Assessment of Aurizon Network's Capital Expenditure Claim

Revision 0 – 23-May-2019
Prepared for – Queensland Competition Authority – ABN: 43 812 633 965

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Client: Queensland Competition Authority

ABN: 43 812 633 965

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Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
A	25-Jan-2019	Preliminary Draft	Lucy Harrington Project Manager	For Final
B	18-Apr-2019	Draft for Review	Susheel Prabhakar Technical Director	For Final
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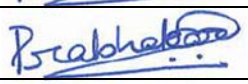
0	23-May-2019	Final Report	Susheel Prabhakar Technical Director	

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Glossary

Term	Definition
ACMA	The Australian Communications and Media Authority
ALCAM	Australian Level Crossing Assessment Model
AS	Australian Standard
AS/NZS	Australian Standard / New Zealand Standard
AUGEX	All Growth Projects
Aurizon Network	Aurizon Network Pty Ltd
CAPEX	Capital Expenditure
CETS	Civil Engineering Track Standard/s
CFR	Capital Funding Request
CP12-CP21-CP30	Types of Processors for Remote Terminal Units
CQCN	Central Queensland Coal Network
DGA	Dissolved Gas Analysis
DMR	Digital Mobile Radio
DNP	Distributed Network Protocol
DTC	Direct Train Control
ECOs	Electric Control Operators
EOI	Expression of Interest
FRA	Fire Risk Assessment
FS	Feeder Station
FY16	Financial Year 2015-16
FY16/17	Financial Year 2016-17
FY17/18	Financial Year 2017-18
FY18/19	Financial Year 2018-19
GAPE	Goonyella to Abbot Point Expansion Project
HBD	Hot Box Detector
HV	High Voltage
HWD	Hot Wheel Detector
IAMPS	Integrated Asset Management Plan System
IAR	Investment Approval Request
IDC	Interest During Construction
ISO	International Organisation of Standardization
ITP	Inspection Test Plans
NAMS	Network Asset Management System
OH	Overhead
PSC	Power Supply Cubicle

Term	Definition
QA	Quality Assurance
QCA	Queensland Competition Authority
QRFL	Queensland Rail's Fault Locator System
RAB	Regulatory Asset Base
RailBAM	Brand of Bearing Acoustic Monitor by Waltec Corporation
REPEX	All Renewal Projects
RFP	Request for Proposal
RFW	Request for Works
RFI	Request for Information
RPEQ	Registered as a Professional Engineer of Queensland
RTU	Remote Terminal Units
SAP	System Analysis and Program Development, a Technology Company
SCADA	Supervisory Control and Data Acquisition
SDH	Synchronous Digital Hierarchy
SPM	Scope Prioritisation Model
t.a.l	Tonne Axle Load
TACA	Track and Civil Assets
TADS	Trackside Acoustic Detection Systems
TCU	Track Connection Unit
TETRA	Terrestrial Trunked Radio
the Act	Queensland Competition Authority Act 1997
TLO	Train Loadout
ToR	Terms of Reference
TSC	Track Sectioning Cabin
TSUDA	Brand of Fault Locator Units by Tsuda Electric Meters Co. Ltd.
TSY	Track Sectioning Yard
UAT	User Acceptance Testing
UTC	Universal Train Control, Universal Control
WHSMP	Work Health and Safety Management Plan
WiM	Weigh in Motion

Executive Summary

Aurizon Network Pty Ltd (Aurizon Network) is a part of the Aurizon Group of companies (Aurizon Group). Aurizon Network operates the below-rail network servicing coal mines in Central Queensland and these services are declared for third party access under the Queensland Competition Authority Act 1997 (the Act).

The Queensland Competition Authority (QCA) has approved a Regulatory Asset Base (RAB) for the Central Queensland Coal Region, and the Access Undertaking provides for the QCA to approve any additions to the RAB. The approval process involves annual assessments of Aurizon Network's Capital Expenditure Claims undertaken in accordance with the access undertaking, which stipulates that capital expenditure must be prudent in scope, standard and cost for acceptance into the RAB.

This report provides AECOM's final recommendations in relation to Aurizon Network's Financial Year 2017-18 (FY17/18) Capital Expenditure (CAPEX) Claim, based on a detailed review of the scope, compliance with standards and cost of a selected sample of projects from the Claim. AECOM has applied a small team of specialist staff for this review, including rail engineers of various disciplines and cost management specialists, coordinated by its Advisory group.

This review has primarily been a desktop review, with several rounds of requests for additional documentation to clarify particular issues in relation to the projects being reviewed. Where the documentation did not provide sufficient clarity, AECOM conducted a number of in-person interviews with key Aurizon Network staff to obtain evidence that would further support a recommendation. To ensure consistency of approach, each technical reviewer used a standard template for the review, which was designed based on the criteria required by the Access Undertaking.

The review sample included 27 of the 58 projects submitted in the FY17/18 Claim, representing 84% of the total value of the Claim.

1.0 Introduction

1.1 Background

Aurizon Network Pty Ltd (Aurizon Network) is a wholly owned subsidiary of Aurizon Holdings Limited. Aurizon Network operates the below-rail network servicing coal mines in central Queensland and these services are declared for third party access under the Queensland Competition Authority Act 1997 (the Act). A map of the Aurizon Network's rail network is provided in Figure 1.

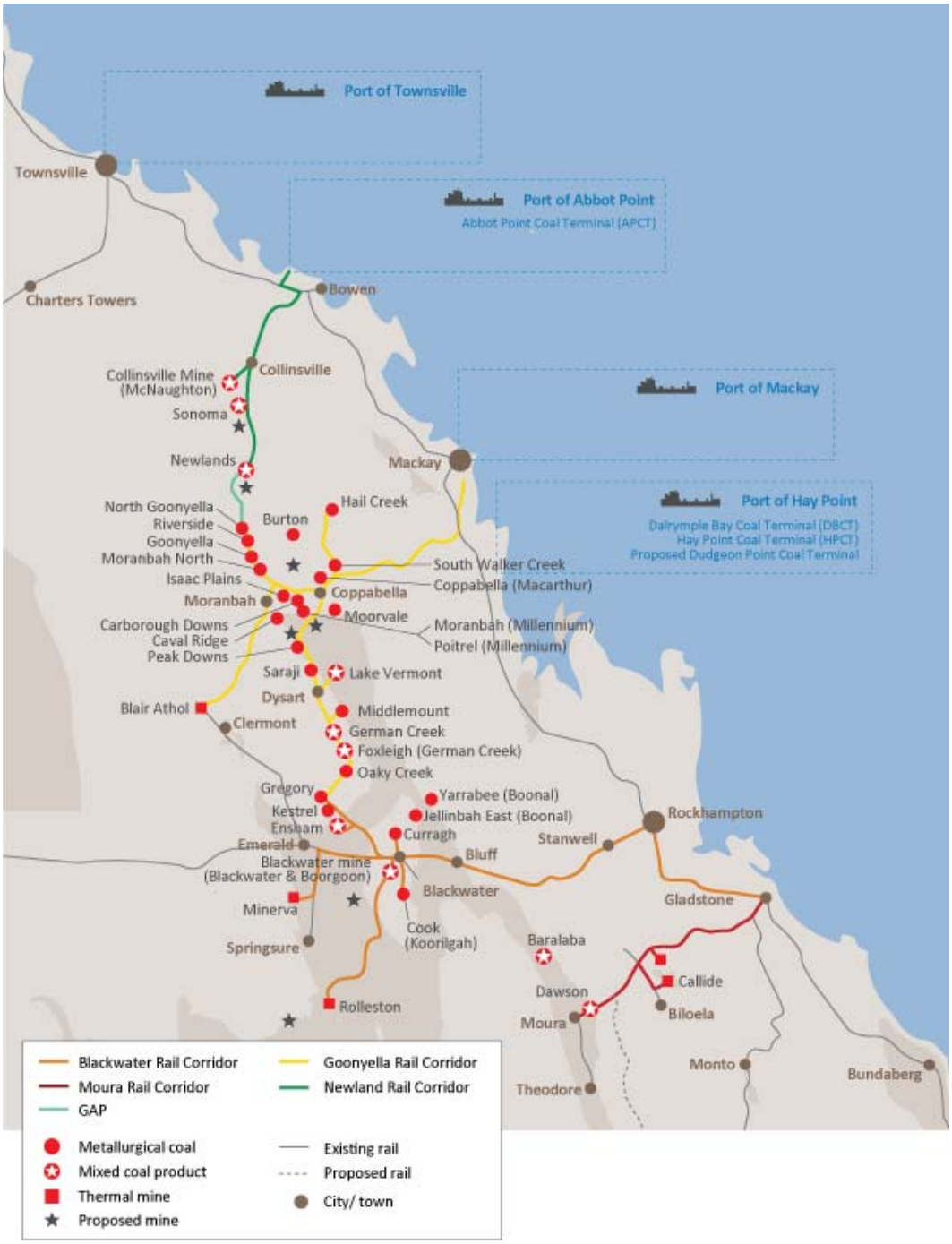


Figure 1 Aurizon Network's Rail Network (Source: QCA)

The Queensland Competition Authority (QCA) has approved a Regulatory Asset Base (RAB) for the Central Queensland Coal Network (CQCN), which includes the Moura, Blackwater, Goonyella, Newlands and the Goonyella to Abbot Point systems.

An access undertaking, approved by the QCA and developed in accordance with the Act, provides a framework for the provision of access to Aurizon Network's rail network. Under the framework, Aurizon Network is responsible for providing, maintaining and managing access to, and operations on, its rail network and associated infrastructure. The current access undertaking is the 2017 access undertaking (UT5), which replaced the previous version on 21 February 2019.

The QCA conducts annual prudency assessments of Aurizon Network's Capital Expenditure Claims to determine if the capital expenditure should be approved for inclusion in the RAB. The prudency assessments are undertaken in accordance with the access undertaking, which stipulates that capital expenditure must be prudent in scope, standard and cost for acceptance into the RAB.

AECOM has been engaged by the QCA to undertake a review of Aurizon Network's capital expenditure claim for works completed during Financial Year 2017-18 (FY17/18).

1.2 Scope

Although this Claim was submitted under the previous, 2016 access undertaking (UT4), UT5 provides for the assessment to continue given an equivalent assessment is provided for in UT5. The claim was assessed under Schedule E of UT4, which requires that QCA assess the prudency and efficiency of capital expenditure in the claim in relation to its scope, standard and cost.

To assess the prudency and efficiency of Aurizon Network's FY17/18 Capital Expenditure Claim, AECOM has examined a sample of projects from the Claim, selected in consultation with QCA.

1.3 Report Structure

The structure of this report is outlined in Table 1.

Table 1 Report Structure

Main Report	
Section 1	Introduction
Section 2	The Aurizon Network Capital Expenditure Claim
Section 3	Assessment Methodology
Section 4	Project Assessments
Section 5	Summary and Recommendations
Appendices	
Appendix A	Individual Project Assessments using the Template

2.0 The Aurizon Network Capital Expenditure Claim

2.1 Overview

The Aurizon Network's FY17/18 Capital Expenditure Claim includes 58 projects totalling $211 million, excluding interest during construction (IDC).

Table 2 Aurizon Network FY17/18 Capital Expenditure Claim

Project Discipline	No. of Projects in Claim	Value of Projects in Claim, excl. IDC ($ million)
Control Systems Control Systems projects include those relating to the assets that communicate with the Universal Train Control (UTC) system which allows train movements, identifies train locations, operates rail points activates level crossing protections.	17	$55.7
Corridor Assets Assets within or that access the rail corridor, but which are not directly part of the track structure, signalling or telecoms networks, or the electrical overhead systems. These assets include fencing and corridor security, environmental protection, corridor access and level crossings.	4	$1.2
Electrical Assets All elements of the electrical supply and distribution network that provides power for electric traction on the systems.	4	$6.9
Expansion Projects that add capacity to the existing network, such as track capacity or additional electrical capacity.	1	$8.7
Track and Civil Assets (TACA) All assets related to the rail formation, corridor civil works, ballast, sleepers, rail and structures such as culverts and bridges.	31	$136.8
Telecommunications Assets These assets provide data linkages between field equipment and network control, the network control systems, digital and microwave radio systems, and the IT systems.	1	$1.9
Total	58	$211.2

2.2 Extent of review

Of the preliminary list of projects in Aurizon Network's FY17/18 Capital Expenditure Claim, a majority of which are system-wide renewal projects, we note that 11 of the 58 projects are considered material and were initially included in the review sample. Of these 11 material projects, project IV.00329 (Structures Renewal FY18) was removed from the review sample due to potential conflict of interest.

From the non-material projects, those with the most value within each of the project disciplines are included in the review sample to make a representative sample. The Non-material projects were selected ensuring that all systems and asset types are included, while avoiding projects that pose a potential conflict of interest.

Our criteria lead to a selection of 17 projects from the non-material list of projects totalling 27 projects of the 58 projects submitted in the Claim, representing 84% of the total value of the Claim. The full list of projects in the claim is shown in Table 3, Table 4, and Table 5, showing growth projects, renewal projects and other projects respectively, and sorted by asset type, system, and claimed amount. The projects in the review sample are highlighted.

This report addresses growth projects, followed by renewal projects in order of project number.

Table 3 Growth Projects

Project Number	Project Name	System	Asset Type	In Sample	Total
A.04599	Havilah Culverts Upgrade	Newlands	Structures	Y	$8.7
A.01731	WIRP1: DINGO TO BLUFF DUPLICATION	Blackwater	Track		$0.6
A.02976	WIRP1: North Coast Line	Blackwater	Track		$0.2
A.03735	WIRP1: Bauhinia NORTH Upgrade	Blackwater	Track		$0.1
A.01552	WIRP1: WIGGINS BALLOON LOOP	Blackwater	Track		$0.0
A.01631	WIRP1: ROCKLANDS TO STANWELL DUPLICATION	Blackwater	Track		$0.0
A.03686	WIRP1: MOURA SYSTEM UPGRADE	Moura	Track		$0.0
All Growth Projects (AUGEX)					**$9.5**
			% of projects in Claim reviewed by Value		91%
			% of projects in Claim reviewed by Number		14%

Table 4 Renewal Projects

Project Number	Project Name	System	Asset Type	In Sample	Total
IV.00375	Corridor Security & Fencing FY18	System Wide	Corridor Access	Y	$0.8
IV.00316	Access Points Renewal Program	System Wide	Corridor Access		$0.3
IV.00260	CQ Access Roads FY17	System Wide	Corridor Access		$0.0
IV.00384	OH Equipment Renewal FY18	System Wide	Distribution Network	Y	$3.5
IV.00004	Traction Fault Locator Renewal	System Wide	Distribution Network	Y	$2.0
IV.00262	Power Resilience FY17	Blackwater	Power Systems		$0.0
IV.00154	FY17 Autotransformer Renewal Project	System Wide	Power Systems	Y	$1.4
IV.00005	Blackwater Supersite	Blackwater	Network Controls		$0.2
IV.00294	Goonyella Supersite FY17	Goonyella	Network Controls	Y	$2.1
IV.00040	Train Detection Renewal Program	Goonyella	Network Controls		$0.4
IV.00049	Radio System Replacement	System Wide	Network Controls	Y	$23.4
IV.00346	Package 1 FY18 Control Systems Renewal	System Wide	Network Controls	Y	$8.2
IV.00347	Package 2 FY18 Control Systems Renewal	System Wide	Network Controls	Y	$8.0
IV.00270	Ethernet to Corner SCADA Upgrade FY17	System Wide	Network Controls	Y	$3.0
IV.00283	Traction SCADA System	System Wide	Network Controls	Y	$2.1
IV.00266	Transmission Renewal FY17	System Wide	Network Controls		$1.9
IV.00184	Network Capacity Model	System Wide	Network Controls		$0.5
IV.00024	NR Vital Disabling Release	System Wide	Network Controls		$0.0
IV.00360	Network Asset Mgt System Tranche 2	System Wide	Operational Systems	Y	$5.3
A.04321	Central Coal UPS Upgrade Project	System Wide	Operational Systems		$0.0
IV.00271	UTC and DTC Upgrade Program	System Wide	Signalling Equipment		$0.3
IV.00267	Asset Protection Equipment Replacement	System Wide	Signalling Equipment	Y	$0.2
IV.00046	Interlocking Renewal Program	System Wide	Signalling Equipment		$0.1
IV.00056	Diagnostic Computer Renewal	System Wide	Signalling Equipment		$0.0

Project Number	Project Name	System	Asset Type	In Sample	Total
IV.00261	Telecommunications Infrastructure Renewal	System Wide	Telecommunication	Y	$1.9
IV.00344	Formation Renewal FY18	System Wide	Formation / Ballast	Y	$12.2
IV.00334	Bridge Ballast Renewal Program FY18	System Wide	Formation / Ballast	Y	$7.3
IV.00170	Bridge Ballast Renewals FY17	System Wide	Formation / Ballast	Y	$1.3
IV.00169	Formation Renewal FY17	System Wide	Formation / Ballast		$0.5
IV.00343	Level Crossings Renewal Program FY18	System Wide	Level Crossings	Y	$5.4
IV.00171	Level Crossings FY17	System Wide	Level Crossings		$0.2
IV.00322	Rail Renewal FY18	System Wide	Rail	Y	$21.5
IV.00144	Rail Renewal FY17	System Wide	Rail	Y	$2.1
OP.00161	FY18 Minerva Renewals	Blackwater	Sleepers		$3.8
IV.00257	Minerva Renewals	Blackwater	Sleepers		$0.0
IV.00321	Sleeper Renewal Program FY18	System Wide	Sleepers	Y	$6.7
IV.00146	Sleeper Renewal FY17	System Wide	Sleepers	Y	$2.8
A.04357	NR Gladstone Yard Retaining Wall Upgrade	Blackwater	Structures		$0.0
IV.00329	Structures Renewal FY18	System Wide	Structures	Y	$15.1
IV.00177	Structures Renewal FY17	System Wide	Structures		$3.6
IV.00323	Track Upgrade FY18	System Wide	Track	Y	$23.4
IV.00145	Track Upgrade FY17	System Wide	Track	Y	$5.1
A.04313	Gauge Face Lubrication Asset Renewal	System Wide	Track		$0.3
IV.00025	NR Track Upgrade Program FY16	System Wide	Track		$0.0
IV.00364	Turnout Renewal FY18	System Wide	Turnouts	Y	$11.5
IV.00168	Turnout Renewal FY17	System Wide	Turnouts	Y	$2.7
IV.00032	FY16 Turnout Renewal Program	System Wide	Turnouts		$0.7
IV.00359	FY16 Goonyella Flood	Goonyella	Various		$0.1
IV.00399	2017 Cyclone Debbie Rectification	System Wide	Various	Y	$4.4
All Renewal Projects (REPEX)					**$196.4**
			% of projects in Claim reviewed by Value		86%
			% of projects in Claim reviewed by Number		53%

Table 5 Other Projects

Project Number	Project Name	System	Asset Type	In Sample	Total
A.02628	COAL SYSTEM: COAL LOSS MANAGEMENT	System Wide	Environmental		$0.1
IV.00437	Callide Infrastructure Upgrade	TBC	Track		$5.2
All Other Projects					**$5.3**
			% of projects in Claim reviewed by Value		0%
			% of projects in Claim reviewed by Number		0%

Table 6 Project Summary

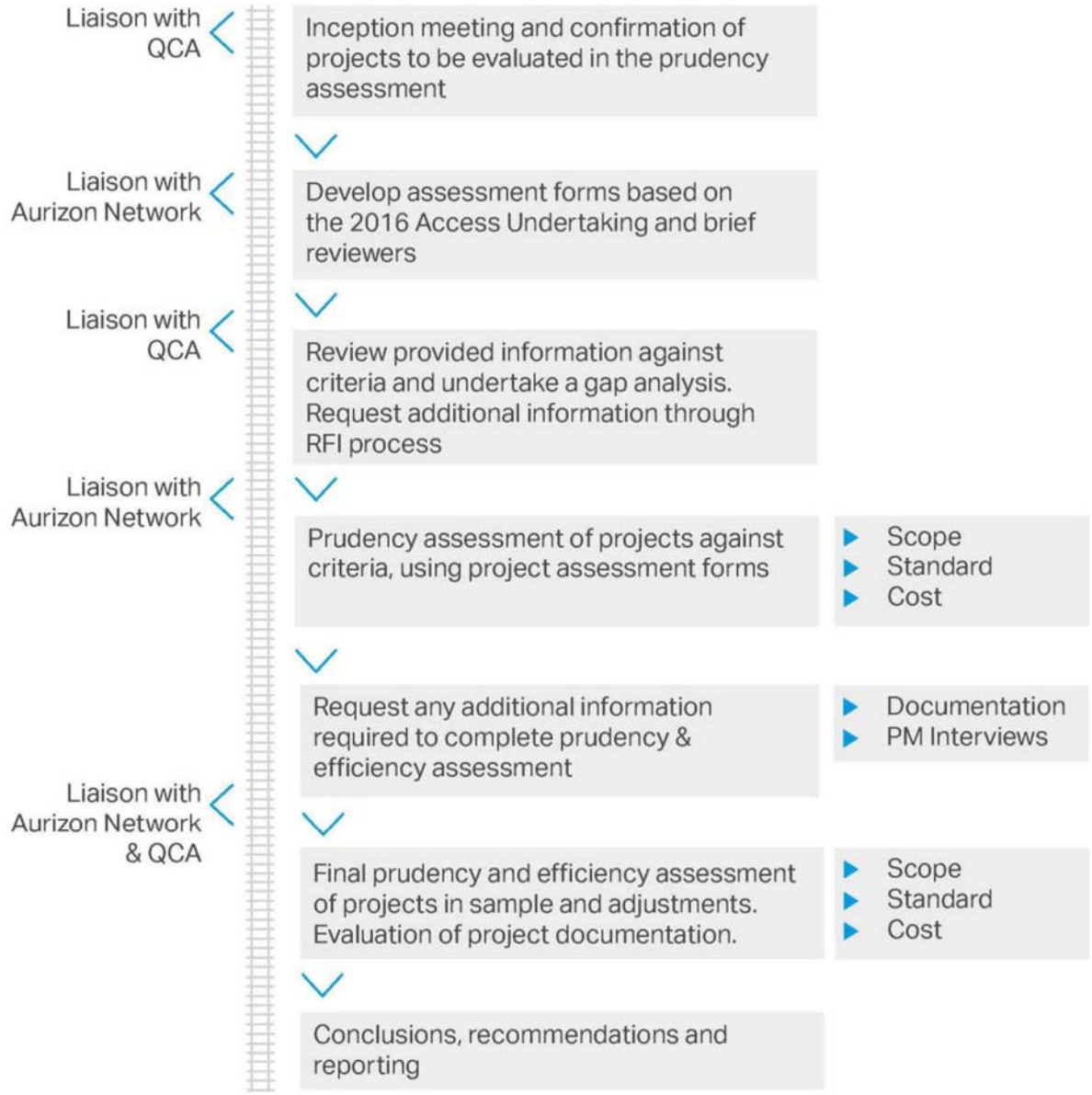
Project Type	Sample	Total Claim
All Growth Projects (AUGEX)	$8.7	$9.5
All Renewal Projects (REPEX)	$168.5	$196.4
All Other Projects	$0.0	$5.3
Total	**$177.2**	**$211.2**
% of projects in Claim reviewed by Value		84%
% of projects in Claim reviewed by Number		47%

3.0 Assessment of Methodology

3.1 Methodology for Assessment

For this assessment of Aurizon Network's FY17/18 Capital Expenditure Claim, the selected sample of projects was evaluated using the methodology summarised in Figure 2. This review has primarily been a desktop review, with requests for additional documentation to clarify issues in relation to the projects being reviewed. Where the documentation did not provide sufficient clarity and where deemed necessary, AECOM conducted in-person interviews with key Aurizon Network staff to obtain evidence to further support a recommendation.

Figure 2 Methodology



3.2 Assessment Template

A standard project assessment template was developed using criteria from the Undertaking. The template ensures consistency in the technical assessment by all reviewers and is a key mechanism by which AECOM has demonstrated transparency in its review. Each team member conducting the assessments was briefed on the format of the assessment and how to complete the forms.

The completed forms are the basis of this report. A sample of ten completed assessments forms is attached in Appendix A.

The criteria used in this assessment and included in the standard template were developed in consultation with the QCA and is based on the Schedule F of the Undertaking and the Terms of Reference (ToR). These criteria are outlined in the following sections.

3.2.1 Scope

Requirement	Considerations
Initial Scope Qualification	Are the project works below-rail infrastructure? If not, what proportion of the works are 'below-rail'? Was the project commissioned in 2017-18 (or earlier if they have been deferred for inclusion in the RAB)? Is the project capital expenditure (capex) and has not otherwise been treated as ongoing maintenance expenditure (opex)? Has the project been covered by other claims, including review events to recover the cost of repairing flood damage? Was the project fully funded by Aurizon Network? If not, was the amount claimed for the proportion of works funded by Aurizon Network?

Requirement	Considerations
4.1 (a) (i) **Interested Participants and Scope Pre-Approval**	Has the scope of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking? Has the standard of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?

If NO to both of the above, complete the following:	
	Expansion projects
2.2 (b) (i) **Whether the requirement for the works is prudent and efficient**	(A) Was the project aligned to any relevant Network Development Plan? (B) Were the works reasonably required to accommodate the requirements of relevant Access Agreements? (C) Were the works reasonably required to accommodate current contracted demand and potential future demand that Aurizon Network, acting reasonably, considers is required within a reasonable timeframe?
	Renewal Projects
	(D) Considering the age and condition of the assets, would operational constraints (load or speed restrictions) on the asset have been required in FY17-18 without this intervention? (D) Were the works consistent with the Asset Management Plan? Were the works consistent with any other asset plans? (D) Were the works reasonably required to reduce external risk to an acceptable level? (E) Were the works reasonably required to the extent that the capex project promotes the economically efficient operation of, use of investment in the Rail Infrastructure, whether present or future? (for example, in relation to extending the life of assets whose economic and/or functional life would otherwise have expired, reducing future operating and maintenance costs or improving capability or capacity of existing assets, systems and processes) (F) Were the works reasonably required to comply with Aurizon Network's legislative and tenure requirements, including relating to rail safety, workplace health and safety, and environmental requirements?
	Stakeholders
	(G) Comment on any outcomes of consultation about the capital expenditure project, with Access Seekers and Access Holders whose Access Charges (or likely access charges) would be affected by including the amount of capital expenditure for the capital expenditure into the Regulatory Asset Base? (H) Comment on any other matters relating to scope in submissions to the QCA by Aurizon Network or Funding Users

3.2.2 Standard

Requirement	Considerations
4.1 (a) (i) **Interested Participants and Standard Pre-Approval**	Has the standard of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking? Has the scope of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?
If NO, complete the following:	
2.2 (b) (ii) **Were the works of a reasonable standard to meet the requirements of the scope?**	(A) With regard to the requirements of Railway Operators and what is reasonable required to comply with Access Agreements (B) With regards to current and likely future usage levels (C) With regards to the requirements of other relevant Australia design and construction standards (D) With regards to the extent of consistency with the Asset Management Plan (E) With regards to Aurizon Network's design standards contained within its Safety Management System and which is accepted by the Safety Regulator (F) With regards to all relevant laws and the requirements of any Authority (including the Safety Regulator) Would the standard of works be expected to deliver the requirements for the project? Has the standard of works been overdesigned, or is it likely to deliver a capital works project beyond the requirements of the scope? (G) Comment on any other matters relating to standard in submissions to the QCA by Aurizon Network or Funding Users

3.2.3 Cost

Requirement	Considerations
2.2 (b) (iii) **Having regard to the scope and standard of works, are the costs prudent and efficient?**	(A) Do the costs align to any relevant Network Development Plan? (B) Do costs align to scale, nature, and complexity of the project? (D) Do costs align to any relevant Asset Management Plan? Was there a material difference between budgeted and actual costs (i.e. >5%)? Why? What proportion of the difference should be considered a capital cost?
Requirement	**Considerations**
2.2 (b) (iii) **Does the project demonstrate prudency and efficiency of costs?**	(C) With regards to the circumstances prevailing in the market and locality for engineering, equipment supply and construction? (C) (1) Did the project demonstrate value for money with regards to sourcing of engineering, equipment supply and construction? (C) (2) Did the project demonstrate value for money with regards to sourcing of labour? (C) (3) Did the project demonstrate value for money with regards to sourcing of materials? Was the procurement methodology consistent with approved procurement strategies?

Requirement	Considerations
2.2 (b) (iii) (E) **Was the project managed effectively, including the manner in which Aurizon Network has balanced the requirements of:**	With regards to appropriate governance structure for size and nature of project? (1) Safety during construction and operation? (2) Environmental approvals and compliance? (3) Compliance with legal and authority requirements? (4) Minimising disruption to operation of train services during construction? (5) Did Aurizon Network accommodate the reasonable requests of Access Holders to amend the scope and sequence of works undertaken to suit their needs? (F) Minimising WLC including future maintenance and operating costs? (G) Minimising total project costs? (H) Did project elements align with other elements in the supply chain? (I) Did the project meet contractual time frames?

Requirement	Considerations
At the time the project was approved, was the program appropriate:	With regards to contingency allowed for? With regards to project management costs? With regards to risk allowances? With regards to timing/delivery program? With regards to ordering and storage of equipment?

Requirement	Considerations
Cost Allocations	Are there multiple beneficiaries to the project? If Yes, were the costs allocated appropriately for end users?

3.3 Project Documentation Assessment

Each project has been evaluated for prudency in terms of scope, standard and cost, and recommendations made based on:

- Review of project documentation provided by Aurizon Network and supplemented by request for information (RFI) process;
- Interviews with key Aurizon Network staff where the information was insufficient and deemed necessary; and
- The professional judgement of the technical reviewers.

The use of project documentation is the preferred and best practice, but not the sole means of evaluating project prudency.

A typical list of documents that we expect to be available to support recommendations of prudency and cost efficiency in relation to capital projects is listed in Table 7.

We note that the list provided should be interpreted as identifying topics that require adequate documentation, rather than a requirement for specific documents.

Table 7 Project Documentation Considered Necessary for Review of Capital Projects

Prudency of Scope	Prudency of Standard	Prudency of Cost
Investment Approval Request Approved business case (growth) Project feasibility analysis (growth) Project plan Project completion report Detailed design report Condition assessment report (renewal) Asset Management Plan (renewal) Access Holder Request Evidence of customer approval (60% or more)	Investment Approval Request As-built drawings Design drawings Project completion report Detailed design report Certificate of practical completion Signed-off inspection and test plans Registered Professional Engineer of Queensland (RPEQ) Certification Photographs of completed works Aurizon Standard Specifications and drawings Aurizon Policy document Post-Implementation Review	Investment Approval Request Approved business case Project Management Plan Project Program Procurement recommendation Tender recommendation or Exemption from Tendering document Evidence of previous claims Evidence of risk allocations / contingencies Pre-Tender Estimates Project completion report

We have assessed the suitability (in terms of quality and range) of the documentation provided by Aurizon Network for each project in the sample. A colour-coded scoring system (using shades of green) is used to easily indicate the degree to which existing documentation has enabled an assessment to be made on each project; and highlight where documentation could be improved for future reviews and for better internal project controls. In summary:

- The quality of documentation is high where the documentation alone was sufficient to make sound recommendations. This rating indicates that all information required to make the recommendation was documented and available, to a sufficient level of quality.
- The quality of documentation is medium where there was insufficient quantity and range, but when supplemented by interviews, informal documentation and/or professional judgement, supported a conclusion of prudency.
- The quality of documentation is low where the documentation provided was inadequate in range or quality, and our reviewers were reliant on professional judgement to make sound recommendations.

Table 8 Project Documentation Assessment

Quality and range of documentation	Legend	Description
High		Sufficient documentary evidence to support and demonstrate a recommendation.
Medium		Incomplete documentary evidence, but interviews, informal documentation and/or professional judgement support a recommendation.
Low		Limited documentary evidence, but professional judgement supports a recommendation.

There are a number of instances in this assessment where prudency of cost has been recommended, supported by a 'low' level of documentation quality.

In these instances, benchmark data from comparable projects has been used to determine whether the project cost is reasonable, other than for works that had been competitively tendered. Works that had been competitively tendered have been assessed as prudent because the tender process is assumed to have provided the optimal value for money at that time.

Where the cost summaries provided suggested that the project costs fall outside normal industry variability as indicated by benchmarking, they were reviewed in more detail to ascertain if the variances were justified by the scope, size, complexity and locality of the project.

3.4 Interviews

In instances where project documentation was insufficient to provide a recommendation, AECOM conducted interviews with Aurizon Network representatives in order to apply more rigour to our assessments. A summary of the interviews conducted where information provided in the interview has been relied upon for a recommendation is provided at Table 9.

Table 9 Interviews with Aurizon Network

Project	Date	Outcome
Scope Priority Model	11 February 2019	Further information around how Aurizon Network develops the scope for renewals upgrades.
All Control Systems Projects	13 February 2019	Overview of control systems projects.
All Electrical Projects	14 February 2019	Overview of electrical projects.
All Civil Projects	15 February 2019	Overview of each civil project.
IV.00384 - OH Equipment Renewal FY18	7 March 2019	Clarification on the scope of works delivered in relation to the approved scope.
IV.00154 - FY17 Autotransformer Renewal Project IV.00384 - OH Equipment Renewal FY18	25 March 2019	Clarification on the standard of oil containment bunds and protection against fire and explosion at autotransformer sites. Further information on the delivered OH Equipment Renewal scope.
IV.00323 Track Upgrade FY18	17 April 2019	Clarification on how the scope for Track Upgrade FY18 was developed.

3.5 Interpreting this Report

An example of a review summary for a project is provided in Table 10. The prudency of scope, standard and cost are denoted by ticks or crosses. The colours of the cells indicate the level of documentation quality for the assessment.

