

16 April 2021

OC210276  
T2021/1002

Hon Grant Robertson  
Minister of Finance

Action required by:  
Wednesday 21 April 2021

Hon Michael Wood  
Minister of Transport

## The New Zealand Upgrade Programme - Baseline Update and Detailed Programme Options

### Purpose

This paper advises on:

- assessment of Waka Kotahi NZ Transport Agency and KiwiRail's (the delivery agencies') baselining information for the transport component of the New Zealand Upgrade Programme (the Programme)
- how the Programme may be re-prioritised within the \$6.8 billion funding envelope, based on the standards of the baseline information and your indicated key outcomes
- steps you can take to move delivery of the Programme forward while increasing Programme certainty and managing residual risks.

### Key points

- In December 2019, Budget Ministers confirmed a \$6.8 billion funding envelope for transport projects under the New Zealand Upgrade Programme (the Programme) and in January 2020, 26 transport projects were announced at an estimated cost of \$6.706 billion, with the remaining \$0.094 billion held as contingency. This contingency was later reduced to \$0.042 billion through the Establishment Reports.
- As part of the Programme, Joint Ministers asked the Ministry of Transport (the Ministry) and Treasury officials to establish appropriate monitoring arrangements over the Programme, modelled on the approach used for the rebuild of road and rail in Kaikōura.
- The Oversight Group's (the OSG) assessment of the Programme, at its initial meeting in August 2020, was that there was significant risk and uncertainty for delivering the

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full Programme. Working alongside delivery agencies, the OSG's independent advisors undertook a baselining exercise to seek better information on what was being delivered, when, and for how much.

- It is important to note the constrained timeframes under which the information has been prepared, and the challenges this has created for delivery agencies means there is still work to complete on some projects. This has also impacted on our confidence assessment across the Programme. These limitations need to be balanced against our obligations to advise you of risks.
- Through the baselining exercise, significant cost increases and uncertainty has been identified across the Programme, which means the current Programme cannot be fully delivered within the fixed funding envelope of \$6.8 billion. Officials also understand that forecast cost estimates have also changed for some projects since the baseline. As we have not had the opportunity to engage with the latest information, the cost estimates in this paper are derived from the baseline material.
- To help support the viability and affordability of the Programme, officials provided preliminary advice on prioritising projects within the fixed funding envelope. You indicated that the Programme should be prioritised with consideration to transit-oriented housing outcomes and emissions reduction.
- The Ministry has undertaken a prioritisation across the Programme with officials from the Treasury, the Ministry of Housing and Urban Development, and delivery agencies, to assess individual projects against your priority outcomes for the Programme.
- There may be limited opportunities for emissions reduction, but we consider it is possible to prioritise a mix of projects and scope choices in the remainder of the Programme that may mitigate potential emissions when compared to other choices within the budget constraint. It is important to weigh the imperative to reduce emissions against other outcomes, such as increasing housing supply. To a certain extent, the potential for emissions mitigation or reduction is constrained by land-use decisions, such as greenfield developments in Drury.
- The prioritisation exercise has involved integrating the findings of several assessment approaches. Using the baseline information, and in accordance with your Programme priorities, officials have categorised projects into the following priorities:
  - **Priority 1:** 18 projects can be prioritised for delivery as they have previously been agreed in-principle by Joint Ministers, are geographically spread, and have a higher certainty and a lower cost risk to the overall Programme
  - **Priority 2:** three projects could also be prioritised as they are likely to represent higher value for money and align with your priorities for transit-oriented housing developments while potentially resulting in less emissions than other Programme configurations
  - **Priority 3:** two projects align with your priorities, but do not necessarily represent value for money from the information available through re-baselining, and further information and work is required before you make a decision to commit to their delivery

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- **Priority 4:** five projects are high risk with high uncertainty around expected outcomes, value for money, and scope, so any decision to deliver or implement should be deferred until further funding or delivery options are available.
- If you agree to our recommended approach, we will work with the delivery agencies to give effect to the prioritised Programme by establishing revised project budgets, utilise a programme level contingency, ensure an appropriate set of project decision-making processes across the Programme, and retain independent monitoring and assurance through the OSG.
- Note that this briefing has been prepared under time constraints, and further work will be required over the coming weeks to further establish confidence in the Programme.

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## Recommendations

We recommend you:

	Minister of Finance	Minister of Transport
1	<b>note</b> that our assessment of baseline information of the transport component of the New Zealand Upgrade Programme (the Programme) has provided a better understanding of project costs, but has identified a number of significant risks and uncertainties	
2	<b>note</b> that officials have assessed the individual projects using the baseline information, and your priorities for the Programme (transit-oriented housing development, and emissions reduction)	
3	<b>note</b> that some projects contribute to housing outcomes but there are limited opportunities for emissions reduction and mitigation across the Programme	
4	<b>note</b> that some projects will still be required to achieve safety, resilience, congestion and freight benefits, and could be scaled or staged to potentially reduce their impact on emissions	
5	<b>agree</b> for Waka Kotahi NZ Transport Agency and KiwiRail to investigate Programme projects to account for likely impacts of induced traffic and resulting increases in emissions	Yes / No
6	<b>agree</b> that individual projects are allocated a revised budget based on the upper range of the latest forecast cost estimate as indicated in the baseline information	Yes / No
7	<b>agree</b> to prioritise the delivery of 18 <b>Priority 1 projects</b> , with a total budget of \$3.0 billion, on the basis that some of these were agreed in-principle previously, are geographically spread, and provide a forward pipeline of work for the sector	Yes / No
8	<b>agree</b> to prioritise the delivery of the additional scope options for KiwiRail, with a forecast cost estimate of \$132 to \$164 million, on the basis that these scope options are relatively low cost and low risk so will not have a significant impact on the wider Programme	Yes / No
9	<b>agree</b> to prioritise the delivery of three <b>Priority 2 projects</b> with a total budget of \$1.1 billion, on the basis that these best align with your Programme priorities for housing benefits and achieving transport outcomes while potentially resulting in less emissions than other projects, and are likely to represent value for money	Yes / No
10	<b>agree</b> that Waka Kotahi NZ Transport Agency and KiwiRail can continue to investigate two <b>Priority 3 projects</b> , with a total budget of \$1.4 billion, but a decision to prioritise and	Yes / No

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deliver these projects is subject to a decision on scope, cost and timeframe by Joint Ministers

- |    |   |          |          |
|----|---|----------|----------|
| 11 | <b>agree</b> that Waka Kotahi NZ Transport Agency and KiwiRail can continue to investigate five <b>Priority 4 projects</b> up to detailed business case stage but any decision to prioritise and commit additional funding to these projects depends on project-specific advice to Joint Ministers and adequate funding being available | Yes / No | Yes / No |
| 12 | <b>agree</b> to set aside 15 percent (or \$1 billion) of programme contingency to cover unforeseen cost increases within the Programme, or to be used to deliver Priority 4 projects if Joint Ministers agree   | Yes / No | Yes / No |
| 13 | <b>agree</b> that Waka Kotahi NZ Transport Agency and KiwiRail may investigate other projects that may better align with your Programme priorities of housing and emissions reduction, and propose that these projects to be funded from the Programme  | Yes / No | Yes / No |
| 14 | <b>agree</b> that, to support the Programme's viability and affordability within the fixed funding envelope of \$6.8 billion, the conditions in Appendix 4 apply to Waka Kotahi NZ Transport Agency and KiwiRail  | Yes / No | Yes / No |
| 15 | <b>direct</b> Ministry of Transport and Treasury officials to investigate amending the delegations to Waka Kotahi NZ Transport Agency and KiwiRail to reflect the decisions above   | Yes / No | Yes / No |
| 16 | <b>note</b> that Ministry of Transport and Treasury officials and the New Zealand Upgrade Programme Oversight Group will report back to the Minister of Finance and the Minister of Transport on the monitoring and oversight arrangements of the New Zealand Upgrade Programme in light of the above decisions                         | Yes / No | Yes / No |

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David Taylor  
**Manager, National Infrastructure Unit**  
**The Treasury**

16 / 04 / 2021

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Bryn Gandy  
**Deputy Chief Executive, System**  
**Strategy and Investment**  
**Ministry of Transport**

16 / 04 / 2021

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Hon Grant Robertson  
**Minister of Finance**

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Hon Minister Wood  
**Minister of Transport**

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- Minister's office to complete:  Approved  Declined  
 Seen by Minister  Not seen by Minister  
 Overtaken by events

Comments

To protect the privacy of individuals

Contacts

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## The New Zealand Upgrade Programme - Baseline Update and Detailed Programme Options

### Background

#### *Original decisions*

- 1 In November 2019, Cabinet authorised Budget Ministers to take decisions on the final details of the New Zealand Upgrade Programme [CAB-19-MIN-0572 refers]. Subsequently, in December 2019, Budget Ministers confirmed \$6.8 billion for transport projects under the New Zealand Upgrade Programme (the Programme) and authorised the Minister of Finance and the Minister of Transport (Joint Ministers) to take decisions on the final details of the projects.
- 2 In January 2020, the 26 transport projects were announced at an estimated cost of \$6.706 billion, with the remaining \$0.094 billion being held as contingency (OC191303 / T2019/4158 refers). At the time, we advised that the projects were at various stages of development, there were varying levels of confidence in the cost estimates, and that the contingency was very small for a programme of this scale.

