

# Project Cost/Scope Adjustment Form

## Part A: Project and phase summary

Project details			
<b>Project/Activity Name</b>	TR – Rail Network Growth Impact Management (RNGIM)		
<b>Project phase:</b>	Implementation	<b>TIO phase ID:</b>	545.264698
<b>Work category and description</b>	545 – Transitional Rail Infrastructure		
<b>Variation Type</b>	Cost/Scope adjustment		
<b>Background</b>	<p>The Rail Network Growth Impact Management (RNGIM) Programme is a multifaceted programme of works to bring the Auckland Metro up to a modern standard and improve the operation and maintenance of the network in advance of City Rail Link (CRL) opening. The High-Level Infrastructure Review (HLIR) that informed the RNGIM business case identified 55 recommendations to improve the operation and maintenance of the Auckland Metro Rail Network. One output of HLIR was the approval of \$10 million to undertake urgent Rolling Contact Fatigue (RCF). This scope included ultrasonic testing and a rerailing programme for urgent RCF locations. These works were concluded in June 2020.</p> <p>Building upon the HLIR a Single Stage Business Case (SSBC) was prepared by Kiwirail (KR) and Auckland Transport (AT) to confirm the preferred way forward to achieve a more resilient network that accounted for increased usage once CRL is in operation. The SSBC concluded that a range of interventions would be required, including a programme of legacy 'catch-up' renewals, a suite of network resilience improvements, and training and competency improvements, with standard and rules changes to support maintenance works in the rail corridor. The approved funding for the RNGIM SSBC is \$ [REDACTED]</p> <p>Since approval of the RNGIM SSBC, the programme team has completed a discovery phase and commenced implementation of the scope. In addition, the RCF inspection of the network identified further RCF scope which required an urgent and accelerated rail and turnout replacement programme. For clarity, this programme of works is referred to as Auckland Metro Recovery (AMR), and is referred as such in the Annexes.</p> <p>In summary, there are three significant changes to the cost and scope of the project. These are itemised below:</p> <ol style="list-style-type: none"> <li>1. The RNGIM SSBC was based on an understanding of the status of the Auckland Metro Rail Network prior to RCF being fully inspected and understood. The RCF inspection output resulted in an accelerated programme of rail and turnout replacement to remove a blanket Temporary Speed Restriction and prevent a network closure. The scope identified includes a significant overlap with the original RNGIM track replacement scope, as well as RNGIM sleeper and turnout scope. Furthermore, it is recognised that KR does not have degradation models for RCF and so an allowance for track assets degrading into an 'urgent' status is included. See Annex A for further detail.</li> <li>2. Revised renewals costs. Experience through the AMR rerailing project has identified that unit rates used in the RNGIM business case underestimated current out turn delivery costs and did not account for bus replacement and disruption costs. Therefore, revised cost rates have been applied and additional costs allowed for. In addition, Formation estimates excluded associated track removal and reinstatement costs required to complete a full Formation renewal. This renewal cost has been included in this paper (see 'Breakdown of costs' table, item 6). Contingencies within the RNGIM business case have been exhausted by additional scope. See Annex A for further detail.</li> <li>3. Revised resilience improvement costs. The RNGIM SSBC budgeted \$15 million for Crossovers, Power Feed and equipment to support inspection and high-</li> </ol>		

