Central Queensland Coal Network FY25 Final Draft Proposal Maintenance and Renewals Strategies and Budgets

Prepared by Aurizon Network
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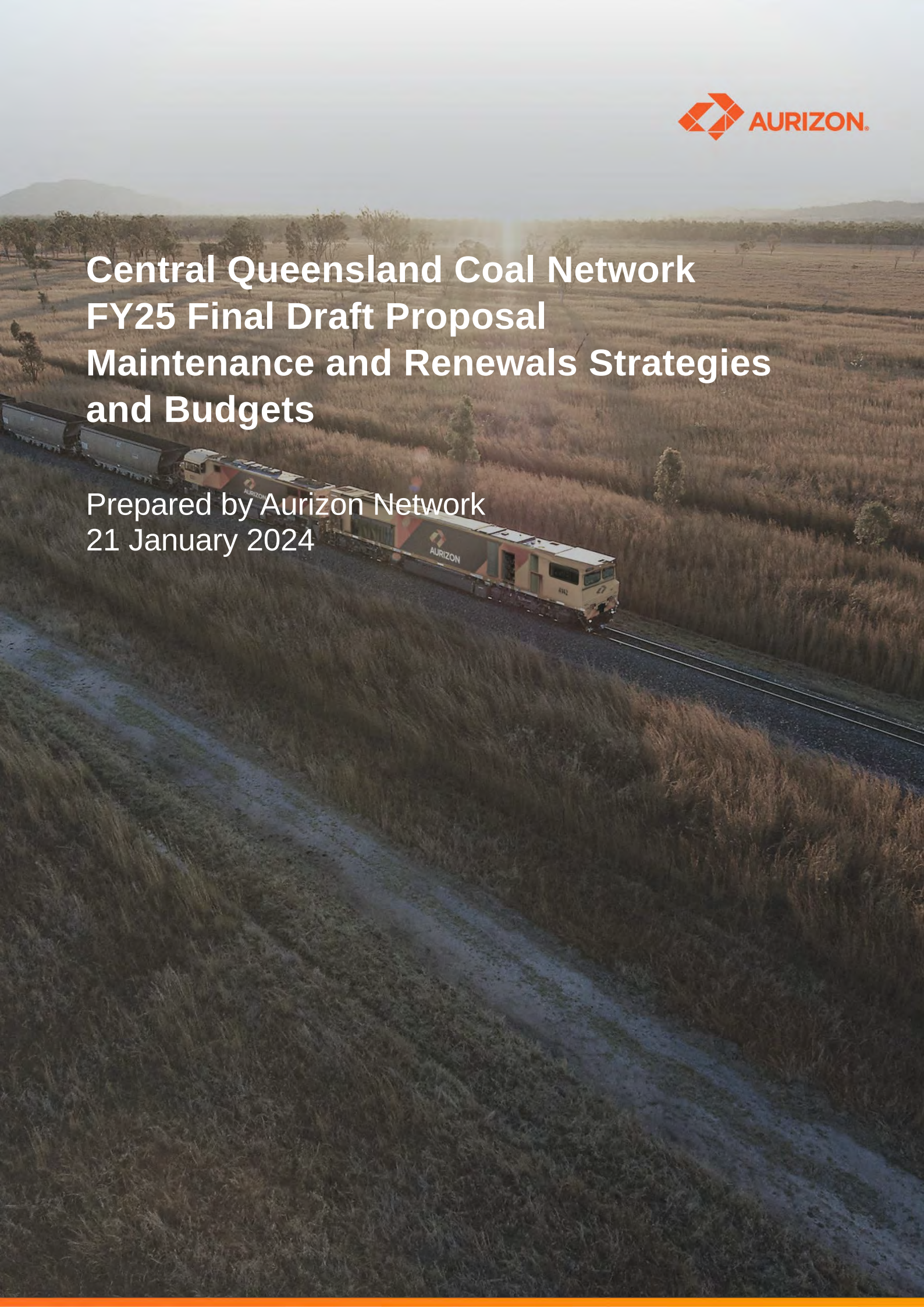

Central Queensland Coal Network
FY25 Final Draft Proposal
Maintenance and Renewals Strategies and Budgets

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1 Introduction

This document outlines Aurizon Network's final draft Maintenance and Renewals Strategies and Budgets (**MRSB**) for each Coal System in the Central Queensland Coal Network (**CQCN**) for the Financial Year ending 30 June 2025 (**FY25 Final Draft Proposal**) to the Rail Industry Group (**RIG**).

Aurizon Network has developed its FY25 Final Draft Proposal for each Coal System having regard to the relevant matters as outlined in the 2017 Access Undertaking, ensuring that Maintenance Work is undertaken in a manner that has regard to the matters set out in the Maintenance Objectives. Table 1 provides an overview of the steps Aurizon Network has taken to achieve the Maintenance Objectives.

Table 1 Approach to Maintenance Objectives

Maintenance Objective	Treatment
Seeks to ensure that Committed Capacity is delivered.	Asset activity is undertaken to support the safe and reliable provision of rail services for users of the CQCN. Aurizon Network seeks to minimise the impact to the supply chain of Track Possessions, wherever reasonably possible, by undertaking renewal activity in integrated system closures, and undertaking maintenance activities between trains or aligned to integrated system closures. As part of the development of the **MRSB**, Aurizon Network develops the integrated closure regime based on critical path activity and seeks opportunities to coordinate works to reduce the footprint of asset activity as well as to align with other supply chain maintenance activities to minimise overall supply chain impact and maximise throughput.
Appropriately balances cost, reliability and performance of the Rail Infrastructure in the long and short term.	Aurizon Network's asset management strategy prioritises a preventive maintenance regime with fit for purpose renewal of Rail Infrastructure, based on asset condition and criticality and targeting performance and reliability consistent with 4-year averages. The identification, planning and rectification of faults seeks to minimise the impact of planned and unplanned failures. Aurizon Network's asset management strategy is based on the future demands on the rail infrastructure. Renewals and maintenance plans consider this long-term demand to determine the appropriate asset activity to ensure the asset is fit for purpose for the economic life of the corridor. Aurizon Network endeavours to ensure that the level of expenditure incurred to deliver the asset activity is reasonable and undertakes a market-based approach when needing to outsource labour, services or materials. Awarding of any contracts will include assessments of past performance, cost, quality and safety
Coordinates outages with other Supply Chain Participants wherever reasonably possible with a view to maximising throughput.	As part of developing the FY25 access plan, Aurizon Network engaged with other Supply Chain Participants to better understand their respective requirements. This engagement provided opportunities for alignment of the delivery of high impact network activities with major infrastructure outages and seasonal demand relevant to each Coal System.

1.1 Summary of Aurizon Network's FY25 Final Draft Proposal

The FY25 Final Draft Proposal provides a level of asset activity and funding that Aurizon Network considers is appropriate to deliver a fit for purpose, sustainable, reliable and safe rail network that meets the needs of customers in each Coal System. It seeks to maximise supply chain throughput and take into consideration the Independent Expert's (**IE**) assessment of Deliverable Network Capacity or in the circumstances where there is no Existing Capacity Deficit, Available Capacity.

The FY25 Final Draft Proposal incorporates feedback where Aurizon Network has engaged with the RIG throughout 2023 on key matters that contribute to the maintenance and renewal strategy and budget as agreed as part of the Annual Engagement Plan and the commitments to the RIG under the approved FY24 MRSB.

In aggregate, Aurizon Network's FY25 Final Draft Proposal for the CQCN provides for a maintenance budget (excluding ballast undercutting plant depreciation) of $183.3m, which is $23.5m above Aurizon Network's FY24 approved budget and $15.0m above Aurizon Network's full year forecast for FY24. The movement in cost between periods reflects the impacts of additional labour costs to support the mitigation of ageing workforce and attrition risks, scheduled plant maintenance activities for resurfacing plant and additional maintenance activities for Structures and Rail Grinding categories. Table 2 sets out the Maintenance Budget for each Coal System.

Table 2 FY25 Final Draft Proposal – Direct Maintenance Cost Budget ($m)

System	FY21 Actual	FY22 Actual	FY23 Actual	FY24 Approved Budget	FY24 Full Year Forecast	FY25 Draft Budget
Direct Maintenance Costs						
Blackwater	62.3	64.6	68.8	68.2	70.2	77.3
Goonyella	56.3	60.0	62.2	64.4	68.8	72.6
Moura	11.4	12.3	13.6	13.3	14.6	16.6
Newlands / GAPE	12.1	13.1	14.6	13.8	14.6	16.7
Total (excluding ballast undercutting plant depreciation)	**142.1**	**150.0**	**159.3**	**159.8**	**168.3**	**183.3**
UT5 FD Allowance	n/a	n/a	n/a	n/a	n/a	n/a
Ballast undercutting plant depreciation	3.9	5.8	6.2	6.2	6.2	6.0
Total Direct Maintenance Costs	**146.0**	**155.8**	**165.5**	**166.0**	**174.5**	**189.3**
Non-Coal Allocation	(1.5)	(1.6)	(1.1)	(1.5)	(1.5)	(1.0)
Total CQCN	**144.4**	**154.1**	**164.3**	**164.2**	**173.0**	**188.3**

The FY25 Final Draft Proposal also provides for a renewals budget of $313.4m, which is $11.8m above Aurizon Network's FY24 approved budget and $6.0m above Aurizon Network's full year forecast for FY24. The movement in cost between periods largely reflects changes in scope and cost across Permanent Way and Ballast Cleaning asset renewals. Table 3 sets out the Renewals Budget values for each Coal System.

Table 3 FY25 Final Draft Proposal – Renewals Budget ($m)

System	FY24 Approved Budget	FY24 Full Year Forecast	FY25 Draft Budget
Blackwater	145.4	143.4	148.1
Goonyella	113.7	119.1	110.6
Moura	18.8	19.8	22.3
Newlands / GAPE	23.7	25.2	32.3
Total CQCN	**301.6**	**307.4**	**313.4**

1.2 Likelihood of Change

There are several risk factors that may result in an increased or decreased spend in the MRSB, including the impact of wet weather, previous year rollover scope and cost escalation. Where possible, Aurizon Network will take action to minimise the net effect of these impacts through various controls.

In response to feedback from the RIG representative group, Aurizon Network has updated the commentary provided in the likelihood of change assessment for items assessed as 'high' to include the potential impact, the controls implemented, and the residual risk being managed as the program develops.

1.3 Structure of the FY25 Draft Proposal

Each annual MRSB proposal provides information to inform the approval process of the Final Draft Maintenance Strategy and Budget and Final Draft Renewal Strategy and Budget for each Coal system consistent with the requirements of Part 7A.11 of UT5. The MRSB is structured in two parts, it is recommended that customers review:

- Part A which provides the system-by-system scope and budgeted cost elements of the MRSB for the year in question. Part A is structured as follows:
    - Key assumptions underpinning the FY25 Final Draft Proposal
    - Maintenance Strategy and Budget and Renewals Strategy and Budget, which provide information on the cost, scope and Integrated Closures being proposed for FY25 and the system specific reasons, for each of:
        - Blackwater System
        - Goonyella System
        - Moura System
        - Newlands System and GAPE
    - Four year forward indicative forecast
    - Stakeholder Engagement.

- Part B provides CQCN-wide information regarding Aurizon Network's asset management approach. It details the strategies applied to deliver on the requirements of the Asset Maintenance and Renewal Policy to maintain reliability and deliver rail infrastructure efficiency and performance (each in the long and short term) while seeking to ensure that Committed Capacity or Deliverable Network Capacity can be achieved. Part B is structured as follows:
    - Guiding Principles and applications of the asset management strategies used in the CQCN
    - Legislative and regulatory obligations
    - Asset strategies applied to each asset class for both maintenance and renewals
    - Works end to end application to detail the process and other relevant information in the development of the MRSB from scope identification, access and works planning, budget setting and procurement, execution or delivery of the asset activity and reporting and engagement.
    - Climate change considerations and the impact on Aurizon Network's asset management approach.

- The **Detailed Scope Report** which includes detail on the specific scope proposed to be completed at specific locations. This information helps highlight the necessity of the proposed scope and the location relative to their operations.

