unlikely to be required for restoration planting of this area.
- Public engagement will be required to gauge current community support for this restoration project.
- Iwi will need to be engaged, be consulted, and invited to be involved in this restoration project.

Key assumptions

- Land transfer of block 2 to Waikato Regional Council is completed.
- Suitable plants/tree species are available.
- Planting survival rates are acceptable.
- Council has freedom to operate.
- Community and Iwi supports this restoration project.
- Planning restrictions will be minimal.
- Carbon sequestration can be recognised either via the compliance and/or voluntary carbon market.
- Costs are acceptable and funding is available.
- Rewilding may also generate biodiversity credits as the biodiversity credit market matures.

Indicative Carbon Offset Potential

Planting trees and shrubs on bare land to re-establish riparian forest via the creation and enhancement of wetland areas. Only species true to the ecologic region will be used for this site.
Total Area to plant with trees and shrubs = 16.7 ha

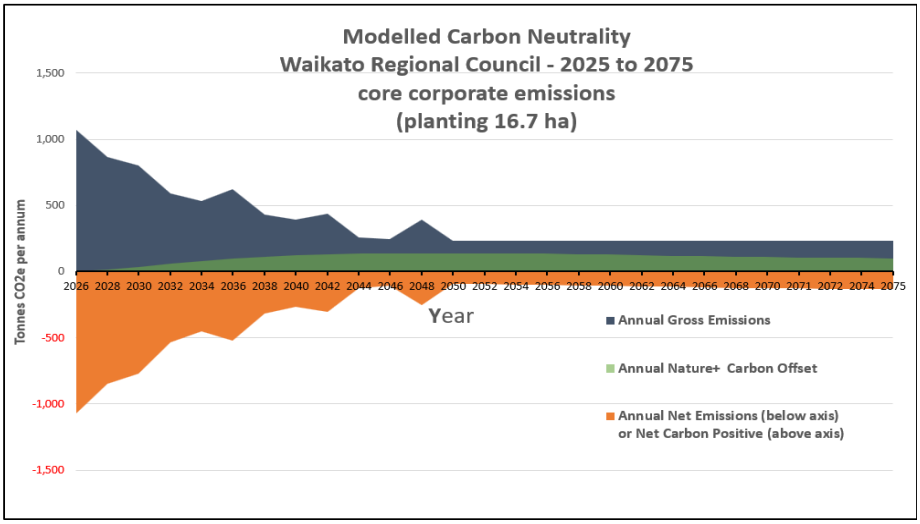
Planting area A planted in 2026 = 12.5 ha
Planting areas B and C planted in 2027 = 4.2 ha

Planting treatment:
Limited site preparation required.
Only limited fencing is required.
Site condition – average.

Contribution to offsetting Core Corporate Emissions

Basic planting regime (1,600 stems per ha)
Planting 80% shrubs and 20% larger grade mixed native/long lived tree species, all planted at 2.5m spacings (1600 stems per hectare) is estimated to generate the following carbon.

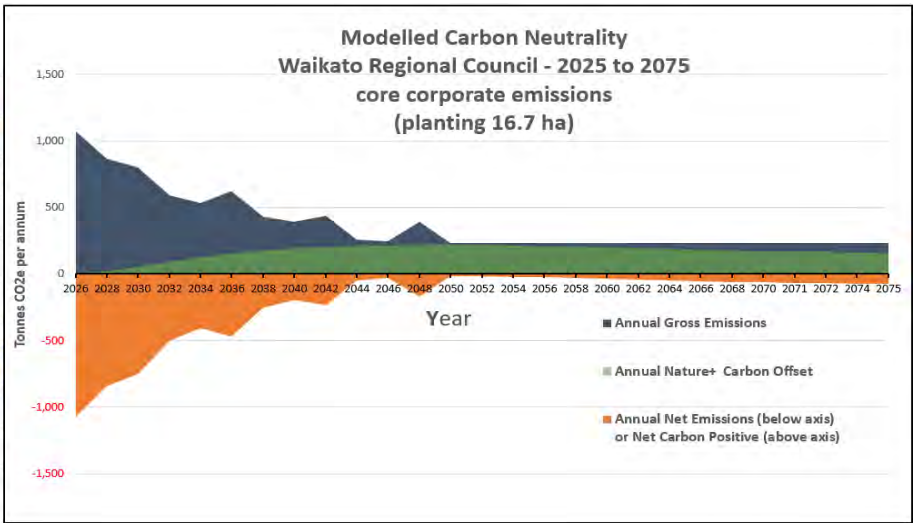
Carbon neutrality model	
Projected annual gross emissions at 2050 (tCO2e)	235
Projected annual net emissions or net surplus at year 2050 (tCO2e)	-95
Planting started	2026
Years of planting required	2
Total Ha planted	16.70
Annual emissions neutrality achieved from year	2050
Assumptions:	
% of available carbon offset used annually prior to 2050	100%
% carbon offsets used annually from 2050	100%
Stems per Ha	1,600
Average planting regime assumed	20% native trees 80% native shrubs Average site



Based on modelled sequestration rates for a basic planting regime for 16.7 ha over two years starting in 2026 would offset around half of the council's core corporate emissions from 2050. At this basic planting rate approximately the same area again on this site or elsewhere would need to be planted to achieve full emissions neutrality for corporate emissions.

Enriched planting rate (2,500 stems per ha)
Planting 80% shrubs and 20% larger grade mixed native/long lived tree species, all planted at 2 metre spacings (2,500 stems per hectare).

Carbon neutrality model	
Projected annual gross emissions at 2050 (tCO2e)	235
Projected annual net emissions or net surplus at year 2050 (tCO2e)	-16
Planting started	2026
Years of planting required	2
Total Ha planted	16.70
Annual emissions neutrality achieved from year	2050
Assumptions:	
% of available carbon offset used annually prior to 2050	100%
% carbon offsets used annually from 2050	100%
Stems per Ha	2,500
Average planting regime assumed	20% native trees 80% native shrubs Average site



Based on modelled sequestration rates for enriched planting of 16.7 ha over two years starting in 2026 would offset approximately 75% of the council's core corporate emissions from 2050. At an enriched planting rate, a further 5.3 ha planted on this site or elsewhere would need to be found to achieve full carbon neutrality for corporate emissions.

Recreation use potential

The original proposal included provision for walking tracks to facilitate community use of the area that is restored to lowland riverine vegetation.

Recreational tracks are part of planting plan to facilitate public use and enjoyment. Tracks could be separately funded by either community groups or via grants.

Indicative Cost of offset – basic planting regime

(managed for carbon and biodiversity outcomes)

The tables below are indicative of the costs of establishment, management and verification to plant the 16.7 hectares. Table 1 is the planting and biodiversity management costs of planting at 1,600 stems per ha. Table 2 is the planting and biodiversity management costs of planting at the higher density of 2,500 stems are ha.

These indicative costs would be incurred over 25 years up to 2050 and are in 2024 - $NZ. Actual costs will be site dependent, including the areas planted and the extent of active management undertaken for biodiversity outcomes post planting.

