

MINISTERIAL BRIEFING NOTE

Subject	Refining our approach to maintenance, renewals, and wider resilience activities
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Contact(s) for telephone discussion (if required)				
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Action taken by Office of the Minister

- ☐ Noted
- ☐ Seen by Minister
- ☐ Agreed
- ☐ Feedback provided
- ☐ Forwarded to
- ☐ Needs change [please specify]
- ☐ Withdrawn
- ☐ Overtaken by events

12 October 2022

Hon Michael Wood – Minister of Transport

REFINING OUR APPROACH TO MAINTENANCE, RENEWALS, AND WIDER RESILIENCE ACTIVITIES

Purpose

1. Expenditure on road maintenance and decisions regarding the level of maintenance investment are a major consideration for the Government Policy Statement on land transport (GPS) 2024. This briefing provides broader context about the current issues and answers recent questions about the reasons for increasing maintenance costs.
2. This briefing provides an overview of the work we are doing to maintain essential levels of service across the state highway network. It covers critical challenges to the resilience of the network; the compounding impact of investment in maintenance activities not keeping pace with demand; work we have underway to address existing shortfalls; and our next steps, including accelerating adaptation planning.

Summary

3. The state highway network is experiencing an unprecedented increase in travel demand, especially from heavy vehicles, has grown in length and complexity, and is facing increasingly severe weather events due to climate change. At the same time, input costs for labour and material have substantially increased, while industry capability and capacity are constrained.
4. Nominal investment in maintenance and renewals is increasing year on year but remains insufficient for the task. Waka Kotahi NZ Transport Agency has significant work underway to improve our approach to maintenance, renewals, and wider resilience activities. We are strengthening our asset management, planning and resilience programmes, developing more rigorous investment scenarios and proposals and have identified that increased investment in capital works is needed to address resilience challenges. We are working with Te Manatū Waka Ministry of Transport to explore innovative investment and financing solutions.
5. We are targeting action in five principal areas:
 - completing the review of Network Outcome Contracts (NOC)
 - catching up on the backlog of preventative maintenance and renewal activities
 - funding and delivering significant recent emergency works
 - refining current baseline levels of service; and
 - accelerating adaptation planning.

Background

6. The state highway network is New Zealand's largest value social asset¹ and is of critical importance to the country's social and economic outcomes. Approximately 90% of the state highway network continues to meet minimum asset condition requirements and is performing as expected. However, there is a growing 'at risk' component of the network of approximately 9% that is near or below the level of what is considered acceptable. This is impacting the level of service experienced by road users through increased exposure to uneven road surfaces, potholes, and journey disruption, such as that caused by landslide events. When lifeline routes are affected, significant detour routes can be required and, in some cases, no alternate is available.
7. It is important to distinguish between different maintenance activities and understand the role of maintenance in relation to wider resilience activities. Maintenance is a catch all term that covers renewal of surfaces, pavements and structures, and emergency works that can involve reinstatement of sub-grade layers and structures, it also includes operation of the network. Resilience is about the transport system's ability to enable communities to withstand the impacts of unplanned disruptive events, perform effectively during disruptions, and respond and recover.

Diagram 1: key terminology



8. This year, we have provided a series of briefings in relation to maintenance and renewals on State highways and local roads – often through joint briefings with Te Manatū Waka. This has included:
 - joint briefings on the results and recommendations of a review of the efficiency and effectiveness of investment under the GPS State Highway Maintenance Activity Class (OC220048, 17 February 2022); and an update on this work (OC220424, 29 July 2022)
 - an overview of investment in state highway and local road maintenance (MIN-3591, 1 September 2022)
 - issues in relation to potholes and road maintenance funding (MINO-0435, 4 August 2022).
 - State Highway Resilience Programme and Emergency Response (BRI-2445, 5 May 2022)

¹ Current replacement value is \$90 billion.