In this FY25 Final Draft Proposal, except to the extent a term is expressed to the contrary, capitalised terms have the meaning given in UT5.

For the FY25 Final Draft Proposal, Aurizon Network has made several changes to improve the readability of the document and reduce duplication. These include:

- System specific summaries have been included in Part A with the addition of a map of total scope location and spend in FY25.
- Key aspects for each program including a description, maintenance and renewal options as well as typical scope requirements are grouped together in Part B, section 10, while options considered in relation to Maintenance and Renewals are included in appendix 2 and 3. Where specific options were considered for strategic scope items or where asset renewal will be different to the typical renewal option, these are identified within each system scope discussion.
- Part B includes the Works End to End process including key process steps and considerations as well as a summary of key improvements over the year.
- The Power BI report in the Customer Portal (Detailed Scope Report), included as an appendix to this document, includes an added column to identify high likelihood of change scope items discussed within each system.

1.4 Key Assumptions

To prepare the FY25 Final Draft Proposal, Aurizon Network has relied on the following key assumptions relating to:

- Interaction with the Annual Capacity Assessment Report (**ACAR**) and forecast volumes for each Coal System discussed in section 1.5.
- The scope and cost of asset activity, noting that the execution of planned asset activities may not occur for another 18 months, during which time changes in asset condition may result in refinements to scope.

Product level assumptions supporting the development of strategy and budget are discussed in section 12.3 Budget Setting and Procurement.

1.5 Interaction between the FY25 Final Draft Proposal and the ICAR

On 1 November 2021, the QCA published the Initial Capacity Assessment Report (**ICAR**) for the CQCN, showing the Deliverable Network Capacity (**DNC**) for the period FY20-FY24. Each year the IE provides updates to DNC through the publication of an ACAR. The ACAR 2023 includes the DNC of each coal system in the CQCN for the period FY24-FY28, noting for the Blackwater System, the Independent Expert identified capacity above the DNC is available to be contracted across the period.

In developing this FY25 Final Draft Proposal, Aurizon Network assess access against both against both Committed Capacity and DNC for all systems to ensure Aurizon Network can meet its obligations to customers. As outlined in Table 4, the current forecast volumes in each system are lower than the FY25 DNC set out in the ACAR.

Table 4 Comparison of FY25 DNC and FY25 Final Draft Proposal forecast volumes

Volumes (Million Net Tonnes)	Blackwater	Goonyella	Moura	Newlands	GAPE
Deliverable Network Capacity (mt)	84.4	129.1	15.7	41.2	
QCA-approved FY25 System Forecasts[1]	54.3	108.0	11.8	16.4	17.2

On 19 October 2023, the QCA approved Aurizon Network's Reset Schedule F Values submission, which included an FY25 volume forecast for the CQCN of 207.8 million net tonnes. When developing the FY25 Final Draft Proposal, Aurizon Network has had regard to the QCA-approved forecast, and has also considered actual railings for the current financial year to date (FY24).

Aurizon Network has commenced end-user consultation on FY25 volumes and notes that historical volumes for each origin-destination pairing are a factor in assessing the overall reasonableness of volume forecasts provided. Aurizon Network intends to provide the QCA with an updated volume forecast in February 2024 as part of the FY25 Annual review of Reference Tariff process and expects that the updated forecasts may differ from the volume forecast considered when developing this FY25 Final Draft Proposal.

On 16 June 2022, the IE made recommendations to the QCA on the proposed Transitional Arrangements that it considered were most likely to resolve the Existing Capacity Deficits effectively and efficiently. The QCA has made determinations in favour of 13 of the recommended Transitional Arrangements. The FY25 Final Draft Proposal does not include any maintenance or capital expenditure relating to proposed Transitional Arrangements.

The results of any further determinations by the QCA on the Transitional Arrangements and any impact on the FY25 Final Draft Proposal will be managed through the reporting and change processes.

1.6 Other Assumptions

The scope, access and cost requirements outlined in the FY25 Final Draft Proposal are based on the following assumptions:

- The closure hours outlined within this FY25 Final Draft Proposal represent integrated closures only and do not include activities completed in the shadow of other activities or in-between trains.
- Access planning includes provision for non-coal traffic.
- The Direct Maintenance cost schedules presented in this FY25 Final Draft Proposal provide for a reduction in costs, to reflect an allocation to non-coal services. This adjustment for each Coal System has been calculated using actual historical (FY23) non-coal railings and the QCA-approved AT1 Reference Tariff that will be applicable in FY25.
- Maintenance costs outlined within the FY25 Final Draft Proposal reflect the Direct Maintenance Costs only.
- High impact Ballast undercutting activity has been prioritised within Integrated Closures with residual scope being executed in single line closures.

[1] Aurizon Network, 2017 Access Undertaking Reset Schedule F Values, October 2023 page 7, Website: http://www.qca.org.au/wp-content/uploads/2023/10/an-reset-schedule-f-values-final-decision-post-board20021542.pdf

The value of asset renewal activities represented within the FY25 Final Draft Proposal reflects the capital expenditure Aurizon Network expects to incur while delivering these works in FY25. These values may differ from the values that Aurizon Network will seek to include in the Regulated Asset Base (**RAB**) via the Annual Capital Expenditure Claim (UT5, Schedule E), which reflects the cost of assets that have been commissioned during the financial year.

Aurizon Network develops costs based on the scope of work required to be delivered, guided by historical costs, and where known, site-specific requirements and scheduling constraints. While average costs per scope unit may be used as a guide to performance for some activities, they can be subject to limitations. For example, they may not adequately explain the impact of site-specific conditions (such as site access, ground conditions and the effect of recent weather) on cost or scope performance. Average unit costs may also be impacted where internal and external resources deliver asset activity in between trains and in integrated system closures. This can create inefficiencies that would not otherwise occur if asset activity was smoothly phased over the period.

There can be a substantial timing difference (of up to 18 months from the submission of the Final Draft Proposal) between planning and execution of works. It should be noted that estimates are made based on information available during the development of the MRSB and that asset conditions and costs may change prior to delivery. As such, refinements to the scope or cost of works presented in the FY25 Final Draft Proposal may be required.

Clause 7A.11.3(q) identifies circumstances where execution of work may be inconsistent with approved maintenance and renewals strategies and budgets. The likelihood of change assessment is included to inform potential changes.

For the purposes of Clause 7A.11.5(f)(ii)(B)(2) of UT5 and the consideration of whether material variations in the actual cost of delivering an “item” contained within the Approved Strategy and Budget are prudent and efficient:

- For Moura, Newlands and GAPE systems, the maintenance budget in its entirety is considered an ‘item’.
- For Blackwater and Goonyella, the product areas of resurfacing, rail grinding, general track maintenance, ‘Signalling and Telecoms’ and Electrical are considered as items. The remaining product areas are considered a single item (Structures and Facilities, Trackside Systems, Other Civil Maintenance, Other General Maintenance).

1.7 Extreme Weather and Review Event Expenditure

The scope of maintenance activities that can be delivered by Aurizon Network each year can be impacted by external events, such as prolonged or extreme weather. Given the uncertainty surrounding the occurrence of such events, Aurizon Network has not included in its FY25 Final Draft Proposal any contingency nor any provision for costs associated with Rail Infrastructure repair or rectification following a Force Majeure Event.

Where a Force Majeure Event and associated cost of rectification constitutes a Review Event under UT5, Aurizon Network will seek QCA approval to recover any incremental costs (which may include ordinary labour costs where they are not already recoverable) through the UT5 process (Schedule F, Clause 5.3) for infrastructure utilised by Coal Carrying services.

1.8 Key Improvements

While seeking to deliver a maintenance and renewal program that maintains stable levels of network performance, Aurizon Network is targeting continuous improvements that will benefit the safety, reliability, performance or cost efficiency of programs. These improvements can be new processes or ways of working, employing new technologies or reviewing how work is planned. The key continuous improvements targeted in FY25 are grouped by the Works End to End processes and whether the improvement will refine scope identification, access and works planning, budget setting and procurement, execution and close or engagement and reporting.

Part B includes each of the continuous improvement initiatives related to specific elements of the Works End to End process.

Asset Maintenance and Renewal scope identification includes 12 improvement initiatives in section 0, including key improvements to:

- extend the life of assets
- improve monitoring and inspections
- improve remote monitoring to reduce physical responses to site.

Access and Works Planning includes 15 improvement initiatives contained in section 0 including key improvements to:

- allow for specific for Electrical and Maintenance works
- allow for contingency closures in the plan
- support performance to plan through improving planning and sequencing of closures
- refine resource planning processes with additional steps and workshops added to the development timeline
- program Mechanised Production and Civil works packaging for external stakeholders.

Works Execution and Close includes 7 improvement initiatives contained in section 0 including:

- improved verification of location with EPG (external precise GPS) units in the field
- packaging vegetation management works to move towards a preventative maintenance strategy
- reviewing Mechanised Production and Civil Vendors to reduce cost.

1.9 Next Steps

Following submission, the key milestones in relation to the FY25 Final Draft Proposal are outlined in Table 5.

Table 5 Regulatory milestones relating to the FY25 Final Draft Proposal

Date	Milestone	Description
30 November 2023	Draft Submission	Aurizon Network submits its FY25 Draft Proposal for each Coal System to the Chair of the RIG, Customers, and non-coal Access Holders.
Week commencing 5 December 2023	Customer Updates	Updated Scope Preview Presentations provided to customers and stakeholders if material changes
1 January 2024	Due date for feedback on the FY25 Draft Proposal	The Chair of the RIG, on behalf of End Users, may give Aurizon Network a notice which specifies amendments to the FY25 Draft Proposal that members of the RIG consider reasonably necessary (giving reasons).

Date	Milestone	Description
21 January 2024	Aurizon Network submits FY25 Final Draft Proposal	Aurizon Network will: • respond to any proposed amendments (giving reasons if Aurizon Network does not accept them) • include information regarding any changes since the submission of the Draft Proposal • provide its FY25 Final Draft Proposal to the Chair of the RIG.
14 February 2024	Notification of voting outcomes	The Chair of the RIG notifies Aurizon Network and the QCA as to whether a Special Majority of End Users for each Coal System has approved Aurizon Network's FY25 Final Draft Proposal.

Aurizon Network welcomes the opportunity to discuss any aspect of this FY25 Draft Proposal in further detail with the RIG, its advisers and customers.

2 New Information since 30 November 2023

The development of the annual maintenance and renewal strategy and budget is part of Aurizon Network's process to manage the rail infrastructure in a way that meets the Maintenance Objectives outlined in section 7A.11 of the 2017 Access Undertaking. The draft proposal submitted on 30 November each year to the Rail Industry Group Chair takes into consideration the identification and assessment of scope that in some cases occurs up to 18 months prior to the submission date. Aurizon Network makes an informed assessment based on the available information, including the likelihood of change to the scope, cost and access impacts, for inclusion in each years' proposal.

Since 30 November 2023, Aurizon Network has continued to develop and review scope identified in the FY24 Draft Proposal for implementation. Consistent with section 7A.11.3(c)(iii) of the 2017 Access Undertaking, this section of the FY25 Final Draft Proposal provides an update to the members of the Rail Industry Group, non-coal Access Holders and Customers on new information in relation to the FY25 Draft Proposal that has become available between 30 November 2023 and the 21 January 2024. The changes are predominantly due to new information regarding the condition of infrastructure and design requirements in the renewals program, and scope finalisation for the Rail Grinding Program.

The changes result in a $2.9m reduction in asset renewal expenditure and an increase of $0.2m in asset maintenance expenditure in FY25.

The tables below provide a summary of all changes to the FY25 Draft Proposal based on new information and the associated forecast variance.