Table 1 - Costs of basic planting regime (1,600 stems per ha) managed for both carbon and biodiversity outcomes (costs incurred over 25 years)

Activity	Specification	Cost per Day	Sites		Cost	Contingency
Pre planting pest animal control	Site assessment & hare control 4 days per site	$1000 per day	site 1 & 2		$ 4,000	15%
				Total	$ 4,000	$ 4,600
Activity	**Specification**	**Cost per Ha**	**Area planted per yr**			
Native Planting (plant purchase and initial planting costs)	1,600 native sp. per ha (ration 20% trees/80% shrubs)	$ 6,725.00	12.50 4.20	Year 1 year 2	$ 84,063 $ 28,245 $ -	30%
			16.7	Total	$ 112,308	$ 146,000
		Cost per metre	**Metres**			
Contingency for fencing (if needed)	Stock proof post and batten fence	$ 27.10	1000 0	Year 1 year 2	$ 27,100 $ -	15%
Total			1,000	Total	$ 27,100	$ 31,165
Post planting pest control - biodiversity focus						
possums /rats trap specificiation	traps at 100x100m grid	**cost per trap** $ 100	**no. of traps** 18	**for all sites**	**Trap Purchase** $ 1,800	
Basic pest control - possum /rat service costs	Traps services 3 times a year	**Cost per ha** $ 30	**No of ha** 20.0	**No of years** 75	**Cost over 25 years** $ 45,000	15%
Enhanced pest animal control	Augment bait stations with trapping for rats and [illegible]	$ 200	20.0	25	$ 100,000	
Hare year 1 and yr 2 annua	2 days per site	**Cost per day** $ 1,000	**Days annually** 2	**no. of years** 2	$ 4,000	
				Total	$ 150,800	$ 173,420
Registration of site in ETS	per site (assumes 3 sites)	**Cost** $ 30.25	**no. of sites** Site 1 & 2	**Costs over 25 years** 24	$ 726	15%
				Total	$ 726	$ 835
Carbon plot establishment	1 plot per 2 ha of planting	**Cost per plot** $400	**no. of plots** 8	year 2	$ 3,200 $ -	15%
Total			8	Total	$ 3,200	$ 3,680
Monitoring / carbon verification	Plots measured every five years	**Cost per plot** $ 400.00	**No of plots measured** 8 8 8 8 8	year 5 year 10 year 15 year 20 year 25	$ 3,200 $ 3,200 $ 3,200 $ 3,200 $ 3,200	10%
			40	total	$ 16,000	$ 17,600
				Indicative total costs over 25 years	**$ 314,134**	**$ 377,300**

Table 2 - Costs of a higher density planting regime (2,500 stems per ha) managed for both carbon and biodiversity outcomes (costs incurred over 25 years)

Activity	Specification	Cost per Day	Sites		Cost	Contingency
Pre planting pest animal control	Site assessment & hare control 4 days per site	$1000 per day	site 1 & 2		$ 4,000	15%
				Total	$ 4,000	$ 4,600
Activity	**Specification**	**Cost per Ha**	**Area planted per yr**			
Native Planting (plant purchase and initial planting costs)	2500 native sp. per ha (ration 20% trees/80% shrubs)	$ 18,125.00	12.50 4.20	Year 1 year 2	$ 226,563 $ 76,125 $ -	30%
			16.7	Total	$ 302,688	$ 393,494
Contingency for fencing (if needed)	Stock proof post and batten fence	**Cost per metre** $ 27.10	**Metres** 1000 0	Year 1 year 2	$ 27,100 $ -	15%
Total			1,000	Total	$ 27,100	$ 31,165
Post planting pest control - biodiversity focus						
possums /rats trap specificiation	traps at 100x100m grid	**cost per trap** $ 100	**no. of traps** 18	**for all sites**	**Trap Purchase** $ 1,800	15%
Basic pest control - possum /rat service costs	Traps services 3 times a year	**Cost per ha** $ 30	**No of ha** 20.0	**No of years** 75	**Cost over 25 years** $ 45,000	
Enhanced pest animal control	Augment bait stations with trapping for rats and mustelids (and other pest animals as required).	$ 200	20.0	25	$ 100,000	
Hare year 1 and yr 2 annua	2 days per site	**Cost per day** $ 1,000	**Days annually** 2	**no. of years** 2	$ 4,000	
				Total	$ 150,800	$ 173,420
Registration of site in ETS	per site (assumes 3 sites)	**Cost** $ 30.25	**no. of sites** Site 1 & 2	**Costs over 25 years** 24	$ 726	15%
				Total	$ 726	$ 835
Carbon plot establishment	1 plot per 2 ha of planting	**Cost per plot** $400	**no. of plots** 8	year 2	$ 3,200 $ -	15%
Total			8	Total	$ 3,200	$ 3,680
Monitoring / carbon verification	Plots measured every five years	**Cost per plot** $ 400.00	**No of plots measured** 8 8 8 8 8	year 5 year 10 year 15 year 20 year 25	$ 3,200 $ 3,200 $ 3,200 $ 3,200 $ 3,200	10%
			40	total	$ 16,000	$ 17,600
				Indicative total costs over 25 years	**$ 504,514**	**$ 624,794**

Indicative Biodiversity Credit Potential

There is potential for these plantings to be designed to generate biodiversity credits provided there is an appropriate species selection for planting and ongoing management of pest and weed species to enhance biodiversity benefits. This is dependent on the New Zealand biodiversity credit market maturing.

Below is an estimate of proposed pest animal control through the 'life' of the project at Site 1 (*Planting Areas A 12.5ha, B 1.4ha and C 2.8 ha = **total area 16.7ha***) – based on a desk top assessment of the sites and the Biosecurity Pest Animal Team's knowledge of the area and of pest animal control requirements. Rabbits/hares are the key pest animals that would require control initially, with possums, and rats/mustelids/hedgehogs/feral cats potentially requiring control depending on the long-term goals.

It is assumed that pest control would be undertaken by contractors unless stated. For ongoing pest control, especially for rats, mustelids, feral cats and hedgehogs for biodiversity benefit a control buffer outside of the actual planting area would be recommended, e.g. 200m for rats, across the road into the mangroves and south.

PHASE	ANIMAL PESTS	REQUIREMENTS	Approx. costs	Comments
GOAL – REVEGETATION (woody vegetation)				
PRE-PLANTING **Initial protection from hares/rabbits**	Hares/Rabbits	Site assessment (Modified McLean Scale) Initial Control (Magtoxin/Shooting) – level of control required will be dependent on the initial site assessment.	4 days @ $1,000/day = $4,000	NB Add guards to planted trees will provide additional protection from rabbit/hare damage. Calicivirus has been released in the past for rabbits by WRC in the vicinity of this site.
AFTER PLANTING (at Y1 or Y2)	Hares/Rabbits Possums/Rats	Ongoing Control (Magtoxin/Shooting) – level of any ongoing control required will be dependent on subsequent site assessments. Est. Y2 – Establishment of bait station network (on stakes in the absence of woody vegetation). Bait fill(s).	1-2 days @ $1,000/day = $1-2,000 annually or more frequently if there is damage noted. $30/ha – on set up and then a three-yearly cycle.	NB Establishing woody areas will make the area less attractive to hares, rabbits may still live in the area using the woody vegetation as cover. Inputs only contract to establish a bait station network do an initial fill, and then service/fill three-yearly.
GOAL – RESTORATION - BIODIVERSITY				
PRE-PLANTING **Initial protection from hares/rabbits**	Hares/Rabbits	Site assessment (Modified McLean Scale) Initial Control (Magtoxin/Shooting) – level of control required will be dependent on the initial site assessment.	4 days @ $1,000/day = $4,000	NB Add guards to planted trees as additional protection from rabbit/hare damage. Calicivirus has been released in the past for rabbits by WRC in the vicinity of this site.
AFTER PLANTING (from Y1)	Hares/Rabbits Possums/Rats Rats/Mustelids/ Hedgehogs/Feral cats	Ongoing Control (Magtoxin/Shooting) – level of any ongoing control required will be dependent on subsequent site assessments. Approx. Y2 - Establishment of bait station network (on stakes in the absence of woody vegetation). Bait fill(s). Augment bait stations with trapping for rats and mustelids (and other pest animals as required).	4 days @ $1,000/day = $4,000 Possums/Rats - $30/ha - on set up and then annually – for bait stations. $200/ha – ongoing trapping and other control as required. Purchase of kill traps: DOC200 or DOC250 traps on a 100m grid ($100/trap)	NB Need to determine the level of biodiversity protection and enhancement desired at the site. HALO-like protection would be annual possum/rat control. For greater levels of protection – from other pest animals like mustelids, rats, hedgehogs and feral cats year-round the level of control will need to be higher/more frequent. NB Any synergies with community groups or schools in the area to support this work? NB Could be issues with traps being stolen and flooding issues if infrastructure left in.