9. More recently, at a meeting with you on 2 September 2022 as part of an update on GPS 2024, Te Manatū Waka provided you with graphs showing trends in nominal (non-indexed) spend over 30 years (1996/7-2026/7) in the state highway and local road maintenance activity classes. You also recently received a presentation from the Australian-based Hiway Group claiming it is possible to renew New Zealand's state highway assets at half the current cost.

Drivers of increased costs

Increasing transport demand – especially from heavy vehicles

10. Over the past ten years New Zealand's population has increased from 4.4 million in 2012 to 5.1 million in 2022. The state highway network carries 50% of New Zealand's general vehicle traffic and 72% of road freight. Total vehicle kilometres travelled (vkt) on state highways has increased in line with population growth by 16% from approximately 19.3 billion in 2009 to 23 billion in 2021. The heavy vehicle vkt component of this figure grew by 28% over this period. The additional 3.7 billion kilometres travelled has had a significant impact on the network and has resulted in degraded surfaces and pavements.
11. The freight model from Te Manatū Waka shows that the upper North Island freight task has grown substantially and is expected to keep growing to a 45% increase from a base in 2018 to 2033.

Increasing size and complexity of our network assets

12. As demand on the land transport system has increased, so too has the length and complexity of the road network to enhance capacity and safety for its growing usage. In the past ten years, the state highway road length has expanded from 22,138 lane kms to 24,297 lane kms. This approximate 10% increase is equivalent to driving the entire length of State Highway 1 from Northland to Southland.
13. There have been increases in safety infrastructure to support the growing network. For example, during 2018-21 there has been a 7% increase in road surface to maintain, a 70% increase in the length of rumble strips, 25% more safety barriers, a 17% increase in the number of streetlights, and a 9% increase in additional line markings. All of these assets require on-going maintenance, driving increased cost.
14. The maintenance activity class was expanded in 2018 to include footpath maintenance and in 2021 to include bridge renewals. The growing size and complexity of the maintenance task for the state highway network brings added challenges and increased costs.

Increasing scale and severity of extreme weather events due to climate change

15. The scale and frequency of climate-related events is challenging the level of service we can maintain through our renewals programme and our ability to respond effectively to emergency weather events. The severity and frequency of extreme weather events is increasing faster than expected.² This is putting already-stretched funding and resources for maintenance and renewals, including emergency works, under additional pressure. The cost of state highway recovery works has grown significantly and is estimated to be \$300 million in this GPS period which is an increase of 33% from the previous GPS period.

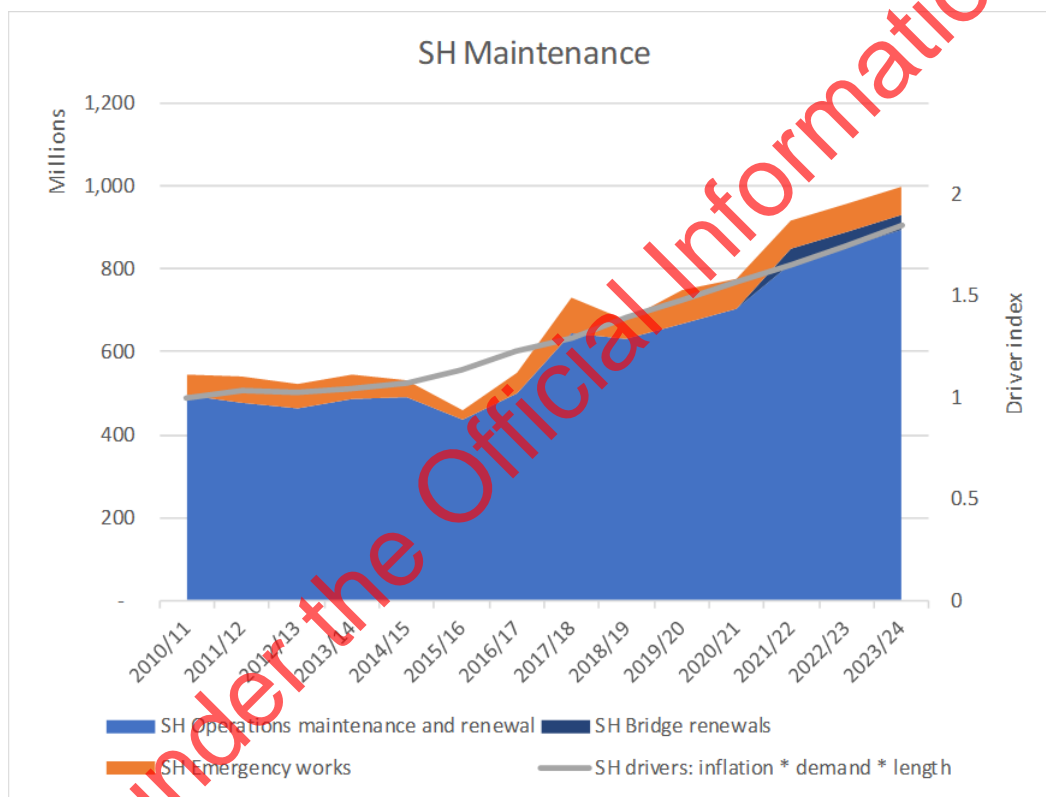
² Winter 2022 was Aotearoa New Zealand's warmest and wettest on record. In August 2022, rainfall records were broken in New Plymouth, Palmerston North, Wellington, Blenheim, Wanaka, and Nelson. Appendix 1 provides further information about recent weather events.