Table A: Changes to FY25 Draft Proposal – Forecast Cost Impact ($m)

System		FY25 Draft Proposal – Nov 23	FY25 Final Draft Proposal - Jan 24	Variance
Blackwater	Maintenance	77.8	77.3	(0.5)
	Renewals	149.0	148.1	(0.9)
	System Total	**226.8**	**225.4**	**(1.4)**
Goonyella	Maintenance	72.6	72.6	0.1
	Renewals	112.6	110.6	(2.0)
	System Total	**185.2**	**183.2**	**(2.0)**
Moura	Maintenance	16.0	16.6	0.6
	Renewals	22.3	22.3	-
	System Total	**38.3**	**38.9**	**0.6**
Newlands	Maintenance	16.8	16.7	(0.0)
	Renewals	32.3	32.3	-
	System Total	**49.1**	**49.0**	**(0.0)**

Table B: Changes to FY25 Draft Proposal from new information detail

Description	Reason for Change	Impact on FY25 Draft Proposal Forecast ($m)
Blackwater System		
Maintenance		
3.3. Blackwater system – FY25 Maintenance Strategy and Budget	Rail Grinding program finalised and FY25 planned scope adjusted	(0.5)
Renewals		

Description	Reason for Change	Impact on FY25 Draft Proposal Forecast ($m)
3.5. Permanent Way	3 Turnout designs deferred from FY25 to FY27	(0.2)
3.7. Structures Renewal	Budget reduction to reflect change in renewal methodology from culvert remove and replace to a diversion	(0.7)
3.10. Overhead Line Equipment Renewal	Permanent Barrier HV Cables scope item removed from FY25 program. Work will be covered under reactive allocation. No change to cost estimate	Nil
Goonyella System		
Renewals		
4.3. FY25 Maintenance Strategy and Budget	Rail Grinding program finalised and FY25 planned scope adjusted	0.1
4.5. Permanent Way	Turnout design scope at South Walker to be substituted with Hatfield 2 sites Walkouts identified Hatfield is a priority over South Walker (Asset Condition)	Nil
4.7. Structures Renewal	Hay Point Culvert Renewal deferred to FY26 to allow additional time for detailed design	(2.0)
Moura System		
Maintenance		
5.3. FY25 Maintenance Strategy and Budget	Rail Grinding program finalised and FY25 planned scope adjusted to manage emergent rail surface condition and include more regular grinding.	0.6
7. Four Year forward indicative cost forecast	The approach to the mainline grinding program in Moura seeks to minimise the significant variations in scope year-on-year and will manage emergent rail surface condition in the standard carbon rail that exists within the system. It is considered that moving from a bi-annual approach to a sustained, smoother program will assist in mitigating defect growth which is anticipated to reduce unplanned disruption. The turnout scope plan follows the conclusion of a detailed review of the grinding program. Grind cycles have changed from a 24-month to a 12-month cycle to enable improved and preventative management of rail surface condition emerging due to the predominant turnout type.	Nil
Newlands System		
6.4. FY25 Maintenance Strategy and Budget	Rail Grinding program finalised and FY25 planned scope adjusted	(0.0)
6.3. Integrated Closure Plan	Added an additional 78hr closure in July for RCS aligning to APCT outage and Grinder scope. Scope not included in MRSB as capacity expansion. The scope will roll forward from FY24 to July closure. The September closure will remain in the program.	Nil

PART A: Aurizon Network's FY25 Draft Proposal

3 Blackwater System

This Section presents Aurizon Network's Draft Maintenance and Renewal Strategy and Budget for the Blackwater System for FY25. In line with 7A.11.3 of UT5, this section will be subject to vote by the relevant Blackwater End Users.

Aurizon Network's FY25 Final Draft Proposal for the Blackwater System provides for:

- **A strategy to maintain a stable level of service over the long-term**

  The asset management and integrated closure strategy for the Blackwater System is to maintain and renew assets to hold the condition of the assets steady relative to the expected economic life of assets.

  This strategy is achieved through undertaking preventive and planned corrective maintenance and asset renewals ahead of unplanned failure or obsolescence.

- **A Direct Maintenance Cost Allowance of $77.3m**

  The proposed Direct Maintenance Cost Allowance, which excludes ballast undercutting plant depreciation, represents an increase of $7.1m compared to Aurizon Network's current FY24 full year maintenance forecast and an increase of $9.1m compared to the approved FY24 Maintenance Strategy and Budget.

  The increase in maintenance spend is predominantly driven by escalation, additional internal labour costs and FTE to support mitigation of ageing workforce and attrition risks, an increase in corrective maintenance activities to rectify the condition of certain structures, additional cyclic grinding requirements and additional maintenance activities for resurfacing plant and equipment.

- **A Renewals Allowance of $148.1m**

  This represents an increase of $4.8m compared to Aurizon Network's current FY24 renewals forecast and an increase of $2.7m compared to the approved FY24 Renewals Strategy and Budget.

  Over half of the renewals allowance relates to Permanent Way and Ballast Cleaning renewals. The increase in renewal spend is a function of labour and non-labour escalation, particularly the cost of materials (steel, concrete) and electrical components.

- **Integrated Closures**

  There are seven integrated closures planned in Blackwater for FY25, including a contingency closure that will be used to recover lost scope if required.

  FY25 sees a 3% YoY reduction in planned System Integrated Closure hours if contingency closure is not required and a 11% increase in hours should it be required. All durations are being driven by critical path renewal scope execution durations.

  Aurizon Network's capacity assessments indicate a capacity risk compared to Deliverable Network Capacity (DNC) (ACAR 2023 FY25) in July-24 due to Oaky Creek bridge replacement piling works. The rest of the year is assessed as low risk in terms of providing adequate system useable capacity to deliver the DNC across FY25.

- **Likelihood of Change**

  Completion of prior year scope and weather remain key program risks for the Blackwater system which could impact the ability to complete planned renewal scope.

3.1 Blackwater System - Characteristics and Corridor Strategy

The Blackwater System is Aurizon Network's oldest Coal System and the largest by track length. It primarily serves coal mines in the central and southern Bowen Basin, carrying product through to export ports in Gladstone, as well as domestic electricity generation and industrial users. The system also supports traffic originating in the Northern coal systems railing via the Gregory Branch to the ports in the Gladstone area as well as freight and passenger services on both the North Coast Line (**NCL**) and Central Lines. The Blackwater System includes approximately 1,137km of electrified track.

The Central Line track section west of Burngrove (202.700km point west) and the Springsure Branch are still managed by Aurizon Network but are not currently utilised coal train services. Consequently, Aurizon Network has excluded FY25 maintenance and renewal activity associated with these track sections from the FY25 Final Draft Proposal.

Maintenance and renewal activities in the Blackwater System are primarily delivered from depots located in Gladstone, Gracemere, and Blackwater, with mobile mechanised plant based in Rockhampton.

Aurizon Network's depots are strategically located to enable incident response times across the Blackwater System within two and half hours. Mechanised plant (e.g., resurfacing) is typically able to respond to an urgent defect (e.g., a buckle or geometry defect) in the Blackwater System within 1 day.

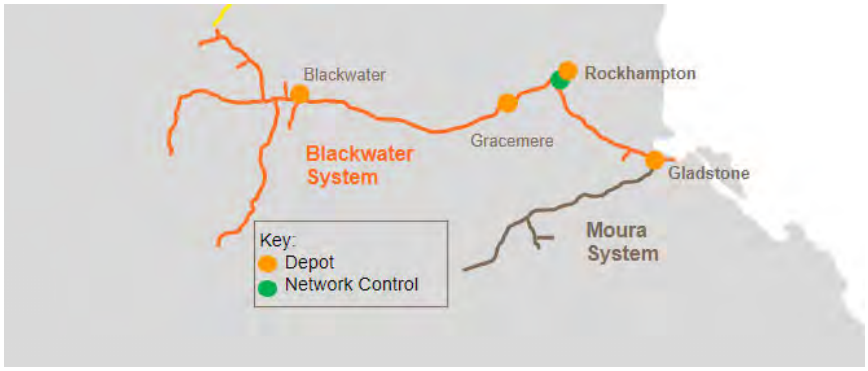


Figure 1 Depot Locations - Blackwater and Moura Systems

Aurizon Network has considered asset conditions specific to this Coal System when developing the FY25 Final Draft Proposal, particularly in relation to:

- **Civil Assets** – the Blackwater System was not built as a dedicated heavy haul coal network but rather to facilitate steam-powered grain, cattle, general freight and passenger movements. Sections of formation and structures date back to the late 1800's. The rail alignment also traverses significant sections of low-lying floodplains and black soils which result in formation and track alignment issues manifesting in temporary speed restrictions during periods of alternating wet and very dry weather. Newer infrastructure constructed in the Blackwater System, including the Wiggins Island Rail Project (**WIRP**), facilitated a capacity uplift however did not address all older civil infrastructure. Despite the aged infrastructure, renewals are targeted based on observable condition and degradation patterns. These considerations typically result in higher track resurfacing and formation renewal activity when compared to the other Coal Systems.
- **Control Systems Assets** – the completion of WIRP and the Blackwater Duplications in the early 2010's resulted in a significant upgrade of the telecommunications, wayside and train protection systems. However, there are aged Control Systems assets remaining, especially on the NCL and west of Tunnel. In particular, the interlockings in Callemondah yard were installed in the 1970's and train detection track circuits were installed in the 1980's. These assets are nearing end of life.

The radio system across Blackwater was upgraded in recent years to a digital based Terrestrial Trunked Radio (**TETRA**) system. Trains are detected through a mix of track circuits and axle counter track sections with ongoing renewals programmed for life expired track circuit assets. A program to modernise the optic fibre in Blackwater commenced in FY22 and continues in FY25

- **Electrical Assets** – the Electrical assets were largely installed during the mid-1980's Main Line Electrification Project and, while four new feeder stations were installed in 2012, a significant proportion of the assets are approaching the end of their 30–40-year design life. Aurizon Network is considering options for the future renewal of Electrical assets in the Blackwater System.
- **Callemondah Yard –** the yard at Callemondah has grown over the last 30 years along with the expansion of the Blackwater System. The yard has a constrained footprint with the Gladstone Airport to the South. As such, the roads in this yard are close together. In addition, the electrical sectioning and signal interlocking arrangement result in outages affecting significant areas within the yard reducing throughput capacity during faults. Several assets require renewal across the yard infrastructure continuing through FY25, including turnouts and signal interlocking from the original 1970's construction. Given the system disruption of renewals in this area, Aurizon Network has developed a Callemondah Yard renewals strategy spanning multiple years to minimise impacts.

Corridor Strategy

The Blackwater System is a mix of aged assets and newer assets installed in the more recent WIRP, Blackwater Duplications and Blackwater Electrification projects.

The asset management strategy for the Blackwater System is to maintain and renew assets to hold the condition of the assets steady relative to the expected economic life. Generally, the level of asset availability is expected to be consistent with prior years.

Variable soil types and age of formation result in higher track resurfacing and formation renewal activity when compared to the other coal systems as well as higher susceptibility to weather related issues (mud holes etc).

Renewal activities in the Callemondah Yard are sequenced and integrated to minimise the impact on capacity where possible.

Maintenance activity is focused on inspecting and maintaining the in-situ condition of assets, repairing or implementing and maintaining minor holding works (including Temporary Speed Restrictions) following identification of a defect or infrastructure failure to minimise the impact and duration of unplanned outages.

Asset Renewals seek to renew or replace aged or degraded assets ahead of unplanned failure or obsolescence.

The below graphs in Figure 2 Blackwater Below Rail Performance 4-year average trends using FY2014 to December FY2024 monthly performance indicate the asset management strategy is effectively maintaining performance and reliability consistent with 4-year averages. Please refer to the Glossary for interpretation of these graphs.