Appendix 5 – Case Study 2 - Neavesville hill country

(Nature positive planting of hill country land owned by the council for soil conservation purposes)

Disclaimer

The following desktop case study is a concept only and is assumption driven due to information limitations and has not been ground-truthed for practicality, affordability, or fatal flaws.

Proposal

Augmentation planting of land owned by Waikato Regional Council in hill country south of Neavesville road to provide carbon offsets and biodiversity credits and soil conservation co-benefits.

Background

This land block at 520 Neavesville Road (178 ha) was an operational farm that was purchased and retired for soil conservation purposes in the 1980s. The property has remained unleased and has been left to naturally regenerate since that time. The northern end of the block was largely indigenous forest at the time of purchase and has further regenerated to include broad leaf indigenous forest species alongside the streams and would already satisfy the definition of a pre-1990 forest under the NZ emission trading scheme so would not be eligible to generate NZUs under current rules.

The southern part of the property (up to 70 hectares maximum) may, however, be eligible.
Access to the property is poor. The council have recently regained better access to this site with access currently via Matariki/Rayonier Forest. Legal access is currently under review.

Primary Opportunities/Benefits

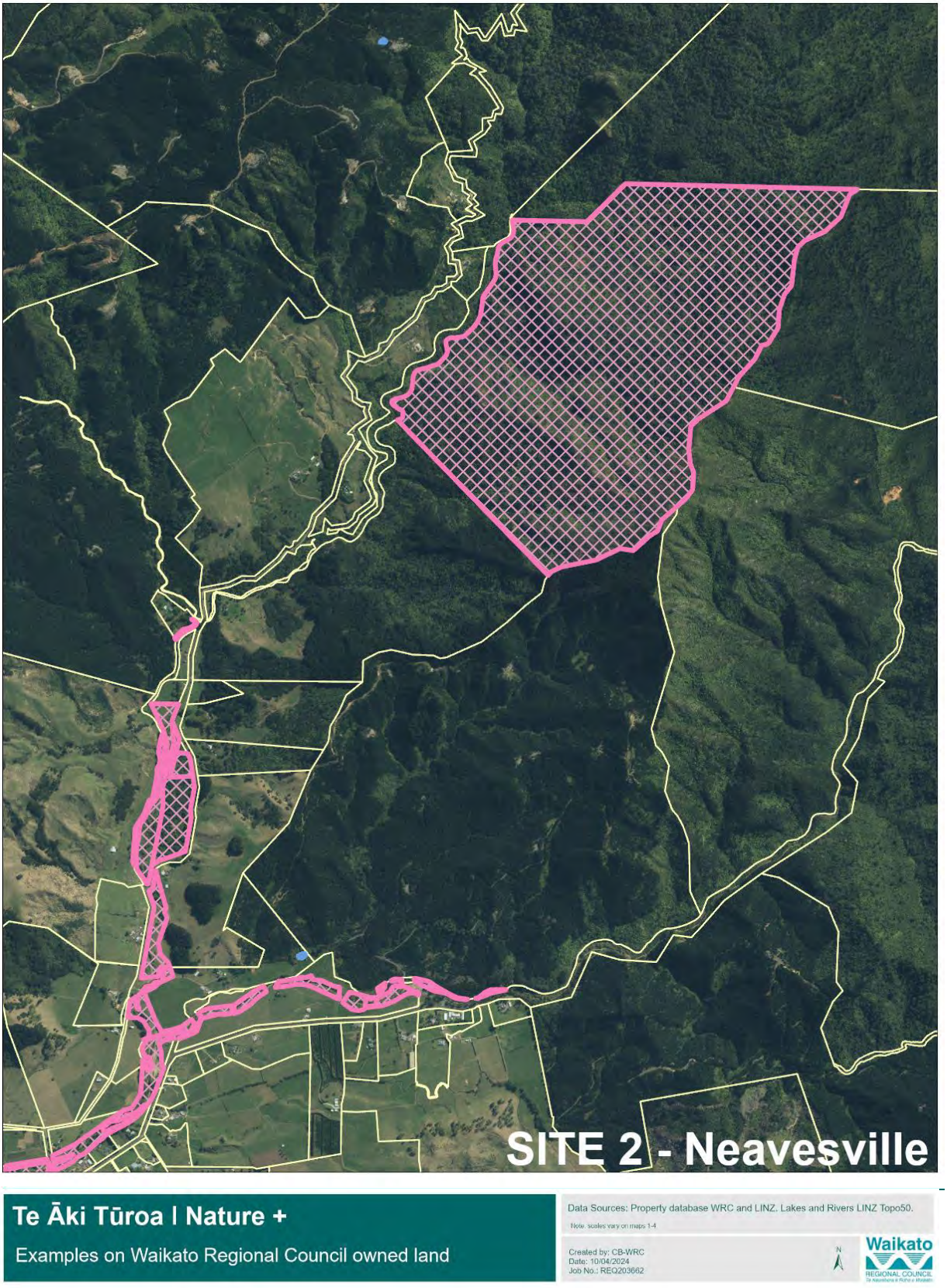
Provision for Carbon Offsets	Medium (to be confirmed)	Site eligibility needs to be confirmed
Potential for regional biodiversity benefits	Medium	Would provide connection to Coromandel Forest Park.
Improved water quality	Medium	(sediment reduction/hill side stabilisation – assumes that land is not cleared and returned to pasture).
Potential for biodiversity credits	Uncertain	Dependent on development of the market. SNA area status needs to be ground truthed and ecological survey would be required.

Location

The Waikato Regional Council owns approx. 178ha of reverting hill country on the southern slope of a valley south of Neavesville Road in the Thames Coromandel District.

Map 1 - Site 2 Neavesville

Map 2 - Neavesville property



This property comprises reverting hill country on the southern slope of a valley south of Neavesville Road in the Thames Coromandel District.

