AURIZON NETWORK 2019-20 CAPITAL EXPENDITURE CLAIM

Queensland Competition Authority

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QUEENSLAND COMPETITION AUTHORITY

AURIZON NETWORK 2019-20 Capital Expenditure Claim

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REVISIONS

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EXECUTIVE SUMMARY

Background

The Queensland Competition Authority (QCA) is an independent statutory body responsible for assisting with implementing competition policy in Queensland, and as part of this role regulates third party access to below-rail infrastructure operated by Aurizon Network.

Aurizon Network is a wholly owned subsidiary of Aurizon Holdings Limited. Aurizon Network's below rail infrastructure consists of 2,670-kilometre multi-user track network comprising of four major coal systems and one connecting system servicing Queensland's Bowen Basin coal region: Newlands, Goonyella, Blackwater, and Moura with Goonyella Abbot Point Expansion - the connecting system link. Collectively this is known as the Central Queensland Coal Network (CQCN).

Objective

Arcadis were appointed by QCA to provide an assessment of the prudency and efficiency of the works undertaken in the capital claim for FY20, based on the scope, standard and cost, as per the terms outlined in Schedule E clause 2 of the Aurizon Network The 2017 Undertaking (UT5).

Total capital expenditure submission

Aurizon Network has advised QCA it would be seeking approval of $236,195,182 of capital expenditure to be included in the Regulatory Asset Base (RAB). From this Arcadis assessed a total a sample of $168,760,855 which is approximately 70% of the total claim. The selected list maximises range across asset types, project disciplines and systems where possible.

Assessment Summary

Overall, Arcadis assessed the sample of projects reviewed as prudent and efficient in scope, standard and cost in relation to the terms outline in Schedule E clause 2 of the Aurizon Network The 2017 Undertaking (UT5).

Arcadis notes that the bushfires in end of calendar year 2019 and the COVID-19 pandemic throughout the latter half of FY20 had some impact on program schedules. This pushed some of the FY20 scope to FY21. However, the assessment showed that Aurizon Network adapted to minimise these impacts by bringing forward some of the FY21 scope where appropriate, or as in the case of the Structures Renewal program focusing on planning, design, and procurement activities to reduce the impact on the overall delivery by creating efficiencies for the scope delivery planned for FY21/22.

The table below summarises the output from the assessments of prudency and efficiency undertaken.

Project Number	Project Name	Brief description	2019-20 CAPEX Claim (exc. IDC)	Assessed as prudent Scope	Assessed as prudent Standard	Assessed as prudent Cost
IV.00605	FY20 Ballast Renewal Program	Removal of contaminated/degraded ballast to	$63,901,439	✓	✓	✓

Project Number	Project Name	Brief description	2019-20 CAPEX Claim (exc. IDC)	Assessed as prudent Scope	Assessed as prudent Standard	Assessed as prudent Cost
		maintain/improve track structural integrity and drainage				
IV.00447	Structures Renewal Program 2	Replace life -expired or near life – expired structures on the CQCN with new structures.	$15,103,232	✓	✓	✓
IV.00456	Control Systems Renewal Package 2	Renew priority assets in line with safety and engineering standards.	$14,542,832	✓	✓	✓
IV.00503	Power Systems Renewal Package 1	Renewal project lessens electrical asset related delays and number of incidents.	$4,956,864	✓	✓	✓
IV.00477	Track Renewal Package 2	Renews track structure (including sleepers, rail, fastenings and in some locations, ballast).	$32,154,636	✓	✓	✓
IV.00459	Level Crossing Renewal Package 2	Program that identifies, renews, and upgrades level crossings across CQCN.	$4,847,545	✓	✓	✓
IV.00506	Electrical Overhead Renewal Package	Renewal project lessens electrical asset related delays and number of incidents.	$4,545,732	✓	✓	✓
IV.00609	FY19 Kestrel Infrastructure Upgrade	Replace and/or refurbish worn or life – expired assets to enable an uplift in railing from Kestrel Mine.	$2,944,844	✓	✓	✓
IV.00426	Rail Renewal Program Package 2	Replacement of life – expired rails across the CQCN with new 60kg HH rails.	$25,763,731	✓	✓	✓
SUBTOTAL			$168,760,854			
MINUS DEDUCTIONS NOT PRUDENT				0	0	0
TOTAL			**$168,760,854**			

Aurizon Network provided a very comprehensive set of key documents for all projects chosen for assessment. However, throughout the assessment Arcadis sought additional information and clarification from Aurizon Network to clarify and substantiate the information originally provided. Arcadis acknowledges that Aurizon Network responded to all requests for information and clarifications in a prompt and efficient manner, and Arcadis would like to thank Aurizon Network for their cooperation in this respect.

1 INTRODUCTION

1.1 Background

The Queensland Competition Authority (QCA) is an independent statutory body responsible for implementing competition policy and regulating infrastructure owned by state and private entities that require third party access. As such the QCA is responsible for the regulation of third-party access to below-rail infrastructure operated by Aurizon Network Pty Ltd (Aurizon Network).

Aurizon Network is a wholly owned subsidiary of Aurizon Holdings Limited. Aurizon Network's below rail infrastructure consists of 2,670-kilometre multi-user track network comprising of four major coal systems and one connecting system servicing Queensland's Bowen Basin coal region: Newlands, Goonyella, Blackwater and Moura with Goonyella Abbot Point Expansion - the connecting system link. Collectively this is known as the Central Queensland Coal Network (CQCN). A map of whole of Aurizon Network's rail network is provided in figure 1.1.

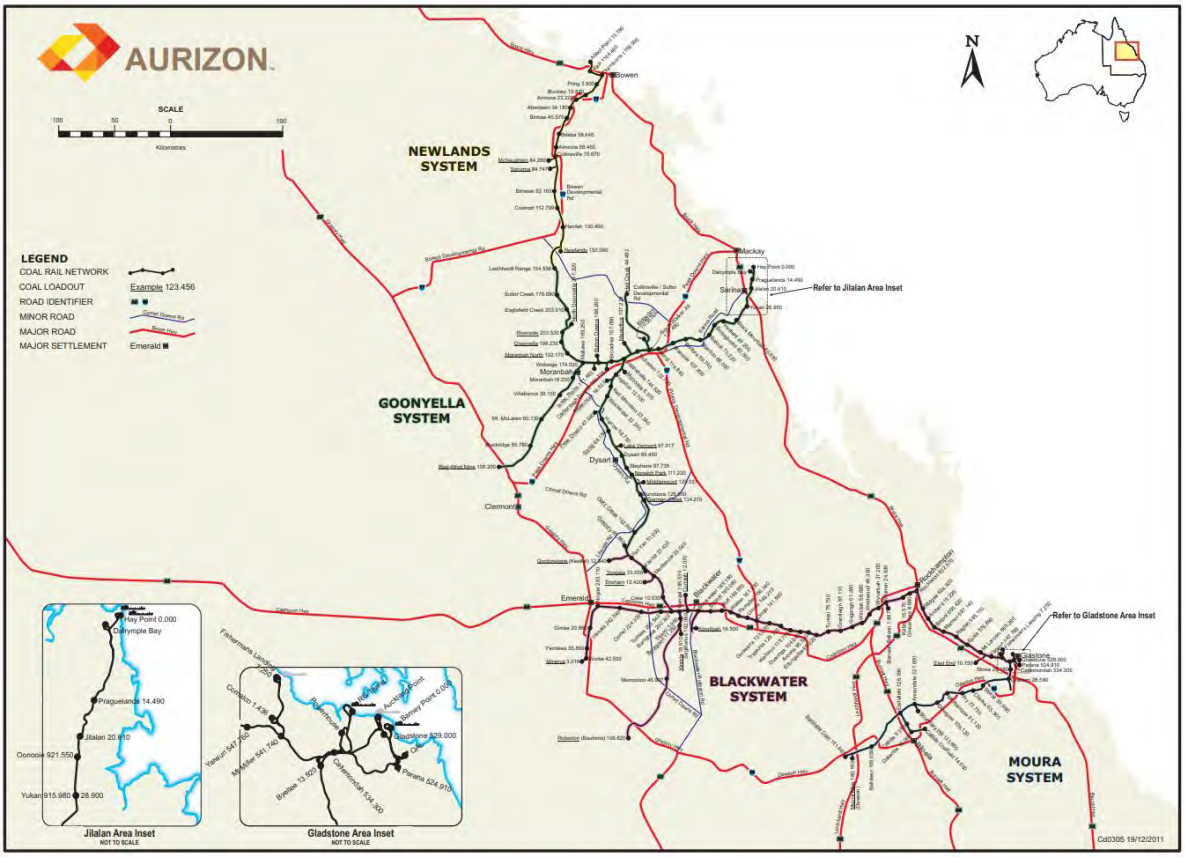

Figure 1-1 Aurizon Rail Network Map

1.2 Objective

The Queensland Competition Authority (QCA) has approved a Regulatory Asset Base (RAB) for the Central Queensland Coal Network. To ensure that current and future tariffs are charged fairly and for works deemed necessary, Aurizon Network is subject to regulation from the Queensland Competition Authority Act 1997 (QCA Act) and the Queensland Competition Authority Regulation 2007 (QCA Regulation). Under the regulatory process Aurizon Network is required to submit a capital expenditure claim to the QCA, which prior to inclusion in the RAB, is subject to the QCA approval process. 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. The current undertaking agreement is the fifth version of this undertaking, *Aurizon Network 2017 Access Undertaking (UT5)*

approved by the QCA – February 2019. UT5 requires maintenance of a RAB reflecting the value of the CQCN infrastructure.

Aurizon Network has submitted its 2019-20 capital expenditure claim and is seeking QCA's approval for $236,195,182 million of capital projects (40 "projects" (program of works comprising of a number of FY20 projects within each rolling program)).

Arcadis has been engaged by QCA to perform a prudency and efficiency assessment of the capital projects (as part of 2019-20 Capital Expenditure Claim) undertaken by Aurizon Network for the 2019-20 financial year in terms of scope, standard and cost of these works. The acceptability of this claim will predominantly be based on Schedule E of UT5; specifically, this requires a test of prudency and efficiency of scope, cost and standard. The works include but are not inclusive off track upgrades, relaying sleepers and rails, renewal of culverts and drains, reparation of structures, level crossing compliance and upgrades, overhead renewals, control systems replacements and ballast undercutting and were performed at various sections of track along the Central Queensland Coal Network.

2 CENTRAL QUEENSLAND COAL NETWORK

2.1 General

Aurizon operates and manages Australia's largest export coal rail network, the Central Queensland Coal Network. The 2,670-kilometre multi-user track network comprises of four major coal systems and one connecting system. The networks connect more than 50 mines to five major export ports, plus many domestic consumers, it is a pivotal component to Queensland's coal industry and bulk freight supply chain.

Aurizon Network's operations are governed by 99-year lease arrangements with the State of Queensland. Access to the rail network is managed under a detailed process approved by the competition regulator, the Queensland Competition Authority.

2.2 CQCN Systems

The CQCN consists of five systems:

- Newlands
- Goonyella to Abbot Point Expansion (GAPE)
- Goonyella
- Blackwater
- Moura

Figures 2.1 and 2.2 below show the location of these systems.

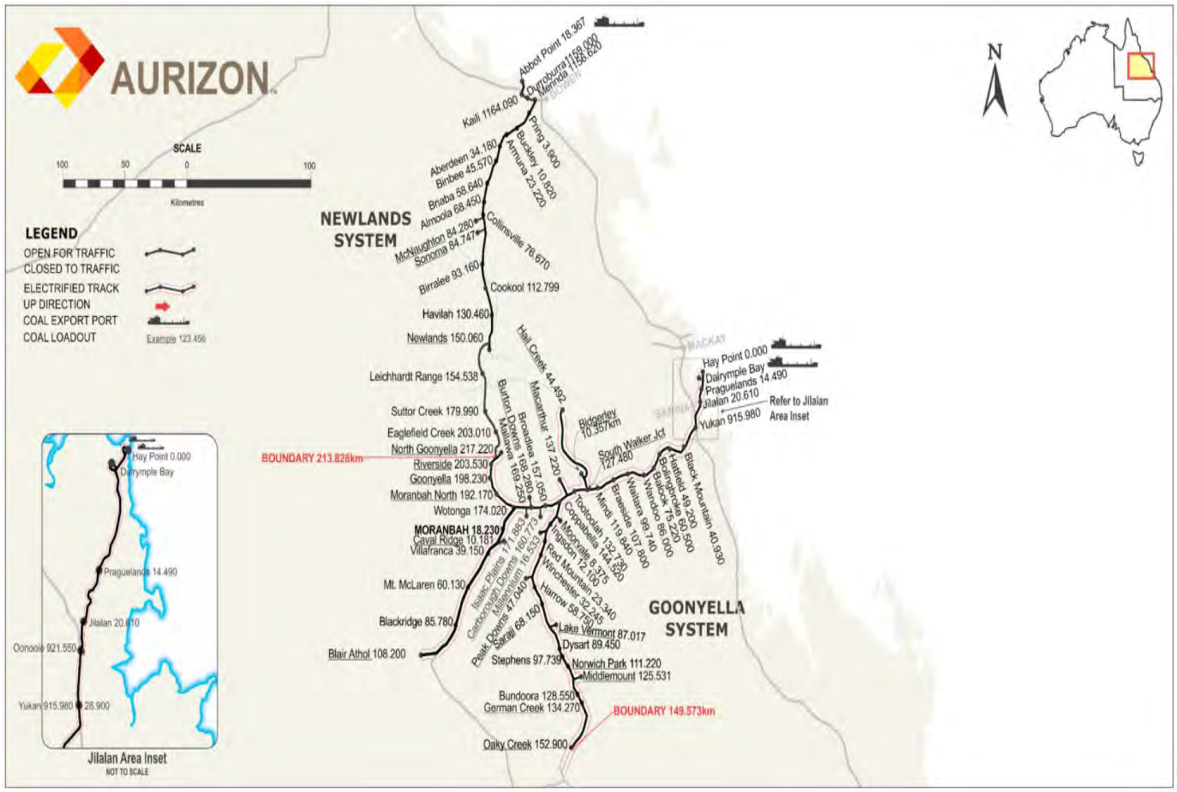

Figure 2-1 Northern CQCN showing Newlands, GAPE and Goonyella Systems

2.2.1 Newlands

The Newlands System is located at the northern end of the Bowen Basin in North Queensland. The total track length is 311.416 km including yards, sidings and passing loops. Presently the concrete sleepered track allows 26.5 tonne axle load (tal) traffic at a maximum speed of 80 km/h. Aurizon operates the Newlands system via Remote Controlled Signalling (RCS) and power operated points.

2.2.2 Goonyella to Abbot Point Expansion (GAPE)

The GAPE system, which connects the Goonyella system to the Newlands system, delivers vital export capacity for coal companies in the Bowen Basin, covering a large geographic area, from Abbot Point in the north to the Goonyella system in the south-west. Presently new sections of the track allow 26.5 tal traffic whereas some sections of the original track, Euri Creek and Briaba allow 20 tal.

2.2.3 Goonyella

The Goonyella system services the Bowen Basin in Central Queensland and carries product to the ports at Hay Point and other destinations by way of connections to the North Coast Line at Yukan and the Central Line via Gregory to Burngrove. The total track length is 1021.319 km including yards, sidings and passing loops. Bridges allow the passage of 26.5 tal wagons at 80 km/h. Aurizon operates the Goonyella system via Remote Control Signalling (RCS), with train movements controlled from Rockhampton.

Figure 2-2 Southern CQCN showing Blackwater and Moura Systems

2.2.4 Blackwater

The Blackwater system is in Central Queensland and services coal mines off the Central Line, carrying the product through to Stanwell Power Station, Gladstone Power Station, and the Port of Gladstone via the North Coast Line. Bridges in the Blackwater system allow the passage of 26.5 tal wagons at 80 km/h. The total track length is 1171.361 km including yards, sidings and passing loops. Aurizon operates the Blackwater system via Remote Control Signalling (RCS), with train movements controlled from Rockhampton.

2.2.5 Moura

The Moura system is in Central Queensland and services the industrial and rural communities of the Dawson and Callide Valleys in Central Queensland with all trains hauled by diesel electric locomotives. Product is hauled to the export facilities at R G Tanna Terminal, Auckland Point and Barney. The track on the main trunk route from Byellee Flyover to Moura Mine is generally 60 kg/m rail with concrete sleepers. The total track length is 315.094 km including yards, sidings and passing loops. The Moura system is operated by Remote Control Signalling (RCS) for most of the system with the sections Graham to Taragoola, Earlsfield to Koorngoo, Moura to Goolara and Koonkool south operated using Direct Traffic Control (DTC) with train movements controlled from Rockhampton.

2.3 Asset configuration

All systems are predominantly designed for 26.5 tal wagons with maximum speeds varying from 60km/h to 80km/h depending on the system. Table 2.3 below shows notable characteristics of the four main systems.

Characteristic	Newlands	Goonyella	Blackwater	Moura	GAPE
Total track length (km rounded)	311	1021	1171	315	80

Characteristic	Newlands	Goonyella	Blackwater	Moura	GAPE
Maximum axle load	26.5 tal	26.5 tal	26.5 tal	26.5 tal	26.5 tal
Electrified	No	Yes	Yes	No (13.7 km only)	No
Control System	RCS/DTC	RCS	RCS	DTC	RCS
No of Level Crossings	82	275	228	149	12
No of bridge structures	32	72	123	27	13
No of culvert structures	777	1216	1494	528	16

Figure 2-3 Summary of system characteristics

2.4 Performance and reliability

Aurizon Network primarily tracks and reports two distinct measures that provide a baseline and assurance that Aurizon Network has and is maintaining the CQCN in an appropriate manner to provide the required reliability and performance expected by the users. Aurizon Network measures and reports these two measures separately for each system. They are:

- Transit time reliability through Below Rail Transit Time (BRTT)
- Track geometry quality through Overall Track Condition Index (OTCI)

2.4.1 2020 Transit time reliability

The BRTT is a measure of the additional time to the nominated cycle time for a service (excluding any planned dwells by rolling stock or delays through Force Majeure Events). Aurizon Network calculated BRTT by adding an allowance to the theoretical non-stop through transit time to account for train starts, train stops and interfacing with other systems.

The following graphs show the transit time reliability taken over the network through the FY20 period. The graphs also show the system the Target BRTT threshold (dotted line) against the actual BRTT (orange line)

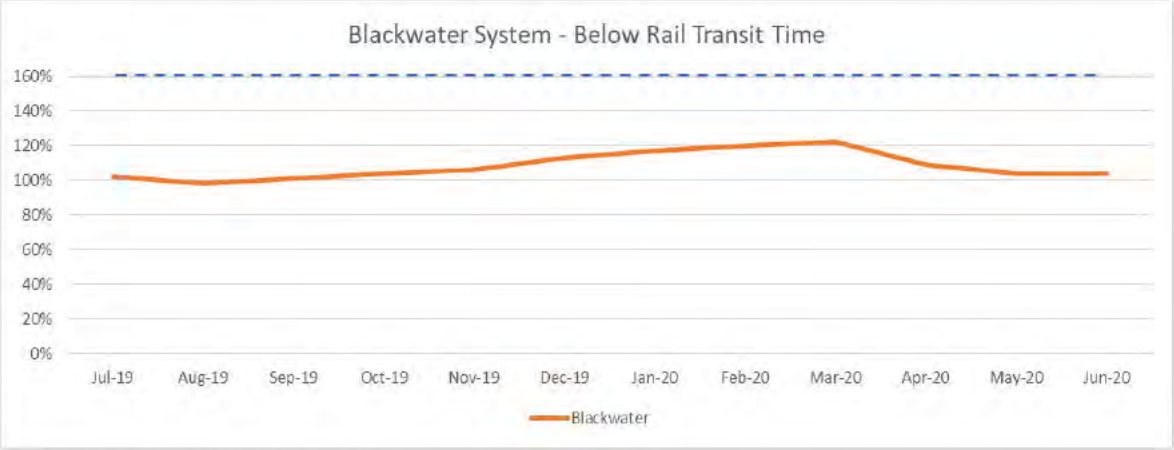

Figure 2-4 Blackwater System BRTT

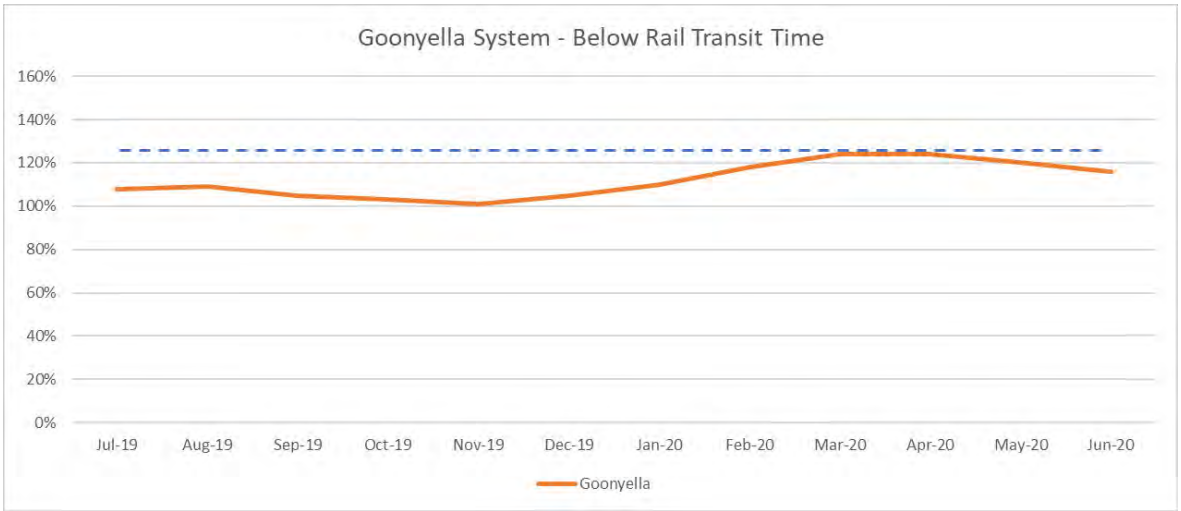

Figure 2-5 Goonyella System BRTT

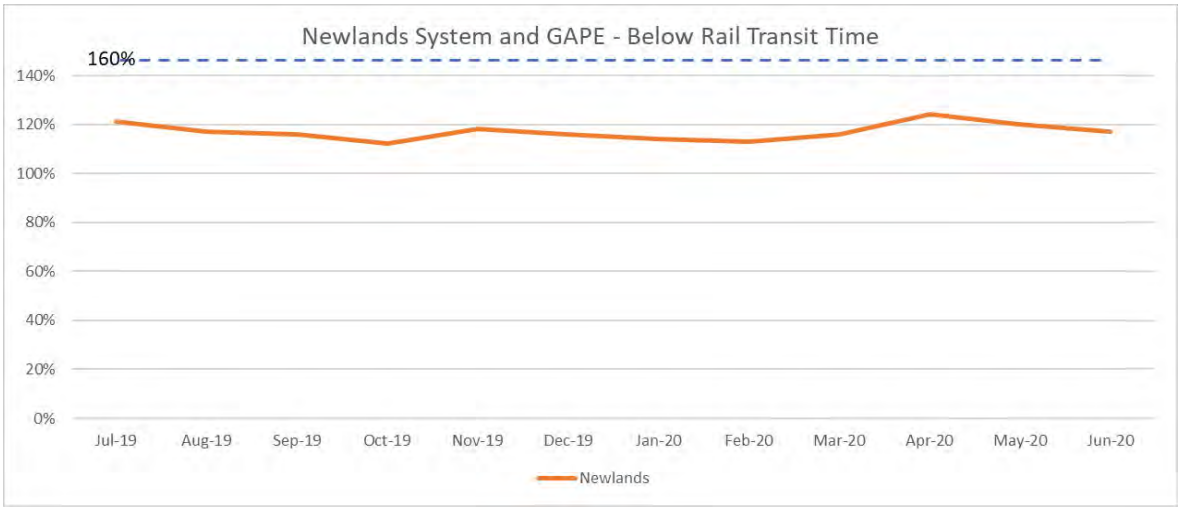

Figure 2-6 Newlands System BRTT

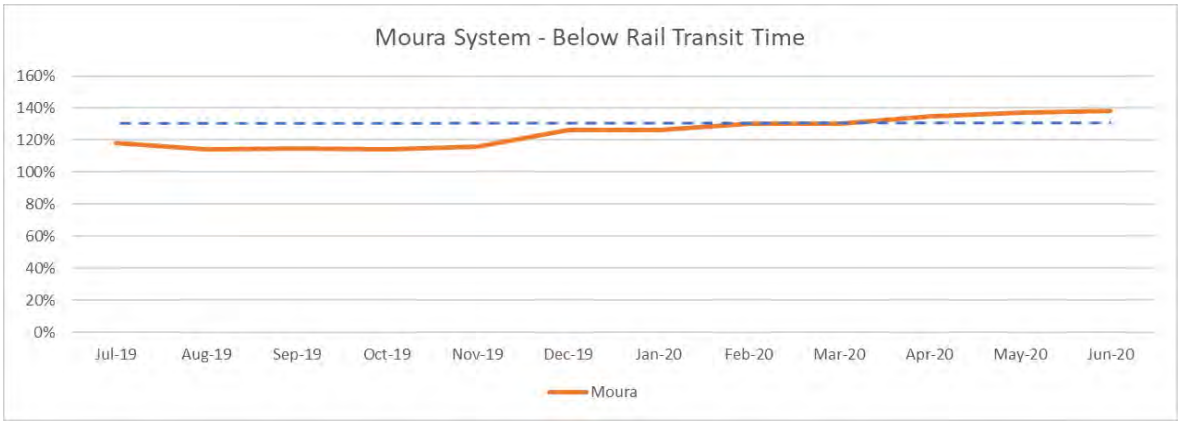

Figure 2-7 Moura System BRTT

The graphs above show that for all systems the average BRTT achieved by Aurizon Network is better than the target for all systems except for Moura which has lapsed above target towards the end of the FY20. Newlands and GAPE are significantly better than the target which is expected in

consideration of the age of the assets in GAPE and the upgrade works to the Newland assets in conjunction with GAPE construction.

Reliability on the Moura System could be improved with greater investment in maintenance and asset renewal. Given the gap between target and average on the Newlands, GAPE and Blackwater system, scenarios where an acceptable level is being maintained in these systems whilst investment is transferred to Moura to upgrade its current reliability may be considered. However, where an acceptable reliability is being achieved by customers, greater investment may not be prudent.

2.4.2 2020 Track geometry – OTCI

The OTCI is a combination of rail parameter measurements including:

- Top
- Twist over 3 m
- Twist over 10 m
- Gauge
- Versine

The Track Recording Car takes measurements of all the Track Condition Indices (TCI's) listed above every metre, and the OTCI at a given location is the absolute values of all the deviations of these measurements at that point. The average OTCI across sections is the average of all TCI measurements taken under the sections in consideration.

The following graph and table show the average OTCI taken over the network through the FY20 period. For each system the CETS "cut off" level for OTCI for is 35, except for Moura where it is 40.

