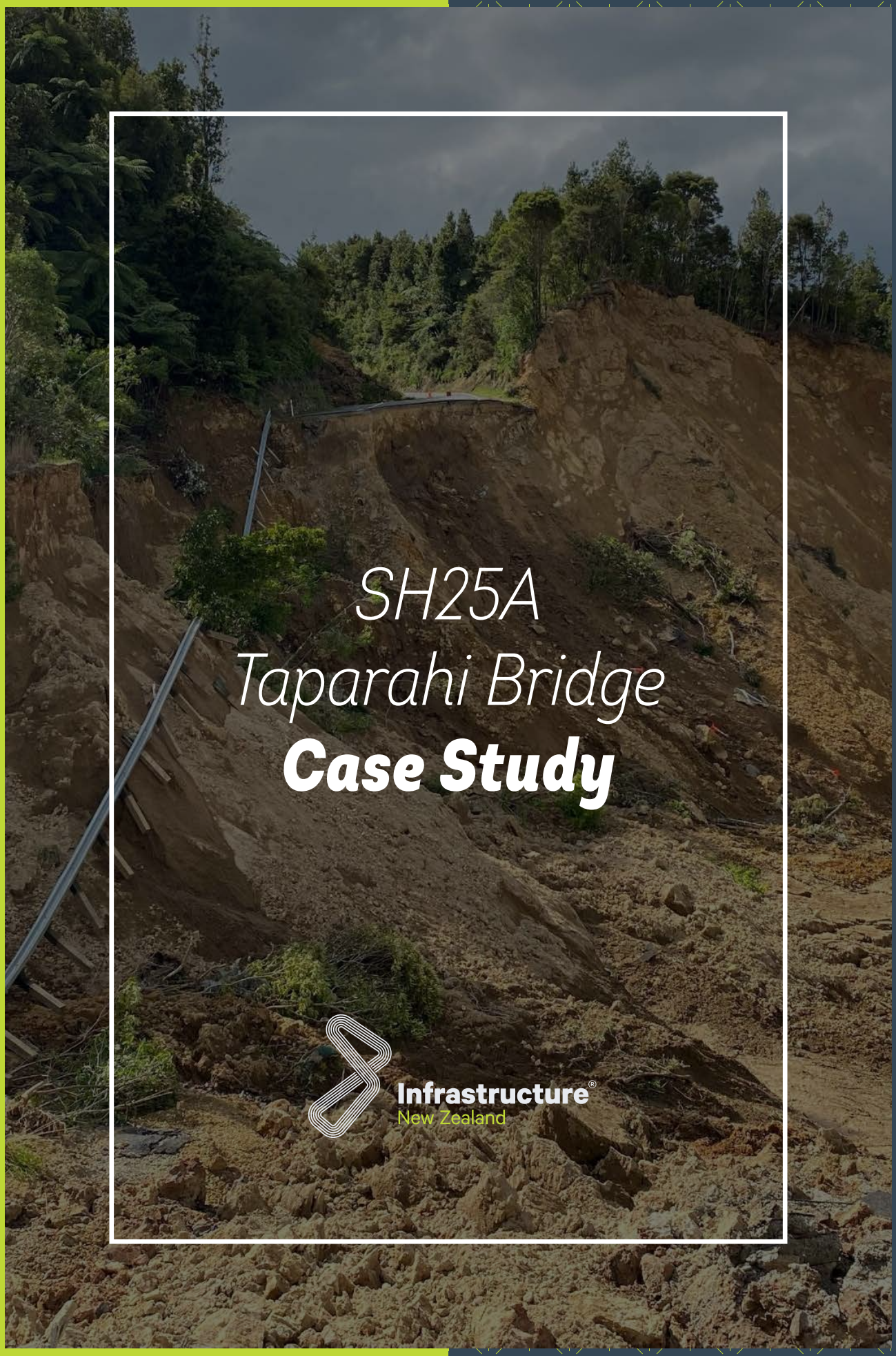

SH25A Taparahi Bridge
Case Study

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Acknowledgements

Infrastructure New Zealand commissioned the case study in this report from RCP.