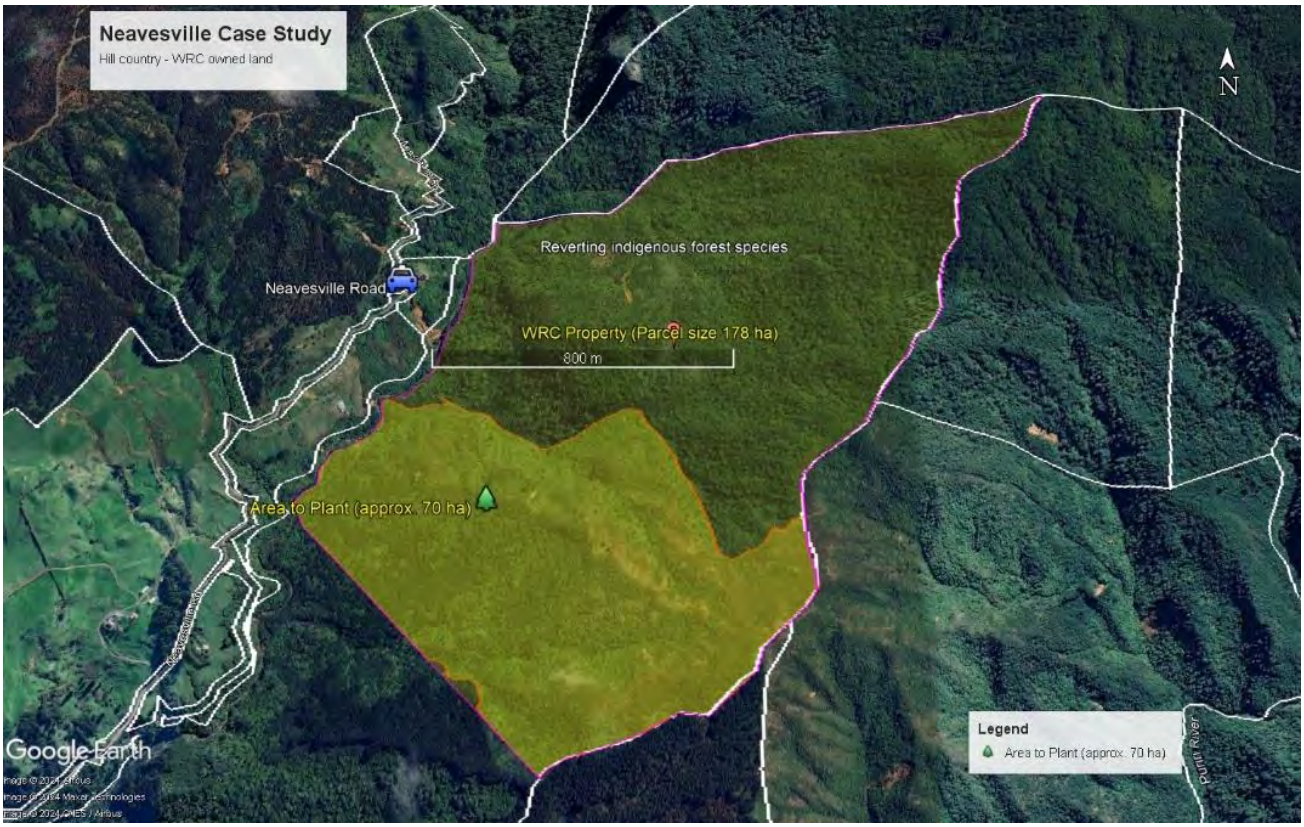
Tenure & Area

Block A - Not leased – Currently Rates free – as held for soil conservation purposes – The council is occupier. Total area 178 ha.

The site is managed through the Waihou Valley Scheme.

Land available to plant

Map 3 – potential planting area



The southern part of the Neavesville property (a maximum of 70 ha but potentially significantly less) has been slowly regenerating into a mixture of ferns, gorse and Manuka. There is potential to interplant the southern portion of the property with indigenous tree and shrub species to generate carbon credits and enhance its biodiversity value.

The proposed planting site has a mix of rough grassland and gorse-dominated scrub primarily on the upper slopes and ridges, with secondary tree fern land and small-leaved scrub dominating the mid-lower slopes and gullies (refer Figure 3 above). Much of it has regenerated since the 1980s from farmland. There are occasional, scattered wilding pines visible on the 2017 oblique aerial imagery. These would be relatively easy to control.

Figure 3 Biospatial_20170211_P2066 – very approximate boundary of proposed planting area. The bulk of the area already supports regenerating native-dominated vegetation.

Eligibility to generate carbon credits

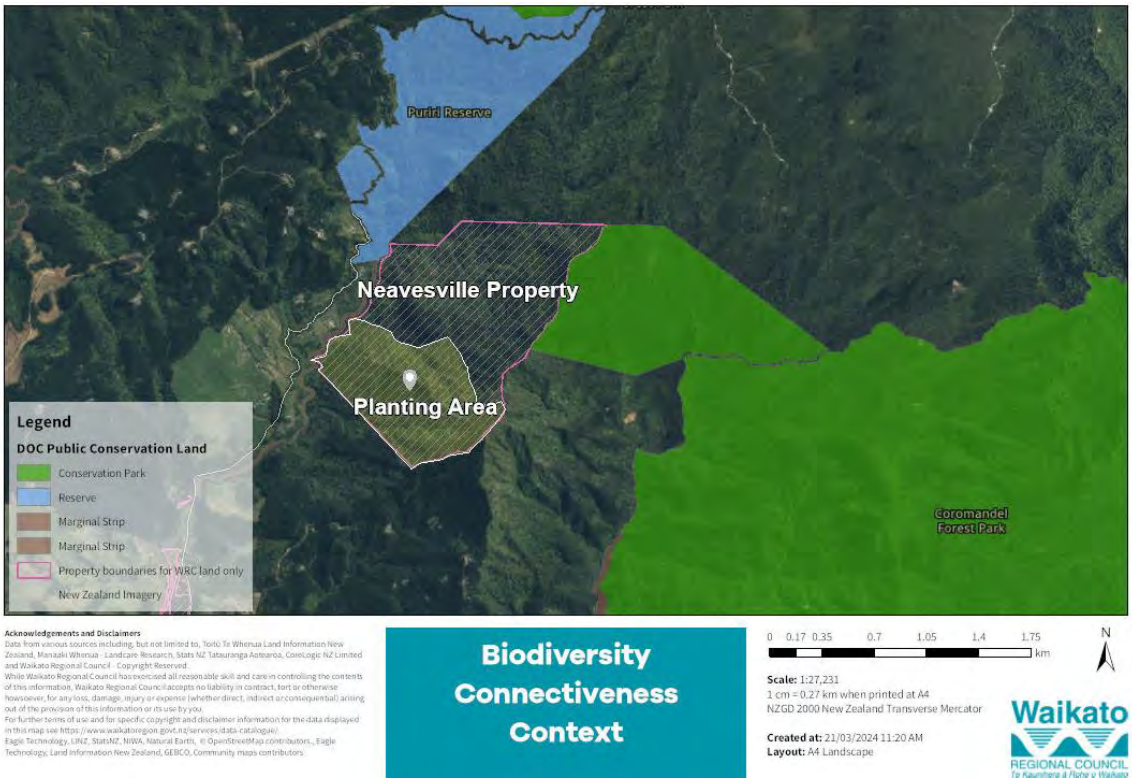
Post 1989 eligibility to generate NZU's under the NZETS or under the voluntary carbon market has yet to be confirmed for this site. This will require a ruling from the Ministry for Primary Industries. Based on current aerial imagery significantly less than 70 ha may be deemed eligible to plant to generate carbon credits.

Eligibility to generate NZUs depend on whether the southern part of the property already meets the definition of a pre-1990 forest based on how it was being managed and the indigenous forest species cover as at 31 December 1989. See PF Olsen guidance - Differentiating-Pre-1990-or-Post-1989-Forest-Land for a discussion of eligibility. Staff have initiated the process with the Ministry for Primary Industries (MPI) to confirm eligibility to generate NZUs.

Current land use and suitability

Biodiversity Connectiveness – 109 Ha of the block at 520 Neavesville Road is owned by Waikato Regional Council and is already reverted indigenous forest that has a common boundary with both the Coromandel Forest Park and Puriri Reserve.

Map 4 –connectiveness to other protected areas



Map 5– Significant natural area classification

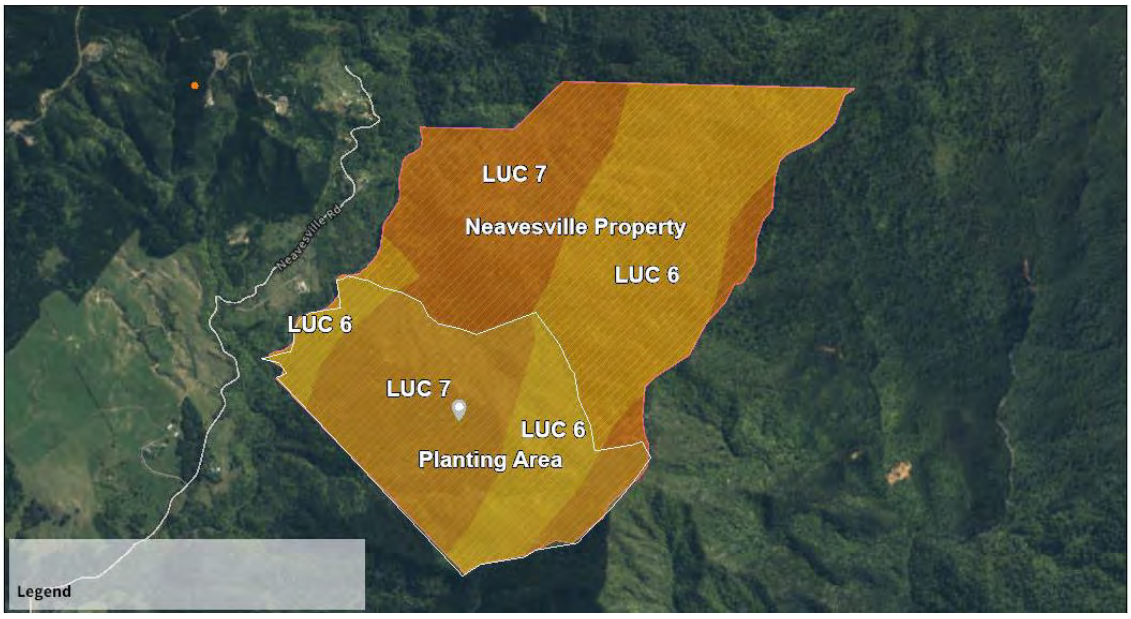
Significant Natural Area Status – most of the block is mapped in the Thames Coromandel district as regionally significant – comprising southern coromandel forest fragments. (Note - TCD has mapped significance coarsely.)