Financial Year	Quarter	Month	Blackwater	Goonyella	Moura	Newlands
FY2020	Q1	Jul-19	29.96	28.07	32.54	25.61
	Q1	Aug-19	29.96	28.07	32.54	25.61
	Q1	Sep-19	29.96	28.07	32.54	25.61
	Q2	Oct-19	29.27	26.43	32.89	25.58
	Q2	Nov-19	29.27	24.97	32.80	21.22
	Q2	Dec-19	29.27	24.97	32.80	21.22
	Q3	Jan-20	29.27	24.97	32.80	21.22
	Q3	Feb-20	29.27	24.97	32.80	21.22
	Q3	Mar-20	29.27	24.97	32.80	21.22
	Q4	Apr-20	29.27	24.97	32.80	21.22
	Q4	May-20	25.00	23.00	32.80	20.00
	Q4	Jun-20	25.00	23.00	31.00	20.00

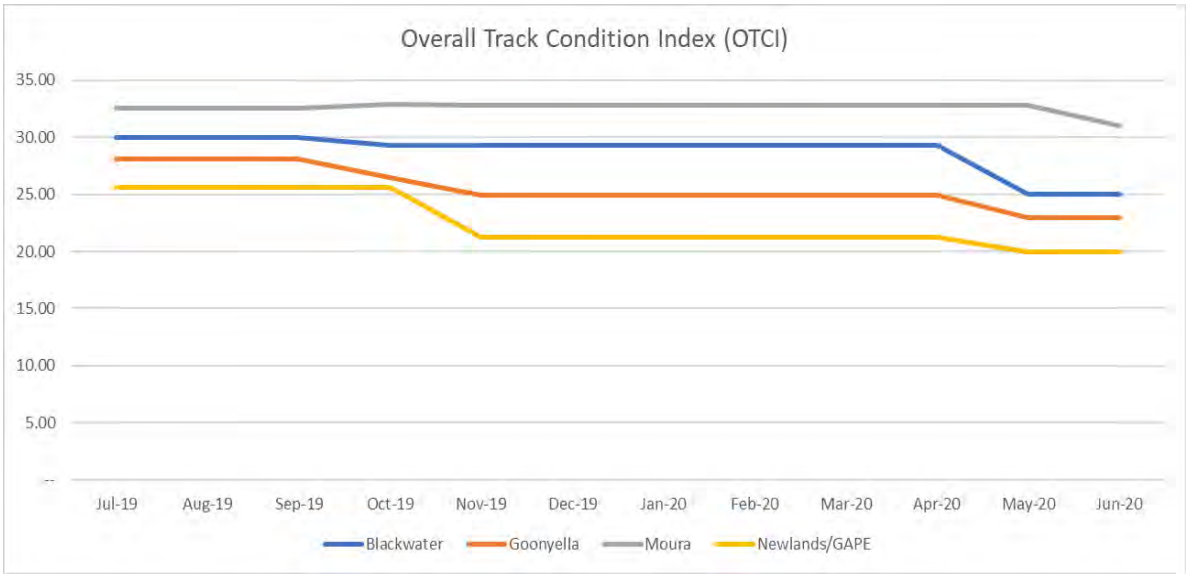

Figure 2-8 Graph showing average OTCI across systems FY20

All systems show a decrease in OTCI over the fiscal year representing an increase in track geometry quality. All systems also show an OTCI well below the target rate.

3 CAPEX PRUDENCY REVIEW

3.1 Overall methodology

Arcadis has implemented a five-stage process to assess Aurizon's Network FY20 CAPEX claim. Figure 3.1 identifies the key milestones with brief descriptions below.

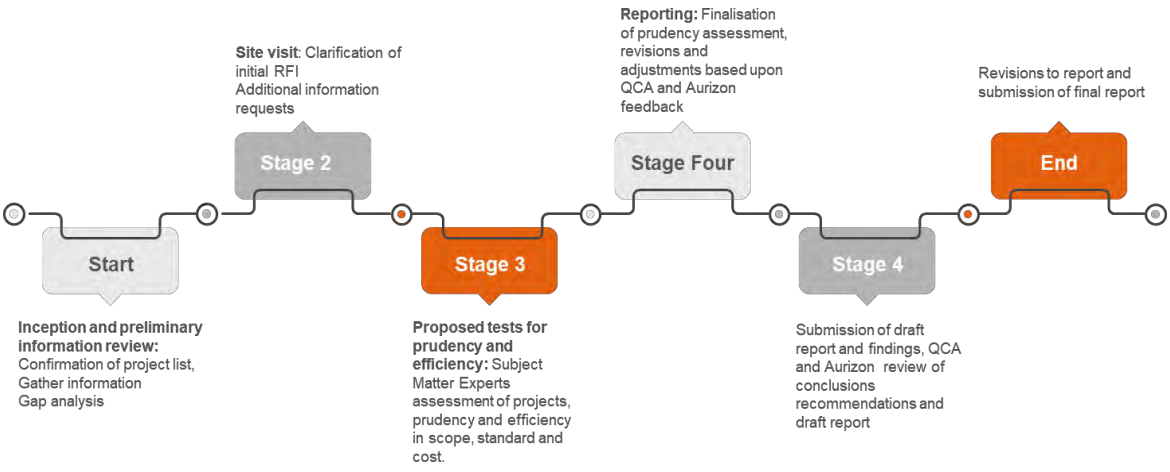

Figure 3-1 Summary of process for prudency and efficiency assessment

3.1.1 Stage 1 – Preparation

The Arcadis team conducted an internal kick off meeting to formalise hand over of information/resources required to perform the assessment. Arcadis created the framework template to help Subject Matter Expert's (SME) perform the prudency and efficiency assessment, on completion Arcadis submitted the framework to the QCA for review and comment. The team held further external inception meetings with QCA and Aurizon Network to finalise:

- Confirmation of the Request for Information (RFI) process and agreement by all parties

- the sample list of projects reviewed and approved
- all contractual issues were finalised
- communication channels were formalised and agreed
- Aurizon Network provided a background summary of current asset management processes

3.1.2 Stage 2 – Information Summarisation and Site Visit

QCA and Aurizon Network provided relevant project information to Arcadis (Project Management plans, EOFY reports, Asset completion certificates etc.).

An initial review was undertaken to confirm any obvious information gaps or identify any significant issues, this review was the basis for the first RFI's. Critical information from each project was summarised and handed over to the SME's for review along with access to all the information provided. RFI's raised where needed.

3.1.3 Stage 3 – Analysis

Arcadis engineering Subject Matter Experts performed a desktop assessment of prudency and efficiency based upon the information provided by Aurizon Network. Arcadis used a framework template developed in alignment with the requirements of UT5 Schedule E and approved by the QCA and summarised in the flow chart depicted in figure 3.2.

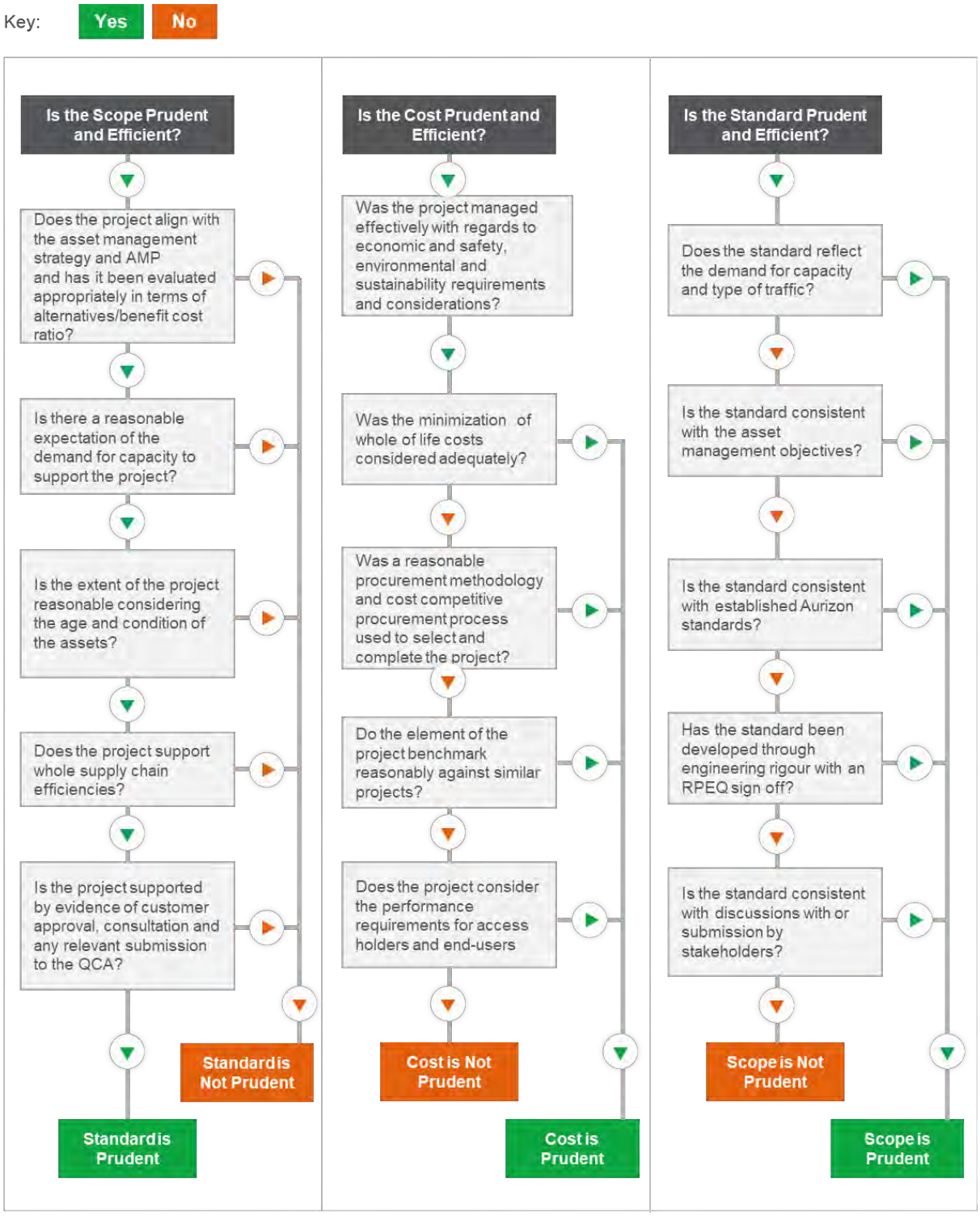

Figure 3-2 Summary of methodology for the assessment of prudency and efficiency

To confirm some of the data received and verify a sample of selected projects Arcadis performed a site visit on completed projects on the system. Arcadis selected a sample of site projects based on:

- Element of complexity
- Type of project, the team made effort to include each individual activity type for each discipline
- Location of project, the team made effort to maximise logistical efficiencies

QCA subsequently reviewed and approved this list. See section 3.3 for the list of projects and further information on the site visit.

3.1.4 Stage 4 and 5 – Reporting and finalisation

On completion of the site visit and assessment Arcadis SME's requested additional RFI's to clarify any concerns raised during the assessment process. The majority of these RFI's included clarification of cost information, scope, and confirmation of completion certification. Upon clarification of issues raised, the team made revisions accordingly and completed the prudency and efficiency assessments.

On completion of SME's assessment, Arcadis compiled and submitted a summary report to the QCA and Aurizon Network for review. On receipt of any revisions Arcadis completed the report and submitted the final report.

3.2 Extent of review

Aurizon Network advised QCA it would be seeking approval of $236,195,182 of capital expenditure to be included in the Regulatory Asset Base (RAB) for its FY20 claim. The full list of projects claimed in the FY20 expenditure claim is in Appendix A, however, to undertake the assessment Arcadis developed a sample listing of projects which QCA reviewed and approved. The criteria for sample selection considered various aspects including:

- Proportion of project types for each discipline area (i.e., track, structures)
- Proportion of project costs in relation to total FY20 expenditure
- Specific identified risks or known challenges associated with the type and genre of the project.

The selection of projects analysed are in the table below.

Table 3-1 Sample projects selected for prudency assessment

Project Name	Project Code	Total Expenditure (excluding IDC)	Project Type	Reasons for choice
FY20 Ballast Renewal Program	IV.00605	$63,901,439	Sustaining/Civil Asset type: track	Total Cost Civil asset
Structural Renewal Package 2	IV.00447	$15,103,232	Sustaining/Civil Asset type: structures	Total Cost Structures asset
Control Systems Renewal package 2	IV.00456	$14,542,832	Sustaining/Systems Asset Type: Network control	Total Cost Network asset
Power Systems Renewal Package 1	IV.00503	$4,956,864	Sustaining/Systems Asset type: Power systems	Total Cost Power asset
Track Renewal Package 2	IV.00477	$32,154,636	Sustaining/Civil Asset type: Track	Total Cost Track asset
Level Crossing Renewal Package 2	IV.00459	$4,847,545	Sustaining/System Asset type: Level Crossing	Safety critical Complexity
Electric Overhead Renewal Package	IV.00506	$4,545,732	Sustaining/Electrical Asset type: Electrical	Safety critical Electrical asset
FY19 Kestrel Infrastructure Upgrade	IV.00609	$2,944,844	Sustaining/Civil Asset type: Track	Blackwater system asset Track asset

Project Name	Project Code	Total Expenditure (excluding IDC)	Project Type	Reasons for choice
Rail Renewal Program Package 2	IV.00426	$25,763,731	Sustaining/Civil Asset type: Track	Total Cost Track asset

The sample above totals $168,760,855, which is approximately 70% of the total FY20 claim and it maximises range across: asset types, project disciplines and systems. The selected projects cover all four systems in the CQCN.

The assessment of these projects was conducted with respect to the Terms of Reference[1] as set by the QCA and the terms and criteria outlined in Schedule E (schedule E, clause 2) of the 2017 Aurizon Network access undertaking (UT5) and summarised in the methodology outlined in Section 3.1.

3.3 SITE VISIT

Arcadis selected several sites to inspect and visit between the 2nd of November to the 4th of November. The assessment team selected these sites based on:

- Element of complexity
- Type of project, team made efforts to include each individual activity type for each discipline
- Location of project, efforts were made to maximise logistical efficiencies

The Blackwater and Moura region were the focus of the site visit. The table below lists out the projects and package of each site visited.

Table 3-2 Summary of projects included in site visit

Package	Location/System	Number of sites
Rail Renewal	Blackwater	2
Ballast Undercutting	Blackwater Moura	5 2
Track Upgrade	Blackwater Moura	1 1
Structures	Blackwater	2
Control systems	Blackwater	6
Overhead Renewals	Blackwater	1
Level Crossing	Blackwater	1
Power Systems	Blackwater	3

Appendix B provides further details on the site projects selected.

[1] Queensland Competition Authority Terms of Reference – 13/07/2020

4 CAPITAL EXPENDITURE CLAIM SUBMISSION

4.1 Asset Management System

4.1.1 Overview

Aurizon Network have a specific asset management plan. They focus on trying to effectively manage assets through the lifecycle of the project on the optimisation of cost, risk, and performance. This includes assessing if an asset it worth renewing or replacing. This is an efficient approach to the planning of asset management.

The framework applied is Aurizon Network Asset Management System (NAMS). NAMS is a series of interrelated systems and activities that work together to provide a digital representation of the asset life cycle. NAMS is and will be a work in progress as Aurizon Network continue the journey of data acquisition and analytics to improve decision making on asset maintenance and renewal strategies. The application of data from NAMS and the Network Asset Scope Prioritisation Model (SPM) ensures optimum below rail asset renewal investment is in line with Asset Management Strategies.

4.1.2 Network Development Plan

The 2019 Network Development Plan (NDP) is prepared in accordance with Aurizon Network's obligations under 7A.6 of the 2017 Access Undertaking (UT5). The NDP examines how Aurizon Network will develop the CQCN to meet the anticipated long – term growth requirements of coal supply chains operating throughout the CQCN.

4.1.3 Scope and program prioritisation

Aurizon Network's scope identification and selection is an iterative process. The current process starts with using the standards to identify maintenance and renewal points. Aurizon Network then examines the Network Strategic Asset Plan (NSAP) which considers future renewal and maintenance activity. Furthermore, Aurizon Network apply the Scope Priority Model to determine priority scope and define access planning. Customer endorsement is then prioritised followed by execution planning.

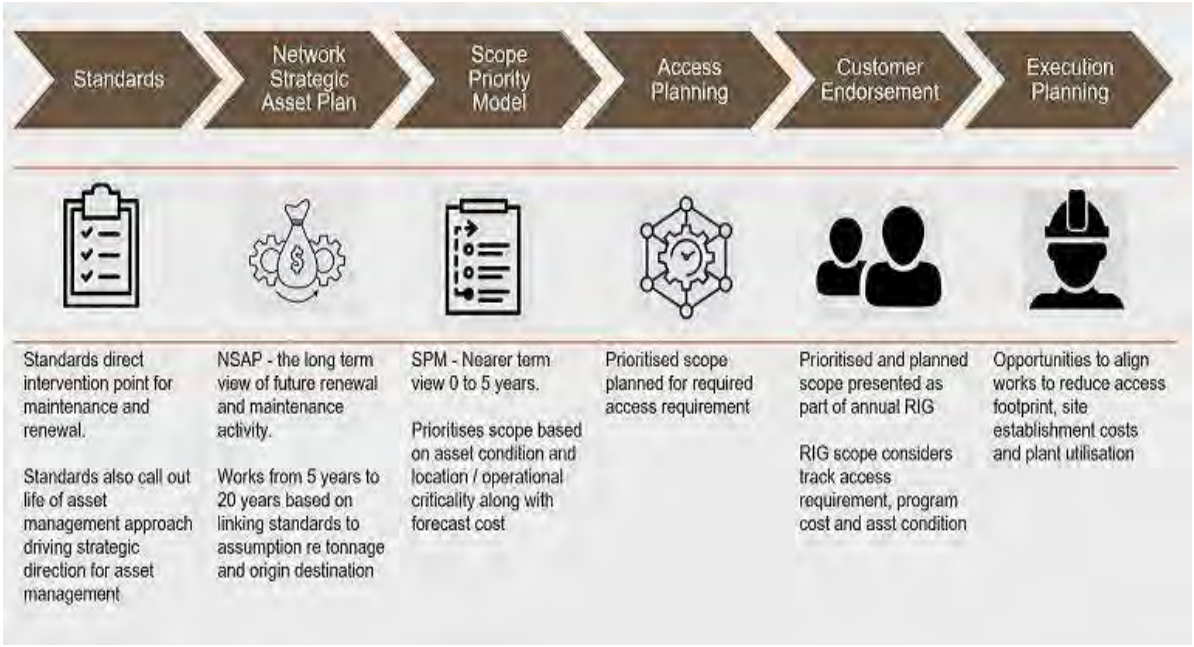

Figure 4-1 Aurizon Network AM programming process. Source Aurizon Network presentation

Arcadis considers this approach to be contemporary industry best practice in asset management. Data forms the fundamental source of truth, from which Aurizon Network can make informed decisions on reparation and renewals. To maximise efficiencies throughout the network, Aurizon Network are applying the process summarised above to make informed decisions balancing cost, performance, and risk. This approach will ensure whole of life considerations are taken into account not only for the asset but for the system.

Arcadis noted that this system is in the process of being developed at Aurizon Network, and although there has been some evidence that this system is being applied in the works submitted under this FY20 claim, it is reasonable to expect that it will be some years before its refinement.

4.1.4 Rail Industry Group

Aurizon Network are establishing a Rail Industry Group with representatives from its stakeholders and the organisation to facilitate collaboration, optimisation and decision making. Ultimately reducing the total cost of delivering coal to market and maximising the efficiencies for undertaking prudent and necessary maintenance activities through the network.

This is a work in process but further increases the opportunity to make informed decisions on the management of the system and facilitating the decision making on balancing user performance requirements, cost, and risk tolerances.

5 AURIZON NETWORK FY20 EXPENDITURE CLAIM

5.1 Aurizon Network FY20 Capital expenditure submission claim

Aurizon Network's total FY20 capital expenditure (CAPEX) claim submission was valued at $236,195,182. The FY20 claim was submitted and assessed for prudency and efficiency under the 2017 Undertaking (UT5) framework to be included in the RAB.

The following section provides a summary of the prudency assessments for scope, standard and cost as undertaken for the sample projects in the Aurizon Network FY20 expenditure claim. Appendix C provides full details of the assessment within the template forms.

5.2 Supporting information

For each project Aurizon Network provided the following key documentation:

- Project Management Plans (PMP)
- Investment Approval Requests (IAR)
- Completion Certification
- End of Financial Year report (EOFY)
- SAP Report

During the assessment the Arcadis team required additional data and hence developed a Request for Information (RFI) register to capture and monitor the RFI process. In response to the RFI list Aurizon Network provided the Arcadis assessment team with a significant amount of additional data.

Arcadis assessors acknowledge the effort Aurizon Network made to provide additional requested data as quickly and efficiently as possible.

5.3 Summary of results

The following tables summarise the results of the prudency assessments on the sample group of projects.

Table 5-1 Summary of assessments undertaken by Arcadis

Value of overall claim	$236,195,182
Value of projects reviewed	$168,760,855
Percentage of claim covered in sample	71%

Table 5-2

Project Number	Project Name	Brief description	2019-20 CAPEX Claim (exc. IDC)	Assessed as prudent Scope	Assessed as prudent Standard	Assessed as prudent Cost
IV.00605	FY20 Ballast Renewal Program	Removal of contaminated/degraded ballast to maintain/improve track structural integrity and drainage	$63,901,439	✓	✓	✓
IV.00447	Structures Renewal Program 2	Replace life -expired or near life – expired structures on the CQCN with new structures.	$15,103,232	✓	✓	✓

Project Number	Project Name	Brief description	2019-20 CAPEX Claim (exc. IDC)	Assessed as prudent Scope	Assessed as prudent Standard	Assessed as prudent Cost
IV.00456	Control Systems Renewal Package 2	Renew priority assets in line with safety and engineering standards.	$14,542,832	✓	✓	✓
IV.00503	Power Systems Renewal Package 1	Renewal project lessens electrical asset related delays and number of incidents.	$4,956,864	✓	✓	✓
IV.00477	Track Renewal Package 2	Renews track structure (including sleepers, rail, fastenings and in some locations, ballast).	$32,154,636	✓	✓	✓
IV.00459	Level Crossing Renewal Package 2	Program that identifies, renews and upgrades level crossings across CQCN.	$4,847,545	✓	✓	✓
IV.00506	Electrical Overhead Renewal Package	Renewal project lessens electrical asset related delays and number of incidents.	$4,545,732	✓	✓	✓
IV.00609	FY19 Kestrel Infrastructure Upgrade	Replace and/or refurbish worn or life – expired assets to enable an uplift in railing from Kestrel Mine.	$2,944,844	✓	✓	?
IV.00426	Rail Renewal Program Package 2	Replacement of life – expired rails across the CQCN with new 60kg HH rails.	$25,763,731	✓	✓	✓
SUBTOTAL			$168,760,854			
MINUS DEDUCTIONS NOT PRUDENT				0	0	0
TOTAL			$168,760,854			

5.4 Overview prudency and efficiency

5.4.1 Track and rail systems renewal programs

Aurizon Network is currently standardising where appropriate and prudent. Aurizon Network is replacing existing track assets as they reach their end of life or are rendered unserviceable due to deterioration or damage and as identified from site inspections, Track Recording Car, GPR and other monitoring and/or inspection activities. Aurizon Network are steadily replacing these track assets with standardised 60 kg/m rail with 28.5 tal concrete sleepers and Pandrol E Clip fasteners.

Arcadis assesses this as an efficient approach, as standardisation ultimately provides consistency throughout the network and minimise overall costs through economies of scale and training requirements. In addition, the engineering assessment team considers 60 kg/m rail and modern 28.5tal sleepers with Pandrol E Clip fasteners appropriate track structure for the CQCN operational requirements.

5.4.2 Train, control, signalling and communications

The CQCN uses a range of signalling and train control systems for train control, detection, and communications.

The main method of control is Remote Control Signalling (RTS) where a train's route is pre-set, and all points and signals infrastructure automatically changes for the train. On Moura system the train control is predominantly via Direct Train Control (DTC) where drivers receive permission to proceed from and operator via radio.

Queensland Rail (prior to the privatisation of Aurizon Network) implemented many of the control and signalling technologies 15 – 20 years ago. These are now nearing end of life, and some are becoming redundant as support of manufacture of components ceases.

Control systems are critical to maintain service reliability and the safety of operations. To this end Aurizon Network Asset Renewal Program consists of a rolling program of control system renewals to minimise the whole of life costs of assets nearing or post end of life on the network plus specific renewal projects over the F20 period.

5.4.3 Traction and power

Aurizon Network's 2,000 km of electrified track represents a considerable proportion of Queensland's total power load, as well as the regional load. The electrical assets include Aurizon Network's Power Systems, Autotransformers, Feeder Stations and Overhead line equipment. Equipment is critical to maintain the performance, reliability, and safety of network operations.

5.5 Project Assessment Summaries

5.5.1 IV.00605 FY20 Ballast Renewal Program

Overview

The Ballast Renewal Program aims to replace fouled ballast ensuring the track can drain freely, transfer loads from rolling stock effectively and support the track structure.

In general, Arcadis found that Aurizon Network has implemented an effective network ballast renewal program based upon GPR and regular inspections and measurements of ballast fouling.

The table and paragraphs below summarise the results of the prudency and efficiency assessment, Appendix C provides further details.

Table 5-3 IIV.00605 FY20 Ballast Renewal Program Summary

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	**Prudent and Efficiency Assessment Outcome**		
	Scope	**Yes**	The condition of spoilt ballast viewed on site was poor, Arcadis then verified this finding with the results from the GPR. Poor contaminated ballast restricts drainage and does not support track efficiently causing damage to track and rolling stock and impacting on operations and access requirements.
	Standard	Yes	
	Cost	Yes	
Capital Expenditure Claim (total)		$63,901,439	
Impact of findings on Claim		$ -	
TOTAL ACCEPTED		$63,901,439	

Assessment of scope

Aurizon Network developed its program using the Scope Prioritisation Model which considers condition ranking from GPR results and inspections with the network criticality ranking of the site.

During the site visit Arcadis assessment team inspected several ballast undercutting sites. On all sites, inspection of the fouled ballast highlighted the deteriorated and fouled state of the ballast and concluded that the scope replacement of the asset was prudent and efficient to enable operational requirements (refer example figure 5.1).

Figure 5-1 Stockpiled removed ballast

Figure 5.1 demonstrates a “typical” example of spoil condition seen on site, as can be seen on the photograph the ballast has lost its angularity making it unsuitable for “locking” to provide support for track, and the smaller particle grains constrain effective drainage away from track and formation. Aurizon Network provided Ground Penetrating Radar results which further substantiated the poor condition of ballast on the sites programmed for works.

Overall, the team considered the project scope prudent given the reasonable operational and safety requirements of Aurizon Network and its customers. Arcadis did not identify any significant issues in the scope within this program.

Assessment of standard

Aurizon Network’s approach to ballast management is consistent with other heavy haul rail networks in Australia and around the world. Aurizon Network’s approach to maintenance intervention through percent void contamination (PVC), GPR and TRC results is consistent with industry accepted approaches. The ballast cleaning program aligns with Rail Industry Standards Board (RISSB) guidelines and Civil Engineering Track Standards as approved by the Rail Safety Regulator as part of Aurizon Network’s Safety Management System.

From site visits undertaken the team assessed that completed works were in alignment with standards applied on adjacent infrastructure.

In consideration of the information provided and sites inspected the team assessed that the standard of the works was prudent and efficient.

Assessment of cost

The assessment found that Aurizon Network achieved:

- an average cost of [redacted] per kilometre of machine or major ballast cleaning against an estimated $[redacted].
- 140km ballast undercutting achieved, approximately 5% of the total network
- 44 turnouts commissioned versus 42 projected

Arcadis considers that unit costs are in line with the approved estimated costs and within industry expectations for similar works.

Overall, the assessment team found that the costs of the ballast cleaning works were prudent and efficient.

5.5.2 IV.00477 FY20 Track Renewal Program

Overview

The Track Renewal Program aims to renew and replace life-expired rails and sleepers to ensure stability of the top, alignment, gauge, and rail profile is appropriate to maintain safe and efficient passage of rolling stock. Combining the upgrading of the whole track system maximises efficiencies in functionality of the system and in the management of track maintenance activities in terms of reducing rework, disruptions and mobilisation and demobilisation costs.

In general, Arcadis found that Aurizon Network has implemented an effective network track renewal program based upon Track Recording car and regular inspections and measurements of rail profile.

The table and paragraphs below summarise the results of the prudency and efficiency assessment, Appendix C provides further details.

Table 5-4 IV.00477 FY20 Track Renewal Program Summary

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	Prudent and Efficiency Assessment Outcome		
	Scope	Yes	In line with engineering standards and operational requirements the program focuses on upgrading track to standard 60 kg HH rail, 28 tal concrete sleepers and Pandrol e-clips. Consideration of "whole of track system" optimises operational functionality of the track system minimising risks of disruption and optimising performance. Also, maintenance activities are programmed in an efficient manner.
	Standard	Yes	
	Cost	Yes	
Capital Expenditure Claim (total)		$32,154,636	
Impact of findings on Claim		$ -	
TOTAL ACCEPTED		$32,154,636	

Assessment of scope

Triggers for track renewal include rail wear against measured profile, cracked or deteriorated sleepers, damaged or defect track. Track renewal includes the replacement of the track structure, sleepers, fasteners, or ballast in poor condition.

