INVESTMENT QUALITY ASSURANCE (IQA)

Copy here

****COPY PROJECT OWNER ASSURANCE AND FUNDING REQUEST HERE****

Copy 'business case summary' and 'engagement and significance' sections. Check the project and request information provided as part of business case assurance process, mark any edits/corrections to the information provided in red text to highlight to decision maker.

In particular ensure significance assessment is validated, and sponsor has endorsed.

When IQA is complete, save word document into the appropriate Infohub folder

Internal link, out of scope

Send either an Infohub link back to the PM for inclusion in the funding application or a PDF back to the approved organisation. For version control do not send word documents.

All documents must conform to the naming convention as follows. Be kind to your future self and/or others attempts to search for the project.

IQA _ SH# (or location identifier) + business case name _ STAGE(SSBC, Interim etc.) _ MonthYYYY _ Reviewer initials

I.e. IQA_Auckland Transport for Future Urban Growth TFUG_PBC_Jun2016_CA

Recommendation and summary	DP&S / PI / I&F to complete
Business case assessment summary *DP&S / PI*	**Introduction** The Warkworth to Wellsford project represents the second and final stage of the broader Ara Tuhono - Puhoi to Wellsford project. The first stage, Puhoi to Warkworth is currently under construction, being delivered through a public private partnership (PPP), and due for completion in late 2021. The Warkworth to Wellsford DBC seeks to confirm route protection of a 26km (approx.) corridor, which is based on a recommended intervention being a four-lane dual carriageway offline state highway/ motorway. The recommended intervention includes three motorway interchanges at Warkworth, Wellsford and Te Hana; along with twin bore tunnels under Kraack Road, (approximately 850 metres long and 160 metres below ground level at their deepest point), as well as a 485m long viaduct (or twin structures) spanning the existing SH1 and Hōteo River. The project team is seeking additional funding/ a price level increase of $2,750,000 to support route protection i.e. the lodgement of Notices of Requirement and resource consents – bringing total approved funding for the pre-implementation phase to $65,003,385 (including property purchases). Pre-implementation funding was approved prior to the completion of the DBC, which identifies the preferred option forming the basis of the route protection exercise and has never been formally approved or endorsed. The submission of the Business Case for endorsement and increased funding for pre-implementation follows decisions of the NZTA Board in May 2019 [Board paper 2019/05/1381 refers], which resolved: *The NZ Transport Agency Board:* a) ***Noted** and **agreed** that route protection is a normal and reasonable step to do, for a full range of activities and projects undertaken by the NZ Transport Agency including but not limited to state highway, local road improvements, public transport, and walking and cycling activities.* b) ***Endorsed** continuing with route protection for the Warkworth to Wellsford project, noting the lodgement of the Notice of Requirement and resource consents will occur in June 2019.* c) ***Delegated** to the NZ Transport Agency Chief Executive the approval of the Warkworth to Wellsford Detailed Business Case, noting that funding for pre-implementation has previously been endorsed by the Board.* The preferred option has an estimated cost of $1.818B and a 95th percentile estimate of $2.153B with a BCR of 0.7 using standard EEM costs and benefits. The BCR for the preferred intervention (the four-lane motorway) remains at 0.7 with the inclusion of WEBs. When assessed with the Puhoi to Warkworth project the combined BCR is 0.8 without WEBs, and 1.1 with WEBs. The DBC estimates that cost of property (prior to the immediate 2-3 years prior to implementation when property acquisition typically increases) will be in the order of $15-$25M, however notes a potential property liability of up to $89M once the designation has been approved. The DBC identifies criteria which are intended to trigger the implementation for the Project, which based on the DBC's forecasts suggest an intervention could be needed as early as 2030 (meaning a potential start date of 2023 based on the DBCs identified six to seven-year timeframe for construction).

No detailed design or construction funding has been identified for the next ten years, or funding in respect of the outstanding property costs beyond amounts already approved.

Decision-makers should note that the route protection of WW2W is included in the NZTA Statement of Performance Expectations for 2019/20.

Issues when considering a business case for route protection

Business cases prepared to support route protection can present a number of challenges. While decision-makers *are not being asked* to fund implementation*;* approving the business case and agreeing to fund subsequent route protection; along with subsequent property purchases - creates an expectation with key stakeholders and the wider public, who may make their own investment decisions based on the location, type, scale and timing of the recommended intervention as detailed in the Business Case.

In undertaking route protection there is a risk that future decision-makers may choose to never deliver the recommended intervention; or alternatively change the location, scale, type (e.g. mode) or timing of the recommended intervention due to wider economic, technology, environmental or societal changes, resulting in sunk costs. There are also opportunity costs from the decision to route protect and undertake advanced property purchases, with relatively scarce funds from the NLTF being used to acquire land that may not directly yield any transport benefits for 10+ years. Funding that could have been used for smaller projects unable to proceed due to a lack of available funding.

The risk of sunk costs and the opportunity costs of route protection and land purchases need to be balanced with the possibility that delaying route protection and property purchases to secure an alignment; can result in significant increased implementation (property) costs or result in build-out leading to a less optimal alignment, with reduced benefits. In a worst-case scenario, delaying route protection may affect the viability of the Transport Agency ever being able to deliver an "offline" intervention (i.e. outside the existing road corridor).

Currently, there is no agreed guidance or criteria for assessing business cases recommending route protection. Noting the complexity and range of issues to consider, this IQA assesses the business case in terms of the quality of investigations and analysis leading to the choice of route for protection (i.e. the recommended intervention); and as a second order issue considers whether there is sufficient evidence and analysis to support route protection and any subsequent property purchases (either for commercial, public works act or hardship reasons) required for the delivery of the recommended intervention.

Overview

As detailed further in this IQA, the business case has a number of omissions, and issues surrounding the quality of analysis and evidence as it relates to the recommended intervention/ project.

The DBC investigation is considered to be of insufficient quality and completeness to support funding for implementation/ construction of the recommended intervention. However, a case can be made that it is of sufficient quality to allow for route protection subject to conditions setting out the need for further work prior to the release of funding for implementation.