#### *Monitoring and oversight of Programme delivery*

- 3 Joint Ministers asked the Ministry of Transport (the Ministry) and Treasury officials to establish appropriate monitoring arrangements for the Programme, modelled on the approach used for the rebuild of road and rail in Kaikōura.
- 4 This is a light touch, high trust approach, where:
  - the New Zealand Upgrade Programme Oversight Group (the OSG) receives Waka Kotahi NZ Transport Agency and KiwiRail's (the delivery agencies) own reporting
  - receives supporting information, which delivery agencies should produce through their own established processes and systems
  - asks questions about how the delivery agencies have made project decisions, and interpreted available information
  - provides a report to Joint Ministers after consultation and comment from delivery agencies
- 5 This approach relies on the Programme's projects having a robust baseline while also acknowledging the early stages of some projects. This baseline should set out the intended shape and benefits from each project (the scope), costs and schedule, along with quantified and unquantified risks. This information is also required by the delivery agencies to manage project delivery.

#### *Baselining the Programme commissioned to provide a stronger understanding of projects*

- 6 The OSG's assessment at its initial meeting in August 2020 was that even though delivery agencies had indicated confidence in delivery of the Programme, the June 2020 Establishment Reports did not provide a solid foundation for Programme

delivery of the full Programme. This was particularly the case for early stage (or pre-business case stage) projects. The initial OSG assessment was that there was a \$1.7 billion shortfall in the Programme. A baselining exercise was commissioned to seek better information on what was being delivered, when, and for how much.

- 7 This baseline process is separate from the Programme's OSG monitoring process. However, it is necessary for Joint Ministers and the delivery agencies to understand what is possible within the Programme's fixed funding envelope of \$6.8 billion, and for all parties to be able to monitor Programme delivery.
- 8 Officials have asked the OSG to oversee the process, and we have used the experience of the external OSG members as a way to ensure the assessments made are realistic and pragmatic. This advice is purchase advice, and separate from the Ministry and Treasury's responsibilities for monitoring entity performance and use of Crown funds, respectively.

*Significant forecast cost increases have occurred across the Programme*

- 9 Through the baselining exercise, significant cost increases and uncertainty have been identified across the Programme. Officials consider that the Programme as announced cannot be fully delivered within the fixed funding envelope of \$6.8 billion (OC210055/T2021/630 refers).
- 10 To help support the viability and affordability of the Programme, officials provided preliminary advice on prioritising projects within the \$6.8 billion fixed funding envelope. You agreed in-principle to support the continued delivery of:
  - five committed projects forecast to cost \$2.1 billion to \$2.3 billion that are already being constructed, or are about to commence with procurement or construction
  - ten smaller-scale projects forecast to cost \$375 million to \$490 million, which will provide direct economic benefits whilst benefitting a range of communities across New Zealand
- 11 You also indicated that the remainder of the projects in the Programme should be prioritised with consideration to alignment with housing outcomes and emissions reduction.
- 12 It is important to note that there are limited opportunities through the Programme to reduce total emissions from the transport network. However, choices can be made to prioritise particular projects or to progress with scope choices (or changes to options) that may result in less emissions than other projects.

**Baselining assessment**

- 13 We have been working closely with Waka Kotahi and KiwiRail to assess their baseline information. Officials will be able to provide a RAG assessment of the individual projects' baselining information if requested by Joint Ministers, as they are

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<sup>1</sup> The forecast cost estimate for Takitimu North Link Stage 1 has increased from \$650 to \$750 million (OC210055/T2021/630 refers) to \$680 to \$760 million.

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being reconciled with the delivery agencies' own assessments, and are undergoing a QA process.

- 14 The baseline assessment was prepared under significant time pressures. There was limited time to develop, share and review all the available information. Additional information sharing and review is underway and will likely impact the below findings.
- 15 The assessment reflects the OSG's and independent advisors' review of information provided to date. We have not carried out assurance of the underlying or technical information, except to consider whether it is consistent with good process.
- 16 Delivery agencies have also rated their own respective confidence in the baselining information provided.
- 17 Overall, our assessment is that significant risk and uncertainty remains across the Programme. This will reduce over time as projects reach particular stage gates. However, for around \$5.5 billion of projects, a preferred option (which includes the preferred route, alignment, form, function, design and level of resilience) has not yet been selected or a business case completed by the delivery agencies, their Boards and their partners. There has also been no quantified risk adjustment to account for this uncertainty.
- 18 The baselines of early-stage projects in particular will develop further through the programme, and officials' assessment is to assist you with deciding appropriate purchase arrangements at this stage, not to indicate pass / fail. The delivery agencies are carrying out further work to improve the quality of information, but Ministers will likely need to make choices based on the information available.

*Several themes are apparent in our assessment of baseline information*

- 19 Appendix 1 provides you with a more detailed summary of the delivery agencies' approach to baselining, common themes, and project examples that provide further context behind the baseline assessment.
- 20 Through its assessment, the OSG and its advisors have identified a number of issues and inconsistencies across the baseline information. In particular, there are issues relating to scope and cost:
  - All projects should have a clear connection between benefits, scope of the option to deliver these benefits, and a schedule and cost to deliver the project over time. For early-stage projects (for example, projects in a business case stage), these will have less developed project detail on costs, schedule, risks and contingency. For projects closer to delivery, there should be higher confidence in the ultimate cost, due to the increased level of design, technical work and fewer scope decisions that need to be made.
    - For example, Takitimu North Link Stage 1 is materially further progressed with alignment confirmed design developed, limited remaining scope uncertainty, tendered prices to support cost estimate, assurance (scope and cost) and more detailed risk analysis / management.
    - Others are at earlier stages of development, such as Whangarei to Port Marsden which has yet to have its alignment confirmed within the circa

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300m wide corridor limiting opportunity to undertake detailed investigations into ground conditions, develop designs, understand property requirements and identify impacted 3<sup>rd</sup> parties / utilities among other things.

- Several projects still have unclear benefits and scope. Waka Kotahi's work has focused on developing deliverable options for the identified project, influenced by a changing policy, standards and compliance environment. Without reassessing the scale of the option development against the benefits, there are questions around value for money and whether its cost remains proportionate to the outcomes and benefits the project will deliver.
- From the information available, there are no projects where there is clarity on all of benefits, scope, cost and schedule information, and where there is integration between these aspects in the baseline information provided. For projects where scope is clearer, key information showing how scope is linked through to cost and schedule was not available.
- Cost and contingency have been estimated differently for different projects. Of the 26 projects, six projects have completed Quantitative Risk Assessments (QRA), and five projects have completed external assurance of the cost estimates. These assurance measures are an important source of confidence.

21 Cost increases are widespread across the Programme.

- 21 of the 26 projects are now forecast to cost more than their funding allocations.
- Contingency (both project and funding risk), which is included in individual project forecast cost estimates to account for project risk and uncertainty, is currently estimated at \$3 billion across all projects. The issues identified with scope and costings mean that some risks are not accounted for in the project contingency.
- Cost and contingency have been estimated in an inconsistent way across the programme, with just seven projects having completed Quantitative Risk Assessments (QRA), and only nine projects having completed external assurance of the cost estimates. These assurance measures are an important source of confidence.
- We have concerns that P50 and P95 contingency estimates are being presented as robust, probabilistic estimates that have undergone consistent QRA processes in accordance with internal standards and guidance.
- Often a deterministic approach is used to estimate contingency, with an uplift reflecting management judgement. It is not always clear how these percentage uplifts have been estimated. The value of probabilistic estimates is that they are resilient to change and preserve options within a project as events arise. A deterministic estimate does not provide this certainty. A less than expected event may require the project to be substantially re-costed.<sup>2</sup>

<sup>2</sup> Probabilistic methods use advanced techniques to model a spectrum of risk likelihood and impacts, providing a more accurate estimate range for contingency and costs. This is required for all projects over \$50 million. Deterministic estimates use a generic percentage uplift

- 22 As a result of our baselining assessment, we have used a RAG rating approach to show our confidence in the delivery agencies' baselining information:
- **Green / low risk and uncertainty:** Projects are prioritised and subject to existing oversight and assurance arrangements, such as ongoing monitoring through the OSG and gateway reviews. One project has been rated as Green.
  - **Amber / medium risk and uncertainty:** Projects are prioritised and subject to certain parameters (dependent on project specific baseline issues) and on the condition that this information is provided within a specified time period. 11 projects have been rated as Amber.
  - **Red / high risk and uncertainty:** Projects progress to the end of the current phase before confirmation of prioritisation to further increase certainty, and to identify and estimate risks. 12 projects have been rated as Red.
- 23 Overall, confidence in the baselining information is much lower than would be expected from the Crown's normal capital management process, e.g. the point at which a typical project proceeds from a detailed business case to pre-implementation.
- 24 Alongside re-prioritising the Programme to fit within budget constraints, officials' advice is that your purchase arrangements for the Programme should include more of the Crown's usual steps for managing risk. These include the Treasury Gateway Process, holding a contingency and having reasonable stage gates for projects and continued oversight and assurance.
- 25 We have suggested an approach to doing this in paragraphs 70 - 87 below, including establishing revised project budgets, utilising a programme level contingency, ensuring an appropriate set of project decision-making processes, and retaining independent monitoring and assurance through the OSG.
- 26 Officials will also report back on how monitoring and oversight arrangements can remain right-sized for the Programme.