Aurizon Network developed its program using the Scope Prioritisation Model which considers condition ranking from the Track Recording Car, historic failures and network criticality ranking of the site.

The track renewal program for FY20 included the renewal of 24.37 km of track at various sites across the CQCN.

Overall, Arcadis considered the project scope prudent and efficient given the reasonable operational and safety requirements of Aurizon Network and its customers. The assessment team did not identify any key issues in the scope within this program.

Assessment of standard

The assessment identified that the technical and safety standards applied on projects within the track renewal program were in alignment with the Civil Engineering Track Standards approved within Aurizon Network Safety Management System and hence in compliance with RISSB standards.

During the site visit the assessment team inspected several track renewal sites (refer example figure 5.1). The team verified that works undertaken aligned with the completion certification provided.

Figure 5-2 Newly replaced sleepers, fasteners, ballast, and rail

From site visits undertaken the team assessed that completed works were in alignment with standards applied on adjacent infrastructure and finished works were in compliance with CETs requirements.

In consideration of the information provided and sites inspected the team assessed that the standard of the works was prudent and efficient.

Assessment of cost

The project delivered a $[redacted]/Track kilometre against a [redacted]/Track kilometre unit estimated across the CQCN.

Overall, the assessment team found that the costs of the track renewal program projects were prudent and efficient.

5.5.3 IV.00426 FY20 Rail Renewal Program Package 2

Overview

The Rail Renewal Program aims to replace defect rail identified through effective monitoring and inspection processes, to minimise risks of disruptions to operations through speed restrictions or derailments.

For the FY20 claim Aurizon installed 614 rails with a total of 65.7 km over the four systems (an improvement on Fy19 despite the constraints imposed by bushfires and covid-19). In addition, the year saw the commencement of the bulk rerail from Yukan to Black Mountain where Aurizon replaced 71 rails.

In general, Arcadis found that Aurizon Network has implemented an effective network rail renewal program.

The table and paragraphs below summarise the results of the prudency and efficiency assessment, Appendix C provides further details.

Table 5-5 IV.00426 FY20 Rail Renewal Program

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency to satisfy:	**Prudent and Efficiency Assessment Outcome**		
	Prudency of Scope	**Yes**	**Industry experience has shown that certain rail defects have potentially serious consequences if allowed to develop, hence protecting the safety of trains following the identification of defective rail is critical concern to rail maintainers and considered to be a prudent and efficient program of works.**
	Prudency of Standard	Yes	
	Prudency of Cost	Yes	
Capital Expenditure Claim (total)		$25,763,731	
Impact of findings on Claim		$ -	
TOTAL ACCEPTED		$25,763,731	

Assessment of scope

Aurizon Network developed its program using the Scope Prioritisation Model which considers condition ranking from TRC results and inspections with the network criticality ranking of the site.

During the site visit Arcadis inspected several rail renewal sites and confirmed that works undertaken aligned with the details on completion certificates.

Overall Arcadis assessed the project scope as prudent given the reasonable operational and safety requirements of Aurizon Network and its customers. The assessment team did not identify any key concerns of significant issues in the scope within this program.

Assessment of standard

The assessment identified that the technical and safety standards applied on projects within the track renewal program were in alignment with the Civil Engineering Track Standards approved within Aurizon Network Safety Management System and hence in compliance with RISSB standards.

During the site visit the assessment team inspected several rail renewal sites and verified that works undertaken aligned with the completion certification provided

From site visits undertaken the team assessed that completed works were in alignment with standards applied on adjacent infrastructure and finished works were in compliance with CETs requirements.

In consideration of the information provided and sites inspected the team assessed that the standard of the works was prudent and efficient.

Assessment of cost

The State of Fire Emergency that applied to most of the CQCN in late 2019 impacted the Rail Renewal Program over FY20, increasing execution costs by more than $0.5m.

Aurizon Network achieved a unit rate average cost of $[redacted] per rail km in FY20. This was lower than the target stretch unit rate of $[redacted]K/Rail km as defined by the Asset Renewal Program efficiency target.

Overall, the assessment team found that the costs of the rail renewal program projects were prudent and efficient.

5.5.4 IV.00503 FY20 Power Systems Renewal Program Package 1

Overview

The Electrical Overhead Renewal Packages form part of the broader Electrical Infrastructure Asset Renewal Program. The objective of the Electrical Infrastructure Asset Renewal Program is to renew priority electrical assets to maintain service reliability across the Central Queensland Coal Network (CQCN).

The replacement of redundant or life-expired electrical assets reduces the significant risk to network performance, potentially resulting in significant impacts to reliability and increasing failure rates.

The assessment identified that works completed during FY20 include scope commissioned from both the FY20 project (IV.00503) and the FY21 project (IV.00504). Subsequently as approximately 30% of the works belonged to IV.00504 (not within the project sample) for completeness, Arcadis requested the completion certificates for these projects.

Aurizon are increasing the monitoring and analysis of relevant trends to further greater understanding of electrical asset delays within the network. Although this is currently in development and further efficiencies in programming should be evident as the program progresses, in general, Arcadis found that Aurizon Network has implemented an effective power systems renewal program.

The table and paragraphs below summarise the results of the prudency and efficiency assessment, Appendix C provides further details.

Table 5-6 IV.00503 FY20 Power Systems Renewal Program

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficient to satisfy:	**Prudent and Efficiency Assessment Outcome**		
	Scope	**Yes**	**Information provided indicates that electrical asset failures and faults cause several operational delays. Aurizon Network is improving the monitoring and analysis of the trends to improve preventative approaches. This is a prudent approach to managing a critical asset for performance reliability of the network**
	Standard	Yes	
	Cost	Yes	
Capital Expenditure Claim (total)		$4,956,864	
Impact of findings on Claim		$ -	
TOTAL ACCEPTED		$4,956,864	

Table 5-7 IV.00504 FY20 Power Systems Renewal Program

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	Prudent and Efficiency Assessment Outcome		
	Scope	Yes	Arcadis has included this assessment only to provide information on the 00504 projects included by Aurizon Network in the expenditure and assessed by the team. Commissioned certificates have been sighted.
	Standard	Yes	
	Cost	Yes	
Capital Expenditure Claim (total)		$2,870,298	
Impact of findings on Claim		$ -	
TOTAL ACCEPTED		$2,870,298	

Assessment of scope

As advised by Aurizon Network in the *EOFY Program Status Report – Electrical Overheads Renewal Program FY20 - IV.00506, IV.00507* of 2 October 2020, certain works scheduled for FY20 were deferred or cancelled due primarily to covid-19 pandemic, national bushfires and extraordinary wet weather events which led to cancellation of planned closures.

As a result of this, Aurizon Network adjusted the works programme scope and budget to compensate with deferral of some works and bringing forward of other works. This led to some confusion during the assessment as although the assessment included IV.00503 as a sample project, during the assessment it was revealed that 30% of the projects commissioned were in fact in IV.00504, the additional completion certificates for these works were provided as a RFI request.

Development and implementation of diagnostic testing and monitoring will provide improvements in terms of increased preventative maintenance regimes and scope that will deliver improved financial and reliability performance from CQCN electrical assets.

Notwithstanding the above, the assessment team considered the project scope prudent given the reasonable operational and safety requirements of Aurizon Network and its customers.

Assessment of standard

In general, Aurizon Network's standards and practices comply to all applicable requirements for access agreements and Train Operation Deeds and are in alignment with Civil Engineering Track Standards (CETS) and industry standards and regulatory requirements.

During the site visits the team inspected several power systems renewals sites and through verification of the alignment with the equipment serial numbers (figure 5.3) the team confirmed that works undertaken were in alignment with the completion certification.

In consideration of the information provided and sites inspected the team assessed that the standard of the works was prudent and efficient.

Figure 5-3 Works undertaken were checked against completion certificates to verify that scope and standard complied.

Assessment of cost

In consideration of the issues and subsequent variations to scope, a comparison of planned and actual costs revealed increases in project management and work provider coordination costs. However, in relation to these costs, while the team assesses that the discrepancy indicates that Aurizon Network can make improvements in estimation practices, the revised costs are consistent with industry expectations for management of a scope subject to:

- significant ongoing change from external factors as listed above
- stringent requirements for scheduling and approval of access to track

For project IV.00504 claim Arcadis has noted that the 38 Completion Certificates as provided in response to works undertaken for this project (Remote Site Monitoring works) did not match the total of 40 sites stated in the expenditure claim. On a pro-rata basis, the claimed expenditure would be reduced by $8,116 (being 2/40 x $162,315). However, based on discussions with Aurizon Network of 2020-11-23, it is understood that all 40 sites have been commissioned, with the Completion Certificate for the remaining two sites pending return of site drawings, and on that basis Arcadis recommends the completion of the 40 sites be accepted.

5.5.5 IV.00506 FY20 Electrical Overhead Renewal Program Package 1

Overview

The Electrical Overhead Renewal Program aims to renew priority electrical assets to maintain service reliability across the Central Queensland Coal Network (CQCN). Aurizon Network achieve

this through renewing life expired assets, focusing on remote monitoring to provide greater asset intelligence and managing assets with obsolete parts/systems.

The assessment identified that works completed during FY20 include scope commissioned from both the FY20 project (IV.00506) and the FY21 project (IV.00507). Subsequently as approximately 30% of the works belonged to IV.00507 (not within the project sample) for completeness, Arcadis requested the completion certificates for these projects.

In general, Arcadis found that Aurizon Network has implemented an effective network electrical overhead renewal program.

The table and paragraphs below summarise the results of the prudency and efficiency assessment, Appendix C provides further details.

Table 5-8 IV.00506 FY20 Electrical Overhead Renewal Program

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	Prudent and Efficiency Assessment Outcome		
	Scope	**Yes**	**Aurizon Network is increasing diagnostic testing and monitoring to improve asset intelligence and enhanced condition reporting to develop a more preventive maintenance regime. This is a prudent and efficient approach to manage a portfolio aging electrical assets.**
	Standard	Yes	
	Cost	Yes	
Capital Expenditure Claim (total)		$4,545,732	
Impact of findings on Claim		$ -	
TOTAL ACCEPTED		$4,545,732	

Table 5-9 IV.00507 FY20 Electrical Overhead Renewal Program

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	Prudent and Efficiency Assessment Outcome		
	Scope	**Yes**	**Arcadis has included this assessment only to provide information on the 00504 projects included by Aurizon Network in the expenditure and assessed by the team. Commissioned certificates have been sighted.**
	Standard	Yes	
	Cost	Yes	
Capital Expenditure Claim (total)		$1,350,902	
Impact of findings on Claim		$ -	
TOTAL ACCEPTED		$1,350,902	

Assessment of scope

In FY16 Aurizon Network amended the strategy for Electrical Assets with the focus of extending asset life whist deferring major investment until the completion of the [redacted].

From the information provided Arcadis assessed that the current scope allows for an appropriate minimum level of investment in electrical assets to address business risks (safety and operational performance) and costs. The assessment team notes that with equipment of this age, replacement spares, ongoing maintenance support and therefore reliability becomes a significant concern.

Aurizon Network are currently implementing several initiatives to improve future scope development and preventative maintenance activities through increased asset intelligence gathered from increased monitoring, rationalisation of assets where appropriate and implementation of components or approaches to improve the reliability of assets from suppliers. The assessment team consider this approach prudent and efficient manner to manage the risks of aging and obsolete electrical assets.

In view of this situation the team assesses the project scope as prudent and efficient given the reasonable operational and safety requirements of Aurizon Network and its customers.

Assessment of standard

In general, Aurizon Network's standards and practices comply to all applicable requirements for access agreements and Train Operation Deeds and are in alignment with Civil Engineering Track Standards (CETS) and industry standards and regulatory requirements.

During the site visits the team inspected several electrical overhead renewals sites and the team confirmed that works undertaken were in alignment with the completion certification and adjacent infrastructure.

In consideration of the information provided and sites inspected the team assessed that the standard of the works was prudent and efficient.

Assessment of cost

Initial assessment showed discrepancies between planned and actual costs, for total costs by project and for component costs within projects. However, the assessment team requested clarification and acknowledges that the responses RFI's and subsequent correspondence addressed these discrepancies by providing further information on tasks undertaken and associated costs. Aurizon Network response to the RFI highlighted that opportunities exist to improve cost estimation at earlier stages, to allow better visibility and control of project costs, however the assessor considers the final actual cost remains in alignment with the work undertaken.

Discussions with Aurizon Network on site explained that to avoid major renewals on overheads it is often necessary to replace clamps or arms (figure 5.4). Aurizon Network staff identify this work on inspections or during the process of undertaking civil works. As it is prudent to undertake the work in these circumstances this causes variation from the original scope.

The assessment team noted that due to issues in relation to bushfires and covid-19 pandemic the comparison of planned and actual costs revealed increases in project management and work provider coordination costs. However, while assessor considers that the discrepancy indicates that estimation practices can be improved, the revised costs are consistent with industry expectations for management of a scope subject to:

- significant ongoing change from external factors as listed above
- stringent requirements for scheduling and approval of access to track

In consideration of these factors, and from the information provided, in general Arcadis considers the cost of the project prudent.

Figure 5-4 Replacement of clamps or arms is critical in maintaining a safe and operational network

5.5.6 IV.00456 FY20 Control Systems Renewal Program

Overview

Aurizon Network's train control system, asset protection, signalling control assets and telecommunications data network are part of the control systems assets.

The Control System Renewal Program aims to maintain service reliability and asset condition throughout the CQCN through the prudent prioritisation of assets which are life-expired, implementation of remote monitoring systems to minimise travel time for staff and effective management of assets with redundant components.

Aurizon Network has implemented its program to focus on assets and components which are life expired and potentially critical to operational safety, extending reliability and asset life through full or partial asset renewal. In additional Aurizon Network is focusing on enhancing its asset intelligence through increased remote monitoring and diagnostic analytical capabilities to provide efficiencies in remote asset inspections and repairs.

Arcadis considers this a prudent and efficient approach and generally found that Aurizon Network has implemented an effective control systems renewal program.

The table and paragraphs below summarise the results of the prudency and efficiency assessment, Appendix C provides further details.

Table 5-10 IV.00456 FY20 Control Systems Renewal Program Summary

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	Prudent and Efficiency Assessment Outcome		
	Scope	Yes	Control system assets are critical to safe operations of the CQCN network. Aurizon Network is increasing asset intelligence through focused monitoring and analysis of trends to understand and implement greater preventative measures.
	Standard	Yes	
	Cost	Yes	
Capital Expenditure Claim (total)		$14,542,832	
Impact of findings on Claim		$ -	
TOTAL ACCEPTED		$14,542,832	

Assessment of scope

In isolation, the works appear reasonable. Aurizon have explained and made reference to the application of the scope prioritisation model, however there is limited written evidence of planning or prioritisation for how the specific works were selected has been provided for the assessment of the control system works.

Notwithstanding, practical completion certificates indicate that Aurizon Network has delivered the project scope in accordance with the relevant Aurizon Network Standard Signalling Equipment Mechanical Drawings and Australian Standards Electrical Wiring Rules, with no outstanding works required. Information on the practical completion certificates indicates the works included appropriate testing and commissioning.

Arcadis assesses overall the project scope is prudent given the reasonable operational and safety requirements of Aurizon Network and its customers. The assessment team did not identify significant issues in the scope within this program.

Assessment of standard

The team assessed that the works delivered were in accordance with the relevant Aurizon Network Standard Signalling Equipment Mechanical Drawings and Australian Standards Electrical Wiring Rules.

During the site visits the team inspected several control systems renewals sites and through verification of the alignment with equipment numbers the team confirmed that works undertaken were in alignment with the completion certification. Site inspection confirmed that works were in alignment with adjacent infrastructure standards.

In consideration of the information provided and sites inspected the team assessed that the standard of the works was prudent and efficient.

Assessment of cost

Control system scope items vary significantly in complexity of site conditions, size and equipment and resources required for renewal.

Arcadis reviewed the works undertaken and assesses that the cost of works is in alignment with the extent of works delivered. The team assessed the project prudent and efficient in cost, supported by a reasonable level of documentation quality.

5.5.7 IV.00459 FY20 Level Crossing Renewal Program Package 2

Overview

The Level Crossing Renewal Program aims effectively risk assess, replace, or upgrade level crossings across the network in compliance with the Australian Level Crossing Assessment Model (ALCAM) risk assessment safety requirements.

In general, Arcadis found that Aurizon Network has implemented an effective network level crossing renewal program based upon ALCAM and condition assessments.

The table and paragraphs below summarise the results of the prudency and efficiency assessment, Appendix C provides further details.

Table 5-11 IV.00459 FY20 Level Crossing Renewal Program Package 2

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency to satisfy:	**Prudent and Efficiency Assessment Outcome**		
	Prudency of Scope	**Yes**	**Level crossing safety is paramount to Aurizon Network for whom safety is a core value. The Level Crossing Renewal program ensures compliance with the Australian Level Crossing Assessment risk assessment requirements and safety regulations. Compliance with the program is considered prudent and efficient.**
	Prudency of Standard	Yes	
	Prudency of Cost	Yes	
Capital Expenditure Claim (total)		$4,847,544	
Impact of findings on Claim		$ -	
TOTAL ACCEPTED		$4,847,544	

Assessment of scope

Arcadis visited several inspection of level crossing works undertaken during the site visits. Works undertaken complied with completion certifications and the sites visited showed no evidence of previous reported deterioration, although on some sites adjacent infrastructure gave an indication of the previous state of the asset, specifically the condition of ballast.

In addition, the implementation of the rubber flangeways along the length of the bitumen crossing provide a hard edge along the interface of the rail and bitumen, providing a smoother transition across the crossing for traffic and providing protection for the edge of bitumen at rail edge and the rail thereby reducing maintenance for whole of life. The assessment team considered this a prudent and efficient application in line with whole of life considerations in managing the asset.

Overall, the project scope is prudent and efficient given the reasonable operational and safety requirements of Aurizon Network and its customers. The assessment team did not identify any significant issues in the scope within this program.

Assessment of standard

Aurizon Network prioritises level crossing works using a combination of ALCAM assessments and visual inspections, couple with consideration for network criticality. Arcadis considers that this is a robust industry accepted approach.

In consideration of the information provided the standard of the works is prudent and efficient.

Assessment of cost

The claimed expenditure of $4,847,544 claim is considered in alignment with the work undertaken and is slightly less than the original estimated costs of $[redacted] which reflected an [redacted]% efficiency target in line with the Asset Renewal Program targets.

5.5.8 IV.00447 FY20 Structures Renewal Package

Overview

The structures renewal program aims to repair, replace, or remove life-expired or dysfunctional structures across the CQCN, with new structures compliant to environmental requirements and to 300LA loading configuration.

The works for the FY20 structural renewal package primarily consisted of culvert reparation/renewal, design, structural assessments, and replacement of bridge bearings.

The effective function of culverts is critical to operations, and failure to maintain effective drainage to a) keep water from collecting on or about the track and b) flowing of water off its Aurizon Network land and flooding adjacent property is economically unviable as the costs following floods and significant weather events is greater than the cost of repair or replacement of individual structures.

Aurizon Network stated that the program was impacted by the bushfires towards the end of the 2019 calendar year (delayed delivery of two planned culvert replacements) and by the COVID-19 pandemic (pushback of three culvert replacements and culvert strengthening jobs) over the 2020 year. Aurizon Network will undertake these projects in FY21. Notwithstanding, the works completed and included in the expenditure claim include scope carried over from the FY19 project (IV.00466) and commissioned in FY20 and the FY20 (IV.00447).

In general, Arcadis considers that the reparation and renewal of structures which are life-expired and not fit for purpose for operational requirements is prudent. From the information provided the program appears efficient programming approximately 30 – 50 renewals annually from 3,809 culverts and 339 bridges across the CQCN. Considering that most of these structures are over 15 years old, the level and extent of the program is considered reasonable.

The table below and following paragraphs below summarise the results of the prudency and efficiency assessment, further details are in Appendix C.

Table 5-12 IV.00447 FY20 Structures Renewal Program Package 2

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudence to satisfy:	**Prudent and Efficiency Assessment Outcome**		
	Prudency of Scope	Yes	Overall, the program was impacted by bushfires and covid-19 with some projects being pushed to FY21. Despite these some 28 renewals and bridge bearing replacements were completed with additional planning, design and procurement activities carried out towards the end of the FY in preparation for FY21
	Prudency of Standard	Yes	
	Prudency of Cost	Yes	
Capital Expenditure Claim (total)		$15,103,232	
Impact of findings on Claim		$ -	
TOTAL ACCEPTED		$15,103,232	

Assessment of scope

The FY20 program of works was to include 52 sites planned, Aurizon Network completed and commissioned a total of 28 sites within the FY20 claim.

The variance in the number of sites overall is primarily because of Aurizon's Network ongoing condition assessment program resulting in a change of priority and changes caused by external impacts such as the bushfires and COVID-19.

Aurizon Network provided photographic evidence on culverts defects prior to reparation, refer example figure 5.5. On assessment it considered that the scope undertaken was in alignment with the pictorial evidence.

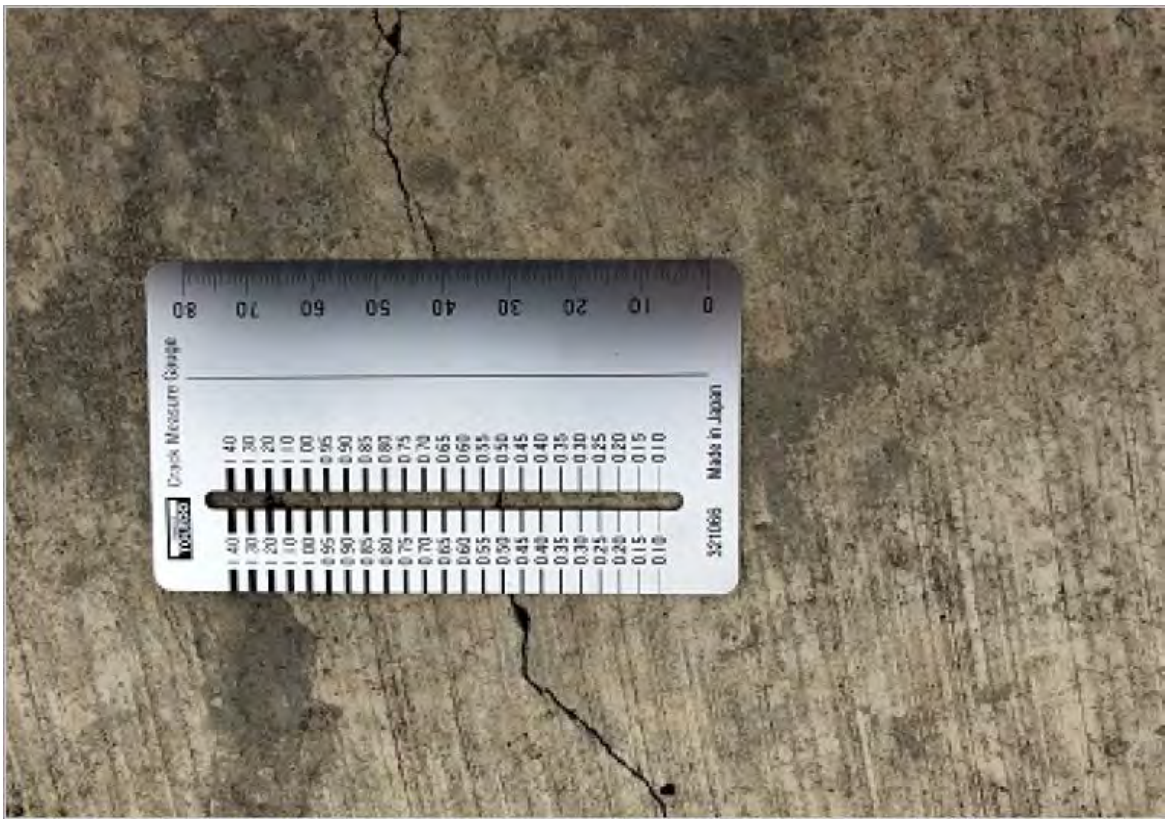

Figure 5-5 Significant cracking on headwall RCBC Blackwater 611.560 km

However, overall, Arcadis assesses the project scope prudent given the reasonable operational and safety requirements of Aurizon Network and its customers. The assessment team did not identify any significant issues in the scope within this program.

Assessment of standard

All commissioned assets were claimed and signed as completed in accordance with the conditions of contract, scope of work, for construction drawings, specifications, relevant standards, technical queries, and any non-conformance reports. From visual site inspection of completed works, Arcadis considered that the standard of completion appeared in alignment with current standards and expectations. Documentation provided stated that works were in compliance with Civil Engineering Structures Standards (CESS), Civil Engineering Track Standards (CETS) and relevant applicable Australian Standards (AS 5100 and AS 7636 RISSB Structure Standard)

In consideration of the information provided Arcadis assesses the standard of the works as prudent and efficient.

Assessment of cost

Aurizon Network's feasibility IAR outlines the case for [redacted] million in budget for the renewal of 52 structures with 3 bridge bearing replacements. The scope of works includes deferred works and the design of culverts in preparation for future year construction.

Actual expenditure claim was reduced to $15,103,232 with several culvert replacement and strengthening projects being pushed back to FY21. However, it is noted that Aurizon Network state that additional planning, design, and procurement activities were carried out towards the end of the FY which will reduce the impact of scope movement on the overall program delivery by creating efficiencies in the scope delivery planned for FY21.

Due to the variance in type and complexity of the culverts and bearing replacement projects within the structural scope, it is not possible to calculate a benchmarkable unit rate comparison.

However, from desktop assessment of the works quoted in the commissioning certification and total costs provided, the assessor considers that overall, the unit costs appear prudent.

5.5.9 IV.00609 FY19 Kestrel Infrastructure Upgrade

Overview

The Kestrel Infrastructure project was to replace and refurbish worn and/or life-expired assets to enable an uplift in railings from Kestrel Mine from current production of [redacted]mtpa to [redacted]mtpa.

Table 5-13 IV.00459 FY20 Level Crossing Renewal Program Package 2

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudence to satisfy:	Prudent and Efficiency Assessment Outcome		
	Prudency of Scope	Yes	The asset was assessed as not being fit for purpose for increased production/railings from Kestrel mine. The upgrade works were required to comply with requirements of Access agreements and Train Operations Deeds
	Prudency of Standard	Yes	
	Prudency of Cost	Yes	
Capital Expenditure Claim (total)		$2,944,844	
Impact of findings on Claim		$ -	
TOTAL ACCEPTED		$2,944,844	

Assessment of scope

Aurizon Network carried out asset condition inspections and identified that an upgrade was required to enable the requested uplift in railings from Kestrel Mine. Aurizon Network had already planned the renewal works for future years but brought the works forward on the advice of Kestrel Mine of their intention to increase production at the Kestrel Mine.

The expenditure scope included 1.6 km ballast undercutting, level crossing works, new insulated rail joints, rerailing (10 rails), 2306 steel sleepers replaced with concrete e-clip, and installation of 20 m track slab on loadout arrival site and 7.6 m on loadout departure side.

Delay of the reparation works would have potentially resulted in increase in deterioration of the assets which would have resulted in delays and increase maintenance requirements during operations. [redacted]

In view of the extension of the access agreement and increased payload, Arcadis assesses the scope of the works as prudent.

Assessment of standard

Aurizon Network provided construction drawings, certification, and condition assessment information to Arcadis for assessment. From the drawings and documentation provided Arcadis team assessed the completed works to be in compliance with relevant standards inclusive of Civil Engineering Track Standards (CETS).

In consideration of the information provided Arcadis assesses the standard of the works as prudent and efficient.

Assessment of cost

Aurizon Network undertook works primarily within one shutdown which provided flexibility in the program for the rest of the year and achieved significant cost efficiencies due to reduced mobilisation and demobilisation costs.

From the information provided Arcadis assesses the cost as prudent and efficient.

5.6 Documentation

Overall Aurizon Network provided sufficient information for the team to undertake the prudency efficiency assessment in a prompt and structured manner. The following paragraphs provide a breakdown for scope, standard and cost.