Map 6 – current land cover (Land Cover Database LCDB version 5)

The property is shown as currently comprising:

- Indigenous forest
- Broadleaf indigenous Hardwoods
- Manuka and/or kanuka

Map 7 – current land use capability



The property is shown as currently comprising land with Land Use capability of a mix of Class 6 and 7 land susceptible to erosion

- Class 6e : Non-arable. Slight to moderate limitations to pastural use, suitable for pasture, tree crops and forestry – erosion susceptible
- Class 7e : Non-arable. Moderate to very severe limitations to pastoral use. High-risk land requiring active management to achieve sustainable production. Can be suited to grazing with intensive soil conservation measures but more suited to forestry. – erosion susceptible

SMAP (soils type):

The property comprises a mix of:

- Acidic Orthic Brown Soils
- Typic Orthic recent soils
- Typic Orthic allophanic soils

Key Risks

	Prep treatment score	**Post Treatment Score**	**Treatment**
Fire risk	Medium	Medium	
Erosion/slope failure	Medium	Low	Regular pest animal control
Planting failure	Medium	Low	Regular pest animal control
Weed risk	Medium	Medium	Surveillance
Impact of animal pests	Medium	Low	Regular pest animal control
Fails eligibility test for carbon credits	High	High	Requires an MPI ruling

Regulatory Restrictions on changing land use

- Resource consent is unlikely to be required for restoration planting of this area.
- There is a small risk planting will trigger a requirement to pay rates at this site if area is planted and generates carbon credits.

Key assumptions

- Waikato Regional Council has access to plant this block.
- Rating impact will be minimal – unless carbon credits are sold instead of retired.
- Designation Under Soil Conservation Act allows for use for carbon credits.
- Only infill/augmentation planting required reducing planting costs.
- Suitable plants/tree species are available.
- Planting survival rates are acceptable.
- Council has freedom to operate.
- Planning restrictions will be minimal.
- Carbon sequestration can be recognised either via the compliance and/or voluntary carbon market.
- Restoration planting may also generate biodiversity credits as the biodiversity credit market matures.
- Costs are acceptable and funding is available.

Indicative Carbon Offset Potential

Planting trees and shrubs on bare land to re-establish a forest
Area to plant with trees and shrubs = 70 ha (assumes a planting rate of 10 ha a year for 7 years starting in 2026)

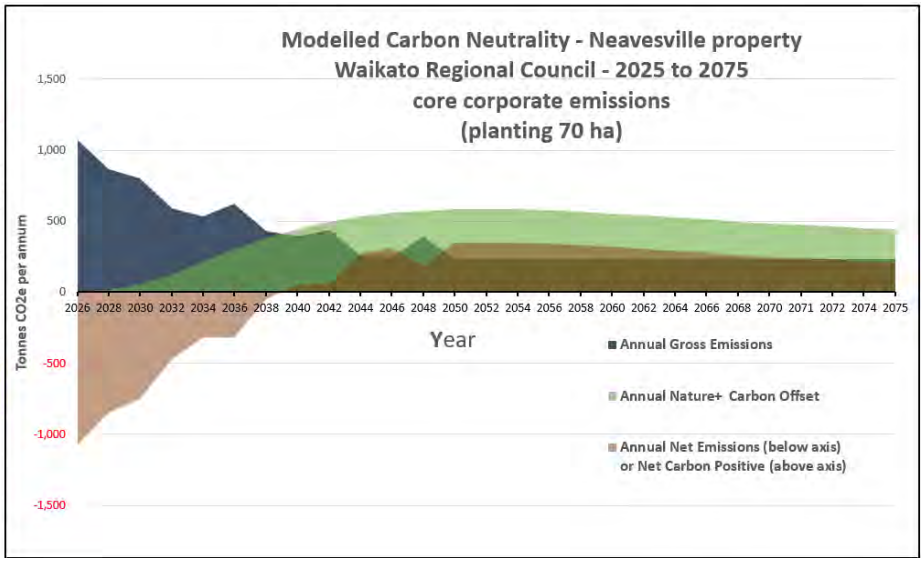
Planting treatment:
Limited site prep
No Stock fences required as adjacent land is forest
Site condition – average
80% small grade manuka/kanuka (50cell), and 20% larger grade mixed native/long lived species, all planted at 2.5m spacings (1600 stems per hectare).

Contribution to offsetting Core Corporate Emissions

Basic planting regime (1,600 stems per ha)
Interplanting 80% shrubs and 20% larger grade mixed native/long lived tree species, all planted at 2.5m spacings (1600 stems per hectare) is estimated to generate the following carbon.

Based on modelled sequestration rates for planting 70 ha over 7 years starting in 2026 would be more than sufficient to offset the Councils core corporate emissions by 2040 and produce a surplus of carbon credits from that point (assuming all 70 ha could be planted, this site is eligible to generate carbon credits and no other tier 3 emissions are offset.)

Carbon neutrality model	
Projected annual gross emissions at 2050 (tCO2e)	235
Projected annual net emissions or net surplus at year 2050 (tCO2e)	349
Planting started	2026
Years of planting required	7
Total Ha planted	70.00
Annual emissions neutrality achieved from year	2050
Assumptions:	
% of available carbon offset used annually prior to 2050	100%
% carbon offsets used annually from 2050	100%
Stems per Ha	1,600
Average planting regime assumed	20% native trees 80% native shrubs Average site



Contribution to offsetting Core Corporate and Public transport emissions

Basic planting regime (1,600 stems per ha)
Based on modelled sequestration rates for planting 70 ha over 7 years starting in 2026 would offset approximately a third of the council's combined corporate and public transport emissions.

Indicative Cost of offset – basic planting regime

(managed for carbon and biodiversity outcomes)

The tables below are indicative of the costs of establishment, management and verification to plant up to 70 ha at 1,600 stems per ha for carbon and biodiversity outcomes. These indicative costs would be incurred over 25 years up to 2050 and are in 2024 - $NZ. Actual costs are likely less due to lower areas of eligible land and lower planting rates needed due to regeneration.