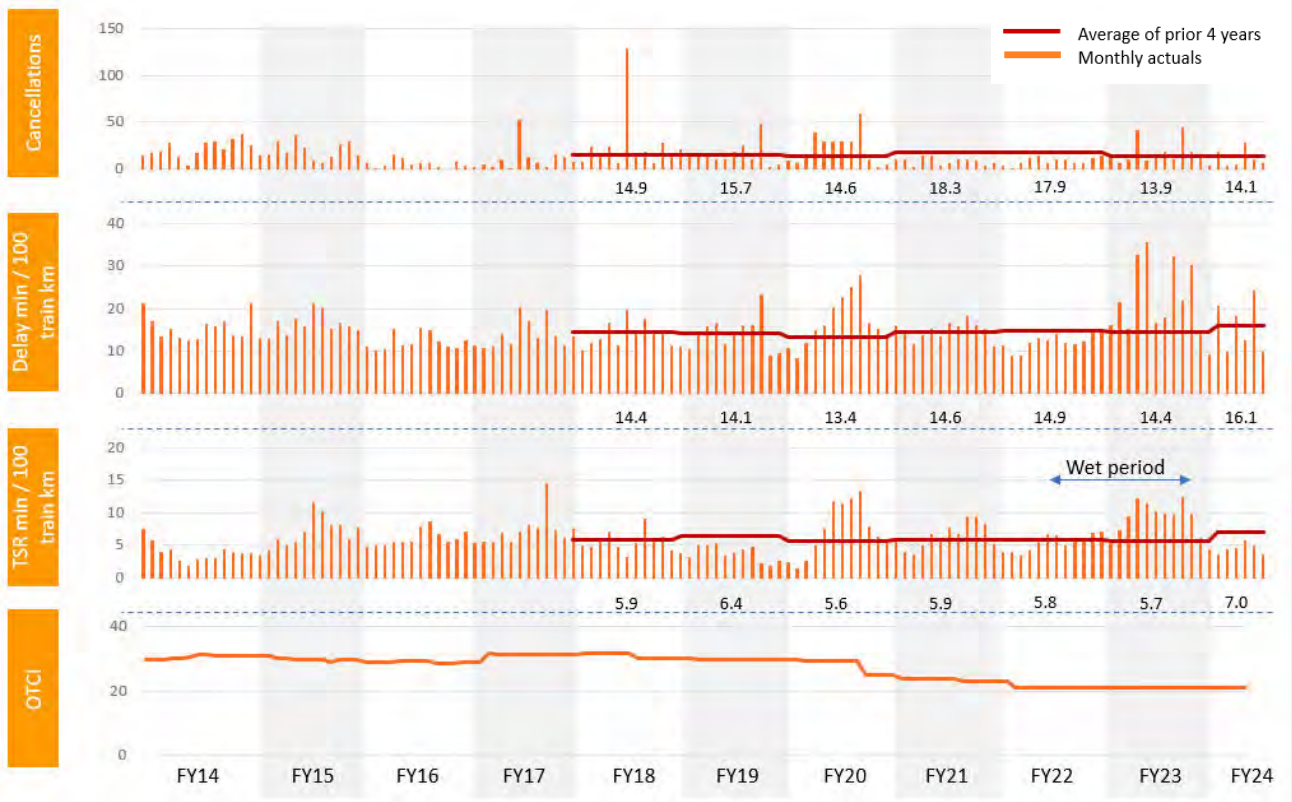


Figure 2 Blackwater Below Rail Performance 4-year average trends using FY2014 to December FY2024 monthly performance

Notes:

- The 4-year average cancellations reduced significantly from 17.9 in FY2022 to 13.9 in FY2023 because of a period of relatively few cancellations in FY2021 and FY2022
- The 4-year average for all delay codes and specifically TSR delays has held relatively steady since FY2018
- The increase in the 4-year average from 14.4 in FY2023 to 16.1 in FY2024 is driven by higher levels of TSRs in FY2023
- TSRs in FY2023 were elevated as a result of a prolonged wet weather period starting Nov 2021 and ending March 2023

OTCI index has stabilised in an improved state, highlighting overall improvement to average track geometry condition. OTCI does not account for localised reliability impacts, traction or control systems assets.

3.2 Blackwater System - Integrated Closure Plan

Aurizon Network has engaged with the RIG and other stakeholders to better understand end user requirements. Aurizon Network has taken the following into consideration when developing the Integrated Closure Plan for the FY25 Final Draft Proposal.

Specific Blackwater Supply Chain considerations

The supply chain typically operates in a 'production push' mode with RG Tanna and Wiggins Island Coal Export Terminal (**WICET**) stockpile ports, while several producers have limited mine site

stockpile capacity. Domestic terminals and processing facilities each have unique inventory and associated logistic requirements.

Specific scope items that require longer closures to execute require increased engagement, planning and risk management to ensure supply chain inventories are managed.

The Blackwater system also interfaces with the NCL. Blackwater closures are aligned with QR NCL outages wherever reasonably possible to minimise the impact to passenger and freight services.

Closure planning considers peak demand periods of December and June, and closure conflicts with adjacent corridors/branch lines are avoided where possible.

Table 6 sets out the proposed Blackwater System integrated closure hours for FY25, including integrated system and branch line closures. Integrated system closures in Blackwater can impact the Central West Line (**CWL**) from Rocklands to Burngrove and/or the NCL from Callemondah to Rocklands.

Table 6 Planned integrated closures and branch closures – Blackwater System

FY25 Integrated System Closures													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Location	CWL[2]		NCL CWL		CWL		CWL		NCL CWL	NCL CWL	NCL CWL		
Hours	96		75		60		36		60	60	108		495
FY25 Integrated Branch Line Closures													
Location		Gregory (Nth & Sth)											
Hours		84											

Closure requirements are driven by scope, the total integrated closure hours for FY25 are 495hours, closure hours increased from FY23 predominantly driven by a change in Ballast Undercutting strategy and this is expected to continue. The program has a mix of closure lengths including a 108hr closure and a 60hr contingency closure. The extended outages are a result of the duration and access requirements of specific critical path asset activities (i.e., the critical path scope). In Blackwater, the extended duration has provided an opportunity for the BCM to be integrated with the critical path scope to achieve optimal production rates and maximise scope delivery within the integrated closures.

In addition to the Integrated and Branch Line closure, single line maintenance activities have also been planned throughout the year. Timing and duration of both the Integrated Closures and single line possessions are tested against delivering both DNC (ACAR 2023 FY25) and Committed Capacity as well as being coordinated with other supply chain participants where possible, to maximise supply chain alignment and throughput. The final Critical Asset Activities Power BI report that aligns with this FY25 Draft Proposal

[2] Oaky Creek Bridge at Archer single line closure 396hrs

was published on 30 November 2023. MRSB Single Line Planned Possession hours for FY25 are 2147 hours consistent with Asset Activities. Note hours are not reflective of customer impact as it does not consider works planned in the shadow of port outages or other works to reduce impact. These hours do not include: moving products such as rail grinders, resurfacing, RTI and Road Patrols; maintenance works to be planned throughout the year or asset activity planned around train services (Plan throughs) as they do not impact capacity or services.

Critical path activities listed in Table 7 have determined the duration of the planned integrated closures and access requirements in the Blackwater System during FY25B.

Table 7 Critical Scope – Blackwater System

Planned Delivery (hours)	Asset Activity	Location
96	Bridge Ballast Replacement	Boonal - Blackwater
75	Turn out Renewal	Mt Miller 3B
60	Reinforced Concrete Culvert	Sagittarius- Burngrove
36	Rail Renewal	Warren - Wycarbah
60	Track Upgrade	Midgee – Rocklands
108	Bridge Replacement	Midgee - Bajool

Figure 3 illustrates the historical Blackwater integrated system closure hours in comparison to the FY25 Final Draft Proposal.

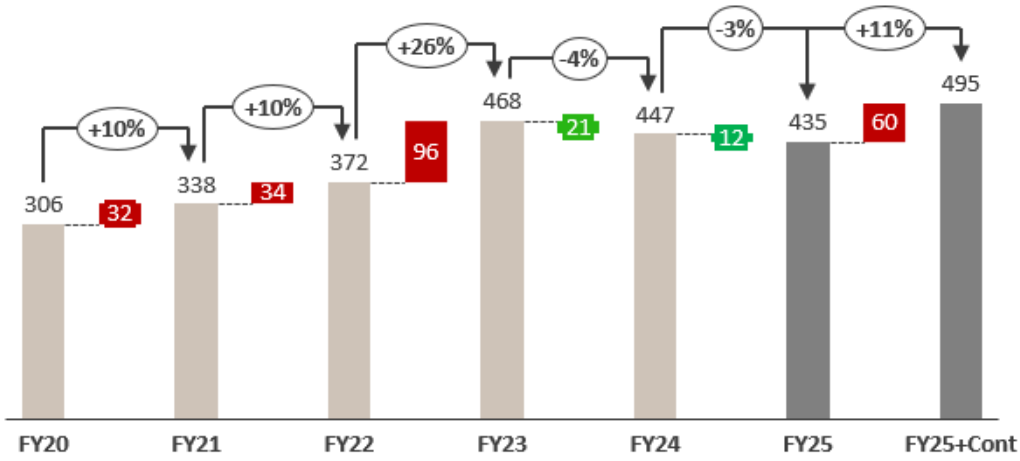


Figure 3 Trend of Integrated System Closure Hours from FY20 to FY25 - Blackwater System

Aurizon Network's assessment of Useable Capacity indicates a capacity risk v. DNC in July-24 due to Oaky Creek bridge replacement piling works. The remainder of the year is assessed as low risk in terms of providing adequate system useable capacity to deliver DNC across FY25.

3.3 Blackwater System - FY25 Maintenance Strategy and Budget

Aurizon Network has developed its Draft Maintenance Strategy and Budget for the Blackwater System having regard to all relevant matters outlined in clause 7A.11 of UT5, including the Maintenance Objectives.

Aurizon Network considers its FY25 Draft Proposal provides an appropriate level of asset activity that will promote the safety, reliability and performance of the Blackwater System rail Infrastructure and seeking to deliver Committed Capacity.

Summary of Historic, Forecast and FY25 Maintenance Strategy and Budget

Aurizon Network's FY25 Final Draft Proposal for the Blackwater System provides for a Direct Maintenance Cost Allowance of $77.3m (excluding ballast undercutting plant depreciation) which is:

- $9.1m higher than the approved FY24 Maintenance Strategy and Budget
- $7.1m higher than Aurizon Network's current FY24 full-year forecast.

Figure 4 provides a summary of historic direct maintenance costs as well as the proposed direct maintenance cost allowance in respect of FY25.

To ensure comparability with prior periods, the direct maintenance costs shown in Figure 4 and Figure 5 exclude depreciation on ballast plant.

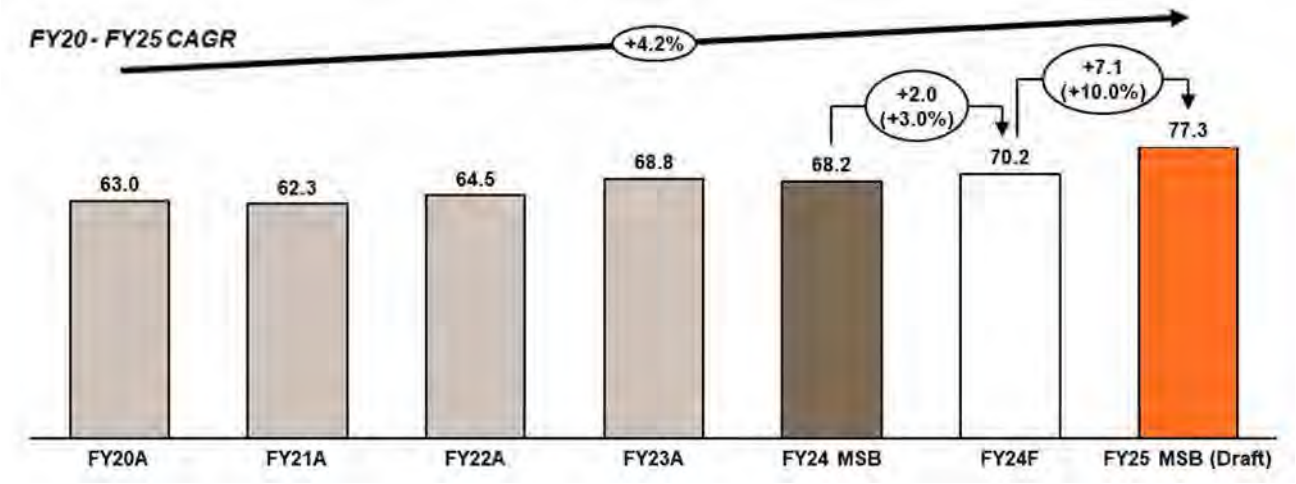


Figure 4 Direct Maintenance Costs – Blackwater System

Aurizon Network acknowledges that the FY25 Final Draft Proposal for Blackwater maintenance is c.10% higher than the current FY24 full-year forecast. Further information on the key drivers of this increase are outlined in Figure 4 below.