5.6.1 Scope Documentation

Overall, the assessment team assesses that the quality of documents provided for scope rated as adequate, with some projects (for example Kestrel Track Upgrade) providing particularly good scope information, inclusive of for construction drawings and comprehensive project management documentation.

At a strategy intent level, Aurizon Network have defined the scope in the Project Management Plan (PMP) and Investment Approval Request (IAR), both of which were provided as key documents with all sample projects. Completed scope of works and clarity on some of the assets, for example structure types and activities on structures, not commissioned was often not clear, and the assessment team sought further clarification through the RFI process or in discussions with the relevant personnel during site visits or virtual meetings.

5.6.2 Standard Documentation

Overall, the assessment team assesses that the quality of documents for standard rated as adequate. Aurizon Network stated and signed within the commissioning certificates that works are compliant with relevant standards and regulatory requirements, therefore providing assurance by implication.

Site inspections provided visual verification that standard of completed work was in line with industry expectations, Aurizon Civil Engineering Standards (CETS) approved within the Aurizon Safety Management System and in compliance with adjacent infrastructure.

5.6.3 Cost Documentation

Overall, the assessment team assesses that the quality of documentation for cost rated as adequate. Of all the information types this was probably the most “lacking”.

Cost aspects within the IAR provided in sufficient detail at the strategic level however Aurizon Network did not provide cost aspects of portions of the claim broken down per structure to allow consideration of m2 unit rates or other benchmarking at a unit level rather than a project level. Where concerns arose, the assessment team requested this additional information via RFI or from site consultation. The assessors also raised issues where costs were significantly not aligned with the number of sites completed. For all issues raised Aurizon Network provided the necessary scope and cost breakdown details for clarification in a prompt and efficient manner


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for natural and
built assets

APPENDIX A AURIZON NETWORK F20 EXPENDITURE CLAIM

APPENDIX B SITE VISIT PROJECT LOCATION DETAILS

Rail Renewal IV.00426

System	Location
Blackwater	Mt Miller-Fishermans Lding 0.057-0.424km
Blackwater	Callemondah Yard - Down 536.307km-536.740km

Ballast Undercutting IV.00605

Asset Description	System	Location	KM point
C14 Ballast Undercutting – Major	Blackwater	IV.00605.S.B.30.26-0147 Rocklands Coal Mn	0-0.261
C14 Ballast Undercutting – Major	Blackwater	IV.00605.S.B.30.35-0166 Rocklands Lp	632.378-632.524
C13 Ballast Undercutting – Complete Turnout	Blackwater	IV.00605.S.B.40.15-0240 Gracemere 10C/D	9.055-9.055
C01 Ballast Undercutting	Moura	IV.00605.S.M.30.05-0134 Stowe Mainline Level Xing	18.450-18.680
C01 Ballast Undercutting	Moura	IV.00605.S.M.40.10-0231 Stowe 12 Points	24.375-24.375
C01 Ballast Undercutting	Blackwater	IV.00605.S.B.30.35-0166 Rocklands Lp	632.378-632.524
C01 Ballast Undercutting	Blackwater	IV.00605.S.B.40.12-0226 Rocklands 8B/C	0.241-0.241

Track Upgrade IV.00477

System	Location
Blackwater	Callemondah Through Road 534.118-536.021km
Moura	Gladstone Yard 1.264-2.444km

Structures IV.00447

System	Location
Blackwater	Culverts at BW 536.050km R&R
Blackwater	MA CF 10.420km RCP R&R

Control Systems IV.00456

Project Group	Asset Description	System	Location

Train Detection	Track circuits	Blackwater	Marmor
Train Detection	Track circuits – Power Upgrade	Blackwater	Rocklands
Control System Infrastructure	OF Replacement	Blackwater	Rocklands to Rockhampton A Cabin
Transmission Renewal	DC Replacement Renewal	Blackwater	Callemondah North MI
Vital Disabling Release	LX Disabling Panel	Blackwater	Rocklands – Roope Rd LX
Data Network	PSS Lobe migration to MPLS/ODCN	Blackwater	North Coast Line-523to624.2

Overhead Renewals IV.00506

Asset Description	System	Location
OH Renewals	Blackwater	BW-Rocklands TSC-Archer

Level Crossing IV.00459

System	Location
Blackwater	BW_LXU ID#758 – Gentle Annie Rd - NCL

Power Systems IV.00503

Asset Description	System	Location
FY19 Spare Auto Transformers & Bunds	Blackwater	Windah
Distance Relays	Blackwater	Rocklands TSC
Motorised Isolators	Blackwater	Mt Miller

APPENDIX C PROJECT PRUDENCY ASSESSMENTS

Template for SME's

AURIZON PRUDENCY CAPEX REVIEW 2019-20 QCA

Arcadis Brisbane
LEVEL 5/120 EDWARD ST, BRISBANE, QLD 4000

IV.00477 TRACK RENEWAL PACKAGE 2

The following provides detail of the project prudency and efficiency assessment:

ASSESSMENT SUMMARY

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	Scope	Yes
	Standard	Yes
	Prudency of Cost	Yes
Capital Expenditure Claim (total)		$$32,154,636
Impact of findings on Claim		$ -
TOTAL ACCEPTED		$$32,154,636

Details	
Project Number	IV.00477
Project Name	Track Renewal Package 2
Project Type	Rail/Civil
Pre-Approval	No
Asset Description	Renew and replace life expired rails and sleepers on CQCN.
Location(s)	Various
Expenditure Claimed	$ 32,154,636
Interest during Construction (IDC)	$ 97,149
Total Claimed	$ 32,251,785

Check list	Documentation Type	Name of document
Essential documents		
Y	Project Management Plan	20191014 IV00477 PMP
Y	Breakdown of costs	SAP Spreadsheet
Y	Business Case Justification (IAR)	Track Renewal Package 2 IAR
Y	Commissioning data and completion, acceptance, and handover validations.	Various
Y	Completion report	End of Year Status Report

PROJECT OVERVIEW

Scope

The purpose of the FY20 Track Renewal Package 2 is to renew and replace life-expired rails and sleepers on the Central Queensland Coal Network (CQCN) to ensure the continued safe passage of rolling stock. The project will produce detailed Best Mean Fit (BMF) designs on sites of significant length to maximise the life of the track elements through improved track alignment and compliance with CETS requirements.

The Track Upgrade Project renews the track structure at a single site (sleepers, rail, fastenings and in some locations ballast), maximising the efficiency of asset renewal activities by only mobilising to a site once. In line with CETS, the project involves upgrading the track structure to 60kg Premium HH rail, 28tal Pandrol e-clip concrete sleepers (figure 1) and renewal of ballast in some locations. A track renewal site is determined by combining a site that has worn or fatigued rail in need of replacement and an area of worn/damaged concrete, or fist or timber sleepers that require replacement.

The activities within this project consists mainly of:

- Replacement of sleepers where sleepers are rendered incapable of supporting the track and/or retaining the rails to gauge due to age, derailed wheels, or inadequate loading capacity
- Replacement of rail where profile has worn beyond CETS limits or there is an unacceptable level of defect
- Deteriorated or life-expired timber sleepers
- FIST clips

Business Case

The primary requirement of this project is to renew or replace prioritised life-expired rails and ineffective and corroded (predominantly) fist-fastened sleepers with new 60 kg HH Rails and 28t Full Depth Concrete E' clip sleepers at identified sites within the CQCN. This is in line with industry good practice to maintain efficient operations and current haulage and axle loads along portions of the CQCN.

The scope of work includes the development of detailed BMF designs for significant areas of track to ensure the optimisation of top line, that is to make sure track constructed to the appropriate and correct vertical and horizontal alignments

Issues

The bushfires and consequences of COVID-19 pandemic impacted the FY20 Track Renewal Program, Aurizon Network managed these issues mostly via approved change requests. Aurizon provided completion certificates for works undertaken.

The key FY20 impacts included:

- A State of Fire Emergency applied to most of the CQCN and importantly all areas of the Blackwater System where a closure was due to commence on 11 November 2019 resulting in the following activities or operations being suspended for the period of the declaration: welding, grinding, the use of oxy acetylene cutting or heating, use of naked flames and other similar operations that could be a source of ignition when flammable material is present or can become a fire hazard regardless of the presence of flammable material. Therefore, the following track upgrade scope had to be cancelled and rescheduled: TU BW Grantleigh - Tunnel Down 71.97km-73.057km 21 Rails 1587 Sleepers (TLM). This increased execution costs by more than $0.5m.
- Increased sleeper, labour, and freight costs

Completion Summary

From the information provided it is identified that the strategy implemented in FY20 sought to maximise effective resource capability / availability given the constraints associated with track possession and issues identified above. Aurizon have stated that as labour and machinery are charged daily, the preference was to maximise productivity and increase efficiency by undertaking additional replacement of fist or timber sleepers in locations where appropriate.

FIGURE 1 28TAL PANDROL E-CLIP CONCRETE SLEEPERS

The assessment identified that the scope was generally executed as per the baseline schedule with some adjustment needed within the financial year due to resource and appropriate possession constraints. In some cases, reprioritisation was conducted based on the asset condition and criticality.

The information provided highlighted that a number of improvements have been implemented in the program, these have resulted in the development of innovative renewal methodologies and new and detailed and specific construction methodologies and procedures. Some key examples of innovations that have been successfully implemented in FY20 include:

- Consolidation of multiple scope items into one. This has been implemented at Gladstone South where multiple turnout removal sites i.e., TRM MA SG1, SG7, SG9 and SG16 (turnout removals at Barney Point Balloon and South Gladstone Yard) were consolidated with track upgrades i.e., TU MA 1.264-2.443km (Moura Main South Gladstone Yard) which achieved significant cost efficiency in both product and execution at these sites.

- Cascading the use of part-worn material. Salvaging part-worn rail and reusing on targeted sections offers the ability to align asset use with material (i.e., part worn rail within balloon loops or lower trafficked areas with life-expired rail through corrosion). Part-worn rail and sleepers have been used in TU MA 1.264-2.443km (Moura Main South Gladstone Yard) and part-worn rail was used in Dalrymple Bay Arrival RD 2 -0.073 km-0.614km. In some cases, leftover sleepers from the scope completed in previous years have been used to reduce costs.

The following information is from the EOFY Program Status Report

System	Product	IAR Value – Current		Commissioned Scope in Current FY20	
		QTY	Value $	QTY	Value $
Blackwater	Track KMs	5.1	[redacted]	6.1	8,833,344
Goonyella	Track KMs	15.66	[redacted]	16.43	21,538,908
Moura	Track KMs	1.2	[redacted]	1.11	622,577
Newlands	Track KMs	2.8	[redacted]	0.75	1,159,808
		24.76	[redacted]	24.37	32,154,636

TABLE 1 PREVIOUS FY PERFORMANCE (YTD) – INFORMATION FROM IAR

	Scope	Cost	Time
FY19 YTD (Dec-18)	6KM Units delivered/YTD Plan 3.2KM *Total Assets 2,200km*	$[redacted] Track KM Planned unit cost	$[redacted] Track KM Actual unit cost Avg 6month Unit rate
Comments	The project has delivered 61% of the project's rail scope and 52% of the project's sleeper scope, year to date The Boundary Hill (2km) track upgrade site will now be completed in May19 due to condition of the asset. It had previously been deferred to FY20.		

TABLE 2 THIS FY PERFORMANCE (YTD) AS PER INFORMATION PROVIDED FROM EOFY.
ESTIMATES REFERENCED FROM AURIZON NETWORK MAINTENANCE AND RENEWAL STRATEGY 2019

	Scope	Cost	
FY20	24.37 km Unites delivered plan 24.76km	$[redacted] Track KM Planned Unit cost	$[redacted] Track KM Average unit cost across FY
Comments	The lower unit rate in FY20 was estimated due to a targeted efficiency from the FY19 year, the FY21 target was estimated as $[redacted] Track KM due to increases in costs of sleepers and materials freight costs. Aurizon has stated that the impact of Covid-19 has created increases in the supply chain more in line with FY21 estimates, Arcadis considers that this aligns with what has been experienced generally throughout industry where there is a cost borne by supply chain freight costs in FY20 and hence considers that the actual FY20 unit cost being closer to FY19 and FY21 estimates as reasonable and to be in alignment with the work undertaken.		

SECTION 1 - IS THE SCOPE PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.1	[i] D	Does the project align with the asset management strategy and AMP and has it been evaluated appropriately in terms of alternative/benefit cost ratio?	Yes	Condition warranting intervention consists of where rail, sleeper or clip has reached a non-serviceable state thereby reducing track structural integrity and increasing the risks of alignment faults, gauge spread and other issues which can cause increase in overall deterioration of the track and rolling stock components as well increase risk of derailment. Works are prioritised on condition ranking of the component and operation criticality. From the information provided and site anecdotal evidence the track renewal program and method of prioritisation of sites for renewal appears in alignment with the Asset Management strategy and whole of life considerations.	PMP, Aurizon Network and Maintenance Strategy, Site inspections	Nil
1.2	[i] C	Are project solutions based on reasonable expectation of the demand to have regard for current and future capacity levels?	Yes	This project maintains capacity at current agreed levels. The works are required to maintain agreed BRITT and minimise risk of delays and application of Temporary Speed Restrictions.	BRITT data provided	Nil
1.3	[i] E	Is the extent of the project economically reasonable and efficient considering the age and condition of the Rail Infrastructure?	Yes	Aurizon provided GPR and evidence of methodologies and processes applied to efficiently monitor rail wear and measurements that provide robust data from which to make informed decisions on rail renewal works programming	RISSB National Standards Civil Engineering Track Standards Site inspection GPR	Nil
1.4	[i] B	Does the project accommodate what is reasonably required to comply with access agreements and Train Operation Deeds?	Yes	Planned and pre-emptive replacements of failing track components avoid accelerated deterioration of track and rolling stock and unplanned failures and disruptions, thereby is in alignment with the requirements of access.	Aurizon Network and Maintenance Strategy,	Nil

1.5	[i], G	Are there outcomes from user consultation or independent assessment which potentially impact access charges and have not been considered/addressed appropriately	No	From the information provided no such outcomes are evident.		Nil
1.6	[i] F	Is there appropriate evidence to demonstrate compliance with Aurizon Network's legislative and tenure requirements, specifically relating to rail safety, workplace health, safety, and environmental requirements?	Yes	Projects were delivered in alignment with the requirements of Rail Safety National Law (RSNL) and the Office of the National Rail Safety Regulator (ONRSR)	PMP Completion certification	Nil
1.7	[i] A	Does the project consider any relevant Network Development Plans?	Yes	Works programmed on combined condition and network criticality ranking consistent with Aurizon Asset Management Strategy	Aurizon Network and Maintenance Strategy	Nil
1.8	[i] G, I	Have there been any additional submissions, requests, or consultations to the QCA that have not been addressed appropriately?	No	From the information provided there is no evident additional submissions, requests of consultations that have not been addressed.	N/A	Nil
1.9	[i] H	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil

SECTION 2 - IS THE STANDARD PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
2.1	[ii] B	Does the standard reflect the current demand and likely future capacity levels and type of traffic?	Yes	Replacement of life-expired or damaged sleepers with modern 28tal concrete sleepers and standard e-clips supports the provision of robust infrastructure solutions to support current and future capacity requirements	PMP, CETS, 1HFY2020 Financial Performance	Nil
2.2	[ii] D	Is the standard consistent with the asset management objectives?	Yes	Whole of life considerations through replacement with fit for purpose and industry proven track elements is consistent with asset management strategy. Asset standardisation through replacement with consistent rail, sleeper and clip type is consistent with contemporary good asset management practice.	Aurizon Network and Maintenance Strategy,	Nil
2.3	[ii] A,	Is the standard consistent with the requirements of Railway Operators and what is reasonably required to comply with Access Agreements and Train Operations Deeds? E.g. does it align with National Railway standards, contractual requirements, etc.	Yes	Standards align with RISSB national requirements and guidelines and through provision of reliability on the network Arcadis considers is consistent with Operator and User requirements.	Completion certification, observations on site	Nil
2.4	[ii] F	Is the standard of works compliant with relevant laws and the requirements of any authority?	Yes	From the information provided and site visit inspections Arcadis considers the standard of work is compliant with national and federal laws and requirements	Completion certification, CETS, site observations	Nil
2.5	[ii] G	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
2.6	[ii] C, E	Is the standard of works consistent with having regard for the requirements of Australian design and construction standards and Aurizon Network's design standard contained within the Safety Management System? If not, have the appropriate risk assessments and verification processes been implemented in the development of the standard	Yes	The assessors found that the standard of works was consistent with the Civil Engineering Track Standards (CETS) which were approved by the Rail Safety Regulator as part of the Aurizon Network Safety Management System. The assessment team confirmed that standard of works on site was in line with adjacent infrastructure.	CETS, site observations	Nil

SECTION 3 - IS THE COST PRUDENT AND EFFICIENT

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.1	[iii]E (1,2,3),	Was the project managed effectively with regards to the customer, economic and safety, environmental and sustainability requirements and does it comply with Laws and requirements of Authorities?	Yes	Details provided indicate work was conducted in consideration with regards to compliance with relevant laws and requirements. Projects managed within program of works to comply with budget and timing targets. Assets recycled where possible, e.g. salvaging of part-worn rail and reusing on targeted sections such as balloon loops or lower trafficked areas where rail has life-expired.	Aurizon 2020 Sustainability Report, EOFY	Nil
3.2	[iii] D	Was the minimization of whole of life costs considered adequately and other principles defined in the strategic asset management plan?	Yes	The inspection, identification and ranking of track assets using visual inspections, track recording car, GPR to name a few is Aurizon core business. Combining the data from condition with criticality, cost, and safety as per the investment variables considered in works planning is considered a balanced approach towards whole of life considerations. Aurizon stated that they are trialling a track "monitoring" system which attaches to normal rolling stock and will provide the data normally collected by the track recording car at approximately 6 day intervals – this will give further robustness to whole of life considerations to track renewal planning in the future.	Aurizon Network Maintenance and Renewal Strategy Aurizon staff	Nil
3.3	[iii] C	Was a reasonable procurement methodology and cost competitive procurement process used to select and complete the project?	Yes	Aurizon applies a mix of procurement for supply of materials and supply of works with supply of items such as rail for track renewal being from a list of preferred suppliers who have already been proven to comply with CETS and national standards for the capacity requirements on the CQCN and to provide an optimised whole of life outcome in consideration of the operational and environmental constraints and requirements. This is an accepted and reasonable approach	Aurizon staff Completion certificates (shows suppliers)	Nil
3.4	[iii] A, B	Do the cost elements of the project consider any relevant Network Development Plans and does it benchmark reasonably relative to	Yes	From the information provided and site discussions the costs are within the industry range expected in consideration of their scale, nature, and complexity.	IAR	Nil

		the scale, nature, cost, and complexity of the project?		Smaller projects and projects located in remote areas have a larger unit rate which is in line with additional mobilisation costs Average unit rate is higher than estimated for FY20 program, Aurizon has stated that this is due to supply chain issues associated with covid-19, this is in alignment with industry generally and it is noted that the average rate is below estimated FY19 and FY21 projections.		
3.5	[iii] E (6,8)	Does the contract selected provide; best performance for all stakeholders, minimisation of project costs, meeting contractual timeframes and dealing with external factors?	Yes	Aurizon Network consolidated a number of multiple scope items into one to minimise costs and increase efficiencies. This approach was implemented at Gladstone South were multiple turnout removal sites were consolidated with track upgrades. This provided project cost efficiencies and productivity.	EOFY, Completion certification	Nil
3.6	[iii] (5,7)	Was the portfolio efficiently programmed to consider the performance and operational requirements for access holders and end users and other elements in the supply chain?	Yes	Access holders are notified of possessions which potentially may impact on operations.	Possession Protocols and System Rules	Nil
3.7	[iii] F	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
3.8	[iii] G	Have there been any additional submissions, requests, or consultation to the QCA that have not been addressed appropriately?	No	From the information provided to Arcadis there has not been any additional submission or requests.	N/A	Nil
3.9	[iii] E (4)	Have the works been scheduled and staged to minimise disruption to the operation of users?	Yes	Aurizon stated that they are in constant consultation with the users and plan works to align with mine maintenance windows where possible.	Site inspections: Aurizon staff	Nil

Template for SME's

AURIZON PRUDENCY CAPEX REVIEW 2019-20 QCA

Arcadis Brisbane
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IV.00503 POWER SYSTEMS RENEWAL PACKAGE

The following provides detail of the project prudency and efficiency assessment:

ASSESSMENT SUMMARY

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudence and efficiency to satisfy:	Scope	YES
	Standard	YES
	Cost	YES
Capital Expenditure Claim (total)		$4,956,864
Impact of findings on Claim		$ -
TOTAL ACCEPTED		$4,956,864

Details	
Project Number	IV.00503
Project Name	Power Systems Renewal Package 1
Project Type	Electrical Systems
Pre-Approval	No
Asset Description	Seeks to renew priority electrical assets to maintain service reliability across CQCN.
Location(s)	Various
Expenditure Claimed	$ 4,956,864
Interest during Construction (IDC)	$ 100,354
Total Claimed	$ 5,057,218

Check list	Documentation Type	Name of document
Essential documents		
Y	Project Management Plan	IV00503-MAA-PLN-000001_IFU_REV 0
Y	Breakdown of costs	SAP breakdown to project level within the program
Y	Business Case Justification (IAR)	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23
Y	Commissioning data and completion, acceptance, and handover validations.	Various documents provided
Y	Completion report	End of Financial Year Report

PROJECT OVERVIEW

Scope

This report summarises the capital works commissioned by the Power Systems Renewal Program in FY20. The works completed during FY20 include scope commissioned from both the FY19 project (IV.00503) and the FY20 project (IV.00504). It should be noted that during FY20, works commenced on the FY21 scope (primarily design). For clarity, Aurizon Network confirms that none of these packages of work has been commissioned for use and accordingly have not been included in Aurizon Network's FY20 capital expenditure claim.

As categorised by Aurizon, the following provides a high-level breakdown of the electrical assets being refurbished or replaced under the Power Systems Renewal Program

1. Autotransformers Replacement and Bund Retrofit
2. Protection Relay Upgrade
3. Recloser Upgrade
4. Earthing Grid Assessment
5. Motorised Isolators (MIs)
6. Remote Protection Relay Monitoring

Business case

The Electrical Overhead Renewal Packages 1 and 2 form part of the broader Electrical Infrastructure Asset Renewal Program. The objective of the Electrical Infrastructure Asset Renewal Program is to renew priority electrical assets to maintain service reliability across the Central Queensland Coal Network (CQCN) through:

- Renewing assets or components which are life expired to maintain continuity of train operations and where possible extending the life of asset through component renewal or part asset renewal.
- Focusing on remote monitoring and diagnostic capabilities for field assets to reduce travel time to site to fix issues; and
- Appropriately managing assets that contain obsolete parts/systems which are hard to source.

The present scope allows for an appropriate level of investment in electrical assets to address business risks (safety and operational performance) and costs. As to be expected with equipment of this age, replacement spares, ongoing maintenance support and therefore reliability becomes a significant concern

Issues

As advised by Aurizon in the *EOFY Program Status Report - Power Systems Renewal Program FY20 - IV.00503, IV.00504* of 30 September 2020, certain works scheduled for FY19 and FY20 were deferred or cancelled due to:

- Misalignment between the Scope Priority Model (SPM) and the Investment Approval Request (IAR)
- Identification of additional works or works of higher priority, as a result of on-going condition assessment and maintenance activities
- Regional bushfires (as far south as the Hunter Valley, up to Gladstone and Rockhampton in Central Queensland, as well as in Southern Queensland including the Sunshine Coast, the Gold Coast, and the Southern Darling Downs).
- Extraordinary wet weather events which led to the cancellation of planned closures.
- National pandemic (COVID-19) requiring social distancing and reduction in productivity leading to a carry-over of $785,000 worth of scope to the next financial year. Aurizon advises that this will be included as part of the remaining project costs to be claimed in future years.

As a result, the works programme and budget were adjusted to compensate, with:

- deferral of some works
- bringing forward alternative works that could be carried out
- performing preparatory works to assist in future programmes

Details of the programme changes were provided to Arcadis in the *EOFY Program Status Report.*

A comparison of planned and actual costs revealed significant increases in project management and work provider coordination costs. However, in relation to these costs, while the discrepancy indicates estimation practices can be improved, the revised costs are consistent with industry expectations for management of a scope subject to:

- significant ongoing change from external factors as listed above
- stringent requirements for scheduling and approval of access to track

Completion Summary

Works completed in FY19 and FY20 claimed in FY20 are provided in Section 4 of the *EOFY Program Status Report - Power Systems Renewal Program FY20 - IV.00503, IV.00504* of 30 September 2020, as shown below.

AURIZON

4 Commissioned Assets

IV.00503 – Power Systems Renewal Package 1

PRODUCT	IAR Value – Current FY		Approved Changes			QCA Approved Value – Previous FYs		Commissioned Scope in Current FY		Remaining Scope – Not Claimed	
	Qty	Value $	CR Type	Qty	Value $	Qty	Value $	Qty	Value $	Qty	Value $
Manual Isolators	25[1]								$ -		
Motorised Isolators	35[2]							6	$ 213,527		
Haycolec Isolators	30[3]								$ -		
Dreischer Upgrade Units (MIs)	16[4]								$ -		
Remote Site Monitoring	19[5]								$ -		
Recloser Upgrade	1[6]								$ -		
Autotransformer Renewal	4		2[7]	Deferred		2	835,307		$ 191,804		
Autotransformer Bunding	9[8]							9	$ 1,204,140		
Distance Relays (sites)	21[9]							18	$ 3,287,188		
Enclosure Security System Locks								48	$ 60,206		
		$ [redacted]					$ 835,307		$ 4,956,864		$ 821,794[10]

IV.00504 – Power Systems Renewal Package 2

PRODUCT	IAR Value – Current FY		Approved Changes			QCA Approved Value – Previous FYs		Commissioned Scope in Current FY		Remaining Scope – Not Claimed	
	Qty	Value $	CR Type	Qty	Value $	Qty	Value $	Qty	Value $	Qty	Value $
Autotransformer Renewal	4							3[7]	$ 1,537,019		
Autotransformer Bunding								5	$ 309,256		
Motorised Isolators	39[2]							34[2]	$ 861,708		
Remote Site Monitoring								40	$ 162,315		
		$ [redacted]							$ 2,870,298		$ 1,499,355[10]

[1] Deferred to Power Systems Renewal Package 3 (IV.00505).

[2] 29 units deferred to Power Systems Renewal Package 2 (IV.00504) with the focus on standard design development for future years. Further 10 units identified, 5 of which had to be deferred to FY21 due to COVID-19.

[3] Scope to be completed as part of Electrical Overhead Renewal Program to align with scope approved for Electrical Overhead Renewal Package 3 (IV.00508).

[4] Scope is part of 35 Motorised Isolators (MIs).

[5] 19 units deferred to Power Systems Renewal Package 2 (IV.00504) to integrate relay replacement.

[6] Scope deferred to Power Systems Renewal Package 3 (IV.00505)

[7] In FY19, 2 units deferred installation to Power Systems Renewals Packages 2 & 3 (IV.00504 & IV.00505) due to capital funding restrictions. 3 Units installed in FY20 in Power Systems Renewal Packages 2 with 1 unit deferred to FY21 due to COVID-19.

[8] Installation deferred to FY20. Focus was on standard design development for future years.

[9] IAR quantity deferred from FY19 to FY20. Scope development /design in FY19 and execution in FY20. 3 sites delayed due to COVID-19 to be completed in FY21.

[10] For information only - provides an estimate of remaining project costs expected to be claimed in future years.