	<p>productive working. The initial outputs of the discovery phase have identified that a number of items were not accounted for in the initial SSBC budgets and that further funding is required to support the resilience scope to provide a resilient network. See Annex B and Annex C for further detail.</p> <p>The above items support the RNGIM SSBC intention of providing a modern metro standard network that will support the increased patronage and tonnage forecast post CRL-opening.</p> <p>The RNGIM SSBC captures the impact Temporary Speed Restrictions (TSR), and other service issues are having on the performance of the network and highlights historic limited investment in renewal works across the Auckland Metro. The information and subsequent scope included in the RNGIM SSBC was a snapshot at a point in time. The request for additional funds is due to:</p> <ul style="list-style-type: none"> <li>• The discovery phase of the project has firmed up the scope to deliver a resilient network and to create a step change in productivity through further training, process and equipment. Furthermore, it was anticipated that there would be some programme refinement through a rebaselining exercise. This was highlighted in governance forums throughout 2020.</li> <li>• The extent of RCF was not fully understood at the time of submission of the SSBC. New testing regimes put in place identified significant and unprecedented acceleration of rail fatigue throughout the Auckland network.</li> <li>• Actual cost to deliver the renewal activities have recently been reassessed in light of the RCF delivery works. The output of this reassessment is comprehensive delivery rates which ensure that renewal activities can be handed back to the operations team in a fully functional state.</li> </ul> <p>Mitigation of these events was not possible, for these reasons:</p> <ol style="list-style-type: none"> <li>1. RNGIM SSBC identified and documented the scope known at a point in time. Detailed investigation into this scope has identified that additional cost and scope are required to deliver the intent of the RNGIM SSBC.</li> <li>2. RCF diagnostics was concurrent with the approval and mobilisation of the RNGIM Project.</li> </ol> <p>Milestones:</p> <ul style="list-style-type: none"> <li>• HLR approval Feb 2019</li> <li>• HLR "Immediate actions" project commenced Sept 2019</li> <li>• RNGIM SSBC approval Feb 2020</li> <li>• RNGIM project setup March 2020</li> <li>• RNGIM renewals work bank reviewed July 2020</li> <li>• Urgent RCF works commenced Sept 2020</li> <li>• 10 Feb 2021 - Remove blanket TSR: (Swanson – Papakura)</li> <li>• March 2021 – Detailed assessment of revised RNGIM scope and RCF scope to understand actual costs and impact</li> </ul> <p>Decisions:</p> <ol style="list-style-type: none"> <li>1. August 2020 commencement of AMR Programme to lift the blanket Temporary Speed Restriction across the Auckland Metro Network.</li> </ol>
<b>Previous CSA(s)</b>	Not Applicable

Funding summary of the phase	
1. Original Approved Total Cost	\$ ██████████
2. Funding Assistance Rate:	100%
3. NZ Transport Agency Share of Original Approved Total Cost	\$ ██████████
4. Revised Total Cost Estimate at Completion	\$ ██████████

5. Increase in Total Cost (4 – 1)	\$ [REDACTED]
6. Percentage increase in total cost (5 / 1)	[REDACTED]
7. NZ Transport Agency Share of Adjustment (5 x 2)	\$ [REDACTED]
8. Amount Claimed to Date	\$ [REDACTED]
9. Percentage of Phase Completed to Date	[REDACTED]
10. Value of Work Completed to Date	\$ [REDACTED]
11. Date Original Funding Approved by the NZ Transport Agency	April 2020
12. Date of most recent claim	February 2021
13. Has the contingency fund been used for this cost increase? (Yes / No)	Yes
14. Is this request retrospective?	[REDACTED]

[1] This request is retrospective due to the urgent nature of the RCF works and the need to commence those works immediately to avoid a network closure.

### Profile and programme linkages

<b>Impact on Results Alignment</b>	Current rating:	High	Revised rating:	High
<b>Impact on BCR</b>	Current BCR:	5.4 (SSBC)	Revised BCR:	2.3 <sup>[1]</sup>
<b>Updated investment profile:</b>	<p>A conservative assessment of the investment profile has been derived from the SSBC options analysis. One option that was not preferred included a greater renewals scope with a cost similar to that now required. This provides a very simple assessment of the impact on the BCR of a cost increase.</p> <p>This is conservative in that the impact on benefits has not been assessed. The option was not taken forward as the scope was not considered necessary to achieve the benefits, nor deliverable in the timeframes without significant disruption. It was considered that the assets could be managed over time and renewed as part of BAU (and via the RNIP) whilst maintaining an acceptable level of service.</p> <p>In practice, the deterioration of the assets has led to network wide speed restrictions and full network shutdowns that were not envisaged. Taking the impact of these things into account within benefit streams (ie avoiding significant journey time increases congestion impacts and ultimately mode shift) will generate significant additional benefits, therefore it would be reasonable to consider the investment profile and BCR as unchanged.</p> <p>Regardless, even without a reassessment of benefits, the BCR remains strong.</p>			
<b>Reason for change:</b>	<p>Increase in the cost and resource from original business case required to deliver the additional scope of work prior to CRL opening.</p> <p>Implementation of the additional scope identified in this CSA will result in metro network resilience and performance, more than what was achievable by the RNGIM SSBC alone.</p> <p>The BCR has reduced from 5.4 to approximately 2.3 (when using an alternative Option considered in the RNGIM SSBC). Please refer detail above.</p>			
<b>Programme/Project linkages – related activities</b>	<p>This activity is linked to the strategic case for Rail Investment (Transitional Rail) and the Auckland Rail Development Plan. It is also included within Auckland Transport Alignment Project (ATAP), the draft Regional Land Transport Plan (RLTP) and the draft Rail Network Investment Programme (RNIP). Its implementation phase is supported by an SSBC approved by the Waka Kotahi Board on 24 February 2020.</p>			