Aurizon Network notes, however, that annual cost increases of this magnitude have been observed in recent years for a multitude of inputs required for maintenance and renewal activities. To help put the FY25 Final Draft Proposal into context, Aurizon Network has considered the impact of actual inflationary outcomes over time.

While CPI can be used to measure the inflationary pressures in the broader economy, the basket of goods used to determine CPI are not representative of the necessary inputs for the asset maintenance and renewal task. Consequently, the QCA has previously approved the use of a 'Maintenance Cost Index' **(MCI)**, to assess the expected change in maintenance costs over time.

The MCI is a weighted index that measures changes in four key cost categories, namely, Accommodation, Consumables, Fuel and Labour. The impact of CPI is considered within the 'Consumables' category. Aurizon

Network has considered the inflationary impacts for these key categories over time, having regard to publicly available data[3]:

- actual published index values to June 2023
- annual growth rates to June 2025 using forecasts for CPI and the Wage Price Index published by the Reserve Bank of Australia.

Aurizon Network has assessed the compounding annual rate of growth **(CAGR)** in maintenance costs over the five-year period ending 30 June 2025. During this period, Aurizon Network estimates that the Blackwater System maintenance costs have increased at a rate of approximately 4.2% per annum.

In comparison, Aurizon Network notes that over the same 5-year period the:

- accommodation index is expected to increase 43% overall, or 7.4% per annum
- CPI is expected to increase 28% overall, or 5.0% per annum
- consumables index is expected to increase 48.5% overall, or 8.2% per annum
- fuel index is expected to see an increase 61% overall, or 10.0% per annum
- labour index is expected to increase 16% overall, or 3.0% per annum.

The application of the QCA-approved MCI methodology indicates that input costs have increased at a rate of 5.6% per annum over the same period.

Aurizon Network has also assessed the annual change against two other indices with similar input costs. Specifically, the:

- Road and Bridge Construction Index[4]
- Coal Mining Index[5]

Results are summarised in Table 8 below, but on balance, Aurizon Network's observation is that it's cost performance over time has generally been favourable when considering actual inflation outcomes.

Table 8 Comparison of cost indices FY20 – FY25

FY20 to FY25 CAGR (% Change p.a.)	MCI	Road and Bridge Construction	Coal Mining	AN's Maintenance Costs
Blackwater	5.6%	4.8%	5.1%	4.2%
Total CQCN				4.8%

[3] Publicly available data sourced from Australian Bureau of Statistics (actual published index results to June 2023) and the Reserve Bank of Australia CPI and Wage Price Index forecasts for FY24 and FY25.
[4] ABS, 6427.0 Producer Price Index, Table 11, Coal Mining, Series ID: A83737106J
[5] ABS, 6427.0 Producer Price Index, Table 17, Road and Bridge Construction, Series ID: A2333727L

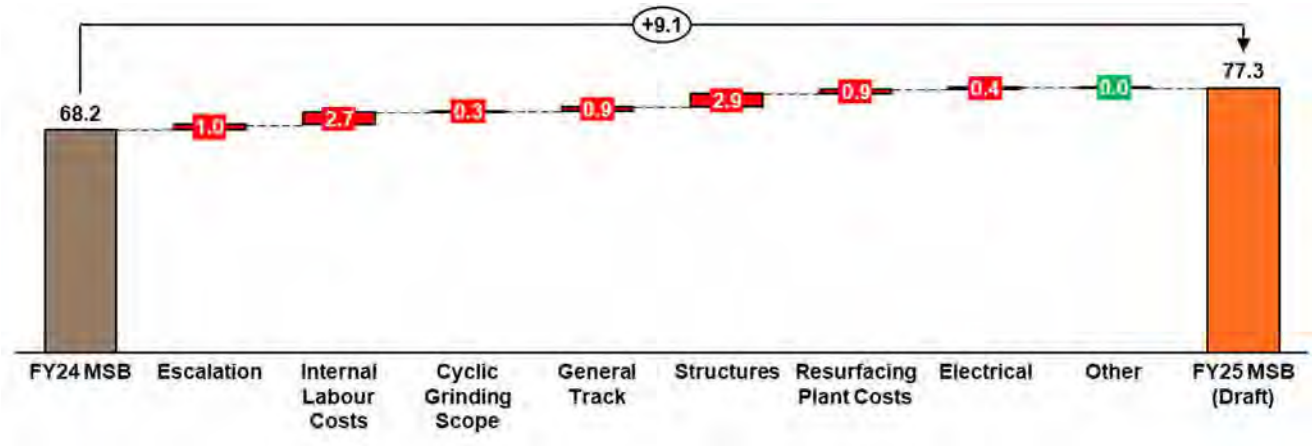


Figure 5 Direct Maintenance Cost Movement – Blackwater System

The FY25 Draft Maintenance costs (excluding ballast undercutting plant depreciation) is $77.3m. The increase in spend of $9.1m against the approved FY24 Maintenance Strategy and Budget is primarily driven by:

- cost escalation (+$1m) – on contractors, materials, plant and other consumables
- internal labour costs (+$2.7m) – associated with Infrastructure Enterprise Agreement outcomes, additional FTE to support mitigation of ageing workforce and attrition risks and costs associated with attraction and retention initiatives for critical roles and locations
- structures repairs program (+$2.9m) – to rectify culvert drainage condition, with the program of works expected to be completed over the next 7 years.

The FY24 forecast is $2m higher than the approved FY24 budget and is informed by actual conditions and maintenance costs from FY23 and Q1 FY24 and other identified costs expected to be incurred[6]. All items are currently within the indicative materiality thresholds set in UT5. The FY24 forecast is subject to review and will be updated at the end of Q2 FY24.

An overview of the methodology used to develop the FY25 maintenance budget is provided in 0.

FY25 Maintenance Strategy and Budget

As detailed in 11.3, Aurizon Network's Asset Management approach is based on achieving the appropriate level of asset availability which will best meet customer requirements in each Coal System. The scope and closure requirements in different systems is influenced by demand, track arrangement, operating parameters, traction mode and signalling and communications systems.

The high tonnages, long haul lengths and age of some assets in Blackwater, particularly formation, result in a maintenance and renewals mix very similar to the Goonyella system that has the highest intensity of train movements. The mix of maintenance to renewal cost for Blackwater can be seen in Table 9.

Table 9 FY25 Final Draft Proposal – Maintenance and Renewal spend % split – System Comparison – Blackwater System

System	FY25 Renewals and Maintenance Cost ($m)	% Maintenance	% Renewal
Blackwater	**225.4**	**34%**	**66%**

[6] Refer to Q1 FY24 Quarterly Performance Report for more detailed information on costs expected to be incurred.

Goonyella	183.3	40%	60%
Moura	38.9	43%	57%
Newlands	49.0	34%	66%

The planned and preventive maintenance activities and inspections, as well as the planned mechanised production scope, are derived in line with the intervention periods as detailed in Aurizon Network's Asset Maintenance and Renewal Policy. This policy determines the inspection regime and period based on asset type condition and location.

Section 10, Strategies by Asset Class, outlines the different approaches with regards to maintaining the Rail Infrastructure. These approaches lead to the application of the maintenance tasks across the system.

The proposed FY25 maintenance scope and budget for the Blackwater System is outlined in Table 10.

Table 10 FY25 Proposal – Maintenance – Blackwater System

Maintenance Item	Scope Units	FY24 Budget Scope	FY24 Budget ($m)	FY24 Forecast Scope	FY24 Forecast ($m)	FY25 Budget Scope	FY25 Budget ($m)
Resurfacing			9.0		9.1		10.2
Mainline	km	896	7.6	896	7.7	896	8.5
Turnout	Site	173	1.4	173	1.5	173	1.7
Rail Grinding			8.8		8.3		9.4
Mainline	km	[redacted]	6.5	[redacted]	5.9	[redacted]	6.7
Turnout	Site	[redacted]	2.3	[redacted]	2.3	[redacted]	2.7
Level Crossing	Track LX	[redacted]	0.1	[redacted]	0.1	[redacted]	0.1
General Track Maintenance			21.9		23.8		24.0
General Track	Activity		21.4		22.8		23.4
Track Recording	km		0	1,310	0.4		-
Ultrasonic Testing	km	5,471	0.6	5,471	0.6	5042	0.6
Signalling and Telecoms			11.8		12.4		12.5
Signalling Corrective	Activity		3.4		2.5		3.2
Signalling Preventive	Inspection		6.1		7.4		6.7
Telecoms Corrective	Activity		0.4		0.4		0.4
Telecoms Preventive	Inspection		2.0		2.1		2.3
Electrical			7.0		6.9		7.7
OHLE Corrective	Activity		2.2		2.2		2.6
OHLE Preventive	Inspection		3.0		3.1		2.9
Power Systems Corrective	Activity		0.8		0.6		0.7

Maintenance Item	Scope Units	FY24 Budget Scope	FY24 Budget ($m)	FY24 Forecast Scope	FY24 Forecast ($m)	FY25 Budget Scope	FY25 Budget ($m)
Power Systems Preventive	Inspection		1.0		1.0		1.4
Structures and Facilities			2.5		2.7		5.5
Trackside Systems			1.2		1.0		1.0
Other Civil Maintenance			2.7		2.7		3.1
Other General Maintenance			3.2		3.3		3.9
Sub Total			**68.2**		**70.2**		**77.3**
Ballast Undercutting Plant Depreciation			3.3		3.3		3.1
Total Direct Maintenance Costs			71.5		73.5		80.4
Non-Coal Allocation			(1.6)		-		(0.8)
Total			**69.9**		**73.5**		**79.6**

Note: Figures may not add due to rounding.

For the Blackwater System:

- **Direct Maintenance Costs** (excluding ballast undercutting plant depreciation) are budgeted to increase by $7.1m from the FY24 Forecast.
  - **Resurfacing (+$1.1m) –** increase in cost primarily driven by cyclical On Track Vehicle maintenance activities due in FY25 and an increase in plant maintenance labour driven by apprentice trade staff to mitigate future attrition risk.
  - **Rail Grinding (+$1.1m)** – FY25 mainline activities remain largely in line with FY24, with cost escalation and a minor increase in turnout scope required within the Callemondah precinct to maintain asset condition.
  - **General Track Maintenance (+$0.3m)** – spend expected to be broadly in line with FY24 forecast. Reflects cost impact of additional FTE to support mitigation of ageing workforce and attrition risk across the Civil discipline. These increases are largely offset by non-recurring costs in FY24 for contract labour hire support and QR Track Geometry Recording Car contract both forecast to cease from January 2024.
  - **Electrical (+$0.7m)** - reflects the maintenance cost impact of additional FTE to support mitigation of ageing workforce and attrition risk across in the Electrical discipline and increased maintenance activity levels. Increased contractor costs to complete corrective oil regeneration task.
  - **Structures (+$2.8m)** – driven by increased culvert drainage & concrete defect repairs planned in FY25 to address asset condition. The draft budget also includes additional culvert cleaning costs to standardise the use of remote inspections by contractors for culverts less or equal to 900mm in height (as inspectors are unable to access entire culvert to assess asset condition). The quantity of defect scope in Blackwater indicates the rectification program will continue for approximately 7 years before returning to a lower “normal” maintenance scope and cost trend. As the asset continues to age, there is a risk of additional defects appearing that will need to be considered within this program.

- **Ballast Undercutting Plant Depreciation (-$0.2m) –** ballast undercutting plant depreciation as a total is largely in line with FY24F, with the allocation between systems based on the number of days that the ballast plant is expected to be operating in the Blackwater system in FY25.
- **Non-Coal Allocation –** this adjustment reflects an allocation of costs to non-coal services and is calculated by applying the actual non-coal volumes railed in Blackwater during FY23 to the QCA-approved AT1 Reference Tariff for FY25.

Figure 6 sets out a summary of historic, forecast, and budgeted direct maintenance costs by maintenance category. To ensure comparability between periods, the direct maintenance costs presented in Figure 6 exclude depreciation on ballast undercutting plant.