We also wish to thank Beca, Tonkin + Taylor, Fulton Hogan, McConnell Dowell and the New Zealand Transport Agency - Waka Kotahi for their input.

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Key Findings and Recommendations

New Zealand Transport Agency Waka Kotahi (NZTA) and different companies across the infrastructure industry collaborated well together to deliver a faster than normal solution to repair a section of State Highway 25A (SH25A), including building the new Taparahi Bridge, in the Coromandel.

The accelerated re-opening is estimated to have increased tourism expenditure in the region by $69.30 million or about 15% compared to a non- accelerated schedule. It also is estimated to have increased GDP in the region by $85.88 million.[1]

Infrastructure New Zealand has produced this brief report for the Minister of Transport, Hon Simeon Brown, to highlight key lessons from this highway repair and bridge project that led to its acceleration completion. The aim of this report is to help inform the new Government's desired infrastructure approach, which we understand is to improve New Zealand's planning, consenting and procurement systems, thereby gaining significant efficiencies by faster delivery of projects. This case study highlights the benefits of streamlined delivery to unlock greater value and economic benefits through a return to productive utilisation of key infrastructure assets faster.

Main observation

We shouldn't have to rely on emergency situations to drive high performance and faster pace in the building of our critical infrastructure. We need to adopt the consenting, client and alliancing approaches recognised in this report, without compromising design standards or the quality of the structure.

Major recommendations for Ministerial consideration

- The Minister could empower the NZTA board and senior management to adopt a mature approach to procurement that balances cost certainty, commercial tension, quality and timely delivery.
- Government infrastructure agencies can drive efficiency through standardisation where appropriate. Changes should include smart procurement of materials, nationally standardised designs and prefabrication.
- Fully utilise emergency works and timely use of Order in Councils provisions combined with the new fast-tracking consenting and approvals system to allow a greater number of projects to be delivered in a shorter time.
- Several regional – or one national emergency panel should be established (single source, open book) to respond to similar events. This would take a long-term multiyear arrangement and would develop best practice approaches that will inform and improve business as usual work. This should include ongoing resilience planning for availability of plant and labour. This could be modelled on the TREC or NCTIR examples to provide a commercial framework.
- More broadly, New Zealand must improve its planning and consenting attitudes to hasten the building of infrastructure for wider economic gains. The only way the current regime recognises value is lowest cost and this must change as it has led to a race to the bottom. Real value will be achieved through faster delivery of infrastructure allowing a faster return to productive utilisation, while not compromising on design or quality of materials.

1 See Appendix A

Introduction

This case study provides a brief overview of the factors contributing to the successful delivery of the SH25A Taparahi Bridge project by NZ Transport Agency Waka Kotahi (NZTA).

Resulting from a series of major storm events in January 2023, State Highway 25A (SH25A) between Kōpū and Hikuai, Coromandel Peninsula, suffered significant damage with the road collapsing and severing the link. Initially after cracks in the road appeared, it was closed for safety reasons. With significant ongoing slope instability, the damage grew significantly with each subsequent January 2023 storm event. Cumulative storm damage caused a slip to occur resulting in the total loss of a section of SH25A measuring over 100m.

The loss of the section of SH25A caused inaccessibility, extra travel time and costs, limited access to healthcare and education, impacts to freight, businesses, tourism and disrupted day-to-day life.

NZTA led the project to re-instate SH25A with technical assistance from consultants Beca for site conditions, options and option selection. Upon selection of the repair option, contractors McConnell Dowell and Fulton Hogan in a joint venture, with support from Tonkin + Taylor and Beca were selected to deliver the bridge solution. Stellar Projects, Gray Matter and the relevant sub-contractors on the project also contributed significantly to its success.

The road was reinstated and SH25A was opened in less than 12 months from date that the damage occurred, where a typical bridge of the type delivered would normally take 18 to 24 months to design and construct. The project did not achieve any specific cost savings compared to other similar projects, although it was delivered faster, while meeting quality standards.