### Reasons for cost/scope variation

#### Reasons for Cost Adjustment

Select as many as appropriate.

Definitions are provided in the appendix.

- Change in scope
- Value engineering
- Change in standards
- Unexpected site conditions
- Variance from the tender
- Change in quantities
- Other (provide greater detail in later questions as appropriate)

#### Reasons for Scope Adjustment

Select as many as appropriate.

Definitions are provided in the appendix.

- Project improvement
- Value engineering
- Change in standards
- Unexpected site conditions
- Other (provide greater detail in later questions as appropriate)

### Breakdown of additional funds required

The additional funds required are provide in the table below, and are further detailed in Annex A, Annex B and Annex C. Annex D includes the Revised Supporting Cashflow.

#### Breakdown of costs

Project Component	Current Approved Cost (in TIO)	Revised Cost to Complete	Variance	Change to scope? (Y/N)
1. RNGIM SSBC (exclusive of items 4 & 5) Business Improvement, Technology, Plant and Equipment, Programme Management and Project Delivery. (RCF affecting original rail scope addressed at no additional cost)				
2. Urgent RCF works (AMR) (additional scope outside RNGIM base scope)				
3. Urgent RCF works Priority 2 → Priority 1 scope (additional scope outside RNGIM base scope)				
4. Renewal Delivery increased costs				
5. Resilience Delivery increased costs				
6. Addition delivery funding to support Formation works				
7. AT costs (bus replacement and communications)				
8. Indirect Admin Fee (1%)				
<b>Total</b>				

## Part B: Funding request summary

### (i) Provide a brief description of the project and key delivery milestones.

As described in Part A Background, the RNGIM scope is to renew track and track bed assets across the Auckland Metro Rail Network and provide the platform for maintaining the network to support higher patronage and tonnage. The funding for this work is catered for under the Transitional Rail Activity Class of the NLTF, for primarily 'below-track' improvements on the rail network that enhance the reliability and capacity of the passenger rail service. The intent of the scope is to address the following:

1. Address historic formation, drainage and track issues to bring the network up to a modern metro standard.
2. Improve the level of asset resilience that will lower the future maintenance needs by renewing sections of the network that were not fully renewed during previous projects.
3. Ensure a Metro network capable of handling the additional capacity, tonnage and reliability required before the opening of the CRL.
4. Provide a step change in the rules, standards, practices, resource, competency, technology and plant for renewing and maintaining the network in future.

#### Key Delivery Milestones:

- Delivery of revised RNGIM renewals scope: July 2020
- Urgent RCF delivery works begin: August 2020
- Removal of network wide TSR: April. Note: Isolated TSR's will be in place in localised areas as required for other operational needs.
- CSA approval and project re-baseline: Waka Kotahi Board May 2021, ratified June 2021
- RNGIM Main Civils Contact Award: July 2021
- Completion of Turnout Replacement Scope: August 2022 (approx.)
- Completion of Resilience works crossovers and technology implementation (2022-2023)
- Completion of Change initiatives (2021-2024)
- Completion of Renewals (Dec 2024).