Table 1 - Costs

Activity	Specification	Unit Cost	units		Cost	Contingency
Pre planting pest animal control	Site assessment 1 days per site for 7 years	$ 1,000	7		$ 7,000	15%
Ungulate control - deer, goats	2 days per site for 7	$ 650	14		$ 9,100	
Possum bait stations setup	Cost per ha /ha	$ 30	70		$ 2,100	
				Total	$ 18,200	$ 20,930
Activity	**Specification**	**Cost per Ha**	**Area planted per yr**			
Native Planting (plant purchase and initial planting costs)	1,600 native sp. per ha (ration 20% trees/80% shrubs)	$ 6,725.00	10	Year 1	$ 67,250	30%
			10	year 2	$ 67,250	
			10	Year 3	$ 67,250	
			10	Year 4	$ 67,250	
			10	Year 5	$ 67,250	
			10	Year 6	$ 67,250	
			10	Year 7	$ 67,250	
			70.0	Total	$ 470,750	$ 611,975
Contingency for fencing (if needed)	Stock proof post and batten fence	**Cost per metre** $ 27.10	**Metres** -	Year 1	$ -	15%
				year 2	$ -	
Total			-	Total	$ -	$ -
Post planting pest control - biodiversity focus						
possums /rats trap specificiation	traps at 100x100m grid	**cost per trap** $ 500	**no. of traps** 53	**for all sites**	**Trap Purchase** $ 26,500	15%
Basic pest control - possum /rat service costs	Traps services 3 times a year	**Cost per ha** $ 30	**No of ha** 70.0	**No of years** 25	**Cost over 25 years** $ 52,500	
Ugulate control	1 day shooting every 2nd year after seven years	$ 650	18		$ 11,700	
Enhanced pest animal control	Augment bait stations with trapping for rats and mustelids (and other pest	$ 200	70.0	25	$ 350,000	
				Total	$ 440,700	$ 506,805
Registration of site in ETS	per site (assumes 7 sites)	**Cost** $ 30.25	**no. of sites** 7	**Costs over 25 years** 24	$ 5,082	15%
				Total	$ 5,082	$ 5,844
Carbon plot establishment	1 plot per 2 ha of planting	**Cost per plot** $400	**no. of plots** 35	year 2	$ 14,000	15%
					$ -	
Total			35	Total	$ 14,000	$ 16,100
Monitoring / carbon verification	Plots measured every five years	**Cost per plot** $ 400.00	**No of plots measured** 35	year 5	$ 14,000	10%
			35	year 10	$ 14,000	
			35	year 15	$ 14,000	
			35	year 20	$ 14,000	
			35	year 25	$ 14,000	
			175	total	$ 70,000	$ 77,000
				Indicative total costs over 25 years	**$ 1,018,732**	**$ 1,238,654**

Indicative Biodiversity Credit Potential

There is potential for these plantings to be designed to generate biodiversity credits provided there is an appropriate species selection for planting and ongoing management of pest and weed species to enhance biodiversity benefits.

Animal control regime

Below is an estimate of proposed pest animal control through the 'life' of the project at Site 1 – based on a desk top assessment of the sites and the Biosecurity Pest Animal Team's knowledge of the area and of pest animal control requirements. It is assumed that pest control would be undertaken by contractors unless stated. For ongoing pest animal control for biodiversity benefit a control buffer outside of the actual planting area would be recommended. Also the coordination of control efforts where possible, for example with DOC for feral goats.

PHASE	ANIMAL PESTS	REQUIREMENTS	Approx. costs	Comments
GOAL – REVEGETATION (woody vegetation)				
PRE-PLANTING **Initial protection from hares/rabbits**	Hares/Rabbits (may not be a big issue at this site compared to Case Study 1 area) Ungulates – deer, goats, pigs	Site assessment (Modified McLean Scale) Control if required (Magtoxin/Shooting) – level of control required will be dependent on what is identified the initial site assessment. Initial Control (shooting) – to remove any ungulates prior to planting,	$250/day – site assessment for presence/impacts - control as required. $85/hour	NB Add guards to planted trees will provide additional protection from rabbit/hare damage if they are a potential issue at the site.
FROM PLANTING (at Y1)	Possums	Establishment of bait station network. Bait fill(s).	$30/ha – on set up and then a three-yearly cycle.	Inputs only contract to establish a bait station network, and then service it three-yearly.
GOAL – RESTORATION - BIODIVERSITY				
PRE-PLANTING **Initial protection from hares/rabbits**	Hares/Rabbits Ungulates – deer, goats, pigs	Site assessment (Modified McLean Scale) Control if required (Magtoxin/Shooting) – level of control required will be dependent on the initial site assessment. Initial Control (shooting) – to remove any ungulates prior to planting,	$250/day – assessment for presence/impacts - control as required. $85/hour	Add guards to planted trees as additional protection from rabbit/hare damage. Calicivirus has been released in the past for rabbits by WRC in the vicinity of this site.
FROM PLANTING (from Y1)	Possums/Rats Rats/Mustelids/ Hedgehogs/Feral Cats	Establishment of bait station network. Initial bait fill(s)/other toxins. Auto resetting traps – possums/rats Augment bait stations with trapping for rats, mustelids and hedgehogs.	$30/ha - on set up and then annually – for bait stations. Could also purchase AT220 traps for possums/rats: 53 traps @ $500/trap = $17,500 incl. GST $200/ha – ongoing trapping and other control as required (annual or more frequently) Purchase of kill and auto resetting traps: e.g. DOC200/DOC250 ($100/trap) – 100x100m network	NB Need to determine the level of biodiversity protection and enhancement desired at the site. HALO-like protection would be annual possum/rat control. For greater levels of protection – from other pest animals like mustelids, rats, hedgehogs or feral cats year-round the level of control will need to be higher/more frequent. NB Any synergies with community groups or schools in the area to support this work? Could also look at including staff time towards the pest animal control, using the site to monitor vegetation recovery over time (exclosure plots /vegetation plots) etc

Appendix 6 – Case Study 3 - Piako River Green Corridor

(Nature+ planting of council owned riparian areas)

Disclaimer

The following desktop case study is a concept only and is assumption driven due to information limitations and has not been ground-truthed for practicality, affordability, or fatal flaws.

Proposal

To claim credit for previous planting of riparian scheme land owned by Waikato Regional Council alongside the Piako river as part of the Piako river green corridor project.

Background

Environment Waikato (EW) owns riparian land within the Piako River Catchments. This land comprises a variety of ecosystem and landform types including, riparian areas, wetlands, and floodplains.

Waikato Regional Council received $2.8m from the Ministry for the Environment's (MfE) Public Waterways and Ecosystems Restoration Fund as part of the Jobs for Nature programme to undertake a $3.2m riparian fencing and planting project that sought to reconnect the Kopuatai wetland to the Firth of Thames. This project was a shovel ready project as part of the Government economic response to COVID-19.

The project vision is to have a continuous green corridor along the true right bank of the Piako River, from the restiad peat bog of the Kopuatai wetland through the mangrove forests, salt marshes and chenier plains of the Firth of Thames foreshore.

In total, a quarter of a million plants are planned to go into the ground and 35 hectares of land was to be retired by 2025. All the plants were eco-sourced with a preference to them being grown by local nurseries and social enterprises. Most of the planting was to be on council managed flood scheme land.

As reported progress to date (first four years) is:

- Ecological survey, berm survey and mapping completed by Wildlands Consultants ltd.
- 18km of riparian area fenced
- 146,697 plants planted on 24.2 ha (average 6,060 plants per ha)

Still to do:

- Pest plant vegetation control at Daggers Road site
- Further planting of approximately 137,200 mixed native plants on remaining areas.

The Piako river is within the Hauraki Plains Adaptation Plan area. So by default will be included in a 'SIDF like' process

Primary Opportunities/Benefits

Provision for Carbon Offsets	Low	Eligibility question due to width of planting and additionality criteria
Potential for regional biodiversity benefits	Medium	Connects major wetland to estuarine and coastal biodiversity
Potential for biodiversity credits	Uncertain	Dependent on development of the market.

Location

Map 1 - Site 3 Piako Green Corridor

Map 2 – Site 3 Piako green corridor

Ownership

Land shown in pink in Map 2 on the true right bank of the Piako river is owned by the Waikato Regional Council

Land available to plant

24.2 ha has already been planted and a further 10 ha is due to be planted by 2025 with a further 137,200 native species.

Ability to earn carbon credits?

Current planting widths

A review of satellite imagery of planting to date on the 24.2 ha of the Piako green corridor below has shown planting widths of between 4.27m and 14.26 metres (average width 8.7 metres). To qualify to generate NZUs under the NZETS that could be used as carbon credits to offset emissions - the minimum planting area is one hectare, and the minimum planting width is 30 metres wide. As such planting on the Piako green corridor to date would not qualify to generate carbon credits to offset emissions.