Table 10 Sample project - interpreting the report

Review Summary	Scope	✔
	Standard	✘
	Cost	✔

Capital Expenditure Claim	$12.2M
Impact of findings on Claim	$2.1M
Total accepted	$10.2M

In the example, the project is found to be:

- Prudent in scope supported by a high level of documentation quality
- Not prudent in standard supported by a medium level of documentation quality
- Prudent and efficient in cost supported by a low level of documentation quality

In addition, the imprudent standard has resulted in a recommendation for $2.1 million to be removed from the accepted value of the claim.

4.0 Project Assessment

4.1 Growth Projects

4.1.1 A.04599 Havilah Culverts Upgrade

Aurizon Network uses a variety of culverts and bridges across the CQCN to allow water to flow under the rail corridor. The size and type of culvert is matched to the required water flow and formation requirements to achieve top of line (rail level) and minimum cover levels.

Four multi-cell corrugated, metal pipe culvert structures south of Havilah displayed advanced signs of deterioration and were identified as reaching their end of life in 2012 from external engineering assessments. The culverts were replaced with a bridge to provide a longer-term, more flood-resilient structure.

Two of the four culverts (135.53km and 143.10km) were included within Aurizon Network's Financial Year 2016-2017 (FY16/17) Capital Expenditure Report, and the costs attributable to the remaining two culverts (139.20km and 145.10km) have been included in the claim.

A.04599 - Havilah Culverts Upgrade	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$8.7M
Impact of findings on Claim	$-
Total accepted	**$8.7M**

Project Review

In 2011, the Goonyella to Abbot Point Expansion project (GAPE) was completed, linking the Goonyella coal system with the Newlands Systems, enabling the transportation of up to 50Mtpa of coal to the port at Abbot Point. Aurizon Network's capital funding request noted that some upgrades were required to handle the heavier 26.5-tonne axle loads, including four culverts at Havilah which were identified to have reached end of life in 2012. The replacement of these culverts was not completed as part of the GAPE scope due to time constraints.

Additional funding of $4.3 million was sought for the project for the completion of 'safety critical works' with the additional scope including the construction of four bridges to replace four culverts located in South Havilah that had reached the end of their design life. The Approval Request suggests that 'the existing culverts are life-expired, heavily propped and in poor condition. The replacement of the culverts enables Aurizon Network to maintain the operational safety of the network by complying with engineering standards and regulations.'

A 2013 Pitt & Sherry report supports this assessment, confirming that the relevant culverts had been propped and had limited structural life. The works are hence deemed to have been reasonably required to reduce risk of track closures and allow continuing network operations and safety.

In determining the best way to approach the project, an options analysis demonstrated a consideration for the design life, flood resilience and whole-of-life cost of the project works. Aurizon Network concluded in the Client Requirement Brief that replacing each existing structure with a bridge would provide long-term flood resilience. The new structures are compliant to a 300LA (Australian Standard) design loading configuration and design flood immunity of Q100 (to top of rail) and Q50 (to top of formation). The project will reduce the number of structures in Condition State 4, which should lead to less reactive maintenance requirements, reduced inspection times, removal of load restrictions and reduction of risk of derailments.

It is our assessment that the scope of works was warranted and justified due to the poor condition and age of assets, as well as network criticality and consequences.

Given that the Havilah Culvert upgrade is a growth project and was required to accommodate reasonable demand, the scope of the project is considered prudent. The documentation quality to inform this assessment is medium.

A detailed design report has been sighted for the two culverts replaced in FY16/17 as part of the Havilah Culverts Upgrade project. The report mentions the remaining two culverts at 139.20km and 145.10km however has not specifically been written for them.

However, the engineering solutions shown on the IFC drawings appear to be aligned with relevant Australian standards (including AS5100, AS1170 and DTMR Design Criteria for Bridges and Other Structures) and are consistent with typical solutions provided for similar applications in the industry. Standard details have been used for efficiency where possible, and drawings have RPEQ approval.

Following construction, the Defects Register noted some outstanding defects which have not been closed out. In a meeting with Aurizon Network, Aurizon Network confirmed that all outstanding defects were the responsibility of the contractor, and to be rectified at the contractor's cost. We cannot verify whether these works have been carried out, as Aurizon Network notes that these are still outstanding.

The standard of work is considered to be prudent, supported by a medium level of documentation quality.

Works were undertaken to meet ongoing drainage requirements. An engineering report sighted indicates that works will incur in a reduction in future maintenance and operating costs, as the ongoing maintenance of the new bridge structures was deemed more cost effective than like for like replacement of the culverts. This is reflective of a value for money approach.

A large portion of the project cost was competitively tendered, and Request for Proposal (RFP), evaluation and award documentation were sighted, indicating efficient processes. Detailed design costs are deemed to be reasonable for the scale and nature of the work.

The project cost is considered to be prudent, supported by a medium level of documentation quality.

4.2 Renewals Projects

4.2.1 IV.00004 Traction Fault Locator Renewal

Project Overview

Traction fault locators find traction faults on the network, which enables crews to rectify the fault quickly. If fault locators are not operational, crews must manually locate the fault resulting in train delays.

Traction fault locators are installed at Autotransformer sites throughout the CQCN. Currently, there are two fault location systems in service:

- TSUDA units which have reached end of life and most of the fault locators provide inaccurate fault locations.
- Queensland Rail's Fault Locator System mk2 (QRFL mk2) design units have reached end of life and components to build or repair units are unable to be sourced.

The project's scope of works includes design development, as well as bench and site testing of 10 trial QRFL mk3 fault locators. On successful completion of the trial QRFL mk3 replacements will be rolled out. Renewing both systems enables compatibility with new communications equipment and technology.

IV.00004 - Traction Fault Locator Renewal	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$2.0M
Impact of findings on Claim	$-
Total accepted	**$2.0M**

Review

Table 1 of the Traction Fault Locator Renewal Program provides details of the traction fault locator renewals carried out on the Goonyella and Blackwater systems including start and finish dates for FY17/18.

Capital Funding Request - Traction Fault Locator Renewals provides details of the existing TSUDA mk1 and the QRFL mk2 fault locators in service. The mk1 units were installed in 1986 and are at 'end of life' with the majority of the units no longer giving any accurate location of the faults. The mk2 unit is also reported to be at the 'end of life' after 11 years in service, with components no longer able to be sourced to build new units or repair failed units. The Capital Funding Request details the requirement to replace all mk1 and mk2 units on the Aurizon Network for all the electrical sections detailed in Table 11.

Table 11 Proposed QRFL Replacements[1]

Goonyella	Blackwater
Wotonga FS - Carborough Downs TSC	Grantleigh FS - Westwood TSC
Wotonga FS - North Goonyella	Wycarbah FS - Westwood TSC
Coppabella FS - Carborough Downs TSC	Duaringa FS - Edungalba TSC
Oonooie FS - Black Mountain TSC	Grantleigh FS - Edungalba TSC
Bolingbroke FS - Black Mountain TSC	Dingo FS - Umolo TSC
Wandoo FS - Balook TSC	Wycarbah FS - Kabra TSC

[1] Full form of acronyms used here is available in the Glossary

Goonyella	Blackwater
Mindi FS - Braeside TSC	Rocklands FS - Kabra TSC
Wandoo FS - Braeside TSC	Callemondah FS - Mount Larcom TSC
Coppabella FS - South Walker TSC	Raglan FS - Mount Larcom TSC
Mindi FS - South Walker TSC	Rangal FS - Blackwater TSC
Vermont TCU - Lake Vermont Balloon Loop	Bluff FS - Blackwater TSC
Coppabella FS - Red Mountain TSC	Red Rock TSC - Burngrove Junction
Norwich Park FS - German Creek TSC	Gregory FS - Red Rock TSC
Norwich Park FS - Saraji TSC	
Peak Downs FS - Saraji TSC	
Oonooie FS - Grasstree TSC	
Dalrymple Bay FS - Hay Point	
Moranbah South FS - Grosvenor TSC	
Wotonga FS - Grosvenor TSC	
Gregory FS - German Creek TSC	
Mount McLaren FS - Villafranca TSC	
Mount McLaren FS - Blair Athol Balloon Loop	
Moranbah South FS - Villafranca TSC	
Peak Downs FS - Red Mountain TSC	

Condition assessments of the mk1 and mk2 units has not been made available for review. The majority of the mk2 fault locators to be replaced have only been in service for between six and ten years. As these units have an expected service life of 15 years, it is unreasonable that the majority of them would be required to be replaced within half the expected service time. This suggests that the original units may have been unsuitable for the original application in that the units did not provide accurate fault location data.

Discussion with Aurizon Network project managers for this project suggest that the fault locators had been updated prior to the end of their useful lives in part due to obsolescence of certain components and in part due to improved fault location technology. There is no evidence to suggest that the existing fault locators had caused any concerns relating to rail safety, workplace health and safety, and environmental requirements. In addition, the spares holding and maintenance of the units has not been sufficiently managed to support continued operation over the expected lifespan. It is recommended that Aurizon Network engage in effective spares management to reduce the requirement for early replacement of assets due to obsolescence.

The scope of work is considered prudent, supported by a low level of documentation quality.

The fault locators are used to relay autotransformer mechanical trip signals to the Feeder Station (FS) or Track Sectioning Cabin (TSC) Supervisory Control and Data Acquisition (SCADA) system for processing of the trip signal to the appropriate circuit breaker to protect autotransformers from further damage. Aurizon Network has used the autotransformer mechanical protection trip as the mitigating controls for several identified hazards in the Autotransformer Risk Assessment relating to *IV.00154 - FY17 Autotransformer Renewal Project*.

We have sighted a sample of test documentation which indicates that the mechanical trip function operates correctly. However, there has been no evidence of timing tests to prove that protection clearing times at each location are sufficiently low to prevent catastrophic damage to the autotransformer and the possible consequence of fire and explosion at the autotransformer station. Considering this, it is considered prudent to ensure that this protection function operates within an adequate timeframe to avoid catastrophic damage to the equipment.

The standard of work is considered prudent, supported by a low level of documentation quality. Evidence of testing of the fault locators is required to demonstrate that protection system operations are functional, to support the function of the fault locators as mitigating controls for the identified hazards in the Autotransformer Risk Assessment.

The project works were competitively tendered and evaluated based on a number of technical and commercial criteria, which appears to be in accordance with the Aurizon Network Procurement Policy.

Claimed costs of $2.0 million are significantly below the approved budget, with a released budget of $2.9 million recorded in SAP.

Limited documentary evidence of the scope of costs for the works delivered has been made available for review. Aurizon Network advised through email communication on 16 April 2019 that the installation of the fault locators is complete, however that the As Built drawings have not yet been finalised and are intended to be included in the FY19 claim.

The project cost is considered prudent, supported by a low level of documentation quality.

4.2.2 IV.00049 Radio System Replacement

Project Overview

Many communications systems interact using Aurizon Network's radio system. It is critical to the safe and efficient operation of the CQCN. Most of the existing radio 'base' equipment was deployed in the 1990s and is beyond its 15-year design life, proving difficult and expensive to maintain.

The project seeks to replace existing Analogue radio networks within the CQCN with a Terrestrial Trunked Radio (TETRA) Voice Private Mobile Radio Network. Following the relocation of the Australian Communications and Media Authority's radio spectrum to the band that Aurizon Network occupies, Aurizon Network is also required to upgrade its infrastructure and change the frequency band allocation channel bandwidths. The scope of works aims to increase system reliability and achieve legislative compliance.

IV.00049 - Radio System Replacement	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$23.4M
Impact of findings on Claim	$-
Total accepted	**$23.4M**

Review

The new radio network system utilises TETRA digital radio technology and consolidates four outdated independent analogue radio systems across Aurizon Network's train control, shunting, maintenance and wayside operations, encompassing 79 sites and covering 2,670 kilometres of rail network, linking 50 coal mines and four major ports throughout Central Queensland.

The scope is broken into three stages relating to (1) Supporting Infrastructure, (2) The Installation and Testing of the Digital Radio Network and the Handover of Assets and (3) Integration with the current Aurizon Network Subscribers. This claim relates to Stages 1 and 2 of the Radio System Replacement project.

The replacement of the existing analogue radio systems is driven by legislative compliance and system reliability requirements. The Australian Communications and Media Authority (ACMA) recently reallocated radio spectrum in the band that the Aurizon Network radio systems occupied, requiring Aurizon Network to upgrade the its infrastructure and systems in order to change frequency band allocation to the revised Rail Industry allocated bands by December 2018.

Additionally, the majority of the existing radio base equipment is reported to have been beyond its original 15-year design life and therefore becoming increasing difficult and expensive to maintain. Replacement of the existing analogue radio systems with the new common platform digital radio will increase operations efficiency and improve system reliability. The works are hence deemed to be reasonably required to promote the efficient operation of below rail infrastructure.

The scope of work is considered prudent, supported by a medium level of documentation quality.

Completion reports include certificates of practical completion and requirements verification tables with no apparent outstanding items. These indicate that the scope of works has been delivered by reputable contractors, and that works are in accordance with Aurizon Network's design standards, with Australian Standards and current industry practice

As built drawings have been reviewed and appear to be compliant with the relevant standards, however the RPEQ Approved section of the drawings have not been completed, and the names in the recommended and authorised fields do not appear in the RPEQ register. It is good standard practice to include RPEQ sign off on as built drawings to demonstrate that the works have been performed or directly supervised by an RPEQ.

The Design Compliance Matrix shows that design requirements appear to have been completed for Stage 1 and 2 of the project, the subjects of this capital claim.

Inspection and test plans were requested but not provided for this review.

The standard of work is considered prudent, supported by a medium level of documentation quality. Inspection and test plans and RPEQ sign off of designs would help to increase the documentation quality.

The Investment Approval Request outlines a robust and competitive procurement process for this project. The first stage of the project, involving supporting infrastructure was designed by internal Aurizon resources, and delivered by tendering through the Telecommunications Installation Panel, which is in accordance with Aurizon's Procurement Policy. For Stage 2 of the project, an Expression of Interest (EOI) was sent to 24 vendors. Of these 24 vendors, 5 were issued a Request for Quote. A multi-criteria assessment was undertaken to select the preferred supplier, giving consideration to Technical Requirements, Safety, Methodology/Programme, Experience/Key Personnel, Pricing/Rates and Contract Terms and Conditions.

The project appears to have been managed effectively, allowing for appropriate delivery timeframes and cost allowances. The project has been delivered under budget with the final cost noted in the Project Closure Report reconciling with SAP costs. The works were competitively tendered with documentation sighted for the Request for Works (RFW), tender evaluation, and award for the civil works (contract).

The works were delivered under the approved budget of $26 million outlined in the Investment Approval Request.

The project cost is considered prudent, supported by a medium level of documentation as the breakdown in the project completion report does not reconcile to the original estimate.

4.2.3 IV.00144 Rail Renewal FY17

Project Overview

The majority of Aurizon Network's rail in the CQCN was installed in the 1980s and 1990s and is now beyond its nominal service life. Aurizon Network's rail renewal strategy supports the proactive replacement of life expired rail or defective rail before it can adversely impact safety and operational performance.

The Rail Renewal Program is a long-term asset renewal program for life expired and defective rail with a prioritised program of works developed and funded yearly. The basis of the prioritisation process for the Rail Renewal Program is asset condition, largely due to rail wear, with the actual service life of the rail determined by the traffic task, the track alignment and geometry. The FY17 Renewals Program involved the replacement of 91.3km of life expired and/or defective rail.

Rail renewal is a risk management activity undertaken to prevent the failure of rail in service, which may subsequently cause derailment or damage to other track structure components.

IV.00144 - Rail Renewal FY17	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$2.1M
Impact of findings on Claim	$-
Total accepted	**$2.1M**

Review

The increasing traffic task (total tonnage) on each of the four systems is accelerating rail wear on mainline curves and increasing the incidence of fatigue cracking on mainline tangent track thereby reducing the time that rails are remaining in service.

Works undertaken as part of the Rail Renewal program are prioritised where:

- Rail has reached its end of life or is expected to reach the end of the its useful life in the financial year
- Rail has reached or passed optimum life-cost (based on cost/benefit analysis of capital costs compared with increased maintenance costs).

Rail renewal supports the proactive replacement of life expired rail or defective rail before it can adversely impact safety and operational performance. The replacement of the rail within the financial year is considered appropriate given the rate of wear and Aurizon Network Standards for limits on head loss.

The majority of the scope of works for this project was delivered in FY16/17, however additional scope items delayed by Cyclone Debbie were delivered in FY17/18, notably on the Goonyella and Blackwater Systems. The project close out report suggests that these were completed by November 2017. The report also suggests that the scope of works increased from 69.39 km to 76.15 km and was subject to 83 change requests over the project's delivery.

The project is assessed as prudent in scope, supported by a medium level of documentation quality.

Civil Engineering Track Standards (CETS) Module 2 (Section 2.12.2) outlines specific thresholds for rail wear in which rail is required to be replaced by. In addition, CETS Module 2 prescribes the standards for the design, construction, monitoring, maintenance and modification of rail used in CQCN.

The standard of works appears reasonable in consideration of increasing traffic task and was delivered to Aurizon Network Standards which are generally in line with wider industry practice for rail size and type.

Track Validation Certificates have been provided for a sample of the scope of works that align to the FY17/18 costs claimed.

Project is assessed as prudent in scope, supported by a medium level of documentation quality.

The project forms part of an ongoing program of works, as outlined in the Investment Approval Request (IAR). The report also suggests that the scope of works increased from 69.39 km to 76.15 km and was subject to 83 change requests over the project's delivery. While additional scope was added to the project, associated budget approval was obtained, and the project was completed within the specific budget.

Works were procured through a competitive selection process. We have sighted competitive tenders, evaluation criteria, developed contracts and various invoices, and this is reflective of efficient processes.

The Project Closure report indicates that works were delivered at a higher unit rate than was originally budgeted, however Aurizon Network has indicated that the proposed unit rate of [redacted] per km was a stretch target subject to a number of assumptions. Unit rates of delivered works were [redacted]. Reasons cited included wet weather delays and issues with track possessions.

The project is considered prudent in cost, supported by a medium level of documentation quality.

4.2.4 IV.00145 Track Upgrade FY17

Project Overview

A track upgrade site is the combination of a site with worn rail and an area of fist fastened concrete or timber sleepers of which both the rail and sleeper require replacement. In some cases, the scope may also request replacement of the ballast. Upgrading the track structures together maximises the efficiency of multiple asset renewal activities by only mobilising to a site once.

The prioritised scope of work encompasses the upgrade of approximately 20km of track where life expired rail and corroded fist fastened concrete or deteriorated timber sleepers occurred together. The project involves upgrading the track structure to 60kg rail, 28tal concrete sleepers with galvanized Pandrol E clips and in select locations new ballast. Sites have been identified for Track Upgrade in the Goonyella, and Blackwater systems. A track upgrade site is determined by combining a site that has worn rail in need of replacement, and an area of fist or timber sleepers that require replacement. In some cases (depending on the condition of the ballast), the scope may also request that the ballast be replaced at the same time.

The Track Upgrade Program aims to deliver supply chain benefit through increasing transit time, increasing reliability and maintaining compliance to standards and regulations.

IV.00145 - Track Upgrade FY17	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$5.1M
Impact of findings on Claim	$-
Total accepted	**$5.1M**

Review

The project scope forms part of the Track Renewal Program, which is a coordinated program of renewing the track structure (sleepers, rail, fastenings and in some locations ballast), which aims to maximise the efficiency of asset renewal activities by only mobilising to a site once.

The FY16/17 Track Upgrade program is a continuation of previous renewal projects and is expected to continue until Financial Year 2018-2019 (FY18/19). The minimum scope for IV.00145 in FY16/17 was driven by the amount of worn rail that needed to be replaced.

Consideration was also given to maximise the productivity of the mobilised resources in that location, such as the additional replacement of fist fastened concrete or timber sleepers. The FY16/17 Scope Priority model was sighted, showing that the scope was determined by assessing condition and criticality of the track, which promotes the economically efficient operation of investment. A sample of inspection photos and notes have also been sighted, which support the scope priority model.

The scope of what was delivered within the FY17/18 claim however is unclear.

The scope of work is considered to be prudent, supported by a low level of documentation quality.

Based on review of the IAR and completion certificates, the standard of works was consistent with configuration of adjacent infrastructure and Aurizon standards (SAF/STD/0077/CIV/NET CETS Module 2).

A sample of signed project completion certificates have been sighted, including a:

- Dilapidation report
- Inspection test and plan report - sleeper replacement
- Inspection test and plan report - track restressing
- Inspection test and plan report - site close out
- Track validation certificate
- Final completion certificate.

The standard of work is considered to be prudent, supported by a high level of documentation quality.

The project was delivered under budget and the integration of works with other projects allowed for a reduction in cost, demonstrating value for money in sourcing of labour and materials, and minimised total project costs. However, scope development and design occurred concurrently with project execution as the funding and scope were issued late.

There is insufficient information to assess if the project was managed effectively. It is noted that some difficulty was experienced in obtaining possession of a suitable length of track to allow all work to be completed. This was resolved by remobilising to the site, at a later date, which may have increased cost.

The project program was assessed appropriate regarding allowed contingencies, project management costs and risk allowances. However, there is opportunity for improvement in the planning and co-ordination of track closures and access to minimise delays.

The scope of what was delivered within the FY17/18 claim however is unclear, on the basis that documentation quality is low.

The cost of work is considered to be prudent, supported by a medium level of documentation quality.

4.2.5 IV.00146 Sleeper Renewal FY17

Project Overview

A sleeper is a component of the track structure that performs critical functions to ensure the reliable passage of trains. Continuous delays of sleeper renewal have progressively led to deteriorating sleeper conditions throughout the network, particularly on coastal areas and areas of high coal spillage that is prone to corrosion. As individual sleepers fail, the incidence of clusters of failed sleepers increases, leading to elevated risk of gauge spread derailment and increasing ongoing maintenance requirements.

The purpose of the Sleeper Renewal program was to replace ineffective timber sleepers and corroded fist fastened sleepers at several sites within the Goonyella, Moura, Newlands and Blackwater systems. Current track standard sleepers with Pandrol e-clip fastenings were used to replace damaged sleepers, facilitating current and future traffic, and providing an asset suitable to the corrosive environments within the coal network.

IV.00146 - Sleeper Renewal FY17	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$2.8M
Impact of findings on Claim	$-
Total accepted	**$2.8M**

Review

The scope of the Sleeper Renewal Program includes the replacement of 22.5 tonne axle load (t.a.l) fist fastened concrete sleepers and selected timber sleepers ‘on a face’ with 28tal. Pandrol e-clip concrete sleepers.

Aurizon Network has implemented an ongoing sleeper program to carry out replacement of fist fastened concrete sleepers on a priority basis determined by the inspection regime of the track assets. This is in addition to manual replacement during routine maintenance. The program also replaces derailment-damaged sleepers previously left in the track and the upgrade of timber sleeper track with high sleeper replacement and maintenance requirements.

Prioritisation is based on the following:

- The current condition of the sleepers
- The impacts of traffic and likely tonnages for that area
- What level of restriction to operations had been enforced
- The availability of access to the track locations.

The prioritisation spreadsheet was sighted which shows a clear relationship between the condition of the assets (using a rating of 1 to 5 for sleeper condition), the criticality and the FY16/17 scope. Aurizon Network’s Civil Assets Manual AZN.NA.MAN.12.6170.010 provides granularity on the 1 to 5 rating system that has been used. Change requests and a technical scope track form were sighted to capture scope variances within the financial year.

The scope is considered prudent, supported a high level of documentation quality.

The use of concrete e-clip sleepers with a load rating of 28tal. is consistent with Aurizon Network standards which are generally in line with industry practice. Standard drawings, technical standards, testing reports and closeout documentation have been sighted.

The standard is considered prudent, supported by a high level of documentation quality.

Costs claimed for the FY17/18 are within the budget carried over from the FY16/17 year. The objective of the project is to upgrade end of life assets to minimise whole of life costs and reduce unplanned rail closures, demonstrating consideration for value for money. Materials and labour were procured through standing offer arrangements and released from inventory to the project, and internal Aurizon Network staff members were used for construction.

The project is considered to demonstrate value for money as the cost per sleeper replaced of [redacted] was less than the budgeted allowance of [redacted]. This was achieved through management of resources across multiple projects.

The project was able to meet the contractual time frames outlined in the scope requirements as works were completed during scheduled closers and to suit network operations.

The project is considered prudent in cost, supported a medium level of quality documentation.

4.2.6 IV.00154 FY17 Autotransformer Renewal Project

Project Overview

Autotransformers balance the voltages of the contact wire and secondary contact wire to the rail, as well as the current between both phases. Out of service autotransformers pose a risk that other autotransformer faults will lead to failure of the overhead system.

This project addresses the replacement of eight autotransformers on the Blackwater and Goonyella systems as they are nearing the end of their working lifecycle. It forms part of a 5-year program to replace all autotransformers at these systems. The project uses current specification 14MVA autotransformers to maintain the integrity of the overhead power distribution system and reduce Aurizon Network's exposure to reportable environmental incidents.

IV.00154 - FY17 Autotransformer Renewal Project	Review Summary	**Scope**	✔
		Standard	✘
		Cost	✔

Capital Expenditure Claim	$1.4M
Impact of findings on Claim	$1.4M
Total accepted	**$0.0M**

Review

Autotransformers are an essential part of the traction power supply system and are required to balance the voltages between the contact wire and feeder wire. Load restrictions may be required if the availability of the equipment exceeds the minimum operating requirement.

The rolling program aims to replace eight autotransformers each year for a five-year period across the Blackwater and Goonyella Systems. However, from the documentation reviewed it appears that only four autotransformers were replaced during FY16/17, and three in FY17/18. Aurizon Network use a Transaudit system for condition monitoring of its autotransformers which produces comprehensive condition reports and identifies the autotransformers required for renewal.

Transaudit uses a number of criteria to score each autotransformer which contribute to an overall condition code. The condition code is derived from a combination of the following:

- Dissolved Gas Analysis (DGA) results
- Furan results
- Oil quality
- Electrical test data
- Asset ages

Oil test reports and condition assessment reports to support this scoring have been sighted. Prioritisation of sites was performed at a system level for Blackwater and Goonyella systems, and those identified as the highest priority have been replaced:

- Dingo AT2
- Epala AT1
- Balook AT1

Aurizon Network has implemented a robust process for monitoring condition of its autotransformers that is consistent with good asset management practice.

Based on the condition assessments sighted and prioritisation process to identify those autotransformers requiring replacement, the project is considered prudent in scope, supported by a medium level of documentation quality.

Aurizon Network has provided photos of completed works, as built design drawings and Quality Assurance (QA) documentation for the replaced autotransformers.

The autotransformers themselves appear to have been designed to Aurizon standards, and oil containment bunds have been fitted to these autotransformers in accordance with the requirements of AS2067:2016.

Aurizon Network has confirmed through interviews held on 25 March 2019 that the oil containment bunds have been connected to the earth grid in accordance with requirements of the standard, and this claim is supported by photographs of the actions undertaken to connect the bunds to the earth grid. It is noted that no design drawings have been provided for the connection of the bund to the earth grid, and Aurizon Network has advised that these do not exist. A design drawing for the bunds has been provided which is signed off by a structural RPEQ, however this does not show the connection to the earth grid. Photos and drawings of the fences' connection to the earth grid have been provided.

It is recommended that Aurizon Network develop a process of documenting the connection of the bunds to the earth grid.

It is noted that the existing autotransformer sites have not been modified to comply with the requirements of AS2067:2016, Section 6.7 - Protection Against Fire and Explosion. This is particularly relevant as the new Autotransformers are rated higher than the original units and contain significantly more insulating oil.

Section 6.7 of AS2067 provides fire prevention and fire protection recommendations for High Voltage (HV) installations to provide for the safety of construction, operating and maintenance personnel, the physical integrity of plant components and the continuity of plant operations. The Standard details that for each installation; a fire risk assessment (FRA) is undertaken which should consider key areas for fire prevention and fire protection. To address the hazards associated with HV installations, the Standard provides detailed requirements for fire resistant barriers to provide physical separation between transformers and adjacent buildings.

Aurizon Network provided a document labelled "Explosion Risk at Autotransformer Sites - Risk Assessment Report" (dated 2017) by email March 2019. This document was produced to expand on the previously provided document "Risk Analysis of Fire, Explosion and Oil Spillage for Existing Feeder Stations" (2013) to demonstrate that for the Autotransformer renewals, Aurizon had adequately addressed the requirements of Australian Standard AS 2067.

We do not agree that Aurizon Network adequately addressed the requirements of Australian Standard AS 2067 for the following reasons:

1. Currency of documents

It is acknowledged that at the time of writing "Risk Analysis of Fire, Explosion and Oil Spillage for Existing Feeder Stations" (2013) the version of AS2067 was dated 2008, with amendment 1 in 2010. Since this time, the Standard has been updated in 2016, however Aurizon's "Explosion Risk at Autotransformer Sites - Risk Assessment Report" (2017) document has not addressed some key changes in the standard as follows:

a. The emphasis on safety of personnel is increased

In section 6.7 of the 2008 version personnel safety is only mentioned twice in clause 6.7.2.(d) and 6.7.5. In the 2016 version, personnel safety is mentioned numerous times in clauses; 6.7.1.1, 6.7.1.2 and 6.7.4.2. This seems consistent with the industry's focus on safety performance and indeed aligned with Aurizon's "ZERO Harm" philosophy. The 2013 risk assessment is silent on personnel safety. We believe this should be a consideration of the risk assessment and may have an impact on the overall risk profile.

b. The emphasis on continuity of operations is increased

The 2013 risk assessment is silent on the redundancy of the system, and the exposure of risk to network failure. The security of supply and redundancy need to be included in the risk

assessment. It may well be that there is adequate redundancy in the network between feeder stations, but this needs to be assessed and evaluated. The embedded redundancy may reduce the need for additional fire protection.

c. The protection of buildings is required

AS2067:2016 Clause 6.7.2.1 (Buildings - General) states that *"Protection shall be provided against fire initiated or propagated by any part or element of high voltage installations".*

Our interpretation of this clause is that the Power Supply Cubicle (PSC) at this site is a building and shall be protected.

d. Protection requirements decided by operator/owner

Clause 6.7.13 from the previous 2008 (Amended 2010) version of AS2076 allowed the network operator or owner to determine their own fire protection requirements. This clause no longer exists in the 2016 version. This was a clause relied on in section 1.8 of the 2013 risk assessment.

e. Standard AS/NZS 3931:1998 withdrawn

AS/NZS 3931:1998 "Risk analysis of technological systems - Application guide" as quoted frequently in the 2013 risk assessment document has since been withdrawn, and not replaced. The current AS2067:2016 now refers to AS/NZS ISO 31000.

While we do not disagree with the use of event tree analysis described in AS3931 and as documented in the 2013 document, the risk assessment needs to consider a wider range of consequences such as personnel safety, and continuity of operations, not only equipment damage.

2. Relevance of Feeder Station risk controls to Autotransformer

There is some concern that the risk assessment done for the Feeder Stations may not be applicable to the Autotransformers based on the following considerations:

a. Lightning arrestor

The 2017 report is silent on whether the risk control of a lightning arrestor is applicable to the Autotransformer. There is not enough information to determine if lightning arrestors are installed at the Autotransformer sites. If not, then this risk control cannot be claimed, and this needs to be reflected in the risk assessment and may have an impact on the overall risk profile.

b. Mechanical Trip Signals

There is not enough information to demonstrate proven reliability of the Fault Locators to be an effective risk control to avoid ignition of an explosion. In a separate capital funding request labelled *'CFR Traction Fault Locator Renewals'* dated (19 September 2014), fault locators have previously been proven to be unreliable to provide exact fault location and to relay the Autotransformer Mechanical Trip Signals back to the Feeder Station for fast clearing of the supply feeding the autotransformer fault.

For the recently renewed fault locators, we have seen test documentation to indicate correct operation of the mechanical trip function, however we have not seen timing tests to prove that the trip function operates within the required tripping time. If the Fault Locators are not reliable, then this risk control cannot be claimed, and this needs to be reflected in the risk assessment and may have an impact on the overall risk profile.

The risk assessment carried out in 2013 (for feeder stations) and the 2017 autotransformer risk assessment report do not adequately address the requirements of the 2016 update of AS2067 for autotransformer sites. As such, the documentation provided by Aurizon which references these documents is not sufficient justification as for not addressing fire and explosion risk at the autotransformer sites.

It is recommended that a risk assessment is undertaken by Aurizon for each autotransformer site to determine the requirements for fire and explosion risk protection.

This project is not considered prudent in standard due to the lack of justification for not addressing fire and explosion risk at the autotransformer sites. This is supported by a low level of documentation quality. It is recommended that the project is rejected from the FY17/18 claim in its entirety. It is recommended that a risk assessment is undertaken by Aurizon Network for each autotransformer site to determine the requirements for fire and explosion risk protection.

The works and material supply have been competitively tendered which reflects efficient practice. The project demonstrates value for money as the tender process has produced a decreasing cost of supply per autotransformer, and aligns to the scale, nature and complexity of the project.

[redacted]

The project is considered prudent in cost, informed by a medium level of documentation quality.

4.2.7 IV.00168 Turnout Renewal FY17

Project Overview

Turnouts are a fundamental component of the total track structure, providing a means of switching traffic to a different rail line, providing flexibility of operations and capability for accessing multiple sources and destinations of freight.

Aurizon Network assessed most of the existing turnouts to be operating above their design requirements, be life-expired and require constant maintenance to allow the safe passage of traffic.

The renewal was completed with the objective of preventing turnout failure, which may subsequently cause derailment or damage to other track structure components. Turnout renewals were based on the wear rates of individual sites to ensure that those turnouts most critical to traffic movement and with the lower remaining asset life were replaced / renewed.

IV.00168 - Turnout Renewal FY17	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$2.7M
Impact of findings on Claim	$-
Total accepted	**$2.7M**

Review

The objective of the project is to upgrade end of life assets to minimise whole of life costs and reduce operational impacts relating to the potential risk of derailment. The project considers the cost of maintenance without replacement.

The scope of works was determined using the civil scope prioritisation model used on a rolling basis.

The scope of works appears reasonable and prudent in that the renewed assets were assessed as being at end of life, and works were undertaken with the objective of minimising whole of life costs and reducing operational impacts.