Damage to the section of SH25A caused by the storm event and resulting slip
Source: Waka Kotahi

Project Decision-Making

In summary, specific standout factors were:

- High trust between client and industry, together with a collectively held common goal to open the road as expediently and efficiently as possible.
- High levels of commitment amongst all parties involved in the project (Iwi, Contractors, Community, Local Council and Territorial Authorities, Central Government).
- Assembling and deploying the right project-team (skills, experience, culture).
- Intensive planning of a project focused on a clear goal that did not change.
- A procurement model that supported the required outcomes.
- Ability to draw upon emergency dispensations and exemptions for procurement and consenting under the Building Act and Resource Management Act.
- Creative thinking by the project team, including maximising offsite fabrication and using locally available resources, enabled the design and construction to be completed in parallel and reduced delays.
- A remote site and closed road enabled minimal disruption of construction traffic.
- Well managed communications to the community and stakeholders created a positive delivery culture for the design and construction staff, encouraging them to go the extra mile to deliver on the goal for the community.

A broad and pragmatic consideration of the impacts and opportunities of each option formed the basis of decision-making. As emergency works and with support to proceed with urgency to re-instate the road by December 2023, the decision making recognised the value of the project to the community and economy and it was not limited to the lowest capital cost or single factor. A broad value-based decision prevailed over a single focus, particularly cost.

Supported by early geo-technical investigation and advice, three solutions to reinstate the SH25A road were explored:

1. Retreat north and build a bypass road around the top of the site.
2. Replace the lost section of road with a bridge.
3. Rebuild the highway from the bottom up, using retaining walls.

A 124-metre multiple span bridge replacing the road was confirmed as the safest to construct and most resilient option, with the shortest and most reliable timeframe for reconnecting Coromandel communities. The other solution options were subject to impediments:

- With winter eminent at the start of construction, options with major earthworks would need a delayed start until the 2023 / 2024 summer earthworks season;
- Land outside the SH25A corridor was not owned and for it to be acquired raised the risk of delay;
- The surrounding area either side of the highway has high ecological, flora and fauna values where it was very hard to avoid impacts particularly during winter months, e.g. hibernating bats.

This decision, based on a thorough investigation and analysis, provided a clear and focussed goal for the next phases of the project. Providing robust early planning and information gathering was key to more detailed planning, design and execution.

Procurement and Commercials

The need to avoid delay and reinstate the road necessitated a departure from the traditional procurement and commercial approaches for road projects under the Ministry of Business, Innovation and Employment's Quick Guide to Emergency Procurement Level 3 – Post-disaster reconstruction: accelerated procurement. This provided more flexibility and greater responsiveness, but sufficient rigour to allow for some level of competition and maintain governance and accountability for the spend.

An intensive and challenging 1-month tender sprint process was undertaken to identify and appoint a construction contractor.

The tender process consisted of:

- 1-week registration of interest with a focus on people nominated to project, who they were and where they were coming from, together with track record of projects. Focus for NZTA was getting the right people with the right experience; followed by,
- 3-week tender process with two consortia focusing on how fast the bridge solution could be implemented, with cost a factor, although not a single deciding factor.

In a single day, tenders were reviewed and a decision taken, involving senior NZTA leadership, the engineer to the contract, client representative and project manager, together with the contactor consortia presentations and interviews.

Accelerating the procurement process in this way both with high-speed delivery by the procurement team and selection of a team by attributes rather than price provided 1-4 month time savings over a conventional procurement process.

The winning consortia identified key opportunities to reduce the timeframe for delivery. These included:

- an existing bridge design, easily modified while construction commenced;
- prefabrication of some bridge components, offsite;
- use of steel plate for bridge beams, imported for an existing project in-construction and readily available in New Zealand, diverted for immediate use and replaced in time for that project to continue on schedule.
- robust planning to demonstrate ability to deliver and contingency options
- resilient project team with redundancy and backup options for all personnel and plant
- high levels of senior resourcing
- effective and reliable supply chain relationships
- accelerating procurement and construction ahead of design completion using a design freeze protocol.

Due to the unknowns on site, reconciling a price ahead of award would have been impractical. The contract award was initially based on cost re-imbursement until the project was out of the ground, with the intent to convert to a lump sum post piling. However, cost reimbursement was continued for the entire project as it progressed.

An intensive and challenging 1-month tender sprint process was undertaken to identify and appoint a construction contractor.