With respect to decision-makers consideration of the endorsement of the business case and the provision of additional funding for route protection - there are a range of complex issues and risks which need to be taken in to account, including;

- the recommended intervention (a 26km, four-lane motorway) was originally selected on the basis of meeting RONS objectives and criteria aligned with

previous Government Policy Statements and in terms of design speed and capacity – there is a high risk it could be characterised as an "over-investment" in respect of addressing safety and resilience issues (e.g. see the design of the Warkworth interchange).

- the project originally sought to induce transport demand for regional economic development purposes through the early provision of additional roading capacity – and as a result the preferred intervention may be viewed as inconsistent with the GPS 2018-2028, including the focus on *"making the best use of the existing network (road, rail, sea and air) and services (e.g. through demand management, mode shift and a reduction in single occupant vehicle trips)"* .

- that the project fails to satisfactorily address the climate impacts associated with the induced transport demand between Whangarei, Wellsford and Auckland, including the probability Wellsford becomes a commuter ("dormitory") suburb.

- the DBC took a road corridor/ hard infrastructure focus and did not sufficiently examine demand management or public transport alternatives (including inter-regional services).

- there is uncertainty surrounding the proposed implementation/ construction start date, eventual project cost, and a strong possibility that the design of the DBC's preferred intervention, (i.e. scale, form, design speed and provision for other modes) will need to be amended, either due to long-term affordability issues, changes in transport demand and/or wider economic, social or environmental changes.

Noting the above matters, with respect to the route protection, decision-makers should also be aware that:

- there is a risk that the route protection exercise will be inaccurate i.e. protect too much/ not enough land; or that future changes to the design of the preferred intervention will require significant changes to the alignment (e.g. if affordability issues result in the removal of the 850m tunnel, or the scaling back of the Warkworth System Interchange.)

- while the route protection being undertaken is conservative i.e. a scenario where a larger corridor is required appears unlikely; there is the potential the preferred alignment will need to be amended, resulting in sunk costs, and unnecessary disruption to landowners, with potential mis-direction of third party investment.

- the DBC identifies likely property costs for route protection over the next decade of $15-$25M, however there is a risk that a greater proportion of the $89m total funding required for property will fall with the 2018-2028 NLTP period and impact on the funding available for other projects. The probability, consequence and ability to manage this risk remains unclear.

Acknowledging the significant issues outlined above it should be noted that the route protection of a new corridor has a number of wider benefits/ positives that decision-makers should also take account of including:

- there is satisfactory evidence that the recommended alignment is the best offline option/ route to deliver a four-lane motorway; and could be re-purposed to deliver a fit-for-purpose comprehensive-infrastructure response to the problems when required in the future.

- acknowledging the significant geotechnical and topographical constraints of the existing SH1 alignment, a case can be made for preparing for future growth in Wellsford/ Rodney area and Northland through the protection of an offline

alignment noting a failure to route protect can result in significant increased implementation costs, result in build-out - leading to a less optimal alignment, and in a worst-case scenario, affect the viability of the Transport Agency ever being able to deliver an "offline" intervention (i.e. outside the existing road corridor).

- with respect to sunk property costs it should also be noted that there are examples of NZTA's previous sales of surplus property resulting in 'profits' i.e. sales exceeding the original purchase price (per m2), noting the rapid inflation in property values over the last 15+ years

- there is sufficient evidence to conclude that 'on-line' alternatives, including comprehensive improvements to the existing road configuration to address longstanding safety and resilience issues would incur a considerable cost, comparable with the recommended offline improvements being proposed.

- an online intervention would create significant additional disruption and based on evidence submitted with the DBC, would deliver poorer outcomes in respect of safety, resilience and travel time.

- the safety improvements currently under construction in the 'Dome Valley' while improving safety on this section of the corridor, do not address the substandard geometric alignment and corresponding resilience issues/ risk of road closures will (all things being equal) be heighted if projected increases in traffic volumes materialise.

Conclusion
The project has been identified as having medium results alignment, with a sub-1.0 BCR (see the "Warkworth to Wellsford (WW2W) Results Alignment assessment" prepared by Graeme Belliss dated 27 September 2019) .

Assuming decision-makers allow the project to utilise a corridor BCR incorporating Puhoi to Warkworth, and wider economic benefits (note: these all stem from the Puhoi to Warkworth project) – the investment priority for the project would be priority 6 with a corridor BCR of 1.1 including WEBs.

On balance, the DBC, and supporting information including the analysis provided in the document titled "Technical Note: Response to Warkworth to Te Hana IQA Queries V5" - provides sufficient level of information and certainty to decision-makers that:

1. There is evidence to suggest that if Northland's high population growth continues, and without dramatic changes in transport demand, the existing SH1 alignment is likely to generate resilience issues and impact interregional travel-time reliability (affecting productivity and economic growth).

2. There is sufficient evidence to conclude that 'on-line' options, including improvements to the existing road configuration to address longstanding safety and resilience issues would incur a considerable cost, comparable with the recommended offline improvements being proposed. Furthermore, an online option would create significant additional disruption and based on evidence submitted with the DBC, would deliver poorer outcomes in respect of safety, resilience and travel time.

3. A case can be made for preparing for future growth in Wellsford/ Rodney area and Northland through the protection of an offline alignment noting a failure to route protect can result in significant increased implementation costs, result in build-out - leading to a less optimal alignment, and in a worst-case scenario, affect the viability of the Transport Agency ever being able to deliver an "offline" intervention (i.e. outside the existing road corridor).