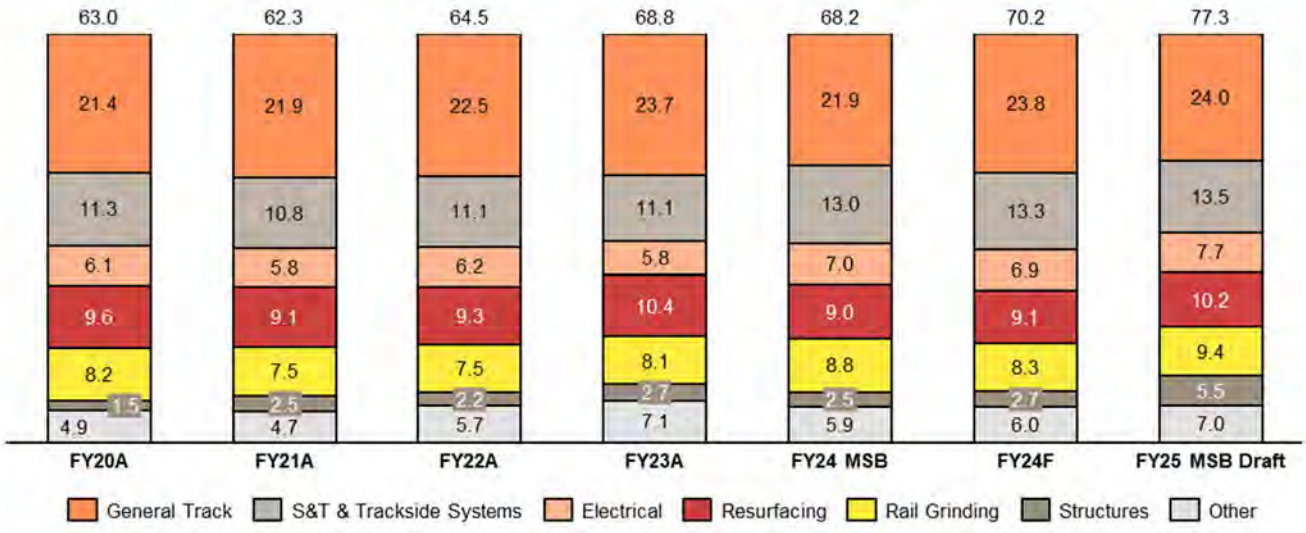


Figure 6 Direct Maintenance Costs – Blackwater System

Structures maintenance activity is expected to be higher in FY25 to support the rectification of culvert drainage condition. With the program of works expected to be completed over the next 7 years, Structures maintenance costs are expected to be sustained at this higher level until the rectification program is completed.

Figure 7 illustrates the proportion of preventive, planned corrective and reactive maintenance expenses in the Blackwater System over time. Approximately 49% of Blackwater System maintenance spend in FY25 is expected to be preventive in nature.

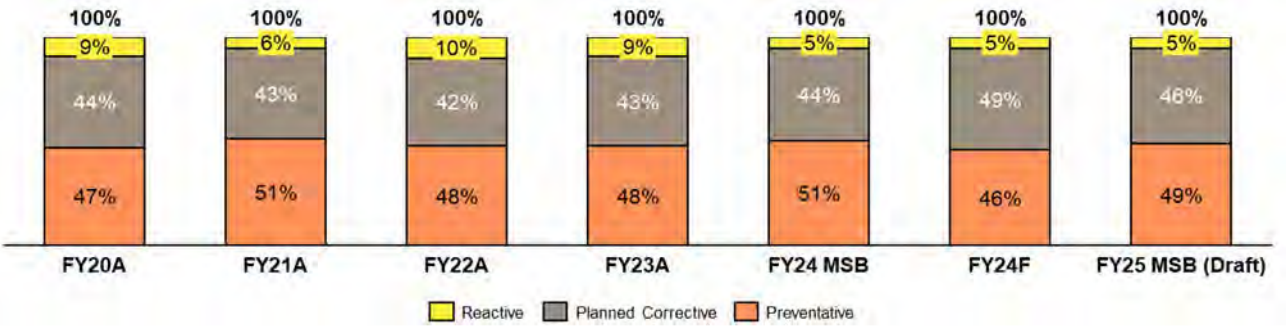


Figure 7 Preventive / Planned Corrective / Reactive Maintenance Spend Composition – Blackwater System

Further information in relation to the costing methodology used by Aurizon Network in the development of the FY25 Draft Proposal is outlined in section 11.3 Budget Setting and Procurement. Additional detail in relation to the make-up of costs for each maintenance activity has also been provided to the RIG Expert Advisor.

3.4 Blackwater System – FY25 Renewals Strategy and Budget

Aurizon Network has developed its Draft Renewals Strategy and Budget for the Blackwater System having regard to all relevant matters outlined in clause 7A.11 of UT5. Aurizon Network considers its FY25 Final Draft Proposal provides an appropriate level of asset activity that will promote the safety, reliability and performance of Blackwater System rail infrastructure and seeking to deliver Committed Capacity.

Summary of FY25 Renewals Strategy and Budget

Aurizon Network's FY25 Final Draft Maintenance Renewals Strategy and Budget for the Blackwater system provides for an Asset Renewals requirement of $148.1m which is:

- $2.7m higher than the approved FY24 Renewals Strategy and Budget
- $4.7m higher than Aurizon Network's current FY24 forecast.

A summary of the FY25 renewals budget for the Blackwater System is outlined below Table 11.

Table 11 FY25 Final Draft Proposal – Renewals – Blackwater System ($m)

Renewals Item	Assets Included	FY24 Approved Budget	FY24 Forecast	FY25 Draft Budget
Civil Assets		119.4	116.0	126.0
Permanent Way	Rail, Track, Sleeper, Turnouts	31.5	27.4	33.8
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	49.8	49.7	54.2
Structures	Culverts, Bridges	24.6	21.2	23.6
Civil Renewals	Formation, Level Crossings, Access Points	13.4	17.8	14.4
Control Systems Assets	Safe Working, Train Control and Detection, Interlocking, Telecoms, Power Resilience, Transmission	20.5	21.8	18.1
Electrical Assets	Overhead Line Equipment and Power Systems	5.5	5.5	4.0
Total		**145.4**	**143.4**	**148.1**

Note: Figures may not add due to rounding.

The FY24 forecast variance to the approved FY25 Renewals Strategy and Budget is primarily driven by:

- **Cost Escalation** – Variations across program largely impacted by labour and non-labour escalation which are outlined in Section 11.3.2.
- **Structures Bridges Renewal (+2.4m)** – Inclusion of the 7 span bridge renewal at Archer (Oaky Creek).

- **Ballast Cleaning (+$4.5m)** – Cost estimates have been informed by expected ballast return rates which have been based on information collected through pre-dig assessments. Pre-dig information has been used to help inform ballast quantity requirements, ballast delivery costs and ballast removal (spoil) costs.

Further details of changes to the FY25 program will be communicated as part of the Quarterly RIG reporting process.

Figure 8 below shows the distribution of scope locations as well as the relative spend per scope. As is typical of prior years in the Blackwater system, the works completed are most concentrated on the NCL and Central mainlines aligned to these track sections seeing 100% of system traffic. There is also investment on branch lines and individual mine balloon loops.

The largest single scope item for FY25 is the Oaky Creek Bridge renewal at the 613km point on the NCL.

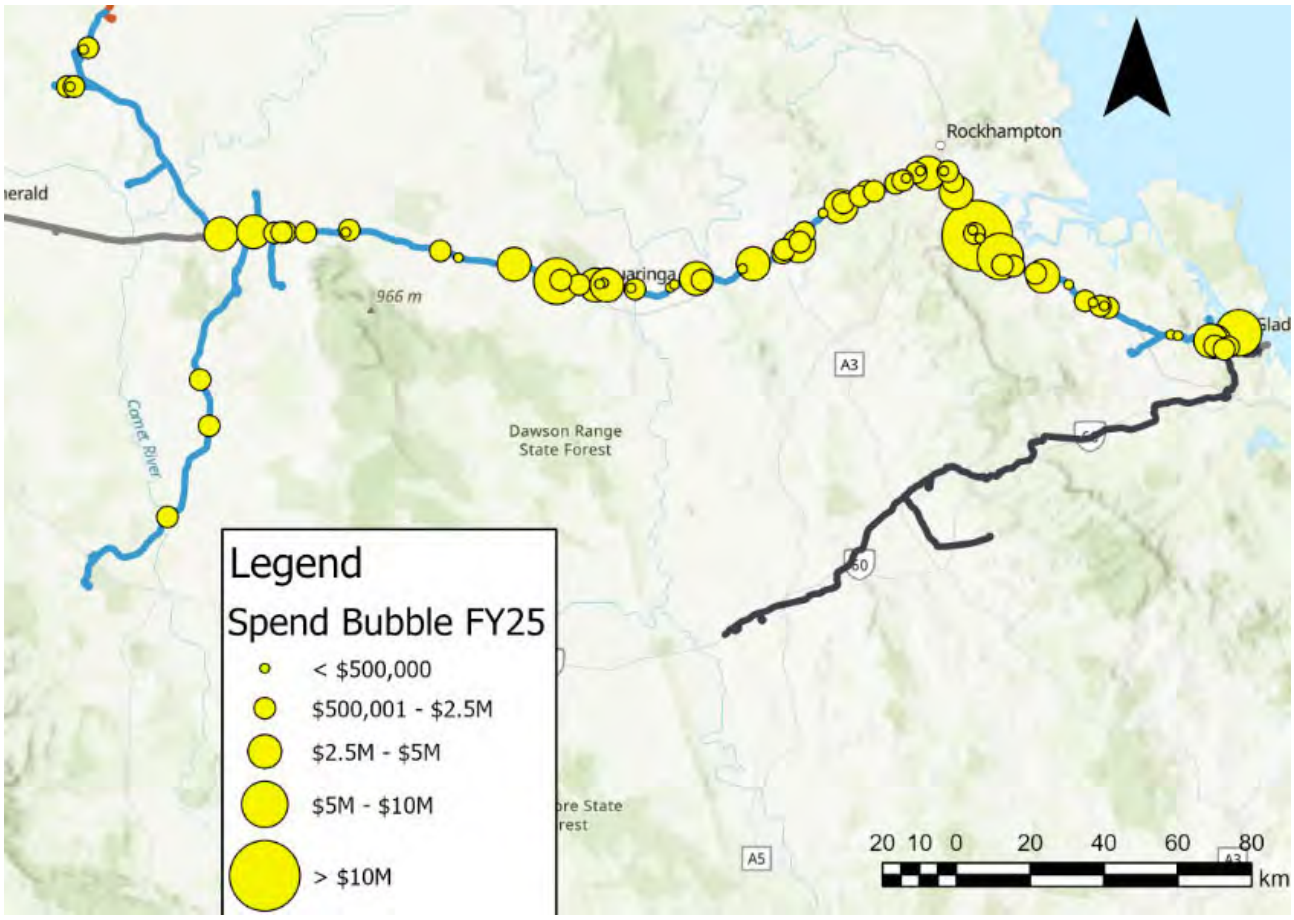


Figure 8 – Map of Scope Location and Spend FY25

Set out in Table 12 is a summary of Blackwater System renewals as a proportion of total system assets.