### Prioritising the Programme

- 27 The Ministry has prioritised the Programme to assess the individual projects against your priority outcomes for the Programme. This has involved integrating the findings of several assessment approaches.
- 28 Delivery agencies have provided some information on project benefits, including transit-oriented housing development and emission impacts, although the quality and depth of this information is variable. They have also completed internal prioritisation exercises, ranking projects against priority outcomes (housing and emission impacts), as well as transport outcomes.
- 29 We understand Waka Kotahi have also provided advice that may differ from the prioritisation outcomes set out in this paper (BRI-2158). As we have not had the opportunity to engage with this advice in the development of this paper, officials are able to provide further advice to Ministers on any differences if required.

- 30 In addition to this, the Ministry has re-assessed project benefits using its policy appraisal tool to identify benefits and impacts of each project. Appendix 3 provides further detail of our prioritisation assessment across the Programme.
- 31 The Chief Science Advisor to the Ministry of Transport has viewed the internal rankings provided by the delivery agencies, and raised questions regarding how the emissions impacts of some of the roading projects have been described.
- 32 We have considered this information, and a range of system considerations such as the mix of rail and roading projects that balance housing and emissions objectives, to help inform our prioritisation across the Programme. Our confidence in the baseline cost as well as understanding of value for money have helped to inform this work. There are several important limitations to consider:
- in many cases, detailed benefit information is not available for project stages or sub-scopes
  - up-to-date benefit cost ratios (BCRs) and the analysis and data underlying these BCRs is not consistently available across the Programme
- 33 Given these limitations, we have been unable to fully assess the individual projects in line with your Programme priorities. However, officials' have proposed a way forward for the Programme, that prioritises the transport projects into four categories using the best available information, while managing the Programme risks and uncertainties:
- **Priority 1:** Projects that are likely to represent value for money, have commenced with procurement or construction, or are about to commence with construction, and have a higher certainty and lower cost risk to the overall Programme.
  - **Priority 2:** Projects that could represent value for money, align with your priorities for housing benefits and achieving transport outcomes, and potentially resulting in less emissions than other projects. However, these projects have medium certainty and further information is required to provide greater confidence in delivery.
  - **Priority 3:** Projects that align with your priorities but do not necessarily represent value for money from the information available through re-baselining. Critical decisions are required before Joint Ministers are able to commit to construction or delivery.
  - **Priority 4:** Projects that are high risk with high uncertainty around expected outcomes, value for money, and scope. These projects could be progressed to detailed business case stage to provide greater certainty, but any decision to deliver or implement should be deferred until further funding or delivery options are available.

**Priority 1: 18 projects can be delivered to support the delivery momentum of the Programme**

34 We have identified 18 projects that:

- have commenced with construction, or are about to commence with procurement or construction
- have higher levels of certainty, or lower levels of cost risk

35 This includes the 15 projects we previously identified and you agreed to commit to in-principle (OC210055 refers), and three additional KiwiRail rail projects.

36 Officials consider that the Wellington rail projects could also be progressed at relatively low cost risk as part of the prioritised Programme. This provides a forward pipeline of work for the sector, and would improve the safety, resilience and reliability of the rail network, and potentially enable mode shift and environmental benefits through an increase to public transport capacity.

37 We recommend prioritising with these 18 projects (as Priority 1), currently forecast to cost \$2.7 to \$3.0 billion, on the basis that this would provide a forward pipeline of work for the sector.

38 Progressing with these projects would support delivery momentum, provide some certainty in the construction pipeline, and allocate projects across New Zealand.

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Table 1: Priority 1 projects

Project	Original Programme allowance (million)	Low cost estimate (million)	High cost estimate (million)	RAG
SH58 Safety Improvements	\$59	\$107	\$133	Red
SH1 Papakura to Drury South Stage 1	\$423	\$655	\$720	Amber
Takitimu North Link Stage 1	\$478	\$658	\$740	Amber
Wiri to Quay Park (Third Main Line)	\$315	\$305	\$318	Amber
Papakura to Pukekohe electrification	\$371	\$356	\$375	Green
Canterbury Package (six projects) <ul style="list-style-type: none"> <li>• Walnut</li> <li>• Brougham</li> <li>• Halswell</li> <li>• Rolleston</li> <li>• Tinwald</li> <li>• Weedons</li> </ul>	\$159	\$228	\$277	2 Red 4 Amber
Queenstown Package (three projects)	\$90	\$117	\$145	Red
SH1/SH29	\$58	\$40	\$49	Amber
Wellington Railway Station safety improvements	\$70	\$69	\$74	Red
Wairarapa Rail upgrades	\$126	\$118	\$127	Red
Capital Connection Interim Replacement Rolling Stock	\$15	\$24	\$26	Amber
<b>Total committed funding</b>	<b>\$2,164</b>	<b>\$2,677</b>	<b>\$2,984</b>	

*There are additional scope options for Priority 1 rail projects which could potentially support emissions reduction and housing growth in Auckland and Wellington*

39 Within the Priority 1 projects, there are also a number of additional scope changes for the rail projects identified by KiwiRail during baselining. This includes:

- **Wiri to Quay Park:** Bringing forward design, consenting and construction of the fourth main at Middlemore Hospital. This will help eliminate noise and construction disruption at the hospital. The capacity created by this option is for future proofing and aligns with the second decade of the Auckland Transport Alignment Project (ATAP).
- **Papakura to Pukekohe:** Auto-Transformer System, Transpower switching, and Pukekohe Master Plan changes. These represent a better value proposition now than in the future, and for the Transpower switching, there is likely to be a requirement for this to occur sooner.
- **Wairarapa Rail Upgrades:** Masterton Yard changes and improved stabling, and Carterton loop. For Masterton Yard, this would improve integration of freight train and passenger train operations at Masterton, which is important for future commuting and improves current safety. Proceeding with the Carterton Loop now represents value for money, compared to delaying.
- **Wellington Rail Improvements:** East Yard Access and Freight Yard Track Reconfiguration. The East Yard Access Track Connection value for money if progressed now, rather than delayed. The Freight Yard Track will address about 90 minutes of travel delays, which would be more disruptive if done at a later stage. While the Freight Yard Track Reconfiguration is not immediately essential (and unlike the East Yard access works, there is no immediate safety benefits) as volumes increase it will become increasingly necessary within the next decade,

40 Further detail on these additional scope options is included in Appendix 2. KiwiRail have advised these additional scope options (excluding the Drury rail stations) will provide for future proofing, rail safety, and increased capacity on the rail network, and are forecast to cost between \$132 million to \$164 million.

41 Officials consider these options can be prioritised within the Programme, as they align with your Programme priorities to support housing growth and could potentially reduce emissions, and are relatively low cost and low risk so will not have a significant impact on the wider Programme.

### Options for the remaining \$3.6 to \$4.0 billion Programme allocation

42 If you agree to progress with the 18 projects that are small scale or close to procurement or construction described in Table 1 above (**Priority 1 projects**), and the additional scope options for rail projects, this leaves a remaining allocation of \$3.6 to \$4.0 billion that could be prioritised to deliver the remaining Programme.

43 We have assessed the remaining projects against your priorities of housing and emissions reduction. Although there is scope to mitigate the impact on emissions through changes to the mix of projects and additional scope options within the budget constraint, choices to reduce emissions in an overall sense are constrained by the overall structure of the Programme.

44 Due to the limited availability of data on the emissions impacts of the Waka Kotahi sub-programme, our judgements are based on scale and various data and rankings

that is available. In addition, there is significant uncertainty about the exact nature of some of the projects, which affects our ability to meaningfully assess the impacts.

- 45 Even without detailed data, officials consider that the roading projects in the Programme may increase emissions through inducing additional vehicle kilometres travelled (VKT) on the transport network. Even so, all of the roading projects are otherwise credible network improvements that deliver some benefits against some priority transport outcomes, and will have some benefits in terms of enabling public transport.
- 46 Land use decisions such as the greenfields development in Drury will help to address housing growth challenges, but will also increase VKT and emissions as a result of their nature. As we have previously advised in *Drury Options for Investment*, it is possible to mitigate VKT to an extent by enabling transit-oriented development and prioritising the delivery of public transport options first, and enabling active modes of transport to access stations. Staging roading investment provides time for the uptake of active modes and public transport, and also allows time for wider policy interventions to take effect (e.g., private fleet decarbonisation and demand management).
- 47 Prioritising rail investment and scope choices that contribute to mode shift within the remaining budget constraint will help to optimise the remaining projects to achieve a pragmatic balance between supporting housing outcomes while managing emission impacts. This may require de-prioritising some of the roading projects that contribute less towards housing outcomes.