16. Recent destructive storm events in Nelson/Marlborough, and in Northland, have highlighted the scale of damage resulting from extreme weather events and the challenges in keeping essential lifelines open for communities. These extreme events are happening at a pace and scale beyond previous forecasts.

Increasing input costs of labour and materials

17. Maintenance costs from one three-year period to the next typically require a 15% increase in the three-year total expenditure to sustain service levels. In 2021/22, the first year of the current National Land Transport Programme (NLTP), maintenance costs rose by approximately 12%. In real terms, this has led to a 10% loss of purchasing power in the local road and state highway maintenance activity classes.

Graph 1: actual and predicted cost of state highway maintenance for the period 2010/11 to 2023/34 in nominal dollars



18. This graph charts the historical and predicted cost of state highway maintenance. It shows the cost impact of a larger and more complex state highway network, increases in demand and input costs in the cost driver index. The expanded scope of works is shown as bridge renewal costs that sit on top of road maintenance and the increase in emergency works costs.

19. Current predicted spend in both local roads and state highway maintenance activity classes is sitting at or near the top of the range, and emergency works are consuming all available headroom. Assuming input costs continue to escalate, accommodating the increased costs within the current activity class ranges will likely mean a reduction in the maintenance activities that can be delivered, with the risk of declining service levels and increasing asset degradation.

Other factors affecting maintenance

Constraints on industry capability and capacity

20. A period of flat-line funding for road maintenance (2010/11-2016/17), while other construction sector segments experienced growth, compounded by Covid-19 disruption has led to supplier disinvestment in plant such as bitumen sprayers, and loss of skilled crews, leading to loss of expertise and maintenance capacity in the sector. Staff are stretched and maintenance work is losing its attractiveness, making it harder to retain adequate resources.
21. Improved health and safety standards, particularly for traffic management requirements to protect those working and travelling on roads, have reduced maintenance productivity due to the time and resource required to safely manage traffic and workers. For example, a crew that used to fill 48 potholes per day on average will now fill 10 in a day, because of the time required to temporarily close and manage lanes safely.