Planting widths todate – Piako green corridor

Offset criteria

For a voluntary carbon offset to be considered credible, it must satisfy several principles including transparency, verifiable, additional, not double counted, addresses leakage and results in a permanent removal of CO_2[9].

In considering these criteria it is likely that the planting to date would fail on the additionality criteria.

The additionality criteria - The greenhouse gas (GHG) emissions reductions or removals are due to a specific intervention and would not have occurred under business as usual. This means the voluntary climate change mitigation cannot be an action or activity that was going to happen anyway, something that is already required under existing regulation, or incentivised by other policy measures.

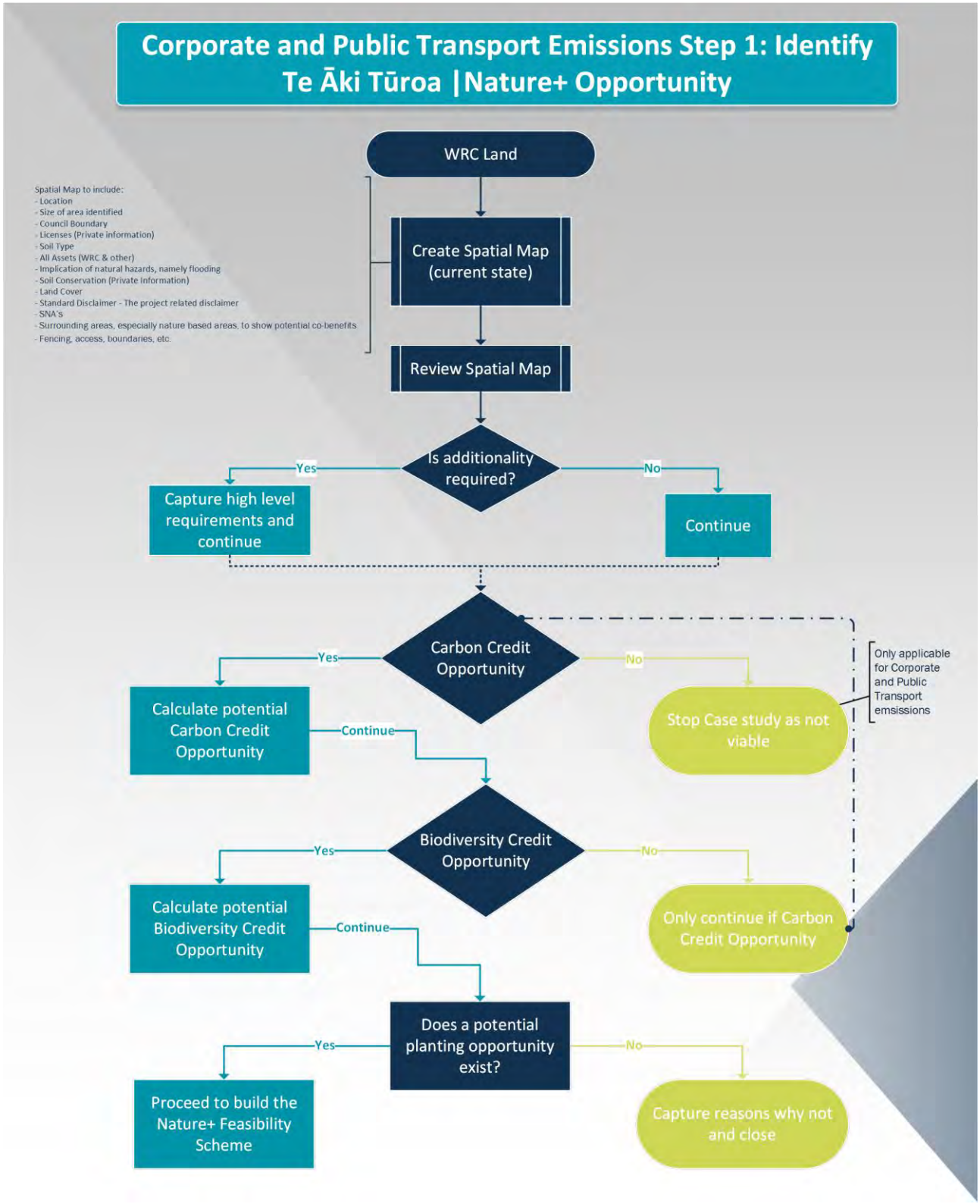
Given that the Piako green corridor planting was undertaken for another reason (riparian restoration) and was funded by the MFE riparian planting fund and has already occurred it is likely to fail this additionality criteria and would not qualify as a carbon offset. Projects like this would be considered business as usual.

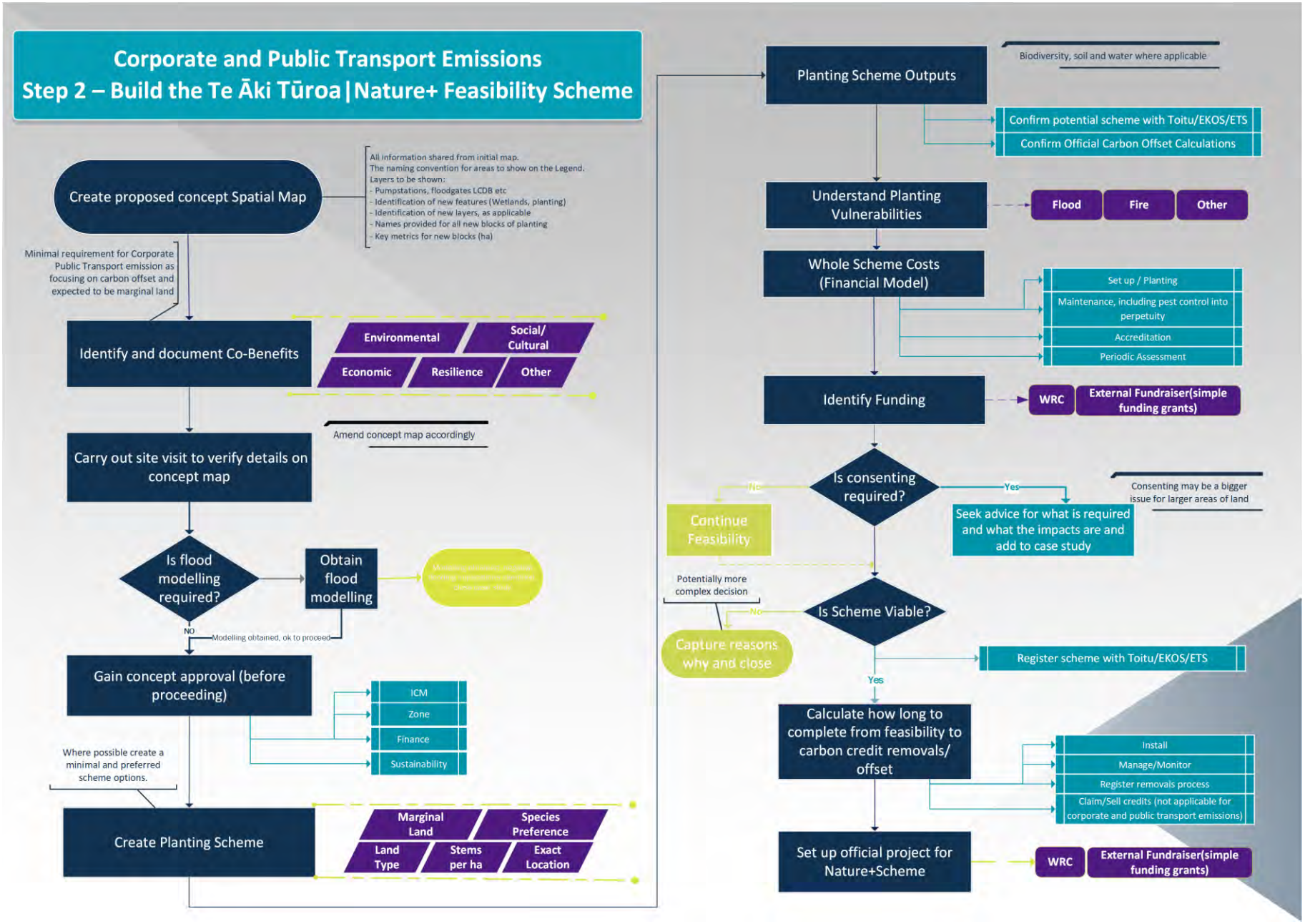
[9] Interim guidance for voluntary climate change mitigation – MFE 2022