SECTION 1 - IS THE SCOPE PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.1	[i] D	Does the project align with the asset management strategy and AMP and has it been evaluated appropriately in terms of alternative/benefit-cost ratio?	Yes	The works are consistent with Aurizon Asset Management Policy. The works represent replacement or refurbishment of critical assets to the minimum condition required for system performance at current levels. Replacement asset types are selected to deliver higher reliability and hence optimised performance for operational requirements.	Electrical Asset Renewals Project Management Plan 19 June 2018	Nil
1.2	[i] C	Are project solutions based on a reasonable expectation of the demand to have regard for current and future capacity levels?	Yes	It is prudent to conduct replacement or refurbishment of critical assets to the minimum condition required for system performance at current levels. (Refer figure 1)	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
1.3	[i] E	Is the extent of the project economically reasonable and efficient considering the age and condition of the Rail Infrastructure?	Yes	The works represent replacement or refurbishment of critical assets to the minimum condition required for system performance at current levels. Selection of assets for replacement or refurbishment was based on sound condition assessment processes.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.4	[i] B	Does the project accommodate what is reasonably required to comply with access agreements and Train Operation Deeds?	Yes	In general, Aurizon Network's standards and practices are understood to comply with all applicable requirements for access agreements and Train Operation Deeds. The access agreement and Train Operation Deed require that Aurizon provide, maintain, and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for power system equipment to be regularly maintained and renewed. Therefore, Arcadis considers that this project promotes and accommodates this requirement.	Completion certificates, Schedule E	Nil
1.5	[i], G	Are there outcomes from user consultation or independent assessment which potentially impact access charges and have not been considered/addressed appropriately	No	From the information provided there were no outcomes that have not been addressed appropriately.	N/A	Nil
1.6	[i] F	Is there appropriate evidence to demonstrate compliance with Aurizon Network's legislative and tenure requirements, specifically relating to rail safety, workplace health, safety, and environmental requirements?	Yes	In general, Aurizon Network's standards and practices comply with all applicable legislative statutory requirements relating to rail safety, workplace health, safety, and environmental matters. The access agreement and Train Operation Deed require that Aurizon provide, maintain, and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for power system equipment to be regularly maintained and renewed. Therefore, Arcadis considers that this project promotes and accommodates this requirement.	Completion certificates, Schedule E	Nil

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.7	[i] A	Does the project consider any relevant Network Development Plans?	Yes	The works allow for represent replacement or refurbishment of critical assets to the minimum condition required for system performance at current levels. However, the scope is based upon the Network Strategic Asset Plan (NSAP) – which derives a program based upon asset life and expected wear rates. The proposed scope is then redefined in line with the criticality (SPM).	PMP, completion certification, IAR	Nil
1.8	[i] G, I	Have there been any additional submissions, requests, or consultations to the QCA that have not been addressed appropriately?	No	From the information provided for review, no additional submissions, requests, or consultations have been identified.	N/A	Nil
1.9	[i] H	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil

SECTION 2 - IS THE STANDARD PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
2.1	[ii] B	Does the standard reflect the current demand and likely future capacity levels and type of traffic?	Yes	Given the uncertainty over future rail demand, the works represent replacement or refurbishment of critical assets to the minimum condition required for system performance at current levels.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
2.2	[ii] D	Is the standard consistent with the asset management objectives?	Yes	Selection of assets for replacement or refurbishment was based on sound condition assessment processes.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
2.3	[ii] A,	Is the standard consistent with the requirements of Railway Operators and what is reasonably required to comply with Access Agreements and Train Operations Deeds? E.g., does it align with National Railway standards, contractual requirements, and so on.	Yes	In general, Aurizon Network's standards and practices comply to all applicable requirements for access agreements and Train Operation Deeds. The access agreement and Train Operation Deed require that Aurizon provide, maintain, and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for power system equipment to be regularly maintained and renewed. Therefore, Arcadis considers that this project promotes and accommodates this requirement.	Completion certificates, Schedule E	Nil
2.4	[ii] F	Is the standard of works compliant with relevant laws and the requirements of any authority?	Yes	The works are understood to conform to requirements of: - Electricity Safety Act and regulations - Rail Safety National Law and regulations	Completion certification, PMP	Nil

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
2.5	[ii] G	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
2.6	[ii] C, E	Is the standard of works consistent with having regard for the requirements of Australian design and construction standards and Aurizon Network's design standard contained within the Safety Management System? If not, have the appropriate risk assessments and verification processes been implemented in the development of the standard	Yes	In general, Aurizon Network's standards and practices comply to all applicable legislative statutory requirements and to applicable national design and construction standards. The access agreement and Train Operation Deed require that Aurizon provide, maintain, and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for power system equipment to be regularly maintained and renewed. Therefore, Arcadis considers that this project promotes and accommodates this requirement. Site inspection of sampled completed works supported this understanding.	Completion certificates, Schedule E	Nil
2.7	[ii] H	Have there been any additional submissions, requests, or consultation to the QCA that have not been addressed appropriately?	No	From the information provided for review, no additional submissions, requests, or consultations have been identified		Nil

SECTION 3 - IS THE COST PRUDENT AND EFFICIENT

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.1	[iii]E (1,2,3),	Was the project managed effectively with regards to the customer, economic and safety, environmental and sustainability requirements and does it comply with Laws and requirements of Authorities?	Yes	In general, Aurizon Network's standards and practices are understood to comply to all applicable legislative statutory requirements and to applicable national design and construction standards. Site inspection of sampled completed works supported this understanding.	Completion certificates, PMP, EOFY	Nil
3.2	[iii] D	Was the minimization of the whole of life costs considered adequately and other principles defined in the strategic asset management plan?	Yes	Where appropriate, the AMP allows for opportunities to minimise whole-of-life cost. Best practice in asset management of electrical assets is often driven by the practicalities of minor maintenance of electrical assets, in that the option of reactive maintenance for the renewal of redundant and/or "cheaper" components is prudent and efficient in terms of whole of life costing.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
3.3	[iii] C	Were a reasonable procurement methodology and cost-competitive procurement process used to select and complete the project?	Yes	Negotiated procurement, market pricing and competitive bid processes in place and managed by Aurizon Network procurement team for all electrical equipment purchased. This is considered a reasonable approach.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.4	[iii] A, B	Do the cost elements of the project consider any relevant Network Development Plans and does it benchmark reasonably relative to the scale, nature, cost, and complexity of the project?	Yes	High-level benchmarking assessment against industry costs for similar works identified costs align with the type and extent of works undertaken. NAMS system is now capturing renewed asset information in each single location. This will provide efficiencies in future long term planning, conditioning monitoring, determining maintenance approaches and planning guidance.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
3.5	[iii] E (6,8)	Does the contract selected provide; best performance for all stakeholders, minimisation of project costs, meeting contractual timeframes and dealing with external factors?	Yes	Aurizon Network manages the program using internal resources and longer-term resource contracts to obtain scarce skilled resources in the discipline. Aurizon Network is optimising the mix of supply only and supply and install options based upon the most efficient cost.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
3.6	[iii] (5,7)	Was the portfolio efficiently programmed to consider the performance and operational requirements for access holders and end-users and other elements in the supply chain?	Yes	Aurizon Network is implementing, through NAMS, the processes to monitor, analyse and report unit rates performance for single portions of the program.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
3.7	[iii] F	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
3.8	[iii] G	Have there been any additional submissions, requests, or consultation to the QCA that have not been addressed appropriately?	No	From the information provided for review, no additional submissions, requests, or consultations have been identified.	N/A	Nil

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.9	[iii] E (4)	Have the works been scheduled and staged to minimise disruption to the operation of users?	Yes	The program is refined after prioritisation based on the deterioration/condition/criticality to account for track access and to meet business requirements and operational functionality for users as part of Aurizon Networks annual Corporate Planning process	EOFY, IAR	Nil

FIGURE 1 PROGRAM SEEKS TO RENEW PRIORITY ELECTRICAL ASSETS TO MAINTAIN SERVICE RELIABILITY. THE SPARE AUTO AND TRANSFORMER & BUND RENEWAL IN WINDAH WAS PART OF THE FY20 CLAIM. THIS WAS PROTECTED WITH BARBED WIRE FOR PUBLIC SAFETY (FIGURE 13) AND HAS A CHEMICAL SYSTEM WHICH FACTORED SPILLAGES FROM THE AUTO TRANSFORMER. A CHEMICAL SEPARATOR WAS INSTALLED TO ENSURE OIL WAS SEPARATED FROM WATER AS SHOWN IN THE FIGURE

Template for SME's

AURIZON PRUDENCY CAPEX REVIEW 2019-20 QCA

Arcadis Brisbane
LEVEL 5/120 EDWARD ST, BRISBANE, QLD 4000

IV.00506 ELECTRICAL OVERHEAD RENEWAL PACKAGE 1

The following provides detail of the project prudency and efficiency assessment:

ASSESSMENT SUMMARY

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	Scope	YES
	Standard	YES
	Cost	YES
Capital Expenditure Claim (total)		$4,545,732
Impact of findings on Claim		$ -
TOTAL ACCEPTED		$4,545,732

Details	
Project Number	IV.00506
Project Name	Electrical Overhead Renewal Package 1
Project Type	Power and electrical
Pre-Approval	No
Asset Description	Seeks to renew priority electrical assets to maintain service reliability across CQCN.
Location(s)	Various
Expenditure Claimed	$ 4,545,732
Interest during Construction (IDC)	$ 228,802
Total Claimed	$ 4,774,534

Check list	Documentation Type	Name of document
	Essential documents	
Y	Project Management Plan	Project Management Plan
Y	Breakdown of costs	SAP breakdown to project level within to program
Y	Business Case Justification (IAR)	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23
Y	Commissioning data and completion, acceptance, and handover validations.	Various
Y	Completion report	End of Financial Year Report

PROJECT OVERVIEW

Scope

From the information provided it is assessed that the scope allows for an appropriate minimum level of investment in electrical assets to address business risks (safety and operational performance) and costs. As to be expected with equipment of this age, replacement spares, ongoing maintenance support and therefore reliability becomes a significant concern.

As categorised by Aurizon, the following provides a high-level breakdown of the electrical assets being refurbished or replaced under the Electrical Overhead Renewal Program

1. Headspan Improvements
2. Section Insulator (SI) and Neutral Section (NS) Replacements
3. Contact Wire Raising
4. Feeder Wire (FW) Clearance Improvements
5. Hail Creek Site Renewal
6. Overhead (OH) Small Components Renewals for Blackwater and Goonyella systems
7. Replacement of Registration Equipment

Business Case

The Electrical Overhead Renewal Packages 1 and 2 form part of the broader Electrical Infrastructure Asset Renewal Program. The objective of the Electrical Infrastructure Asset Renewal Program is to renew priority electrical assets to maintain service reliability across the Central Queensland Coal Network (CQCN) through:

- Renewing assets or components which are life expired to maintain continuity of train operations and where possible extending the life of asset through component renewal or part asset renewal.
- Focusing on remote monitoring and diagnostic capabilities for field assets to reduce travel time to site to fix issues; and
- Appropriately managing assets that contain obsolete parts/systems which are hard to source.

The electrical assets renewal projects are part of the annual Asset Renewal program. This program delivers a consistently performing below-rail asset that enables optimised above-rail performance and the ability for the below-rail asset to meet contracted tonnage requirements.

The electrical assets renewal projects will also lessen electrical asset-related delays, less the number of incidents attributed to below-rail assets and allow supply chain partners to transport product from mine to port with minimal disruption thus unlocking value for supply chain partners.

Issues

As advised by Aurizon in the *EOFY Program Status Report - Electrical Overhead Renewal Packages 1 and 2 - IV.00506, IV.00507* of 2 October 2020, certain works scheduled for FY19 and FY20 were deferred or cancelled due to:

- Misalignment between the Scope Priority Model (SPM) and the Investment Approval Request (IAR)
- Identification of additional works or works of higher priority, as a result of on-going condition assessment and maintenance activities
- Regional bushfires (as far south as the Hunter Valley, up to Gladstone and Rockhampton in Central Queensland, as well as in Southern Queensland including the Sunshine Coast, the Gold Coast, and the Southern Darling Downs).
- Extraordinary wet weather events which led to the cancellation of planned closures.
- National pandemic (COVID-19) requiring social distancing and reduction in productivity leading to a carry-over of $2.043M worth of scope to the next financial year. Aurizon advises that this will be included as part of the remaining project costs to be claimed in future years.

As a result, the works programme and budget were adjusted to compensate, with:

- deferral of some works
- bringing forward alternative works that could be carried out
- performing preparatory works to assist in future programmes

Details of the programme changes are provided in the *EOFY Program Status Report.*

Initial assessment showed discrepancies between planned and actual costs, for total costs by project and for component costs within projects. Responses to RFI #08 and subsequent correspondence addressed the discrepancies. The assessment and RFI response has identified that opportunities exist to improve cost estimation at earlier stages, to allow better visibility and control of project costs, however the final actual remains in alignment with the work undertaken hence is assessed as prudent.

Discussions with Aurizon Network on site explained that to avoid major renewals on overheads it is often necessary to replace clamps or arms (figure 1). This work is often identified on inspections or during the process of undertaking civil works. As it is prudent to undertake the work in these circumstances this causes variation from the original scope.

Comparison of planned and actual costs revealed significant increases in project management and work provider coordination costs. However, while the discrepancy indicates estimation practices can be improved, the revised costs are consistent with industry expectations for management of a scope subject to:

- significant ongoing change from external factors as listed above
- stringent requirements for scheduling and approval of access to track

Completion Summary

Works completed in FY19 and FY20 claimed in FY20 are provided in Section 4 of the *EOFY Program Status Report - Electrical Overhead Renewal Packages 1 and 2 - IV.00506, IV.00507* of 2 October 2020, as shown below.

AURIZON

4 Commissioned Assets

IV.00506 – Electrical Overhead Renewal Package 1

SYSTEM	PRODUCT	IAR Value		Commissioned Scope in Current FY		Remaining Scope – Not Claimed	
		Qty	Value $	Qty	Value $	Qty	Value $
Blackwater	OH Renewals	20 km		67.92 km[1]	$ 1,437,340		
Blackwater	SI and NS Replacements	4		4	$ 273,969		
Goonyella	OH Renewals	26 km		126.02 km[1]	$ 1,190,219		
Goonyella	FW Clearence Improvement	3		1[2]	$ 112,172		
Goonyella	Replacement of Registration Equipment	3		2[3]	$ 465,870		
Goonyella	SI and NS Replacements	11		4[4]	$ 259,812		
Goonyella	Headspan Improvement	1[5]					
Blackwater	Contact Wire Raising	5		5[6]	$ 806,350		
			$ [redacted]		$ 4,545,732		

IV.00507 – Electrical Overhead Renewal Package 2

SYSTEM	PRODUCT	IAR Value - Current FY		Commissioned Scope in Current FY		Remaining Scope – Not Claimed[7]	
		Qty	Value $	Qty	Value $	Qty	Value $
Blackwater	OH Renewals	20 km		35.61 km[1]	$ 355,212		$ 675,668
Blackwater	FW Clearence Improvement			1[1]	$ 93,951		$ 564,077
Blackwater	Burngrove Wire Gap Installation			1	$ 244,017		$ -
Goonyella	OH Renewals	20 km		81.82 km[1]	$ 219,839		$ 1,288,327
Goonyella	Replacement of Registration Equipment				$ -		$ 248,388
Goonyella	Headspan Improvement				$ -		$ 2,049,885
Goonyella	SI and NS Replacements			1[6]	$ 437,883		$ -
			$ [redacted]		$ 1,350,902		$ 4,826,345

[1] Variance in quantity due to reprioritisation of resources to perform urgent corrective works associated with unplanned incidents across the network and also a reduction in production due to travel restrictions imposed during COVID-19.
[2] Wycarbah FW sub-section 822F completed but remaining 2 sites deferred to IV.00507. In IV.00507 Bajool sites were completed however Westwood site was delayed to FY21 due to COVID-19 impacts.
[3] Callemondah Yard and Jilalan Yard completed. Incomplete site deferred to IV.00507.
[4] 6 incomplete sites as of FY20. Deferred 2 to IV.00507 and 4 to IV.00508 due to substantial scope and insufficient cashflow.
[5] Headspan Improvement deferred to IV.00507. Design and procurement completed with installation to be completed in FY21.
[6] Scope completed at Moura 512L site. 4 additional sites were completed prior to IAR timeline.
[7] For information only - provides an estimate of remaining project costs expected to be claimed in future years.

FIGURE 1 GENERALLY, THE OVERHEAD LINES HAVE A 70-YEAR LIFE SPAN. HOWEVER, SOMETIMES COMPONENTS NEED TO BE REPLACED EARLIER SUCH AS CLAMPS OR ARMS. THIS AVOIDS MAJOR RENEWALS TO THE OVERHEAD LINE. THE BUDGET IS GENERALLY BASED ON WHAT WAS DONE IN PREVIOUS YEARS.

SECTION 1 - IS THE SCOPE PRUDENT AND EFFICIENT?

Item No.	UTS Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.1	[i] D	Does the project align with the asset management strategy and AMP and has it been evaluated appropriately in terms of alternative/benefit-cost ratio?	Yes	The works are consistent with Aurizon Asset Management Policy. The works represent replacement or refurbishment of critical assets to the minimum condition required for system performance at current levels.	Electrical Asset Renewals Project Management Plan 19 June 2018	Nil
1.2	[i] C	Are project solutions based on a reasonable expectation of the demand to have regard for current and future capacity levels?	Yes	Given the uncertainty over future electrification strategy and until regulatory clarity for the capacity to recover the costs of electric traction assets are obtained, it is prudent to conduct replacement or refurbishment of critical assets to the minimum condition required for system performance at current levels. (Refer figure 1)	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
1.3	[i] E	Is the extent of the project economically reasonable and efficient considering the age and condition of the Rail Infrastructure?	Yes	The works represent replacement or refurbishment of critical assets to the minimum condition required for system performance at current levels. Selection of assets for replacement or refurbishment was based on sound condition assessment processes.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.4	[i] B	Does the project accommodate what is reasonably required to comply with access agreements and Train Operation Deeds?	Yes Conditional	In general, Aurizon Network's standards and practices are understood to comply with all applicable requirements for access agreements and Train Operation Deeds. The access agreement and Train Operation Deed require that Aurizon provide, maintain, and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for power system equipment to be regularly maintained and renewed. Therefore, Arcadis considers that this project promotes and accommodates this requirement.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
1.5	[i], G	Are there outcomes from user consultation or independent assessment which potentially impact access charges and have not been considered/addressed appropriately	Yes	Engagement of access holders and access seekers through Aurizon standard maintenance planning processes	EOFY	Nil
1.6	[i] F	Is there appropriate evidence to demonstrate compliance with Aurizon Network's legislative and tenure requirements, specifically relating to rail safety, workplace health, safety, and environmental requirements?	Yes Conditional	In general, Aurizon Network's standards and practices comply with all applicable legislative statutory requirements relating to rail safety, workplace health, safety, and environmental matters. The access agreement and Train Operation Deed require that Aurizon provide, maintain, and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for power system equipment to be regularly maintained and renewed. Therefore, Arcadis considers that this project promotes and accommodates this requirement.	Completion certification, PMP	Nil

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.7	[i] A	Does the project consider any relevant Network Development Plans?	NA	Not applicable to this work, given that the works allow for represent replacement or refurbishment of critical assets to the minimum condition required for system performance at current levels.	Network Asset Management Assessment	Nil
1.8	[i] G, I	Have there been any additional submissions, requests, or consultations to the QCA that have not been addressed appropriately?	No	From the information provided	N/A	Nil
1.9	[i] H	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil

SECTION 2 - IS THE STANDARD PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
2.1	[ii] B	Does the standard reflect the current demand and likely future capacity levels and type of traffic?	Yes	Given the uncertainty over future rail demand, the works represent replacement or refurbishment of critical assets to the minimum condition required for system performance at current levels.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
2.2	[ii] D	Is the standard consistent with the asset management objectives?	Yes	Selection of assets for replacement or refurbishment was based on sound condition assessment processes.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
2.3	[ii] A,	Is the standard consistent with the requirements of Railway Operators and what is reasonably required to comply with Access Agreements and Train Operations Deeds? E.g. does it align with National Railway standards, contractual requirements, and so on.	Yes Conditional	In general, Aurizon Network's standards and practices comply to all applicable requirements for access agreements and Train Operation Deeds. The access agreement and Train Operation Deed require that Aurizon provide, maintain, and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for power system equipment to be regularly maintained and renewed. Therefore, Arcadis considers that this project promotes and accommodates this requirement.	EOFY, completion certification, discussions with Aurizon Network Project Managers	Nil
2.4	[ii] F	Is the standard of works compliant with relevant laws and the requirements of any authority?	Yes	The works are understood to conform to requirements of: - Electricity Safety Act and regulations - Rail Safety National Law and regulations	Completion certification, discussions with Aurizon Network Project Managers	Nil

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
2.5	[ii] G	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
2.6	[ii] C, E	Is the standard of works consistent with having regard for the requirements of Australian design and construction standards and Aurizon Network's design standard contained within the Safety Management System? If not, have the appropriate risk assessments and verification processes been implemented in the development of the standard	Yes Conditional	In general, Aurizon Network's standards and practices comply to all applicable legislative statutory requirements and to applicable national design and construction standards. The access agreement and Train Operation Deed require that Aurizon provide, maintain, and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for power system equipment to be regularly maintained and renewed. Therefore, Arcadis considers that this project promotes and accommodates this requirement. Site inspection of sampled completed works supported this understanding.	Preamble Clause 1.2 Responsibilities	Nil
2.7	[ii] H	Have there been any additional submissions, requests, or consultation to the QCA that have not been addressed appropriately?	No	From the information provided for review, no additional submissions, requests, or consultations have been identified	N/A	Nil

SECTION 3 - IS THE COST PRUDENT AND EFFICIENT

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.1	[iii]E (1,2,3),	Was the project managed effectively with regards to the customer, economic and safety, environmental and sustainability requirements and does it comply with Laws and requirements of Authorities?	Yes Conditional	In general, Aurizon Network's standards and practices are understood to comply to all applicable legislative statutory requirements and to applicable national design and construction standards. The access agreement and Train Operation Deed require that Aurizon provide, maintain, and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for power system equipment to be regularly maintained and renewed. Therefore, Arcadis considers that this project promotes and accommodates this requirement. Site inspection of sampled completed works supported this understanding.	EOFY, completion certification, discussions with Aurizon Network Project Managers	Nil
3.2	[iii] D	Was the minimization of the whole of life costs considered adequately and other principles defined in the strategic asset management plan?	Yes	Where permitted, the AMP allows for opportunities to minimise whole-of-life cost. However, these opportunities are often limited by the practicalities of minor maintenance of electrical assets.	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
3.3	[iii] C	Were a reasonable procurement methodology and cost-competitive procurement process used to select and complete the project?	Yes	High-level assessment performed as part of IAR preparation process	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.4	[iii] A, B	Do the cost elements of the project consider any relevant Network Development Plans and does it benchmark reasonably relative to the scale, nature, cost, and complexity of the project?	Yes	High-level assessment performed as part of IAR preparation process	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil
3.5	[iii] E (6,8)	Does the contract selected provide; best performance for all stakeholders, minimisation of project costs, meeting contractual timeframes and dealing with external factors?	Yes Conditional	In general, Aurizon Network's standards and practices are understood to deliver a high degree of effective contract management. The access agreement and Train Operation Deed require that Aurizon provide, maintain, and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for power system equipment to be regularly maintained and renewed. Therefore, Arcadis considers that this project promotes and accommodates this requirement. High-level assessment performed as part of IAR preparation process	Feasibility Investment Approval Request – Electrical Infrastructure Asset Renewal Program FY19 – FY23	Nil

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.6	[iii] (5,7)	Was the portfolio efficiently programmed to consider the performance and operational requirements for access holders and end-users and other elements in the supply chain?	Yes Conditional	Based on the information provided, a definitive assessment against these criteria cannot be provided. However, in general, Aurizon Network's standards and practices are understood to deliver a high degree of effective contract management. The access agreement and Train Operation Deed require that Aurizon provide, maintain, and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for power system equipment to be regularly maintained and renewed. Therefore, Arcadis considers that this project promotes and accommodates this requirement.	Preamble Clause 1.2 Responsibilities	Nil
3.7	[iii] F	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
3.8	[iii] G	Have there been any additional submissions, requests, or consultation to the QCA that have not been addressed appropriately?	No	From the information provided for review, no additional submissions, requests, or consultations have been identified	N/A	Nil

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.9	[iii] E (4)	Have the works been scheduled and staged to minimise disruption to the operation of users?	Yes Conditional	Based on the information provided, a definitive assessment against this criterion cannot be provided. However, no evidence or indication was provided of significant unplanned interruptions to rail operations. The access agreement and Train Operation Deed require that Aurizon provide, maintain, and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for power system equipment to be regularly maintained and renewed. Therefore, Arcadis considers that this project promotes and accommodates this requirement.	Preamble Clause 1.2 Responsibilities	Nil

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AURIZON PRUDENCY CAPEX REVIEW 2019-20 QCA

Arcadis Brisbane
LEVEL 5/120 EDWARD ST, BRISBANE, QLD 4000

IV.00605 BALLAST RENEWAL DRAFT ASSESSMENT

The following provides detail of the project prudency and efficiency assessment:

ASSESSMENT SUMMARY

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	Scope	Yes
	Standard	Yes
	Cost	Yes
Capital Expenditure Claim (total)		$ 63,901,439
Impact of findings on Claim		$ -
TOTAL ACCEPTED		$ 63,901,439

Details	
Project Number	IV00605
Project Name	FY20 Ballast Renewal Program
Project Type	Civil Rail
Asset Description	Track support
Location(s)	Various
Expenditure Claimed	$ 63,901,439
Interest during Construction (IDC)	$ 141,408
Total Claimed	$ 64,042,847

Check list	Documentation Type	Name of document
Essential documents		
Y	Project Management Plan	SAP Planned vs Actual FY20 FY20 Daily logs
Y	Breakdown of costs	
Y	Business Case Justification (IAR)	FY20 Ballast Renewal Program Proposal to increase Capital Ballast Scope
Y	Final layout/ drawings	Production ITPS and daily logs
Y	Commissioning data and completion, acceptance, and handover validations.	EOFY Status Report Ballast Undercutting Program
Y	Completion report	

PROJECT OVERVIEW

Scope

The Program objective is to undertake the renewal of ballast throughout the CQCN to maintain/improve the Network's capacity to move coal trains. The Program scope is the renewal of ballast under mainline and turnouts which is executed by either the RM900 (an efficient ballast undercutting machine) or excavator undercutters.

Ballast cleaning involves the removal of the contaminated and/or degraded ballast rock under track or removal of non-standard ballast and its replacement to standard. The Ballast Renewal program consists of three main activities:

1. Ballast undercutting applying the RM900 – a machine that is capable of "cleaning" by removing spent ballast and combines the cleaning of existing ballast rock by removing contaminates and replacing any spent ballast with new at a high production rate (where new ballast can be 60-85% of replaced and approximately 15 – 40% is cleaned returned rock).
2. Ballast undercutting applying undercutter excavators – use of 'high rail' excavators using bar attachments to remove all existing ballast out from under the track and replacing with 100% new ballast.
3. Turnout undercut – degraded ballast condition can result in turnout failure, potentially causing a derailment or need to be taken out of service. The undercutter excavator is applied to remove all existing ballast and replace with new.

In the documentation provided Aurizon Network state that the FY20 Ballast Renewal Program is capital intensive and has a significant impact on the Network's capacity to move customer trains. As a result, a significant amount of planning goes into creating the Program to achieve its stated objectives.

FIGURE 1 RM900 BALLAST UNDERCUTTER
Source https://www.youtube.com/watch?v=jWaBZ5HBtrU

Business Case

Aurizon has approximately 2,670km of track throughout the CQCN which is used primarily for the movement of heavy haul trains moving coal from mines to the port.

A key component of the track structure is the ballast bed upon which the sleepers supporting the rail sit. This ballast bed is ideally 300mm thick and has several functions:

- Enable the even distribution of forces associated with a moving coal train as it passes to protect the formation
- Enable the drainage of water in through the ballast and away from track preventing the formation from becoming wet and degraded

- Stabilise the sleepers to hold them in position and resist the movement of track from the movement of trains and forces associated with the growth and constriction of rail under varying temperature.

Ballast progressively becomes fouled throughout its life as a result of:

- Material washing into the track in areas of poor drainage
- Windblown debris
- Coal falling off wagons as a result of poor loading and unloading practices
- The loading cycle of trains moving across the ballast. This results in the ballast degrading in size through crushing and eventually needing to be replaced as it is no longer large enough to lock the track in position and maintain drainage voids.