Impact of stretching the asset

22. Ongoing under-investment in preventative measures is resulting in repeated cycles of damage and repair.³ While we are managing the asset well overall within funding constraints, a lack of preventative investment means that the cost of recovery from extreme weather events and other disruptions is higher than it would otherwise be. For example, insufficient funding for bridge renewals is a contributing factor leading to premature failure during adverse weather events that then requires more expensive emergency repairs.
23. Due to funding constraints, we are unable to fund sufficient preventative activities to reduce risk from future events. Examples of such preventative works are repairing under-slips or reducing permeability of pavements in areas prone to flooding. Similarly, maintenance funding cannot stretch to include 'associated works' that could efficiently be delivered as part of maintenance and renewal works, such as widening roads, providing pedestrian and cycle paths, or crossing points, or improving intersection configuration for safety. These types of 'associated works' are usually included in 'low cost, low risk' programmes funded through the improvement activity classes. Associated and preventative works are often not affordable within current funding caps, with only \$40m being invested in state highway preventative works under the current NLTP.
24. Fewer roads have been rehabilitated since 2009 than before 2009. We need to replace 9% of road surfaces each year and rehabilitate 2% of the network, on average, to cost effectively sustain access. We also need to undertake preventative works such as drainage maintenance and bank stability. Part fixes are sub optimal and we are experiencing repetitive failures over common corridors, meaning lengthy repetitive closures on some corridors are becoming more common as seen on State Highway 4 and the Mangamuka Gorge. Consequentially, our networks are less resilient to high intensity rain events.

Case study: Bridges

25. There has been a significant increase in the level of service required of the bridge asset over the last 10 years in terms of the live load capacity for heavy vehicles. The maximum legal gross vehicle mass was increased in 2018 to 46T. 50MAX has also been introduced which allows 50T gross with 8.2T axles. Recently the allowable axle weights for buses and special vehicles have increased to 12T under permit. Most state highways have had bridge strengthening completed to

³ SH6 and S1, which were substantially repaired only one year ago, have suffered similar damage again.

accommodate high productivity motor vehicles (HPMV) up to 62T gross with 8.8T axles under permit on restricted routes. Green freight vehicles are typically heavier than equivalent combustion engine vehicles and will further increase stress on assets.

26. The number of bridges approaching end of life is more than 10 times the number for the last decade meaning maintenance and renewal costs will be higher than previously. Of the 599 bridges that will reach their theoretical end-of-life over the next 10 years, 66 are scheduled for replacement. While the life of the remaining bridges can be extended, this will mean increased costs for maintenance and potentially reduced service levels.

Investment is not keeping pace

Nominal investment in maintenance and renewals is increasing year on year but remains insufficient for the task

27. Investment in maintenance and renewals of state highways has increased from \$2.19 billion in the 2018-21 NLTP period to \$2.81 billion in the 2021-24 NLTP period. Investment in local roads has increased from \$1.97 billion in 2018-21 to \$2.34 billion in 2021-24. This is a 19% increase in investment in local roads and 28% increase in state highways. However, in real terms, this represents a decline in investment, as we are playing catch-up with work that was unable to be delivered in previous periods and it cannot fund the increasing level of work required (at greater cost due to inflation and other drivers) in the current period.

Graph 2: real expenditure on state highway maintenance



28. The real level of expenditure on state highway maintenance has not increased since a high point in 2009/10. Once the impact of inflation, traffic growth and increases in network length and complexity are accounted for, the level of expenditure on maintenance is relatively flat.

29. Reduction in the size of the state highway improvement activity class is also having an impact. The state highway improvement activity class is not just focused on building new highways but is also about strengthening our existing asset. Reducing state highway improvements places more pressure on state highway maintenance. At current investment levels, we are not achieving baseline levels of service and the level of service on our road assets is declining year on year.
30. Over the past ten years, annual renewal expenditure across the total asset stock has been approximately half the annual depreciation expense. In general, spending less on renewals compared to the rate of depreciation can indicate a potential 'gap' in investment that may increase the level of risk to the long-term ability of Waka Kotahi to maintain the condition of the state highway network. Over the 2018-21 funding period there was a \$1.08 billion gap between how much Waka Kotahi expensed on depreciation compared to how much was invested in renewing the asset stock (excluding new builds).