Table 12 FY25 Final Draft Proposal – Renewals as a % of Total System Assets – Blackwater System

Renewals Item	Assets Include	Total system Assets	FY24 RIG Approved Scope	FY25 Proposed Scope	FY25 scope % Total System Assets
Civil Assets					

Renewals Item	Assets Include	Total system Assets	FY24 RIG Approved Scope	FY25 Proposed Scope	FY25 scope % Total System Assets
Permanent Way	Rail, Track, Sleeper, Turnouts	• 2,352 rail km • 1,176km sleepers • 1,176 track km • 431 turnouts	• 36.2 rail km • 0.9km sleeper • 10.4km track upgrade • 3 turnouts	• 31.0 rail km • 0.8km sleeper • 4.7km track upgrade • 4 turnouts	• 1.3% • 0.1% • 0.4% • 0.9%
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	• 1,176 track km Mainline • 431 Turnouts • 150 bridges	• 76.8 track km Mainline • 20 Turnouts • 9 bridges	• 63.2 track km Mainline • 17 Turnouts • 11 bridges	• 5.4% • 3.9% • 7.3%
Structures	Culverts, Bridges	• 150 bridges • 1,473 culverts	• 3 bridges • 18 culverts	• 5 bridges • 12 culverts	• 3.3% • 0.8%
Civil Renewals	Formation, Level Crossings, Access Points	• 1,176km formation • 236 level crossings	• 1.8km formation • 5 level crossings	• 0.8km formation • 3 level crossings	• 0.1% • 1.3%
Control Systems Assets	Safe Working, Train Control and Detection, Interlocking, Telecoms, Power Resilience, Transmission		• 104 Sites • 23.8km Optic Fibre	• 20 Sites • 16 Units • 1 Link • 27.0km Optic Fibre	
Electrical Assets	Overhead Line Equipment, Feeder Stations, Autotransformer, SCADA system		• 26 Units	• 1 Site • 10 Units	

Note:

- Control Systems count of assets is a collective of sites, nodes, cable routes, communications assets and systems and is included to indicate level of work comparable to prior year.
- Electrical count of assets is a collective of units, earthing and bonding, current detection, transformer renewal, protection relay replacement etc.

Figure 9 illustrates the FY24 Approved Budget and proposed FY25 asset renewals by type (categorised as baseload scope, reactive renewals, strategic renewals and future scope).

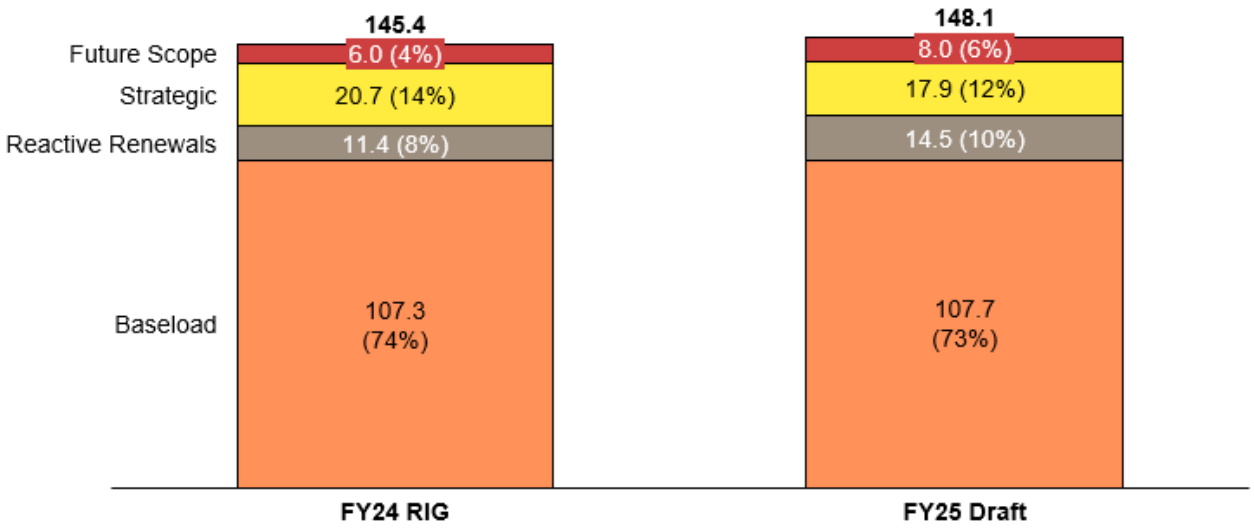


Figure 9 Split of Renewals by Category FY24B and FY25 Final Draft Proposal – Blackwater System ($m)

In relation to the above, the following comments are made:

- **Baseload renewals** – represents the majority of the FY25 asset renewal program and includes rail renewal, formation, structures and ballast cleaning
- **Reactive renewals** – primarily reflects an allowance for 6.0km of reactive ballast cleaning scope
- **Strategic scope** – reflects the commencement of strategic turnout renewals in Callemondah, continuation of the Optic Fibre renewal program and TETRA Radio rollout and scope development relating to the Substation Renewal Program
- **Future scope** – incorporates the cost of designs relating to structures, level crossings, turnouts and formation to be delivered in future years.

Further information in relation to the scope categorisation used by Aurizon Network in the development of the FY25 Final Draft Proposal is outlined in 11.1.

Details of the FY25 Renewals Strategy and Budget

This section provides detailed information in relation to the individual scope items selected for renewal in FY25, along with the rationale for those selections and alternative options considered.

Additional information is provided in relation to strategic scope items given these are either new or continuing programs of scopes that are not typical of scope seen in previous years.

This section should be read in conjunction with Aurizon Network's Detailed Scope Report. This Power BI report provides detail on the individual scope items including works location, Combined Risk Assessment (**CRA**) score and comments supporting the rationale for those selections.

Section 11.1 provides further detail on how asset condition and criticality is used to determine whether scope is critical, required for system reliability or strategic, and alternate approaches considered when planning a renewal. For each scope item:

- The location of the bubble indicates the Scope Priority Model ranking for asset condition and location or operational criticality
- The size of the bubble represents the number of sites and / or tasks to be renewed.

The maps included in this section indicate the location of the scope proposed in FY25.

Aurizon Network notes that the prioritisation of renewals scope is based on currently available information and that this prioritisation may change over the period prior to execution (of up to 18 months) due to environmental factors, relative degradation rates or other considerations. Changes to the proposed scope will be dealt with through the reporting and change management processes as appropriate.

3.5 Civil Assets – Permanent Way

Permanent Way Renewal Program

Aurizon Network's FY25 Final Draft Proposal provides $33.8m to deliver the scope of permanent way renewals in the Blackwater System. Table 13 summarises the scope and budget for each relevant renewal item.

Table 13 FY25 Permanent Way Renewals – Blackwater System

Renewal Item	Scope Type	FY25 Scope	Scope Unit	FY25 Budget ($m)
Rail Renewal	Baseload	31.0	Rail km	13.2
Sleeper Renewal	Baseload	1185	Sleepers	1.4
Track Upgrade	Baseload	4.7	Track km	8.1
Turnout Renewals	Baseload	2	Turnout	3.9
	Strategic	2	Turnout	2.1
Turnout Components	Reactive Renewals		Lumpsum	3.3
Turnouts Designs	Future Scope	6	Turnouts	0.4
Permanent Way Other	Baseload	0.1	Track km	0.3
	Reactive Renewals		Lumpsum	1.0
				33.8

The track upgrade scope has a higher portion of smaller length sites (e.g. sidings) at multiple locations and will be delivered via manual track upgrade. While manual track upgrades operate at a higher cost per km than sites completed with the Track Laying Machine **(TLM)**, it is a more efficient delivery option for small work sites due to the high, fixed plant cost and track access requirements for TLM operations.

The Bajool sleeper scope is deferred from FY24 to be integrated with an adjacent formation renewal.

Permanent Way Other Baseload Scope includes a planned renewal site for a Slab Track renewal at Clinton Spur 3 (Callemondah Provisioning Road 5).

The FY25 Turnout renewal program includes 4 turnouts, with the 1 turnout at Mt Miller integrating with the formation renewal in the adjacent location. A further 2 turnouts are planned to be delivered within the Callemondah strategy. Turnout Designs are delivered over a multi-year program and are grouped where possible for efficiency, which can lead to variations between design costs each year.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Permanent Way.

Aurizon Network has adopted alternate approaches for the Permanent Way scope in FY25, with sleeper renewals in two locations being replaced with longer life assets. Specifically:

- Sleeper Renewal at Bajool will replace timber sleepers with concrete
- Sleeper Renewal scope at Gordonstone will remove 53kg rail on steel sleepers and replace with 60Kg rail on concrete sleepers

Strategic Scope:

Callemondah Strategy for Interlockings and Turnouts ($2.1m)

In FY25, the Callemondah yard renewal strategy will continue coordinated renewal of interlocking and turnout assets to renew life expired assets in Callemondah yard and minimise, where possible, track outage requirements.

The completion of some tasks at the same time will not be possible due to the sequencing of turnout removal, formation works, turnout install, overhead alignment and signalling changes. These elements are planned to de-risk works within required closures times.

Two turnouts at Callemondah have been deferred from FY24 to FY25 due to Callemondah 250/251 being unable to be completed in September2023 closure.

The multi-year program of renewals in Callemondah is planned to run into FY26 and FY27.

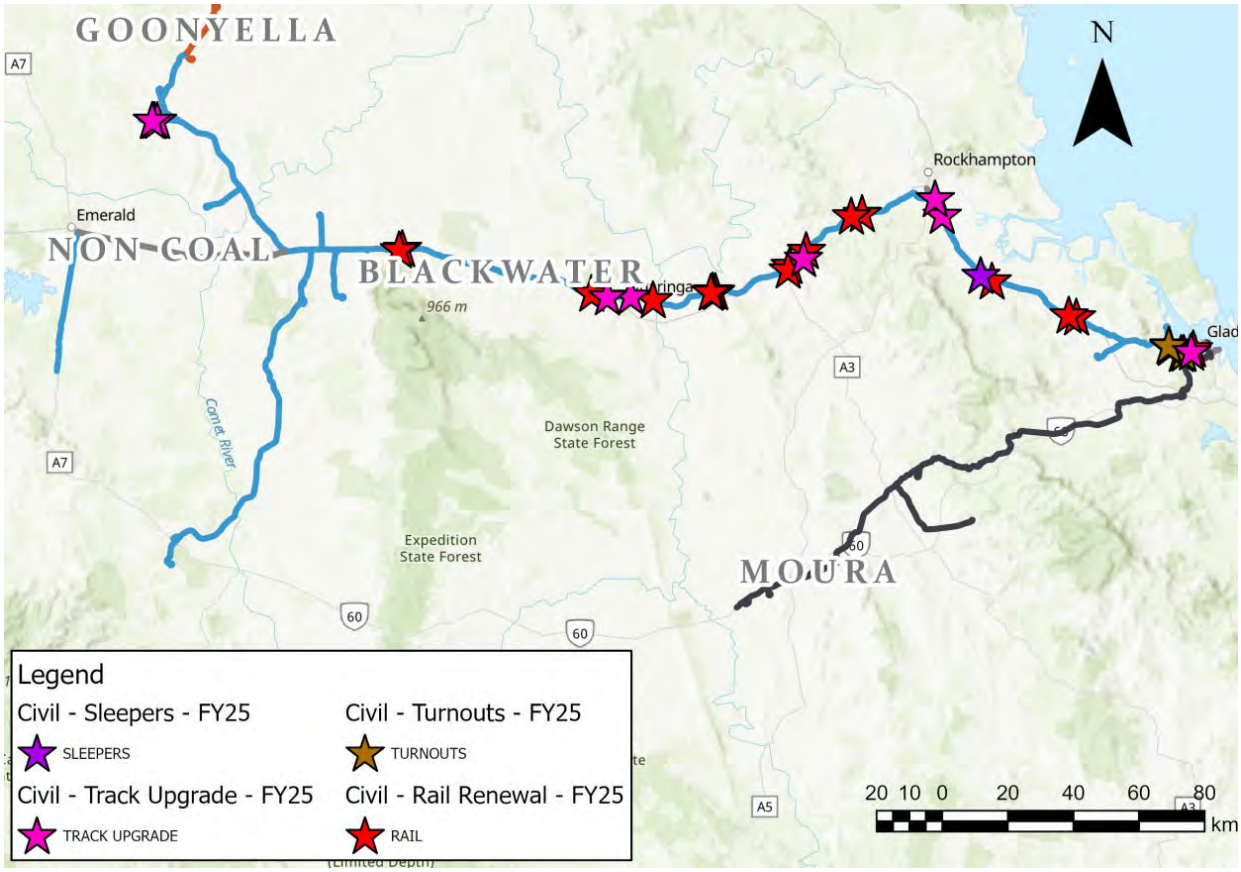


Figure 10 Rail, Sleepers, Track Upgrade and Turnouts Renewal Sites – Blackwater System

FY25 Permanent Way FY25 Scope – Asset Condition and Criticality Assignment

Figure 11 plots the permanent way renewals against asset condition and location / operational criticality. All planned FY25 renewals are either advanced in wear or degradation and / or located in track sections identified as critical to maximising throughput.