**(ii) Describe what is required to complete this phase of the project.**

**Track and Track Bed Renewals**

1. This scope includes renewal of Formation, Drainage, Ballast, Sleeper, Rail, and Turnout assets, based on the network wide review and assessment carried out by Kiwirail Asset Management between February – June 2020.
2. The adjustment to this scope and cost is due to three components, detailed below:
  1. RCF delivery scope included a portion of the RNGIM renewal scope, as well as other renewal scope. This additional scope is identified in Annex A, which uses Venn diagrams to illustrate the RNGIM scope overlap and other renewal scope. Rail, Sleepers and Turnouts are captured, see Annex A. Additional scope has been estimated at \$80 million.
  2. Revised delivery costs were determined on the basis that the original SSBC estimate did not allow for all cost components of a renewal. A revised all-inclusive delivery rate for rail, sleeper and turnouts has been calculated. Additional cost has been estimated at \$25 million for remaining RNGIM scope.
  3. The RNGIM SSBC estimate for Formation works did not account for the post-treatment activities required to complete a formation renewal. These post-treatments vary but will generally include tamping and regulating, welding and destress. An allowance is included to cover these costs and ensure that a fully renewed asset is returned to the operation and maintenance team. Additional cost has been estimated at \$10 million.
3. Delivery is underway.

**Resilience Interventions**

1. Implementation of new assets to improve network resilience, including turnouts and an additional power feed.
2. Additional funding is required to complete fully operational crossovers, including civil, signalling and OLE disciplines. The full cost consideration was not allowed for within the SSBC. Additional cost has been estimated at \$25 million, see Annex C, Resilience Crossover PCG Paper for further details.
3. The Resilience Interventions are in the design phase and pending approval of this CSA will progress shortly after to the implementation phase.

**Bus Replacement Costs**

1. As the urgent RCF scope works were undertaken (for priority 1 scope), trains were unable to operate across various sections of the networks and AT was required to provide bus replacement services to ensure a level of service to rail passengers over the August 2020 to March 2021 period. The cost has been estimated at \$ [REDACTED] for those bus replacements. AT identified that these were a cost to KR for the delivery of this project, however it is noted that the lost revenue impact as a result of the RCF works has been absorbed by AT as there was no mechanism to recover these costs from KR (this has been discussed previously with Waka Kotahi in relation to the PT Continuous Programme (2018-21)).
2. Provision has also been made for future bus replacement and passenger communications costs directly related to this project, based on a best assessment of the current implementation programme (\$ [REDACTED]).

**(iii) Explain whether (and how) the cost adjustment could have been prevented and what options were considered for mitigating the cost savings.**

The discovery phase of the RNGIM programme was intended to confirm the interventions of the SSBC and baseline the detailed scope of the programme. Therefore, it was foreseen that the scope of the programme will adapt to the outputs of this phase. However, the impacts of RCF and basis of cost in the SSBC was unforeseen and it is these issues that result in this CSA. Below captures the basis for why the cost adjustment could not have been prevented:

1. The extent of RCF on the metro network is far greater than could have been reasonably anticipated or was identified through early testing. This RCF has accelerated over the course of the past 24 months. This is unprecedented within the New Zealand context. If undetected, RCF propagation accelerates exponentially once past a critical point and requires immediate management (via speed restrictions) and remediation via rail replacement in order to avoid rail breakages that have the potential to cause derailments and serious harm.
2. Upon detailed investigation, review and confirmation of the works required it has become apparent that the budgets are insufficient to deliver the quantum of renewal works required to deliver a safe and resilient network of modern metro standard prior to CRL opening
3. Costs to deliver the Renewals were based on BAU modelling costs prior to RNGIM, using previous methodologies and production rates and methods. Whilst developing the delivery plan for the renewals scope a revision of the delivery rates were undertaken and it was identified that the rates used in the SSBC did not account for the full cost to deliver a renewal. The additional cost required has been identified and is further detailed in Annex A.
4. The RNGIM SSBC included the Detailed Business Case Estimate which identified a contingency value. This CSA, with the appended supporting documents, provides the basis for the required increase in funding to deliver the benefits intended by the RNGIM SSBC.

**(iv) Describe any action taken to mitigate future cost increases.**

The output of the discovery phase of the programme is a detailed understanding of the scope and funding required to deliver the SSBC benefits. Both the understanding of the original costing developed for the SSBC and expansion of scope mitigate future cost increases. Further improvements, as part of the delivery of the programme, are anticipated. For example, improved delivery productivity and improved training and use of access are likely to improve both the utilisation of the funding but also offset any future cost increase potential.