Overview of current maintenance and renewal activities

Investment in road maintenance, renewals and operations provides a baseline level of service across multiple key outcomes for the transport system – access, resilience, safety

31. Our maintenance and renewals activities are delivered in line with design standards and guidelines that are updated over time to reflect changes in demand, technologies, and external drivers such as changing climate patterns. For this reason, they are not just about renewing assets 'like for like' – replacement bridges and culverts are built to withstand modern climate forecasts. In this way, we aim to 'build back better' as a standard component of our asset renewals.
32. We routinely collect asset condition data and model the expected deterioration of roads and the impact of planned works across a range of scenarios. Annual state highway road surveys are undertaken that provide network condition reports for pavement and surfacing. Regular inspections of other asset classes including structures, drainage and signage are undertaken by consultants and contractors along with ongoing Geographic Information Systems (GIS) network hazard mapping.
33. We run continuous programmes of work to operate, maintain and renew roading assets, including multimodal paths and busways. These programmes are primarily contracted through Network Operating Contracts (NOCs).⁴ Councils manage their own procurement of maintenance and renewal works (the exception being Marlborough). These programmes are designed to ensure that roading assets deliver essential levels of service for safety, access, and resilience.
34. Our asset management modelling is calibrated against about 120 pavement deterioration calibration sites across the local and state highway network, and against the impact of past maintenance programmes compared to forecasts. State highway and urban data and modelling is more extensive than that for rural roads where there are smaller changes in demand year on year. These activities provide baseline data and modelling to inform provision of the levels of service required to deliver wider outcomes such as urban development, emissions reduction (through multi-modal options that reduce reliance on cars), social connectivity, and resilience to climate change.
35. Because of the increasing frequency of extreme weather events, Waka Kotahi has put considerable resource and focus into improving our emergency response over the past five years,

⁴ We also have Structures Maintenance Contracts (SMC) and traditional maintenance contracts for the management of Intelligent Transport Systems (ITS).

and we are recognised for providing an outstanding response to emergency events. Under the current NLTP, we have budgeted \$480m for response and recovery works on state highways and local roads.

Work underway to strengthen our approach to maintenance and renewals

Significant work is already underway to leverage 'best value' from our maintenance and renewals activities

36. We have a comprehensive programme of work underway to strengthen our maintenance and operations activities, improve their efficiency and effectiveness, and ensure they are future fit. A key component is the review of the current NOCs. It has been a decade since Waka Kotahi introduced the NOC contracts. These were introduced at a time when there was pressure on our maintenance spend, with the objective of our contractors taking a stronger asset management lead in optimising the level of renewal works on an as needed basis within available funding.
37. These contracts had risk allocated to the contractors for preventative maintenance and Waka Kotahi for renewals. Consequently, contractors must manage the effects of a degrading network within their profit margins, under contracts that have lean margins (quoted as 4.5% as being the most profitable). This approach to risk allocation is resulting in reduced levels of service and a backlog of network renewal activity, much of which is currently not funded. The objective of the review is to better balance renewals and repair. To achieve this better balance, the contract review is considering the commercial form of the contract, how maintenance works are specified, how quality is managed, and the related roles of the parties in planning works and managing risks.
38. We continue to research improved practices and identify improvement opportunities; these require additional investment to realise long-term gains. For example, we have trialled using epoxy modified road surfaces at twice the conventional treatment cost for four times the service life and using structural pavements instead of un-bound gravel pavements for three to four times the cost but two to four times the service life, and 25-35% less traffic disruption from roadworks.
39. The Road Efficiency Group (REG), a collaboration between Local Government New Zealand (LGNZ) and Waka Kotahi, is working to lift asset management capability and efficiency across the sector. This group has developed and implemented the One Network Road Classification that has been used to differentiate service levels and provide a basis for comparative analysis of costs and impacts of road maintenance, and an asset management competency framework. Waka Kotahi has configured it for use internally and by the sector as a foundational element of delivering asset management as set out in ISO 55000 the International Standard for Asset Management.