The above products of deterioration will clog the ballast, adversely affecting the drainage properties of the track, reduce the effectiveness and durability of tamping and may affect the support to the sleepers.

Issues

The key issues impacting the Ballast Renewal program were:

- The delayed commissioning of the very high capacity ballast cleaning machine (RM902) meant that key budget and productivity assumption for the year could not be achieved
- The delay and disruption due to bushfires
- The delay and disruption due to COVID-19 travel and workgroup restrictions.

Completion Summary

The FY20 Ballast Undercutting Program met aggregate scope targets despite production being impacted by the issues listed above.

The tables below show the work completed and commissioned compared to the projected work listed in the IAR.

System	Product / Sub Product	Projected work in IAR		Commissioned/Completed Work	
		QTY (km)	Value ($AU)	QTY (km)	Value ($AU)
Blackwater	Ballast Undercutting Machine	61.805	[redacted]	46.776	20,495,041
	Ballast Undercutting – Major	6	[redacted]	8.848	5,022,923
Goonyella	Ballast Undercutting Machine	49.495	[redacted]	58.387	23,651,045

	Ballast Undercutting – Major	7.2	[redacted]	5.578	3,226,195
Newlands	Ballast Undercutting Machine	6.5	[redacted]	10.44	1,443,516
	Ballast Undercutting – Major	1.2	[redacted]	2.44	939,953
Moura	Ballast Undercutting Machine	7.2	[redacted]	5.37	3,118,052
	Ballast Undercutting – Major	0.6	[redacted]	2.702	832,323

System	Product / Sub Product	Projected work in IAR		Commissioned/Completed Work	
		QTY	Value ($AU)	QTY	Value ($AU)
Blackwater	Ballast Undercutting - Turnout	16	[redacted]	17	1,691,627
Goonyella	Ballast Undercutting - Turnout	18	[redacted]	25	2,986,622
Newlands	Ballast Undercutting - Turnout	1	[redacted]	1	236,299
Moura	Ballast Undercutting - Turnout	7	[redacted]	1	257,844

System	Product / Sub Product	Projected work in IAR		Commissioned/Completed Work	
		QTY	Value ($AU)	QTY	Value ($AU)
TOTAL	Ballast Undercutting Machine and Major	140	[redacted]	140.541	58,729,047
TOTAL	Ballast Undercutting - Turnout	42	[redacted]	44	5,172,392
TOTAL (Rounded)					63,901,439

The above equates to:

- an average a cost of $[redacted] per kilometre of machine or major ballast cleaning and $[redacted] per turnout has been achieved against an estimated $[redacted] and $[redacted] estimated.
- 140km ballast undercutting achieved, approximately 5% of the total network
- 44 turnouts commissioned versus 42 projected

Arcadis assesses the $[redacted] per kilometre achieved is in line with the industry expected estimates for similar works and therefore prudent and efficient in cost. Commissioned turnout cleaning costs were in line with estimated work costs with the exception in Newlands and Moura where additional costs were incurred due to access and supply chain constraints due to COVID-19 travel and work restrictions.

Despite scope being achieved in terms of kilometre completion, it is noted that projected scope was impacted by:

- Delayed commissioning of the RM902 – a higher productivity ballast clean machine which will replace the RM900

- Delay and disruptions caused at the beginning of the year due to bushfires
- Delay and disruption due to COVID-19 travel and work group restrictions.

FIGURE 2 EXAMPLE TAKEN FROM SITE VISIT OF FOULED BALLAST. STONES DEGRADED AND EDGES ROUNDED (UNABLE TO "LOCK") AND MIXED WITH COAL DUST CONSTRAINING ITS ABILITY TO DRAIN

FIGURE 3 BLACKWATER NCL NEW LAID BALLAST (RM900 BALLAST UNDERCUTTING). THE BALLAST HAS A DISTINCTIVE BRIGHTER COLOUR WITH DISTINCT IRREGULAR SHAPING TO MAXIMISE "LOCKING" TOGETHER

SECTION 1 - IS THE SCOPE PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.1	[i] D	Does the project align with the asset management strategy and AMP and has it been evaluated appropriately in terms of alternative/benefit-cost ratio?	Yes	Aurizon applies a number of asset management approaches either condition-based, inspection based and reactive. This program is based upon the GPR inspections and condition rating of the ballast. This aligns with the strategy outlined in the Aurizon Network Maintenance and Renewal Strategy and Budget 21st January 2020 and is in alignment with industry-accepted maintenance practices.	Aurizon Network Maintenance and Renewal Strategy and Budget 21st January 2020	Nil
1.2	[i] C	Are project solutions based on a reasonable expectation of the demand to have regard for current and future capacity levels?	Yes	The solution is considered necessary to maintain current and future capacity levels, as deterioration in ballast can impact the integrity of track infrastructure, and cause delays through speed restrictions or increase risks of derailments.	N/A	Nil
1.3	[i] E	Is the extent of the project economically reasonable and efficient considering the age and condition of the Rail Infrastructure?	Yes	From the GPR information provided showed large sections of track with Percentage Void Contamination (PVC) >40% and some at +60%. Research has shown that a PVC > 30% is the critical fouling point and fouling of 50% indicates that fouling has reached the bottom of sleepers (refer figure 5).	GPR Data	Nil
1.4	[i] B	Does the project accommodate what is reasonably required to comply with access agreements and Train Operation Deeds?	Yes	The access agreement and Train Operation Deed require that Aurizon provide, maintain and manage the rail infrastructure and "provide and manage access" to it. To ensure that the infrastructure functions properly it is necessary for ballast to be clean, well consolidated and of adequate profile. Therefore, Arcadis considers that this project promotes and accommodates this requirement.	N/A	Nil
1.5	[i], G	Are there outcomes from user consultation or independent assessment which potentially impact access charges and have not been considered/addressed appropriately	No	From the information provided, there are no outcomes from user consultation that negatively impact access charges in relation to this project.	N/A	Nil
1.6	[i] F	Is there appropriate evidence to demonstrate compliance with Aurizon Network's legislative and tenure requirements, specifically relating to rail safety, workplace health, safety and environmental requirements?	Yes	From the documentation provided and supported by anecdotal evidence with site staff and from what the team observed on site, Arcadis believe that Aurizon Network has made the necessary consideration with regards to WHS and environmental compliance.	PMP, Completion certification Media search for recorded incidents	Nil

1.7	[i] A	Does the project consider any relevant Network Development Plans?	N/A	The program constitutes a necessary whole of life maintenance requirement for the ballasted track and is necessary to ensure future capacity requirements are met.		Nil
1.8	[i] G, I	Have there been any additional submissions, requests, or consultations to the QCA that have not been addressed appropriately?	No	From the information provided for review, no additional submissions, requests or consultations have been identified.	N/A	Nil
1.9	[i] H	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil

FIGURE 4 RED INDICATES PVC > 30%, PURPLE > 40% DARK PURPLE +60% GREEN < 10% AND YELLOW/ORANGE BETWEEN 10 TO 30%

SECTION 2 - IS THE STANDARD PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
2.1	[ii] B	Does the standard reflect the current demand and likely future capacity levels and type of traffic?	Yes	The upgraded asset is fit for purpose for current and known future capacity requirements and aligns with engineering standards fit for similar operations.	CETS, Site observations	Nil
2.2	[ii] D	Is the standard consistent with the asset management objectives?	Yes	The renewal of deteriorated and contaminated ballast is in line with the whole of life management of ballast assets.	CETS, RISSB standards, PWI Plain Line Maintenance guidelines	Nil
2.3	[ii] A,	Is the standard consistent with the requirements of Railway Operators and what is reasonably required to comply with Access Agreements and Train Operations Deeds? E.g. does it align with National Railway standards, contractual requirements, and so on.	Yes	From the information provided and the completed works viewed on site, it is Arcadis assessment that the completed works align with RISSB National and Aurizon CETS railway standards.	Completion documentation	Nil
2.4	[ii] F	Is the standard of works compliant with relevant laws and the requirements of any authority?	Yes	From the information provided the assessors consider that Aurizon Network has made the necessary consideration with regards to compliance with relevant laws and requirements.	Completion documentation, observations, and discussions on site	Nil
2.5	[ii] G	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
2.6	[ii] C, E	Is the standard of works consistent with having regard for the requirements of Australian design and construction standards and Aurizon Network's design standard contained within the Safety Management System? If not, have the appropriate risk assessments and verification processes been implemented in the development of the standard	Yes	Ballast undercutting is a core maintenance activity undertaken by Aurizon. From the information provided and discussions with Aurizon engineering staff, Arcadis considers that the work undertaken is in alignment with industry recognised and accepted work practices.	PMP. GPR results	Nil

SECTION 3 - IS THE COST PRUDENT AND EFFICIENT

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.1	[iii]E (1,2,3),	Was the project managed effectively with regards to the customer, economic and safety, environmental and sustainability requirements and does it comply with Laws and requirements of Authorities?	Yes	Details provided indicate work was conducted in consideration with regards to compliance with relevant laws and requirements. During site visits, it was confirmed that where possible spoilt ballast from ballast undercutting is reused for surface and sub-base material for track access roads – this aligns with the Aurizon sustainability initiatives on optimisation of waste management and recycling.	The National Waste Policy Action Plan (2019) Aurizon 2020 Sustainability Report, PMP	Nil
3.2	[iii] D	Was the minimization of the whole of life costs considered adequately and other principles defined in the strategic asset management plan?	Yes	The following pictures were taken on-site to demonstrate the condition of ballast at the time of undercutting. This alongside the GPR results shown earlier demonstrate that whole of life considerations have been taken adequately, in alignment with the maintenance and renewal strategy. (Refer Figure 2 and 3 above)	Aurizon Network Maintenance and Renewal Strategy and Budget 21st January 2020	Nil
3.3	[iii] C	Were a reasonable procurement methodology and cost-competitive procurement process used to select and complete the project?	Yes	Aurizon Network evidence a reasonable procurement methodology through their Aurizon supplier portal and through the application of the Supplier code of conduct. By providing a platform for suppliers to register interest, and by undertaking tendering requirements Arcadis assess that Aurizon is implementing a reasonable cost-competitive process.	Aurizon Supplier Portal, Supplier Code of Conduct	Nil

3.4	[iii] A, B	Do the cost elements of the project benchmark reasonably relative to the scale, nature, cost, and complexity of the project?	Yes	Cost elements averaged a cost of $[redacted] per kilometre of machine or major ballast cleaning and $[redacted] per turnout has been achieved against estimated $[redacted] and $[redacted] estimated, although this equates to a + - [redacted]% range in estimating accuracy it is acknowledged that the estimated unit rates take account differentiation across the program whereas the FY20 unit rate is only averaged across the works achieved in that financial year. Notwithstanding, it is considered that these rates fall within the benchmark accepted industry cost rates and are in alignment with the complexity of the sites and ballast condition.	IAR	Nil
3.5	[iii] E (6,8)	Does the contract selected provide; best performance for all stakeholders, minimisation of project costs, meeting contractual timeframes and dealing with external factors?	Yes	There is no indication that there were any significant issues with the contract selected.	EOFY, IAR, completion documentation	Nil
3.6	[iii] (5,7)	Was the portfolio efficiently programmed to consider the performance and operational requirements for access holders and end-users and other elements in the supply chain?	Yes	Aurizon Network completed total 140km ballast undercutting which is approximately 5% of the total network. The scope was prioritised on condition from GPR and TRC and the criticality of the location. This indicates efficiency in the programme to consider the performance of the asset and its purpose for the supply chain.	IAR, PMP, Presentation provided by Aurizon Network on SPM	Nil
3.7	[iii] F	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
3.8	[iii] G	Have there been any additional submissions, requests, or consultation to the QCA that have not been addressed appropriately?	No	From the information provided there was no additional submissions that have not been addressed properly.		Nil
3.9	[iii] E (4)	Have the works been scheduled and staged to minimise disruption to the operation of users?	Yes	Discussion with engineering staff indicates that works have been scheduled in planned possessions and at minimal disruption to operations.	Completion documentation and discussions with technical delivery staff.	Nil

Template for SME's

AURIZON PRUDENCY CAPEX REVIEW 2019-20 QCA

Arcadis Brisbane
LEVEL 5/120 EDWARD ST, BRISBANE, QLD 4000

IV.00609 FY19 KESTRAL INFRASTRUCTURE UPGRADE

The following provides detail of the project prudency and efficiency assessment:

ASSESSMENT SUMMARY

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	Scope	Yes
	Standard	Yes
	Cost	Yes
Capital Expenditure Claim (total)		$2,944,844
Impact of findings on Claim		$ -
TOTAL ACCEPTED		$2,944,844

Details	
Project Number	IV.00609
Project Name	Kestrel Infrastructure Upgrade
Project Type	Civil
Pre-Approval	No
Asset Description	Upgrade
Location(s)	Kestrel Mine
Expenditure Claimed	$ 2,944,844
Interest during Construction (IDC)	$ 70,466
Total Claimed	$ 3,015,310

Check list	Documentation Type	Name of document
	Essential documents	
y	Project Management Plan	20190626 IV.000609 Kestrel Infrastructure Upgrade PMP Sign off
y	Breakdown of costs	SAP Spreadsheet/summary EOFY/IAR
y	Business Case Justification (IAR)	FY19 Kestrel Infrastructure Upgrade
y	Final layout/ drawings	Issued for construction: attached to completion certification
y	Commissioning data and completion, acceptance, and handover validations.	Ballast undercutting, concrete load out slab works, track upgrade, tamping/resurfacing works and restressing.
y	Completion report	EOFY Status Report_FY19 Kestrel Infrastructure Upgrade

PROJECT OVERVIEW

Scope

The purpose of the FY19 Kestrel Infrastructure Upgrade project was to replace and/or refurbish worn or life-expired assets to enable an uplift in railings from Kestrel Mine. Kestrel advised Aurizon Network of their intention to increase production at the Kestrel Mine up to [redacted] An asset condition assessment was undertaking to confirm structural capacity for the additional loading which identified the following infrastructure defects (table 1) which were deemed necessary to rectify in order to meet the increased throughput requirement. These renewal works were already within Aurizon Network's asset renewal plan for a future date but were brought forward to manage the rate of deterioration under increased tonnages and therefore to support the uplift in railings under Kestrel's five month access agreement.

TABLE 1 SUMMARY OF IDENTIFIED DEFECTS

Product	Defect
Ballast	Heavy coal fouled ballast – various locations including either side of the level crossing, approach side of the loadout and weighbridge through to #12 points Track pumping with top and line issues
Rail	Corroded rail & fastening from weighbridge through to ER1B points Corroded 4 bolts GIJs
Track Upgrade	Right leg and left leg of 53kg rail approaching Civil Engineering Track standards Coal foul ballast 191 ineffective corroded steel sleepers
Level Crossing	Crossing ID 802 has grease accumulation on the road surface Track pumping on the mining side of the crossing
Fencing	The damaged fence on the right-hand side

Business Case

From the documentation provided in 2019 Kestrel Coal Resources Pty Ltd (Kestrel) advised Aurizon Network of their intent to increase production at Kestrel Mine from [redacted]mtpa up to [redacted]mtpa and [redacted]

To facilitate this increase in tonnage and manage the deteriorating asset, asset renewal works were required to upgrade the defects identified in table 1. The renewal works were expected to cost a total of approximately $[redacted]m and included ballast undercutting, level crossing upgrade, rail and sleeper replacement and track upgrade in line with

the Civil Engineering Track Standard (CETS) on the Kestrel Spur and Balloon Loop. Aurizon Network has provided the estimates of these works and drawings for construction, and the assessment concluded that these estimates align within the industry range for similar works on railways.

Issues

The key investment concerns and risks identified in the Investment Approval Request (IAR) were:

- [redacted].
- risk to the customer if the resources set aside to deliver the scope of this project were not available, leading to a delay in the railing of tonnes.
- [redacted]

Completion Summary

Aurizon Network executed the scope in FY19/20 to align with the mine maintenance access window in July 2019, which reduced the requirement for additional access and impact. The scope was materially in line with the Investment Approval Request (IAR) but adjusted for actual asset condition according to advice received from the District Asset Engineer.

The information provided indicated Aurizon Network delivered all agreed scope in this location in one shutdown. This outcome provided flexibility in the program for the rest of the year and achieved significant cost efficiency due to the reduced mobilisation and demobilisation.

SECTION 1 - IS THE SCOPE PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.1	[i] D	Does the project align with the asset management strategy and AMP and has it been evaluated appropriately in terms of alternative/benefit-cost ratio?	Yes	The project aligns with Aurizon Network asset management strategy and priorities and aims at providing capacity and acceptable transit time reliability for coal extracted at Kestrel Mine.	IAR, PMP, PMP, Aurizon Network and Maintenance Strategy	Nil
1.2	[i] C	Are project solutions based on a reasonable expectation of the demand to have regard for current and future capacity levels?	Yes	The project specifically seeks to address capacity for Kestrel's [redacted]	IAR	Nil
1.3	[i] E	Is the extent of the project economically reasonable and efficient considering the age and condition of the Rail Infrastructure?	Yes	From the information provided Aurizon Network arrived at a condition assessment of the system to inform capital works through industry approved methods, i.e. site inspections, Track Recording Car data, GPR and fault reports.	IAR, PMP, Civil Engineering Track Standards	Nil
1.4	[i] B	Does the project accommodate what is reasonably required to comply with access agreements and Train Operation Deeds?	Yes	The project is the direct result of request/negotiations with the stakeholder.	IAR	Nil
1.5	[i], G	Are there outcomes from user consultation or independent assessment which potentially impact access charges and have not been considered/addressed appropriately	No	From the information provided there are no outcomes from user consultation or independent assessment which have not been considered.	N/A	Nil
1.6	[i] F	Is there appropriate evidence to demonstrate compliance with Aurizon Network's legislative and tenure requirements, specifically relating to rail	Yes	From the information provided, drawings and references in the completion certifications it appears that projects were delivered meeting the requirements of the Rail Safety national Law (RSNL) and the Office of the National Rail Safety Regulator (ONRSR)	PMP Completion certification	Nil

		safety, workplace health, safety, and environmental requirements?				
1.8	[i] G, I	Have there been any additional submissions, requests, or consultations to the QCA that have not been addressed appropriately?	No	From the information provided	N/A	Nil
1.9	[i] H	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil

SECTION 2 - IS THE STANDARD PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
2.1	[ii] B	Does the standard reflect the current demand and likely future capacity levels and type of traffic?	Yes	In consideration of whole of life, further "loading" an already potentially fatigued asset can result in increased deterioration which leads to increased maintenance costs and delays to operations. The project approach is considered prudent to minimise this risk. The project was driven by Coal Resources Pty Ltd (Kestrel) advising Aurizon Network of their intent to increase production at Kestrel Mine from [redacted]mtpa up to [redacted]mtpa.	IAR	Nil
2.2	[ii] D	Is the standard consistent with the asset management objectives?	Yes	Whole of life considerations through informed decision to replace unreliable deteriorating assets with fit for purpose and industry proven track elements to increase reliability and decrease maintenance requirements.	Aurizon Network and Maintenance Strategy, PMP	Nil
2.3	[ii] A,	Is the standard consistent with the requirements of Railway Operators and what is reasonably required to comply with Access Agreements and Train Operations Deeds? E.g. does it align with National Railway standards, contractual requirements, and so on.	Yes	The project is the direct result of request/negotiations with the stakeholder.	AR	Nil
2.4	[ii] F	Is the standard of works compliant with relevant laws and the requirements of any authority?	Yes	From the information provided the works comply with regulatory requirements.	Completion certification	Nil
2.5	[ii] G	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil

2.6	[ii] C, E	Is the standard of works consistent with having regard for the requirements of Australian design and construction standards and Aurizon Network's design standard contained within the Safety Management System? If not, have the appropriate risk assessments and verification processes been implemented in the development of the standard	Yes	Track upgrades are core maintenance and renewal activities undertaken by Aurizon. From the information provided and discussions with Aurizon engineering staff, Arcadis considers that the work undertaken is in alignment with industry recognised and accepted work practices.	PMP, completion documentation	Nil

SECTION 3 - IS THE COST PRUDENT AND EFFICIENT

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.1	[iii]E (1,2,3),	Was the project managed effectively with regards to the customer, economic and safety, environmental and sustainability requirements and does it comply with Laws and requirements of Authorities?	Yes	The project aligns with Aurizon Network asset management strategy and priorities and aims at providing capacity and acceptable transit time reliability for coal extracted at Kestrel Mine.	IAR, PMP, EOFY	Nil
3.2	[iii] D	Was the minimization of the whole of life costs considered adequately and other principles defined in the strategic asset management plan?	Yes	Aurizon Network had already planned the works in its renewal plan but in view of the additional loading requirements brought them forward. In consideration of whole of life, further "loading" an already potentially fatigued asset can result in increased deterioration which leads to increased maintenance costs and delays to operations. The project approach is in alignment with the strategic asset management.	Aurizon Network and Maintenance Strategy	Nil
3.3	[iii] C	Were a reasonable procurement methodology and cost-competitive procurement process used to select and complete the project?	Yes	Primarily, Aurizon Network undertook the scoping, design and construction works, with external contractors delivering the unloader upgrade and provide additional labour and support as required. Materials sought through competitive pricing on pre-approved panel arrangements. This approach is considered reasonable.	EOFY	Nil
3.4	[iii] A, B	Do the cost elements of the project consider any relevant Network Development Plans and does it benchmark reasonably relative to the scale, nature, cost, and complexity of the project?	Yes	Costs and breakdown align with the level and amount of work undertaken. IAR estimate was $[redacted]m which compares well with claimed completed works of $2.945 m	IAR	Nil
3.5	[iii] E (6,8)	Does the contract selected provide; best performance for all stakeholders, minimisation of project costs, meeting contractual timeframes and dealing with external factors?	Yes	Aurizon Network undertook the scoping, design and construction works, with external contractors delivering the unloader upgrade and provide additional labour and support as required. As works of this nature are considered	IAR, EOFY	Nil

				core business as usual to Aurizon this approach is reasonable.		
3.6	[iii] (5,7)	Was the portfolio efficiently programmed to consider the performance and operational requirements for access holders and end-users and other elements in the supply chain?	Yes	[redacted]	EOFY, Completion certification RFI	Nil
3.7	[iii] F	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
3.8	[iii] G	Have there been any additional submissions, requests, or consultation to the QCA that have not been addressed appropriately?	No	From the information provided for review, no additional submissions, requests, or consultations have been identified.	N/A	Nil
3.9	[iii] E (4)	Have the works been scheduled and staged to minimise disruption to the operation of users?	Yes	Negotiations with Kestrel [redacted] to efficiently program in consideration of operational requirements. The information provided states works delivered within planned possession.	EOFY, Completion certification	Nil

Template for SME's

AURIZON PRUDENCY CAPEX REVIEW 2019-20 QCA

Arcadis Brisbane
LEVEL 5/120 EDWARD ST, BRISBANE, QLD 4000

IV.00447 STRUCTURES RENEWAL PACKAGE

The following provides detail of the project prudency and efficiency assessment:

ASSESSMENT SUMMARY

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	Scope	Yes
	Standard	Yes
	Cost	Yes
Capital Expenditure Claim (total)		$15,103,232
Impact of findings on Claim		$ -
TOTAL ACCEPTED		$15,103,232

Details	
Project Number	IV. 00447
Project Name	Structures Renewal Package 2
Project Type	Civils
Pre-Approval	Yes
Asset Description	Design and renew or place life – expired structures on the CQCN with new structures complaint to 300LA
Location(s)	Various
Expenditure Claimed	$15,103,232
Interest during Construction (IDC)	$ 63,890
Total Claimed	$ 15,167,122

Check list	Documentation Type	Name of document
Essential documents		
Y	Project Management Plan	Structures Renewals Project Plan 20190810 Rev C
Y	Breakdown of costs	SAP spreadsheet
Y	Business Case Justification (IAR)	Structures Renewal Package 2 (FY20) IAR
Y	Final layout/ drawings	Various
Y	Commissioning data and completion, acceptance, and handover validations.	Various
Y	Completion report	End of Year Report

PROJECT OVERVIEW

Scope

Existing culverts and structures across the CQCN were predominantly installed during track construction in the 1960s. Due to operational requirements and national structural standards at the time, these structures were designed for lower axle load tonnages than current operational requirements, which means that these structures could currently be "overloaded" potentially causing stress to the structure and increasing the rate of fatigue and deterioration leading to loss of structural integrity. Overstress or condition deterioration may result in the collapse of culverts leading to loss of top and line of the overlying track or even derailment.

To minimise the risk of severe deterioration and/or full or partial collapse of the structure, regular inspections are undertaken, from which programs of reparation or in more degraded cases renewal are developed. Whether renewal or reparation is undertaken is dependent on the condition of the structure, rate of deterioration and whole of life considerations. The structural renewal program incorporates the replacement, lining, removal or strengthening for deteriorated culverts and bridges.

The works completed and included in the FY20 expenditure claim include scope carries over from the FY19 project and commissioned in FY20 and the FY20 project. It should be noted that works have commenced on the FY21 scope (preliminary design) however none of these packages have been commissioned for use and as such have not been included within the FY20 capital expenditure claim.

The primary objectives for the project are to:

- Repair, replace or remove life-expired structures on the CQCN, with new structures compliant to 300LA loading configuration
- Achieve flood immunity of Q100 to top of the rail, Q50 to top of the formation
- Complete scoped bridge bearing and bridge deck replacement
- Complete M220 Bridge assessment and report for the management of current CQCN bridge structures
- Complete IFC designs for listed culverts in readiness for future construction

The table below provides a summary of the scope of works executed within the financial period.

	Goonyella	Blackwater	Moura	Newlands	Total
IAR	13	19	8	12	52
Commissioned scope	6	15	3	4	28
Claimed value $	1,258,994	3,850,090	1,154,057	8,840,092	15,103,232

Aurizon states within the financial year report many of the 52 sites planned in the IAR were grout-filled and diverted (removed) and structures that were reinforced (Berolina or Tunnel lining).

In addition to culvert works two bridge bearing projects were undertaken on the Newlands Line. Due to the complexity of these two projects, their costs varied significantly from the other works. Two large uni-cell construction culverts, also installed on the Newlands line, also accounted for the higher cost expenditure. A summary of the breakdown of costs for the four commissioned projects on Newlands is provided in the table below.

Site Details	Commissioned Value	Culvert Size	PM Comments
NL 94.900km R&R	$ 2,701,776	4/2400 x2400 Uni Culverts 22m	Large uni-cell construction - not a standard culvert replacement.
Saltwater Creek Bridge Bearing Replacement	$ 2,207,371	Bridge	7 span bridge bearing replacement over water requiring specialist working platform to complete the work.
Merinda Bridge Deck Replacement at NL1.1km	$ 3,583,156	Bridge	Complete bridge deck replacement over the busy Bruce Highway without stopping traffic.
NP 58.030km R&R	$ 347,789	1/2400*900mm RCBC 7.45m	Standard culvert replacement.

Business Case

Culverts serve the purpose of providing drainage through the rail formation and embankments to provide continuity of natural watercourses and to enable drainage across the rail corridor under general rainfall and (in particular) flood conditions.

Aurizon has stated that the program strategy is to develop detailed designs through selected specialist structural consultants and contract out required constructions works. Detailed designs incorporate hydraulic modelling to ensure flood immunity requirements of the track are met, and adjacent private properties do not experience worsened conditions due to structure upgrades.

The scope is determined via condition monitoring/inspections and critically rating assessed as an outcome of such inspections. Program of works and scope for the financial period is developed via the Scope Priority Model.

Issues

Aurizon stated that FY20 was a challenging year for the Structures Renewal Program with two major events. The program was impacted primarily by the bushfires towards the end of the 2019 calendar year and by the COVID-19 pandemic over the 2020 year.

The bushfires delayed to delivery of two planned culvert replacements and the COVID-19 pandemic pushed three culvert replacements and culvert strengthening jobs into FY21.