The scope of works is considered to be prudent, supported by a medium level of documentation quality.

Most of the existing turnouts are 47kg or 53kg rail on timber sleepers and are operating above their design requirements. The current turnout standard calls for 60kg / metre rail and 28tal concrete sleepers with galvanised Pandrol e-clip fasteners to facilitate current and future axle loads.

As constructed drawings have been reviewed to evaluate the standard of the works undertaken. In addition, Signed Track Validation Certificates, Inspection and Test Plans, and photos (during and post-construction) were sighted for works delivered in the FY16/17 claim. Confirmation was being sought on the scope of works aligning to the costs claimed in FY17/18.

The standard of works is reasonable and consistent with Aurizon Network standards and the configuration of adjacent infrastructure.

The standard of work is considered prudent, supported a high level of documentation quality.

This project is part of a larger program of works, with the objective to upgrade end of life assets to minimise whole of life costs and reduce unplanned rail closures.

The project was delivered under the allowed budget of $11.5 million, however it is noted in the Project Completion Report that project costs are still being incurred. Value for money regarding materials sourcing and procurement was not demonstrated as funding and scope of works were not received in time to allow for full design and construction activities, despite works being procured through standing offer arrangements.

Total project costs were not minimised as increased costs may have been incurred from the late delivery of design and lack of clarity in the scope of works.

Scope changes on design and construction activities were managed effectively, and works were altered to minimise disruption to train services, demonstrating effective project management. The project was also completed within contractual time frames with major risk appropriately identified.

Confirmation was sought on the scope of works aligning to the costs claimed in FY17/18.

The cost of work is considered to be prudent, supported by a medium level of documentation quality.

4.2.8 IV.00170 Bridge Ballast Renewals FY17

Project Overview

The Aurizon Network has approximately 19.0km of ballast on 258 ballast-deck bridges across the CQCN. Ballast forms the bed upon which sleepers are laid, locking the track in place and facilitating the drainage of water.

Aurizon Network identified that contaminated ballast on bridges was causing track stability issues resulting in poor alignment and increased maintenance intervention. The ballast cannot be cleaned using standard undercutting process used on track away from bridges due to clearance and loading constraints.

The project involved installation of ballast matting, replacement of life-expired ballast on 34 bridges, construction of permanent handrails and trialling glued ballast. The works intend to improve the track condition and safety for workers and extend the life of the ballast.

IV.00170 - Bridge Ballast Renewals FY17	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$1.3M
Impact of findings on Claim	$-
Total accepted	**$1.3M**

Review

Coal fouling and other contaminants impede ballast's drainage functionality. As the ballast becomes increasingly fouled normal track maintenance techniques (i.e. resurfacing) are no longer effective and result in the increasing occurrence of track geometry anomalies and rail faults. These defects cause the track to settle unevenly, resulting in a weakened track structure that requires regular maintenance, including frequent reactive maintenance. It also presents an increased risk of derailment, train partings and broken rails. Typically, these risks are managed through the use of speed and load restrictions.

This project involves the repair and replacement of areas of ballast that present an increased risk to the safe operation of the Network and have impacted or are expected to impact train operations through the imposition of speed and/or load restrictions.

The scope of IV.00170 has been built on condition, defects, speed restrictions, new technologies, and corporate plan constraints. The Project Execution Plan shows a prioritisation process that clearly links criticality (consequence) and condition to the selected scope. Scope changes have then been managed appropriately by Change Requests. Track recording car reports and an inspection report show the poor condition of bridges that have been brought forward to FY17/18.

The scope of work is considered to be prudent, supported by a high level of documentation quality.

Works are generally comparable with the rest of CQCN and other heavy rail networks in Australia to treat ballast contamination on bridges. Site information packages were sighted for several locations which included: speed and cant data, site photos and as-built drawings. Close out documentation was available for most locations.

It is our understanding that the non-conforming capping layer issue at Isaac River noted in the document labelled *Supply of Capping Layer Material Meeting Minutes (*dated 31 July 2017) and discussed in the review of IV.00344 Formation Renewal FY18 in Section 4.2.19 relates to works included in this project scope.

Aurizon Network provided Inspection Test Plans for the Isaac River site, and through email communication on 30 April 2019 stated that *'The capping layer material was used, but completion of the ITP demonstrates that the formation passed its final compaction test, which indicates that the formation was suitable for use and asset life not compromised by the non-conforming material.'*

The Inspection Test Plans (ITP) does not provide evidence of compaction testing or passing of the testing. Further, we do not agree that passing of the compaction test proves that the material was suitable for use and that asset life has not been compromised. While the compaction of the material may have met the construction specification that does not prove that the capping material is compliant. The material may still be out of specification but meet the compaction specification.

As such we cannot confirm whether the capping material used at the Isaac River site was compliant. Based on the information provided, we cannot determine the impact of the use of the material on the expected life of formation and cannot accurately determine the extent within each site where the material has been used, that is, if any other sites had the same issues. We note that we have not seen any clear evidence to suggest that any other sites had use of non-compliant material. The size of Isaac River works is immaterial to the overall project.

As the impact of the use of potentially non-conforming capping layer material is uncertain and is likely to be immaterial in overall scope of the project, we have not recommended a cost deduction. The project standard is considered to be prudent, supported by a medium level of documentation quality.

Claimed costs are within the approved budget. However, the project completion report is signed 30 Sept 2017 whilst the works claimed finish in April 2018 and are less than the value contained in the Completion Certificate, which suggests that costs may have gone beyond the original program. It is unclear what the specific extent of works delivered in FY17/18 was compared to that delivered in FY16/17.

Unit rates are typically consistent with the budget outlined in the funding request. The total cost when compared with the completed work outlined the validation certificates is considered reasonable.

The project demonstrates consistency with conditions prevailing in the market, with the materials required for works purchased under an existing supply agreement. The new permanent balustrades delivered are expected to reduce future ongoing maintenance access costs.

The cost is considered to be prudent, supported by a low level of documentation quality as change requests are not reconciled into register and as project completion costs do not fully align with SAP.

4.2.9 IV.00261 Telecommunications Infrastructure Renewal

Project Overview

The Telecommunications Buildings house all telecommunication transmission equipment and wayside system. The equipment provides the UTC interlocking status to the train control operator and power system status to the electrical control operator. Telecommunications buildings that are not maintained pose failure risks to the equipment inside from structural damage, water leaks, dust and vermin ingress. In some cases, the hazard materials and detached structural components of buildings in disrepair can make the site unsafe to work in.

The project aims to replace unserviceable sections of optical fibre underground cable, refurbish equipment rooms, replace end of life power supply equipment and paint a telecommunications tower. The scope of works hopes to ensure the reliability of the telecommunications and signalling operational network.

IV.00261 - Telecommunications Infrastructure Renewal	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$1.9M
Impact of findings on Claim	$-
Total accepted	**$1.9M**

Review

Items delivered appear to be prudent in scope, with the replaced cabling and supporting infrastructure assessed as being at end of life and posing a risk of disruption to rail operations.

The condition of telecommunications systems and infrastructure has a direct impact on rail safety and operations efficiency. This project brings the deteriorated systems to an acceptable operational level, compliant with Aurizon Network's legislative and tenure requirements.

The telecommunications infrastructure renewal works are deemed to have been reasonably required, and the scope delivered is expected to achieve the project objectives of improving reliability of the telecommunications and signalling network.

The scope of work is considered prudent, supported by a medium level of documentation quality as informal evidence has been used.

Completion reports indicate that the project has been delivered according to current Australian and Industry Standards. The standard of works is deemed to be reasonable in relation to the project scope requirements, and in relation to usage levels.

The standard of work is assessed as prudent, supported by a medium level of documentation quality.

The project has been delivered within the approved budget of $1.9 million. Approved change requests totalled $0.9 million, however all work was completed within the overall budget inclusive of the management reserve.

The works were competitively tendered where appropriate, with tendering documentation sighted for some components of the project.

The project cost is considered prudent, supported by a medium level of documentation quality.

4.2.10 IV.00267 Asset Protection Equipment Replacement

Project Overview

Asset protection involves various systems aimed to protect the below rail asset from damage caused by rail vehicles, preventing derailments due to degradation and protecting production by predicting the failure of rolling stock components. Most asset protection systems are electronic devices; thus, age and equipment obsolescence are key factors in determining replacement schedules.

The project is an ongoing technology refresh program that addresses the replacement of life expired and obsolete equipment, in which the manufacturer has ceased support and failures to system reliability can no longer be tolerated. The scope of works for this project include design work for the remote monitoring system and Weighbridge interface graphical software, as well as upgrades to alarms, reporting and connectivity. The replacement of equipment reduces the risk of derailment and below rail damage and improves network performance through system reliability.

IV.00267 - Asset Protection Equipment Replacement	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$0.2M
Impact of findings on Claim	$-
Total accepted	**$0.2M**

Review

The FY17/18 project scope has four parts:

- Upgrade and provision of Ethernet connectivity for 8 Hot Box Detector (HBD) and Hot Wheel Detector (HWD) sites
- Design work for the replacement of the Remote Monitoring System backend (LX monitors and weather stations)
- Design for rationalisation of the Weighbridge Train Loadout (TLO) interface.
- Integrated Asset Management Plan System (IAMPS) upgrades to provide enhanced real-time reporting and alarms.

The scope of works delivered is expected to achieve the project objectives, as outlined in the Investment Approval Request of preventing loss of services, maximising the use of the data collected through trending and predictive analysis to protect the network, and support the economically efficient operation of Rail Infrastructure. These works are consistent with the Asset Management Condition-based Assessment Policy, however limited supporting evidence has been provided in relation to this.

The scope of works appears reasonable, as the replacement of life expired and obsolete condition-based monitoring equipment in the field will prevent the loss of important services and reduce risk of rail operations disruptions.

The scope of work is considered prudent, supported by a medium level of documentation quality as informal evidence has been used.

Completion reports and operation handover certificates indicate that the project has been delivered by reputable contractors and in accordance with current Australian and Industry Standards. The design and implementation of the project is deemed reasonable in relation to the scope requirements and industry standards. Design drawings have been requested but not provided for this review.

The standard of work is assessed as prudent, supported by a low level of documentation quality.

The project has been delivered under the approved budget of $1.42 million, with the final cost of $1.14 million noted in the Project Closure Report reconciling with SAP costs. The works were competitively tendered with documentation sighted for the RFW, tender evaluation, and award.

The project cost is considered prudent, supported by a low level of documentation as the breakdown in the project completion report does not reconcile to the original estimate.

4.2.11 IV.00270 Ethernet to Corner SCADA Upgrade FY17

Project Overview

The data communications equipment comprising of key routers and switches, connects the Power SCADA system to control infrastructure associated with the overhead traction system in the field. The entire data communications network enables operation of telecommunications and signalling network required for train operations within CQCN.

The project involves replacing of end of life infrastructure and renewing modems and CP21 and CP12 processors which have an increasing failure rate and limited ongoing support. This will improve the reliability of the Power SCADA control network and allow the Mackay Disaster Recovery and Rockhampton Control Centres to be connected to the field at the same time.

IV.00270 - Ethernet to Corner SCADA Upgrade FY17	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$3.0M
Impact of findings on Claim	$0.0M
Total accepted	**$3.0M**

Review

The scope of work forms part of the Control Systems Program, which is a rolling program of renewal works with a prioritised scope of works developed and funded yearly.

The project objective was to reduce communication and command failures within the existing traction SCADA system by improving its reach and reliability, replace end of life infrastructure, and specifically to address two risks (risks 3 and 6) on the control systems asset risk register. Aurizon Network clarified through email dated 16 April 2019 that the risks 3 and 6 are actually from Electrical High Voltage Risk Register and not the control systems asset risk register. The risk details were provided. We not that these are generic risks not specific to this project. The project was also commissioned to help de-risk the Traction SCADA System upgrade (IV.00283).

The IAR identifies two key scope items across different locations:

- Upgrade all Remote Terminal Units (RTUs) to modern CP30 RTU processors and add a direct Ethernet connection to all RTUs for Lobes 2,3,5,6,7,8
    - First: 27 RTUs
    - Second: 93 RTUs
- Upgrade power and telecommunication transmission equipment to support the Ethernet requirements at each site for lobes 2,3,5,6,7,8

Evidence has been provided for the completion of the second scope item, however it is unclear whether the first item (RTU replacements) has been delivered. In addition, the project scope does not identify works to be completed on lobe 4, and nor does it provide a cost estimate for works on this lobe. Completion details suggest work has been completed at lobe 4, however no evidence of scope changes can be seen in the Change Request Summary document to suggest that this lobe would be included in the scope.

Clarification was requested from Aurizon Network about these two scope issues.

Aurizon Network, through email communication on 11 April 2019 advised that the omission of lobe 4 works from the IAR was the result of administrative error. As a result of this, there is no formal approval documentation for the love 4 works. However, the lobe 4 works are still deemed to have been reasonably required to integrate lobe 4 to the rest of the network, and as such the works are considered prudent.

Through email communication on 11 April 2019 Aurizon Network, Aurizon Network provided a document labelled *'IV0270 ETHERNET TO RTU SITES - RTU SITES TO BE UPGRADED'* (dated 10 April 2017) which provided further detail on the scope of works for RTU upgrades.

This document indicates that many of the sites for RTU upgrade works included in the scope were upgraded within the last 5-10 years through TrackPower alliance works. For example, for Lobe 3

alone, sites such as Wallaroo TSC, Dingo FS, Umolo TSC, Bluff FS, Blackwater TSC, Rangal FS, Kinrola TSY and Struan Road FS are understood to have been upgraded through TrackPower works. We understand that this equipment can be expected to last 20-25 years and consider that these assets would still have expected service lives of 10-20 years.

We believe that even though a number of CP21s were replaced much earlier that their end of economic life, it was prudent to do so to reduce risk, increase redundancy at a low extra cost to the overall project going forward. From the manufacturer of this equipment, it is understood that:

- The CP-21 went end of Production in 2012
- The CP-30 was first available in 2007
- The CP-35 has just been released Aug 2018

Aurizon Network confirms that they were aware that CP-21s were out of production at the end of 2011. Aurizon Network however, continued to install CP-21s at a number of sites throughout the network up until 2014-2015. We believe a more efficient outcome would have been for Aurizon to have installed CP-30s from 2008 onwards. Such forward planning would have eliminated the need to re-do some of the work in this project and would have saved the costs of additional units within a relatively short-span of 5-10 years.

However, we understand that this review is limited to the prudency of decisions taken related to the project in question and efficient decision making for future investments. Given that this issue is related to historic planning, we, after consultation with the QCA, consider this matter as being out of scope of this review. On this basis and our view on prudency of the scope, we deem this project to be prudent and no adjustments are therefore recommended.

The scope of work is considered to be prudent, supported by a medium level of documentation quality.

Drawings appear to align with the relevant standards, and a number of completed commissioning certificates have been sighted which indicate that the project has been delivered in accordance with the relevant standards.

The standard of work is considered to be prudent, supported by a low level of documentation quality.

The works have been delivered within the estimated budget, the scope delivered against these costs is not clear. Further information to confirm the scope delivered against budgeted costs has been requested but not provided for review.

Works for this project were procured through sole sourced arrangements, with approved Requests to Sole Source sighted during the review. Suppliers Bytecomm and Data#3 appear to have been approached to deliver the project based on their existing relationship and knowledge of the Aurizon Network's network. Data#3 is party to a Preferred Supplier Agreement with Aurizon Network, and Bytecomm is the sole vendor on Aurizon Network's telecommunications panel (other panel member was removed from the panel due to substandard works). The sole source request identifies discounts that Aurizon Network are able to access through engaging Data #3. The process appears to be in line with Aurizon Procurement Policy and suggests that existing contracts allow access to discounted materials.

It is noted that works completed on lobe 4 were not included in the Investment Approval Request due to administrative error. However, on the basis that the lobe 4 works have been still been considered prudent under the assessment of scope, and that the works have been delivered within the estimated budget, the costs for these works is still considered prudent.

The cost of works is considered to be prudent, supported by a low level of documentation quality.

4.2.12 IV.00283 Traction SCADA System

Project Overview

The Traction SCADA System allows for the remote control and monitoring of traction assets such as circuit breakers and motorised isolators. Without a functional operating SCADA system, the power system equipment would need to be operated manually.

Elements of the SCADA system including the Distributed Network Protocol (DNP) driver, sever operating system software and client workstation operating system software are no longer supported by the vendors and Aurizon Network's computer software. The project involves upgrading these applications and software to the latest supported versions including those at the Brisbane Development system and Off-site backup facility. This will reduce the number of lost / delayed train paths caused by traction failure and improve electrical system operations in the Goonyella and Blackwater systems.

IV.00283 - Traction SCADA System	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$2.1M
Impact of findings on Claim	$-
Total accepted	**$2.1M**

Preliminary Comments

The Traction Power SCADA enables Electric Control Operators (ECOs) to monitor and control the distribution of power across the rail network. The current Citect SCADA software system is cited to be unsupported and at end of life. This project involves the replacement of the Traction Power SCADA System with a modern equivalent system with minor functionality improvements.

The Investment Approval Request suggests that the existing SCADA application (Citect SCADA) and SCADA DNP driver are no longer supported by the vendor, Schneider Electric and the operating system software is no longer supported by Microsoft. The Request also states that the system is at end of life, which appears to be in line with the expected life of the system. Failure of the SCADA system has the potential to result in extended outages on the electrical systems of the network, and so continued and up to date support for the SCADA system is prudent, however little evidence has been provided on the condition monitoring or likelihood of failure of system.

Works were deemed to be reasonably required in promoting the economically efficient use of investment in rail infrastructure. However, this could be further substantiated by evidence of an Asset Management Plan that details the full maintenance strategy of the assets.

The scope of work is considered prudent, supported by a medium level of documentation quality.

There are design documents for the ClearSCADA topology as provided by the system integrator Parasyn. The design documentation shows a system of updates. The work appears reasonable based upon the design documentation which include detailed design reports and as built reports.

Numerous inspection and test plans have been provided for the various aspects of the project, however some of these have not been fully completed or signed off.

The standard of work is considered prudent, supported by a medium level of documentation quality.

Works for this project have been competitively tendered to more than six service providers, and procurement is in line with Aurizon's Procurement Policy. Project completion documentation has been provided, confirming delivery of scope.

The project has been delivered within the original budget of $2.9 million.

The project cost is considered prudent, supported by a medium level of documentation quality.

4.2.13 IV.00294 Goonyella Supersite FY17

Project Overview

The Wayside System sites house asset protection systems and rollingstock performance condition monitoring systems, which detect defects in rollingstock that may potentially damage fixed infrastructure.

Having reached its end of life, Goonyella detection equipment has proven ineffective relative to equivalent equipment at Blackwater and Moura. The project seeks to commission a mainline weighbridge and a Bearing Acoustic Monitor RailBAM at the existing Wayside System Monitoring site at Wandoo. The weighbridge prevents the overload of trains and wagons which can damage the rail. The RailBAM detects the trending of a wheel going flat and enables early intervention and replacement.

IV.00294 - Goonyella Supersite FY17	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$2.1M
Impact of findings on Claim	$-
Total accepted	**$2.1M**

Review

Items delivered appear to be prudent in scope, with the replaced Trackside Acoustic Detection Systems (TADS) system assessed as being at end of life and due for replacement with the adopted RailBAM Bearing Acoustic Monitor and Mainline Weigh in Motion (WiM) equipment. These works are consistent with Aurizon's overall plan to replace the end of life TADS system with RailBAM.

The installation of main line weighbridge provides a calibrated weight recording for trains in the Goonyella System to identify defects and prevent overloaded trains, which can cause broken rails and possible derailments.

The scope of works delivered is expected to achieve the project objectives of enabling the early identification and intervention of defects, and as such support the economically efficient operation of Rail Infrastructure.

The scope of work is considered prudent, supported by a medium level of documentation quality as informal evidence has been used.

Completion reports and operation handover certificates indicate that the project has been reasonably designed and has been delivered by reputable contractors according to current Aurizon, Australian and Industry Standards.

Design drawings have been requested but not provided for this review.

The standard of work is assessed as prudent, supported by a medium level of documentation quality.

The project has been delivered under the initial budget of $2.2 million (plus management reserve) with the final cost noted in the Project Closure Report reconciling with SAP costs.

The works for the WiM were competitively tendered, while the RailBAM monitor was sole sourced due to the preferred Track IQ equipment only being available from one supplier.

Slight project overrun was noted, with a planned completion date of June 2017 compared to a final project acceptance at November 2017, due to redesign of WiM sleeper requirements and RailBAM integration issues. The project otherwise is deemed to have been managed effectively.

The project cost is considered prudent, supported by a low level of documentation as the breakdown in the project completion report does not reconcile to the original estimate.

4.2.14 IV.00321 Sleeper Renewal Program FY18

Project Overview

Sleepers are a fundamental component of the track structure that ensures the reliable passage of trains by keeping the track aligned, holding the rails and distributing the load of the trains to the underlying soil.

The purpose of the project is to replace priority life expired and ineffective timber sleepers and corroded fist fastened concrete sleepers designed with current standard 28tal Pandrol E-clip concrete sleepers at numerous identified sites within the Goonyella, Moura, Newlands and Blackwater systems. The project will also replace derailment damaged sleepers and upgrade timber sleeper tracks with high maintenance and replacement requirements. The upgrades ensure the track can carry the current and future traffic tasks and provide an asset suitable to the corrosive environments within the coal network.

IV.00321 - Sleeper Renewal Program FY18	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✘

Capital Expenditure Claim	$6.7M
Impact of findings on Claim	$0.3M
Total accepted	**$6.4M**

Review

The scope of works in FY17/18 was identified in accordance with a developed priority rating, based on output of the Scope Prioritisation Model (SPM). The rating is assessed and determined by:

- The current condition of the sleepers and corrosion of the clips
- The impact of traffic and frequency of tonnages on the applicable track section
- The probability of negative impact to the Network
- The availability of access to the track location if failure did occur

Condition information to support the score in the SPM has been sighted for a reasonable proportion of assets. The scope of works was consistent with other asset plans. Prioritisation was based on consequence and condition, which is consistent with other rail renewals and included in the Scope Prioritisation Model. Sites were prioritised by worn rail assets, based on consequence and condition which is considered to be good asset management practice.

The scope of work is considered to be prudent, supported by a high level of documentation quality.

The use of concrete e-clip sleepers with a load rating of 28tal. is consistent with Aurizon Network standards which are generally in line with industry practice. Standard drawings, technical standards, testing reports and closeout documentation have been sighted, and as such, the project scope is assessed as prudent. The documentation quality to inform this assessment of standard is high.

The standard of work is considered to be prudent, supporting a high level of documentation quality.

The original cost for the project was budgeted for [redacted] per sleeper, for [redacted] sleepers. The actual cost for works incurred was [redacted] per sleeper, for [redacted] sleepers. The scope was reduced by Capital Challenge project removing [redacted] sleepers from the scope. This resulted in a cost reduction of [redacted] million. A further [redacted] sleepers were removed due to design constraints.

Multiple mobilisations and demobilisations at various sites were required due to the scope of works at each site exceeding available timeframes, incurring additional costs over that budgeted. This has resulted in a high unit rate for works completed. The budgeted unit cost of [redacted] per sleeper is considered to be a stretch target, as the actual cost of works incurred in FY16/17 was [redacted] per sleeper. Considering this, we have used the difference between the FY17/18 and FY16/17 unit rates to calculate the recommended cost deduction.

The cost of work is considered to be not prudent, supported by a low level of documentation quality. A deduction of $0.3M from the capital claim is recommended, reflecting the difference between the FY17/18 unit rates and the FY16/17 unit rates.

4.2.15 IV.00322 Rail Renewal FY18

Project Overview

Aurizon Network has 2,760km of track in the CQCN, most of which was installed in the 1980's and 1990's. Friction between wagon wheels and the rail causes rail wear, which increases the likelihood of rail bending. Lubrication of curved rail and appropriate rail grinding is necessary to ensure the rail reaches its maximum rail life.

The FY18 Rail Renewal Program delivered 47.856km of new rail to replace damaged and worn rail assets to ensure compliance with the mandatory Civil Engineering Track Standard (CETS) Network Safety Management System. It follows Aurizon Network's rail renewal strategy which supports the proactive replacement of life expired rail or defective rail before it can adversely impact safety and operational performance.

IV.00322 - Rail Renewal FY18	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$21.5M
Impact of findings on Claim	$-
Total accepted	**$21.5M**

Review

The rail renewal program supports the proactive replacement of life expired rail or defective rail before it can adversely impact safety and operational performance.

The scope of works was based on the output of the Scope Prioritisation Model (SPM), which considers condition and criticality. The works were prioritised where rail had already reached the end of its useful life or was expected to reach the end of its useful life in the financial year. This was based on a cost/benefit analysis of the capital costs compared to increased maintenance costs. The works were found to be reasonably required to promote the economically efficient operation of the rail infrastructure.

Based on condition scores in the SPM, the scope of works is appropriate. However, condition information to support the score in the Scope Prioritisation Model has been requested but not provided for this review. It is recommended that Aurizon Network continue to document inspections and condition assessments to provide evidence to support condition scores as they are recorded in the SPM.

54 change requests for the programme of works were documented during the project lifecycle, which saw the initial project scope of 60.92 km of rail renewal reduced to 47.856 km delivered. Not all works were completed in FY17/18, most notably a site at Black Mountain was moved to FY19 under a change request as part of the Capital Challenge.

The scope of work is considered to be prudent, supported by a high level of documentation quality.

The increasing traffic task (total tonnage) on each of the four systems is accelerating rail wear on mainline curves and increasing the incidence of fatigue cracking on mainline tangent track thereby reducing the time that rails are remaining in service. Tonnage volumes have increased 165% in the last 20 years from 130 million gross tonnes in 1994/95 to 235 million gross tonnes in 2004/2005 and to 345 million gross tonnes in 2014/15.

Asset Management tools highlight that the rail renewal program needs to increase from an average of 500 rails per annum to 1400 rails per annum to ensure compliance with the CETS that have been mandated by the business (Network Safety Management System SAF/STD/0077/CIV/NET CETS Module 2).

Civil Engineering Track Standards (CETS) Module 2 (Section 2.12.2) outlines specific thresholds for rail wear in which rail is required to be replaced by. In addition, CETS Module 2 prescribes the standards for the design, construction, monitoring, maintenance and modification of rail used in CQCN. Based on a review of the Investment Approval Request and the completion documentation (find weld grind records, high and stagger sheets, track validation certificate), the standard of works was aligned with Aurizon Network Standards, which are generally in line with wider industry practice for rail size and type.

The standard of work is considered to be prudent, supported by a high level of documentation quality.

Budget for the total scope of works was estimated at $28.1 million. Total claimed out was within this value, however as noted above, the scope of works was reduced through a number of change requests and as a result of Aurizon Network's capital challenge. Unit rates for the project were estimated at [redacted] per km, and the cost of construction in FY16/17 was [redacted] per km and [redacted] per km in FY17/18, exceedances of [redacted] and [redacted] over the benchmarked rate respectively for each year. These exceedances are not considered material and are reasonable considering the reduction in scope.

The decision to have the cost of inventory management applied to the projects through the cost of materials together with the requirements to use taper rails may have resulted in increased costs.

Aurizon Network accommodated the requests of Access Holders to amend the scope and sequence of work undertaken to suit their needs. Regular meetings were held with Network Planning to consider the scope and planning of the project.

The costs of the programme of works reflect the vagaries of working in a live network where closures must be planned, and where a delay due to network operations can cause significant delays. Overall costs are considered reasonable for the works completed.

The project is considered to be prudent in cost, supported a low level of document quality.

4.2.16 IV.00323 Track Upgrade FY18

Project Overview

A track upgrade site is the combination of a site with worn rail and an area of fist fastened concrete or timber sleepers of which both the rail and sleeper require replacement. In some cases, the scope may also request replacement of the ballast. Upgrading the track structures together maximises the efficiency of multiple asset renewal activities by only mobilising to a site once.

The mainline track was constructed with concrete sleepers with fist clips which fasten the rail to the sleeper. Constant exposure to coal and coastal environments has corroded the pins and clips of the sleepers, which may lead to a wide gauge or failure of the sleeper. These sleepers are also rated at 22.5tal while current track standards call for 28tal sleepers.

The project involved upgrading 24.6km of track and 32,860 sleepers with galvanized Pandrol E-clips and new ballast in the Goonyella, Newlands, Moura and Blackwater systems. The renewal of track assets at these locations ensures the ongoing integrity of the below rail infrastructure to facilitate the current and future traffic task.

The Track Upgrade Program aims to deliver supply chain benefit through increasing transit time, increasing reliability and maintaining compliance to standards and regulations.

IV.00323 - Track Upgrade FY18	Review Summary	**Scope**	✘
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$23.4M
Impact of findings on Claim	$0.2M
Total accepted	**$23.3M**

Review

The project scope forms part of the Track Renewal Program, which is a coordinated program of renewing the track structure (sleepers, rail, fastenings and in some locations ballast), which aims to maximise the efficiency of asset renewal activities by only mobilising to a site once.

Prioritisation for the scope of works undertaken has been performed using Aurizon Network's Scope Priority Model (SPM), which uses condition and criticality data to arrive at a prioritised list of renewals for the financial year. Some of the sighted inspection forms included condition and fastener ratings which were in line with the SPM. For most of the scoped locations the reporting would indicate that operational constraints would have been required without undertaking the works.

During the project lifecycle there were 16 approved Change Requests. The majority of these changes related to alterations to the approved scope, balancing the cost of the scope with the available funding and the need to alter the timing of scope completion due to possession being rejected by Network Planning.

Combining rerail and sleeper renewals where both are approaching end of life is considered to be sound asset management practice.

However, some locations with condition 1 and 2 ratings ('as new' and 'good' respectively) have been included in the scope of the project, having been manually included in the FY17/18 scope within the SPM. Justification of replacement of items in scope that are in condition state 1 and 2 and with a low criticality was requested from Aurizon Network, who advised that as the SPM was in its early stages of development at the time of the investment approval request, scope determination was not done in the SPM alone. In their response, Aurizon Network stated -

> *'The actual scope delivered was determined by the expertise of our railway engineers and their assessment of asset requirements and as a result differs from the scope set out in January 2017 SPM (that was attached to the IAR). We are confident that the scope delivered was required based on rail wear and asset requirements.*
>
> *It is also worth understanding that while the scope is heavily driven by the amount of worn rail needing to be replaced, consideration is also given to maximising the productivity of mobilising resources to that location to ensure efficient spend and delivery.'*

Condition documentation to support the inclusion of these scope items was requested for 12 locations. Aurizon Network provided supporting rail wear data for 11 of these 12 scope items via email communication on 24 April 2019. Based on the provided information, there are two scope items where the replacement of rail is considered to be not prudent:

- For GA Coppabella Yard DN RD 145.612-146.046km, the sleeper condition data contained in the SPM supports the completed sleeper renewal works. However, the provided rail wear data indicates that the rate of wear for both rails is over 50 % less than the wear limits outlined in Civil Engineering Track Standards (CETS) Module 2 (Section 2.12.2). Based on the information provided, it is considered that the rail would have had a remaining life expectancy of approximately 10-14 years. Given this, it is considered that the benefits of replacing rail on the basis of efficiency are outweighed by the loss of service life, and the rail renewal works at this location are not considered prudent.
- No further condition information was provided for GA Coppabella-Broadlea UP RD 147.83-148.100km. Based on the sleeper condition data provided in the SPM, the sleeper renewal works are considered prudent. However, whilst requested, no condition information has been provided for the replaced rail at this location, and no condition information was contained in the SPM. As such, the rail renewal works at this location are not considered prudent.

A unit rate of [redacted] for material rail costs has been used to calculate a recommended cost deduction of $150,000 for these two scope items, reflective of the additional costs of rerailing. Only material rail costs have been accounted for, as the rail would still need to have been removed to complete the sleeper renewal works at these locations.

The scope of work is considered to be not prudent, supported by a low level of documentation quality. A deduction of $150,000 is recommended, reflective of the additional costs of rerailing at locations where condition information does not support rail renewal. It is recommended that

Aurizon Network collect and store condition documentation with the project scope definition to combine all the supporting information that should be available for the IAR.

Based on a review of the IAR and completion certificates, the standard of works was consistent with configuration of adjacent infrastructure and Aurizon Network's standards (SAF/STD/0077/CIV/NET CETS Module 2).

The works were considered of a reasonable standard regarding the requirements of railway operators and access agreements. A sample of signed project completion certificates have been sighted, including:

- dilapidation report
- inspection test and plan report - sleeper replacement
- inspection test and plan report - track restressing
- inspection test and plan report - site close out
- track validation certificate
- final completion certificate.

The standard of work is considered to be prudent, supported by a high level of documentation quality.

A material difference between budgeted and actual costs was cited, mainly due to the decrease in scope of work. Budgeted costs were estimated at $29.5 million whereas actual costs incurred was $23.4 million. The project demonstrated value for money based on returned costs per km. However, it is noted that the budgeted cost of [redacted] per km was not the cheapest rate. In Financial Year 2015-2016 (FY16) historical data, a budgeted cost of [redacted] per km was achieved.

Appropriate planning was conducted to minimise the disruption to the operation of train services and accommodate the requests of Access Holders.

Project documentation suggests that Aurizon Network was unable to confirm with network operations whether a single line closures were approved in order to meet the planning window. This led to an overrun in project management costs, mainly in planning. Greater than anticipated project management costs were incurred, suggesting that the governance structure may not have been appropriate for the size and nature of the project. In addition, the project did not meet contractual time frames as some works were transferred to FY19/20 for completion.

The cost of work is considered to be prudent, supported by a medium level of documentation quality.

4.2.17 IV.00334 Bridge Ballast Renewal Program FY18

Project Overview

The Aurizon Network has approximately 19.0km of ballast on 258 ballast-deck bridges across the CQCN. It was identified that contaminated ballast on bridges was causing track stability issues resulting in poor alignment and increased maintenance intervention. The ballast cannot be cleaned using standard undercutting process used on track away from bridges due to clearance and loading constraints.