We are strengthening our strategic approach to asset management

40. We are developing a new State Highway Strategy, as part of our role as a road controlling authority, to better manage the state highway asset to achieve Government outcomes. This asset management strategy covers all activities involved with operating, maintaining, and improving the state highway network. The strategy will guide all input into state highway improvement and management decisions from policy advice, and asset lifecycle planning through to operating, maintaining, and renewing the state highway.
41. We are also reviewing our asset management plans to provide for greater agility as technology and conditions change, to move beyond a reactive approach bound by funding cycles. This approach to asset management planning will help improve private sector visibility of and

confidence in the forward maintenance programme. Increased confidence will set the foundation for the contracting sector to re-build capability and capacity.

42. Waka Kotahi has developed a communications and engagement plan relating to the continued presence of potholes on the roading network. This plan has been provided as Attachment 1.

Resilience Programme

43. Waka Kotahi has developed a Resilience Framework to prioritise, guide and coordinate our maintenance activity and strategic work programme to improve resilience. The Waka Kotahi resilience effort is focused on four objectives:

- *Reduction of risk* - proactive system management to minimise or avoid high risk locations, and where unavoidable, designing to avoid catastrophic failures
- *Readiness* – identifying risk and preparing for unplanned events
- *Response* - responding safely and quickly to disruptions to minimise social and economic impacts
- *Recovery* – helping communities reconnect and build back better.

44. In May 2020, the Waka Kotahi Board approved the National Resilience Programme Business Case, which prioritises risks to the land transport system from major and extreme natural hazards (including climate change-related risks) and recommends multiple system responses. This includes better integration of our maintenance and operation and improvement activities across all aspects of resilience (reduce, readiness, response, recovery).

45. We are shifting to undertaking full corridor assessments that consider the changing operating environment to ensure we are realistic in our levels of service for the reliability of lifeline corridors. We are using the SH1 Mangamuka Gorge and SH6 Whangamoa recovery processes as case studies to develop and test a more holistic system approach. A business case for additional resilience focused capital funding is currently being developed.

Increased investment in capital works is needed to address resilience challenges

46. As part of supporting Te Manatū Waka advice on GPS 2024, and as input to the Waka Kotahi Investment Proposal, we are developing a range of investment scenarios for our continuous programmes. This work includes developing a series of proposals to improve long-term value for money from road maintenance. A key finding in our scenario development work is that we will need to spend more in the short-term to save more in the long-term. We need to bring forward a significant amount of capital expenditure to improve the underlying condition of the network if we are to reduce the long-term cost of maintenance, particularly emergency works, in the future.

47. This is not about spending more overall but addressing strategic weaknesses in the network. Doing so will deliver greater resilience to climate change impacts and more sustainable maintenance expenditure in the future. For example, if we were to invest in building structural pavements on all high traffic volume routes instead of rehabilitating with unbound granular pavements, this would significantly reduce the incidence of road defects and the frequency of resurfacing requirements. Overall, this will reduce our maintenance expenditure. We are working with Te Manatū Waka to explore this opportunity, including the potential for innovative financing options to spread the cost.

Strengthening planning and delivery to support resilience and climate change adaptation

48. Given the increasing frequency and severity of extreme weather events, we are planning for a more climate-resilient land transport system. In close partnership with councils, communities, iwi/Māori, and wider government agencies, we are refining our approach to reducing risk so that we are right sizing our resilience activities and investment in the future.
49. We are currently developing Tiro Rangi, the Waka Kotahi Climate Adaptation Plan, which will help shape our response to the changing climate and describe the role we will play in supporting the Government's adaptation objectives for the land transport system. This is a key action under the Government's National Adaptation Plan Urutau, ka taurikura: Kia tū pakari a Aotearoa i ngā huringa āhuarangi released in August 2022. Arataki, our 30-year plan, is also providing a system view of what is required to support a climate-resilient land transport system.

Hiway Group renewal proposal

50. s 9(2)(g)(i) Far less pavement rehabilitation work is conducted in current renewal programmes and improvement projects than they propose. Recycling pavements does have merit and is a technique we currently use, with Hiway Group being one of our providers. A multi-year opportunity exists to use recycling among other innovative approaches. The scale of how much benefit can be realised depends on the rate at which availability of funding and sector capacity can be scaled up to address backlogs in poor road condition and establish sustainable renewal programmes.