*Staging investment in South Auckland will help to balance your Programme priorities*

- 48 The remaining Programme could be prioritised towards urban and housing benefits, concentrated around the new rail stations in Drury.
- 49 The South Auckland projects are higher priority than roading projects that primarily achieve transport outcomes such as Penlink and Takitimu North Link Stage 2, where there is only limited opportunity for transit-oriented development. This approach is consistent with our previous advice to you regarding Drury Options for Investment OC210264 refers).
- 50 The Ministry of Housing and Urban Development (MHUD) have indicated that it considers the projects impacting the Drury and South Auckland areas are the priority from a housing perspective. These are:

- SH1 Papakura to Drury South Stage 2
- Drury rail stations, at Drury Central and Paerata
- Mill Road northern section, and route protection of the full Mill Road corridor.

- 51 Officials consider there are staging options for some larger projects as indicated in our previous advice. Most notable of these are Mill Road and SH1 Papakura to Drury South.

- 52 Improvements to address safety and congestion issues in the northern end of Mill Road are regarded as high priority from a transport network perspective. These do not relate to housing outcomes in the area.
- 53 Improvements to the remainder of Mill Road do not directly enable transit oriented development around Drury, and are not essential for planned developments to go ahead in the near term. A staged approach (described below) to the corridor is recommended.
- 54 For any large scale growth to occur throughout the Drury/Opaheke area Auckland Council, developers and Waka Kotahi consider that, over time, Mill Road in its entirety is required to provide access. The alternative is a large network of local collector roads which allow people access to developments. It is important to note that this larger growth area is not adjacent to the rail corridor, and it could be argued that alternative locations for development that can be well served by rail should be identified and prioritised. The counterfactual is that the wider growth area throughout Drury and Opaheke is not served by a strategic arterial route.
- 55 These projects could be staged for delivery alongside the housing growth expected in South Auckland. Officials have recommended to prioritise these projects across multiple decades in our previous advice (OC210264 refers).
- 56 Progressing with officials' proposed staging for these three projects in South Auckland could be focused on connections to rail stations and other transit in Manukau and parts of Drury. This would help manage pressure on the Programme.
- 57 This would enable more immediate projects in the Programme to proceed in the near term, and enable the business case, scope and designations for less developed projects in the Programme to be worked through.
- 58 However, officials are aware of the MHUD's support for all three stations immediately, and the analysis provided by KiwiRail shows a clear benefit for investing in all three stations. If all three rail stations are to progress, and funding made available, the sequence above would only change to the extent Drury West is brought forward to the first decade.

*Officials recommend that the preferred option for Northern Pathway is assessed in the same manner as other projects in the Programme*

- 59 Waka Kotahi has provided a briefing regarding a new preferred option for the Northern Pathway. The new preferred option has an estimated P50 cost of \$650 to \$715 million, with a P95 of \$715 to \$785 million, significantly over the initial allocation of \$360 million. The briefing notes that the indicative BCR of the preferred option is between 0.4 and 0.6, which is based on the benefits calculated in 2019. [REDACTED]

- 60 The briefing states that additional funding would be required to deliver the project.

- 61 [REDACTED]  
[REDACTED]  
[REDACTED] Further, the OSG and officials have not had the available opportunity to appraise the projects' baseline

To maintain the free and frank expression of opinions

information or engage with the process undertaken to develop the P50 and P95 estimates.

**Preferred allocation of remaining projects in Priority 2, 3, and 4**

62 We have developed a preferred ranking for the remaining projects in the Programme that reflects a balance of outcomes, your Programme priorities, and manages the cost risk to Joint Ministers. In order of priority:

Table 2: Ranked list of remaining Programme projects<sup>3</sup>

Priority group	Project	Latest cost estimate range (million)		Our advice
		Low	High	
Priority 2	Drury rail stations (Drury Central and Paerata, with connector roads)	\$303	\$360	We recommend progressing with these projects as they help to achieve housing benefits while potentially resulting in less emissions than other projects. We consider that the potential benefits and expected costs are relatively well defined, and consider the uncertainty and cost risk is medium.
	SH1 Papakura to Drury South Stage 2	\$510	\$600	
	Drury West rail station, with connector roads	\$110	\$135	
Priority 3	Melling Mill Road, at a reduced scope (i.e., the Northern section)	\$376	\$419	We consider that these projects could be delivered in a way to achieve housing benefits and address key network issues while potentially resulting in less emissions than other projects. However more information is needed to assess their value for money and to confirm their intended scope, expected benefits and forecast costs.
		\$800	\$950	
Priority 4	Penlink (with significant scope decisions to be made)	\$739	\$826	We recommend these projects are progressed to

<sup>3</sup> Northern Pathway (\$750 to \$832 million) has been excluded from this list as there is limited information on the preferred option for this project. Once further information is available, officials recommend prioritising this project on the same basis as the other projects in the Programme.

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	Remaining stages of Mill Road	\$2,100	\$2,550	detailed business case to support confidence in the Programme, but any further decision to construct or deliver the project is deferred until further funding or delivery options are available.
	Takitimu North Link Stage 2	\$543	\$627	
	Whangarei to Port Marsden	\$1,233	\$1,311	
	Otaki to North of Levin	\$1,203	\$1,501	

63 If you agree to our prioritised list above, there are three projects (**Priority 2**) that could be staged for delivery. However, given the uncertainty and cost risk is medium, a greater level of oversight and assurance should be expected.

64 Three additional projects that could align with your Programme priorities for housing would need to be investigated further, with their scope, expected benefits, and forecast costs further defined before Joint Ministers can commit to their delivery (**Priority 3**).

65 We understand that Waka Kotahi considers there is benefit in bringing the 'Snodgrass extension' from Takitimu North Link Stage 2 to Stage 1 (BRI-2108 refers). This is on the basis that it would eliminate the need for a temporary solution in Stage 2, and deliver a State Highway 2 tie in that is in a safer and more practical location. The costs associated with deconstructing the temporary solution when, or if Takitimu North Link Stage 2 progresses would also be eliminated.

66 While there may be benefit in doing this, we do not currently have information on the scope and cost implications of this scope change. As Takitimu North Link Stage 2 is in Priority 4 we consider that including the extension in Stage 1 of the project will require a decision from Joint Ministers once forecast costs and scope is confirmed.

**All projects could be progressed to business case stages now at a minimal cost risk to the overall Programme**

67 We previously recommended you could allow all projects in the Programme to reach decision stage gates now, such as completion of business cases, regardless of whether they remain part of the Programme.

68 This could be funded from the existing Programme allocation, as it presents a relatively low cost risk to the overall Programme, and enable projects to have greater levels of readiness if additional funding or delivery options become available.

69 This would allow you to manage market expectations on the delivery of these projects, particularly with land owners and communities. A decision can then be made by Joint Ministers to confirm the delivery of these projects if the projects still align with Government priorities and further funding or delivery options become available.

**Given the remaining issues in the Programme, we have suggested an approach that allows delivery to continue while managing the risks to Joint Ministers**

70 Given the residual issues and risks in the Programme, we have recommended an approach that allows delivery to continue but also manages the risks to Joint Ministers in a way that better reflects normal Crown practices.

71 If you agree to our recommendations, we will work with the delivery agencies to give effect to the prioritised Programme by:

*Establishing revised project budgets*

72 Given the variability in costs to date, key scope decisions to be made and the limited information on both the process and resulting estimates, we recommend that you confirm your expectations for the funding allocated to each project in the Programme. This should be set equal to the upper limit of the forecast cost estimates provided by the delivery agencies through the baseline.

73 A proportion of the budget (notionally P50 to upper limit) should be retained by the Crown to incentivise a robust cost and project management discipline.

74 This upper cost limit would provide a higher level of certainty that it will be sufficient to cover the base cost for the project, include allowance for cost escalation, and provide a sufficient level of project and programme contingency based on the current status of the project.

75 This will help to ensure there is a clear understanding of project costs, the fixed funding envelope for the Programme, and provides a reference point for the OSG and officials to use to measure any variances against.

*Utilising a programme level contingency*

76 Given the remaining uncertainty and risk for the majority of these projects, officials consider there is a high risk that the costs for these projects will increase over time, despite adopting the high cost estimates

77 Officials recommend 15 percent (\$1 billion) of the Programme funding be retained as Programme contingency to be held by the Ministry in its Crown appropriations. This contingency can be called upon for prioritised projects should the forecast cost to complete a project exceed the project budget. Delivery agencies would be required to seek Joint Ministers agreement to apply any of the Programme contingency to the project, with supporting advice from the OSG. This would include explaining the drivers for the cost increases, and what mitigations are in place to manage the residual risk in the project.

78 Over the life of the Programme, it is possible that projects will forecast a cost to complete under the allocated budget. In these instances, the residual funding could be "returned" to the Programme contingency to be applied to cost over-runs on other Programme projects.

79 If sufficient contingency exists, we consider that delivery agencies could seek a decision from Joint Ministers to move a Priority 4 project (or a scaled/re-scoped version of such) into a higher priority category for delivery.

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- 80 Additionally, given Ministers' priority outcomes of housing and emissions reduction, you may wish to allow agencies to seek agreement to fund a transport project not currently within the Programme, if such a project better aligns with your priority outcomes and would represent a better value proposition than a Priority 4 project.