Consenting

Under the cost reimbursement model, the project was delivered within its $50m budget with cost tension applied, being:

- Independent construction verifier on site to provide production oversight.
- Independent estimator to audit costs.
- Contractual programme agreed between parties. If not achieved site overheads would not be paid by NZTA.
- If quality control not achieved, NZTA not paying to remedy or for re-work to fix.
- NZTA covering costs for agreed scope changes and true unforeseen events e.g. pandemic, severe-storm.
- Careful fostering of a cost conscious culture in all parties to ensure value was not forgotten with the strong focus on time.

Use of a cost reimbursement contract allowed rapid decisions using the Time/Cost/Quality decision triangle without commercial negotiation slowing the change process. It also provided balance risk sharing where construction was proceeding ahead of final design completion.

The construction of the bridge proceeded without consent under the emergency provisions of the RMA and an exemption from the Building Act, with agreement from the Waikato Regional Council and Thames Coromandel District Council.

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Use of a building consent exemption is typical practice on transport projects for Waka Kotahi with the Building Consent Authorities relying on Waka Kotahi design standards and review requirements to ensure structures are safe and durable.

Undertaking works under emergency provisions of the Resource Management Act occurs quite commonly. Use of these provisions requires that planning rules are adhered to during completion of the works and consents are obtained following the works where there are ongoing adverse effects.

Importantly, this requires trust and collaborative working between the procuring agency, the project team and regulators, e.g. ecological studies were undertaken, fit for purpose sediment controls were put in place, pH monitoring and dosing systems were employed to deal with the downstream impact of cement stabilised soils.

Consents for the construction activities and permanent works are applied for retrospectively. Regular consultation with regulatory agencies ensured that environmental standards were maintained and expected consent requirements were met to allow processing of any required consents.

There was no need to purchase additional land with the bridge solution and minimal traffic management plans required with the road closed. Therefore, a large saving in time was achieved on consenting processes that typically take a year.

Delivery

Acceleration of the design and construction process required early delivery of many key elements of the design to allow procurement and commencement of fabrication. Early delivery of design required:

- robust planning of design activities and design stages
- delivery of design prior to external peer review or full co-ordination processes
- careful selection of design freeze points to provide certainty and minimise co-ordination risk
- selection of design options that decoupled interdependency in design (for example designing slopes to minimise landslide soil load on piles so pile design and construction could proceed ahead of slope design)
- selection of design concepts to provide flexibility for change during construction.

Ongoing co-ordination of the design during this accelerated delivery used high levels of team communication to support ongoing co-ordination where required.

Many more minor elements of the design were undertaken close to the time of construction to allow optimisation of the designed works for available plant and materials and to the ground shape already made on site, such as utilising temporary access roads.

Acceleration of the construction process required high levels of resourcing, including plant and senior personnel. This included co-ordination and support from a wide range of subcontractors and suppliers to meet requirement of the site. The high pace of construction meant the site was extremely congested with a much higher density of work activities than is typical.

Management and co-ordination of this intense activity required rigorous and extensive planning and the ability to modify plans rapidly based on contingency planning. This meant that timing and material requirements in a congested and busy site were well understood at all times and could be optimised to minimise downtime in any activity. Rigorous planning of both design and construction activities minimised the risk of abortive work or uncertainty by ensuring that decisions were made on paper where possible before committing to site work.

A high level of on-site technical ability was provided by the design and construction team to ensure that any on site issues or decisions could be resolved rapidly to prevent delay in construction activity.

The NZTA effectively managed the communications and engagement with the community and stakeholders. This led to a high level of public interest and support for the project, resulting in the design and construction staff seeing the real benefit for the work they were undertaking. This supported a positive and delivery focussed culture across the team with all parties willing to go the extra mile because their effort was rewarded.

Inspecting the SH25A slip site
Source: Waka Kotahi

Implications for the Future

Emergency Learnings

The SH25A – Taparahi Bridge project is unique. However, the trust between the industry and the client together with buy-in into the big audacious goal to reinstate to the road by Christmas 2023 is a key success factor and applicable to any future project. Another contributing factor was the buy in and support from Iwi, stakeholders, community, and the government to move with speed and challenge themselves to deliver.