The project renewed life-expired ballasts at 14 bridges at priority sites across CQCN. The replacement of fouled ballast on bridges ensures the track can drain freely, and the ballast can evenly absorb and transfer the weight of trains. This prevents issues that may lead to rail break and derailment.

IV.00334 - Bridge Ballast Renewal Program FY18	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$7.3M
Impact of findings on Claim	$-
Total accepted	**$7.3M**

Review

The FY17/18 scope as per the Investment Approval Request was to renew life-expired ballasts at 14 bridges at priority sites across CQCN.

The scope of works was determined as part of the scope priority model, giving consideration to the current condition of assets. Condition ratings of 4 and 4.5 were identified for the locations within the scope.

Scoping information for Horseshoe Creek Bridge was provided for review, which included inspection photos, inspection videos, Ground Penetrating Radar reports and inspection forms. This information for the provided Horseshoe Creek location supports the condition rating of 4 provided within the scope priority model.

Supporting information to substantiate these condition ratings was not however provided for all locations.

A completion report has not been provided for the project to confirm status as of end of FY17/18.

The scope of work is considered prudent, supported by a medium level of documentation quality.

The IAR and completion certificates indicate that the standard of works was consistent with the configuration of adjacent infrastructure, Aurizon Standards, and Civil Engineering Track Standards. The works methodology was refined to respond to issues with interface between bridge and earthworks.

The standard of work is considered prudent, supported by a high level of documentation quality.

The actual costs of $7.3 million for works completed within FY17/18 are within the approved Budget of $12.6 million. It is noted that some project work scope has not yet been completed, and that the scope of the project appears to have markedly changed, however with limited documentation.

Specific details around procurement have not been sighted, however the IAR suggests that the project has been delivered by both internal and external resources, where existing supply arrangements and panel agreements were used for external labour and materials supply. Further, the IAR indicates that the Procurement team was engaged to procure standardised precast elements based on standardised designs to reduce material cost and provide installation flexibility between sites. This is in line with efficient process.

The cost of works is considered to be prudent, supported by a low level of documentation quality. Specific procurement documentation to demonstrate the processes mentioned above would help to improve the documentation quality.

4.2.18 IV.00343 Level Crossings Renewal Program FY18

Project Overview

Rail level crossings are the intersection between road and railway lines, allowing road users to travel over the railway tracks. Aurizon Network manages the rail infrastructure of 763 rail level crossings within the CQCN.

This project aims to identify and renew level crossings on a cyclical basis within the Goonyella, Moura, Newlands and Blackwater systems. Works for this project include upgrading control systems, signage and remote monitoring systems, as well as rectifying level crossings that have inadequate flangeways. The project seeks to mitigate against level crossing failures to minimise safety risks to all stakeholders and prevent disruption of traffic.

IV.00343 - Level Crossings Renewal Program FY18	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✘

Capital Expenditure Claim	$5.4M
Impact of findings on Claim	$0.2M
Total accepted	**$5.2M**

Review

This project is the continuation of the program of identifying and renewing level crossings on a cyclic basis within the Goonyella, Moura, Newlands and Blackwater systems. The project seeks to mitigate against level crossing failures that arise within the CQCN system in order to minimise safety risks to all stakeholders and prevent disruption to rail traffic.

The scope for FY17/18 has been identified in accordance with a priority rating based on condition and risk rating identified through the Australian Level Crossing Assessment Model (ALCAM).

Photos and inspections notes provided for renewals and flangeways support the condition ratings provided in the priority scope model. Outside of this, there is inadequate information to support the condition ratings of the works.

The scope of work is considered to be prudent, supported by a low level of documentation quality as informal evidence was used. Evidence to support condition ratings would help to raise the documentation quality score.

The standard of scope is generally consistent with Aurizon Network standards and configuration of adjacent, similar infrastructure. It is considered that the works were of a reasonable standard to current and likely future usage requirements as removal works were undertaken throughout engagement with road users.

It is our understanding that the non-conforming capping layer issue at Dysart noted in the document labelled *Supply of Capping Layer Material Meeting Minutes (*dated 31 July 2017) and discussed in the review of IV.00344 Formation Renewal FY18 in Section 4.2.19 relates to works included in this project scope.

Aurizon Network provided ITPs and conformance checklists for the Dysart site, and through email communication on 30 April 2019 stated that *'The capping layer material was used, but completion of the ITP demonstrates that the formation passed its final compaction test, which indicates that the formation was suitable for use and asset life not compromised by the non-conforming material.'*

The inspection test plan for formation works at Level Crossing ID20134 indicates that non-conforming capping material has been used. The non-conformance is against technical specification MRTS05 Unbound Pavement Type 2.3. The document labelled *Roadbase - Material Conformance Checklist* mentions Source Material Type to be of 'Aurizon Spec Capping Material'. The certificate lists 9 material property specifications, however the certificate is not filled in, is unsigned, not dated and does not provide any comments. The document *Formation Checklist* relates to construction related activities.

We do not agree that passing of the compaction test proves that the material was suitable for use and that asset life has not been compromised. While the compaction of the material may have met the

construction specification that does not prove that the capping material is compliant. The material may still be out of specification but meet the compaction specification.

As such we cannot confirm whether the capping material used at the Dysart site was compliant. Based on the information provided, we cannot determine the impact of the use of the material on the expected life of formation and cannot accurately determine the extent within each site where the material has been used. We however note that given the small scale and size of this project, any likely impact will not be material in the context of the overall project.

As the impact of the use of potentially non-conforming capping layer material is uncertain and likely immaterial, we have not recommended a cost deduction. The project standard is considered to be prudent, supported by a medium level of documentation quality.

The project was completed within the allowed budget of $6.3 million with a contingency of [redacted] which was not spent. Works were completed by Aurizon Network staff and external contractors, using existing supply agreements, demonstrating prudency and efficiency of costs.

Review of SAP data has indicated that costs for *'FY19 Engineering Design'* of $177,766 have been included in the FY17/18 claim. It is recommended that these costs should be deferred until the FY18/19 claim.

There is insufficient information to assess the effectiveness of project management and if the program was appropriate regarding timing, project management costs and risk allowances.

The cost of work is considered to be not prudent, supported by a low level of documentation quality. It is recommended that $177,766 for 'FY19 Engineering Design' included in total project costs be deferred until next year.

4.2.19 IV.00344 Formation Renewal FY18

Project Overview

The Formation Renewal Project seeks to renew damaged and end of life formation segments at priority sites across the CQCN. A prioritised program of works is determined using track geometry (carried out by the Track Recording Car) which covers the entire CQCN and highlights areas of concern. Geometry defects caused by formation failure are condition and risk assessed and prioritised.

The project upgraded 15 sites (totalling 2km of formation) over the Blackwater, Goonyella, Moura and Newlands systems. The upgrades aim to eliminate risk of the loss of top and line, risk of derailments and future speed restrictions.

IV.00344 - Formation Renewal FY18	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$12.2M
Impact of findings on Claim	$-
Total accepted	**$12.2M**

Review

A track geometry audit of the entire CQCN has been completed and condition and risk assessments have been completed for each site where a geometry defect has been identified. Sites with formation failures have been given a priority rating to assist with prioritising upgrades to the network. The rating considers multiple criteria to efficiently manage scope which is constrained by the cash flows allocated to the Network Asset Renewal program and track access.

The Investment Approval Request states that the project was required to:

1. Eliminate the risk of the loss of top and line
2. Eliminate wheel unload that may result in derailment
3. Eliminate future speed restrictions
4. Keep track quality within the track quality index for the passage of traffic at line-speed.

The formation renewals scope has been identified and prioritised in accordance with Aurizon Network's priority model and based on these inputs is considered prudent in addressing the risks presented by formation failures at these sites. Additional evidence to support the condition scores in the scope priority model was requested, and Aurizon Network has advised that the scores were developed based on the following:

'Preventative - initiated through engagement and consultation with District Engineering and Infrastructure Maintenance, condition score applied based on their feedback as to the severity and extent of the failing formation.

Fix-on-Fail - initiated through Hi-rail or Detailed Patrol Inspections, which give rise to defect Notifications in Aurizon Network's Network Asset Management System. These notifications give rise to DCP testing to confirm in-situ strength, extent and depth of defect. No specific scopes exist within the SPM and as such a condition score is not applied in this instance.'

A condition and scope report for a fix on fail formation repair has been provided.

The scope of work is considered prudent, supported by a high level of documentation quality.

Priority sites with worn and life expired formations have been restored to a Condition 1 (ideal condition). Works generally make use of well-known typical engineering solutions. Design report for Ch143.14 km includes findings from a visual assessment and geotechnical investigation. At this site, embankment stability has been improved by incorporating a berm into the widened embankment, and earthworks/formation reconstruction has been completed in accordance with Aurizon Network's earthworks specification. Design reports and as-built plans only provided for a select number of sites, and Aurizon Network has advised that this is because other sites have been upgraded in accordance with typical treatment detail.

The document labelled *Supply of Capping Layer Material Meeting Minutes (*dated 31 July 2017) states that *'formation material ordered…to be in accordance with the spec fails to meet the spec when tested on site.'* This capping layer issue has been noted on four sites; one bridge rollout at Isaac River, one level crossing at Dysart, and two Newlands flood recovery sites. The minutes also state that *'Incorrect capping specification was referenced in the supplier contracts*.'

While the minutes identify actions for mitigating this issue in the future, including issuing non-conformance reports to suppliers and plans for compliance auditing, no record of actions to address the identified capping layer issues at the mentioned sites has been sighted, and no evidence has been provided that the open actions items have been addressed.

Track validation certificates have been sighted for a sample of the completed works. However, this does not provide confirmation on whether or not non-compliant capping layer material was used, and if used what the impact on remaining life of the assets is.

Non-compliant capping layer materials have the potential to reduce the service life of the formation. In accordance with the process provided by Aurizon Network, material is delivered to site in advance of work activity and reviewed onsite by the constructors and/or site engineers. Documentary evidence was sought from Aurizon Network to confirm that the non-compliant capping layer material was replaced and the replacement material was tested on-site and found to be compliant, however this has not been made available.

Only the Newland sites are relevant to this project. These two sites are the Newlands 96.925 - 96.950 (SAP WBS Element IV.00344.E.N.NA) and Newlands 125.797 - 125.857 (SAP WBS Element IV.00344.E.N.NB) which form part of the SAP records and also the change register. The amount claimed for these two sites in FY17/18 is [redacted] which is immaterial in comparison to the total $12.2M capital expenditure claim of IV.00344.

Our assessment for prudency of standards has concluded that there are two topics that need to be addressed in relation to the use of non-compliant material of the capping layers:

1. **Whether the non-conformity of standards for the two known projects affects the assessment for prudency of standard for the overall project?**

   We understand that the Newlands formation works have been funded through the Formation Renewals rolling program. The Newlands Practical Completion Certificate provided in FY16/17 as part of IV.00399 - Cyclone Debbie Rectification states that the Newlands formation works were funded through IV.00169 - Formation Renewals FY17 rather than the flood recovery project IV.00399. The subject issue was highlighted through the aforementioned minutes of the meeting that took place on 31 July 2017. From the SAP extract, we understand that the Newlands related formation works at the aforementioned two sites has an assigned total budget of [redacted] with [redacted] claimed for works in FY17/18 and the remainder was claimed in earlier years i.e. in FY17. The works claimed in earlier years were part of IV.00169 which was not in the project sample list for FY16/17 and hence was not assessed for prudency and efficiency for FY16/17 capital claim. From the provided information it appears that the non-conformance of the material used was discovered onsite while under operational constraints to complete the work in allocated time.

   Aurizon Network, through email communication on 30 April 2019 stated that *'The capping layer material was used, but completion of the track validation certificate demonstrates that the formation passed its final compaction test, which indicates that the formation was suitable for use and asset life not compromised by the non-conforming material.'*

   Further, we do not agree that passing of the compaction test proves that the material was suitable for use and that asset life has not been compromised. While the compaction of the material may have met the construction specification that does not prove that the capping material is compliant. The material may still be out of specification but meet the compaction specification.

   As such we cannot confirm whether the capping material used was compliant. Based on the information provided, we cannot determine the impact of the use of the material on the expected life of formation and cannot accurately determine the extent within each site where the material has been used.

We have also not received confirmation that this issue is isolated to these two sites only. Testing results of the other sites have been requested but have not been provided. However, we note that there no evidence to suggest a wider issue has been sighted.

As the impact of the use of the capping layer material is uncertain, and as the amount claimed in FY17/18 for the two Newlands sites is immaterial in relation to the overall project scope, we have not recommended a cost deduction, and the standard of work is considered to be prudent. As the two Newlands sites are a small proportion of the overall claim, the documentation quality supporting this assessment is medium.

2. Is there a systemic issue related to processes and documentation related to discovery and use of non-compliant material that must be addressed?

Aurizon Network, through email communication on 21 March 2019 stated that on occasions where material is found to be non-compliant on site, there is potential for that non-compliant material to be used for the formation reconstruction in order to comply with agreed closure times.

Aurizon Network, through email communication on 29 March 2019 stated that the Meeting Minutes were incorrectly filed, and that the *'sites do not form a part of the works completed for IV.00344 Formation Renewal FY18'*. We have detailed our understanding of the Newlands work earlier and with respect to the other sites noted in the aforementioned Minutes of 31 July 2017 meeting, we note that:

- It appears that the Dysart formation works form part of the *IV.00343 - Level Crossings Renewal Program with a completion date of 31 July 2017 and* included in the FY17/18 capital claim.
- It appears that the Isaac River formation works form part of the *IV.00170 - Bridge Ballast Renewals with a completion date of 3 July 2017 and included in FY16/17 capital claim*.

It is also unclear, whether this non-conformance material issue is strictly limited to only four sites noted in those minutes or whether it is more widely present issue that had not been identified at the time that those minutes were produced.

If there is a reduction in service life of the formation at these sites due to the use of non-standard materials, additional costs will occur when the formation reaches the end of its service life earlier than expected. To replace the formation the track structure above will need to be removed, and there would be material costs for closure rails, welding, and top up ballast in addition to the capping layer. There is also a risk of failure leading to an unsafe event or of causing damage.

It is our recommendation that:

- ***A detailed investigation of the processes followed by Aurizon before / during and most importantly after discovery and / or use of non-compliant material for capping layer be undertaken***
- ***Further investigation of documenting process for the actual used capping material is warranted***
- ***An improvement of the processes whereby follow-up of actions as mentioned in the aforementioned minutes of 31 July 2017 meeting is also considered necessary***

The project closure report states that the project was delivered under the budget of $13.4 million and that the outputs have been delivered.

However, in the deliverables section of the Closure Report, there are no specific deliverables mentioned, and project completion details could only be identified for eight of the 15 nominated scopes of work; however, SAP data provides costs claimed against the FY16/17 and FY17/18 scopes of works.

The project was delivered under budget, however confirmation of the completion of the full scope of works has not been provided. Contingency was allowed for but not expended during the FY17/18 program of works.

However, in the deliverables section of the Closure Report, there are no specific deliverables mentioned, and project completion details could only be identified for eight of the 15 nominated scopes

of work; however, SAP data provides costs claimed against the FY16/17 and FY17/18 scopes of works.

The project was delivered by internal and external resources, with existing supply agreements and panel arrangements (for example, the Civil and Trackwork Infrastructure Maintenance Panel) used for external labour and materials. As aforementioned, the claimed cost for the two Newlands projects with potential use of non-conforming material for formation is immaterial to the total project expenditure.

The cost of works is considered to be prudent, supported by a low level of documentation quality.

A project completion report which details the completion of the full scope of works would help to increase this documentation quality rating.

4.2.20 IV.00346 Package 1 FY18 Control Systems Renewal

Project Overview

Control Systems Assets include Aurizon Network's train control system, asset protection and signalling control assets as well as managing Australia's largest non-commercial telecommunications data network. This program of works seeks to maximise the performance and reliability of network assets whilst maintaining safety. The program consists of a total ten projects separated into two packages.

There are four projects within Package 1:

- Renewal of train detection assets required to replace end of life track circuit related equipment
- Upgrade of interlocking assets which allow network control to operate remote control signalling equipment
- Rollout of new Power Equipment Rooms that house uninterruptable power supplies that reduce power instability caused by storms
- Software and hardware updates to the Universal Train Control (UTC) and the Direct Train Control (DTC) which operate throughout the CQCN.

IV.00346 - Package 1 FY18 Control Systems Renewal	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$8.2M
Impact of findings on Claim	$-
Total accepted	**$8.2M**

Review

The Investment Approval Request indicates that the works were required to achieve the benefits outlined in Table 12.

Table 12 Package 1 FY18 Control Systems Renewal Benefits Targeted

Project	Benefits Targeted
Train Detection Renewals	• Support continuity of the sensing operation of the rail network with the aim of reducing the number of track circuit related fault impacts • Improved equipment protection from lightning and electrical surges
Interlocking Signalling Upgrades	• Allow network control to operate remote control signalling equipment • Reduce the number of signalling faults experienced as a result of signalling interlocking and associated critical non-vital sub system failures
Power Resilience	• Reduce power instability caused by storms
UTC and DTC Updates	• Support continuity of the universal traffic control and direct traffic control systems

In isolation, the works appear reasonable. However, there is limited evidence of planning or prioritisation for how the specific works were selected. While the scope of works was determined as part of the scope priority model, limited information has been provided on the justification of this determination. An asset management plan or other justification of scope prioritisation has been requested but not provided for this review. As such it is unclear whether the projects undertaken reflect the state of the assets more broadly.

The scope of works is considered to be prudent, supported a low level of documentation quality.

Practical completion certificates indicate that the project scope has been delivered in accordance with the relevant Aurizon Standard Signalling Equipment Mechanical Drawings and Australian Standards Electrical Wiring Rules, with no outstanding works required. The practical completion certificates suggest that testing and commissioning has been undertaken.

Drawings have been reviewed and appear compliant with relevant standards.

The standard of works is considered to be prudent, supported by a medium level of documentation quality.

Costs claimed are within the approved budget, however there are no records of actual costs provided in the Completion Report.

Material required for works were purchased under existing supply agreements, and costs are deemed to be consistent with conditions prevailing in the market.

The expected reduction in the number of system failures is expected to reduce future maintenance costs.

It is noted that IFC drawings were delivered late due to lack of resources and that the track circuit delivery / commissioning was late, and that expenditure on this item has been pushed back to FY18/19.

The cost of works is considered to be prudent, supported by a low level of documentation quality.

4.2.21 IV.00347 Package 2 FY18 Control Systems Renewal

Project Overview

This project forms the second part of the FY18 Control System Renewal, which consists of Aurizon Network's train control system, asset protection and signalling control assets as well as managing Australia's largest non-commercial telecommunications data network. This program of works seeks to maximise the performance and reliability of network assets whilst maintaining safety. The program consists of a total ten projects separated into two packages.

There are six projects in Package 2:

- Renewal of Digital Mobile Radio (DMR) and Optic Fibre based Synchronous Digital Hierarchy (SDH) transmission systems to provide a reliable telecommunications system
- Replacement of life expired Signalling Diagnostic Computers at seven sites across the CQCN
- Replacement of end of life and obsolete asset protection equipment to preserve the level of protection they provide
- Vital Disabling Release Project improved the operational efficiency of the signalling network
- Renewal of elements of telecommunications and signalling operational network to extend the life of control system infrastructure assets
- Renewal and reallocation of 21 location cases to outside the Danger Zone.

IV.00347 - Package 2 FY18 Control Systems Renewal	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$8.0M
Impact of findings on Claim	$-
Total accepted	**$8.0M**

Review

While the scope of works was determined as part of the scope priority model, limited information has been provided on the justification of this determination.

The Investment Approval Request indicates that the works were required to achieve the benefits outlined in Table 13.

Table 13 Package 2 FY18 Control Systems Renewal Benefits Targeted

Project	Benefits Targeted
Transmission System Renewals	• Maintain reliability of telecommunications system • Maintain functionality of telecommunications network in the event of power failures
Diagnostic Computer Renewals	• Remote monitoring and diagnostics for signalling equipment
Asset Protection	• Improved asset monitoring • Remote monitoring capability • Sharing asset information to improve supply chain efficiency
Vital Disabling Panel	• Improved Interlocking and Level Crossing functionality and safety for track maintenance renewal works conducted at level crossings
Control System Infrastructure	• Continuity of data communications
Location Cases	• Replacement and relocation of equipment cases outside of the Danger Zone

In isolation the works appear reasonable. However, there is limited evidence of planning or prioritisation for how the specific works were selected. While the scope of works was determined as part of the scope priority model, limited information has been provided on the justification of this determination. An asset management plan, risk register determining project selection or other justification of scope prioritisation has been requested but not yet provided for this review. As such it is unclear whether the projects undertaken reflect the state of the assets more broadly.

The scope of works is considered to be prudent, supported a low level of documentation quality.

Practical completion certificates indicate that the project scope has been delivered in accordance with the relevant Aurizon Standard Signalling Equipment Mechanical Drawings and Australian Standards Electrical Wiring Rules, with no outstanding works required. The practical completion certificates suggest that testing and commissioning has been undertaken.

Drawings have been reviewed and appear compliant with relevant standards.

The standard of works is considered to be prudent, supported a low level of documentation quality.

Overall costs claimed are within the approved budget, and works were completed within the financial year.

There has however been no single source of information provided to support the review.

The cost of works is considered to be prudent, supported by a low level of documentation quality.

4.2.22 IV.00360 Network Asset Mgt System Tranche 2

Project Overview

The Network Asset Management System (NAMS) deploys standardised maintenance processes through a single data repository and maintenance system. NAMS reduces unplanned network downtime and the cost of asset information to inform preventative maintenance, as well as improving scheduling, work order management and execution.

The NAMs program has been delivered through two scopes of work; Tranche 1 (civil assets) and this Tranche 2. Tranche 2 extends NAMS to the control system, electrical assets and mechanised production, along with transitioning the asset master data and decommissioning the existing system.

Finalising NAMS Tranche 2 will transition Aurizon Network to the standardised processes, reduce Aurizon's time spent operating multiple systems and transition away from reactive maintenance strategies.

IV.00360 - Network Asset Mgt System Tranche 2	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$5.3M
Impact of findings on Claim	$-
Total accepted	**$5.3M**

Review

The aim of the NAMS project is to standardise asset management and associated processes by having a single centralised asset management system.

Tranche 1 of the project which was restricted to civil assets was reviewed in the FY16/17 Capex review and found to be prudent and efficient. This claim is for Tranche 2 of the NAMS project being implemented, which extends the NAMS to include other asset classes including control systems, electrical assets and mechanised production. Tranche 2 also included the delivery of reporting capability to deliver a combination of management dashboards, querying and operational reports.

One of the overall drivers for this project (T1 and T2) was the high level of unplanned/reactive maintenance caused in part by the lack of readily available condition and performance information. The NAMS project aims to deliver a better understanding of the lifecycle of network assets and optimise the maintenance and renewal of assets through improved predictive modelling.

Given that the benefits of the NAMS project rely on having a single centralised asset management system, it would be ineffective to implement NAMS and stop at Tranche 1 which only covered civil asset classes.

The NAMS project is aligned with the Network Development Plan 2016-17 and Network Technical Strategy. Improved asset management is deemed to have been required to deliver significant improvement in asset utilisation in light of the anticipated increase in coal transportation volumes.

The scope of work is assessed as prudent, supported by a medium level of documentation quality.

A signed project closure request has been completed which indicates that all deliverables have been accepted and that all objectives/benefits have been achieved. User Acceptance Testing (UAT) signoffs exist and have been sighted. The closure report provides specific

Extensive design documentation exists, and sufficient detail has been provided in the approved blueprints for each of the major asset classes. The design appears appropriate in relation to required standards and to scope requirements.

The standard of work is assessed as prudent, supported by a high level of documentation quality.

The final projects costs of $5.6 million were under the approved budget by over $1 million. The cost reduction reflects the utilisation of existing hardware, rather than the purchase of new, demonstrating an efficient use of project funds.

The project program was assessed as appropriate in all regards as works were completed within budget allowances.

There is however insufficient information available to assess the effectiveness of project management.

The project is prudent and efficient in cost, supported by a medium level of documentation quality.

4.2.23 IV.00364 Turnout Renewal FY18

Project Overview

Turnouts are a fundamental component of the total track structure, providing a means of switching traffic to a different rail line, providing flexibility to operations and capability for accessing multiple sources and destinations of freight.

Aurizon Network assessed most of the existing turnouts to be operating above their design requirements, be life-expired and/or require constant maintenance to allow the safe passage of traffic.

The project completed upgrades to turnout componentry at 99 sites, renewal of six turnouts and removal of nine turnouts across the CQCN. By delivering this renewal program Aurizon Network seeks to increase the reliability of the entire network's supply chain, while minimising the cost of the maintenance task.

IV.00364 - Turnout Renewal FY18	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$11.5M
Impact of findings on Claim	$-
Total accepted	**$11.5M**

Review

The Turnout Renewal Program is a rolling Asset Renewal Program with a prioritised program of works developed and funded yearly. The FY17/18 Turnout project seeks to upgrade major componentry, fully replace life expired turnouts, and remove redundant turnouts across the CQCN system from the prioritised condition listing.

A condition assessment guide for turnout components has been provided in the Investment Approval Request, and a Power Point slide with photos of the turnout renewals attached to the IAR show heavily contaminated ballast and poor condition. Refurbishment scopes of work were created for each location with photos and supporting condition assessment. Scopes without photos either were removed from project or limited to crossing replacement only.

Detailed scopes for all works have been sighted. The condition rating for most locations in the SPM is supported by inspection reports, photos and condition ratings of components. Scopes of work without photos were removed from the project or limited to crossing replacement only. Refurbishments scopes were created for each location with photos supporting the condition assessment.

It is regarded that operational constraints on the asset would have been required in FY17/18 when considering the age and condition of the turnouts.

The scope of works is considered to be prudent, supported a high level of documentation quality.

The standard of works is based on CETS, which is appropriate for the location and in line with adjacent infrastructure.

The prioritisation process of the scope of works is consistent with other rail renewals, indicating consistency with Aurizon Network asset management processes.

The works were deemed to be reasonable to meet the requirements of the scope in relation to current and likely future usage levels. This includes removal of turnouts that were no longer required, refurbishment works that were in line with usage and the renewal of locations that were high in use and of poor condition. Standard of works appear to have been delivered in accordance with the relevant standards.

The standard of work is considered prudent, supported a high level of documentation quality.

The work was completed within the allowed budget of $16.2 million; however, this may be attributed to the refurbishment of turnouts that were not completed in FY17/18 and deferred to FY18/19. There is

insufficient detail on the budget transfer or estimate in order to assess whether there are sufficient funds to complete the transferred work. Thus, at the time of project approval the program is considered to be not appropriate in regard to timing and program delivery.

Total project costs were not minimised as it was sighted in the Project Completion Report that the length of possession was inadequate to complete the works in a cost-effective manner.

However, value for money of sourcing of supply and labour is demonstrated by the works being completed within the scope and budget.

The cost of works is considered to be prudent, supported by a low level of documentation quality.

4.2.24 IV.00375 Corridor Security and Fencing FY18

Project Overview

The Corridor Security and Fencing project seeks to replace existing corridor fencing that no longer effectively prevents stock or personnel from entering the rail corridor. Works were performed at 11 sites in Blackwater, four sites in Goonyella and Moura, and one site in Newlands systems. This enables Aurizon Network to comply with legislative requirements and restrict and / or prevent public vehicles and pedestrians from unknowingly entering the rail corridor. The project decreases the probability of rolling stock collisions with live stock, which reduces delays and operation costs, annual livestock compensation costs and call out costs.

IV.00375 - Corridor Security & Fencing FY18	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$0.8M
Impact of findings on Claim	$-
Total accepted	**$0.8M**

Review

Aurizon Network has advised that the scope of works has been driven by communication and complaints from adjacent land owners, corridor inspections and reports of trespass (by persons or animals). However, these documents have not been provided for the purposes of this review. Further, condition scores and prioritisation in light of the relevant reports have not been documented in the SPM.

Based on interviews with project managers, the works are deemed to have been reasonably required to reduce risk to an acceptable level. The project is expected to deliver the intended benefits of reducing delays and costs associated with rolling stock collisions with livestock.

The project is deemed to have been reasonably required to comply with legislative requirements, with the identification of locations for high security fencing being aligned with more populated areas where access was available.

The scope of work is considered prudent, supported by a low level of documentation quality as informal evidence has been used.

Fencing has been constructed according to relevant Aurizon design standards. This is line with other rail networks in Australia.

The standard of work is assessed as prudent, supported by a medium level of documentation quality.

The works were competitively tendered, with three companies issued an invitation to tender, reflecting an efficient process.

The project has been delivered within budget and within the FY17/18 timeframe, at a final cost of $0.77 million compared to the planned budget of $0.84 million.

The project cost is considered prudent and efficient, supported by a medium level of documentation quality.

4.2.25 IV.00384 OH Equipment Renewal FY18

Project Overview

The project forms part of the multi-year Overhead Equipment Renewal Program for Blackwater and Goonyella systems. The project replaces damaged, aged and deteriorating components that have exceeded their design life within the overhead line equipment, covering an approximate distance of 70km each financial year. Other works include upgrades to contact wire, feeder wire clearances and feeder insulators and isolators.

The Overhead (OH) Equipment Renewal Project seeks to mitigate against overhead line equipment failures, minimise track movement and prevent disruption to rail traffic.

IV.00384 - OH Equipment Renewal FY18	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$3.5M
Impact of findings on Claim	$-
Total accepted	**$3.5M**

Review

Condition monitoring was carried out by Aurizon to determine the assets to be replaced and the priority, based on the Aurizon scoring system. Evidence of the condition monitoring has been sighted in spreadsheet format. Electrical Overhead Asset Renewal Scope Documents for the Blackwater and Goonyella Networks identifies areas of work for overhead electrical asset renewal works. The documents provide details on how the asset condition was assessed and the scoring mechanism for determining the replacement work priority.

OH Asset Renewals Scope FY17/18 provides a detailed scope of works for the renewals. From the evidence provided, it appears that the works were required to reduce the external risk to an acceptable level. Through interviews, Aurizon Network has advised that the scope of works was reduced.

Quality Assurance Documentation indicates that maintenance works were carried out at the same time as renewals. Through interviews and email communications, Aurizon Network has provided confirmation that separate work order types are used to ensure that maintenance works are separately funded.

The scope of work is considered to be prudent, supported by a low level of documentation quality.

Sample Quality Assurance Documentation has been sighted for section insulator and neutral section renewals, and for the contact wire changes. The quality documentation shows that the work was carried out to Aurizon Network's standards.

However, it is difficult to align the handover documentation with the original scope document, and interviews with Aurizon Network staff were required to obtain confirmation of the works delivered.

The standard of work is considered to be prudent, supported by a low level of documentation quality.

The total claimed expenditure of $3.5 million is substantially less than the approved budget of $5.9 million, excluding contingency. This is reflective of the reduction in scope, with works being deferred to FY19 or removed from the program.

Through interviews and email communications, Aurizon Network has provided confirmation that whilst maintenance works were carried out at the same time as renewals separate work order types are used to ensure that maintenance works are separately funded.

The cost of works is considered to be prudent, supported by a low level of documentation quality.

4.2.26 IV.00399 2017 Cyclone Debbie Rectification

Project Overview

On 28 March 2017, Tropical Cyclone Debbie hit the Queensland coastline south of Bowen, bringing an extended period of heavy rainfall and high winds to northern and central Queensland. Widespread daily rainfall totals of 150-200mm and wind speeds of up to 263km/h were recorded in certain areas. This weather event damaged infrastructure across each of the Newlands, Goonyella, Blackwater and Moura Systems, which impaired Aurizon Network's ability to provide Access across the entire CQCN. Systems were closed for periods ranging from 10 to 30 days, with Goonyella the worst affected.

During this closure time, and subsequent to the reopening of the network to traffic, repairs were performed across all four systems, whilst the primary objective was to restore the network to its pre-flood condition, standard asset renewal methodology was followed such as restoring asset to an increased standard where current engineering standards, more recent weather and hydrology information, latest flood mitigation strategies, total cost analysis and / or customer requirements supported it.

The criteria applied by Aurizon Network to define works scopes as capital expenditure are:

1. The total materials cost (incurred or to be incurred) for that work order is greater than $40,000;
2. For linear assets, the physical distance over which the renewal of infrastructure is required to be undertaken for that activity, is greater than 75 metres; and
3. The work is not ballast undercutting.

IV.00399 - 2017 Cyclone Debbie Rectification	Review Summary	**Scope**	✔
		Standard	✔
		Cost	✔

Capital Expenditure Claim	$4.4M
Impact of findings on Claim	$-
Total accepted	**$4.4M**

Review

The claim includes a significant number of small scopes of work to address the damage caused by Cyclone Debbie and the subsequent flooding.

We have reviewed a sample of projects to form an overall assessment of scope.

Notably for the scope delivered as part of the FY17/18 claim, GA-004B was reviewed. GA-004B included embankment stabilisation works and reinstatement of rock fall fencing for 37.345 to 37.540 km in the Goonyella system. The works to remove material from the track and reinstate the cutting were deemed to have been reasonably required, as Black Mountain is a high-risk area. The installation of the rockfall mesh is deemed to be a cost-effective measure compared with other methods such as shotcrete with steel mesh and rock bolts.

Generally, inspection documentation and photo evidence indicate that the works included in this claim were reasonably required due to the extent of damage.

The NETCON system, along with the Incident Management Procedure, is intended to ensure that stakeholders are kept informed of any changes to the CQCN condition. Aurizon Network's submission indicates that internal and external stakeholders were promptly advised of disruptions to the Network.

In addition, feedback from stakeholders contributed to the prioritisation of works. Access Holders on the network provided information as to the status of their operations, which allowed Aurizon Network to determine and prioritise 'critical paths,' to direct recovery focus towards servicing those mines that were operational.

The scope has been assessed as prudent to a medium level of documentation quality. Further detail on the scope included as part of the FY17/18 claim would help to raise the documentation quality score.