	4. There is sufficient evidence to suggest that the recommended alignment represents the 'best' corridor within which to deliver a future "off-line" transport intervention. Acknowledging the significant public money required to deliver the project, the recommendation of this IQA is that the Warkworth to Wellsford DBC is only endorsed for route protection and subject to a condition requiring the development of a subsequent and comprehensive "Implementation Business Case". It should be noted from a prioritisation perspective that a high-level review of the corridor suggests there is minimal risk of build-out; or rezoning of the existing rural land for urban use. In this context, the merit of undertaking the route protection exercise predominantly stems from strategic and stakeholder benefits (e.g. identifying and providing a degree of certainty to stakeholders re: the location of a future investment), as well as avoiding some sunk costs, noting consenting documentation is complete and ready to be lodged. Decision-makers should note this IQA has been prepared following decisions by the NZTA Board in May 2019 to endorse the recommended Route Protection Approach and delegate the endorsement/ approval of the DBC to the Chief Executive. Following this decision the route protection (i.e. lodgement of consents) for the project was included in NZTA's performance expectations for 2019/20. Further to the above, as outlined in the 'Risks and Significance' section of this IQA, it is not clear whether the NZTA Board meeting on 8 May 2019 received evidence or analysis in respect of the project's overall costs and benefits; and/or overall affordability and priority in making its decisions (to endorse the route protection approach and delegate responsibility for endorsing the business case to the Chief Executive). From a best-practice governance perspective, it is strongly recommended that consideration should be given to referring decisions on the route protection and endorsement of the business case back to the NZTA Board, particularly noting the cost of the recommended intervention ($1.7B to $2.1B) and recent clarification of the results alignment and low investment priority.
Review	Todd Webb — Date: 27/09/2019
Investment assurance assessment summary *I&F if relevant*	This IQA has been prepared based upon a reissued Warkworth to Wellsford DBC dated September 2019. This follows a prior IQA[1] which noted significant issues of quality and evidence with previous business case versions, and direction by the Delegations Committee that the business case be updated to more accurately reflect the business case's intent to seek approval only of route protection and property purchase for the project. The technical components of the amended business case are sufficient to support the case for selecting an indicative alignment for potential route protection. There is evidence that a robust repeatable process was followed to confirm the indicative alignment on the basis that; an online upgrade of State Highway 1 would not offer significant cost savings over an offline solution; that an online upgrade of State Highway 1 would not significantly address future resilience and safety issues if traffic volumes along the corridor continue to grow; and that the identified offline route could best accommodate a range of alternative solution designs due to its typography and geotechnical conditions. Therefore, despite route optioneering being predicated on a motorway standard solution consistent with RoNS objectives, the option to deliver an offline solution to a lower design standard is not foreclosed to the Agency.

[1] Internal link, out of scope

Given that a case has been made out that the appropriate corridor has been selected for route protection the remaining question is whether route protection and property purchase should be prioritised in the current NLTP period.

No analysis of the benefits and opportunity costs of route protection has been provided and this reflects the business case's prior focus on both route protection and implementation.

Under the assumption that the corridor solution is constructed to motorway standards, the BCR including wider economic benefits and impacts is 0.8 which would ordinarily be unfundable from the NLTF. If the Warkworth to Te Hana corridor is still considered as part of the wider Puhoi to Wellsford RoNS the project may be funded on the basis of the full project BCR of 1.1. It is however worthwhile noting that the success of Puhoi to Warkworth is not contingent on the construction of Warkworth to Te Hana, and if anything, the value for money proposition of Puhoi to Warkworth is reduced by Warkworth to Te Hana's high cost and low benefit levels.

As the project team has committed to a future business case for implementation which will need to retest solution assumptions and design there is some uncertainty regarding the eventual project BCR, however the weight of prior evidence suggests that this will remain low.

A 2009 business case estimated a BCR of 0.4 for the full Puhoi to Wellsford corridor which was the lowest of all the proposed RoNS projects, with the BCR only rising in subsequent years due to growth enabled in Warkworth under the Auckland Unitary Plan. Similar plan enabled growth in Wellsford is unlikely due to the risk of sprawl. Additionally, the Warkworth to Wellsford project has experienced significant cost escalation in the interim, and the DBC confirms that there are no alternative alignments that could deliver appreciable cost savings and options for value engineering are limited. On this basis the BCR can be safely assessed as low with some residual risk that the BCR will still be below 1.0 in the future.

In all versions of the business case the project team submitted that the project meets the conditions required for a High results alignment classification. This has been disputed by the business case reviewers from both Design Practice & Solutions and Investment Assurance in prior IQAs. As a condition of the previous decision by the Delegations Committee to defer consideration of the business case it was agreed that an independent reviewer would assess the results alignment to resolve the disagreement.

The independent review utilised two methods to determine the results alignment under the IAF's Safety criteria and both future collective and personal risk ratings were only sufficient to reach an assessment of Medium. The project was additionally assessed against the Access criteria and it was concluded that the evidence provided by the project team was insufficient to demonstrate that "the current route once it includes the significant improvements [from the Dome Valley upgrades] will act as a significant impediment to … access, and hence constrain access to economic and social activities". Thus the project was assessed as having a Medium results alignment under Access as well.

The project has now been assessed on multiple occasions by three reviewers as only meeting the IAF's criteria for a Medium results alignment. With a Medium results alignment confirmed this means that the correct funding priority for the project is 6 (ML).

With a reconfirmed funding priority of 6 the project is at the threshold for investment from the State Highway Activity Class under NLTP 2018-21. Thus, the urgency of route protection becomes a key consideration when weighing the project against other as yet unfunded activities, some of which may have a higher funding priority. Additionally, the opportunity costs of route protection can be significant given that no appreciable

benefits are delivered except where there is a risk that land prices will substantially appreciate in the future or there is a risk of build out. If these scenarios are unlikely then advance funding for route protection and property purchase comes at the expense of benefits that could be delivered by other projects.

At present the timing of implementation remains uncertain with the business case proposing a number of threshold "triggers" that would need to be reached for implementation to proceed. The thresholds are unlikely to be breached before 2030, there has been insufficient analysis of alternatives that could delay the need for the project, and the project is not indicatively programmed, all of which belies immediate urgency. Route protection in advance of an as yet unconfirmed project is however a practical approach to ensure that future options are not foreclosed by development within a corridor. The business case does not address this as a significant risk except to note that "the southern end of the project in Warkworth is an identified area of significant growth". The business case provides some general discussion on the merits of early route protection but provides no evidence that these circumstances apply to the Warkworth to Te Hana corridor.