**(v) Describe why a scope adjustment is required and why the scope has changed from the approved design?**

The following points describe why the scope adjustment elements are required and the changes from the original scope:

1. Urgent RCF works (AMR) - \$55 million: These works were and are required to ensure operational continuity within the Auckland Metro Rail Network. The scope of work included original RNGIM scope (already covered within the SSBC funding) and additional scope not previously included. Based on the timing of the RCF inspection across the Auckland Metro this scope was not included within the RNGIM scope. However, assets afflicted with RCF meet the requirements of the RNGIM SSBC. The delivery of this scope will ultimately lift a network-wide TSR. Annex A provides further illustrations of this scope adjustment.
2. Urgent RCF works Priority 2 → Priority 1 scope - \$25 million: It is acknowledged that the critical assets that triggered the network-wide TSR and required urgent replacement are captured in item 1 above, there is known scope of assets which risk further TSRs and therefore disruption to the Auckland Metro Rail Network. These assets are to be renewed in advance of further TSRs. These assets meet the criteria of the RNGIM SSBC but were not known at the time of the initial RNGIM workbank. This results in a further expansion of scope for the RNGIM Programme. Annex A provides further illustrations of this scope adjustment.



3. Revised Resilience Delivery costs - \$25 million: The original funding for Crossovers within the RNGIM SSBC did not account for the supporting systems, for example traction and signalling systems. The inclusion of these systems in the RNGIM programme constitutes a scope adjustment. Annex B and Annex C provide further information of this scope adjustment.
4. Rail Bus Replacement costs - \$11.7 million: AT was required to implement rail bus replacements to continue to provide support to rail passengers during the period of RCF priority 1 works. As this is cost is in response to the works, AT informed KR that they would be seeking a cost recovery for the services. AT has absorbed the rail revenue impact of these works within their operational programme. Allowance is also made for future bus replacement and passenger communication costs that fall outside normal business as usual budgets.

**(vi) How will the change in scope affect project outcomes?**

The revised scope, that captured within this CSA, will deliver the SSBC objectives of:

- A truly resilient upgraded modern metro standard network with root causes of track issues addressed.
- Additional access implemented.
- Proactive renewals regime implemented with reduced future maintenance and breakdowns, and disruption for network users.

It is also important to recognise the wider impact the RNGIM Programme has on the business cases for other capital works programmes. RNGIM is a dependency for other key capital projects such as CRL, W2QP, P2P, without which these projects will not realise the benefits they aim to deliver in full.

**(vii) Describe any other additional information or unusual circumstances**

- The occurrence of the Covid-19 pandemic delayed progress in developing the BC assumptions and the workbank and, to some extent, physical work on site as this was limited to confirming asset requirement.
- The implementation of Covid-19 lockdowns does present an opportunity for delivery of the programme in some cases. It is known that a key constraint in delivery will be rail corridor access. Under certain lockdown conditions, access to the rail corridor to progress delivery may be granted over and above the existing and known access.
- The urgent nature of removing RCF and safety considerations reduced access to resources to develop and confirm BC assumptions, but have helped improve productivity and true cost understanding.
- A full unconstrained audit of the Auckland Metro Rail Network has now confirmed scope which was to be further developed in the BC high level assumptions.
- Due to inspection and modelling regimes constantly improving and additional focus on Asset Management in Kiwirail, and the implementation of advanced inspection technology, the true condition of the network asset is better understood than previously.
- The full extent of RCF was greater than originally anticipated, which has driven the majority of this CSA. This exercise has accelerated understanding of the network and provides significant value in terms of delivery of the RNGIM renewals programmes.



**(viii) Describe any lessons learned and opportunities to improve processes and procedures**

As described in the above sections, the scope and cost adjustments are associated with the level of scope definition that was available at the time the SSBC was prepared. There are two main contributing factors. Firstly, further investigation would have identified the growing RCF issue and secondly, further development of the scope prior to issue of the SSBC would have incorporated fully scope estimates to deliver the outputs of the business case. These points are detailed below:

1. The urgent RCF works were not fully understood at the time the SSBC was prepared and approved. At the time HLIR was reviewed and approved the RCF issue was apparent to the extent that the initial HLIR funding was approved to mitigate the known RCF. As it transpired the investigation and interpretation of the RCF inspection data was more complex and time consuming and therefore the output of the RCF investigation was not incorporated into the RNGIM SSBC.
2. The estimates that support the RNGIM SSBC budget do not fully allow for the completion of the renewal activities and hand-back for operation. Further definition of the scope and the associated estimating will have likely identified comprehensive delivery costs factoring in all supporting activities and systems.