To manage the safety aspects of the program of works, a work health and safety management plan (WHSMP) was developed in accordance with Aurizon's corporate Safety Policy. The Plan was

developed to ‘document the management strategy framework to address known safety issues in relation to CQCN construction works to repair damage cause by Cyclone Debbie.’

Drawings and design reports have been reviewed and appear compliant with Aurizon Standards.

The standard of work is considered to be prudent, supported by a high level of documentation quality*.*

Aurizon Network used existing contracts with pre-agreed labour rates to procure the works, with the exception of damage requiring highly specialised consultants. Where possible, contractors were procured who had the experience working on the network and familiarity with the sites and safety requirements.

An initial funding request was made after the event for $12 million including [redacted] in contingency. The approved budget was increased to $14.27 million, however limited change request documentation has been provided in relation to this increase. Including the $4.04 million FY17/18 claim, the total expenditure claimed so far is $12.6 million and is within the approved budget. However, works are still ongoing.

The project is considered to be prudent in cost, supported by a low level of documentation quality.

5.0 Findings and Recommendations

5.1 Key Findings

A summary of findings in relation to the sample of projects selected for this review is presented in Table 14. It shows our assessment in relation to each major criterion and our assessment of the level of project documentation available.

Table 14 Final Assessment

Project	Prudency Asessment			Project Cost ($ million)		
	Scope	Standard	Cost	Claim	Adjust.	Accepted
A.04599 - Havilah Culverts Upgrade	✔	✔	✔	$8.72		$8.72
All Growth Projects (AUGEX)				**$8.72**		**$8.72**
IV.00004 - Traction Fault Locator Renewal	✔	✔	✔	$1.99		$1.99
IV.00049 - Radio System Replacement	✔	✔	✔	$23.35		$23.35
IV.00144 - Rail Renewal FY17	✔	✔	✔	$2.06		$2.06
IV.00145 - Track Upgrade FY17	✔	✔	✔	$5.15		$5.15
IV.00146 - Sleeper Renewal FY17	✔	✔	✔	$2.84		$2.84
IV.00154 - FY17 Autotransformer Renewal Project	✔	✘	✔	$1.44	$1.44	
IV.00168 - Turnout Renewal FY17	✔	✔	✔	$2.69		$2.69
IV.00170 - Bridge Ballast Renewals FY17	✔	✔	✔	$1.28		$1.28
IV.00261 - Telecommunications Infrastructure Renewal	✔	✔	✔	$1.88		$1.88
IV.00267 - Asset Protection Equipment Replacement	✔	✔	✔	$0.24		$0.24
IV.00270 - Ethernet to Corner SCADA Upgrade FY17	✔	✔	✔	$3.02		$3.02
IV.00283 - Traction SCADA System	✔	✔	✔	$2.08		$2.08
IV.00294 - Goonyella Supersite FY17	✔	✔	✔	$2.15		$2.15
IV.00321 - Sleeper Renewal Program FY18	✔	✔	✘	$6.75	$0.31	$6.44
IV.00322 - Rail Renewal FY18	✔	✔	✔	$21.47		$21.47
IV.00323 - Track Upgrade FY18	✘	✔	✔	$23.45	$0.15	$23.30
IV.00334 - Bridge Ballast Renewal Program FY18	✔	✔	✔	$7.27		$7.27
IV.00343 - Level Crossings Renewal Program FY18	✔	✔	✘	$5.42	$0.18	$5.24
IV.00344 - Formation Renewal FY18	✔	✔	✔	$12.24		$12.24
IV.00346 - Package 1 FY18 Control Systems Renewal	✔	✔	✔	$8.22		$8.22
IV.00347 - Package 2 FY18 Control Systems Renewal	✔	✔	✔	$8.04		$8.04
IV.00360 - Network Asset Mgt System Tranche 2	✔	✔	✔	$5.31		$5.31
IV.00364 - Turnout Renewal FY18	✔	✔	✔	$11.50		$11.50
IV.00375 - Corridor Security & Fencing FY18	✔	✔	✔	$0.77		$0.77
IV.00384 - OH Equipment Renewal FY18	✔	✔	✔	$3.46		$3.46
IV.00399 - 2017 Cyclone Debbie Rectification	✔	✔	✔	$4.44		$4.44
All Renewal Projects (REPEX)				**$168.50**	**$2.08**	**$166.43**
All Projects Reviewed				**$177.22**	**$2.08**	**$175.14**

A cost adjustment has been recommended for four projects, amounting to a total recommended adjustment of $2.08 million to the claim.

5.2 Recommendations

We recommend that four projects of the sample projects reviewed have their cost claim completely or partially rejected. These include:

- **IV.00154 - Autotransformer Renewal Project**

  It is noted that the existing autotransformer sites have not been modified to comply with the requirements of AS2067:2016, Section 6.7 - Protection Against Fire and Explosion.

  The Standard details that for each installation, an FRA is undertaken which should consider key areas for fire prevention and fire protection. To address the hazards associated with HV installations, the Standard provides detailed requirements for fire resistant barriers to provide physical separation between transformers and adjacent buildings.

  The risk assessment carried out in 2013 (for feeder stations) and the 2017 report for autotransformers does not adequately address, or otherwise provide adequate justification as for not addressing, the requirements of the 2016 update of AS2067 for autotransformer sites. As such, the documentation provided by Aurizon which references these documents is not sufficient justification as for not addressing fire and explosion risk at the autotransformer sites.

  It is recommended that the project is rejected from the FY17/18 claim in its entirety, due to the lack of justification as for not addressing fire and explosion risk at the autotransformer sites. It is recommended that a risk assessment is undertaken by Aurizon Network for each autotransformer site to determine the requirements for fire and explosion risk protection and then a decision be made on the prudency of standard.

- **IV.00321 Sleeper Renewal Program FY18**

  We note that the unit rate for the completed works was higher than both the FY17/18 target and the actual unit rate for the previous year. The budgeted unit cost of [redacted] per sleeper is considered to be a stretch target, as the actual cost of works incurred in FY16/17 was [redacted] per sleeper. Considering this, we have used the difference between the FY17/18 and FY16/17 unit rates to calculate a recommended cost deduction of $0.3M.

- **IV.00323 - Track Upgrade FY18**

  We note that this project has been found not prudent in scope due to the replacement of rail at two locations where condition information does not support the renewal of rail, and it is considered that the benefits of replacing rail on the basis of efficiency are outweighed by the loss of service life. A deduction of $150,000 is recommended for material rail costs, reflective of the additional costs of rerailing at these locations.

  The quality of documentation supporting this assessment was low, with there being no central source of condition information supporting the scope of works. It is recommended that Aurizon Network collect and store condition documentation with the project scope definition to combine all the supporting information that should be available for the IAR.

- **IV.00343 Level Crossings Renewal Program FY18**

  We note that costs for *'FY19 Engineering Design'* of $177,766 were included in the FY17/18 claim. It is recommended that this amount should be deferred until the FY18/19 claim.

In addition to this, we have made the following recommendations in relation to projects which have been deemed prudent:

- **Formation Renewals**

  A capping layer issue has been noted on four sites where formation renewal works were undertaken. We understand that two of these in the Newlands system are included in the claim for *IV.00344 - Formation Renewal FY18*. It appears that the remaining sites at Dysart and Isaac River are included in the claims for IV.00343 - Level Crossings Renewal Program FY18 and *IV.00170 - Bridge Ballast Renewals* respectively.

Based on the information provided, we cannot confirm whether the capping material used was compliant, cannot determine the impact of the use of the material on the expected life of formation and cannot accurately determine the extent within each site where the material has been used.

We have not recommended a cost deduction for these issues due to impact of the use of the capping layer material being uncertain, and due to the scale of the works being immaterial in relation to the overall project scope.

However, we note that there is a systemic issue related to processes and documentation related to discovery and use of non-compliant material that should be addressed. It is our recommendation that:

- A detailed investigation of the processes followed by Aurizon before / during and most importantly after discovery and / or use of non-compliant material for capping layer be undertaken
- Further investigation of documenting process for the actual used capping material is also warranted
- An improvement of the processes whereby follow-up of actions as mentioned in the document labelled Supply of Capping Layer Material Meeting Minutes (dated 31 July 2017) is also considered necessary.

5.3 Recommendations in Relation to the Review Process

The quality of documentation provided for the FY17/18 claim was notably lower than that provided for prior reviews. This is particularly noticeable in relation to cost documentation, which was assessed as low for the majority of the projects reviewed.

For numerous of the projects reviewed, project completion reports were either not provided, incomplete or did not provide a breakdown of actual costs incurred that reconciles to the original estimate. In these cases, there has otherwise been no single source of information provided to support the review. It is recommended that the process of variance reporting be improved, not only for review purposes, but also to establish a better feedback process to support improvements to be made in the accuracy of the cost estimating process.

Where costs for rolling programs of work that were scoped for FY16/17 are claimed in the FY17/18 claim, there is generally low documentation quality around the scope of works that is associated with the claimed costs for the financial year. It is recommended that the process of documenting the works delivered within each financial year is improved.

Appendix A

Sample Assessment Forms

Appendix A Sample Assessment Forms

S. No.	Project No.	Project Name	Click on Link to Navigate to Assessment Forms
1.	A.04599	Havilah Culverts Upgrade	Form for A.04599
2.	IV.00145	Track Upgrade FY17	Form for IV.00145
3.	IV.00154	FY17 Autotransformer Renewal Project	Form for IV.00154
4.	IV.00168	Turnout Renewal FY17	Form for IV.00168
5.	IV.00170	Bridge Ballast Renewals FY17	Form for IV.00170
6.	IV.00270	Ethernet to Corner SCADA Upgrade FY17	Form for IV.00270
7.	IV.00321	Sleeper Renewal Program FY18	Form for IV.00321
8.	IV.00323	Track Upgrade FY18	Form for IV.00323
9.	IV.00343	Level Crossings Renewal Program FY18	Form for IV.00343
10.	IV.00344	Formation Renewal FY18	Form for IV.00344
11.	IV.00375	Corridor Security & Fencing FY18	Form for IV.00375

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Assessment Number	5
Project Name	Havilah Culverts Upgrade
Project Number	A.04599
Project Type	Growth
Project Discipline	Expansion
Asset Type	Structures
System	Newlands
Expenditure Claimed	$8.72M

Project Overview

- Includes culverts 139.20km and 145.10km on Newlands line.
- part of 2013 upgrade to 4x culverts, 2 of which (135.53km and 143.10km) were upgraded in FY17 program

NOTE

The QCA must approve including capital expenditure into the Regulatory Asset Base if that capital expenditure is for the prudent and efficient value of the assets that are used or intended to be used by Aurizon Network to provide the service taken to be declared under section 250(1)(a) of the Act.

Pre-approval by QCA

Assessed by Torill Pape

Pre-Approval Capital Expenditure	Has the capital expenditure been pre-approved by the QCA in accordance with Clause 2.2 of Schedule E of the 2016 access undertaking? (including that accepted by interested participants)	NO			
	If yes: Has the capital expenditure been incurred?				
	Does the capital expenditure approved equal or exceed the amount claimed?				
	Was there a time limit associated with the pre-approval, and was the project completed within this time limit?				
	Did the project meet all pre-approval conditions, including but not limited to: Cost to construct the project Time for completion of the project Estimated capacity to be delivered by the project				

SCOPE

Assessed by Torill Pape

Assessing the prudency of scope of works involves assessing whether the works are reasonably required.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment
Initial Scope Qualification	Are the project works below-rail infrastructure? If not, what proportion of the works are 'below-rail'?	YES	All below-rail.
	Was the project commissioned in 2015-17 (or earlier if they have been deferred for inclusion in the RAB)?	YES	Project originally initiated in 2010.
	Is the project capital expenditure (capex) and has not otherwise been treated as ongoing maintenance expenditure (opex)?	YES	No evidence to suggest it has been claimed as OPEX.
	Has the project been covered by other claims, including review events to recover the cost of repairing flood damage?	NO	No evidence to suggest so.
	Was the project fully funded by Aurizon Network? If not, was the amount claimed for the proportion of works funded by Aurizon Network?	YES	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the scope of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	-Signed Client Requirement Brief - Engineering Proposal - Options Study - Aurizon Report: Review of Replacement of Havilah Culverts @ 135.53km, 139.20km, 143.10km & 145.10km on Newlands System - PB Design Report: Bridge Replacement Design on the Newlands System at Ch. 135.53km and Ch. 143.10km - Aurizon Project Management Plan - Project Completion Report - Project Closeout Report - Defects Register - EPOCA Project Management Plan - Havilah Culverts Replacement Additional Funds / Change of Scope Approval Request
Interested Participants and Scope Pre-Approval	Has the standard of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO to both of the above, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
	Expansion projects					
2.2 (b) (i)	(A) Was the project aligned to any relevant Network Development Plan?	Insufficient information	No information provided to suggest so.			
Whether the requirement for the works is prudent and efficient	(B) Were the works reasonably required to accommodate the requirements of relevant Access Agreements?	YES	No access agreements specifically sited but culverts were old, in poor condition (CS4) and critical to the operation of the network. If not replaced, access could have been compromised.			
	(C) Were the works reasonably required to accommodate current contracted demand and potential future demand that Aurizon Network, acting reasonably, considers is required within a reasonable timeframe?	YES	Culverts were old, in poor condition (CS4) and critical to the operation of the network. Pitt & Sherry report identified the culverts have been propped and have a limited structural life within a two year timeframe (dated 2013).			
	Renewal Projects					
	(D) Considering the age and condition of the assets, would operational constraints (load or speed restrictions) on the asset have been required in FY17-18 without this intervention?	YES	Culverts were old, in poor condition (CS4) and critical to the operation of the network. Pitt & Sherry report identified the culverts have been propped and have a limited structural life within a two year timeframe (dated 2013).			
	(D) Were the works consistent with the Asset Management Plan?	YES	No Asset Management Plan specifically sited for this project. But an Aurizon Structures Asset Management Report was available.			
	Were the works consistent with any other asset plans?	N/A				
	(D) Were the works reasonably required to reduce external risk to an acceptable level?	YES	Culverts were old, in poor condition (CS4) and critical to the operation of the network. Performing the work mitigated the risk of failure and subsequent safety issues and track closures.			
	(E) Were the works reasonably required to the extent that the capex project promotes the economically efficient operation of, use of investment in the Rail Infrastructure, whether present or future? (for example, in relation to extending the life of assets whose economic and/or functional life would otherwise have expired, reducing future operating and maintenance costs or improving capability or capacity of existing assets, systems and processes)	YES	Useful life had expired. It would be inefficient to replace long before expiry so in this case it could be considered an efficient use of funds, although risks while operating at end of life were far increased.			
	(F) Were the works reasonably required to comply with Aurizon Network's legislative and tenure requirements, including relating to rail safety, workplace health and safety, and environmental requirements?	YES	Culverts were considered to be at end of life and therefore were likely unsafe. In the Scope Approval Request it was deemed they would improve network resilience in extreme weather and flooding events.			
	Stakeholders					
	(G) Comment on any outcomes of consultation about the capital expenditure project, with Access Seekers and Access Holders whose Access Charges (or likely access charges) would be affected by including the amount of capital expenditure for the capital expenditure into the Regulatory Asset Base?	N/A				
	(H) Comment on any other matters relating to scope in submissions to the QCA by Aurizon Network or Funding Users	N/A				

Comment on Prudency & Efficiency of Scope	Prudent and efficient scope with medium level of document quality. Scope of works was warranted and justifiable due to poor condition of culverts that are critical on the network. The works will reduce risk of track closures to allow continuing network operation and safety. There is a detailed design report prepared by PB for the two culverts replaced in FY17 as part of the Havilah project and the report mentions the culverts at 139.20km and 145.10km but has not specifically been written for them. There are IFC drawings available but they cannot be checked against a design report to see if scope was specifically met. The Defects Register shows there are some outstanding defects that have not been closed out but these were discussed in the meeting with Aurizon on the 15th of Feb 2019 and it was noted that all outstanding defects would be rectified by the contractor at their own cost and therefore will have no impact on costs to Aurizon.

Prudent	YES	**Document Quality**	Medium
Efficient	YES	**Assessment Status**	FINAL

STANDARD

Assessed by Torill Pape

Assessing the prudency and efficiency of standard of works involves assessing whether the works are of a reasonable standard to meet the requirements of the scope and are not overdesigned such that they are beyond the requirements of the scope.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i) **Interested Participants and Standard Pre-Approval**	Has the standard of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	-Signed Client Requirement Brief - Engineering Proposal - Options Study - Aurizon Report: Review of Replacement of Havilah Culverts @ 135.53km, 139.20km, 143.10km & 145.10km on Newlands System - PB Design Report: Bridge Replacement Design on the Newlands System at Ch. 135.53km and Ch. 143.10km - Geotechnical Engineer Piles Certification - Environmental Compliance Report - Pitt & Sherry report: Inspection and Structural Assessment of Havilah Culverts, Newlands System at 135.53km, 139.20km, 143.10km & 145.10km (2012) - IFC drawings & as-built drawings - EPOCA Project Management Plan - Safe Work Method Statements & Enviro & Safety Risk Assessment
	Has the scope of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
2.2 (b) (ii) **Were the works of a reasonable standard to meet the requirements of the scope?**	(A) With regard to the requirements of Railway Operators and what is reasonable required to comply with Access Agreements	YES	Yes - based on PB design report.			
	(B) With regards to current and likely future usage levels	YES	No mention of poss ble future demand but design is acceptable.			
	(C) With regards to the requirements of other relevant Australia design and construction standards	YES	Designed in accordance with Australian Standards (AS5100 & AS1170 & DTMR Design Criteria for Bridges and Other Structures (other AU design codes also mentioned on drawings for reinforcements (reo), welding, etc)			
	(D) With regards to the extent of consistency with the Asset Management Plan	YES	No specific Asset Management Plan sited.			
	(E) With regards to Aurizon Network's design standards contained within its Safety Management System and which is accepted by the Safety Regulator	YES	Safe Work Method Statements & Enviro and Safety Risk Assessment available			
	(F) With regards to all relevant laws and the requirements of any Authority (including the Safety Regulator)	YES	There is a detailed design report prepared by PB for the two culverts replaced in FY17 as part of the Havilah project and the report mentions the culverts at 139.20km and 145.10km but has not specifically been written for them. However, the IFC drawings seem to be in line with current practice and standards.			
	Would the standard of works be expected to deliver the requirements for the project?	NO	Design appears to be in line with code requirements. Standard solutions adopted where possible.			
	Has the standard of works been overdesigned, or is it likely to deliver a capital works project beyond the requirements of the scope?	N/A				
	(G) Comment on any other matters relating to standard in submissions to the QCA by Aurizon Network or Funding Users					

Comment on Prudency & Efficiency of Standard	Prudent and efficient standard with medium level of document quality. There is a detailed design report prepared by PB for the two culverts replaced in FY17 as part of the Havilah project and the report mentions the culverts at 139.20km and 145.10km but has not specifically been written for them. However, the engineering solutions shown on the IFC drawings appear to be aligned with relevant Australian standards and consistent with typical solutions provided for similar applications in the industry. Standard details have been utilised for efficiency where possible. All drawings are signed by RPEQ engineers. The Defects Register shows there are some outstanding defects that have not been closed out but these were discussed in the meeting with Aurizon on the 15th of Feb 2019 and it was noted that all outstanding defects would be rectified by the contractor at their own cost and therefore will have no impact on costs to Aurizon.
Prudent	YES
Efficient	YES

Document Quality	Medium
Status	FINAL

COST

Assessed by Gary McDonald

Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
2.2 (b) (iii) **Having regard to the scope and standard of works, are the costs prudent and efficient?**	(A) Do the costs align to any relevant Network Development Plan?	FINAL	Replacement of assets to reduce ongoing maintenance	None	$ -	project Management Plan, initial budgets, Client request, Engineering Report, upgrade Schedule, Executed Contract AC.4655
	(B) Do costs align to scale, nature, and complexity of the project?	FINAL	Works competitively tendered	None		
	(D) Do costs align to any relevant Asset Management Plan?	N/A				
	Was there a material difference between budgeted and actual costs (i.e. >5%)? Why?	FINAL	Minor cost saving due to Contingency Allowance not being fully utilised	None		
	What proportion of the difference should be considered a capital cost?	n/a				

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii)	(C) With regards to the circumstances prevailing in the market and locality for engineering, equipment supply and construction?	YES	Bridge works competitively tendered	None	$ -
Does the project demonstrate prudency and efficiency of costs?	(C) (1) Did the project demonstrate value for money with regards to sourcing of engineering, equipment supply and construction?	YES	Bridge works competitively tendered	None	
	(C) (2) Did the project demonstrate value for money with regards to sourcing of labour?	YES	Bridge works competitively tendered	None	
	(C) (3) Did the project demonstrate value for money with regards to sourcing of materials?	YES	Bridge works competitively tendered	None	
	Was the procurement methodology consistent with approved procurement strategies?	YES	Bridge works competitively tendered	None	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) (E)	With regards to appropriate governance structure for size and nature of project?				
Was the project managed effectively, including the manner in which Aurizon Network has balanced the requirements of:	(1) Safety during construction and operation?				
	(2) Environmental approvals and compliance?				
	(3) Compliance with legal and authority requirements?				
	(4) Minimising disruption to operation of train services during construction?				
	(5) Did Aurizon Network accommodate the reasonable requests of Access Holders to amend the scope and sequence of works undertaken to suit their needs?				$ -
	(F) Minimising WLC including future maintenance and operating costs?	YES	Engineering Report indicated the ongoing maintenance of the Bridge was far more cost effective than replacing the culverts l ke for like	None	
	(G) Minimising total project costs?	YES	Negotiated tendered		
	(H) Did project elements align with other elements in the supply chain?				
	(I) Did the project meet contractual time frames?				

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
At the time the project was approved, was the program appropriate:	With regards to contingency allowed for?	Yes	A contingency of [redacted] was included	None	
	With regards to project management costs?				
	With regards to risk allowances?	Yes	A risk allowance of [redacted] was included in the overall contingency which total [redacted]	None	$ -
	With regards to timing/delivery program?	Insufficient information	Works programmed over four years	None	
	With regards to ordering and storage of equipment?	Insufficient information		None	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
Cost Allocations	Are there multiple beneficiaries to the project?	YES	Less disruption to users	None	$ -
	If Yes, were the costs allocated appropriately for end users?	N/A			

Comment on Prudency & Efficiency of Cost	Prudent expenditure with medium level of documentation		
Prudent	YES	**Document Quality**	Medium
Efficient	YES	**Status**	FINAL

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Assessment Number	**26**
Project Name	**Track Upgrade FY17**
Project Number	IV.00145
Project Type	Capital Renewal
Project Discipline	TACA
Asset Type	Track
System	System Wide
Expenditure Claimed	$5.15M

Project Overview

The project scope forms part of the Track Renewal Program, which is a coordinated program of renewing the track structure (sleepers, rail, fastenings and in some locations ballast), which aims to maximise the efficiency of asset renewal activities by only mobilising to a site once.
The FY16/17 Track Upgrade program is a continuation of previous renewal projects and is expected to continue until FY18/19. The minimum scope for IV.00145 in FY16/17 was driven by the amount of worn rail that needed to be replaced.

NOTE

The QCA must approve including capital expenditure into the Regulatory Asset Base if that capital expenditure is for the prudent and efficient value of the assets that are used or intended to be used by Aurizon Network to provide the service taken to be declared under section 250(1)(a) of the Act.

Pre-approval by QCA

Assessed by Stuart Lawton

Pre-Approval Capital Expenditure

Has the capital expenditure been pre-approved by the QCA in accordance with Clause 2.2 of Schedule E of the 2016 access undertaking? (including that accepted by interested participants)	NO			$ -	
If yes: Has the capital expenditure been incurred?	N/A			$ -	
Does the capital expenditure approved equal or exceed the amount claimed?	N/A			$ -	
Was there a time limit associated with the pre-approval, and was the project completed within this time limit?	N/A			$ -	
Did the project meet all pre-approval conditions, including but not limited to: Cost to construct the project Time for completion of the project Estimated capacity to be delivered by the project	N/A			$ -	

SCOPE

Assessed by Stuart Lawton

Assessing the prudency of scope of works involves assessing whether the works are reasonably required.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment
Initial Scope Qualification	Are the project works below-rail infrastructure? If not, what proportion of the works are 'below-rail'?	YES	
	Was the project commissioned in 2017-18 (or earlier if they have been deferred for inclusion in the RAB)?	YES	Finalisation of the FY17 scope
	Is the project capital expenditure (capex) and has not otherwise been treated as ongoing maintenance expenditure (opex)?	YES	
	Has the project been covered by other claims, including review events to recover the cost of repairing flood damage?	YES	This is in addition to the claim made in FY17
	Was the project fully funded by Aurizon Network? If not, was the amount claimed for the proportion of works funded by Aurizon Network?	YES	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the scope of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	Based on FY17 review of this project
Interested Participants and Scope Pre-Approval	Has the standard of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	Funding Request Photos Testing documents Site notes Prioritisation spreadsheet
If NO to both of the above, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
	Expansion projects					
2.2 (b) (i)	(A) Was the project aligned to any relevant Network Development Plan?	N/A			$ -	
Whether the requirement for the works is prudent and efficient	(B) Were the works reasonably required to accommodate the requirements of relevant Access Agreements?	N/A			$ -	
	(C) Were the works reasonably required to accommodate current contracted demand and potential future demand that Aurizon Network, acting reasonably, considers is required within a reasonable timeframe?	N/A			$ -	
	Renewal Projects					
	(D) Considering the age and condition of the assets, would operational constraints (load or speed restrictions) on the asset have been required in FY17-18 without this intervention?	YES			$ -	
	(D) Were the works consistent with the Asset Management Plan?	NO			$ -	
	Were the works consistent with any other asset plans?	YES	Prioritisation based on consequence and condition which is consistent with other rail renewals		$ -	
	(D) Were the works reasonably required to reduce external risk to an acceptable level?	YES	Works prioritised where rail has reached its end or is expected to reach the end of the its useful life in the FY		$ -	
	(E) Were the works reasonably required to the extent that the capex project promotes the economically efficient operation of, use of investment in the Rail Infrastructure, whether present or future? (for example, in relation to extending the life of assets whose economic and/or functional life would otherwise have expired, reducing future operating and maintenance costs or improving capability or capacity of existing assets, systems and processes)	YES	Sites are prioritised by worn rail assets and is based on consequence and condition. This is good asset management practice.		$ -	
	(F) Were the works reasonably required to comply with Aurizon Network's legislative and tenure requirements, including relating to rail safety, workplace health and safety, and environmental requirements?	YES	KPI of zero derailments		$ -	
	Stakeholders					
	(G) Comment on any outcomes of consultation about the capital expenditure project, with Access Seekers and Access Holders whose Access Charges (or likely access charges) would be affected by including the amount of capital expenditure for the capital expenditure into the Regulatory Asset Base?	Insufficient information			$ -	
	(H) Comment on any other matters relating to scope in submissions to the QCA by Aurizon Network or Funding Users	Insufficient information			$ -	

Comment on Prudency & Efficiency of Scope	The FY17 Track Upgrade program is a continuation of previous renewal projects and is expected to continue until FY19. The minimum scope for IV.00145 in FY17 was driven by the amount of worn rail that needed to be replaced. Consideration was also given to maximise the productivity of the mobilised resources in that location, such as the additional replacement of fist or timber sleepers. The FY17 Scope Priority model was sighted, showing that the scope was determined by assessing condition and criticality of the track, promotes the economically efficient operation of investment. A sample of inspection photos and notes has also been sighted. The scope of what was delivered for this claim is unclear. The general scope is considered prudent supported by a low level of documentation quality.

Prudent	YES	**Document Quality**	Low
Efficient	YES	**Assessment Status**	FINAL

STANDARD

Assessed by Stuart Lawton

Assessing the prudency and efficiency of standard of works involves assessing whether the works are of a reasonable standard to meet the requirements of the scope and are not overdesigned such that they are beyond the requirements of the scope.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the standard of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	Based on FY17 review of this project Funding Request Photos Testing documents Site notes Prioritisation spreadsheet
Interested Participants and Standard Pre-Approval	Has the scope of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
2.2 (b) (ii)						
Were the works of a reasonable standard to meet the requirements of the scope?	(A) With regard to the requirements of Railway Operators and what is reasonable required to comply with Access Agreements	YES	Based on review of the IAR and completion certificates, the standard of works was consistent with Aurizon standards (SAF/STD/0077/CIV/NET CETS Module 2) A sample of signed project completion certificates have been sighted, including a: • dilapidation report; • inspection test and plan report – sleeper replacement; • inspection test and plan report – track restressing; • inspection test and plan report – site close out; • track validation certificate; and • final completion certificate.		$ -	
	(B) With regards to current and likely future usage levels	YES			$ -	
	(C) With regards to the requirements of other relevant Australia design and construction standards	YES			$ -	
	(D) With regards to the extent of consistency with the Asset Management Plan	NO			$ -	
	(E) With regards to Aurizon Network's design standards contained within its Safety Management System and which is accepted by the Safety Regulator	YES	Based on review of the IAR and completion certificates, the standard of works was consistent with Aurizon standards (SAF/STD/0077/CIV/NET CETS Module 2)		$ -	
	(F) With regards to all relevant laws and the requirements of any Authority (including the Safety Regulator)					
	Would the standard of works be expected to deliver the requirements for the project?	YES			$ -	
	Has the standard of works been overdesigned, or is it likely to deliver a capital works project beyond the requirements of the scope?	NO			$ -	
	(G) Comment on any other matters relating to standard in submissions to the QCA by Aurizon Network or Funding Users				$ -	

Comment on Prudency & Efficiency of Standard	Based on review of the IAR and completion certificates, the standard of works was consistent with Aurizon standards (SAF/STD/0077/CIV/NET CETS Module 2) and configuration of adjacent infrastructure. The project is considered prudent. The documentation quality to inform this assessment of standard is high

Prudent	YES	**Document Quality**	High
Efficient	YES	**Status**	FINAL

COST

Assessed by Gary McDonald

Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
2.2 (b) (iii) **Having regard to the scope and standard of works, are the costs prudent and efficient?**	(A) Do the costs align to any relevant Network Development Plan?	FINAL	Network Track and Civil Program FY17-FY-19	None	$ -	
	(B) Do costs align to scale, nature, and complexity of the project?	FINAL	Approved Funding $26,924,000 funds expended	None		
	(D) Do costs align to any relevant Asset Management Plan?	FINAL	Alignment with approved funding and Network Civil Program FY17-FY19	None		
	Was there a material difference between budgeted and actual costs (i.e. >5%)? Why?	FINAL	Delta with budget and capital costs within 5%	None		
	What proportion of the difference should be considered a capital cost?	FINAL	All works considered capital costs	None		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) **Does the project demonstrate prudency and efficiency of costs?**	(C) With regards to the circumstances prevailing in the market and locality for engineering, equipment supply and construction?	YES	Project delivered under budget and cost reduced due to integration with other projects.	None	$ -
	(C) (1) Did the project demonstrate value for money with regards to sourcing of engineering, equipment supply and construction?	NO	Funding and scope issued too close to project end date forcing scope development and design concurrent with execution .	Minor	
	(C) (2) Did the project demonstrate value for money with regards to sourcing of labour?	YES	Project delivered under budget and cost reduced due to integration with other projects.	None	
	(C) (3) Did the project demonstrate value for money with regards to sourcing of materials?	YES	Project delivered under budget and cost reduced due to integration with other projects.	None	
	Was the procurement methodology consistent with approved procurement strategies?	Insufficient information			

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) (E) **Was the project managed effectively, including the manner in which Aurizon Network has balanced the requirements of:**	With regards to appropriate governance structure for size and nature of project?	Insufficient information			
	(1) Safety during construction and operation?	Insufficient information			
	(2) Environmental approvals and compliance?	Insufficient information			
	(3) Compliance with legal and authority requirements?	Insufficient information			
	(4) Minimising disruption to operation of train services during construction?	NO	Difficulty at some site in obtaining possession of suitable length of track to allow all work to be completed , resolved by remobilising to site at a later date at extra cost.		$ -
	(5) Did Aurizon Network accommodate the reasonable requests of Access Holders to amend the scope and sequence of works undertaken to suit their needs?	Insufficient information			
	(F) Minimising WLC including future maintenance and operating costs?	Insufficient information			
	(G) Minimising total project costs?	YES	Yes evidence of cost saving on project due to sharing and integration of project resources.		
	(H) Did project elements align with other elements in the supply chain?				
	(I) Did the project meet contractual time frames?				

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
At the time the project was approved, was the program appropriate:	With regards to contingency allowed for?	YES	All works completed within budget	None	
	With regards to project management costs?	YES	Evidence of costs savings due to sharing resources	None	
	With regards to risk allowances?	YES	All works completed within budget	None	$ -
	With regards to timing/delivery program?	NO	Remobilisation and delays/disruptions due to access issues to track	Minor	
	With regards to ordering and storage of equipment?	Insufficient information			

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
Cost Allocations	Are there multiple beneficiaries to the project?	Insufficient information			
	If Yes, were the costs allocated appropriately for end users?	Insufficient information			$ -

Comment on Prudency & Efficiency of Cost	Project delivered within budget and scope actually increased. Overall costs were efficient and prudent areas for improvement involve planning and co-ordination of track closures and access		
Prudent	YES	**Document Quality**	Medium
Efficient	YES	**Status**	FINAL

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Assessment Number	4
Project Name	FY17 Autotransformer Renewal Project
Project Number	IV.00154
Project Type	Capital Renewal
Project Discipline	Electrical
Asset Type	Power Systems
System	System Wide
Expenditure Claimed	$1.44M

Project Overview

This project addresses the replacement of eight autotransformers on the Blackwater and Goonyella systems as they are nearing the end of their working lifecycle. It forms part of a 5-year program to replace all autotransformers at these systems. The project uses current specification 14MVA autotransformers to maintain the integrity of the overhead power distribution system and reduce Aurizon Network's exposure to reportable environmental incidents.

NOTE

The QCA must approve including capital expenditure into the Regulatory Asset Base if that capital expenditure is for the prudent and efficient value of the assets that are used or intended to be used by Aurizon Network to provide the service taken to be declared under section 250(1)(a) of the Act.