In general, the case for advancing route protection is underdeveloped with the DBC reading primarily as if it were written to support implementation, which is a direct result of the minimal changes that the project team have made to the business case prior to reissue. Thus there is a significant sunk cost risk as the alignment may not be utilised in the future.

To summarise, there is no demonstrable urgency to prioritise route protection of the Warkworth to Te Hana on the basis of build-out risk. Instead it appears that the urgency to route protect is predicated on; expectations built by previous public engagement and the uncertainty this has created for affected landowners; the potential for implementation to be delayed by a "more challenging approvals process" in the future; previous Board decisions to endorse route protection as part of the re-evaluation of State Highway 1 Wellsford to Whangarei; and the readiness of the project team to lodge a notice of requirement.
Decision makers will therefore need to weigh a number of reputational issues against each other to reach a resolution.

Due to prior public engagement there is an expectation in the region that the project will proceed. This will have been heightened by the Agency's decision to include route protection of Warkworth to Wellsford in the Statement of Performance Expectations for 2019/20. This has also potentially built a risk that the public expects a motorway standard solution to be built in the future, and this could undermine the Agency's ability to properly reassess the suitability of the previously preferred option. This is particularly problematic for the Warkworth interchange given that it has already been the subject of public criticism for its large footprint. There is a therefore a reputational risk in the north-Auckland and Northland regions if route protection is not advanced, and an existing reputational issue relating to the Warkworth interchange which will be exacerbated if at a later date it is found that an excessive designation was submitted.
Furthermore, public engagement on the indicative alignment will have created uncertainty for affected landowners and so there is a significant reputational risk if the question of route protection is not resolved at this time.
A countervailing reputation risk remains, given the project's medium results alignment and low prioritisation, that the Agency is viewed as giving insufficient weight to the GPS' priorities. s 9(2)(g)(i) [redacted] While it is acknowledged that the Minister cannot direct the Agency's course of action on specific projects consideration will need to be given to whether continuing with route protection is consistent with the GPS.
Likewise, if funding for route protection comes at the expense of higher priority, yet unfunded, projects there is considerable reputational risk for the Agency, especially if

	funding is displaced from projects that deliver immediate benefits or safety improvements. Given the low urgency and lack of demonstrable benefits from route protecting this corridor, decision makers will need to carefully manage future messaging to manage this risk if route protection is approved. It does however need to be acknowledged that the Agency has so far underspent in the current NLTP period, including the State Highway Activity Class, and therefore a case could be made that approval of the business case and funding for route protection should proceed due to the countervailing reputation risk that arises from underspending. To conclude, the business case provides sufficient technical appraisal of the indicative route for route protection to proceed and notwithstanding the uncertainty of the long-term solution is indicatively assessed as having a funding priority of 6 which meets the investment threshold for NLTP 2018-21. On this basis decision makers could endorse the business case and route protection only. It is however recommended that decision makers give full regard to the complex reputational issues raised and consider whether these are sufficient to prioritise funding when the case for urgently route protecting the corridor has not been made out.		
Assessed by	Ben Smith	Date	01/10/2019
Recommendation commentary	As detailed in this IQA - it is considered that the recommended intervention (a four-lane motorway from Warkworth to Te Hana) is not consistent with the GPS 2018-21, including the focus on *"making the best use of the existing network (road, rail, sea and air) and services (e.g. through demand management, mode shift and a reduction in single occupant vehicle trips)"* as it seeks to provide excessive road capacity in a bid to induce transport demand for regional economic development purposes. Acknowledging the strategic misalignment of the recommended intervention, there is value in undertaking route protection of the alignment on the basis that it is likely able to be repurposed noting high rates of growth in the Northland region; and issues surrounding the performance of the existing corridor mean that if additional transport demand materialises - an offline transport solution may be required in the future. Noting the above matters, decision-makers will need to carefully consider whether funding for route protection is a sufficient priority – recognising at this time there is uncertainty as to the overall funding availability (at least from the reviews perspective.) Should Senior Manager OPPP/ Chief Executive endorse the DBC and additional funding for route protection, it is strongly recommended that consideration be given to the scoping of a work programme to investigate TDM and inter-regional PT measures that may delay the need for any comprehensive infrastructure intervention to address the documented safety and resilience issues; and/or reduce the scale and cost of any future intervention As identified elsewhere in this IQA, significant issues are evident with the scale and design of the preferred intervention and the timing for delivery. These issues can only be addressed through a new comprehensive business case. A condition is recommended requiring the preparation of a comprehensive 'Implementation Business Case' to address the significant deficiencies in the recommended option.		
Proposed Recommendation	Recommend subject to conditions (for route protection only)		
Proposed conditions (if applicable)	Should the Senior Manager OPPP/ Chief Executive choose to endorse the business case and commit funding for route protection it is recommended that the following conditions are imposed: Prior to the commencement of detailed design or release of funding for construction a 'Implementation Business Case' is prepared and submitted for NZTA Board approval		

	which investigates the optimal use of the protected corridor alignment, and includes investigation, analysis and recommendations that address: - any changes in population growth and land use in the corridor (existing and forecast) - the role of North Port and impact on freight patterns (mode etc) - the role of Northland Rail Line and any subsequent investment in inter-regional rail which may impact on transport demand - climate and environmental impacts - any relevant technology changes - any updates to EEM (currently under review) and impact on project economics - a review and investigation into the achieveability of the DBC targets, kpis and benefits (including the forecast 30% increase in GDP) - whether any changes are required to the preferred intervention in respect of geometric standards, design speed or provision for other modes. - management of the design and implementation phases (e.g. more detailed project planning, risk management and stakeholder communication processes) - a full peer review of the implementation business case including but not limited to; ▪ optioneering ▪ results alignment (or alternative assessment criteria) ▪ economic case ▪ financial case ▪ procurement ▪ cost estimation ▪ performance measures
Delegated decision maker	(Vanessa Browne) Senior Manager; Operational Policy, Planning & Performance (Mark Ratcliffe) Chief Executive
Reason for recommendation	The approval of Warkworth to Wellsford Detailed Business Case represent years of work to identify a new alignment on which to carry-out a hard-infrastructure transport intervention to complement or replace the existing SH1 alignment. Funding has been approved to ensure that route protection of this new corridor can now be carried out, with the Detailed Business Case confirming that based on current population growth and travel demand forecasts, a comprehensive infrastructure intervention may be required in the future to address resilience/ travel time reliability and safety issues within the Warkworth to Wellsford section of SH1. Acknowledging uncertainty in respect of the scale of future growth, and subsequent travel demand on the corridor; the funding decisions also acknowledge the need for further work with funding provided on the basis that a further comprehensive implementation business case will be carried out prior to the commencement of detailed design and confirm the option for construction.
IAF Profile	The DBCs preferred intervention has an IAF profile of ML – BCR 0.7.