Completion Summary

However, it is noted that despite these setbacks the project end of year report states that the overall position for FY20 was a good result with additional planning, design and procurement activities carried out towards the end of the FY reducing the impact of scope movement on the overall scope delivery planned for FY21.23

SECTION 1 - IS THE SCOPE PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.1	[i] D	Does the project align with the asset management strategy and AMP and has it been evaluated appropriately in terms of alternative/benefit-cost ratio?	Yes	The works are consistent with Aurizon Asset Management Policy. The works represent replacement or refurbishment of critical assets to national and regulatory standards (figure 1)	Aurizon Network Maintenance and Renewal Strategy and Budget 21st January 2020	Nil
1.2	[i] C	Are project solutions based on a reasonable expectation of the demand to have regard for current and future capacity levels?	Yes	Renewals of culverts to 300LA ensures that structures will be capable of current and future load requirements.	AS 55000	Nil
1.3	[i] E	Is the extent of the project economically reasonable and efficient considering the age and condition of the Rail Infrastructure?	Yes	The Scope Prioritisation model assesses the structural condition assessment, coupled with current and future operational requirements and network criticality to determine prioritisation of the scope within the program. Structures constructed prior to the 1970s were not designed to current national standards (AS 5100). In consideration of the current axle loadings, it is considered prudent that these structures are replaced to compliant standards when nearing the end of their serviceable life.	Aurizon Asset Management Presentation provided to Arcadis (SPM)	Nil
1.4	[i] B	Does the project accommodate what is reasonably required to comply with access agreements and Train Operation Deeds?	Yes	Through the reparation of culverts to align with current and future operational requirements, access is being maintained. Therefore, Arcadis considers that this project promotes and accommodates this requirement.	PMP, IAR	Nil
1.5	[i], G	Are there outcomes from user consultation or independent assessment which potentially impact access charges and have not been considered/addressed appropriately	No	From the information provided there appear to be no outcomes from user consultation that negatively impact access charges in relation to this project.	N/A	Nil
1.6	[i] F	Is there appropriate evidence to demonstrate compliance with Aurizon Network's legislative and tenure requirements, specifically relating to rail safety, workplace health, safety and environmental requirements?	Yes	From anecdotal evidence with site staff and from what was observed on site, it is believed that Aurizon Network has made the necessary consideration with regards to WHS and environmental compliance.	N/A	Nil

1.7	[i] A	Does the project consider any relevant Network Development Plans?		The regular monitoring to program preventative structural reparation and renewal works, and the undertaking of such works to minimise risks of unplanned failures is consistent with Aurizon Asset Management Strategy outlined in the Network Development Plans	Aurizon Network Maintenance and Renewal Strategy and Budget 21st January 2020	Nil
1.8	[i] G, I	Have there been any additional submissions, requests, or consultations to the QCA that have not been addressed appropriately?	No	From the information provided for review, no additional submissions, requests, or consultations have been identified.	N/A	Nil
1.9	[i] H	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil

FIGURE 1 ONE OF THE PRIMARY OBJECTIVES FOR THE PROJECT IS TO REPAIR, REPLACE OR REMOVE LIFE – EXPIRED STRUCTURES ON THE CQCN, WITH NEW STRUCTURES COMPLAINT TO 300LA LOADING CONFIGURATION. THE ABOVE IS AN EXAMPLE OF A NEWLY CONSTRUCTED CULVERT INCORPORATING NEW STANDARDS TO HAVE HANDRAILS INSTALLED. DUE TO BLOCKAGE ON THE ACCESS ROAD NOT ALLOWING WATER TO DRAIN DOWN THE BANK WATER HAS POOLED AROUND THE STRUCTURE. AURIZON SITE STAFF IMMEDIATELY CONTACTED ENGINEERING TO REMOVE THE OBSTRUCTION AND ALLOW THE WATER TO DRAIN FROM THE ACCESS ROAD

SECTION 2 - IS THE STANDARD PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
2.1	[ii] B	Does the standard reflect the current demand and likely future capacity levels and type of traffic?	Yes	The standard 300LA is in line with national best practice and existing and future loading requirements for 30-tonne axles.	PMP, IAR	Nil
2.2	[ii] D	Is the standard consistent with the asset management objectives?	Yes	Renewals to align with current national standards and current and future operations align with the whole of life considerations and are consistent with asset management objectives	NDP	Nil
2.3	[ii] A,	Is the standard consistent with the requirements of Railway Operators and what is reasonably required to comply with Access Agreements and Train Operations Deeds? E.g. does it align with National Railway standards, contractual requirements, and so on.	Yes	The project mitigates risks of culvert loss of structural integrity and partial or full collapse which would disrupt operations and access.	CESS, CETS	Nil
2.4	[ii] F	Is the standard of works compliant with relevant laws and the requirements of any authority?	Yes	The information provided and observations on site indicates that the projects were delivered meeting the requirements of the Rail Safety National Law (RSNL) and the National Rail Safety Regulator (ONSR)	Completion documentation	Nil
2.5	[ii] G	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
2.6	[ii] C, E	Is the standard of works consistent with having regard for the requirements of Australian design and construction standards and Aurizon Network's design standard contained within the Safety Management System? If not, have the appropriate risk assessments and verification processes been implemented in the development of the standard	Yes	The projects were delivered meeting the requirements of the Rail Safety National Law (RSNL) and the National Rail Safety Regulator (ONSR). The information provided from Aurizon states that one of the objectives is to "Ensure the works are constructed in a safe manner and with minimum harm to the environment"	PMP	Nil

SECTION 3 - IS THE COST PRUDENT AND EFFICIENT

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.1	[iii]E (1,2,3),	Was the project managed effectively with regards to the customer, economic and safety, environmental and sustainability requirements and does it comply with Laws and requirements of Authorities?	Yes	The information provided indicates the intent to deliver full approved scope within the approved budget and expected time. However, it is noted that the impact of the bushfires in late FY19 and the COVID-19 pandemic had some impact on the program with three culvert replacements and culvert strengthening jobs pushed into FY21. To reduce the impact of this on overall program Aurizon Network stated that focus was put on undertaking additional planning, design and procurement activities carried out towards the end of FY20.	EOFY	Nil
3.2	[iii] D	Was the minimization of the whole of life costs considered adequately and other principles defined in the strategic asset management plan?	Yes	Inspections and condition assessments were considered along with structure age and criticality to assess whole of life costs and renewal actions. This is in line with the asset management strategy.	Aurizon Network Maintenance and Renewal Strategy	Nil
3.3	[iii] C	Were a reasonable procurement methodology and cost-competitive procurement process used to select and complete the project?	Yes	The project strategy is that both specialised design works, and construction were tendered competitively.	PMP	Nil
3.4	[iii] A, B	Do the cost elements of the project consider any relevant Network Development Plans and does it benchmark reasonably relative to the scale, nature, cost, and complexity of the project?	Yes	Due to the range of type and sizes of the culverts no meaningful average unit rate could be determined. However, where there was significant discrepancy between work undertaken and cost Aurizon Network provided cost breakdowns and further scope detail to provide clarification of any additional expenses or requirements.	RFI, Commissioning Certification	Nil
3.5	[iii] E (6,8)	Does the contract selected provide; best performance for all stakeholders, minimisation of project costs, meeting contractual timeframes and dealing with external factors?	Yes	Contractors were selected through the Aurizon network approved panel for design and construct with some internal designs completed based on resource availability. Aurizon Network Project Management team coordinate the works in compliance with established procedures and policies. This is considered a reasonable approach.	IAR	Nil

3.6	[iii] (5,7)	Was the portfolio efficiently programmed to consider the performance and operational requirements for access holders and end-users and other elements in the supply chain?	Yes	Objective of the program Is that it is too provide quality client services to ensure the operational and performance requirements of users and stakeholders are met.	EOFY	Nil
3.7	[iii] F	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
3.8	[iii] G	Have there been any additional submissions, requests, or consultation to the QCA that have not been addressed appropriately?	No	From the information provided for review, no additional submissions, requests, or consultations have been identified	N/A	Nil
3.9	[iii] E (4)	Have the works been scheduled and staged to minimise disruption to the operation of users?	Yes	Anecdotal and planning documentation provided indicates that Aurizon has sought to employ construction methodologies that minimise disruption to rail traffic	EOFY, site discussion	Nil

Template for SME's

AURIZON PRUDENCY CAPEX REVIEW 2019-20 QCA

Arcadis Brisbane
LEVEL 5/120 EDWARD ST, BRISBANE, QLD 4000

IV.00456: CONTROL SYSTEMS RENEWAL PACKAGE 1

The following provides detail of the project prudency and efficiency assessment:

ASSESSMENT SUMMARY

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	Scope	Yes
	Standard	Yes
	Cost	
Capital Expenditure Claim (total)		$14,542,832
Impact of findings on Claim		$ -
TOTAL ACCEPTED		$14,542,832

Details	
Project Number	**IV.00455**
Project Name	Control Systems Renewal Package 1
Project Type	Sustaining/Systems
Pre-Approval	No
Asset Description	Renewing signalling systems
Location(s)	Various
Expenditure Claimed	$ 14,542,832
Interest during Construction (IDC)	$ 107,354
Total Claimed	$ 14,650,185

Check list	Documentation Type	Name of document/Notes
Essential documents		
Y	Project Management Plan	IV00456 Program Plan Control System V2 20190805
Y	Breakdown of costs	Spreadsheet breakdown to project site level within the program
Y	Business Case Justification (IAR)	Control Systems Renewal Package 2 (FY20) IAR
Y	Commissioning data and completion, acceptance, and handover validations.	Various
Y	EOFY Completion Summary	EOFY Status Report Control Systems Program

PROJECT OVERVIEW

Scope

For the FY20 claim, the scope of works includes separable deliverables of 10 key packages of work for each of the Network Control Systems, inclusive of:

- Train detection systems – a total of 1 procure and renewal of 227 units
- Diagnostic Computers – 12 sites identified
- Interlocking renewals – 6 units identified
- Power Resilience – 6 sites identified
- Control system infrastructure – 57 sites identified
- Train Control - UTC/DTC – 13 renewals and 11 upgrades identified
- Asset protection/detection systems – 95 sites identified
- Location Case Safety – 27 sites identified
- Vital disabling panel – 5 sites
- Data Network

From the information provided it is noted that the program is a 4-year rolling program of renewal. FY20 was to concentrate on renewing priority assets in a rolling cycle, whilst FY21-23 will add major renewals for Callemondah and Goonyella Trunk Interlockings and Optical Fibre.

The Aurizon Project Management Plan states that the purpose of the Control Systems Package is to maintain service reliability and asset condition throughout the CQCN through the prudent prioritisation of:

- Renewal of system assets or components which are life expired, or extending the life of the asset through component renewal or part asset renewal
- Implementation of remote monitoring and diagnostic capabilities for field assets to reduce travel time and risk
- Effective management of assets with obsolete parts/systems which are hard to source

Review of the completion certification provided in Aurizon documentation confirm that the following scope has been completed and commissioned. The number and type of activities are in line with the scope provided and key packages of work outlined with the IAR and Project Management Plan.

Task	Commissioning Certification provided	Total Cost claimed FY20
Train Detection	The track detection includes track circuit upgrades and location case power upgrades. Only UM71 track circuits on the Blackwater line have formed this claim (line items 132 and 135 of SPM Baseline 2 1. Track circuit upgrade completed at 3 stations: Raglan, Marmor and Bajool. Upgrades also occurred at adjacent blocks: Epala to Raglan Block and Bajool to Archer Block. 132 total track circuits completed based on Track Upgrade Status 2020-02-20 2. Location case upgrade completed at 3 locations: Archer, Midgee and Rocklands. 51 location case upgrades On first assessment the claim amount does not appear to line up with the work undertaken, and a significant difference between the baseline scope and the claim amount was identified, with the baseline claim amount appearing to be more in alignment based on the information provided. Arcadis requested that Aurizon Network provided more information to clarify this discrepancy. Aurizon Network provided relevant information to confirm that $4,688,347 expenditure claimed also includes: 3. $3,025,272 for the CSEE track circuit renewal works [redacted] for the scope quoted by the auditor (line items 132 and 135 of SPM Baseline 2). 4. $1,663,075 for material and construction for replacement of CSEE track circuits with [redacted] axle counters at Edungalba, commissioned 1st June 2020. 5. 22 axle counters were included in the scope for SPM ID 3530 (line 67) of SPM Baseline 2 at above station 6. The train detection scope was executed as an integrated project along with the interlocking upgrade at this station (per SPM ID 3505 (line 62) of SPM Baseline 2). The other half of the scope under SPM ID 3530 (line 67) of SPM Baseline 2 for similar scope at Wallaroo station was commissioned 7th July 2020, and did not form part of the FY20 claim. In view of the additional information requested by Aurizon Network the cost aligns with the work undertaken	$4,688,347
Interlocking	2 sites completed, works included - Edungalba: o Installation of 3 new and modification of 10 location cases o Removal of 9 location cases o 4 signals will be driven by LOM cards and require rewiring - Wallaroo: o New Thales axle counters throughout station yard o Installation of 5 new and modification of 9 location cases o Removal of 10 location cases	$966,569

Task	Commissioning Certification provided	Total Cost claimed FY20
	Overall, this cost seems considerably lower than would have expected. Both Interlockings have been upgraded to Westrace MII with axle counters provided through the yards, each interlocking would be in excess of $1M however if the interlockings were not replaced but only the location case and axle counter elements were undertaken then this cost would be reflective of the design, supply, and installation costs for that reduced scope.	
Power Resilience	Signalling construction completed in North Goonyella: - Installation of; automatic changeover switch, new switchboards, [redacted] Rectifier Rack System, standby batteries - Function testing of all new and modified circuitry - Correspondence to network control Only one Power Equipment Room (PER) modified to facilitate the power resilience with the provision of charger, batteries, and inverter Battery Replacements In total there were 204 battery sets across the CQCN that were identified as being already life – expired or due to expire in FY20, of these, to date all but 29 have been replaced. This is reflective of the claimed amount	$589,409
Data Network	PSS Lobe migration to MPLS/ODCN Data Network Core Consolidation It is assumed the core consolidation has been captured within the migrations, migration includes a router and switch commissioning at 7 core lobes: Lobe 1 – 8 routers/22 switches Lobe 2 – 12 routers/15 switches Lobe 3 – 10 routers/10 switches Lobe 4 – 10 routers/15 switches Lobe 5 – 14 routers/28 switches Lobe 6 – 12 routers/14 switches Lobe 7 – 14 routers/14 switches Based on the equipment count this equates to approx. $[redacted] per unit for supply, installation, and testing, The cost appears to be low if the unit cost is greater than $[redacted] item (expected industry range).	$349,474

Task	Commissioning Certification provided	Total Cost claimed FY20
Vital Disabling Release (VDR)	LX Disabling Panel 6 level crossing monitor switches on the Blackwater line This is reflective of the claimed amount based on FAT, integration and correspondence testing, no handover certificate has been provided for Spring Ck Rd Wycarbah.	$435,932
CSI	Optical fibre replacement for ODCN support for 4 sites – Cbella, Edungalba & Wallaroo, Mt Mclaren and Wycarbah Coppabella - • Broadlea to Coppabella – 2.4km 2 joints • Coppabella ATW to Coppabella MW – 9.8km 3 joints Edungalba & Wallaroo • Wallaroo MWR to Duaringa SER– 11.5km 6 joints • Edungalba TSC – SER – 2.2km • Wallaroo TSC to Tryphinia AT – 8km 3 joints • Wallaroo TSC to Tryphinia CER– 10.8km 5 joints • Wallaroo MW to Wallaroo TSC – 2.4km 1 joint • Wallaroo MW to Wallaroo AT – 5km 1 joint Mt McLaren • Mt McLaren FS to Blackridge AT – 9.8km 2 joints Wycarbah • Spring Creek TSC to Wycarbah HBD – 2.1km 2 joints • Wycarbah SER to Wycarbah HBD – 2.8km 1 joint Circa 67km of fibre replacement McNaughton Pole Route 24 poles at McNaughton Loop – 3 immediate resolutions (Priority 1) and 3 high attention (Priority 2) all 6 defect items were rectified Callemondah Tower Visibility Hi-Vis paint and installation of aircraft warning light This is reflective of the claimed amount for combined total cost including supply, installation, and testing of fibre	$2,828,319
TR	Transmission Renewals ITP, TS-TIF-NET – 20 sites This is reflective of the claimed amount, the extent of the equipment is limited to controllers, batteries, and rectifiers.	$551,354
Asset Protection	Various locations – monitoring equipment 2 x weighbridges (Newlands and McNaughton $500k each	$2,455,392

Task	Commissioning Certification provided	Total Cost claimed FY20
	6 x Hot Box Detectors (HBD) for Goonyella system – 3 on Oaky Ck section, 2 Blair Athol and 1 Winchester 1 x HBD replacement on Blackwater system (Wycarbah) 90 x IoT temperature monitoring devices trial sites This seems a little low $[redacted] for the weighbridges and circa $[redacted] for each HBD	
UTC-DTC	Universal traffic control – direct traffic control. Implemented to replace some of the older systems This is reflective of the claimed amount.	$1,678,035

Business Case

The CQCN is controlled and operated through a diverse range of systems to keep trains moving through the network safely and efficiently. Signalling systems provide the vital safety systems for the detection of rail traffic movements, and the logic and signalling to maintain safe separation between trains.

These systems comprise of electrical and electronic systems and components that degrade over time increasing the risk of faults and failures, affecting efficient operation of the network. Electronic systems and software are also subject to obsolesce as technology advances, or supplier support is withdrawn. Technology advances also provide opportunities to achieve improvements in the safety, reliability, or performance of the network. The Control Systems Renewal Program provides for the capital works required to affect these asset management strategies.

Aurizon Network installed 90 devices through the entire CQCN intending to remotely monitor rail and ambient temperatures. The comparison has made between the period of 1st December to 28th February for FY19 and FY20. Observations from the monitoring program included[1].

- Total number of services that experienced delays due to heat restrictions dropped by 56%
- The total number of delay minutes of each delayed service was reduced by 217%

Overall, the Control Systems packages were required to achieve the following benefits:

- Train Detection - renewal of train detection assets to replace the end of life track circuit-related equipment and reduce fault impacts experienced by the network operators and reduce maintenance effort on the track circuit equipment

[1] Temperature monitoring document (Asset Protn – IoT RailTemp

- Interlocking - Allow network control to operate remote control signalling equipment and reduce the number of signalling faults experienced as a result of signalling to interlocking and associated critical non-vital subsystem failures
- Power Resilience - Reduce power instability caused by storms
- Data Network - core consolidation and fibre optic cable
- Vital Disabling Release (VDR) - delivers many of the benefits of VDR, but at significantly less comparative cost, and has improved the operational efficiency of the signalling network
- Control Systems Infrastructure - extending life of the control systems infrastructure assets, improved reliability, and reduced maintenance cost
- Transmission Renewal - provide a reliable telecommunications system that enables communications from central control systems to field sites for Train Control, Traction Power Control and Radio Systems
- Asset Protection - replaced end of life and obsolete asset protection equipment to preserve the level of protection they provide
- UTC/DTC - improve safety and reliability and hardware changes to improve telemetry systems and Networking equipment that enables communications with field signalling equipment and the UTC and DTC system elements. These updates maintain and extend the life of the existing train control systems control systems

Issues

From the End of Year Financial Report provided (EOFY) Aurizon Network identified that progress within the year was expected to be greater had the following key impacts not occurred:

- Delays caused by the impact of COVID on the supply chain. This has affected the supply of components, particularly [redacted] alternators and [redacted] track circuit components. The result was a slippage of scope from FY20 to FY21 (~$0.7M)
- Limited availability of design resources during possession caused the commissioning of Wallaroo interlocking/train detection renewal to fall back to the possession of 6-7 July, which was successfully achieved. The root cause of this delay was the strain on signalling design expertise in the market generally due to the significant number of projects in play.

The above is reflected in the difference defined in the total commissioned scope in the current FY is $14,542,832 and the IAR value provided for the current FY which is stated as [redacted]

Completion Summary

In isolation, the works appear reasonable. However, although there is a reference to the application of the scope prioritisation model, limited written evidence of planning or prioritisation for how the specific works were selected has been provided for the assessment of the control system works. Notwithstanding, 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. The cost of works is considered to be prudent, supported by a reasonable level of documentation quality.

Summarising the above Aurizon provided evidence of completion in the form of asset completion certificates during the program. Aurizon's end of year report for the program reported that "significant" progress was achieved with key achievements as:

- Train detection scope completed on time
    - 132 total track circuits completed based on Track Upgrade Status 2020-02-20
    - 51 location case upgrades
- The significant asset protection scope (weighers and HWBD's) was commissioned within the year
    - 2 x weighbridges (Newlands and McNaughton [redacted] each
    - 6 x Hot Box Detectors (HBD) for Goonyella system – 3 on Oaky Ck section, 2 Blair Athol and 1 Winchester
    - 1 x HBD replacement on Blackwater system (Wycarbah)
    - 90 x IoT temperature monitoring devices trial sites
- Significant optical fibre achieved, with the bundling of integrated works and trial of alternative design and methodologies delivering efficiencies
    - Coppabella -
        - Broadlea to Coppabella – 2.4km 2 joints
        - Coppabella ATW to Coppabella MW – 9.8km 3 joints
    - Edungalba & Wallaroo
        - Wallaroo MWR to Duaringa SER– 11.5km 6 joints
        - Edungalba TSC – SER – 2.2km
        - Wallaroo TSC to Tryphinia AT – 8km 3 joints
        - Wallaroo TSC to Tryphinia CER– 10.8km 5 joints
        - Wallaroo MW to Wallaroo TSC – 2.4km 1 joint
        - Wallaroo MW to Wallaroo AT – 5km 1 joint
    - Mt McLaren
        - Mt McLaren FS to Blackridge AT – 9.8km 2 joints
    - Wycarbah
        - Spring Creek TSC to Wycarbah HBD – 2.1km 2 joints
        - Wycarbah SER to Wycarbah HBD – 2.8km 1 joint

    Circa 67km of fibre replacement

- Interlocking replacement at 2 sites, both Interlockings have been upgraded to [redacted] with axle counters provided through the yards
    - Edungalba:
        - Installation of 3 new and modification of 10 location cases
        - Removal of 9 location cases
        - 4 signals will be driven by LOM cards and require rewiring
    - Wallaroo:
        - New [redacted] axle counters throughout station yard
        - Installation of 5 new and modification of 9 location cases
        - Removal of 10 location cases
- Power Resilience upgrades have included the installation of new equipment and the replacement of existing equipment
    - Installation of; automatic changeover switch, new switchboards, [redacted] System, [redacted] Rectifier Rack System, standby batteries
    - 204 battery sets across the CQCN that were identified as being already life – expired or due to expire in FY20, of these, to date all but 29 have been replaced
- Data Network core consolidation has been captured within the migrations, migration includes a router and switches commissioning at 7 core lobes:
    - Lobe 1 – 8 routers/22 switches
    - Lobe 2 – 12 routers/15 switches
    - Lobe 3 – 10 routers/10 switches
    - Lobe 4 – 10 routers/15 switches
    - Lobe 5 – 14 routers/28 switches
    - Lobe 6 – 12 routers/14 switches
    - Lobe 7 – 14 routers/14 switches
- VDR at 6 level crossing monitor switches on the Blackwater line
- Transmission Renewal undertaken across 20 sites
- UTC-DTC upgrades across 9 sub-packages

SECTION 1 - IS THE SCOPE PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.1	[i] D	Does the project align with the asset management strategy and AMP and has it been evaluated appropriately in terms of alternative/benefit-cost ratio?	Yes	Generally, the scope of the project works undertaken for the Control Systems Package is reflective of maintaining service reliability and asset condition throughout the CQCN	Aurizon PMP	Nil
1.2	[i] C	Are project solutions based on a reasonable expectation of the demand to have regard for current and future capacity levels?	Yes	All assets that have been upgraded are in alignment with opportunities to increase capacity including the renewal of interlockings and the MPLS migration	Asset Completion certificates and associated area signalling plans	Nil
1.3	[i] E	Is the extent of the project economically reasonable and efficient considering the age and condition of the Rail Infrastructure?	Yes	Critical assets such as interlockings, fibre and UTC upgrades support reasonable upgrades	Asset Completion certificates and associated area signalling plans	Nil
1.4	[i] B	Does the project accommodate what is reasonably required to comply with access agreements and Train Operation Deeds?	Yes	Planned and pre-emptive replacements of failing control system components is critical to avoid delays and critical safety incidents, thereby is in alignment with the requirements of access.	PMP	Nil
1.5	[i] G	Are there outcomes from user consultation or independent assessment which potentially impact access charges and have not been considered/addressed appropriately	No	From the information provided there are no outcomes that have not been considered appropriately	n/A	Nil
1.6	[i] F	Is there appropriate evidence to demonstrate compliance with Aurizon Network's legislative and tenure requirements, specifically relating to rail safety, workplace health, safety and environmental requirements?	Yes	The design has been delivered in accordance with the Aurizon SMS and the broader RPEQ requirements for signalling	Asset Completion certificates and associated area signalling plans, Practical completion certificates and outstanding items punch lists	Nil

1.7	[i] A	Does the project consider any relevant Network Development Plans?	Yes	Aurizon's internally approved business case (IAR) states "renewal and replacement of Control Systems infrastructure at priority sites across the CQCN…." To "maximise the performance and reliability of network assets" This aligns with the Asset Management strategy outlined in the Network Development plan.	IAR	Nil
1.8	[i] G, I	Have there been any additional submissions, requests, or consultations to the QCA that have not been addressed appropriately?	No	From the information provided there is no evident additional submissions, requests of consultations that have not been addressed.	N/A	Nil
1.9	[i] H	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil

SECTION 2 - IS THE STANDARD PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
2.1	[ii] B	Does the standard reflect the current demand and likely future capacity levels and type of traffic?	Yes	The standard reflects the current technology advances provides opportunities to achieve improvements in the safety, reliability, and performance of the network. The Control Systems Renewal Program provides for the capital works required to affect these asset management strategies.	PMP, Asset Completion certificates and associated area signalling plans	Nil
2.2	[ii] D	Is the standard consistent with the asset management objectives?	Yes	Renewal of system assets or components which are life expired, or extending the life of the asset through component renewal or part asset renewal Implementation of remote monitoring and diagnostic capabilities for field assets to reduce travel time and risk Effective management of assets with obsolete parts/systems which are hard to source	PMP	Nil
2.3	[ii] A,	Is the standard consistent with the requirements of Railway Operators and what is reasonably required to comply with Access Agreements and Train Operations Deeds? E.g., does it align with National Railway standards, contractual requirements, and so on.	Yes	The design has been delivered in accordance with the Aurizon SMS and the broader RPEQ requirements for signalling	Asset Completion certificates and associated area signalling plans	Nil
2.4	[ii] F	Is the standard of works compliant with relevant laws and the requirements of any authority?	Yes	The design has been delivered in accordance with the Aurizon SMS and the broader RPEQ requirements for signalling	Asset Completion certificates and associated area signalling plans	Nil

2.5	[ii] G	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
2.6	[ii] C, E	Is the standard of works consistent with having regard for the requirements of Australian design and construction standards and Aurizon Network's design standard contained within the Safety Management System? If not, have the appropriate risk assessments and verification processes been implemented in the development of the standard	Yes	The design has been delivered in accordance with the Aurizon SMS and the broader RPEQ requirements for signalling	Asset Completion certificates and associated area signalling plans	Nil

SECTION 3 - IS THE COST PRUDENT AND EFFICIENT

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.1	[iii]E (1,2,3),	Was the project managed effectively with regards to the customer, economic and safety, environmental and sustainability requirements and does it comply with Laws and requirements of Authorities?	Yes	Project phasing over the 12 months was pushed to the end of the FY due to long lead items and supply chain constraints impacted through covid-19 pandemic.	IAR	Nil
3.2	[iii] D	Was the minimization of the whole of life costs considered adequately and other principles defined in the strategic asset management plan?	Yes	Renewing critical system assets which are life expired to ensure safe network operations and extending the life of the asset through component renewal or part asset renewal is in line with whole of life considerations and the asset management strategy	Aurizon Network and Maintenance Strategy	Nil
3.3	[iii] C	Were a reasonable procurement methodology and cost-competitive procurement process used to select and complete the project?	Yes	Aurizon Network procurement processes applied to ensure competitive pricing and provision of services.	IAR, Aurizon supplier portal	Nil
3.4	[iii] A, B	Do the cost elements of the project consider any relevant Network Development Plans and does it benchmark reasonably relative to the scale, nature, cost, and complexity of the project?	Yes	All items excluding the Interlocking upgrades are reflective of the work undertaken. Overall, the cost for the Interlocking upgrade seems considerably lower than would have been expected. Both Interlockings have been upgraded to Westrace MII with axle counters provided through the yards each individual interlocking would be in excess of $1M	AS218 Stagework design AS1763 stagework design	Confirming details on train detection/interlocking upgrades
3.5	[iii] E (6,8)	Does the contract selected provide; best performance for all stakeholders, minimisation of project costs, meeting contractual timeframes and dealing with external factors?	Yes	Aurizon Network state that cost estimates reflect an [redacted] efficiency in FY20 in line with their Asset Renewal efficiency targets	IAR	Nil

3.6	[iii] (5,7)	Was the portfolio efficiently programmed to consider the performance and operational requirements for access holders and end-users and other elements in the supply chain?	Yes	Due to the size of the project and limited track access times, works were split into smaller separable portions and commissioned over several stages. Generally, the following handovers were provided for various stages of works at the time of commissioning: • Network Operations Handovers were provided to confirm any New and/or Modified Signalling Infrastructure is safe for operational use. • Maintenance Handovers were provided to the relevant Signalling Maintenance depots and Engineering Offices.	Copies of these handovers are included in the relevant Test and Commissioning Packages	Nil
3.7	[iii] F	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
3.8	[iii] G	Have there been any additional submissions, requests, or consultation to the QCA that have not been addressed appropriately?	No	From the information provided there has not been any additional submissions, requests or consultation that has not been addressed appropriately.	N/A	Nil
3.9	[iii] E (4)	Have the works been scheduled and staged to minimise disruption to the operation of users?	Yes	Completed test plans demonstrate that the various works required to be undertaken prior to commissioning were completed thereby ensuring no loss of operations outside of the possessions	Completed Test Plans, Handover certificated, Mater test certificates	Nil

Template for SME's

AURIZON NETWORK PRUDENCY CAPEX REVIEW 2019-20 QCA

Arcadis Brisbane
LEVEL 5/120 EDWARD ST, BRISBANE, QLD 4000

IV.00459 LEVEL CROSSING RENEWAL PACKAGE 2

The following provides detail of the project prudency and efficiency assessment:

ASSESSMENT SUMMARY

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 Undertaking (UT5), was there sufficient demonstration of prudency and efficiency to satisfy:	Scope	Yes
	Standard	Yes
	Cost	Yes
Capital Expenditure Claim (total)		$4,847,544
Impact of findings on Claim		$ -
TOTAL ACCEPTED		$4,847,544

Check list	Documentation Type	Name of document
Essential documents		
Y	Project Management Plan	F20 Level Crossing Program PMP RevC
Y	Breakdown of costs	SAP Spreadsheet
Y	Business Case Justification (IAR)	Level Crossing Renewal Package 2 (FY20)
Y	Commissioning data and completion, acceptance, and handover validations.	Various
Y	Completion report	EOFY Status Report Level Crossing Renewal

Details	
Project Number	IV.00459
Project Name	Level Crossing Renewal Package 2
Project Type	Civil
Pre-Approval	No
Asset Description	Renew or upgrade level crossing assets in line with ALCAM risk ratings and/or condition
Location(s)	Various
Expenditure Claimed	$ 4,847,544
Interest during Construction (IDC)	$ 45,472
Total Claimed	$ 4,893,017

PROJECT OVERVIEW

Scope

From the information provided the primary objectives of the Level Crossing Renewal Program include, but are not limited to:

- Major Renewals (track and civil) – this refers to the renewal of the formation (where required), ballast, sleepers (where required) and rail. It also includes the installation of flangeways and any required upgrades to existing signage and road line markings
- Upgrade of level crossing control systems based on Australian Level Crossing Assessment Model (ALCAM) assessments – this refers to the upgrade of control systems to incorporate flashing lights and boom gates to improve the separation of trains and the public, improving the overall safety of the level crossing.
- Replacement and improvement of signage.
- Full Issued For Construction (IFC) designs for current and future years scope.
- Closure of level crossings no longer required or where assessments show there is too high a risk of a safety incident occurring.
- ALCAM assessments (ongoing program required to maintain rail regulator accreditation).
- Consultation with road managers (where required).