The need to deliver as quickly as possible provided the driver to think creatively about design and construction delivery. It was an excellent unifying and consistent purpose for the wider project team to produce an exceptional performance. Using standard and available materials and known bridge designs minimised delays, while also enabling design to run in parallel with construction. Using emergency provisions was a key unlock for the success project, which allowed significant time savings in the procurement and consenting processes. The availability of emergency provisions to deliver infrastructure solutions quickly after a major natural event is an important tool in the resilience toolbox. The emergency provisions are a proxy for what can be achieved under and benefits of fast-track consenting.

Acceleration of the procurement process using attribute only selection and a cost reimbursable model saved significant time in delivery and allowed parallel progression of design and construction. Infrastructure New Zealand recommends investigating the establishment of an emergency panel that could mitigate this problem in future and provide an even faster and more efficient response. This could include provisions to require contingency planning for plant and labour to minimise mobilisation times for project teams.

Business as usual learnings

There are learnings from the SH25A – Taparahi Bridge project that can be applied to business-as-usual projects to speed up delivery and benefits of infrastructure:

- Strong and robust up front option selection, risk assessment and planning.
- Accepting additional short term road user impacts by closing roads to enable faster and safer construction
- The use of standardised design. This can accelerate both design and provide in country supply of materials with long lead times.
- Off-site fabrication undertaken in parallel with other works and decoupled from the site specific and weather conditions.
- Factoring in decision making the opportunity cost of delaying infrastructure investment and long construction programmes, versus understanding the value of investing in and delivering infrastructure to enjoy the benefits it provides early.
- Fast track consenting to shorten the design and construction programme.
- Procurement and decision-making models that allow a balance between cost certainty and pace of delivery.

The need to deliver as quickly as possible provided the driver to think creatively about design and construction delivery.

Appendix A: Wider Economic Benefit Analysis

SH25A Accelerated Re-Opening

Economic Benefits
Final Report

12 February 2024
Commercial in Confidence

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Preface

This report has been prepared for Infrastructure New Zealand by Memory Rugube and Jason Webber from MartinJenkins (Martin, Jenkins & Associates Ltd).

For 30 years MartinJenkins has been a trusted adviser to clients in the government, private, and non-profit sectors in Aotearoa New Zealand and internationally. Our services include organisational performance, employment relations, financial and economic analysis, economic development, research and evaluation, data analytics, engagement, and public policy and regulatory systems.

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Executive Summary

On 10 January 2023, Ex-Tropical Cyclone Hale made landfall in the Coromandel with torrential rain, fierce winds, and significant flooding that left residents and tourists alike trapped.

Major arterial routes in and out of the Coromandel were significantly affected, with the most significant impacts felt with the closure of SH25A, which links Kopu with Hikuai.

The government and New Zealand Transport Agency (NZTA), recognising the importance of SH25A to tourism and linkages throughout the Coromandel, moved quickly the re-instate the road.

The closure of the road throughout 2023 led to a significant reduction in domestic tourism expenditure throughout the region

The road remained closed for almost the entirety of 2023. Domestic tourism expenditure – which represents nearly 70% of the region's tourism expenditure, dropped from a total of $456m in 2022 to a total of $415m in 2023.

This decrease was blunted somewhat by the strong recovery in international tourism expenditure, which rose from a low of $12m (approximately 10% of pre-COVID numbers) to $65m in 2023 (approximately 60% of pre-COVID international tourism expenditure).

Overall, this resulted in tourism expenditure in the Thames Coromandel region rising far slower than in other regional economies, which aw tourism expenditure increases of between 15 and 18% between 2022 and 2023.

Re-instatement of the State Highway was achieved much quicker than in other, similar transport projects

The road was reinstated and SH25A was opened in less than 12 months from date that the damage occurred, where a replacement would normally take 18 to 24 months to design and construct.

This report estimates the economic benefits that generated as a result of this accelerated schedule

INZ is developing a case study for the road's re-opening. MartinJenkins was asked to contribute to the case study by estimating the economic benefits that accrued to the Thames-Coromandel region as a result of the accelerated road re-opening. This report summarises our initial findings and lists the key assumptions that we used in our analysis.