Readiness / urgency factors to consider	Documents supporting the Notices of Requirement and applications for resource consent are complete and ready to be lodged. Lodgement of the NORs and Consents is included in NZTAs Statement of Performance Expectations 2019/20.

Business case quality assessment questions	**DP&S / PI to complete**
Problem/opportunity statements	
Is it clear what the problem is that needs addressing (both cause and effect)?	The DBC identifies two problems being: Problem 1: Poor resilience and costly journeys between Northland and key markets is constraining economic growth and investor confidence (50%) Problem 2: The corridor is substandard for a national strategic route, resulting in a higher number of crashes involving injury and death (50%) Both problems identify a cause and effect, however as detailed further (below), the scoping of Problem 2 and its singular focus on the road corridor is inconsistent with the Transport Agency's "system view".
Is there evidence to confirm the cause and effect of the problem?	With respect to problem 1, the evidence presented in respect of poor resilience lacks sufficient bench-marking or national context. The DBC cites nine full closures from 2013 to 2018 on SH1 between Warkworth and Te Hana route. For a 20km+ stretch of highway traversing difficult terrain, this amount of closures does not seem disproportionate to other State Highways with similar volumes. Further to this, there may be questions as to whether averaging 1.8 closures per year, is a problem of such significance, as to warrant an intervention on the magnitude being proposed. It would have been useful for the DBC to include data from comparable stretches of highway (e.g. in terms of vpd, travel distance, terrain and the availability of alternative routes) to provide a benchmark that would enable decision-makers to better understand the severity of the issue. With respect to 'costly journey' component of problem 1 – there is an attempt at benchmarking through a comparison of the travel time performance on SH29. The analysis shows that the Warkworth to Te Hana corridor northbound and southbound average travel speed is 77km/h and compares this to an 86km/h average along the SH29 corridor. While useful context, the value of the comparison is diminished as the SH29 data is for the whole 50km+ corridor which includes sections traversing flat rural farmland in addition to the challenging terrain through the Kaimai Ranges. The extent of these 'flat straights' inevitably raise the average speed dulling the value of the comparison. With respect to evidence of the "effect" of poor resilience and costly journeys in terms of constrained economic growth - the DBC identifies: *"Establishing a direct link between economic performance and transport accessibility is difficult as there are many factors that influence economic outcomes, particularly for regions like Northland. However, a strong message from stakeholders and the evidence is that the performance of the transport network, and particularly connectivity to a strong economic centre such as Auckland, has a role to play in the economic performance of a region such as Northland."* Acknowledging there is strong anecdotal evidence that these issues are impacting on economic outcomes, a question remains whether anecdotal evidence is sufficient to justify a $1.7B to 2.1B four lane motorway as the preferred response to addressing Northland's economic issues. Arguably an investment of this scale should include primary research and analysis including an investigation of issues including agricultural and business/ employment growth within the region. Other issues including skilled labour shortages, availability of business land, and

wider issues such as climate change/conditions, will impact on Northland's long-term economic performance, but are largely left unaddressed.

Noting the project targets a 30% increase in GDP within the Northland region, (assumedly this is above projected growth and to be sustained for longer than the construction period)- arguably a 'leap of faith' is required by decision-makers in respect Northland's improved economic performance, noting the result will depend on a range of actions and investment by key stakeholders.

A further criticism of the DBC may be that recognising discussion of rail services in Part A and within the section exploring transport constraints, the DBC has failed to explore the problem with a broader system lens incorporating other modes. For instance, it is not clear whether the resilience issues extend to the rail corridor, with regular rail closures a partial reason for the low demand.

With respect to problem 2, while there is evidence of existing safety issues Figure 6 of the DBC shows a collective risk rating in the Dome Valley section of medium-high (the second-highest ranking) to a low rating in the southern-most section north of Warkworth.

It is important to note that the safety issues within the Dome Valley section of the corridor are in the process of being at least partially addressed through a current safety intervention, which is identified in the DBC, which states:

"It is noted the Safe Roads Alliance are providing short-term safety upgrades in the Dome Valley, a 15km project extent between Wellsford and Kaipara Flats Road (the new interface between the Puhoi to Warkworth route and the existing SH1). These upgrades predominantly include the provision of flexible wire rope barriers in the centre of the highway. It is predicted that the death and serious injuries can be reduced by 27 (68%) within 10 years of construction, from the previous 17 deaths and 42 serious injuries between 2006 to 2015."

There would have been benefit in further interrogation of the claim "*as the forecast increase in traffic demands through this section of the corridor in the near future will mean that this section of road will have insufficient capacity to meet the demands, further increasing the risk of a safety problem in the long-term"*.

While increased volumes often result in an increase in collective risk, personal risk often decreases. As per the Kiwi RAP Highway Safety Ratings 2012-2016 (copied below), from a safety perspective the performance of the Warkworth section has gradually improved since the project was first investigated in 2011 – with a reduction in both collective and personal risk during this period.