## Part C

Supporting Documentation	Location of Documentation
RNGIM – Cost Scope Adjustment	TIO
Annex A - AMR/RNGIM Scope Adjustment PCG Paper	TIO
Annex B - Resilience Funding PCG Paper	TIO
Annex C - Resilience Crossover PCG Paper	TIO
Annex D – Revised Supporting Cashflow	TIO

## Part D

### Recommendation, sign-off and approval

***That the [approver of this CSA] approves the following recommendation to the Transport Agency's Senior Manager, OPPP SD&D:***

***Endorses the variation request and recommends that the GM I&F approves funding to Auckland Transport for an increase of \$ [REDACTED] at a funding assistance rate of 100% (\$ [REDACTED] out of the NLTF) for the implementation phase of TR – Rail Network Impact Growth Management (RNGIM) activity thereby increasing the approved total cost from \$ [REDACTED] to \$ [REDACTED].***

Submitted by [REDACTED], Funding Advisor:

Signature: [REDACTED] Date: 07 / 04 / 2021

Reviewed by [REDACTED], Metro Rail Improvements Programme Director:

Signature: [REDACTED] Date: 07 / 04 / 2021

Reviewed by [REDACTED], Head of Funding and Analysis:

Signature: [REDACTED] Date: 07 / 04 / 2021

Approved for submission by [REDACTED] Kiwirail Chief Operating Officer:

Signature: [REDACTED] Date: 8/4/2021

Approved for submission by [REDACTED] EGM – Finance:

Signature: [REDACTED] Date: 09/04/2021

## Appendix – definitions and examples

Category	Definition	Examples
<b>Project Improvement</b>	An improvement beyond those identified in the initial funding approval, that costs additional money. A change to the outcome of the project.	Additional costs incurred in extending the length of a road by an additional 1 km.  Change in material from poured concrete to basalt (gold plating).
<b>Value Engineering</b> (increase in capital expenditure only)	Additional capital expenditure spent to obtain long term savings in operating expenditure (maintenance). Overall the expected life cost will have decreased.	Additional spending on landscaping to mitigate the costs associated with long term erosion.
<b>Change in Standards</b>	An externally imposed change requiring different standards.	Legislative change.  A change in Transport Agency guidelines or requirements.
<b>Scope</b>	<p>The sum of all a project's products and the extent of their requirements. This should be set out in the Project Initiation Document and progressively elaborated on as the project progresses through its phases.</p> <p>The detailed scope for an upcoming phase will only be known at the end of the preceding phase. The Project Manager's checklist sets out the typical AT project products for each project phase.</p> <p>Note: Until a preferred option is selected, and construction scope (and cost) defined, the scope and cost can only be estimated at a high level and are therefore subject to uncertainty. Certainty will increase as a project progresses through the different phases.</p>	
<b>Change in the Scope of Works</b>	<p>Where an issue impacts on a project's scope, the baseline for determining whether it is a scope change is the scope defined in the Business Case / Project Initiation Document. Refer to AT's "Guide to Project Change Management".</p> <p>Where a proposed change affects a latter phase, the scope definition and project objectives should be assessed to determine whether the proposal is in fact a change or an elaboration on a high-level documented scope. Scope changes can include gold-plating of solutions, i.e. not keeping to the core project objectives.</p>	The tendered construction scope is altered as it does not provide the benefits (outcomes) approved at the time of funding approval.
<b>Scope creep</b>	Scope creep is where small, uncontrolled changes happen over time until they compound into a larger overall scope change.	

Category	Definition	Examples
<b>Unexpected site conditions</b>	A change resulting from insufficient investigation in the initial phases of the project or from site plans not being sufficiently detailed.	Ground conditions are worse than expected.  Utilities are in a different location to those shown on the services drawings.
<b>Variance from the Tender</b>	The variance between the estimate and the winning tender price.	The tender awarded is at a greater cost than expected.
<b>Change in Quantities</b>	The routine variation between forecast and actual quantities on a measure and value contract.	A measure and value contract included 100,000m <sup>2</sup> of surfacing and on final re-measurement this was actually 103,000m <sup>2</sup> .
<b>Other</b>	Any other change not accounted for in the examples above.	Changes caused by third parties.  A contractor defaulting or going into receivership.  Unaccounted for variances.