Pre-approval by QCA

Assessed by Ian Woodhead

Pre-Approval Capital Expenditure	Has the capital expenditure been pre-approved by the QCA in accordance with Clause 2.2 of Schedule E of the 2016 access undertaking? (including that accepted by interested participants)	Insufficient information	Client Requirement Brief and Capital Funding Request has been completed, but there are no signed copies available to approve the works.		$ -	Capital Expenditure - Feasibility Investment Approval Request
	If yes: Has the capital expenditure been incurred?				$ -	
	Does the capital expenditure approved equal or exceed the amount claimed?				$ -	
	Was there a time limit associated with the pre-approval, and was the project completed within this time limit?				$ -	
	Did the project meet all pre-approval conditions, including but not limited to: Cost to construct the project Time for completion of the project Estimated capacity to be delivered by the project				$ -	

SCOPE

Assessed by Ian Woodhead

Assessing the prudency of scope of works involves assessing whether the works are reasonably required.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment
Initial Scope Qualification	Are the project works below-rail infrastructure? If not, what proportion of the works are 'below-rail'?	YES	
	Was the project commissioned in 2015-17 (or earlier if they have been deferred for inclusion in the RAB)?	YES	
	Is the project capital expenditure (capex) and has not otherwise been treated as ongoing maintenance expenditure (opex)?	YES	
	Has the project been covered by other claims, including review events to recover the cost of repairing flood damage?	NO	
	Was the project fully funded by Aurizon Network? If not, was the amount claimed for the proportion of works funded by Aurizon Network?	YES	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the scope of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	Insufficient information	There is no evidence of this available		$ -	Client Requirement Brief and Capital Funding Request
Interested Participants and Scope Pre-Approval	Has the standard of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	Insufficient information	There is no evidence of this available		$ -	
If NO to both of the above, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
	Expansion projects					
2.2 (b) (i)	(A) Was the project aligned to any relevant Network Development Plan?				$ -	
Whether the requirement for the works is prudent and efficient	(B) Were the works reasonably required to accommodate the requirements of relevant Access Agreements?				$ -	
	(C) Were the works reasonably required to accommodate current contracted demand and potential future demand that Aurizon Network, acting reasonably, considers is required within a reasonable timeframe?				$ -	
	Renewal Projects					
	(D) Considering the age and condition of the assets, would operational constraints (load or speed restrictions) on the asset have been required in FY17-18 without this intervention?	YES	Autotransformers are an essential part of the traction power supply system and are required to balance the voltages between the contact wire and feeder wire. Load restrictions would have been required if the availability of the equipment exceeds the minimum operating requirement.		$ -	
	(D) Were the works consistent with the Asset Management Plan?	Insufficient information	The project was to replace 8 autotransformers each year for a 5 year period. From the evidence viewed, it appears that only four autotransformers were replaced during FY17. The Condition Assessment Report in the Client Requirement Brief and Capital Funding Request does not provide sufficient information as to why only four autotransformers were replaced during FY18 and the reasoning into why these ones were chosen.		$ -	
	Were the works consistent with any other asset plans?	Insufficient information			$ -	
	(D) Were the works reasonably required to reduce external risk to an acceptable level?	Insufficient information	Condition Monitoring Report is required to be able to assess this.		$ -	
	(E) Were the works reasonably required to the extent that the capex project promotes the economically efficient operation of, use of investment in the Rail Infrastructure, whether present or future? (for example, in relation to extending the life of assets whose economic and/or functional life would otherwise have expired, reducing future operating and maintenance costs or improving capability or capacity of existing assets, systems and processes)	YES	Autotransformers are an essential part of the traction power supply system and are required to balance the voltages between the contact wire and feeder wire. Load restrictions would have been required if the availability of the equipment exceeds the minimum operating requirement.		$ -	
	(F) Were the works reasonably required to comply with Aurizon Network's legislative and tenure requirements, including relating to rail safety, workplace health and safety, and environmental requirements?	Insufficient information	Condition Monitoring Report is required to be able to assess this.		$ -	
	Stakeholders					
	(G) Comment on any outcomes of consultation about the capital expenditure project, with Access Seekers and Access Holders whose Access Charges (or likely access charges) would be affected by including the amount of capital expenditure for the capital expenditure into the Regulatory Asset Base?	N/A			$ -	
	(H) Comment on any other matters relating to scope in submissions to the QCA by Aurizon Network or Funding Users	N/A			$ -	

Comment on Prudency & Efficiency of Scope	Based on the condition assessments sighted and prioritisation process to identify those autotransformers requiring replacement, the project is considered prudent in scope, supported by a medium level of documentation quality.
Prudent	YES
Efficient	YES

Document Quality	Medium
Assessment Status	FINAL

STANDARD

Assessed by Ian Woodhead

Assessing the prudency and efficiency of standard of works involves assessing whether the works are of a reasonable standard to meet the requirements of the scope and are not overdesigned such that they are beyond the requirements of the scope.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the standard of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	
Interested Participants and Standard Pre-Approval	Has the scope of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
2.2 (b) (ii)	(A) With regard to the requirements of Railway Operators and what is reasonable required to comply with Access Agreements	YES			$ -	
Were the works of a reasonable standard to meet the requirements of the scope?	(B) With regards to current and likely future usage levels	YES			$ -	
	(C) With regards to the requirements of other relevant Australia design and construction standards	Insufficient information	Require copies of the handover documentation for the transformers which have been replaced. Requirements of AS2067:2016, Section 6.7 – Protection Against Fire and Explosion have not been complied.		$ 1,437,365.91	
	(D) With regards to the extent of consistency with the Asset Management Plan	Insufficient information			$ -	
	(E) With regards to Aurizon Network's design standards contained within its Safety Management System and which is accepted by the Safety Regulator	NO	Risk Assessment Template for Feeder Stations has been used for transformer sites.		$ -	
	(F) With regards to all relevant laws and the requirements of any Authority (including the Safety Regulator)					
	Would the standard of works be expected to deliver the requirements for the project?	NO			$ -	
	Has the standard of works been overdesigned, or is it likely to deliver a capital works project beyond the requirements of the scope?	NO	Lack of justification as for not addressing fire and explosion risk at the autotransformer sites		$ -	
	(G) Comment on any other matters relating to standard in submissions to the QCA by Aurizon Network or Funding Users	N/A			$ -	

Comment on Prudency & Efficiency of Standard	It is noted that the existing autotransformer sites have not been modified to comply with the requirements of AS2067:2016, Section 6.7 – Protection Against Fire and Explosion. This is particularly relevant as the new Autotransformers are rated higher than the original units and contain significantly more insulating oil. Inadequate justification for this has been sighted. The risk assessment carried out in 2013 (for feeder stations) and the 2017 autotransformer risk assessment report do not adequately address the requirements of the 2016 update of AS2067 for autotransformer sites. As such, the documentation provided by Aurizon which references these documents is not sufficient justification as for not addressing fire and explosion risk at the autotransformer sites. This project is not considered prudent in standard due to the lack of justification as for not addressing fire and explosion risk at the autotransformer sites. This is supported by a low level of documentation quality. It is recommended that the project is rejected from the FY17/18 claim in its entirety. It is recommended that a risk assessment is undertaken by Aurizon Network for each autotransformer site to determine the requirements for fire and explosion risk protection.

Prudent	NO	**Document Quality**	Low
Efficient	NO	**Status**	FINAL

COST

Assessed by Gary McDonald

Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
2.2 (b) (iii)	(A) Do the costs align to any relevant Network Development Plan?	FINAL	Yes - Part of an ongoing renewal program			
Having regard to the scope and standard of works, are the costs prudent and efficient?	(B) Do costs align to scale, nature, and complexity of the project?	FINAL	Yes - Supply costs significantly less per transformer due to tender process			
	(D) Do costs align to any relevant Asset Management Plan?	FINAL	Yes		$ -	
	Was there a material difference between budgeted and actual costs (i.e. >5%)? Why?	FINAL	Original budget set using Panel agreements however supply of transformers competitively tendered			
	What proportion of the difference should be considered a capital cost?	FINAL	Cost reduction therefore all			
Requirement	**Considerations**	**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
2.2 (b) (iii)	(C) With regards to the circumstances prevailing in the market and locality for engineering, equipment supply and construction?	YES	yes Competitive tender			
Does the project demonstrate prudency and efficiency of costs?	(C) (1) Did the project demonstrate value for money with regards to sourcing of engineering, equipment supply and construction?	YES	Yes			
	(C) (2) Did the project demonstrate value for money with regards to sourcing of labour?	YES			$ -	
	(C) (3) Did the project demonstrate value for money with regards to sourcing of materials?	YES	Yes Competitively tendered			
	Was the procurement methodology consistent with approved procurement strategies?	YES	Material supply competitively tendered			
Requirement	**Considerations**	**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
2.2 (b) (iii) (E)	With regards to appropriate governance structure for size and nature of project?	YES				
Was the project managed effectively, including the manner in which Aurizon Network has balanced the requirements of:	(1) Safety during construction and operation?	YES				
	(2) Environmental approvals and compliance?	YES				
	(3) Compliance with legal and authority requirements?	YES				
	(4) Minimising disruption to operation of train services during construction?	YES				
	(5) Did Aurizon Network accommodate the reasonable requests of Access Holders to amend the scope and sequence of works undertaken to suit their needs?	YES			$ -	
	(F) Minimising WLC including future maintenance and operating costs?	YES				
	(G) Minimising total project costs?	YES				
	(H) Did project elements align with other elements in the supply chain?	YES				
	(I) Did the project meet contractual time frames?	YES				
Requirement	**Considerations**	**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
At the time the project was approved, was the program appropriate:	With regards to contingency allowed for?	YES	[redacted] was allowed however not used			
	With regards to project management costs?	YES				
	With regards to risk allowances?	YES				
	With regards to timing/delivery program?	NO	Program delivered over two years		$ -	
	With regards to ordering and storage of equipment?	Insufficient information				
Requirement	**Considerations**	**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
Cost Allocations	Are there multiple beneficiaries to the project?	N/A	Network reliability is the reason for the works			
	If Yes, were the costs allocated appropriately for end users?	N/A			$ -	

Comment on Prudency & Efficiency of Cost	Costs were competitive and prudent		
Prudent	YES	**Document Quality**	Medium
Efficient	YES	**Status**	FINAL

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Assessment Number	27
Project Name	Turnout Renewal FY17
Project Number	IV.00168
Project Type	Capital Renewal
Project Discipline	TACA
Asset Type	Turnouts
System	System Wide
Expenditure Claimed	$2.69M

Project Overview

A significant part of the capacity of the network and the operational capability of the CQCN is delivered through the operation of turnouts. The CQCN has over 1000 turnouts. Numerous of the existing turnouts are life-expired and require constant maintenance to allow the safe passage of traffic. Additionally, numerous turnouts are operating above their design requirements. The Turnout Renewal Program is a prioritised rolling program of works to replace life expired turnouts.

NOTE

The QCA must approve including capital expenditure into the Regulatory Asset Base if that capital expenditure is for the prudent and efficient value of the assets that are used or intended to be used by Aurizon Network to provide the service taken to be declared under section 250(1)(a) of the Act.

Pre-approval by QCA

Assessed by Stuart Lawton

Pre-Approval Capital Expenditure	Has the capital expenditure been pre-approved by the QCA in accordance with Clause 2.2 of Schedule E of the 2016 access undertaking? (including that accepted by interested participants)	NO			$ -
	If yes:				
	Has the capital expenditure been incurred?	N/A			$ -
	Does the capital expenditure approved equal or exceed the amount claimed?	N/A			$ -
	Was there a time limit associated with the pre-approval, and was the project completed within this time limit?	N/A			$ -
	Did the project meet all pre-approval conditions, including but not limited to: Cost to construct the project Time for completion of the project Estimated capacity to be delivered by the project	N/A			$ -

SCOPE

Assessed by Stuart Lawton

Assessing the prudency of scope of works involves assessing whether the works are reasonably required.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment
Initial Scope Qualification	Are the project works below-rail infrastructure? If not, what proportion of the works are 'below-rail'?	YES	
	Was the project commissioned in 2017-18 (or earlier if they have been deferred for inclusion in the RAB)?	YES	Rolling program of works
	Is the project capital expenditure (capex) and has not otherwise been treated as ongoing maintenance expenditure (opex)?	YES	Renewal works are considered wholly capital expenditure
	Has the project been covered by other claims, including review events to recover the cost of repairing flood damage?	YES	Rolling program of works
	Was the project fully funded by Aurizon Network? If not, was the amount claimed for the proportion of works funded by Aurizon Network?	YES	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the scope of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	Investment Approval Request Civil Scope Prioritisation Model
Interested Participants and Scope Pre-Approval	Has the standard of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO to both of the above, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
	Expansion projects					
2.2 (b) (i)	(A) Was the project aligned to any relevant Network Development Plan?	N/A			$ -	
Whether the requirement for the works is prudent and efficient	(B) Were the works reasonably required to accommodate the requirements of relevant Access Agreements?	N/A			$ -	
	(C) Were the works reasonably required to accommodate current contracted demand and potential future demand that Aurizon Network, acting reasonably, considers is required within a reasonable timeframe?	N/A			$ -	
	Renewal Projects					
	(D) Considering the age and condition of the assets, would operational constraints (load or speed restrictions) on the asset have been required in FY17-18 without this intervention?	YES	The renewed turnouts were assessed as nearing their end of life. Asset failure would represent a risk of derailment.		$ -	
	(D) Were the works consistent with the Asset Management Plan?	N/A	No AMP available		$ -	
	Were the works consistent with any other asset plans?	YES	Consistent with the civil scope prioritisation model used to determine the rolling program of works		$ -	
	(D) Were the works reasonably required to reduce external risk to an acceptable level?	YES	Failure of turnouts represents a risk of derailment.		$ -	
	(E) Were the works reasonably required to the extent that the capex project promotes the economically efficient operation of, use of investment in the Rail Infrastructure, whether present or future? (for example, in relation to extending the life of assets whose economic and/or functional life would otherwise have expired, reducing future operating and maintenance costs or improving capability or capacity of existing assets, systems and processes)	YES	The objective of the project is to upgrade end of life assets to minimise whole of life costs and reduce operational impacts. The project considers the cost of maintenance without replacement.		$ -	
	(F) Were the works reasonably required to comply with Aurizon Network's legislative and tenure requirements, including relating to rail safety, workplace health and safety, and environmental requirements?	YES			$ -	
	Stakeholders					
	(G) Comment on any outcomes of consultation about the capital expenditure project, with Access Seekers and Access Holders whose Access Charges (or likely access charges) would be affected by including the amount of capital expenditure for the capital expenditure into the Regulatory Asset Base?	Insufficient information			$ -	
	(H) Comment on any other matters relating to scope in submissions to the QCA by Aurizon Network or Funding Users	Insufficient information			$ -	

Comment on Prudency & Efficiency of Scope	The scope of works is considered to be prudent. The renewed assets were assessed as being at end of life, and works were undertaken with the objective of minimising whole of life costs and reducing operational impacts.		
Prudent	YES	**Document Quality**	Medium
Efficient	YES	**Assessment Status**	FINAL

STANDARD

Assessed by Stuart Lawton

Assessing the prudency and efficiency of standard of works involves assessing whether the works are of a reasonable standard to meet the requirements of the scope and are not overdesigned such that they are beyond the requirements of the scope.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the standard of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	
Interested Participants and Standard Pre-Approval	Has the scope of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
2.2 (b) (ii)	(A) With regard to the requirements of Railway Operators and what is reasonable required to comply with Access Agreements	YES			$ -	
Were the works of a reasonable standard to meet the requirements of the scope?	(B) With regards to current and likely future usage levels	YES			$ -	
	(C) With regards to the requirements of other relevant Australia design and construction standards				$ -	
	(D) With regards to the extent of consistency with the Asset Management Plan	N/A	No AMP available		$ -	
	(E) With regards to Aurizon Network's design standards contained within its Safety Management System and which is accepted by the Safety Regulator				$ -	
	(F) With regards to all relevant laws and the requirements of any Authority (including the Safety Regulator)					
	Would the standard of works be expected to deliver the requirements for the project?	YES			$ -	
	Has the standard of works been overdesigned, or is it likely to deliver a capital works project beyond the requirements of the scope?	NO	Rolling, prioritised scope of works		$ -	
	(G) Comment on any other matters relating to standard in submissions to the QCA by Aurizon Network or Funding Users				$ -	

Comment on Prudency & Efficiency of Standard	Project completion report sighted. No inspection test plan sighted.		
Prudent	YES	**Document Quality**	High
Efficient	YES	**Status**	FINAL

COST

Assessed by Gary McDonald

Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
2.2 (b) (iii)	(A) Do the costs align to any relevant Network Development Plan?	FINAL	Turnout Renewal Program FY 17	None	$ -	
Having regard to the scope and standard of works, are the costs prudent and efficient?	(B) Do costs align to scale, nature, and complexity of the project?	FINAL	Funds for the renewal works	None		
	(D) Do costs align to any relevant Asset Management Plan?	FINAL	No AMP available	None		
	Was there a material difference between budgeted and actual costs (i.e. >5%)? Why?	NO	The total claimed amount for the project of $10.3 M is less than the total approved amount for the project of $11.5 M.	Minor		
	What proportion of the difference should be considered a capital cost?	FINAL	All costs are considered capital costs	None		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii)	(C) With regards to the circumstances prevailing in the market and locality for engineering, equipment supply and construction?	YES	Design budget $550,000 actual costs $1,065,840 due to increased scope	Medium	$ -
Does the project demonstrate prudency and efficiency of costs?	(C) (1) Did the project demonstrate value for money with regards to sourcing of engineering, equipment supply and construction?	Insufficient information	Actual costs incurred less than approved i.e. approved $11,461,687 compared to actual reported costs $10,262,406 . However completion report indicates costs still to come for the project.	Minor	
	(C) (2) Did the project demonstrate value for money with regards to sourcing of labour?	Insufficient information	Funding and scope were not received in time for full design and construction activities in a financial year	Minor	
	(C) (3) Did the project demonstrate value for money with regards to sourcing of materials?	NO	Funding and scope were not received in time for full design and construction activities financial year	Minor	
	Was the procurement methodology consistent with approved procurement strategies?	NO	Funding and scope were not received in time for full design and construction activities financial year	Minor	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) (E)	With regards to appropriate governance structure for size and nature of project?	NO	Lack of certainty on scope for formation works	Medium	
Was the project managed effectively, including the manner in which Aurizon Network has balanced the requirements of:	(1) Safety during construction and operation?	Insufficient information	No issues raised in completion report	None	
	(2) Environmental approvals and compliance?	Insufficient information	No issues raised in completion report	None	
	(3) Compliance with legal and authority requirements?	Insufficient information	No issues raised in completion report	None	
	(4) Minimising disruption to operation of train services during construction?	YES	Program of works altered to suit track access	Minor	
	(5) Did Aurizon Network accommodate the reasonable requests of Access Holders to amend the scope and sequence of works undertaken to suit their needs?	YES	Scopes changes on design and construction activities managed during execution of project	Minor	$ -
	(F) Minimising WLC including future maintenance and operating costs?	Insufficient information			
	(G) Minimising total project costs?	NO	Late design and lack of clarity with scope may have given rise to increased costs.	Medium	
	(H) Did project elements align with other elements in the supply chain?	NO	Contract [redacted] for bearer supply lapsed without alternative	Minor	
	(I) Did the project meet contractual time frames?	YES	Project completed on time	None	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
At the time the project was approved, was the program appropriate:	With regards to contingency allowed for?	YES	Major risks identified correctly and overall budget not exceeded.	None	
	With regards to project management costs?	YES		None	
	With regards to risk allowances?	YES	Contingency allowance adequate for risk that enervated during execution	None	$ -
	With regards to timing/delivery program?	YES	Work scope completed within nominated program	None	
	With regards to ordering and storage of equipment?	Insufficient information			

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
Cost Allocations	Are there multiple beneficiaries to the project?	Insufficient information			
	If Yes, were the costs allocated appropriately for end users?	Insufficient information			$ -

Comment on Prudency & Efficiency of Cost	While project completed within allocated budget adopting lessons learned regarding definition of scope clarity and timing for approval of funds, may have resulted in savings on the project.		
Prudent	YES	**Document Quality**	Medium
Efficient	YES	**Status**	FINAL

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Assessment Number	**17**
Project Name	**Bridge Ballast Renewals FY17**
Project Number	IV.00170
Project Type	Capital Renewal
Project Discipline	TACA
Asset Type	Formation / Ballast
System	System Wide
Expenditure Claimed	$1.28M

Project Overview

The Aurizon Network has approximately 23.0km of ballast on 258 ballast-deck bridges across central Queensland. Ballast forms the bed upon which sleepers are laid, locking the track in place and facilitating the drainage of water.
Aurizon Network identified that contaminated ballast on bridges was causing track stability issues resulting in poor alignment and increased maintenance intervention. The ballast cannot be cleaned using standard undercutting process used on track away from bridges due to clearance and loading constraints.
The project involved installation of ballast matting, replacement of life-expired ballast on 34 bridges, construction of permanent handrails and trialling glued ballast. The works intend to improve the track condition and safety for workers, and extend the life of the ballast.

NOTE

The QCA must approve including capital expenditure into the Regulatory Asset Base if that capital expenditure is for the prudent and efficient value of the assets that are used or intended to be used by Aurizon Network to provide the service taken to be declared under section 250(1)(a) of the Act.

Pre-approval by QCA

Assessed by Stuart Lawton

Pre-Approval Capital Expenditure	Has the capital expenditure been pre-approved by the QCA in accordance with Clause 2.2 of Schedule E of the 2016 access undertaking? (including that accepted by interested participants)	NO			$ -	
	If yes: Has the capital expenditure been incurred?	N/A			$ -	
	Does the capital expenditure approved equal or exceed the amount claimed?	N/A			$ -	
	Was there a time limit associated with the pre-approval, and was the project completed within this time limit?	N/A			$ -	
	Did the project meet all pre-approval conditions, including but not limited to: Cost to construct the project Time for completion of the project Estimated capacity to be delivered by the project	N/A			$ -	

SCOPE

Assessed by Stuart Lawton

Assessing the prudency of scope of works involves assessing whether the works are reasonably required.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment
Initial Scope Qualification	Are the project works below-rail infrastructure? If not, what proportion of the works are 'below-rail'?	YES	
	Was the project commissioned in 2015-17 (or earlier if they have been deferred for inclusion in the RAB)?		UNKNOWN - PROJECT CLOSE OUT REPORT FOR FY17-18 REQUIRED
	Is the project capital expenditure (capex) and has not otherwise been treated as ongoing maintenance expenditure (opex)?	YES	
	Has the project been covered by other claims, including review events to recover the cost of repairing flood damage?	YES	This is a follow up claim from the FY17 Capex Claim.
	Was the project fully funded by Aurizon Network? If not, was the amount claimed for the proportion of works funded by Aurizon Network?	YES	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the scope of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	Bridge Ballast Renewals Fy17 CRB (0) BRIDGE ROLL-OUTS FOR CQCN - FY17 Scope Scope Priority Model FY17 - 18 05 16 Network Issue IV.00170_Project Execution Plan_V2_BBR IV.00170_Change request summary
Interested Participants and Scope Pre-Approval	Has the standard of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO to both of the above, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
	Expansion projects					
2.2 (b) (i)	(A) Was the project aligned to any relevant Network Development Plan?	N/A			$ -	
Whether the requirement for the works is prudent and efficient	(B) Were the works reasonably required to accommodate the requirements of relevant Access Agreements?	N/A			$ -	
	(C) Were the works reasonably required to accommodate current contracted demand and potential future demand that Aurizon Network, acting reasonably, considers is required within a reasonable timeframe?	N/A			$ -	
	Renewal Projects					
	(D) Considering the age and condition of the assets, would operational constraints (load or speed restrictions) on the asset have been required in FY17-18 without this intervention?	YES	Scope based on bridges on existing/ current speed restrictions impacting revenue traffic throughput. Track geometry data for one bridge sighted for the FY16-17 review that is used to determine the need for ballast replacement on bridges and the track geometry after the works had been completed.		$ -	
	(D) Were the works consistent with the Asset Management Plan?	NO			$ -	
	Were the works consistent with any other asset plans?	YES	Appendix 1 of the Project Execution Plan shows a prioritisation process based criticality (consequence) and condition. This is consistent with other rail renewals		$ -	
	(D) Were the works reasonably required to reduce external risk to an acceptable level?	YES	Coal fouling and other contaminants impede the ballast's drainage functionality. As the ballast becomes increasingly fouled normal track maintenance techniques (i.e. resurfacing) are no longer effective and result in the increasing occurrence of track geometry anomalies and rail faults. These defects cause the track to settle unevenly resulting in a weakened track structure that requires regular and often reactive maintenance. It also increases the risk of derailment, train partings and broken rails. Typically these risks are managed through the use of speed and load restrictions.		$ -	
	(E) Were the works reasonably required to the extent that the capex project promotes the economically efficient operation of, use of investment in the Rail Infrastructure, whether present or future? (for example, in relation to extending the life of assets whose economic and/or functional life would otherwise have expired, reducing future operating and maintenance costs or improving capability or capacity of existing assets, systems and processes)	YES	Minimising track geometry anomalies and rail faults.		$ -	
	(F) Were the works reasonably required to comply with Aurizon Network's legislative and tenure requirements, including relating to rail safety, workplace health and safety, and environmental requirements?	YES			$ -	
	Stakeholders					
	(G) Comment on any outcomes of consultation about the capital expenditure project, with Access Seekers and Access Holders whose Access Charges (or likely access charges) would be affected by including the amount of capital expenditure for the capital expenditure into the Regulatory Asset Base?	Insufficient information			$ -	
	(H) Comment on any other matters relating to scope in submissions to the QCA by Aurizon Network or Funding Users	Insufficient information			$ -	

Comment on Prudency & Efficiency of Scope	The scope of IV.00170 has been built on condition, defects, speed restrictions, new technologies, and corporate plan constraints. The Project Execution Plan shows a prioritisation process that clearly links criticality (consequence) and condition to the selected scope. Scope changes have then been managed appropriately by Change Requests. Track recording car reports and an inspection report has been showing the poor condition o bridges that has been brought forward to the FY17 year.		
Prudent	YES	**Document Quality**	High
Efficient	YES	**Assessment Status**	FINAL

STANDARD

Assessed by Stuart Lawton

Assessing the prudency and efficiency of standard of works involves assessing whether the works are of a reasonable standard to meet the requirements of the scope and are not overdesigned such that they are beyond the requirements of the scope.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the standard of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	Site Information Packs As built Photos Project Closure Requests Geometry testing Funding Request Change Requests Project completion documentation Project Execution Plan Standard Drawings
Interested Participants and Standard Pre-Approval	Has the scope of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
2.2 (b) (ii)	(A) With regard to the requirements of Railway Operators and what is reasonable required to comply with Access Agreements	YES			$ -	
Were the works of a reasonable standard to meet the requirements of the scope?	(B) With regards to current and likely future usage levels	YES			$ -	
	(C) With regards to the requirements of other relevant Australia design and construction standards	YES			$ -	
	(D) With regards to the extent of consistency with the Asset Management Plan	YES			$ -	
	(E) With regards to Aurizon Network's design standards contained within its Safety Management System and which is accepted by the Safety Regulator	YES			$ -	
	(F) With regards to all relevant laws and the requirements of any Authority (including the Safety Regulator)					
	Would the standard of works be expected to deliver the requirements for the project?	YES			$ -	
	Has the standard of works been overdesigned, or is it likely to deliver a capital works project beyond the requirements of the scope?	NO			$ -	
	(G) Comment on any other matters relating to standard in submissions to the QCA by Aurizon Network or Funding Users				$ -	

Comment on Prudency & Efficiency of Standard	Works are comparable with the rest of CQCN and other heavy rail networks in Australia to treat ballast contamination on bridges. Site information packages were sighted for several locations which included: speed and cant data, site photos and as-built drawings. Close out documentation available for most locations. It appears that the capping layer issue at Isaac River noted in the document labelled Supply of Capping Layer Material Meeting Minutes (dated 31 July 2017) provided in IV.00344 Formation Renewal FY18 relates to works included in this project scope. Aurizon Network provided Inspection Test Plans for the Isaac River site, and through email communication on 30 April 2019 stated that 'The capping layer material was used, but completion of the ITP demonstrates that the formation passed its final compaction test, which indicates that the formation was suitable for use and asset life not compromised by the non-conforming material.' The passing of the compaction test does not prove that the material was suitable for use and that asset life has not been compromised. While the compaction of the material may have met the construction specification that does not prove that the capping material is compliant. Based on the information provided, the impact of the use of the material on the expected life of formation and the extent within each site where the
Prudent	YES
Efficient	YES

Document Quality	Medium
Status	FINAL

COST

Assessed by Gary McDonald

Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
2.2 (b) (iii)	(A) Do the costs align to any relevant Network Development Plan?	FINAL	Cost claimed are within the budget however the completion report is signed 30 Sept 2017 but the works claimed finish in April 2018 and are less than the value contained in the Completion Certificate	None	$ -	
Having regard to the scope and standard of works, are the costs prudent and efficient?	(B) Do costs align to scale, nature, and complexity of the project?		Costs are within budget for the scope of work,	None		
	(D) Do costs align to any relevant Asset Management Plan?		Costs fall within the approved budget but appear to have gone beyond the original program	None		
	Was there a material difference between budgeted and actual costs (i.e. >5%)? Why?		The costs claimed in SAP are less than those noted in the completion report dated 30 Sept 2017	None		
	What proportion of the difference should be considered a capital cost?	N/A				

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii)	(C) With regards to the circumstances prevailing in the market and locality for engineering, equipment supply and construction?	YES	Material purchased under existing supply agreement	None	$ -
Does the project demonstrate prudency and efficiency of costs?	(C) (1) Did the project demonstrate value for money with regards to sourcing of engineering, equipment supply and construction?	YES	Rate per m increased on Bridges with length shorter than 75 m length, plus increased material cost.	None	
	(C) (2) Did the project demonstrate value for money with regards to sourcing of labour?	YES	However opportunity to reduce labour costs exist if labour van be rationalised over several projects	None	
	(C) (3) Did the project demonstrate value for money with regards to sourcing of materials?	YES	Material purchased under existing supply agreement	None	
	Was the procurement methodology consistent with approved procurement strategies?	YES	Material purchased under existing supply agreement	None	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) (E)	With regards to appropriate governance structure for size and nature of project?	YES			$ -
Was the project managed effectively, including the manner in which Aurizon Network has balanced the requirements of:	(1) Safety during construction and operation?	Insufficient information			
	(2) Environmental approvals and compliance?	Insufficient information			
	(3) Compliance with legal and authority requirements?	YES	Works required to meet Aurizon design Standards	None	
	(4) Minimising disruption to operation of train services during construction?	YES	Works completed during programmed closures	None	
	(5) Did Aurizon Network accommodate the reasonable requests of Access Holders to amend the scope and sequence of works undertaken to suit their needs?	YES	Works completed during programmed closures	None	
	(F) Minimising WLC including future maintenance and operating costs?	YES	With new permanent balustrades reduced ongoing access costs will be incurred	None	
	(G) Minimising total project costs?	YES	Costs were within budget without expending any of the Contingency	None	
	(H) Did project elements align with other elements in the supply chain?	YES	Material purchased under existing supply agreement	None	
	(I) Did the project meet contractual time frames?	YES	Programme supplied indicates a completion date of 10 March 2018	None	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
At the time the project was approved, was the program appropriate:	With regards to contingency allowed for?	YES	Contingency allowed - not expended	None	$ -
	With regards to project management costs?	YES	Project Management costs -not exceeded	None	
	With regards to risk allowances?	YES	Project delivered within budget	None	
	With regards to timing/delivery program?	Insufficient information			
	With regards to ordering and storage of equipment?	Insufficient information			

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
Cost Allocations	Are there multiple beneficiaries to the project?	N/A	Network reliability	None	$ -
	If Yes, were the costs allocated appropriately for end users?	N/A			

Comment on Prudency & Efficiency of Cost	The cost is considered to be prudent, supported by a low level of documentation quality as change requests are not reconciled into register and as project completion costs do not align with SAP.		
Prudent	YES	**Document Quality**	Low
Efficient	YES	**Status**	FINAL

LINK BACK TO NAVIGATION INDEX

Assessment Number	10
Project Name	Ethernet to Corner SCADA Upgrade FY17
Project Number	IV.00270
Project Type	Capital Renewal
Project Discipline	Systems
Asset Type	Network Controls
System	System Wide
Expenditure Claimed	$3.02M

Project Overview

The Control Systems Program is a rolling program of renewal works with a prioritised scope of works developed and funded yearly. Package 2 of the FY18 program includes Control System Infrastructure works, Asset Protection works, Diagnostic Computers renewals, Location Case renewals, Transmission works and Vital Disabling Panel works.

NOTE

The QCA must approve including capital expenditure into the Regulatory Asset Base if that capital expenditure is for the prudent and efficient value of the assets that are used or intended to be used by Aurizon Network to provide the service taken to be declared under section 250(1)(a) of the Act.