			2002 - 2006				2007 - 2011				2012 - 2016			
			Crashes		KiwiRAP Risk		Crashes		KiwiRAP Risk		Crashes		KiwiRAP Risk	
Link Name	Region(s)	Length(km)	Fatal	Serious	Collective	Personal	Fatal	Serious	Collective	Personal	Fatal	Serious	Collective	Personal
SH 1 from Albany to Twin Tunnels	Northland and Auckland	48.352	0	4	L	L	1	4	L	L	1	8	L	L
SH 1 from Auckland to Takanini	Northland and Auckland	50.098	14	54	H	L	8	46	H	L	6	44	H	L
SH 1 from Cape Reinga to Kaitaia	Northland and Auckland	109.459	7	9	L	MH	2	9	L	M	3	10	L	M
SH 1 from Kaitaia to Ohaeawai	Northland and Auckland	79.690	2	11	L	M	2	21	LM	H	1	20	LM	H
SH 1 from Marsden Point (SH 15A) to Whangarei	Northland and Auckland	24.205	8	19	H	LM	5	12	MH	L	11	16	H	LM
SH 1 from Ruakaka to Wellsford	Northland and Auckland	53.911	12	41	H	M	10	29	MH	LM	10	34	MH	M
SH 1 from Warkworth to Wellsford	Northland and Auckland	18.600	10	18	H	MH	9	17	H	MH	2	11	MH	LM

It is likely the increase in volumes and reduced speeds has made the section of highway safer, while the $35m Dome Valley safety improvements (due for completion in 2021) will

	result in further reductions in both collective and personal risk while volumes remain within current levels. Accordingly, the DBC does not present compelling evidence that the corridor is a significant outlier in respect of safety or at least warranting a $2.1B intervention in the current 2018-2028 NLTP period. However, noting significant growth is proposed in Warkworth under the Auckland Unitary Plan, with projected traffic volumes on this section of highway expected to increase by 10-20,000 vpd by 2046, on balance there is sufficient evidence to suggest the existing geometric constraints and corresponding safety/ travel time reliability issues could overtime be of a magnitude to warrant a comprehensive infrastructure response. In conclusion, while there is evidence to support route protection and preparation for a longer-term intervention, the evidence presented raises a number of questions as to whether a fit-for-purpose intervention is being proposed.
Does the problem need to be addressed at this time?	No – due to traffic volumes and the safety interventions currently under construction in the Dome Valley, the problems as identified in the DBC are not of a magnitude that they need to be addressed now. With respect to route protection, there are no documented emergent risks from build-out/ growth that suggests there is considerable urgency in undertaking route protection. There is stakeholder pressure/ expectation, and a decision to delay route protection further would incur some cost, noting consenting documentation is prepared and ready for lodgement.
Is the problem specific to this investment (or should a broader perspective be taken)?	The problems have arguably been defined in such a way as to pertain specifically to the road corridor. In undertaking further work to confirm the scale and type of intervention to occur within the recommended alignment, consideration should be given to refreshing the Auckland to Whangarei PBC in light of the changes in strategic focus arising from the GPS 2018-21, with a more integrated approach to considering regional economic development issues in Northland including the role of other modes in improving transport accessibility and reliability.
Benefits	
Have the benefits that will result from fixing the problem been adequately defined?	The DBC identifies three benefits being: 1. Improved Safety 2. Improved corridor reliability 3. Stronger regional growth and national GDP The benefits are supported by four investment objectives being: *Investment objective 1: "Improve resilience to key social and economic activities between Auckland and Northland through reduction in unplanned closures by 90% between Warkworth and Te Hana"* *Investment objective 2: "Improve safety for road users by reducing the number of DSI's by 100% between Warkworth and Te Hana"* *Investment objective 3: "Facilitate increase in Northlands regional GDP due to improved accessibility for freight for key markets between Warkworth and Te Hana by 30%"* *Investment objective 4: "Contribute to an increase of Northlands tourism market through improved accessibility for tourism trips between Warkworth and Te Hana by 30%* While the benefits lack sufficient definition, the supporting investment objectives are relatively well-defined. A criticism of the investment objectives 3 and 4 in particular; may be that the lack specificity, are not timebound, and may not be attributable to the investment. For instance, a 30% increase in regional GDP is meaningless without understanding the current or baseline rate of growth and whether the expected duration for achieving the objective is five, ten of twenty years from opening (e.g. Northland may already have 30% projected growth in regional GDP over the next ten years). Further to this, whether it is

	expected that there will be a sustained "shift" in GDP growth, to warrant an investment of this scale. As discussed in the business case summary a comprehensive business case should be developed (preferably before route protection) which will allow the development of more appropriate investment targets.
Will the measures specified provide reasonable evidence that the benefits have been delivered?	Yes – noting previous comments regarding the need for the measures to be revisited through the Implementation Business Case, the measures specified are appropriate. The measures are; the number of full closures per year, no. of deaths and serious injuries, medium personal and collective risk rating, average travel speed on corridor and GDP per capita.
Are the measures both attributable and quantifiable to this investment?	Possibly – Achieving a sustained 30% increase in tourism and gdp will prima facie require engagement with government partners, stakeholders and Northland businesses/ agricultural/forestry providers to address key education and skills gaps; as well as other measures to entice new investment into new growth areas. Acknowledging discussion in relation to the Northland Economic Action Plan (NEAP), the DBC does not include any clear analysis or investigation as to whether the investment and supporting proposals included in the NEAP are sufficient to ensure delivery of the GDP related objectives. Acknowledging the above issues do not direct bearing or a decision to route protect, the objectives and measures will need to be comprehensively revisited through the development of a subsequent business case – confirming the design, mode and scale of the recommended intervention.
Are the benefits of high value to the NZ Transport Agency (furthering its objectives)?	All of the stated benefits including safety, resilience and trip reliability are of high value to the NZ Transport Agency. Regional development remains a focus of the GPS 2018, however noting the comments in the business case summary, there is a strong argument that the project has been designed to induce transport demand for regional economic development purposes through the provision of excess roading capacity. While not directly stated in the benefits section - travel time savings, make up over 80% of the monetised transport-user benefits. In this context, it would have been useful for the project team to have regard to the GPS 2018, section titled "Investment at Best Cost" which identifies: *"Investment should represent the best use of resources. This requires the investment appraisal system to include a rigorous cost benefit analysis.* *Traditional approaches to transport economic evaluation can overstate the travel time benefits from new infrastructure and under-estimate the contribution from walking, cycling and public transport in providing more network capacity and other non-transport benefits.* *An investigation into the appropriateness of current economic evaluation approaches will be a priority to ensure they are fit for purpose, with this investigation to occur in 2019" [underline added]* It is understood that a review of the EEM is being progressed and that this will include some consideration of the costing of travel time savings. Noting Warkworth to Wellsford as a standalone project has a BCR of 0.7; any significant changes to the EEM may have an effect on the future viability of the project in generating a sufficient economic return as either a standalone project or when assessed as part of the wider Puhoi to Wellsford corridor. Again, it is recommended that these issues be addressed further through the development of a more comprehensive business case.
Alternatives and options considered (strategic response level)	