The accelerated re-opening is estimated to deliver at least $69m in increased tourism expenditure for the region, and will increase regional GDP by a total of $86m

These increases are driven primarily by an increase in domestic tourism visitation that is estimated to have occurred following the re-opening of the road, compared to a schedule where the road was re-opened in July 2024.

The bulk of these benefits accrue as a result of having the road re-opened in time for the busy Christmas holiday period in 2023, which generates a substantial proportion of Thames-Coromandel's tourism visitation figures.

Approach and methodology

Our approach and methodology for developing these estimates are outlined below, and further detailed in our Assumptions annex.

- Review of tourism expenditure results and daily visitation rates for the Thames Coromandel region between 2022 and 2023
- Review of traffic telemetry data from the Hikuai site on SH25A (Telemetry Site 76), which records daily traffic movements for light and heavy vehicles
- Development of a model which estimated the incremental number of visitors that would visit the Thames Coromandel region as a result of the accelerated road re-opening
- Development of an economic impact assessment, which assessed the incremental benefits that accrued to the region as a result of road re-opening quicker

Purpose and scope of review

We were asked by Infrastructure New Zealand to complete an estimate of the economic benefits that will accrue to the region as a result of the accelerated re-opening of the road.

The review is an initial estimate, based largely on data and information since the road was re-opened on 20 December 2023

The estimates included in this report should be considered indicative estimates of the economic benefits that will accrue, based on the limited data that is available, primarily due to the short timeframe between when the road was re-opened and when this data was analysed.

There are a series of assumptions and limitations to the analysis that is included in this report, which are outlined in the assumptions section.

Our report focusses only on the economic benefits that will accrue as a result of increased tourism expenditure

This report only estimates the additional tourism benefits that will accrue to the region as a result of re-opening the road. Although we received data on heavy vehicle traffic that travels the road veery day, these numbers are limited (fewer than 300 heavy truck movements a day since the re-opening) and would represent only a small proportion of savings.

The input/output multipliers used are national multipliers, which likely limits the GDP impact of tourism expenditure calculations

Due to the timeframe and data limitations, we only utilised national input/output multipliers for the analysis rather than regional multipliers. This likely means that the GDP analysis underestimates the total impact of the tourism expenditure in the region, as Thames Coromandel is more heavily reliant on tourism than the national economy overall.

Key data and assumptions

The following tables outline the key assumptions that have been used to arrive at the estimates for increased tourism expenditure and increased GDP.

Assumption	Description	Data/value used
Accelerated V Delayed Schedule	This outlines the comparison period for which benefits accrue – this compares the actual re-opening date of SH25A (20 December 2023) to an alternative scenario where the programme schedule and re-opening date was delayed.	For the delayed programme, we estimated that construction would take 6 months longer, and so would complete at the end of July 2024. The benefits are then calculated as the difference between benefits accrued between the opening and 31 July 2024. There is no discounting applied to the benefits calculations, given the short time frame.
Recovery profile	This outlines the proportion of vehicle traffic (and implied tourism recovery) that has occurred following the road re-opening. We calculated this figure by comparing daily light vehicle movements on the road following its reopening on 20 December 2023 to the last date at which data was available through the traffic counts, which was 4 January.	This data showed that vehicle traffic on SH25A had recovered to 90.88% of its rate in the comparable period in 2022.[1]

[1] Daily traffic counts for the study site on Hikuai Road are available here: https://opendata-nzta.opendata.arcgis.com/datasets/tms-daily-traffic-counts-api/explore?filters=eyJzaXRlRGVzY3JpcHRpb24iOlsiSElLVUFFIC0gVGVsZW1ldHJ5IFNpdGUgNzYgLSAxLjNrbSBhZnRlciBLaXRhaGkgUmQiXX0%3D