### *Ensuring an appropriate set of project decision-making processes*

- 81 Ministers previously set a highly delegated arrangement for Programme delivery that reflected a high level of confidence in project and Programme delivery. This relied on thresholds above which issues needed to be raised. However, given the level of risk and uncertainty that will remain after the baselining process, we consider that a clearer direction on expectations and greater assurance from the delivery agencies is required.
- 82 To support the Programme's viability and affordability within the \$6.8 billion funding envelope, we consider that all projects should be subject to a set of additional conditions/assurance designed to provide a greater degree of decision-making transparency alignment and Programme assurance. The detailed conditions/assurance are set out in Appendix 4.

### *These measures should be supported by the Programme's oversight arrangements*

- 83 The measures outlined above will rest on decisions made by you, and advice from Waka Kotahi and KiwiRail. Officials are working with the delivery agencies to determine the best governance and oversight arrangements for the revised Programme, and will report to Ministers jointly.
- 84 Independent monitoring and assurance is a critical part of large capital project delivery, providing transparency and visibility of risks to funders, and ensuring any major risks are being suitably mitigated.
- 85 The delivery agencies agree that the Programme's monitoring and governance arrangements can, and should work more effectively together, while respecting the roles and responsibilities of the respective Boards and their accountability for project delivery. We are working through how this can operate in practice.
- 86 This may, for example, include right-sizing the scale of the OSG's monitoring role and reporting activity, as programme and project risk is increasingly managed. The OSG has reflected that as the baselining process concludes, it is important that it rules a line under the baselining process and executes the light touch, high trust approach that was envisaged.
- 87 We will report to you shortly on the delivery agencies' agreed advice.

### **Next steps**

- 88 If you agree with the recommendations in this report, officials will prepare letters for you to send to the delivery agencies' Boards outlining the priority of each project and the expectations for the Programme moving forward.
- 89 The OSG will continue to meet monthly with delivery agencies to provide monitoring and oversight over the Programme, and subsequently report to you.

## Appendix 1 – New Zealand Upgrade Programme Baseline Assessment Summary

Waka Kotahi and KiwiRail (the delivery agencies) have undertaken significant work since the June 2020 Establishment Reports were approved by Joint Ministers, to develop the baseline information for the transport component of the New Zealand Upgrade Programme (the Programme). Delivery agencies have engaged closely with the New Zealand Upgrade Programme Oversight Group (OSG), its independent advisors and officials from the Ministry of Transport (the Ministry) to meet challenging timeframes. Officials have not re-evaluated technical judgments or assessments, but have looked at the processes followed, and what information has been applied to form judgments.

This assessment is not a pass or fail judgment, but does provide purchase advice to Joint Ministers on the level of confidence in aspects of the projects and the transport component of the Programme overall, so Joint Ministers can make choices about how to proceed. The overall assessment of the Programme is that significant risk and uncertainty remains. This reflects that for around \$5.5 billion work of projects, a preferred option (which includes factors such as route, alignment, form function and resilience) has not been selected by the delivery agencies, their Boards and partners. There has been no quantified risk adjustment for this.

The baseline analysis undertaken is based on information provided by delivery agencies. Officials have worked with delivery agencies on what information is needed or expected. Where information was not been made available to support confirmation of a process or output, it has been assumed that it has not yet been undertaken, or developed.

The following RAG ratings represent the OSG's and independent advisors' review of information provided to date. The OSG rating reflects risk and uncertainty that remains for scope, cost and schedule, based on the quality of process undertaken and level of project development. The Waka Kotahi and KiwiRail ratings relate to their own respective confidence in the information provided.

Overall, of the 24 baselines provided (Queenstown projects were combined into a single baseline) the projects received the following OSG rating:

- 12 projects are rated as Red
- 11 projects are rated as Amber
- 1 project is rated as Green

Officials will be able to provide a RAG assessment of the individual projects' baselining information if requested by Joint Ministers, as they are being reconciled with the delivery agencies' own assessments, and are undergoing a QA process.

The review has excluded assurance of the underlying information provided, such as the methodology used to undertake Quantitative Risk Assessments (QRAs) or mechanical review of calculations, for instance. The ratings provided should be viewed as a guide based on information provided to date.

Officials note that further work is underway by the delivery agencies to improve the quality of the baseline to both enable effective oversight and monitoring and to improve project delivery performance. In particular, material improvements in scoring may be achieved by provision of additional information in the coming weeks.

The themes presented on the next page are apparent across both delivery agencies, although to differing degrees, due to the nature of each agencies' projects. The quality and breadth of information provided by KiwiRail has been relatively high and has demonstrated maturity of project management processes, leading to a relatively lower level of risk in general. That said, this is helped by the fact that by their nature, rail projects are less vulnerable to scope change, leading to a lower exposure to significant change.

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Table 1: Summary of general observations from independent advisors on the Programme's scope, benefits, cost, and schedule

Areas of inquiry	General observations from independent advisors	Agency specific comments from independent advisors	Project examples
<b>Scope</b>	<p>Scope is a key driver of certainty in other aspects of the programme, including cost. However, there is significant uncertainty on project scope, and what benefits will be delivered.</p> <p>There are key risks to the unavailability of an appropriate Work Breakdown Structure (WBS) for certain projects. Without a defined WBS it is also difficult to develop integrated cost and schedules tied back to a documented scope.</p> <p>Without an appropriately defined scope, monitoring of scope development is not possible, and there is the potential for scope creep. Flow on impacts of unclear scopes for projects impact both cost and schedule, as they are interrelated.</p>	<p>Waka Kotahi and KiwiRail have taken different approaches to scope development and management. Both have merits and drawbacks which will need to be considered as part of the prioritisation assessment.</p> <p>Waka Kotahi have developed scope in a manner to deliver the best project, without constraining options to the previously agreed funding limit (without sacrificing the core project outcomes).</p> <p>KiwiRail have developed project scope where possible, with respect to the original funding envelope. Both have merits and drawbacks which will need to be considered as part of the prioritisation assessment.</p>	<p><b>Papakura to Pukekohe Electrification</b> is an example of a project where scope changes led to a positive result (a lowered cost forecast). The project underwent value engineering and identified various ways of reducing cost or increasing benefits within the available budget through re-scoping. Examples include: a revised Pukekohe station scheme and staging plan; and alternative Overhead Line Electrification structures. Costs are currently forecast within the existing budget.</p> <p><b>Mill Road</b> scope amendments include changed route alignment resulting in increased costs, as well as the transfer of Drury South Interchange and additional tie in with local roads. Mill Road is an example where scope changes led to a negative outcome (significant increase in costs).</p>
<b>Benefits</b>	<p>In general, benefits of the projects have not been well defined. In the majority of cases, the level of information available does not enable effective monitoring, with scope changes and benefit impacts not reported. It is currently not clear what level of outcomes and benefits are being purchased or delivered, both on individual projects and the Programme as a whole.</p> <p>Data relating on emissions reductions and housing benefits was not available for analysis.</p> <p>There is no information that the cost increases observed across the Programme correspond to an increase in benefits. It is likely that the Benefit Cost Ratios (BCR) of projects and the wider programme have reduced.</p> <p>BCRs and other supporting information was available only for a small number of projects. This means that it is difficult to assess how increased costs affect value for money. Many business cases no longer reflect the benefits and costs of the project they were written for, due to age and subsequent scope changes.</p>	<p>Across the Programme, benefits information from individual projects linking back to the Programme outcomes, objectives and benefits is not well documented. Individual projects typically have specific problem and benefits statements and investment objectives which document the localised impacts of the projects.</p>	<p><b>SH58 Safety Improvements</b> project is an example where benefit estimates around deaths and serious injuries prevention were not provided. Waka Kotahi note that the original business case estimates do not reflect the current scope, limiting their ability to supply benefits information. This situation reflects the majority of baseline documentation provided across the programme.</p> <p><b>Northern Pathway</b> and <b>Papakura to Pukekohe Electrification</b> are examples where benefits information have been provided. In the case of the Northern Pathway project, detailed benefits targets were provided for the expected mode shift required to be delivered by the project. An example is increasing walking and cycling trips across the harbour to 3 percent of total trips by 2028. This gave a good basis for scope development.</p> <p><b>Papakura to Pukekohe Electrification</b> baseline documentation includes Investment Logic Mapping (ILM) showing the link between the investment objectives, benefits and performance metrics. Target benefit information such as the reducing travel time by 4 minutes by 2024 is an example of this.</p>