Pre-approval by QCA

Assessed by Ian Woodhead

Pre-Approval Capital Expenditure	Has the capital expenditure been pre-approved by the QCA in accordance with Clause 2.2 of Schedule E of the 2016 access undertaking? (including that accepted by interested participants)	NO			$ -	
	If yes: Has the capital expenditure been incurred?	N/A			$ -	
	Does the capital expenditure approved equal or exceed the amount claimed?	N/A			$ -	
	Was there a time limit associated with the pre-approval, and was the project completed within this time limit?	N/A			$ -	
	Did the project meet all pre-approval conditions, including but not limited to: Cost to construct the project Time for completion of the project Estimated capacity to be delivered by the project	N/A			$ -	

SCOPE

Assessed by Ian Woodhead

Assessing the prudency of scope of works involves assessing whether the works are reasonably required.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment
Initial Scope Qualification	Are the project works below-rail infrastructure? If not, what proportion of the works are 'below-rail'?	YES	Control systems are considered below-rail infrastructure.
	Was the project commissioned in 2017-18 (or earlier if they have been deferred for inclusion in the RAB)?	YES	The completion target was 30/06/18 for the package of works. Works unable to be completed as per original scope have been excluded / pushed back from the FY18 scope.
	Is the project capital expenditure (capex) and has not otherwise been treated as ongoing maintenance expenditure (opex)?	YES	Renewal / replacement works.
	Has the project been covered by other claims, including review events to recover the cost of repairing flood damage?	YES	This project is related to IV.00267 - Asset Protection Equipment Replacement (FY17 works).
	Was the project fully funded by Aurizon Network? If not, was the amount claimed for the proportion of works funded by Aurizon Network?	YES	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i) Interested Participants and Scope Pre-Approval	Has the scope of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	Ethernet to Corner - SCADA Upgrade (2) (Approval Request Form)
	Has the standard of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	IAR - Ethernet to Corner - SCADA Upgrade (A0231) (Investment Approval Request)

If NO to both of the above, complete the following:		Response	Comment	Impact on Claim	Recommended Adjustment
	Expansion projects				
2.2 (b) (i)	(A) Was the project aligned to any relevant Network Development Plan?	N/A			$ -
Whether the requirement for the works is prudent and efficient	(B) Were the works reasonably required to accommodate the requirements of relevant Access Agreements?	N/A			$ -
	(C) Were the works reasonably required to accommodate current contracted demand and potential future demand that Aurizon Network, acting reasonably, considers is required within a reasonable timeframe?	N/A			$ -
	Renewal Projects				
	(D) Considering the age and condition of the assets, would operational constraints (load or speed restrictions) on the asset have been required in FY17-18 without this intervention?	Insufficient information	This is difficult to answer based upon the evidence. The Investment Approval Request Form does reference 104 faults on the Power Supervisory System (PSS). However, the evidence does not show a link between these faults and the impact on the operation of the rail operation. The request form also states that site spares were able to enable consistent operation.		$ -
	(D) Were the works consistent with the Asset Management Plan?	Insufficient information	No Asset Management Plan for the communications network.		$ -
	Were the works consistent with any other asset plans?	Insufficient information	No asset plans or registers available.		$ -
	(D) Were the works reasonably required to reduce external risk to an acceptable level?	Insufficient information			$ -
	(E) Were the works reasonably required to the extent that the capex project promotes the economically efficient operation of, use of investment in the Rail Infrastructure, whether present or future? (for example, in relation to extending the life of assets whose economic and/or functional life would otherwise have expired, reducing future operating and maintenance costs or improving capability or capacity of existing assets, systems and processes)	YES	The evidence of the CISCO Ethernet switches does indicate an improved capability of the assets from a high speed protocol to Ethernet. The project documentation does not reflect the funding request form. The project documentation details procurement, installation and commissioning of CISCO Ethernet switches. I could not find evidence of the RTU upgrades for lobe 2.		$ -
	(F) Were the works reasonably required to comply with Aurizon Network's legislative and tenure requirements, including relating to rail safety, workplace health and safety, and environmental requirements?	YES	The project folder contains evidence of the Safety Management Plan, risk register		$ -
	Stakeholders				
	(G) Comment on any outcomes of consultation about the capital expenditure project, with Access Seekers and Access Holders whose Access Charges (or likely access charges) would be affected by including the amount of capital expenditure for the capital expenditure into the Regulatory Asset Base?	Insufficient information	Not sighted.		$ -
	(H) Comment on any other matters relating to scope in submissions to the QCA by Aurizon Network or Funding Users	Insufficient information	Not sighted.		$ -

20170406 WHSMP Electrical Construction

IV270 risk register

001 - IV.007E2R Project - lessons learned 17 01 18

IV.00270 Ethernet to RTU Project Completion Report 08 05 18

MLM-TSC-CR20-01- Cisco Router Commissioning Certificate

IV00270 161220_06 ST Estimate

Comment on Prudency & Efficiency of Scope	Evidence has been provided for the completion of the power and telecommunication transmission equipment upgrade, however it is unclear whether the RTU replacements have been delivered. In addition, the project scope does not identify works to be completed on lobe 4, and nor does it provide a cost estimate for works on this lobe. Completion details suggest work has been completed at lobe 4, however no evidence of scope changes can be seen in the Change Request Summary document to suggest that this lobe would be included in the scope. Aurizon Network, through email communication on 11 April 2019 advised that the omission of lobe 4 works from the IAR was the result of administrative error. However, the lobe 4 works are still deemed to have been reasonably required to integrate lobe 4 to the rest of the network. This document labelled 'IV0270 ETHERNET TO RTU SITES – RTU SITES TO BE UPGRADED' (dated 10 April 2017) indicates that many of the sites for RTU upgrade works included in the scope were upgraded within the last 5-10 years through TrackPower alliance works. For example, for Lobe 3 alone, sites such as Wallaroo TSC, Dingo FS, Umolo TSC, Bluff FS, Blackwater TSC, Rangal FS, Kinrola TSY and Struan Road FS are understood to have been upgraded through TrackPower works. We understand that this equipment can be expected to last 20-25 years and consider that these assets would still have an expected service lives of 10-20 years. However, it has been cited that the recently installed CP21s are no longer supported and are incompatible with Ethernet upgrades as justification for the works. As such the works are deemed to have been reasonably required, and are considered prudent.
Prudent	YES
Efficient	YES

Document Quality	Medium
Assessment Status	FINAL

STANDARD

Assessed by Ian Woodhead

Assessing the prudency and efficiency of standard of works involves assessing whether the works are of a reasonable standard to meet the requirements of the scope and are not overdesigned such that they are beyond the requirements of the scope.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the standard of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	TD03804#009 - IFC Control Data Comms Network Power SCADA System Saraji TSC Network Schematic
Interested Participants and Standard Pre-Approval	Has the scope of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	001 - IV.00270 EtherNet to Corner - SCADA Upgrade 21 10 16
If NO, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	20170406 WHSMP Electrical Construction
2.2 (b) (ii)	(A) With regard to the requirements of Railway Operators and what is reasonable required to comply with Access Agreements	N/A			$ -	IV00270 Risk Register - run 19 Oct 16
Were the works of a reasonable standard to meet the requirements of the scope?	(B) With regards to current and l kely future usage levels	N/A			$ -	IV.00270 EtherNet to RTU Project Completion Report 08 05 18
	(C) With regards to the requirements of other relevant Australia design and construction standards	Insufficient information	No specific evidence of work complying to Australian standards. Yes, the Funding Request form incorrectly details AS/NZS 5070.2:2008 - Siting and operation of radio-communications facilities… Completion report is not signed Construction standards are not particularly relevant because these works were installations. The is ample evidence of completed commissioning sheets.		$ -	MLM-TSC-CR20-01- Cisco Router Commissioning Certificate
	(D) With regards to the extent of consistency with the Asset Management Plan	Insufficient information	No Asset management plan was provided.		$ -	
	(E) With regards to Aurizon Network's design standards contained within its Safety Management System and which is accepted by the Safety Regulator	YES	The project documentation includes a detailed Safety Management Plan.		$ -	
	(F) With regards to all relevant laws and the requirements of any Authority (including the Safety Regulator) Would the standard of works be expected to deliver the requirements for the project?	NO	No evidence of RPEQ accreditation on IFC drawings. Engineering design section is empty. No evidence of electrical contractor's ticket for power supply connections The is ample evidence of completed commissioning sheets.		$ -	
	Has the standard of works been overdesigned, or is it l kely to deliver a capital works project beyond the requirements of the scope?	NO	There is no evidence of overdesign - refer to information assessed.		$ -	
	(G) Comment on any other matters relating to standard in submissions to the QCA by Aurizon Network or Funding Users				$ -	

Comment on Prudency & Efficiency of Standard	Completion reports have been sighted.		
Prudent	YES	**Document Quality**	Low
Efficient	YES	**Status**	FINAL

COST

Assessed by Gary McDonald

Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
2.2 (b) (iii) **Having regard to the scope and standard of works, are the costs prudent and efficient?**	(A) Do the costs align to any relevant Network Development Plan?	FINAL	Works required to ensure reliability of the SCADA system	None	$ -	
	(B) Do costs align to scale, nature, and complexity of the project?	FINAL	The capital funding request was $3.581m incl [redacted] Contingency The works were a continuation of a previous works project which previously spend [redacted]	None		
	(D) Do costs align to any relevant Asset Management Plan?	FINAL	Asset was at end of life and these works replaced redundant control systems	None		
	Was there a material difference between budgeted and actual costs (i.e. >5%)? Why?	FINAL	Costs were approx. 12% less than budget excl Contingency	None		
	What proportion of the difference should be considered a capital cost?	FINAL	Represents a saving in capital cost	None		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) **Does the project demonstrate prudency and efficiency of costs?**	(C) With regards to the circumstances prevailing in the market and locality for engineering, equipment supply and construction?	YES	The works were a continuation of a previous works project which previously spend $2.846m	None	
	(C) (1) Did the project demonstrate value for money with regards to sourcing of engineering, equipment supply and construction?	YES	The supply of various components was competitively tendered, other goods were taken from Aurizon Operations Warehouse, [redacted] equipment was sole sourced as the supplier is the only one in Australia	None	
	(C) (2) Did the project demonstrate value for money with regards to sourcing of labour?	YES	Competitively tendered supply and installation of Telecommunications, labour for installation of computer equipment self performed within budget		$ -
	(C) (3) Did the project demonstrate value for money with regards to sourcing of materials?	YES	The supply of various components was competitively tendered, other goods were taken from Aurizon Operations Warehouse		
	Was the procurement methodology consistent with approved procurement strategies?	YES	Items generally competitively tender with the exception of [redacted] equipment which was sole sourced as the supplier is the only one in Australia		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) (E)	With regards to appropriate governance structure for size and nature of project?	YES			
Was the project managed effectively, including the manner in which Aurizon Network has balanced the requirements of:	(1) Safety during construction and operation?	Insufficient information			
	(2) Environmental approvals and compliance?	Insufficient information			
	(3) Compliance with legal and authority requirements?	Insufficient information			
	(4) Minimising disruption to operation of train services during construction?	Insufficient information			
	(5) Did Aurizon Network accommodate the reasonable requests of Access Holders to amend the scope and sequence of works undertaken to suit their needs?	Insufficient information			$ -
	(F) Minimising WLC including future maintenance and operating costs?	Insufficient information			
	(G) Minimising total project costs?	YES			
	(H) Did project elements align with other elements in the supply chain?	Insufficient information			
	(I) Did the project meet contractual time frames?	Insufficient information			

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
At the time the project was approved, was the program appropriate:	With regards to contingency allowed for?	YES	Project Contingency was [redacted]		
	With regards to project management costs?	YES	Design budget was $388K actual were $199K		
	With regards to risk allowances?	YES	Contingency not spent		$ -
	With regards to timing/delivery program?	YES			
	With regards to ordering and storage of equipment?	Insufficient information			

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
Cost Allocations	Are there multiple beneficiaries to the project?	Insufficient information			
	If Yes, were the costs allocated appropriately for end users?	Insufficient information			$ -

Comment on Prudency & Efficiency of Cost	There has been no single point of review provided. Asset Protection works relating to the upgrade of 4 dual track HBD/HDW sites exceeded approved budget of $1.4 million. The final cost for site construction by Aurizon ID was $428,000 from an original benchmark estimate of $180,000. Works to Lobe 4 incl in cost but not budget. Despite this the budget was not exceeded		
Prudent	YES	**Document Quality**	Low
Efficient	YES	**Status**	FINAL

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Assessment Number	**20**
Project Name	**Sleeper Renewal Program FY18**
Project Number	IV.00321
Project Type	Capital Renewal
Project Discipline	TACA
Asset Type	Sleepers
System	System Wide
Expenditure Claimed	$6.75M

Project Overview

FY18 Sleeper Renewal Program to replace 600 priority life expired and ineffective timber sleepers and 24,912 corroded fist fastened sleepers designed for 22.5 tonne axle load (t.a.l) with 28 t.a.l Pandrol e-clip concrete sleepers (totalling 25,512 sleepers) at priority sites across CQCN under Aurizon Network's annual Asset Renewal Program.

NOTE

The QCA must approve including capital expenditure into the Regulatory Asset Base if that capital expenditure is for the prudent and efficient value of the assets that are used or intended to be used by Aurizon Network to provide the service taken to be declared under section 250(1)(a) of the Act.

Pre-approval by QCA

Assessed by Stuart Lawton

Pre-Approval Capital Expenditure	Has the capital expenditure been pre-approved by the QCA in accordance with Clause 2.2 of Schedule E of the 2016 access undertaking? (including that accepted by interested participants)	NO			$ -
	If yes:				
	Has the capital expenditure been incurred?	N/A			$ -
	Does the capital expenditure approved equal or exceed the amount claimed?	N/A			$ -
	Was there a time limit associated with the pre-approval, and was the project completed within this time limit?	N/A			$ -
	Did the project meet all pre-approval conditions, including but not limited to: Cost to construct the project Time for completion of the project Estimated capacity to be delivered by the project	N/A			$ -

SCOPE

Assessed by Stuart Lawton

Assessing the prudency of scope of works involves assessing whether the works are reasonably required.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment
Initial Scope Qualification	Are the project works below-rail infrastructure? If not, what proportion of the works are 'below-rail'?	YES	
	Was the project commissioned in 2015-17 (or earlier if they have been deferred for inclusion in the RAB)?	NO	Not all works were completed in FY17-18 as it extended to Dec 2018. Check required of what value has been claimed against the scope delivered before the end of FY17-18.
	Is the project capital expenditure (capex) and has not otherwise been treated as ongoing maintenance expenditure (opex)?	YES	
	Has the project been covered by other claims, including review events to recover the cost of repairing flood damage?	NO	
	Was the project fully funded by Aurizon Network? If not, was the amount claimed for the proportion of works funded by Aurizon Network?	YES	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the scope of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	
Interested Participants and Scope Pre-Approval	Has the standard of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO to both of the above, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
	Expansion projects					
2.2 (b) (i)	(A) Was the project aligned to any relevant Network Development Plan?	N/A			$ -	
Whether the requirement for the works is prudent and efficient	(B) Were the works reasonably required to accommodate the requirements of relevant Access Agreements?	N/A			$ -	
	(C) Were the works reasonably required to accommodate current contracted demand and potential future demand that Aurizon Network, acting reasonably, considers is required within a reasonable timeframe?	N/A			$ -	
	Renewal Projects					
	(D) Considering the age and condition of the assets, would operational constraints (load or speed restrictions) on the asset have been required in FY17-18 without this intervention?		The scope for FY18 has been identified in accordance with a developed priority rating. This rating is assessed and determined by: •The current condition of the sleepers and corrosion of the clips; •The impact of traffic and frequency of tonnages on that track section; •The probability of negative impact to the Network; and •The availability of access to the track location if failure did occur		$ -	
	(D) Were the works consistent with the Asset Management Plan?	NO	Not available		$ -	
	Were the works consistent with any other asset plans?	YES	Prioritisation based on consequence and condition which is consistent with other rail renewals and included in the Scope Prioritisation Model.		$ -	
	(D) Were the works reasonably required to reduce external risk to an acceptable level?		Condition information to support values include in the prioritisation model to be reviewed		$ -	
	(E) Were the works reasonably required to the extent that the capex project promotes the economically efficient operation of, use of investment in the Rail Infrastructure, whether present or future? (for example, in relation to extending the life of assets whose economic and/or functional life would otherwise have expired, reducing future operating and maintenance costs or improving capability or capacity of existing assets, systems and processes)	YES	Sites are prioritised by worn rail assets and is based on consequence and condition. This is good asset management practice.		$ -	
	(F) Were the works reasonably required to comply with Aurizon Network's legislative and tenure requirements, including relating to rail safety, workplace health and safety, and environmental requirements?	YES			$ -	
	Stakeholders					
	(G) Comment on any outcomes of consultation about the capital expenditure project, with Access Seekers and Access Holders whose Access Charges (or l kely access charges) would be affected by including the amount of capital expenditure for the capital expenditure into the Regulatory Asset Base?	Insufficient information			$ -	
	(H) Comment on any other matters relating to scope in submissions to the QCA by Aurizon Network or Funding Users		Exact scope delivered in FY17-18 to be confirmed.		$ -	

Comment on Prudency & Efficiency of Scope	Prioritisation of scope based on output of the Scope Prioritisation Model (SPM) which considers condition and criticality. At this time the condition information to support the score in the SPM is not available. Efficiency developed based on grouping scope together and available track access is appropriate.		
Prudent	YES	**Document Quality**	High
Efficient	YES	**Assessment Status**	FINAL

STANDARD

Assessed by Stuart Lawton

Assessing the prudency and efficiency of standard of works involves assessing whether the works are of a reasonable standard to meet the requirements of the scope and are not overdesigned such that they are beyond the requirements of the scope.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the standard of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	
Interested Participants and Standard Pre-Approval	Has the scope of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
2.2 (b) (ii)	(A) With regard to the requirements of Railway Operators and what is reasonable required to comply with Access Agreements	YES			$ -	
Were the works of a reasonable standard to meet the requirements of the scope?	(B) With regards to current and likely future usage levels	YES	Use of 28 t.a.l Pandrol sleepers instead of 22.5 t.a.l		$ -	
	(C) With regards to the requirements of other relevant Australia design and construction standards	YES	The use of concrete e-clip sleepers with a load rating of 28 t.a.l. is consistent with Aurizon standards which are		$ -	
	(D) With regards to the extent of consistency with the Asset Management Plan	NO	No AMP available		$ -	
	(E) With regards to Aurizon Network's design standards contained within its Safety Management System and which is accepted by the Safety Regulator	YES	QR standard drawing used in conjunction with Aurizon standards		$ -	
	(F) With regards to all relevant laws and the requirements of any Authority (including the Safety Regulator)					
	Would the standard of works be expected to deliver the requirements for the project?	YES			$ -	
	Has the standard of works been overdesigned, or is it likely to deliver a capital works project beyond the requirements of the scope?	NO			$ -	
	(G) Comment on any other matters relating to standard in submissions to the QCA by Aurizon Network or Funding Users				$ -	

Comment on Prudency & Efficiency of Standard	The use of concrete e-clip sleepers with a load rating of 28 t.a.l. is consistent with Aurizon standards which are generally in line with industry practice. Standard drawings, technical standards, testing reports and closeout documentation have been sighted, and as such, the project scope is assessed as prudent. The documentation quality to inform this assessment of standard is high.
Prudent	YES
Efficient	YES

Document Quality	High
Status	FINAL

COST

Assessed by Gary McDonald

Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
2.2 (b) (iii)	(A) Do the costs align to any relevant Network Development Plan?	FINAL	Yes Sleeper renewal program			
Having regard to the scope and standard of works, are the costs prudent and efficient?	(B) Do costs align to scale, nature, and complexity of the project?	FINAL	Original budget was [redacted] each for [redacted] sleepers, whereas the actual cost was [redacted] sleepers. Scope was reduce by Capital Challenge project removing [redacted] sleepers from scope with a cost reduction of [redacted] and a further [redacted] sleeper were removed due to design constraints			
	(D) Do costs align to any relevant Asset Management Plan?	FINAL	Renewal program		$ -	
	Was there a material difference between budgeted and actual costs (i.e. >5%)? Why?	FINAL	Rate per sleeper increased from budgeted [redacted] per sleeper to [redacted] average per sleeper but included replacement insulators (not previously included in budget). Multiple mobilisations and demobilisations at various sites were required due to the scope of works at each site exceeding available timeframes, incurring additional costs over that budgeted.			
	What proportion of the difference should be considered a capital cost?		The difference all relates Capital Cost			

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii)	(C) With regards to the circumstances prevailing in the market and locality for engineering, equipment supply and construction?		Sleepers purchased through supplier agreements		
Does the project demonstrate prudency and efficiency of costs?	(C) (1) Did the project demonstrate value for money with regards to sourcing of engineering, equipment supply and construction?		Sleepers purchased through supplier agreements		
	(C) (2) Did the project demonstrate value for money with regards to sourcing of labour?		Labour increased due to multiple mob and demob to suit track closures		$ -
	(C) (3) Did the project demonstrate value for money with regards to sourcing of materials?		Sleepers purchased through supplier agreements		
	Was the procurement methodology consistent with approved procurement strategies?		Sleepers purchased through supplier agreements		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) (E)	With regards to appropriate governance structure for size and nature of project?	YES	Scope reduced from [redacted] sleeper to [redacted]		
Was the project managed effectively, including the manner in which Aurizon Network has balanced the requirements of:	(1) Safety during construction and operation?	Insufficient information			
	(2) Environmental approvals and compliance?	Insufficient information			
	(3) Compliance with legal and authority requirements?	Insufficient information			
	(4) Minimising disruption to operation of train services during construction?	YES	Works performed during planned closures		
	(5) Did Aurizon Network accommodate the reasonable requests of Access Holders to amend the scope and sequence of works undertaken to suit their needs?	N/A			$ 310,273.43
	(F) Minimising WLC including future maintenance and operating costs?	YES	Sleepers and insulators installed in accordance with Aurizon Standards		
	(G) Minimising total project costs?	NO	Multiple Mob and Demob at various sites to fit with schedules closures incurred additional costs over that budgeted	Minor	
	(H) Did project elements align with other elements in the supply chain?	Insufficient information	Multiple Mob and Demob at various sites to fit with schedules closures		
	(I) Did the project meet contractual time frames?	YES	Completion achieved prior to July 2019		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
At the time the project was approved, was the program appropriate:	With regards to contingency allowed for?	YES	[redacted] Contingency allowed in original budget		
	With regards to project management costs?	YES	Overheads costs significantly less than budgeted as a large portion of the works was deleted		
	With regards to risk allowances?	YES	Budget costs not exceeded		$ -
	With regards to timing/delivery program?	YES	Works finished on program however scope reduced significantly		
	With regards to ordering and storage of equipment?	Insufficient information			

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
Cost Allocations	Are there multiple beneficiaries to the project?	N/A			
	If Yes, were the costs allocated appropriately for end users?	N/A			$ -

Comment on Prudency & Efficiency of Cost	The original cost for the project was budgeted for [redacted] per sleeper, for [redacted] sleepers. The actual cost for works incurred was [redacted] per sleeper, [redacted] sleepers. The scope was reduced by Capital Challenge project removing [redacted] sleepers from the scope. This resulted in a cost reduction of [redacted]. A further [redacted] sleepers were removed due to design constraints. Multiple mobilisations and demobilisations at various sites were required due to the scope of works at each site exceeding available timeframes, incurring additional costs over that budgeted. This has resulted in a high unit rate for works completed. The budgeted unit cost of [redacted] per sleeper is considered to be a stretch target, as the actual cost of works incurred in FY16/17 was [redacted] per sleeper. Considering this, the difference between the FY17/18 and FY16/17 unit rates has been used to calculate the recommended cost deduction.
Prudent	NO
Efficient	NO

Document Quality	Low
Status	FINAL

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Assessment Number	**23**
Project Name	**Track Upgrade FY18**
Project Number	IV.00323
Project Type	Capital Renewal
Project Discipline	TACA
Asset Type	Track
System	System Wide
Expenditure Claimed	$23.45M

Project Overview

A track upgrade site is the combination of a site with worn rail and an area of fist or timber sleepers of which both the rail and sleeper require replacement. The project involved upgrading 24.6km of track and 32,860 sleepers with galvanized Pandrol E-clips and new ballast in the Goonyella, Newlands, Moura and Blackwater systems. The renewal of track assets at these locations ensures the ongoing integrity of the below rail infrastructure to facilitate the current and future traffic task.

NOTE

The QCA must approve including capital expenditure into the Regulatory Asset Base if that capital expenditure is for the prudent and efficient value of the assets that are used or intended to be used by Aurizon Network to provide the service taken to be declared under section 250(1)(a) of the Act.

Pre-approval by QCA

Assessed by Stuart Lawton

Pre-Approval Capital Expenditure	Has the capital expenditure been pre-approved by the QCA in accordance with Clause 2.2 of Schedule E of the 2016 access undertaking? (including that accepted by interested participants)	NO			$ -	
	If yes:					
	Has the capital expenditure been incurred?	N/A			$ -	
	Does the capital expenditure approved equal or exceed the amount claimed?	N/A			$ -	
	Was there a time limit associated with the pre-approval, and was the project completed within this time limit?	N/A			$ -	
	Did the project meet all pre-approval conditions, including but not limited to: Cost to construct the project Time for completion of the project Estimated capacity to be delivered by the project	N/A			$ -	

SCOPE

Assessed by Stuart Lawton

Assessing the prudency of scope of works involves assessing whether the works are reasonably required.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment
Initial Scope Qualification	Are the project works below-rail infrastructure? If not, what proportion of the works are 'below-rail'?	YES	
	Was the project commissioned in 2015-17 (or earlier if they have been deferred for inclusion in the RAB)?	NO	
	Is the project capital expenditure (capex) and has not otherwise been treated as ongoing maintenance expenditure (opex)?	YES	
	Has the project been covered by other claims, including review events to recover the cost of repairing flood damage?	NO	
	Was the project fully funded by Aurizon Network? If not, was the amount claimed for the proportion of works funded by Aurizon Network?	YES	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the scope of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	
Interested Participants and Scope Pre-Approval	Has the standard of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO to both of the above, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
	Expansion projects					
2.2 (b) (i)	(A) Was the project aligned to any relevant Network Development Plan?	N/A			$ -	
Whether the requirement for the works is prudent and efficient	(B) Were the works reasonably required to accommodate the requirements of relevant Access Agreements?	N/A			$ -	
	(C) Were the works reasonably required to accommodate current contracted demand and potential future demand that Aurizon Network, acting reasonably, considers is required within a reasonable timeframe?	N/A			$ -	
	Renewal Projects					
	(D) Considering the age and condition of the assets, would operational constraints (load or speed restrictions) on the asset have been required in FY17-18 without this intervention?	NO	Track inspection for scoping has been made available for review. Some inspection forms included condition and fastener ratings in line with the SPM. For most of the scoped locations the reporting would indicate that operational constraints would need to be applied to the location without undertaking the works.	Minor	$ 150,000.00	
	(D) Were the works consistent with the Asset Management Plan?	NO	Asset management plan not referenced		$ -	
	Were the works consistent with any other asset plans?	YES	Prioritisation from the SPM		$ -	
	(D) Were the works reasonably required to reduce external risk to an acceptable level?	YES			$ -	
	(E) Were the works reasonably required to the extent that the capex project promotes the economically efficient operation of, use of investment in the Rail Infrastructure, whether present or future? (for example, in relation to extending the life of assets whose economic and/or functional life would otherwise have expired, reducing future operating and maintenance costs or improving capability or capacity of existing assets, systems and processes)	YES	Combining rerail and sleepers where both are approaching end of life is sound asset management practice.		$ -	
	(F) Were the works reasonably required to comply with Aurizon Network's legislative and tenure requirements, including relating to rail safety, workplace health and safety, and environmental requirements?	YES	Referenced in funding approval		$ -	
	Stakeholders					
	(G) Comment on any outcomes of consultation about the capital expenditure project, with Access Seekers and Access Holders whose Access Charges (or likely access charges) would be affected by including the amount of capital expenditure for the capital expenditure into the Regulatory Asset Base?	Insufficient information			$ -	
	(H) Comment on any other matters relating to scope in submissions to the QCA by Aurizon Network or Funding Users				$ -	

Comment on Prudency & Efficiency of Scope	Some locations with condition 1 and 2 ratings (‘as new’ and ‘good’ respectively) have been included in the scope of the project, having been manually included in the FY17/18 scope within the SPM. Condition documentation to support the inclusion of these scope items was requested for 12 locations. Aurizon Network provided supporting rail wear data for 11 of these 12 scope items via email communication on 24 April 2019. Based on the provided information, there are two scope items where the replacement of rail is considered to be not prudent: • For GA Coppabella Yard DN RD 145.612-146.046km, the sleeper condition data contained in the SPM supports the completed sleeper renewal works. However, the provided rail wear data indicates that the rate of wear for both rails is over 50 % less than the wear limits outlined in Civil Engineering Track Standards (CETS) Module 2 (Section 2.12.2). Based on the information provided, it is considered that the rail would have had a remaining life expectancy of approximately 10-14 years. Given this, it is considered that the benefits of replacing rail on the basis of efficiency are outweighed by the loss of service life, and the rail renewal works at this location are not considered prudent. • No further condition information was provided for GA Coppabella-Broadlea UP RD 147.83-148.100km. Based on the sleeper condition data provided in the SPM, the sleeper renewal works are considered prudent. However, whilst requested, no condition information has been provided for the replaced rail at this location, and no condition information was contained in the SPM. As such, the rail renewal works at this location are not considered prudent. A unit rate of [redacted] for material rail costs has been used to calculate a recommended cost deduction of $150,000 for these two scope items, reflective of the additional costs of rerailing. Only material rail costs have been accounted for, as the rail would still need to have been removed to complete the sleeper renewal works at these locations.
Prudent	NO
Efficient	NO

Document Quality	Low
Assessment Status	FINAL

STANDARD

Assessed by Stuart Lawton

Assessing the prudency and efficiency of standard of works involves assessing whether the works are of a reasonable standard to meet the requirements of the scope and are not overdesigned such that they are beyond the requirements of the scope.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the standard of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	
Interested Participants and Standard Pre-Approval	Has the scope of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
2.2 (b) (ii)						
Were the works of a reasonable standard to meet the requirements of the scope?	(A) With regard to the requirements of Railway Operators and what is reasonable required to comply with Access Agreements	YES	The standard of works was consistent with Aurizon standards (SAF/STD/0077/CIV/NET CETS Module 2) A sample of signed project completion certificates have been sighted, including a: • dilapidation report; • inspection test and plan report – sleeper replacement; • inspection test and plan report – track restressing; • inspection test and plan report – site close out; • track validation certificate; and • final completion certificate.		$ -	IAR Track Inspection forms Track validation forms
	(B) With regards to current and likely future usage levels	YES			$ -	
	(C) With regards to the requirements of other relevant Australia design and construction standards	YES			$ -	
	(D) With regards to the extent of consistency with the Asset Management Plan	NO			$ -	
	(E) With regards to Aurizon Network's design standards contained within its Safety Management System and which is accepted by the Safety Regulator	YES	Based on review of the IAR and completion certificates, the standard of works was consistent with Aurizon standards (SAF/STD/0077/CIV/NET CETS Module 2)		$ -	
	(F) With regards to all relevant laws and the requirements of any Authority (including the Safety Regulator)					
	Would the standard of works be expected to deliver the requirements for the project?	YES	In line with CETS		$ -	
	Has the standard of works been overdesigned, or is it likely to deliver a capital works project beyond the requirements of the scope?	NO	In line with CETS		$ -	
	(G) Comment on any other matters relating to standard in submissions to the QCA by Aurizon Network or Funding Users				$ -	

Comment on Prudency & Efficiency of Standard	Based on review of the IAR and completion certificates, the standard of works was consistent with configuration of adjacent infrastructure and Aurizon standards (SAF/STD/0077/CIV/NET CETS Module 2). The project is considered prudent. The documentation quality to inform this assessment of standard is high		
Prudent	YES	**Document Quality**	High
Efficient	YES	**Status**	FINAL

COST

Assessed by Gary McDonald

Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
2.2 (b) (iii)	(A) Do the costs align to any relevant Network Development Plan?	FINAL	Track Renewal Program CETS	None	$ -	
Having regard to the scope and standard of works, are the costs prudent and efficient?	(B) Do costs align to scale, nature, and complexity of the project?	FINAL	Yes cost s do align as scope involves renewal of track,	None		
	(D) Do costs align to any relevant Asset Management Plan?	FINAL	Yes Track renewal plan	None		
	Was there a material difference between budgeted and actual costs (i.e. >5%)? Why?	FINAL	Budget costs $29.48 Million actual costs $23.64 Million . Cost reduction mainly due to scope decreases.	Medium		
	What proportion of the difference should be considered a capital cost?	FINAL	All	None		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii)	(C) With regards to the circumstances prevailing in the market and locality for engineering, equipment supply and construction?	YES	Cost of [redacted] within Budget	None	$ -
Does the project demonstrate prudency and efficiency of costs?	(C) (1) Did the project demonstrate value for money with regards to sourcing of engineering, equipment supply and construction?	YES	Based on returned costs per KM	None	
	(C) (2) Did the project demonstrate value for money with regards to sourcing of labour?	YES	Based on returned costs per KM	None	
	(C) (3) Did the project demonstrate value for money with regards to sourcing of materials?	YES	Based on returned costs per KM	None	
	Was the procurement methodology consistent with approved procurement strategies?	Insufficient information	No detail available on procurement plan used during execution		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) (E)	With regards to appropriate governance structure for size and nature of project?	NO	Greater than anticipated project management cost incurred to complete increased planning effort to complete scope.	Medium	
Was the project managed effectively, including the manner in which Aurizon Network has balanced the requirements of:	(1) Safety during construction and operation?	Insufficient information	No Safety Stats included in completion report		
	(2) Environmental approvals and compliance?	Insufficient information	No Environmental KPIs included in completion report		
	(3) Compliance with legal and authority requirements?	Insufficient information	No included in completion report		
	(4) Minimising disruption to operation of train services during construction?	YES	Large effort and budget allocation to plan and co-ordinate construction effort to reduce disruption to normal rail operations.	Medium	
	(5) Did Aurizon Network accommodate the reasonable requests of Access Holders to amend the scope and sequence of works undertaken to suit their needs?	YES	Large effort and budget allocation to plan and co-ordinate construction effort to reduce disruption to normal rail operations.	Medium	$ -
	(F) Minimising WLC including future maintenance and operating costs?	Insufficient information			
	(G) Minimising total project costs?	NO	Refer lessons learnt section 5.0 of completion report for areas to minimise costs.	Medium	
	(H) Did project elements align with other elements in the supply chain?	Insufficient information	No details included to make informed decision		
	(I) Did the project meet contractual time frames?	NO	Scope not completed has been transferred for completion in FY20	Medium	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
At the time the project was approved, was the program appropriate:	With regards to contingency allowed for?	YES	No major overrun in costs due to unforeseen circumstances	None	
	With regards to project management costs?	NO	Overrun in project management costs especially	Medium	
	With regards to risk allowances?	Insufficient information	details of risk allowances included required to comment		$ -
	With regards to timing/delivery program?	NO	Unable to confirm with network operations when single line closures are approved to meet planning window	Medium	
	With regards to ordering and storage of equipment?	Insufficient information	More information required to comment	Minor	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
Cost Allocations	Are there multiple beneficiaries to the project?	YES			
	If Yes, were the costs allocated appropriately for end users?	YES			$ -

Comment on Prudency & Efficiency of Cost	Costs of similar the work completed may be reduced if lessons learnt recommendations implemented		
Prudent	YES	**Document Quality**	Medium
Efficient	YES	**Status**	FINAL

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Assessment Number	18
Project Name	Level Crossings Renewal Program FY18
Project Number	IV.00343
Project Type	Capital Renewal
Project Discipline	TACA
Asset Type	Level Crossings
System	System Wide
Expenditure Claimed	$5.42M

Project Overview

This project is the continuation of the program of identifying and renewing level crossings on a cyclic basis within the Goonyella, Moura, Newlands and Blackwater systems. The project seeks to mitigate against level crossing failures that arise within the CQCN system in order to minimise safety risks to all stakeholders and prevent disruption to rail traffic.