Assumption	Description	Data/value used
Substitution/alternative route	Whilst the road was closed throughout 2023, some tourists and visitors took alternative routes to reach their destination in the Coromandel, or did not require the use of SH25A to reach their destination. To calculate this figure, we compared the guest arrival figures in 2022 with guest arrival figures in 2023.	Guest arrival figures in 2023 were 252,300, and guest arrivals in 2022 were 308,800. This implies that although the road was closed, 81.7% of visitors used an alternative route to arrive or depart their destination in the Coromandel. [2]
Proportion of light vehicle movements that are related to tourists on the road	This figure estimates the proportion of light vehicle traffic movements observed on the road that are tourism-related.	We estimated this figure to be 50%.[3]
Average occupants per vehicle	This calculates the average number of occupants per light vehicle.	This is 2.1 occupants per vehicle, and comes from the NZTA's traffic count information[4]
Average expenditure per visitor	This figure calculates the average expenditure per visitor per day, split between domestic and international visitors.	This is estimated as $309 per international visitor per day, and $176 per domestic visitor per day. The data comes from tourism studies and has been inflated to reflect current 2023 dollars.

[2] Tourism expenditure and visitation data is sourced from here: https://rep.infometrics.co.nz/thames-coromandel-district/tourism/tourism-spending

[3] This figure comes from the following data source: https://www.tcdc.govt.nz/Our-Community/Economic-Development/Latest-Economic-Development-News/Economic-Development-News-September-2023

[4] https://maphub.nzta.govt.nz/public/?appid=31305d4c1c794c1188a87da0d3e85d04

Assumption	Description	Data/value used
Average nights visited	This estimates the average number of nights that a visitor stays in the Coromandel region upon each visit.	This is estimated as 2.3 nights per guest[5]
Total tourism expenditure	This is the total tourism expenditure that was incurred in the region by both domestic and international tourists, between 2019 and 2023.	This information drawn from Infometrics.[6] It is further broken down in to spending categories, which are used to calculate the economic impact assessment of the tourism expenditure, to generate a GDP figure.
Proportion of domestic and international visitors	Calculation of the proportion of visitors that are domestic and international.	These figures are calculated presuming that 79% of visitors are domestic visitors, and 21% of visitors are international visitors.

[5] https://www.tcdc.govt.nz/Our-Community/Economic-Development/Latest-Economic-Development-News/Economic-Development-News-September-2023

[6] https://rep.infometrics.co.nz/thames-coromandel-district/tourism/tourism-spending

Data and outputs

Summary of incremental tourism expenditure and GDP benefits

Expenditure Category	Tourism Expenditure ($m)	GDP ($m) - Direct + Indirect + Induced
Accommodation	$5.85	$6.85
Sport and recreation services	$13.41	$16.23
Food and beverage services	$13.80	$17.14
Road transport	$4.33	$4.95
Supermarket and grocery stores	$11.62	$15.40
Fuel retailing	$4.64	$5.54
Pharmaceutical and other store-based retailing	$15.65	$19.77
Totals	**$69.30**	**$85.88**

How is the incremental tourism expenditure calculated?

The methodological approach for calculating the incremental tourism expenditure is as follows:

- Obtains daily traffic volumes for light vehicles from traffic counter, and compares daily traffic volumes from 20 December 2023 – 4 January 2024 (the latest day for which data is available) to the same period in 2022/23
- Forecasts future traffic volumes on the basis of a recovery comparator for January – July 2024, using data from 2022 as the baseline comparator

- Multiples the traffic volumes by the inverse of the substitution profile, to estimate the actual unique vehicles on the road
- Multiplies this figure by the proportion of light vehicles that are estimated to be tourists
- Multiplies this resulting figure by the average number of occupants per vehicle, arriving at a total number of unique incremental visitors
- Does this for each month between January 2024 and July 2024
- Apportions the total number of unique visitors according to the estimated proportion of domestic and international visitors
- Multiplies the average daily spend for international and domestic visitors by the average number of nights per stay
- Multiples the spend per domestic and international visitor per stay to the total number of unique domestic and international visitors
- Apportions this spend according to expenditure categories, as shown above
- Runs an economic impact assessment using an input/output to generate the GDP result
- The GDP figure represents both the direct impact of the tourism expenditure in region, but also the indirect impacts (spend on services not related to tourism expenditure by tourists), and induced impacts (further spend on economic activity by tourism operators)

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SH25A Taparahi rebuild, early November 2023
Source: Waka Kotahi

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