Areas of inquiry	General observations from independent advisors	Agency specific comments from independent advisors	Project examples
<p><b>Cost</b></p>	<p>The Programme's cost has increased, with a P50 to P95 range of \$11 to \$13 billion (total cost). This corresponds to around \$4.2 to \$7.2 billion over the \$6.8 billion funding envelope. This is primarily driven by the increasing cost of Waka Kotahi projects.</p> <p>Cost increases are widespread across the Programme, with 21 of the 26 projects now forecasting costs over their allocated funding.</p> <p>Contingency is currently estimated at \$3 billion. Officials believe there is potential for additional risks and uncertainty. This is because the way cost and contingency have been estimated varies across the Programme, with just 7 projects having completed Quantitative Risk Assessments, and only 9 having completed external assurance of the cost estimates. Inconsistent methodology makes it difficult to have confidence in current costings.</p> <p>It has not been possible to reconcile cost estimates to scope due to how different cost breakdowns (or a lack of cost breakdowns) were present. There is a risk that project scopes have not been fully costed, and the impact of this on schedule and project timings unclear.</p> <p>Often a deterministic approach has been used to estimate contingency, with an uplift applied based on management judgement. It is not clear how these percentage uplifts were arrived at and therefore whether they are appropriate. In several cases this is not consistent with the relevant policies and procedures.</p>	<p>Cost increases sit largely in the Waka Kotahi sub-programme. Cost uncertainty should be able to be addressed more effectively after the business case phase once the preferred options is selected and better understood.</p>	<p><b>Mill Road</b> has seen the most significant increase in costs, with the P50 costs rising to \$2,913 million, from an initial funding allocation of \$1,354 million.</p> <p><b>Whangarei to Port Marsden</b> has, positively, undertaken a Quantitative Risk Assessment (QRA) to support contingency estimates, although the preferred option has not been selected. Similarly, the <b>Papakura to Pukekohe Electrification</b> and <b>Wiri to Quay Park</b> projects both have QRA contingency estimates to support the cost range provided.</p> <p><b>SH1 Papakura to Drury South</b> is a mix of QRA and deterministic approaches depending on the stage. Additional price certainty is provided due to the tendered price for Stage 1A of the project, as well as allowances and risk for quantities and rates and for "unknown unknowns" up to 30% per cent of physical works costs. Some of this risk though is built into the base cost and difficult to disentangle from the true base cost, indicating the true level of contingency may be higher than it otherwise appears.</p> <p>However, for most projects QRAs have not been undertaken. An example is for the <b>Takitimu North Link Stage 1</b> project. Given that the project is already at a procurement stage, it would be expected that a QRA is completed.</p> <p>One of the areas of risk that appear to be under represented and therefore may lead to lower amounts of contingency than required, relates to option risk. This is the potential for scope change where preferred options haven't been confirmed and therefore a materially different and potentially higher cost option may be delivered.</p> <p>For example the <b>Northern Pathway P95</b> provided in the Establishment Report was around \$352 million but option risk was not fully considered and the current P50 estimate is now significantly higher.</p> <p>Given the value and complexity of the projects, officials would expect to see a probabilistic approach, rather than deterministic. This has been shown to lead to a better outcomes and more accurate cost estimates reflecting the inherent uncertainty of the projects.</p> <p>Additionally, where deterministic uplifts are used, officials would expect to see underlying analysis and rationale to demonstrate that a robust process has been undertaken and to support the chosen values.</p>

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Areas of inquiry	General observations from independent advisors	Agency specific comments from independent advisors	Project examples
<p><b>Schedule</b></p>	<p>Overall schedules were weaker relative to scope and cost. This is important as there should be a common Work Breakdown Structure (WBS) built of a scope to identify the tasks required to deliver the project over time.</p> <p>Around 9 projects have provided a construction schedule. In a number of cases however a one-line item accounts for more than 30 months of activity. Further, the available information does not confirm the methodology used to determine schedule duration and therefore was unable to be assessed by the independent advisors.</p>		<p><b>Mill Road</b> represents a risk adjusted approach to schedule estimates, with a base, P50 and P95 provided. In this example there is approximately a 3-year difference between completion dates in the base and the P95. Significant risk and other allowances have been built into the schedule. It would seem that this is sufficient to represent a pessimistic or worst-case scenario, but no analysis or methodology is provided to support the outputs.</p> <p><b>Whangarei to Port Marsden</b> is an example where the schedule provided included “construction underway” as a line-item accounting for a duration of over 1000 days, with little information to support analysis of whether this top down estimate is suitable.</p> <p><b>Papakura to Pukekohe Electrification</b>, in comparison, provides a more detailed breakdown of a schedule including construction, which better aligns (although not perfectly) back to the WBS and is broken into its geographic packages. The level of detail provided enables more robust identification and management of the critical path and other key schedule risks.</p>

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## Appendix 2 – KiwiRail additional scope options

Note – table excludes the two projects that received early approval to proceed (Wiri to Quay Park and Papakura to Pukekohe electrification)

Project	Base / Option	Confidence in costs to deliver identified scope	Grouping	Latest cost estimate range**	Staging options and benefit trade-offs	Contribution to improved housing and transit-oriented development outcomes and benefits	Contribution to emissions reduction outcomes and benefits	Wider outcomes and benefits	Interdependencies	Updated Benefit-Cost Ratio/More detailed VFM information	Relative Prioritisation Emissions Reduction	Relative Prioritisation Housing and transit oriented development	Notes
W2QP – 4 <sup>th</sup> Main - bring forward design, consenting and construction of the 4 <sup>th</sup> main through CMDHB site at Middlemore.	Additional Scope Option		South Auckland/ ATAP	\$40.0M - \$60.0M	Staging: works should occur now rather than at a later stage to avoid further disruption to PT and freight services.	4 <sup>th</sup> main will enable additional passenger and freight operation and will also bring further transit-oriented development benefits.	Future benefits when 4 <sup>th</sup> main complete. Increased capacity for both PT and freight operations. Emissions reductions from mode shift	Future proofs the site. Main Benefits: <ul style="list-style-type: none"> <li>• Environmental benefits</li> <li>• Economic prosperity</li> <li>• Resilience</li> <li>• Transit-oriented development</li> <li>• Healthy and safe people – improved community health</li> <li>• Inclusive access - Increased passenger and freight journeys</li> </ul>	Completion of 4 <sup>th</sup> main required to maximise benefits	Not yet completed	4		Supports Kainga Ora and DHB future development of the site (incl proposed hospital upgrades)  Eliminates noise and construction disruption to the hospital during 4 <sup>th</sup> main development  It is estimated that the cost of completing these works will rise by ~\$20-\$30m if completed post completion of W2QP works.
P2P – Auto-Transformer System  Transpower switching – additional 220kV switchgear and protection mods  Pukekohe Master Plan Changes	Additional Scope Option		South Auckland/ ATAP	\$24.9M - \$31.7M	Staging: works should occur now rather than at a later stage to avoid further disruption to PT and freight services and avoid safety hazards associated with retrofitting.	Improvement in resilience and reliability of PT and Freight services  Improved experience for PT customers	Supports increased PT services – emission reductions from mode shift (diesel fleet replacement and avoided car travel)	Future proofing A second circuit connection will provide a significantly higher level of power supply to the Drury traction feed and mitigate the risk of extended feeds from Westfield not being able to meet future demand in an outage scenario. Resilience benefits from having a secondary feed Supports Transit-oriented development Environment benefits		Not yet completed	5		Auto Transformer: If completed in 10years the expected cost will be ~\$48m with NPV of \$30m (vs NPV of doing now ~\$20m)  Transpower Bussing: Additional switchgear may be a requirement rather than optional - currently awaiting outcome of power supply modelling being undertaken by Transpower.  Pukekohe Master Plan Changes – all elements disruptive and expensive to do at a future point in time.
Drury Rail Stations  - 2 station option (Drury Central and Paerata) plus land for 3 <sup>rd</sup> station and connector roads	Base		South Auckland/ ATAP	\$303M - \$360M	Development close to Drury West is not anticipated to proceed with the same scale and pace as development close to the other two stations and therefore is excluded from this option.	The two new stations will support and enable growth and improve access to economic and social opportunities for existing and future communities in the South, by supporting a transformational mode shift away from use of LOV, which in turn will help to reduce carbon emissions.	Supports increased PT services – emission reductions from mode shift	PT benefits: <ul style="list-style-type: none"> <li>• Travel time benefits</li> <li>• Reliability</li> <li>• Health Benefits</li> </ul> Mode shift benefits: <ul style="list-style-type: none"> <li>• Travel time costs</li> <li>• Congestion costs</li> <li>• Trip reliability</li> <li>• Vehicle operating costs</li> <li>• Crash savings</li> <li>• CO2 reduction</li> </ul>	ATAP funding (\$243m) for other roading requirements	BCR 4.6  See separate paper		2	Best option if no additional funding is available. Highest BCR. Separate paper completed with detailed benefits, Has secondary emission benefits.  Southern Growth Areas Household Growth Rate: Drury: 4,100 by 2028, 19,000 by 2048, 24,600 2048+  Pukekohe: 14,700 by 2028, 20,900 by 2048, 26,200 2028+ (Source SGA Rail DBC)  Rail Patronage – separate paper provided