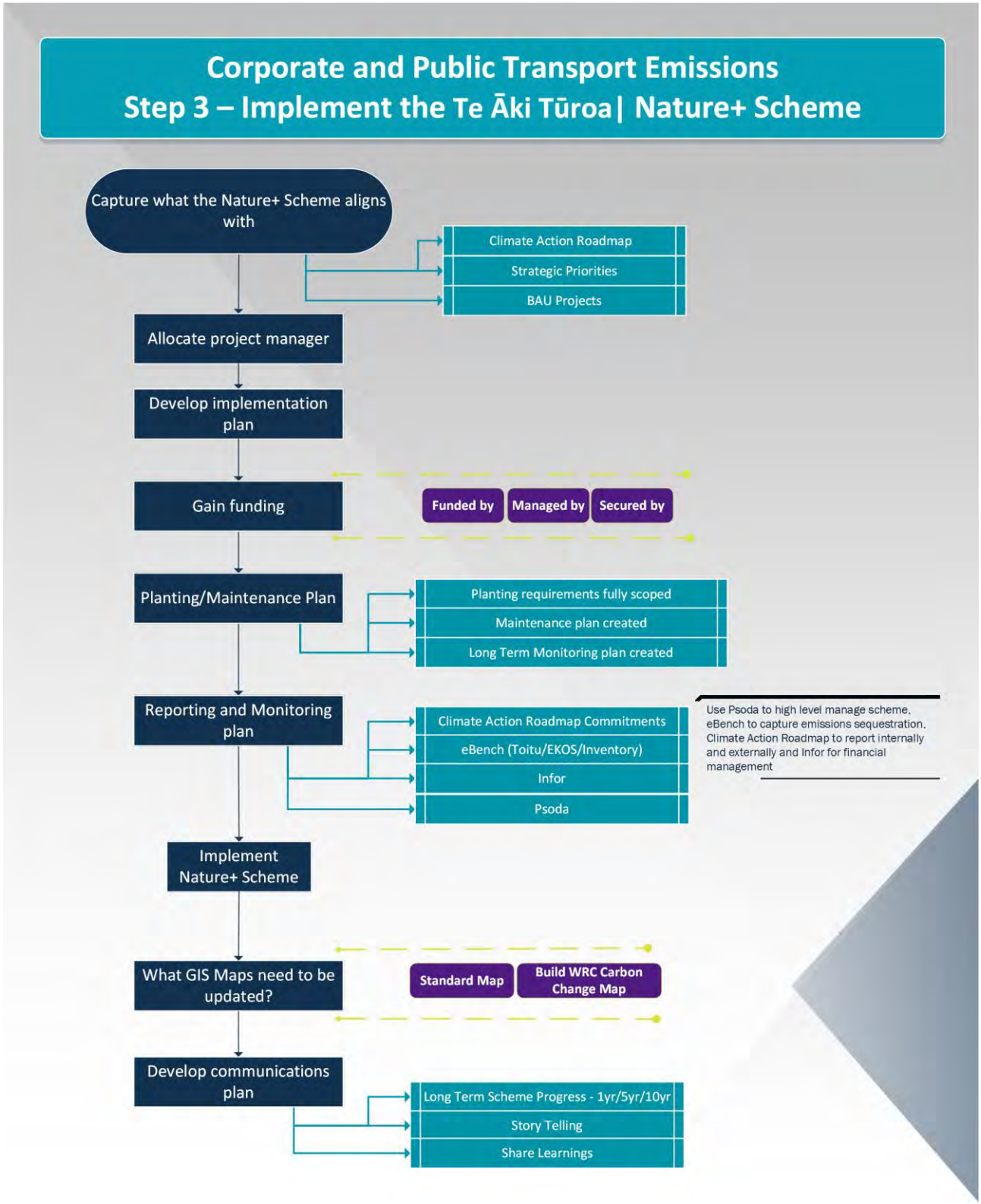
APPENDIX 7

Nature + Framework process for screening land to plant

To screen areas of council land as potential project sites to plant to generate nature+ carbon offsites, the following flow chart involving three process steps are proposed.




Corporate and Public Transport Emissions
Step 2 – Build the Te Āki Tūroa | Nature+ Feasibility Scheme
Create proposed concept Spatial Map
All information shared from initial map.
The naming convention for areas to show on the Legend.
Layers to be shown:
- Pumpstations, floodgates LCDB etc
- Identification of new features (Wetlands, planting)
- Identification of new layers, as applicable
- Names provided for all new blocks of planting
- Key metrics for new blocks (ha)
Minimal requirement for Corporate Public Transport emission as focusing on carbon offset and expected to be marginal land
Identify and document Co-Benefits
Environmental
Social/ Cultural
Economic
Resilience
Other
Amend concept map accordingly
Carry out site visit to verify details on concept map
Is flood modelling required?
Obtain flood modelling
NO
Modelling obtained, ok to proceed
Gain concept approval (before proceeding)
ICM
Zone
Finance
Sustainability
Where possible create a minimal and preferred scheme options.
Create Planting Scheme
Marginal Land
Species Preference
Land Type
Stems per ha
Exact Location
Planting Scheme Outputs
Biodiversity, soil and water where applicable
Confirm potential scheme with Toitu/EKOS/ETS
Confirm Official Carbon Offset Calculations
Understand Planting Vulnerabilities
Flood
Fire
Other
Whole Scheme Costs (Financial Model)
Set up / Planting
Maintenance, including pest control into perpetuity
Accreditation
Periodic Assessment
Identify Funding
WRC
External Fundraiser(simple funding grants)
Is consenting required?
No
Continue Feasibility
Yes
Seek advice for what is required and what the impacts are and add to case study
Consenting may be a bigger issue for larger areas of land
Potentially more complex decision
Is Scheme Viable?
No
Capture reasons why and close
Register scheme with Toitu/EKOS/ETS
Yes
Calculate how long to complete from feasibility to carbon credit removals/ offset
Install
Manage/Monitor
Register removals process
Claim/Sell credits (not applicable for corporate and public transport emissions)
Set up official project for Nature+Scheme
WRC
External Fundraiser(simple funding grants)


Corporate and Public Transport Emissions
Step 3 – Implement the Te Āki Tūroa| Nature+ Scheme
Capture what the Nature+ Scheme aligns with
Climate Action Roadmap
Strategic Priorities
BAU Projects
Allocate project manager
Develop implementation plan
Gain funding
Funded by
Managed by
Secured by
Planting/Maintenance Plan
Planting requirements fully scoped
Maintenance plan created
Long Term Monitoring plan created
Reporting and Monitoring plan
Climate Action Roadmap Commitments
eBench (Toitu/EKOS/Inventory)
Infor
Psoda
Use Psoda to high level manage scheme, eBench to capture emissions sequestration. Climate Action Roadmap to report internally and externally and Infor for financial management
Implement Nature+ Scheme
What GIS Maps need to be updated?
Standard Map
Build WRC Carbon Change Map
Develop communications plan
Long Term Scheme Progress - 1yr/5yr/10yr
Story Telling
Share Learnings

Waikato
REGIONAL COUNCIL
Te Kaunihera ā Rohe o Waikato

He taiao mauriora ▲ **Healthy environment**

He hapori hihiri ▲ **Vibrant communities**

He ōhanga pakari ▲ **Strong economy**

Policy Series PS24-11
ISSN 2230-4339 (Print)
ISSN 2230-4347 (Online)
#7551

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