Have a sufficient range of strategic alternatives and options been explored (demand, productivity and supply)?	No - noting that 68% of DSIs are the corridor are predicted to be addressed by the Dome Valley safety improvements; and a high proportion of the road closures relate to these crashes – it could be argued the impetus for the project stems from projected increases in travel demand and wider economic development objectives. This may be reason why the DBC did not include consideration of Demand Management measures, or investment in inter-regional public transport as a method of slowing transport growth ("making best use of the existing network") i.e. such an approach represents a contradiction to the unstated objective to increase regional development through induced transport demand (incl private vehicles). As highlighted elsewhere in this IQA, while regional economic development remains an important focus of the GPS 2018-28, the failure to consider inter-regional PT or TDM measures arguably represents a fundamental flaw in the business case, and should prevent the release of any funding for implementation. With respect to the route protection, there is sufficient evidence to be satisfied that the exploration and consideration of alternative alignments for delivering a road-based response was robust, however there are questions as to whether the alignment can be effectively repurposed for future use, and subsequent risks of sunk costs and unnecessary disruption to residents. As previously stated it is recommended that TDM measures and Public Transport alternatives be investigated through a Comprehensive Business Case which may work to downscale or change the recommended (four-lane) motorway intervention and could change the recommended alignment.
Is it clear what alternatives and options are proposed and the rationale for their selection?	No - as above the rational for inclusion and consideration of alternatives is confused. This stems from the problem identification and a failure by the project team to refresh the DBC (or the Auckland to Whangarei PBC) following the change in strategic direction established by GPS 2018-28. With respect to the route-protection exercise, the rationale and choice of alignments for investigation was/ is sufficient, however there is an absence of evidence that the alignment will be able to be repurposed at a later stage (For instance is not clear from the DBC whether the alignment would still be preferred if the 850m tunnel was deemed unaffordable in the future). This should be address in a comprehensive business case, prior to detailed design.
Are the proposed programmes the most effective response to the problem (comprehensive and balanced)?	No- as above there are issues with the programme and the extent to which it focussed on hard infrastructure solutions to a series of narrowly defined problems in relation to the corridor. The proposed programme has an in-balance towards state highway improvements, failing to sufficiently consider other modes, soft interventions, planning/ land use responses that may address the problems and ultimately shape a recommended intervention to improve accessibility and safety for transport users travelling between Auckland and Northland. While a comprehensive infrastructure response to the corridor's geometric constraints and related safety and resilience issues is likely to be required in the future, the DBC presents insufficient evidence to confirm the scale and form of that response. As above, it is recommended that these issues are address in a new comprehensive business case (or earlier) and prior to the release of funding for construction.
Are the proposed programmes *feasible*?	It is not for this IQA to comment on the feasibility of the wider Auckland to Whangarei programme, however there are significant affordability issues with the recommended intervention. Route protection of the preferred alignment is feasible.
Detailed programme of packages/activities intervention (solution/outcome level)	

Consistent with the strategic alternatives chosen, have a *reasonable range of project options* been analysed?	Noting previous discussion with respect to the alternatives, and the need for a more comprehensive systems-based approach (i.e. including TDM, PT and land use) , the consideration of options for route protection of a new 'road corridor' appear robust, as can be evidenced through the DBC and appended reports including the report titled "WW2W Online MCA Assessment for DBC" dated December 2016, and "Warkworth to Wellsford Online Options: Initial Assessment" dated August 2011 (Appendix J) and work undertaken as part of the earlier Scheme Assessment Report. However, the quality of these assessments is diminished by the failure to consider any public transport interventions, or the impact of transport demand measures (e.g. many of the assessments were informed and responded to projected vehicle volumes). On balance, noting the above matters, it is considered that the DBC did not consider a "reasonable" range of options, particularly noting the change in strategic focus from GPS 2-18-2028.
Is the proposed solution specified clearly and fully (all business changes and any assets)?	No – as detailed in previous sections, the recommended intervention is sub-optimal and fails to identify a whole-of-system response to the issues of inter-regional accessibility, safety and travel-time reliability. As detailed further in the Management Case section below, there is no detailed project planning, or sufficient detail with respect to benefits realisation including the role of project partners – particularly in respect of the 30% increase in GDP and Tourism. While a case can be made that these issues are not critical for route protection, it is possible that they could influence the design and form of the final intervention and are therefore more appropriately addressed in a comprehensive business case prior to detailed design.
Is the proposed solution the *best* way to respond to the problem and *deliver the expected benefits*?	Uncertain – noting issues raised with respect to the identified benefits in respect of a 30% increase in GDP & Tourism, there is insufficient evidence to be satisfied the recommended intervention is the best way to achieve the stated benefits in the DBC. As above, these issues are of less consequence in making decisions in respect of route protection, however there remains a significant risk that future changes will require amendments to the recommended alignment and/or the form, scale of the recommended option. Accordingly, again these issues will need to be addressed in a subsequent and more comprehensive business case prior to the commencement of detailed design.
Can the solution really be delivered (costs, risks, timeframes, governance, etc)?	Uncertain – there are significant funding issues. There is uncertainty as to how the "triggers" for the implementation will be managed. For instance, they do not appear to take account of the potential for broader societal or economic changes over time, which could mean the recommended intervention is not fit-for-purpose irrespective of increased traffic volumes. Again, these issues will need to be addressed in a comprehensive Business Case prior to detailed design. There is no evidence to suggest that the route protection of the alignment cannot be delivered.