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Drury Rail Stations  - 3 station option including connector roads	Option - Alternate Base		South Auckland/ ATAP	\$413M - \$495M		The three new stations will support and enable growth and improve access to economic and social opportunities for existing and future communities in the South, by supporting a transformational mode shift away from use of LOV, which in turn will help to reduce carbon emissions.	Supports increased PT services – emission reductions from mode shift	PT benefits: • Travel time benefits • Reliability • Health Benefits Mode shift benefits: • Travel time costs • Congestion costs • Trip reliability • Vehicle operating costs • Crash savings • CO2 reduction	ATAP funding (\$243m) for other roading requirements	BCR 3.9  See separate paper		1	Best option for enablement of housing growth Has secondary emission benefits.  Southern Growth Areas Household Growth Rate: Drury: 4,100 by 2028, 19,000 by 2048, 24,600 2048+  Pukekohe: 14,700 by 2028, 20,900 by 2048, 26,200 2028+ (Source SGA Rail DBC)  Rail Patronage – separate paper provided
Wellington Regional Rail - Wairarapa Rail Upgrades	Base		Review of Rail	\$117.5M - \$126.5	Staging: Current baseline proposal incorporates a staged approach commencing May 2021 to final completion mid 2024		Supports increased PT and freight services – emission reductions from mode shift	Main Benefits: • Safety • Resilience • Environmental benefit through mode shift for freight and passenger	Increased service benefits are dependent on Wellington Railway Station safety base works being completed	Not yet completed	3		Essential for future commuting and improves current safety and resilience 625k peak passengers and 154k off-peak passengers carried on this service in the 2019 financial year. (Source: Wellington Longer Distance Rail Rolling Stock Business Case)
Wellington Regional Rail – Carterton Loop	Additional Scope Option		Review of Rail	\$15.3M - \$16.3M	Staging: following completion of Wairarapa resignalling works and level crossing upgrades.		Supports increased PT and freight services – emission reductions from mode shift	Main Benefits: • Safety • Resilience • Environmental benefits through mode shift for freight and passenger		Not yet completed	8		Enables Passenger and Freight trains to pass each other at Carterton station.  Base cost savings lost \$0.5m - \$0.8m if delayed/not completed concurrently with base works.
Wellington Regional Rail – Masterton Yard changes and improved stabling	Additional Scope Option		Review of Rail	\$12.0M - \$12.9M	Staging: ideally at same time as new signalling at Masterton or can be completed later once new rolling stock configuration is confirmed.		Supports increased PT and freight services – emission reductions from mode shift	Main Benefits: • Safety • Resilience • Environmental benefits through mode shift for freight and passenger		Not yet completed	6		Enables more trains to be stabled at Masterton. Improves integration of freight train and passenger train operations at Masterton. Important for future commuting and improves current safety
Wellington Railway Station safety improvements	Base		Review of Rail  Safety	\$68.6M - \$73.5M	Staging: Recommend proceeding immediately.  Critical works required for all Wellington Metro services	Continuation of benefits from PT for whole of Wellington Metro network	Supports increased PT services – continued emission reductions and incremental emissions benefits from enabling increase capacity and frequency of services	Main Benefits: •Safety •Resilience •Reliability •Travel time benefits •Capacity Improvements •Environmental benefits through enabling public transport capacity	New RS1 timetable cannot be implemented without these works being completed Regulatory prohibition in place until these works completed.	Not yet completed	1		Critical capacity asset for entire Wellington pax network
Wellington Railway Station safety: – Freight Yard Track Reconfiguration	Additional Scope Option		Review of Rail  Safety	\$26.6M - \$28.5M	Staging: Recommend undertaken concurrently with base works.		Reduces conflict and delay caused to PT services by freight trains therefore increasing capacity and frequency of PT services	Main Benefits: •Safety •Resilience •Reliability •Travel time benefits •Capacity Improvements •Environmental benefits through enabling public transport capacity	Station safety base works required ahead of reconfiguration.	Not yet completed	7		Critical capacity asset for entire Wellington pax network. Once RS1 timetable implemented total delay minutes (per day) from peak hour freight service departure at WRS will be up to 94mins, this work will remove the delay.  Additional disruption impacts if not completed immediately following Station Entry Safety works.
Wellington Railway Station safety: – East Yard Access Track Connection	Additional Scope Option		Review of Rail  Safety	\$12.6M - \$13.5M	Staging: Recommend undertaken concurrently with base works.		Supports increased PT services – continued emission reductions and incremental emissions benefits from enabling	Main Benefits: •Safety •Resilience •Reliability • Environmental benefits through enabling public transport capacity		Not yet completed	2		Reduces empty carriage movements (or 'Relay moves'). Relay moves only have a train driver on board, no train manager, and have been involved in a number of SPAD events in recent years.

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							increased capacity and frequency of services						Overall disruption impacts and additional base cost if works delayed estimated at \$0.8m - \$1.2m for remobilisation.
Capital Connection Interim Replacement Rolling Stock	Base		Review of Rail	\$24-26M	Staging: Works required to be complete by end of 2022 when existing fleet is retired.		Continuation of emissions benefits PT Services from Palmerston North to Wellington	Main Benefits: <ul style="list-style-type: none"> <li>• Inclusive access</li> <li>• Resilience</li> <li>• Environmental benefits (public transport)</li> </ul>		Not yet completed	9		134,000 passengers carried on this service in the 2019 financial year (Source: Wellington Longer Distance Rail Rolling Stock Business Case)

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Appendix 3 – New Zealand Upgrade Programme – Prioritisation Assessment

Projects	Forecast cost range (\$m):			BCR	Emissions reduction outcomes	Housing growth outcomes	Transit Oriented Development & Other Transport Outcomes	Our advice and prioritised rank		
	Original allocation	Low	High					Based on original cost	Emissions reduction	Facilitating Housing Growth
SH58 Safety Improvements	59	108	133	2.5	Not assessed					
Papakura to Drury South Stage 1	423	655	720	3.7	Not assessed					
Takitimu North Link Stage 1	478	658	740	2	Not assessed					
Wiri to Quay Park (4th Line Only)	315	305 (40 for fourth line only)	318 (60 for fourth line only)	3	<ul style="list-style-type: none"> <li>Some decrease in emissions from increased access to PT</li> </ul>	<ul style="list-style-type: none"> <li>No direct impact on housing growth</li> </ul>	<ul style="list-style-type: none"> <li>Strong increase in TOD with line going through Middlemore</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 3</b></li> <li>Reduction in emissions from better access to essential services via PT</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 9</b></li> <li>No direct link to housing growth</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 4</b></li> <li>Strong likelihood of TOD</li> <li>Some likelihood of reduced emissions</li> </ul>
Papakura to Pukekohe electrification	371	356	375	2.2	Not assessed, but see below for additional scope options					
Canterbury Package (six projects)	159	228	287	1.7	Not assessed					
Queenstown Package (three projects)	90	117	145	1.5	Not assessed					
SH1/SH29	58	40	49	2.1	Not assessed					
Wellington Railway Station Safety Improvements	70	69	74		<ul style="list-style-type: none"> <li>Sustaining and increasing PT capacity maintains and increases mode shift from road to rail</li> <li>Emissions reduction considering the counterfactual of restricted train services</li> </ul>	<ul style="list-style-type: none"> <li>No direct impact on housing growth</li> </ul>	<ul style="list-style-type: none"> <li>Improved Safety: fewer road accidents &amp; DSI</li> <li>Improved resilience</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 3</b></li> <li>Reduction in emissions as enables more mode shift to PT</li> <li>Reduction in emissions relative to counterfactual of restricted services</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 9</b></li> <li>No direct link to housing growth</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 6</b></li> <li>Scores high on emissions reduction</li> <li>Further benefits to safety &amp; resilience</li> </ul>
Wairarapa rail upgrades	126	118	127		<ul style="list-style-type: none"> <li>Sustained and longer-term increase in mode shift helps reduce emissions but in the short term the doubling of passenger capacity will lead to slight increase in emissions</li> </ul>	<ul style="list-style-type: none"> <li>The existence and expansion of the rail passenger services should accommodate economic (and possibly housing) growth in the region</li> </ul>	<ul style="list-style-type: none"> <li>Increased Access: extra passenger services</li> <li>Economic prosperity via enhanced freight efficiency</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 1</b></li> <li>Emissions reduction from sustained and extra PT</li> <li>Increase in growth from freight and accommodating economic growth</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 9</b></li> <li>No direct link to housing growth</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 2</b></li> <li>Scores high on emissions reduction and extra services to drive longer-term mode shift to PT</li> <li>Resilience, health and safety all benefit</li> </ul>
Capital Connection rolling stock	15	24	26		<ul style="list-style-type: none"> <li>Reduced emissions relative to ending the service once the existing rolling stock is retired (avoiding mode shift regression to cars)</li> </ul>	<ul style="list-style-type: none"> <li>No direct impact on housing growth</li> </ul>	<ul style="list-style-type: none"> <li>Increased Access: rail passenger services</li> <li>Benefits relative to counterfactual (ending the service)</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 3</b></li> <li>Emissions reductions from sustaining current levels of PT use &amp; more attractive experience</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 9</b></li> <li>No direct impact on housing growth</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 4</b></li> <li>Emissions benefits of PT use sustained and PT is more attractive</li> <li>Improvements in resilience, health and safety</li> </ul>
Drury rail stations (Drury Central and Paerata with connector roads)	247	303	360	4.6	<ul style="list-style-type: none"> <li>Emission reductions from increased access to PT (rail) and greater mode shift over time</li> <li>Larger population will likely lead to higher road emissions</li> </ul>	<ul style="list-style-type: none"> <li>Household growth in Drury: 4,100 by 2028, 19,000 by 2048, 24,600 2048+; Pukekohe: 14,700 by 2028, 20,900 by 2048, 26,200 2028+ (source: SGA rail DBC)</li> </ul>	<ul style="list-style-type: none"> <li>Facilitates TOD</li> <li>Strong increase in access to PT</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 1</b></li> <li>Emissions reductions through strongly increased access to PT</li> <li>Mode shift to PT encouraged</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 1</b></li> <li>Strong link to housing growth in surrounding areas</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 1</b></li> <li>Mutually reinforcing benefits in terms of emissions reduction, housing growth and TOD</li> </ul>
Additional scope options for rail (excluding Drury West rail station) - Papakura to Pukekohe assessed here		132	164		<p><i>(Only the P2P Options assessed: \$ 4.9m \$31.7m)</i></p> <ul style="list-style-type: none"> <li>Support long term mode shift and therefore some decrease in emissions</li> </ul>	<ul style="list-style-type: none"> <li>No direct effect</li> </ul>	<ul style="list-style-type: none"> <li>Some improvement in Resilience, Health, Safety</li> <li>Some increase in Access to PT</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 3</b></li> <li>Supports emissions reduction through mode shift to rail PT</li> <li>Mode shift to rail freight also reduces emissions</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 9</b></li> <li>No direct link to housing growth</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 7</b></li> <li>Emissions reduction via mode shift from road to rail passenger PT and rail freight</li> <li>Some improvement in resilience, health &amp; safety</li> </ul>
SH1 Papakura to Drury South Stage 2		510	600	3.7	<ul style="list-style-type: none"> <li>Some decrease in emissions from mode shift, congestion relief</li> <li>Some increase in emissions likely through induced demand</li> </ul>	<ul style="list-style-type: none"> <li>Supports Mill Rd project, which accommodates housing growth</li> </ul>	<ul style="list-style-type: none"> <li>Some impact on TOD; strong impact on access &amp; economic growth</li> <li>Provides for walking and cycling</li> <li>Negatively impact on DoC areas</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 9</b></li> <li>Short to medium term increases in emissions from induced demand</li> <li>Possibility of longer mode-shift-induced emissions reduction</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 1</b></li> <li>Associated with significant housing growth and development</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 3</b></li> <li>Strong increases in economic growth &amp; access to transport modes, some impact on TOD</li> <li>Some improvement in health &amp; safety</li> </ul>
Penlink	411	739	826	3	<ul style="list-style-type: none"> <li>Some increase in emissions as new 7km road enables 6,000 extra VPD &amp; 1,100 HCVs by 2028</li> <li>Some decrease in emissions from reduced congestion, shorter journey distances and increased access</li> </ul>	<ul style="list-style-type: none"> <li>Potential for 8,000 new houses over ten years</li> </ul>	<ul style="list-style-type: none"> <li>Some increase in access &amp; economic growth</li> <li>Some increase in resilience (alternative route)</li> <li>Some negative impact on marine environment (bridge to the Whangaparaoa peninsula) and rural land</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 8</b></li> <li>Some increase in emissions in medium term</li> <li>Likely emissions benefits in longer term owing to shorter journeys, reduced congestion</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 4</b></li> <li>Associated with housing growth potential both along the route and in the peninsula itself once access improves</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 11</b></li> <li>Increased emissions in the short to medium term</li> <li>Some detriment to the marine environment and rural landscape</li> </ul>