Aurizon Network states that level crossings are key focus area due to the elevated risk profile (i.e. consequence) introduced through train and vehicle interaction, this is considered a reasonable approach and in line with National Safety Regulation

Most of the level crossings to be constructed in FY20 have had design completed in FY19. Future designs (to be constructed FY21) will be completed during FY20.

TABLE 1 SUMMARY OF SCOPE

System	Scope	Total # Assets Level Crossing	% Renewal
Blackwater	3	245	1.2
Goonyella	2	282	0.7
Moura	3	147	2
Newlands	0	93	0
Total	8	767	1

Business Case

Rail Level Crossings are the locations where road and railway lines intersect allowing road users (including pedestrians and cyclists) to travel over the railway tracks. Aurizon Network is the Rail Infrastructure Manager (RIM) of over 765 level crossings in its 2,670 kilometres of heavy haul railways throughout the Central Queensland Coal Network (CQCN).

Level crossing works undertaken seek to mitigate track-based level crossing failures and minimise vehicle incidents that arise within the CQCN. Both these activities will act to reduce safety risks to all stakeholders and decrease disruption to rail traffic.

Issues

From the information provided it is noted that the FY20 year Level Crossing Renewal Program was impacted by a number of issues, including:

- Due to concerns over internal resource availability over F2Y20 number of sites were unable to be packaged together due to delays with design and, in some instances, the urgent nature of works to be completed, for some these cases Aurizon Network had to utilise external contractors to manage the construction of the level crossings. Aurizon Network has stated that in these cases, contractors were unable to spread their risk across multiple sites resulting in the tendered price to complete an individual site being high as it included a significant allocation for risk which by and large the project was already carrying.
- The upgrade of Mills Road Level Crossing (BW 84.12km ID5556) was delayed from the planned November date due to a state-wide fire ban being imposed after the contractor had mobilised to site. This resulted in increased costs ($64,594 excluding construction management and planning costs) due to additional mobilisation and material management requirements later.
- Due to access issues and resource availability on the Inverness Road Level Crossing (MA 116.0.12km ID6012 where a significant realignment was required to improve the track geometry, Aurizon Network was required to complete the track realignment in a second closure. While able to be incorporated with a planned undercut (reducing the rail and resurfacing costs), the project was required to support the second mobilisation of a track crew to complete the re-stress incurring an additional cost of $50,759.
- Due to delays to the design for Normandy Road Level Crossing (BW 141.26km ID746) and the need to undertake works at this crossing early in the financial year (due to its deteriorating condition), Aurizon Network was unable to procure, in a timely manner, the steelwork needed to complete mast adjustments. These adjustments were the result of changes to the track alignment necessary to reduce the forces that were causing the crossing to deteriorate. This resulted in an additional mobilisation to site and the need to relay, resurface and bitumen the down road track a second time incurring some $229,000 in additional costs.
- During completion of the Gentle Annie Level Crossing (581.4km ID758), Aurizon Network identified the need to replace a significant number of dipped welds and to rectify a significant dip in the top and line of the track adjacent to the site. While the contractor absorbed their costs (which accordingly have not been included in Aurizon Network's capital claim), the project incurred additional costs ($48,807) associated with the integrated possession, protection officer and signalling support.

Completion Summary

Four sights were completed, and a number of level crossing signage upgrades/minor works completed at a total cost of $4,847,544. Works included but were not limited to:

Mills Road Level Crossing:

- Track panel removed and reinstalled renewal of ballast and existing level crossing
- Track slewed to required alignment and restressed
- New 60 kg rails installed, and 4 insulated joints installed each side of the crossing
- Flangeway and asphalt resurfaced in accordance with engineering standards and drawings
- Signal testing and commissioning

Normandy Level Crossing

- Track upgraded including ballast, sleepers, and new 60 kg rail
- Formation renewal completed across crossing site
- Rail restressed
- Level crossing reinstated with flangeways and asphalt surfacing in accordance with engineering standards and drawings
- Signal testing and commissioning

Gentle Annie Level Crossing:

- Track upgraded including ballast, sleepers, and new 60 kg rail 50 m
- Closure rail installed on the down road to remove defective weld
- Rail Restressed across upgrade
- Formation renewal completed
- Level crossing reinstated with flangeways and asphalt surfacing in accordance with engineering standards and drawings
- Signal testing and commissioning

Braeside Road Level Crossing

- Track upgraded including ballast, sleepers, and new 60 kg rail
- Formation rebuild 900mm (additional depth was necessary due to unsuitable material being found on excavation)
- Rail restressed

- Level crossing reinstated with flangeways and asphalt surfacing in accordance with engineering standards and drawings
- Signal testing and commissioning

In addition, minor works including:

- drainage
- signing upgrades including new stop signs, whistle boards, “Look out for trains” signs and Crossing Procedure signs, to ensure signage is correct, legible, and visible.
- Inspection works including ALCOM risk assessments undertaken to specific key risks, prioritise works and ensure appropriate controls are in place to maintain the safety of road and rail users

Were undertaken on various sites which were noted on the completion certification provided to Arcadis for assessment.

As stated on the documentation works also included design services for planned FY21 works and used to develop the FY20 CQCN closure plan.

The cost claimed is considered in alignment with the works undertaken and summarised above.

SECTION 1 - IS THE SCOPE PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.1	[i] D	Does the project align with the asset management strategy and AMP and has it been evaluated appropriately in terms of alternative/benefit-cost ratio?	Yes	Works to mitigate risks to road and rail users on level crossings (road/rail interface) are considered safety critical. Works are prioritised via the ALCAM assessment which is an industry approved risk assessment.	IAR	Nil
1.2	[i] C	Are project solutions based on a reasonable expectation of the demand to have regard for current and future capacity levels?	Yes	Projects are aimed at maintaining acceptable safety levels at road/rail interface and hence maintaining reliability of operations.	PMP, 1HFY2020 Financial Performance	Nil
1.3	[i] E	Is the extent of the project economically reasonable and efficient considering the age and condition of the Rail Infrastructure?	Yes	ALCAM (Australian Level Crossing Assessment Module) used for the prioritisation of crossings coupled with the criticality for FY20 and future program	Completion certification, PMP	Nil
1.4	[i] B	Does the project accommodate what is reasonably required to comply with access agreements and Train Operation Deeds?	Yes	Works prioritised through safety ALCAM risk assessment. Other works including within the package (drainage, formation, renewal of rail to 60 kg, replacement of sleeper with 28 tal) support operational requirements and are aimed at achieving target BRTT	IAR, EOFY	Nil
1.5	[i], G	Are there outcomes from user consultation or independent assessment which potentially impact access charges and have not been considered/addressed appropriately	No	From the information provided.	N/A	Nil
1.6	[i] F	Is there appropriate evidence to demonstrate compliance with Aurizon Network's legislative and tenure requirements, specifically relating to rail safety, workplace health, safety, and environmental requirements?	Yes	From the information provided these projects were delivered in compliance with State and National Regulation, in alignment with Rail Safety National Law (RSNL) and	Completion certification	Nil

				Regulation Office of the National Rail Safety Regulator (ONRSR)		
1.7	[i] A	Does the project consider any relevant Network Development Plans?	Yes	Upgrading Level Crossings to align with safety requirements is consistent with the Asset Management strategy	Network Maintenance and Renewal Strategy	Nil
1.8	[i] G, I	Have there been any additional submissions, requests, or consultations to the QCA that have not been addressed appropriately?	No	From the information provided.	N/A	Nil
1.9	[i] H	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil

SECTION 2 - IS THE STANDARD PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
2.1	[ii] B	Does the standard reflect the current demand and likely future capacity levels and type of traffic?	Yes	For example, Aurizon Network are proactively seeking ways to minimise future maintenance and increase liability through design solutions such as the installation of flangeways along the length of the bitumen crossing. These minimise the risks of damage to bitumen against the rail which reduces the likelihood of future operational and maintenance issues.	Network Maintenance and Renewal Strategy, 1HFY2020 Financial Performance	Nil
2.2	[ii] D	Is the standard consistent with the asset management objectives?	Yes			Nil
2.3	[ii] A,	Is the standard consistent with the requirements of Railway Operators and what is reasonably required to comply with Access Agreements and Train Operations Deeds? E.g. does it align with National Railway standards, contractual requirements, and so on.	Yes	Aurizon Network is prioritising its level crossings using combination of ALCAM risk assessments and network criticality. This is a sound approach with aligns with RISSB requirements and operational efficiencies.	IAR	Nil
2.4	[ii] F	Is the standard of works compliant with relevant laws and the requirements of any authority?	Yes	The compliance with ALCAM requirements by default implies compliance with relevant laws and requirements	PMP	Nil
2.5	[ii] G	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
2.6	[ii] C, E	Is the standard of works consistent with having regard for the requirements of Australian design and construction standards and Aurizon Network's design standard contained within the Safety Management System? If not, have the appropriate risk assessments and verification processes been implemented in the development of the standard	Yes	Aurizon Network is prioritising its level crossings using combination of ALCAM risk assessments and network criticality. This is a sound approach with aligns with RISSB requirements and operational efficiencies	PMP	Nil

SECTION 3 - IS THE COST PRUDENT AND EFFICIENT

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.1	[iii]E (1,2,3),	Was the project managed effectively with regards to the customer, economic and safety, environmental and sustainability requirements and does it comply with Laws and requirements of Authorities?	Yes	Level crossing works are core deliverables for Aurizon Network technical staff. From the information provided works are carried out in alignment with environmental and sustainability requirements.	IAR, PMP, EOFY	Nil
3.2	[iii] D	Was the minimization of the whole of life costs considered adequately and other principles defined in the strategic asset management plan?	Yes	Aurizon Network are installing flangeways at all renewal sites to increase the life of the road pavement and rail at crossing interfaces, this is in line with whole of life considerations.	Site discussions, completion certification	Nil
3.3	[iii] C	Were a reasonable procurement methodology and cost-competitive procurement process used to select and complete the project?	Yes	From the information provided outsourced works were tendered as per Aurizon Network approved competitive procurement processes.	EOFY	Nil
3.4	[iii] A, B	Do the cost elements of the project consider any relevant Network Development Plans and does it benchmark reasonably relative to the scale, nature, cost, and complexity of the project?	Yes	Aurizon Network states that final estimated costs of $[redacted] reflect an [redacted]% efficiency target in line with the Asset Renewal Program targets – despite the issues caused by unforeseen events over FY20 and some changes to original scope due to this the $4,848,544 claim is considered in alignment with the work undertaken	IAR	Nil
3.5	[iii] E (6,8)	Does the contract selected provide; best performance for all stakeholders, minimisation of project costs, meeting contractual timeframes and dealing with external factors?	Yes	From the information provided outsourced works were tendered as per Aurizon Network approved competitive procurement processes.	IAR	Nil

3.6	[iii] (5,7)	Was the portfolio efficiently programmed to consider the performance and operational requirements for access holders and end-users and other elements in the supply chain?	Yes	Work undertaken in track closures and managed in coordination with access holders and local road owners. An additional 15 sites had signage upgrades completed within the FY20 program.	IAR, PMP	Nil
3.7	[iii] F	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
3.8	[iii] G	Have there been any additional submissions, requests, or consultation to the QCA that have not been addressed appropriately?	No	From the information provided	N/A	Nil
3.9	[iii] E (4)	Have the works been scheduled and staged to minimise disruption to the operation of users?	Yes	Work undertaken in track closures and managed in coordination with access holders and local road owners. An additional 15 sites had signage upgrades completed within the FY20 program.	EOFY	Nil

Template for SME's

AURIZON PRUDENCY CAPEX REVIEW 2019-20 QCA

Arcadis Brisbane
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IV 00426 RAIL RENEWAL PROGRAM

The following provides detail of the project prudency and efficiency assessment:

ASSESSMENT SUMMARY

In accordance with clause 2, Schedule E of the Aurizon Network The 2017 undertaking UT5, was there sufficient demonstration of prudence and efficiency to satisfy Clause 2.2(b) of Schedule E.	Scope	Yes
	Standard	Yes
	Cost	Yes
Capital Expenditure Claim (total)		$25,763,731
Impact of findings on Claim		$ -
TOTAL ACCEPTED		$25,763,731

Details	
Project Number	IV.00426
Project Name	F20 Asset Renewal Program Track Upgrade
Project Type	Civil Engineering
Asset Description	Renewal of end of life or worn rail
Location(s)	Various
Expenditure Claimed	$ 25,763,731
Interest during Construction (IDC)	$ 140,643
Total Claimed	$ 25,904,374

Check list	Documentation Type	Received
	Essential documents	
Y	Project Management Plan	20191014 IV00477 PMP
Y	Breakdown of costs	SAP Spreadsheet
Y	Business Case Justification (IAR)	Track Renewal Package 2 IAR
Y	Commissioning data and completion, acceptance, and handover validations.	Various
Y	Completion report	End of Year Status Report

PROJECT OVERVIEW

Scope

The works completed include scope commissioned from the FY19 project (IV.00425) and the FY20 (IV.00426) project. It should be noted that works have commenced on the FY21 scope (primarily design) however none of these packages have been commissioned for use and as such have not been included within the FY20 CAPEX claim.

As per the Aurizon Project Management Plan and the IAR the primary objected of the Rail Renewal Program include:

- Replacement of life-expired rails across the CQCN with new 60 kg HH rails.
- Complete track restressing to CETS standards.
- Replacement of expired GIJs.
- Complete flangeway installation as required.
- Complete track resurfacing to design BMF.
- Employ construction methodologies that minimise disruption to rail traffic.
- Complete all approved scope in accordance with the approved budget and expected time.
- Provide quality client services to ensure the business objectives of Aurizon Network are satisfied.
- Ensure the works are constructed in a safe manner and with minimum harm to the environment.

The project forms an ongoing program of rail replacement works, implementing effective monitoring and inspection processes by which to identify damaged or worn rail and implement preventive or renewal works to minimise risk to operations and remain compliant with the Civil Engineering Track Standards (CETS).

Business Case

The CQCN comprises 2,670 km of track across mainlines, passing loops and balloon loops (or over 5000 rail km) of which rail is a critical and most expensive component.

The basis of the Rail Renewal Program is life – expired rail. From the information provided by Aurizon prerequisites to undertake a renewal include:

- When the rail reaches rail wear limits (as defined in CETS 2 or Asset Notice TC003).
- For track sections where only locomotives and empty wagons run, CETS wear limits for “>16 to <20 tal” traffic may be used.
- Corrosion affecting the rail section integrity (e.g. corrosion of rail foot reducing effectiveness of fasteners).
- Rail defects (either defect removed as a weld, plug or closure or as longer section of rail renewal if high incidence of defects).

- NDT defects are to be monitored for clusters and trends. Rail renewal due to excessive rail defects shall be determined by the Civil Assets team.
- Most rail renewal is due to rail wear with the actual service life of the rail primarily determined by the traffic volume, the track alignment and geometry.

It is noted that the rail may be allowed to exceed the allowable wear limits under the following circumstance and conditions:

- Any instances where it is proposed to leave rail in track beyond the limits above require a derogation approved by Civil Assets.
- For rail curve renewals, the rail replacement length is typical to be planned to extend through the whole curve and a minimum of 20m into the straight at each end (depending on instruction from provided technical scope documents).

In general, Arcadis considers that the program implemented is an effective rail maintenance strategy based upon accurate and regular monitoring and proven industry standards to mitigate risks and maintain operational safety whilst extending rail whole of life.

Issues

The Rail Renewal Program was impacted by a State of Fire Emergency that applied to most of the CQCN in late 2019. This increased execution costs by more than $0.5m.

Completion Summary

From the EOFY it is noted that the Rail Renewal Program was successful in terms of completed km versus projected with quantities in Newlands and Goonyella exceeding projected scope for the year in the IAR with costs slightly below estimated. Aurizon stated that this is due to efficiencies within closure delivery. Summary of scope delivered is provided below:

- 614 rails were installed across four systems (an improvement on FY19 by an additional 77 rails).
- Introduction and execution of bulk rerail from Yukan to Black Mountain, where 71 rails were replaced in one mobilisation and part-worn rail was picked up to be reused on other projects.

The table below compares the projected IAR value vs the completed and commissioned scope.

System	Product	Projected work in IAR		Commissioned/Completed Work	
		QTY (km)	Value ($AU)	QTY (km)	Value ($AU)
Blackwater	Rail KMs	23.6	[redacted]	21.7	8,302,042
Goonyella	Rail KMs	37.5	[redacted]	39.5	15,315,471
Moura	Rail KMs	2.1	[redacted]	2.1	893,081
Newlands	Rail KMs	2.3	[redacted]	2.4	1,253,136

SECTION 1 - IS THE SCOPE PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
1.1	[i] D	Does the project align with the asset management strategy and AMP and has it been evaluated appropriately in terms of alternative/benefit-cost ratio?	Yes	Preventative works to minimise unplanned rail failures are critical to the safe operations of a railway. Prerequisites listed to prioritise renewals are in line with industry standards and whole of life considerations of the rail asset. This aligns with the Asset Management strategy.	PMP, Aurizon Network and Maintenance Strategy, Site inspections	Nil
1.2	[i] C	Are project solutions based on a reasonable expectation of the demand to have regard for current and future capacity levels?	Yes	This project maintains capacity at current agreed levels. The works are required to maintain agreed BRITT and minimise risk of delays, derailments, and application of Temporary Speed Restrictions.	BRITT data provided, 1HFY2020 Financial Performance	Nil
1.3	[i] E	Is the extent of the project economically reasonable and efficient considering the age and condition of the Rail Infrastructure?	Yes	Governing criteria is % of rail head wear in relation to CETS limits. Allowing wear beyond these states may lead to other safety related problems caused by high wheel/rail contact stresses.	RISSB National Standards Civil Engineering Track Standards Site inspection GPR	Nil
1.4	[i] B	Does the project accommodate what is reasonably required to comply with access agreements and Train Operation Deeds?	Yes	Planned and pre-emptive replacements of failing track components avoid accelerated deterioration of track and rolling stock and unplanned failures and disruptions, thereby is in alignment with the requirements of access.	PMP	Nil
1.5	[i] G	Are there outcomes from user consultation or independent assessment which potentially impact access charges and have not been considered/addressed appropriately	No	From the information provided there are no outcomes that have not been considered appropriately	N/A	Nil

1.6	[i] F	Is there appropriate evidence to demonstrate compliance with Aurizon Network's legislative and tenure requirements, specifically relating to rail safety, workplace health, safety, and environmental requirements?	Yes	Quality Management is through the Aurizon Program Delivery Quality Management System (PDQMS Projects were delivered in alignment with the requirements of Rail Safety National Law (RSNL) and the Office of the National Rail Safety Regulator (ONRSR)	PMP	Nil
1.7	[i] A	Does the project consider any relevant Network Development Plans?	Yes	Works programmed on combined condition and network criticality ranking consistent with Aurizon Asset Management Strategy. Unplanned breakages and failures of rail create safety risks to operations, preventative maintenance of damaged or worn rail is in the interest of the efficiency of the network.	Aurizon Network and Maintenance Strategy	Nil
1.8	[i] G, I	Have there been any additional submissions, requests, or consultations to the QCA that have not been addressed appropriately?	No	From the information provided there is no evident additional submissions, requests of consultations that have not been addressed.	N/A	Nil
1.9	[i] H	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil

SECTION 2 - IS THE STANDARD PRUDENT AND EFFICIENT?

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
2.1	[ii] B	Does the standard reflect the current demand and likely future capacity levels and type of traffic?	Yes	Replacement of life-expired or damaged rail supports the provision of a safe operations and robust infrastructure solutions to support current and future capacity requirements	PMP, CETS, 1HFY2020 Financial Performance	Nil
2.2	[ii] D	Is the standard consistent with the asset management objectives?	Yes	Whole of life considerations through replacement with fit for purpose and industry proven track elements.	Aurizon Network and Maintenance Strategy,	Nil
2.3	[ii] A	Is the standard consistent with the requirements of Railway Operators and what is reasonably required to comply with Access Agreements and Train Operations Deeds? E.g. does it align with National Railway standards, contractual requirements, and so on.	Yes	Standards align with RISSB national requirements and guidelines and through provision of reliability on the network Arcadis considers is consistent with Operator and User requirements.	Completion certification, observations on site	Nil
2.4	[ii] F	Is the standard of works compliant with relevant laws and the requirements of any authority?	Yes	From the information provided and site visit inspections Arcadis considers the standard of work is compliant with national and federal laws and requirements	Completion certification, observations on site	Nil
2.5	[ii] G	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
2.6	[ii] C, E	Is the standard of works consistent with having regard for the requirements of Australian design and construction standards and Aurizon Network's design standard contained within the Safety Management System. If not, have the appropriate risk assessments and verification processes been implemented in the development of the standard	Yes	Completion certification confirms for all sites that work has been down in compliance with relevant regulations inclusive of all Inspection and Test Plans, Aurizon Civil Engineering Track Standards and Track Stability Manual V5.0	Completion certification, observations on site	Nil

SECTION 3 - IS THE COST PRUDENT AND EFFICIENT

Item No.	UT5 Schedule E 2.2b Ref.	Question	Response	Comments/Findings	Source	Impact to claim
3.1	[iii], E (1,2,3)	Was the project managed effectively with regards to the customer, economic and safety, environmental and sustainability requirements and does it comply with Laws and requirements of Authorities?	Yes	From the information provide works are considered to be in compliance with safety, environmental requirements. No evidence was noted that this was not the case. Assets recycled where possible, e.g. salvaging of part-worn rail, and reusing on targeted sections such as balloon loops or lower trafficked areas where rail has life-expired.	Aurizon 2020 Sustainability Report, EOFY	Nil
3.2	[iii] D	Was the minimization of the whole of life costs considered adequately and other principles defined in the strategic asset management plan?	Yes	Correct maintenance of rail, whether that be maintaining profile, monitoring rail joints, identifying, marking and replacing defected rail where appropriate can prevent severe wheel/rail stresses which potentially can cause catastrophic failure of the rail asset and subsequent safety risks such as derailment.	Aurizon Network Maintenance and Renewal Strategy Aurizon staff	Nil
3.3	[iii] C	Were a reasonable procurement methodology and cost-competitive procurement process used to select and complete the project?	Yes	Aurizon uses a preferred supplier base of [redacted] and [redacted] rail alternating between the two to ensure the best pricing at that time. The preferred supplier base was developed through a competitive tendering process where suppliers were selected based on quality, whole of life considerations of the asset and cost.	Aurizon staff Completion certificates (shows suppliers	Nil
3.4	[iii] A, B	Do the cost elements of the project consider any relevant Network Development Plans and does it benchmark reasonably relative to the scale, nature, cost, and complexity of the project?	Yes	Average cost of $[redacted] per rail km achieved in FY20 was lower than the target stretch unit rate of $[redacted]K/Rail km as defined by the Asset Renewal Program efficiency target.	IAR	Nil
3.5	[iii] E (6,8)	Does the contract selected provide; best performance for all stakeholders, minimisation of project costs, meeting contractual timeframes and dealing with external factors?	Yes	From the information provided both internal and external resources were provided in line with optimisation of output. Procurement for rail is managed through long term procurements with two suppliers [redacted] and [redacted] to maximise opportunities for cost efficiencies.	Aurizon staff Completion certificates (shows suppliers	Nil

3.6	[iii] (5,7)	Was the portfolio efficiently programmed to consider the performance and operational requirements for access holders and end-users and other elements in the supply chain?	Yes	From the information provided it is considered that the project was delivered within system closures and single line possessions where possible to minimise disruptions to services.	EOFY, Completion certification	Nil
3.7	[iii] F	Has the project considered the Renewals Strategy and Budget?	N/A	Not relevant as it applies from 2020-21	Clause 7A.11.3 UT5	Nil
3.8	[iii] G	Have there been any additional submissions, requests, or consultation to the QCA that have not been addressed appropriately?	No	From the information provided there has not been any additional submissions, requests or consultation that has not been addressed appropriately.	N/A	Nil
3.9	[iii] E (4)	Have the works been scheduled and staged to minimise operations to users where appropriate?	Yes	Works are programmed and planned ahead under full possession or single line working. Aurizon stated that Access Holders are notified where they are potentially impacted by rail renewal works.	Site inspections: Aurizon staff	Nil

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