General assessment	**DP&S / PI to complete**
Robustness of management case	Acknowledging the DBC recommends route-protection only, the Management Case is only high-level and provides limited confidence that the project and related objectives and benefits can be delivered. Significant additional work is required to address notable omissions including project planning and controls for the design and construction stages. There is also minimal detail with respect to risk management, communications and stakeholder engagement (during construction), and cost management.
Strategic context and programme linkages	Acknowledging Safety and Resilience are a key focus of the Agency, as detailed elsewhere in this IQA, the recommended intervention (being a new 26km four lane motorway from Warkworth to Wellsford); as well as the supporting Auckland to

	Whangarei PBC both suffer from misalignment with the current GPS and the Transport Agency's Statement of Intent 2019/20. The recommended intervention does however exhibit good alignment with regional planning documents and the Northland Economic Action Plan. As stated elsewhere, route protection of the alignment is identified in the NZTA Statement of Performance Expectations for 2019/20.
Results alignment	Noting the safety and resilience issues are not urgent and are not required to be addressed in the immediate future (i.e. do not address a significant [and current as opposed to future] gap in safety), it is considered that the project has a "Medium" results alignment.
Cost benefit appraisal	The project team have not provided there EEM worksheets for analysis. Noting earlier comments with respect to changes to the EEM, there is significant uncertainty in respect of the project's future BCR and efficiency. Undoubtedly, the BCR will change as a result of recommendations/ changes arising from the Implementation Business Case, noting there is limited certainty in respect of the future cost.
Economics robustness	There has been no incremental assessment to assist in option selection. Sensitivity testing has occurred on the basis of: a 25% reduction in cost, a 10% increase in cost, and excluding safety benefits. However, none of the scenarios enable the BCR to get above 1.0 as a standalone project. Noting earlier comments with respect to the likelihood of an EEM review it would have been beneficial for the project team to carry-out sensitivity with a reduction in travel time savings. Noting road users travelling through the Auckland will likely face increased congestion in other parts of the network partially as a result of this intervention- sensitivity testing with a broader system view to take account of lost travel time savings relating to increased congestion elsewhere (as a result of this intervention) should also have been undertaken. Noting the above issues, work surrounding wider economic benefits appears robust, and a peer review of the economics has been completed.
Risks and significance	The project is of high significance – the project carries a substantial cost and there are significant reputational risks associated with this intervention, noting high levels of stakeholder support from the Northland community and significant questions as to the project's misalignment with the GPS. As identified elsewhere in this IQA the identification of risks, particularly relating to the design and construction stage is deficient. Significant additional work is required to address deficiencies with the Management Case through the Implementation Business Case. As outlined in the IQA summary, decision-makers should be aware that features of the proposed designation such as the corridor width, have been determined on the basis of the preferred intervention being a four-lane motorway. There is a strong possibility that features of current design, such as the proposed system interchange at Warkworth will need to be scaled back or changed due to affordability issues, changes in transport demand and/or wider economic, social or environmental changes. Accordingly, there is a risk that the route protection exercise will be inaccurate (i.e won't meet the needs of a fit-for-purpose comprehensive transport response to future problems) While it is possible that the protected corridor could be easily re-purposed, the approach still carries an unexplored risk of sunk property costs and unnecessary disruption to landowners, that based on current information cannot be accurately evaluated (i.e. in terms of risk).

	Decision-makers should be aware that there is uncertainty within the IQA review team as to what information was provided to the NZTA Board in seeking their endorsement of the route protection approach. For instance, it is unclear whether they were fully aware of the costs and BCR for the recommended intervention and potential strategic misalignment. Accordingly, it is considered that careful consideration should be given to elevating decisions in respect of funding to undertake route protection and the endorsement of the business case back to the NZTA Board.
Form, function and standards	As a route protection exercise the DBC does not include safety audits or any in-depth discussion of compliance with the highway engineering, construction or pavement standards. Detail regarding ongoing maintenance and operating costs is sufficient for this DBC stage, however further detailed investigation into the operating costs particularly in relation to the proposed 850m tunnel should be required before progressing to subsequent stages and should inform the analysis of affordability through the Implementation Business Case (in the event the current DBC is endorsed).
Investment	Funding availability has not been confirmed. Decisions in respect of funding route protection and subsequent property purchases do not easily fit with the existing investment decision-making framework, noting this investment (i.e. the route protection) delivers no direct transport benefits. With respect to the recommended intervention, noting the sub 1.0 BCR as a standalone project, if a corridor BCR is deemed appropriate – it would have a priority ranking of 6. The comments of the I&F reviewer and the subsequent independent review carried out by Graeme Belliss dated 27 September 2019 in respect of the medium results alignment are supported.

Investment and Finance questions	**I&F to complete (if relevant)**
Affordability	Funding for pre-implementation has previously been endorsed by the Transport Agency Board and the Treasury & Cashflow team has confirmed that funding is available. As detailed cashflows have not been provided in the business case it is not possible to conclude whether pre-implementation is affordable in the current or subsequent NLTP period. The business case indicates that approximately $4m for route protection and $10m for property purchases will be required between now and 2024. It is however noted that there is a risk that property liabilities could be higher and that a detailed hardship policy will need to be developed to mitigate this. This policy should have been developed prior to seeking funding approval.
Robustness of the financial case	The project team has responded in part to prior feedback on the financial case by including an indicative property expenditure forecast in the business case. This is considered appropriate for medium term expenditure given uncertainty regarding the timing of future property purchases. However the financial case is still insufficient as detailed cashflows for route protection and short-term property expenditure have not been included despite these residing in TIO. Ideally, there should also be included a discussion of funding committed and spent to date, in current and prior phases, so that it is possible to understand any sunk costs. Additional information in the business case relating to implementation has been assessed in prior IQAs, was found to be insufficient, but is now considered redundant.

Procurement approach	It appears from the business case that procurement of professional services for route protection has already occurred. It is assumed that procurement was conducted in accordance with business rules. Procurement for future phases is only briefly discussed as part of the commercial case, but this is acceptable given the high level of uncertainty regarding any future solution and the business case's focus on route protection.