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Melling	258	376	419	1.3	<ul style="list-style-type: none"> <li>Some increase in emissions as greater capacity causes induced demand</li> <li>Some decrease in emissions from reduced congestion, improved access</li> </ul>	<ul style="list-style-type: none"> <li>Would facilitate 1,000 more houses in the Hutt CBD</li> </ul>	<ul style="list-style-type: none"> <li>Strong increase in access to rail</li> <li>Some increase in resilience, some negative environmental impact</li> <li>Strong increase in walking &amp; cycling facilitated</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 7</b></li> <li>Some emissions reduction via reductions in congestion &amp; better access to PT</li> <li>Some emissions increase as greater road capacity induces demand</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 8</b></li> <li>Facilitates housing in Hutt CBD</li> <li>This might be an artifact of flood walls rather than improved transport infrastructure</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 8</b></li> <li>Likely net increase in emissions, and some environmental detriment</li> <li>Housing growth possibly facilitated by non-transport improvements</li> </ul>
Drury West rail station with connector roads		110	135	3.9, for 3 stations	Not separately assessed					
Northern Pathway	360	650	785	1.3	Not assessed					
Mill Road	1354	2900	3500	1.2, for entire Mill Road	<ul style="list-style-type: none"> <li>Increased emissions as 21.5km new road caters for 3,500 more VPD+2,100 HCV in Manukau North, VPD on SH1 in Drury to grow to 11,000 by 2028.</li> <li>Reduced emissions from congestion relief and mode shift to PT</li> </ul>	<ul style="list-style-type: none"> <li>Supports housing growth of 30,000 over ten years</li> </ul>	<ul style="list-style-type: none"> <li>Strong increase in economic growth</li> <li>Creation of 38,000 new jobs</li> <li>Improved resilience – alternative to SH1</li> <li>Walking &amp; cycling provided for</li> <li>Environmental impacts from river crossing and on rural landscape</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 13</b></li> <li>Short-to-medium term associated with significant emissions growth</li> <li>Longer-term emissions reduction could be possible with greater access to and use of PT options</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 1</b></li> <li>Largest potential for housing growth</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 12</b></li> <li>Significant housing growth potential and economic growth are offset by significant increases in emissions</li> <li>Some environmental detriment</li> </ul>
Taikitimu North Link Stage 2	455	543	627	1.2	<ul style="list-style-type: none"> <li>Some increase in emissions as 7km new road causes induced demand, serving 12,000 more VPD by 2028, incl. 3,800 more HCVs</li> <li>Some decrease in emissions from inclusion of bus priority route</li> <li>Some decrease in emissions from reduced congestion and travel times</li> </ul>	<ul style="list-style-type: none"> <li>4,000 houses to be built</li> <li>Housing in Omokoroa is expected to increase by 12,000 over 30 year</li> </ul>	<ul style="list-style-type: none"> <li>Some increase in access to walking &amp; cycling</li> <li>Improved resilience to rising sea levels</li> <li>Strong safety target of 16 fewer DSI over 5 years</li> <li>Some environmental detriment to rural area</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 10</b></li> <li>Some increase in emissions from induced demand although offset by reduced congestion and travel times</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 5</b></li> <li>Associated with significant housing growth</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 8</b></li> <li>Housing growth offset by increased emissions</li> <li>Strong improvement in safety, some improvement in health &amp; resilience, but some detriment to the environment</li> </ul>
Whangarei to Port Marsden	692	1233	1311	1.1	<ul style="list-style-type: none"> <li>Increased emissions as new lanes on 22km of SH1 induces traffic growth of 13,000 urban, 6,000 rural VPD, total HCVs of 3,000 by 2028</li> <li>Reduced emissions from reduced congestion and travel times and improved PT flow</li> </ul>	<ul style="list-style-type: none"> <li>Provision for 2,000 houses in Port Marsden area and facilitates regional population growth</li> </ul>	<ul style="list-style-type: none"> <li>Strong increase in economic growth including freight</li> <li>Strong impact on road safety: 60 fewer DSI target in 5 years</li> <li>Facilitates an increase in walking &amp; cycling</li> <li>Facilitates access to PT - bus priority likely</li> <li>Some environmental detriment - marine reclamation</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 12</b></li> <li>Strong increase in emissions from economic growth and freight uptake</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 7</b></li> <li>Housing growth facilitated in the area and region</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 12</b></li> <li>Trade-off between more housing and more emissions</li> <li>Notable benefits to safety and freight; improvements in access to bus PT and walking &amp; cycling facilities, but some environmental detriment from marine reclamation</li> </ul>
Otaki to North of Levin	817	1203	1501	1.4	<ul style="list-style-type: none"> <li>Some increase in emissions as new 24km 4-lane highway induces more traffic 7,500 VPD plus 3,400 HCVs</li> <li>Some decrease in emissions from reduced congestion</li> </ul>	<ul style="list-style-type: none"> <li>Facilitates 2,500 new houses in the area over the next 5-10 years</li> </ul>	<ul style="list-style-type: none"> <li>Balanced impacts on increasing both emissions and housing</li> <li>Supports Transit Oriented Development</li> <li>Some increase in walking &amp; cycling provided for</li> <li>Some increase in Resilience from alternative route</li> <li>Some environmental detriment from road crossing a river and traversing rural land</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 11</b></li> <li>Some increase in emissions from induced demand despite reduced congestion</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 6</b></li> <li>Will be associated with housing growth in the area</li> </ul>	<ul style="list-style-type: none"> <li><b>Rank 8</b></li> <li>Strong safety benefits, some increase in inclusive access, but some environmental detriment from road crossing river and increased noise in a rural area</li> <li>Some association with housing growth but also an increase in emissions</li> </ul>