Next steps

51. We are targeting action in five principal areas to:
- complete the **review of Network Outcome Contracts (NOCs)** – ensuring our contracting operating model is optimised for the future, ensuring we have the right capability, capacity, and approach in place to deliver effectively and efficiently in a changing environment
 - start catching up on the **backlog of preventative maintenance and renewal activities**
 - **fund and deliver the significant emergency works** resulting from recent extreme weather events and identify investment likely to be needed for future events
 - **refine current baseline levels of service** for maintenance and renewals activities (to inform GPS 24 and short-term investment), and right-size ongoing levels of service as part of our revised strategic approach to resilience and other system outcomes
 - **accelerate adaptation planning** towards a climate-resilient land transport system.

52. Next step actions in relation to each of these areas are as follows:

Area of focus	Actions for Waka Kotahi
Transition to a new future focused NOC operating model	<ul style="list-style-type: none"> • Progressing from design into implementation of the new NOC operating model.

	<ul style="list-style-type: none"> • Developing a procurement strategy to implement future commercial changes. • Supporting a sustainable maintenance workforce into the future. • Adapting the current performance regime to ensure incentives have a strong focus on network condition and value for money. • Implementing a more collaborative operating model with wider contracting sector and community involvement. • Encouraging greater industry innovation and use of technology.
Catch up on the backlog of preventative measures	<ul style="list-style-type: none"> • Review our level of preventative maintenance and renewal activities to determine the appropriate levels of investment and timings required to bring the network back to a satisfactory level of condition as part of our Activity Management Plan process for NLTP 24/27. • Prepare a stocktake of deferred preventative measures as part of the NOC review. • Provide a cost estimate and timeline for catching up deferred works as part of the 'budget-like process' for building the next GPS. • Explore including maintenance as part of the Regional Resilience Budget 2023 bid.
<p>Emergency works:</p> <ul style="list-style-type: none"> • Fund recent emergency works activities • Re-calibrate future investment needs 	<ul style="list-style-type: none"> • Support a 'cost-pressures' Budget bid for emergency works in response to recent severe weather events in the upper South Island and Northland. • Model increased demand and investment needs for future emergency works. • Consider the need to increase funding (e.g., via any Regional Resilience Budget bid) for future emergency works.
Refine and invest in 'right-sized' baseline levels of service	<ul style="list-style-type: none"> • Partner with Te Manatū Waka to model the essential spend for GPS 2024, by refining essential levels of service (for access, safety, and resilience) to be delivered through maintenance and renewals activities. This will include consideration of opportunities to build back better to support climate adaptation and mitigation objectives, while ensuring we are not trading off baseline levels of service. • Consider investment needs arising from this work – including through work on GPS 2024, Budget 2023 (a 'Regional Resilience' bid) and Climate Emergency Response Fund (CERF) 2023. This includes funding mechanisms to lift sector capability in maintenance and capital works.

Accelerate adaptation planning for resilience	<ul style="list-style-type: none"> • Use current recovery work in Nelson as a model to improve our planning for, response to, and recovery from extreme weather events. • Accelerate adaptation planning for the land transport system in partnership with communities, councils, iwi/Māori, and lifeline agencies, with a view to being better prepared for future extreme weather events. This may involve some challenging discussions on potential changes to future levels of service – e.g., to down-grade existing roads from sealed to gravel; or to abandon existing routes where it is not sustainable to maintain them. • Consider investment needs for accelerated adaptation planning as part of any Regional Resilience bid under Budget 2023 or other bids under CERF 2023. • Consider system improvements as part of our approach to resilience in GPS 2024.
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It is recommended that you:

1. **Note** the content of this briefing.

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Brett Gliddon

Group Manager, Transport Services

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Hon Michael Wood, Minister of Transport

Date: 2021

Appendix 1

Significant Highway Emergency Events 2020 - 2022

Released under the Official Information Act 1982