NOTE

The QCA must approve including capital expenditure into the Regulatory Asset Base if that capital expenditure is for the prudent and efficient value of the assets that are used or intended to be used by Aurizon Network to provide the service taken to be declared under section 250(1)(a) of the Act.

Pre-approval by QCA

Assessed by Stuart Lawton

Pre-Approval Capital Expenditure	Has the capital expenditure been pre-approved by the QCA in accordance with Clause 2.2 of Schedule E of the 2016 access undertaking? (including that accepted by interested participants)	NO			$ -	
	If yes:					
	Has the capital expenditure been incurred?	N/A			$ -	
	Does the capital expenditure approved equal or exceed the amount claimed?	N/A			$ -	
	Was there a time limit associated with the pre-approval, and was the project completed within this time limit?	N/A			$ -	
	Did the project meet all pre-approval conditions, including but not limited to: Cost to construct the project Time for completion of the project Estimated capacity to be delivered by the project	N/A			$ -	

SCOPE

Assessed by Stuart Lawton

Assessing the prudency of scope of works involves assessing whether the works are reasonably required.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment
Initial Scope Qualification	Are the project works below-rail infrastructure? If not, what proportion of the works are 'below-rail'?	YES	
	Was the project commissioned in 2015-17 (or earlier if they have been deferred for inclusion in the RAB)?	Insufficient information	No closeout report provided for review.
	Is the project capital expenditure (capex) and has not otherwise been treated as ongoing maintenance expenditure (opex)?	YES	
	Has the project been covered by other claims, including review events to recover the cost of repairing flood damage?	NO	
	Was the project fully funded by Aurizon Network? If not, was the amount claimed for the proportion of works funded by Aurizon Network?	YES	Investment Approval Request

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the scope of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	
Interested Participants and Scope Pre-Approval	Has the standard of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO to both of the above, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
	Expansion projects					
2.2 (b) (i)	(A) Was the project aligned to any relevant Network Development Plan?	N/A			$ -	
Whether the requirement for the works is prudent and efficient	(B) Were the works reasonably required to accommodate the requirements of relevant Access Agreements?	N/A			$ -	
	(C) Were the works reasonably required to accommodate current contracted demand and potential future demand that Aurizon Network, acting reasonably, considers is required within a reasonable timeframe?	N/A			$ -	
	Renewal Projects					
	(D) Considering the age and condition of the assets, would operational constraints (load or speed restrictions) on the asset have been required in FY17-18 without this intervention?	Insufficient information	For renewals and flangeway: Condition rating provided in SPM. Photos and inspection notes align with the condition rating provided. For ALCAM inspections: No detail provided for how the inspections were selected. For other scope: Condition ratings not provided in SPM for LED upgrades and remote monitoring. Details of Level Crossing ALCAM score not provided.		$ -	
	(D) Were the works consistent with the Asset Management Plan?	NO	Asset management plan not referenced		$ -	
	Were the works consistent with any other asset plans?	YES	Prioritisation from the SPM		$ -	
	(D) Were the works reasonably required to reduce external risk to an acceptable level?	YES			$ -	
	(E) Were the works reasonably required to the extent that the capex project promotes the economically efficient operation of, use of investment in the Rail Infrastructure, whether present or future? (for example, in relation to extending the life of assets whose economic and/or functional life would otherwise have expired, reducing future operating and maintenance costs or improving capability or capacity of existing assets, systems and processes)	YES			$ -	
	(F) Were the works reasonably required to comply with Aurizon Network's legislative and tenure requirements, including relating to rail safety, workplace health and safety, and environmental requirements?	YES			$ -	
	Stakeholders					
	(G) Comment on any outcomes of consultation about the capital expenditure project, with Access Seekers and Access Holders whose Access Charges (or likely access charges) would be affected by including the amount of capital expenditure for the capital expenditure into the Regulatory Asset Base?	Insufficient information			$ -	
	(H) Comment on any other matters relating to scope in submissions to the QCA by Aurizon Network or Funding Users				$ -	

Comment on Prudency & Efficiency of Scope	Except for renewals and flangeways there is a lack of information to confirm the condition of the level crossings included within the project scope.		
Prudent	YES	**Document Quality**	Low
Efficient	YES	**Assessment Status**	FINAL

STANDARD

Assessed by Stuart Lawton

Assessing the prudency and efficiency of standard of works involves assessing whether the works are of a reasonable standard to meet the requirements of the scope and are not overdesigned such that they are beyond the requirements of the scope.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the standard of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	
Interested Participants and Standard Pre-Approval	Has the scope of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
2.2 (b) (ii)	(A) With regard to the requirements of Railway Operators and what is reasonable required to comply with Access Agreements	YES			$ -	
Were the works of a reasonable standard to meet the requirements of the scope?	(B) With regards to current and likely future usage levels	YES	Removals undertaken through engagement with road user.		$ -	
	(C) With regards to the requirements of other relevant Australia design and construction standards	YES			$ -	
	(D) With regards to the extent of consistency with the Asset Management Plan	NO			$ -	
	(E) With regards to Aurizon Network's design standards contained within its Safety Management System and which is accepted by the Safety Regulator	YES			$ -	
	(F) With regards to all relevant laws and the requirements of any Authority (including the Safety Regulator)					
	Would the standard of works be expected to deliver the requirements for the project?	YES			$ -	
	Has the standard of works been overdesigned, or is it likely to deliver a capital works project beyond the requirements of the scope?	NO			$ -	
	(G) Comment on any other matters relating to standard in submissions to the QCA by Aurizon Network or Funding Users				$ -	

Comment on Prudency & Efficiency of Standard	Standard of scope is consistent with Aurizon Standards and configuration of adjacent similar infrastructure. However, the inspection test plan for formation works at Level Crossing ID20134 indicates that non-conforming capping material has been used. The non-conformance is against technical specification MRTS05. Aurizon Network provided ITPs and Materials Conformance Checklists for the Dysart site, and through email communication on 30 April 2019 stated that 'The capping layer material was used, but completion of the ITP demonstrates that the formation passed its final compaction test, which indicates that the formation was suitable for use and asset life not compromised by the non-conforming material.' Passing of the compaction test does not prove that the material was suitable for use and that asset life has not been compromised. While the compaction of the material may have met the construction specification that does not prove that the capping material is compliant. Based on the information provided, the impact of the use of the material on the expected life of formation and the extent within each site where the material has been used cannot accurately be determined. As the impact of the use of potentially non-conforming capping layer material is uncertain, a cost deduction is not recommended.

Prudent	YES	**Document Quality**	Medium
Efficient	YES	**Status**	FINAL

COST

Assessed by Gary McDonald

Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
2.2 (b) (iii) **Having regard to the scope and standard of works, are the costs prudent and efficient?**	(A) Do the costs align to any relevant Network Development Plan?	FINAL	Level Crossings Renewal Program FY18	None	$ -	
	(B) Do costs align to scale, nature, and complexity of the project?	FINAL	Yes	None		
	(D) Do costs align to any relevant Asset Management Plan?	FINAL	Level Crossings Renewal Program FY18	None		
	Was there a material difference between budgeted and actual costs (i.e. >5%)? Why?	FINAL	Approved funds [redacted] plus [redacted] contingency	None		
	What proportion of the difference should be considered a capital cost?	FINAL	all costs			

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) **Does the project demonstrate prudency and efficiency of costs?**	(C) With regards to the circumstances prevailing in the market and locality for engineering, equipment supply and construction?	YES	Works completed by Aurizon and external contractors using existing supply agreements		$ -
	(C) (1) Did the project demonstrate value for money with regards to sourcing of engineering, equipment supply and construction?	YES	Works completed by Aurizon and external contractors using existing supply agreements		
	(C) (2) Did the project demonstrate value for money with regards to sourcing of labour?	Insufficient information			
	(C) (3) Did the project demonstrate value for money with regards to sourcing of materials?	YES	Works completed by Aurizon and external contractors using existing supply agreements		
	Was the procurement methodology consistent with approved procurement strategies?	YES	Works completed by Aurizon and external contractors using existing supply agreements		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) (E) **Was the project managed effectively, including the manner in which Aurizon Network has balanced the requirements of:**	With regards to appropriate governance structure for size and nature of project?	Insufficient information			$ -
	(1) Safety during construction and operation?	Insufficient information			
	(2) Environmental approvals and compliance?	Insufficient information			
	(3) Compliance with legal and authority requirements?	Insufficient information			
	(4) Minimising disruption to operation of train services during construction?	Insufficient information			
	(5) Did Aurizon Network accommodate the reasonable requests of Access Holders to amend the scope and sequence of works undertaken to suit their needs?	Insufficient information			
	(F) Minimising WLC including future maintenance and operating costs?	Insufficient information			
	(G) Minimising total project costs?	YES	Works completed by Aurizon and external contractors using existing supply agreements		
	(H) Did project elements align with other elements in the supply chain?	YES			
	(I) Did the project meet contractual time frames?	Insufficient information			

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
At the time the project was approved, was the program appropriate:	With regards to contingency allowed for?	YES	Contingency was incl at [redacted] and has not been spent		$177,765.88
	With regards to project management costs?	Insufficient			
	With regards to risk allowances?	Insufficient information			
	With regards to timing/delivery program?	Insufficient information	FY19 Engineering Design costs have been included with the current claim		
	With regards to ordering and storage of equipment?	Insufficient information			

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
Cost Allocations	Are there multiple beneficiaries to the project?	Insufficient information			$ -
	If Yes, were the costs allocated appropriately for end users?	Insufficient information			

Comment on Prudency & Efficiency of Cost	Works were completed within budget however $177,765.88 for FY19 Engineering Design have been included with the current claim - this should be deferred till next year		
Prudent	NO	**Document Quality**	Low
Efficient	NO	**Status**	FINAL

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Assessment Number	**15**
Project Name	**Formation Renewal FY18**
Project Number	IV.00344
Project Type	Capital Renewal
Project Discipline	TACA
Asset Type	Formation / Ballast
System	System Wide
Expenditure Claimed	$12.24M

Project Overview

The FY18 Formation Renewal Program captures the renewal of damaged and end of life formation segments at priority sites across the CQCN under Aurizon Network's annual Asset renewal program to retain the safety standard of the existing track.

NOTE

The QCA must approve including capital expenditure into the Regulatory Asset Base if that capital expenditure is for the prudent and efficient value of the assets that are used or intended to be used by Aurizon Network to provide the service taken to be declared under section 250(1)(a) of the Act.

Pre-approval by QCA

Assessed by Gemma Thomas

Pre-Approval Capital Expenditure	Has the capital expenditure been pre-approved by the QCA in accordance with Clause 2.2 of Schedule E of the 2016 access undertaking? (including that accepted by interested participants)	NO			$ -	
	If yes:					
	Has the capital expenditure been incurred?	N/A			$ -	
	Does the capital expenditure approved equal or exceed the amount claimed?	N/A			$ -	
	Was there a time limit associated with the pre-approval, and was the project completed within this time limit?	N/A			$ -	
	Did the project meet all pre-approval conditions, including but not limited to: Cost to construct the project Time for completion of the project Estimated capacity to be delivered by the project	N/A			$ -	

SCOPE

Assessed by Gemma Thomas

Assessing the prudency of scope of works involves assessing whether the works are reasonably required.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment
Initial Scope Qualification	Are the project works below-rail infrastructure? If not, what proportion of the works are 'below-rail'?	YES	
	Was the project commissioned in 2015-17 (or earlier if they have been deferred for inclusion in the RAB)?	YES	
	Is the project capital expenditure (capex) and has not otherwise been treated as ongoing maintenance expenditure (opex)?	YES	
	Has the project been covered by other claims, including review events to recover the cost of repairing flood damage?	NO	
	Was the project fully funded by Aurizon Network? If not, was the amount claimed for the proportion of works funded by Aurizon Network?	YES	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the scope of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	Investment Approval Request Project plan Award for Works for [redacted] to provide Newlands - Formation Renewals Project completion report Design report Ch143.14km - Newlands Line
Interested Participants and Scope Pre-Approval	Has the standard of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO to both of the above, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
	Expansion projects					
2.2 (b) (i)	(A) Was the project aligned to any relevant Network Development Plan?	N/A	Renewal project		$ -	
Whether the requirement for the works is prudent and efficient	(B) Were the works reasonably required to accommodate the requirements of relevant Access Agreements?	N/A	Renewal project		$ -	
	(C) Were the works reasonably required to accommodate current contracted demand and potential future demand that Aurizon Network, acting reasonably, considers is required within a reasonable timeframe?	N/A	Renewal project		$ -	
	Renewal Projects					
	(D) Considering the age and condition of the assets, would operational constraints (load or speed restrictions) on the asset have been required in FY17-18 without this intervention?	YES	This program was required to: 1. Eliminate the risk of the loss of top and line, 2. Eliminate wheel unload that may result in derailment, 3. Eliminate future speed restrictions, 4. Keep track quality within the track quality index for the passage of traffic at line-speed.		$ -	
	(D) Were the works consistent with the Asset Management Plan?	Insufficient information	Asset Management Plan not found.		$ -	
	Were the works consistent with any other asset plans?	YES	Investment Approval Request states works completed under Aurizon Network's annual Asset renewal program.		$ -	
	(D) Were the works reasonably required to reduce external risk to an acceptable level?	YES	Refer 2.2 (b) (i) (D)		$ -	
	(E) Were the works reasonably required to the extent that the capex project promotes the economically efficient operation of, use of investment in the Rail Infrastructure, whether present or future? (for example, in relation to extending the life of assets whose economic and/or functional life would otherwise have expired, reducing future operating and maintenance costs or improving capability or capacity of existing assets, systems and processes)	YES	Refer 2.2 (b) (i) (D)		$ -	
	(F) Were the works reasonably required to comply with Aurizon Network's legislative and tenure requirements, including relating to rail safety, workplace health and safety, and environmental requirements?	YES	Relevant health, safety and environmental policies listed in 'Award CP-SOW-097 Formation Works' doc.		$ -	
	Stakeholders					
	(G) Comment on any outcomes of consultation about the capital expenditure project, with Access Seekers and Access Holders whose Access Charges (or likely access charges) would be affected by including the amount of capital expenditure for the capital expenditure into the Regulatory Asset Base?	N/A			$ -	
	(H) Comment on any other matters relating to scope in submissions to the QCA by Aurizon Network or Funding Users	N/A			$ -	

Comment on Prudency & Efficiency of Scope	A track geometry audit of the entire CQCN has been completed and condition and risk assessments have been completed for each site where a geometry defect has been identified. Sites with formation failures have been given a priority rating to assist with prioritising upgrades to the network. The rating considers multiple criteria to efficiently manage scope which is constrained by the cash flows allocated to the Network Asset Renewal program and track access.		
Prudent	YES	**Document Quality**	High
Efficient	YES	**Assessment Status**	FINAL

STANDARD

Assessed by Gemma Thomas

Assessing the prudency and efficiency of standard of works involves assessing whether the works are of a reasonable standard to meet the requirements of the scope and are not overdesigned such that they are beyond the requirements of the scope.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the standard of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	Investment Approval Request As-built drawings Design drawings (e.g. Ch143.14km - Newlands Line, Formation Renewal 17/18 - Newlands System detail by [redacted] dated 25/07/2017) Award for Works for [redacted] to provide Newlands - Formation Renewals Project completion report Design report Ch143.14km - Newlands Line Signed-off inspection and test plans RPEQ Certification Photographs of completed works Aurizon Standard Specifications and drawings (e.g. dwg no. AUR-S-9999-2100 Rev D, other dwg and specs. listed in Award CP-SOW-097 doc.) Aurizon Policy document
Interested Participants and Standard Pre-Approval	Has the scope of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
2.2 (b) (ii)	(A) With regard to the requirements of Railway Operators and what is reasonable required to comply with Access Agreements	YES			$ -	
Were the works of a reasonable standard to meet the requirements of the scope?	(B) With regards to current and likely future usage levels	YES	The formation at localised sites where accelerated deterioration has been observed, has been reconstructed.		$ -	
	(C) With regards to the requirements of other relevant Australia design and construction standards	YES			$ -	
	(D) With regards to the extent of consistency with the Asset Management Plan	Insufficient information	Asset Management Plan not found.		$ -	
	(E) With regards to Aurizon Network's design standards contained within its Safety Management System and which is accepted by the Safety Regulator	YES	Works target sites where upgrades are needed to maintain compliance with standards and regulations.		$ -	
	(F) With regards to all relevant laws and the requirements of any Authority (including the Safety Regulator)					
	Would the standard of works be expected to deliver the requirements for the project?	YES			$ -	
	Has the standard of works been overdesigned, or is it likely to deliver a capital works project beyond the requirements of the scope?	NO	Works generally make use of well known typical engineering solutions. Standard treatment detail for formation reconstruction provided in dwg no. AUR-S-9999-2100 Rev D sighted.		$ -	
	(G) Comment on any other matters relating to standard in submissions to the QCA by Aurizon Network or Funding Users	N/A			$ -	

Comment on Prudency & Efficiency of Standard	Priority sites with worn and life expired formations have been restored to a Condition 1 (ideal condition). Works generally make use of well known typical engineering solutions. Design report for Ch143.14km includes findings from a visual assessment and geotechnical investigation. At this site, embankment stability has been improved by incorporating a berm into the widened embankment, and earthworks/formation reconstruction has been completed in accordance with QR's earthworks specification. Design reports, as-built plans and ITPs only provided for a select no. of sites, presumably because other sites have been upgraded in accordance with typical treatment detail. The standard of works for typical (most sites) / site specific (e.g. Ch143.14km) formation treatments is considered prudent. The document labelled Supply of Capping Layer Material Meeting Minutes (dated 31 July 2017) states that 'formation material ordered…to be in accordance with the spec fails to meet the spec when tested on site.' This capping layer issue has been noted on four sites; one bridge rollout at Isaac River, one level crossing at Dysart, and two Newlands flood recovery sites. Only the Newland sites are relevant to this project. These two sites are the Newlands 96.925 - 96.950 (SAP WBS Element IV.00344.E.N.NA) and Newlands 125.797 - 125.857 (SAP WBS Element IV.00344.E.N.NB) which form part of the SAP records and also the change register. The minutes also state that 'Incorrect capping specification was referenced in the supplier contracts'. Track validation certificates have been sighted for a sample of the completed works. However, this does not provide confirmation on whether or not non-compliant capping layer material was used, and if used what the impact on remaining life of the assets is. Aurizon Network, through email communication on 30 April 2019 stated that 'The capping layer material was used, but completion of the track validation certificate demonstrates that the formation passed its final compaction test, which indicates that the formation was suitable for use and asset life not compromised by the non-conforming material.' Passing of the compaction test does not however prove that the material was suitable for use and that asset life has not been compromised. While the compaction of the material may have met the construction specification that does not prove that the capping material is compliant. There is insufficient information provided to determine the impact of the use of the material on the expected life of formation or to accurately determine the extent within each site where the material has been used. As the impact of the use of the capping layer material is uncertain, and as the amount claimed in FY17/18 for the two Newlands sites is immaterial in relation to the overall project scope, we have not recommended a cost deduction, and the standard of work is considered to be prudent. As the two Newlands sites are a small proportion of the overall claim, the documentation quality supporting this assessment is medium.
Prudent	YES
Efficient	YES
Document Quality	Medium
Status	FINAL

COST

Assessed by Gary McDonald

Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
2.2 (b) (iii) **Having regard to the scope and standard of works, are the costs prudent and efficient?**	(A) Do the costs align to any relevant Network Development Plan?	N/A	Ongoing planned maintenance	None	$ -	Investment Approval Request Project Management Plan Project Program Award for Works for [redacted] to provide Newlands - Formation Renewals Evidence of previous claims Evidence of risk allocations / contingencies Project Completion Report
	(B) Do costs align to scale, nature, and complexity of the project?	YES	Scope adjusted to suit operations and opportunistic works	None		
	(D) Do costs align to any relevant Asset Management Plan?	N/A	Planned maintenance	none		
	Was there a material difference between budgeted and actual costs (i.e. >5%)? Why?	NO	Budgeted cost = $13.432M (incl. contingency) Actual cost = $12.194M	None		
	What proportion of the difference should be considered a capital cost?					

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) **Does the project demonstrate prudency and efficiency of costs?**	(C) With regards to the circumstances prevailing in the market and locality for engineering, equipment supply and construction?	YES	Existing procurement arrangement used	None	$ -
	(C) (1) Did the project demonstrate value for money with regards to sourcing of engineering, equipment supply and construction?	YES	Existing procurement arrangement used	None	
	(C) (2) Did the project demonstrate value for money with regards to sourcing of labour?	YES	Aurizon crews used for ongoing maintenance	None	
	(C) (3) Did the project demonstrate value for money with regards to sourcing of materials?	YES	Existing procurement arrangement used	None	
	Was the procurement methodology consistent with approved procurement strategies?	YES	Existing supply agreements and panel arrangements have been used for the procurement of external resources.		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) (E)	With regards to appropriate governance structure for size and nature of project?				
Was the project managed effectively, including the manner in which Aurizon Network has balanced the requirements of:	(1) Safety during construction and operation?	YES	Reduces the risk of derailment and improves the operational safety of the network. Formation sites showing accelerated deterioration and outside the scope of this project in FY18 will be managed by increased inspections and associated maintenance activities.		
	(2) Environmental approvals and compliance?	YES	Environmental management of site referenced within 'Award CP-SOW-097 Formation Works'		
	(3) Compliance with legal and authority requirements?				
	(4) Minimising disruption to operation of train services during construction?	YES	Rating criteria defined to assist with reducing negative impact to the Network.		$ -
	(5) Did Aurizon Network accommodate the reasonable requests of Access Holders to amend the scope and sequence of works undertaken to suit their needs?	Insufficient information			
	(F) Minimising WLC including future maintenance and operating costs?	YES	Ongoing maintenance using Aurizon standards		
	(G) Minimising total project costs?	YES	Contingency not expended		
	(H) Did project elements align with other elements in the supply chain?	Insufficient information			
	(I) Did the project meet contractual time frames?	Insufficient information	Ongoing maintenance		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
At the time the project was approved, was the program appropriate:	With regards to contingency allowed for?	YES	[redacted] contingency allowed for in Budget approval	None	
	With regards to project management costs?		Ongoing maintenance program		
	With regards to risk allowances?	YES	Ongoing maintenance program - risk incl in Contingency		$ -
	With regards to timing/delivery program?	Insufficient information	Ongoing maintenance program		
	With regards to ordering and storage of equipment?	Insufficient information			

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
Cost Allocations	Are there multiple beneficiaries to the project?	YES	All end users due to reduced impacts from potential corridor closures		
	If Yes, were the costs allocated appropriately for end users?	N/A	Cost are part of the ongoing renewal of Aurizon Assets		$ -

Comment on Prudency & Efficiency of Cost			
Prudent	YES	**Document Quality**	Low
Efficient	YES	**Status**	FINAL

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Assessment Number	1
Project Name	Corridor Security & Fencing FY18
Project Number	IV.00375
Project Type	Capital Renewal
Project Discipline	Corridor
Asset Type	Corridor Access
System	System Wide
Expenditure Claimed	$0.77M

Project Overview

Replace existing corridor fencing that is no longer effective in preventing stock or personnel from entering the rail corridor.

NOTE

The QCA must approve including capital expenditure into the Regulatory Asset Base if that capital expenditure is for the prudent and efficient value of the assets that are used or intended to be used by Aurizon Network to provide the service taken to be declared under section 250(1)(a) of the Act.

Pre-approval by QCA

Assessed by Stuart Lawton

Pre-Approval Capital Expenditure	Has the capital expenditure been pre-approved by the QCA in accordance with Clause 2.2 of Schedule E of the 2016 access undertaking? (including that accepted by interested participants)	NO			$ -	
	If yes:					
	Has the capital expenditure been incurred?	N/A			$ -	
	Does the capital expenditure approved equal or exceed the amount claimed?	N/A			$ -	
	Was there a time limit associated with the pre-approval, and was the project completed within this time limit?	N/A			$ -	
	Did the project meet all pre-approval conditions, including but not limited to: Cost to construct the project Time for completion of the project Estimated capacity to be delivered by the project	N/A			$ -	

SCOPE

Assessed by Stuart Lawton

Assessing the prudency of scope of works involves assessing whether the works are reasonably required.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment
Initial Scope Qualification	Are the project works below-rail infrastructure? If not, what proportion of the works are 'below-rail'?	YES	
	Was the project commissioned in 2015-17 (or earlier if they have been deferred for inclusion in the RAB)?	YES	Project closure request completed 25 May 2018
	Is the project capital expenditure (capex) and has not otherwise been treated as ongoing maintenance expenditure (opex)?	YES	
	Has the project been covered by other claims, including review events to recover the cost of repairing flood damage?	NO	
	Was the project fully funded by Aurizon Network? If not, was the amount claimed for the proportion of works funded by Aurizon Network?	YES	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the scope of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	
Interested Participants and Scope Pre-Approval	Has the standard of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO to both of the above, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
	Expansion projects					
2.2 (b) (i)	(A) Was the project aligned to any relevant Network Development Plan?	N/A			$ -	
Whether the requirement for the works is prudent and efficient	(B) Were the works reasonably required to accommodate the requirements of relevant Access Agreements?	N/A			$ -	
	(C) Were the works reasonably required to accommodate current contracted demand and potential future demand that Aurizon Network, acting reasonably, considers is required within a reasonable timeframe?	N/A			$ -	
	Renewal Projects					
	(D) Considering the age and condition of the assets, would operational constraints (load or speed restrictions) on the asset have been required in FY17-18 without this intervention?		Identification of locations is based on reports from adjacent land owners, corridor inspections and reports of trespass (person/animal). Condition score not provided in the SPM.		$ -	
	(D) Were the works consistent with the Asset Management Plan?	NO	Asset management plan not referenced		$ -	
	Were the works consistent with any other asset plans?	Insufficient information	Prioritisation not documented in the SPM.		$ -	
	(D) Were the works reasonably required to reduce external risk to an acceptable level?	YES	Based on interview discussions with PM		$ -	
	(E) Were the works reasonably required to the extent that the capex project promotes the economically efficient operation of, use of investment in the Rail Infrastructure, whether present or future? (for example, in relation to extending the life of assets whose economic and/or functional life would otherwise have expired, reducing future operating and maintenance costs or improving capability or capacity of existing assets, systems and processes)	YES	Based on interview discussions with PM		$ -	
	(F) Were the works reasonably required to comply with Aurizon Network's legislative and tenure requirements, including relating to rail safety, workplace health and safety, and environmental requirements?	YES	Identification of high security fencing aligned with more populated areas with access available.		$ -	
	Stakeholders					
	(G) Comment on any outcomes of consultation about the capital expenditure project, with Access Seekers and Access Holders whose Access Charges (or likely access charges) would be affected by including the amount of capital expenditure for the capital expenditure into the Regulatory Asset Base?	Insufficient information			$ -	
	(H) Comment on any other matters relating to scope in submissions to the QCA by Aurizon Network or Funding Users				$ -	

Comment on Prudency & Efficiency of Scope	Scope based on reports from adjacent land owners, corridor inspections and reports of trespass (person/animal) - these have not been provided. This has not been transferred to condition scoring and ranking in the SPM as for other projects.		
Prudent	YES	**Document Quality**	Low
Efficient	YES	**Assessment Status**	FINAL

STANDARD

Assessed by Stuart Lawton

Assessing the prudency and efficiency of standard of works involves assessing whether the works are of a reasonable standard to meet the requirements of the scope and are not overdesigned such that they are beyond the requirements of the scope.
Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
4.1 (a) (i)	Has the standard of works been accepted by a group of Interested Participants under Clause 4 of Schedule E of the 2016 Undertaking?	NO			$ -	
Interested Participants and Standard Pre-Approval	Has the scope of works been pre-approved by the QCA in accordance with Clause 2 of Schedule E of the 2016 Undertaking?	NO			$ -	
If NO, complete the following:		**Response**	**Comment**	**Impact on Claim**	**Recommended Adjustment**	
2.2 (b) (ii)	(A) With regard to the requirements of Railway Operators and what is reasonable required to comply with Access Agreements	YES			$ -	
Were the works of a reasonable standard to meet the requirements of the scope?	(B) With regards to current and likely future usage levels	N/A			$ -	
	(C) With regards to the requirements of other relevant Australia design and construction standards	YES	Type of fencing references Aurizon standards. This is line with other rail networks in Australia.		$ -	
	(D) With regards to the extent of consistency with the Asset Management Plan	N/A	No AMP sighted		$ -	
	(E) With regards to Aurizon Network's design standards contained within its Safety Management System and which is accepted by the Safety Regulator	YES			$ -	
	(F) With regards to all relevant laws and the requirements of any Authority (including the Safety Regulator)					
	Would the standard of works be expected to deliver the requirements for the project?	YES			$ -	
	Has the standard of works been overdesigned, or is it likely to deliver a capital works project beyond the requirements of the scope?	NO			$ -	
	(G) Comment on any other matters relating to standard in submissions to the QCA by Aurizon Network or Funding Users				$ -	

Comment on Prudency & Efficiency of Standard	Fencing used references Aurizon standards. This is line with other rail networks in Australia.		
Prudent	YES	**Document Quality**	Medium
Efficient	YES	**Status**	FINAL

COST

Assessed by Gary McDonald

Efficient Cost: the cost for each Year during the Evaluation Period, that reflects the cost that would be reasonably expected to be incurred by a Railway Manager adopting efficient work practices in the provision of the Rail Infrastructure to the required service standard, having regard to any matters particular to the environment in which Aurizon Network operates, and including any transitional arrangements agreed between Aurizon Network and the QCA to reflect the transition from Aurizon Network's actual cost to that efficient cost.

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment	Information assessed
2.2 (b) (iii) **Having regard to the scope and standard of works, are the costs prudent and efficient?**	(A) Do the costs align to any relevant Network Development Plan?			None	$ -	
	(B) Do costs align to scale, nature, and complexity of the project?			None		
	(D) Do costs align to any relevant Asset Management Plan?			None		
	Was there a material difference between budgeted and actual costs (i.e. >5%)? Why?	NO	Planned Budget $843,000 expended $769,726	None		
	What proportion of the difference should be considered a capital cost?		All costs capital costs	None		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) **Does the project demonstrate prudency and efficiency of costs?**	(C) With regards to the circumstances prevailing in the market and locality for engineering, equipment supply and construction?	YES	Project completed within budget	None	$ -
	(C) (1) Did the project demonstrate value for money with regards to sourcing of engineering, equipment supply and construction?	YES	Project completed within budget	None	
	(C) (2) Did the project demonstrate value for money with regards to sourcing of labour?	YES	Project completed within budget	None	
	(C) (3) Did the project demonstrate value for money with regards to sourcing of materials?	YES	Project completed within budget	None	
	Was the procurement methodology consistent with approved procurement strategies?	YES	The works were competitively tendered, with three companies issued an invitation to tender.		

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
2.2 (b) (iii) (E)	With regards to appropriate governance structure for size and nature of project?	YES	No issues raised on close out report	None	
Was the project managed effectively, including the manner in which Aurizon Network has balanced the requirements of:	(1) Safety during construction and operation?	Insufficient information	No safety statistics provided	None	
	(2) Environmental approvals and compliance?	Insufficient information	No safety environmental KPI's in close out report	None	
	(3) Compliance with legal and authority requirements?	Insufficient information	No detail provided	None	
	(4) Minimising disruption to operation of train services during construction?	YES	No disruption to operation during execution	None	
	(5) Did Aurizon Network accommodate the reasonable requests of Access Holders to amend the scope and sequence of works undertaken to suit their needs?	YES	Work scope completed	None	$ -
	(F) Minimising WLC including future maintenance and operating costs?	Insufficient information			
	(G) Minimising total project costs?	NO	Input needed from landowners to help assist in developing scope	Medium	
	(H) Did project elements align with other elements in the supply chain?	Insufficient information	No details available on supply chain used		
	(I) Did the project meet contractual time frames?	YES	Project completed during FY 18	None	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
At the time the project was approved, was the program appropriate:	With regards to contingency allowed for?	YES	Project completed within budget	None	
	With regards to project management costs?	YES	Project completed within budget	None	
	With regards to risk allowances?	Insufficient information	No details of risk assessment used at budget provided		$ -
	With regards to timing/delivery program?	YES	Project completed during FY 18	None	
	With regards to ordering and storage of equipment?	Insufficient information	No details on storage provided	None	

Requirement	Considerations	Response	Comment	Impact on Claim	Recommended Adjustment
Cost Allocations	Are there multiple beneficiaries to the project?	Insufficient information			
	If Yes, were the costs allocated appropriately for end users?	Insufficient information			$ -

Comment on Prudency & Efficiency of Cost	Works were competitively tendered, with all scope completed as planned and within budget.		
Prudent	YES	**Document Quality**	Medium
Efficient	YES	**Status**	FINAL

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