The rail renewal sites at Fisherman's Landing and Gordonstone have criticality indices of 1.5 prioritised due to multiple defects in this specific type of rail.

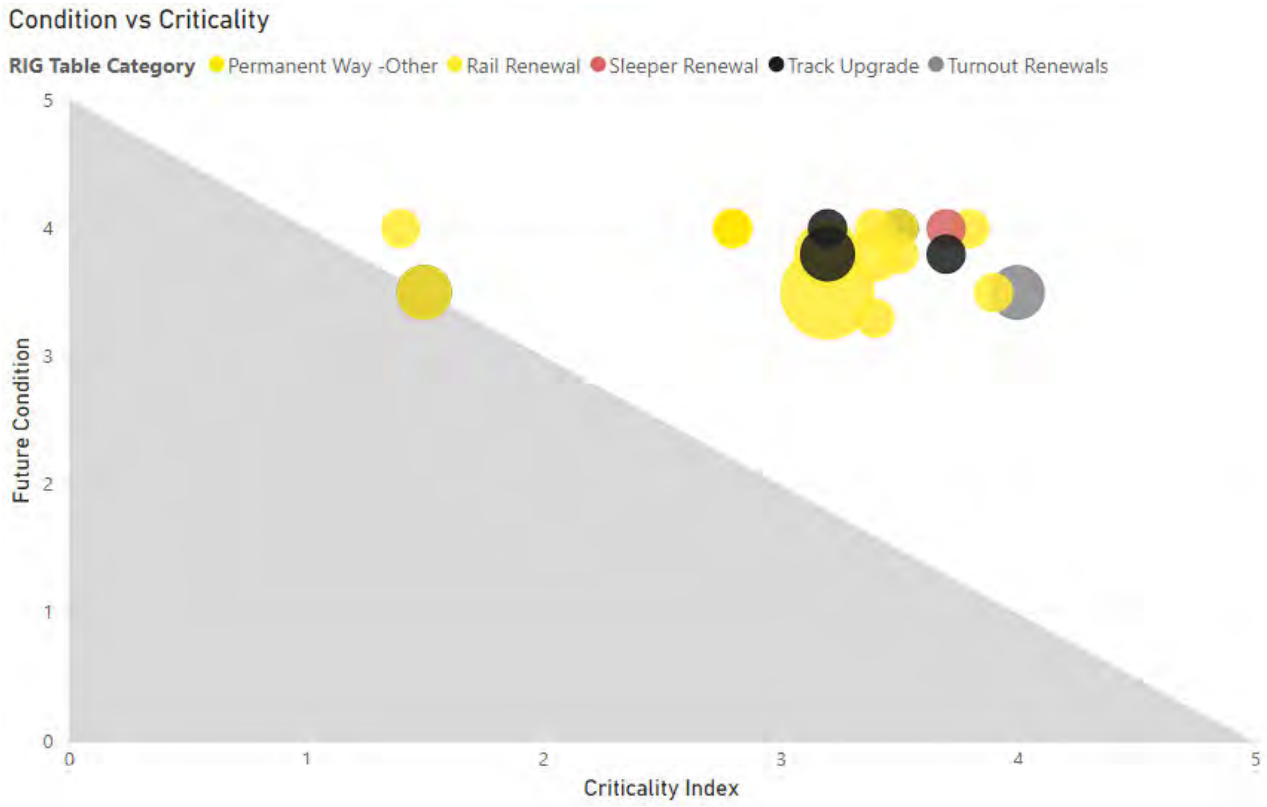


Figure 11 Permanent Way – FY25 Scope Priority Ratings – Blackwater System

3.6 Civil Assets – Ballast Cleaning and Renewals

Ballast Cleaning Renewal Program

In FY25, Aurizon Network proposes to undertake 64.2km of Ballast Cleaning, across mainline undercutting, reactive undercutting works and Bridge Rollouts, at a cost of $54.2m. Table 14 summarises the scope and budget for each relevant renewal item.

It should be noted that for Ballast Cleaning, historical performance indicates that approximately 10% of scope can be lost each year from unplanned impacts (e.g. wet weather, incidents). In such circumstances, a loss of scope will not directly translate to a proportional reduction in cost given the predominantly fixed-cost nature of Ballast Undercutting.

Table 14 FY25 Ballast Cleaning Program – Blackwater System

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Mainline Undercutting	Baseload	52.5	Track km	34.6
Mainline Excavator Undercutting	Baseload	4.6	Track km	2.8
	Reactive Renewals	6	Track km	4.5
Turnout Undercutting	Baseload	17	Turnout	2.7
Bridge Rollout	Baseload	1.0	Track km	7.7
	Future Scope	7.0	Site	0.1
Monumenting	Baseload	13	Site	1.0
Ground Penetrating Radar	Future Scope		Lumpsum	0.8
				54.2

The traditional approach to setting mainline ballast cleaning scope was to apply an assumed ballast return rate across the program. However, actual ballast condition can vary significantly between locations, and can lead to fluctuations in the actual return rates that can be achieved compared to the assumed amount. In circumstances where ballast condition and return rates are lower than the rate assumed, this can slow ballast undercutting production, and result in scope not being completed within the assigned access opportunity.

In FY25, pre-digs have been completed for a high proportion of Mainline Undercutting scope locations. Pre-dig results have helped to inform planning assumptions, including the volume of material to process (ballast profile) and screenability assumptions. Within the Blackwater scopes, this deeper understanding of latent ballast condition indicates that an increased volume of ballast will be required given the high spoiling rates of the selected locations. This increase in ballast material required coupled with the need to remove the spoiled ballast from the worksite has contributed to an increase in estimated unit cost compared to prior years.

The pre-dig information has enabled an improved level of certainty with respect to closure requirements for site specific scope items.

Detailed information on the development of the ballast cleaning program is included in Section 11.3 Budget Setting and Procurement.

The FY25 mainline scope has been planned in such a way as to deliver longer sites at an average of approximately 3.5km, greater than 1.6km average site length for the last 3 years It is expected that these longer sites will lead to improved undercutting delivery efficiency as there are less cut in and cut out activities as well as a reduction in machine repositioning.

An allocation to re-establish a portion of monuments is included in the Ballast Cleaning Program in FY25. This includes detailed survey, design and installation of new track data plaques. This enables future track maintenance activities to align to the design alignments. The alignment and height of track moves over time due to temperature changes, train operations, maintenance and construction activities which can give rise to track buckles, breaks, accelerated rail wear and contact wire geometry exceptions (in electrified systems). Track monuments are located within the rail corridor immediately adjacent to track as fixed in-ground posts or on electrical masts to indicate the correct level or position of the track. Measurements are taken from these to confirm the correct position of the track to ensure that the ballast cleaning activity and associated resurfacing correctly locates the track to the design alignment.

The bridge lengths in the FY25 Bridge Rollout program are smaller lengths compared to prior years leading to a reduced scope in length but an increase in actual quantity of bridges. Cost drivers within the program are more dependent on-site mobilisation/demobilisation as well as site specific scope (e.g. rail/sleepers/formation renewal).

Ground Penetrating Radar **(GPR)** data provides important information to help understand sub ground conditions. This information is used to measure fouling and to allow comparison of the FY25 data against prior data sets to plan for future renewal requirements. GPR is a critical input to the Aurizon Ballast Condition Analyser tool that utilises historical GPR, historical undercutting and track resurfacing and rainfall data to predict ballast fouling growth at the site level to identify future scope locations and volume.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Ballast Cleaning.

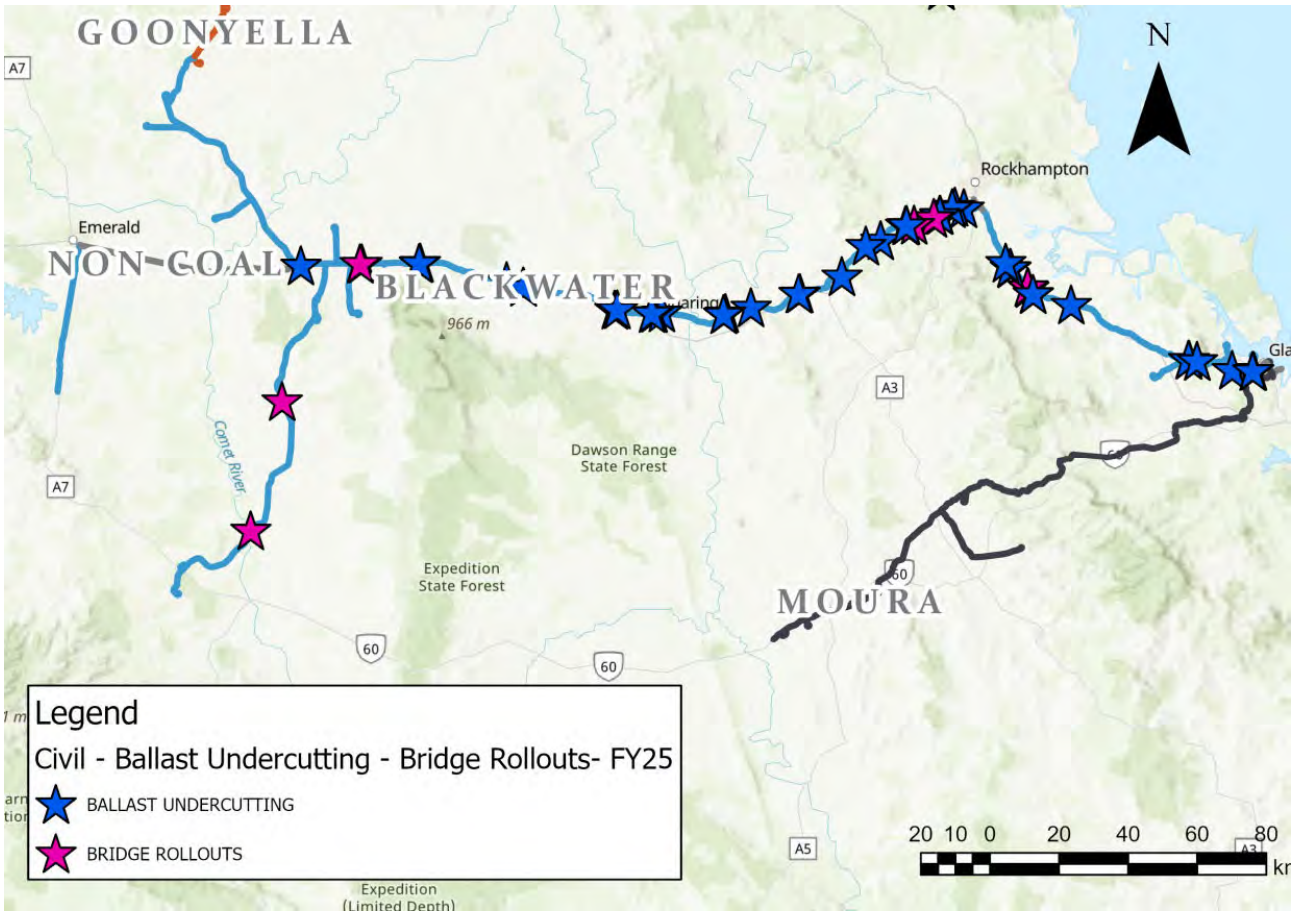


Figure 12 Ballast Cleaning and Bridge Rollout Sites – Blackwater System

Ballast Cleaning FY25 Scope – Asset Condition and Criticality Assignment

Figure 13 plots planned Ballast renewals against asset condition and location / operational criticality. All sites have a condition of 3.2 or above with most sites being in more critical track sections of the Blackwater System. The sites that each have a Criticality Index of 2.3, have a Condition Score of 3.7. these sites are within the Callemondah Yard precinct and these turnouts service arrival and departure roads within Callemondah are critical to operations.

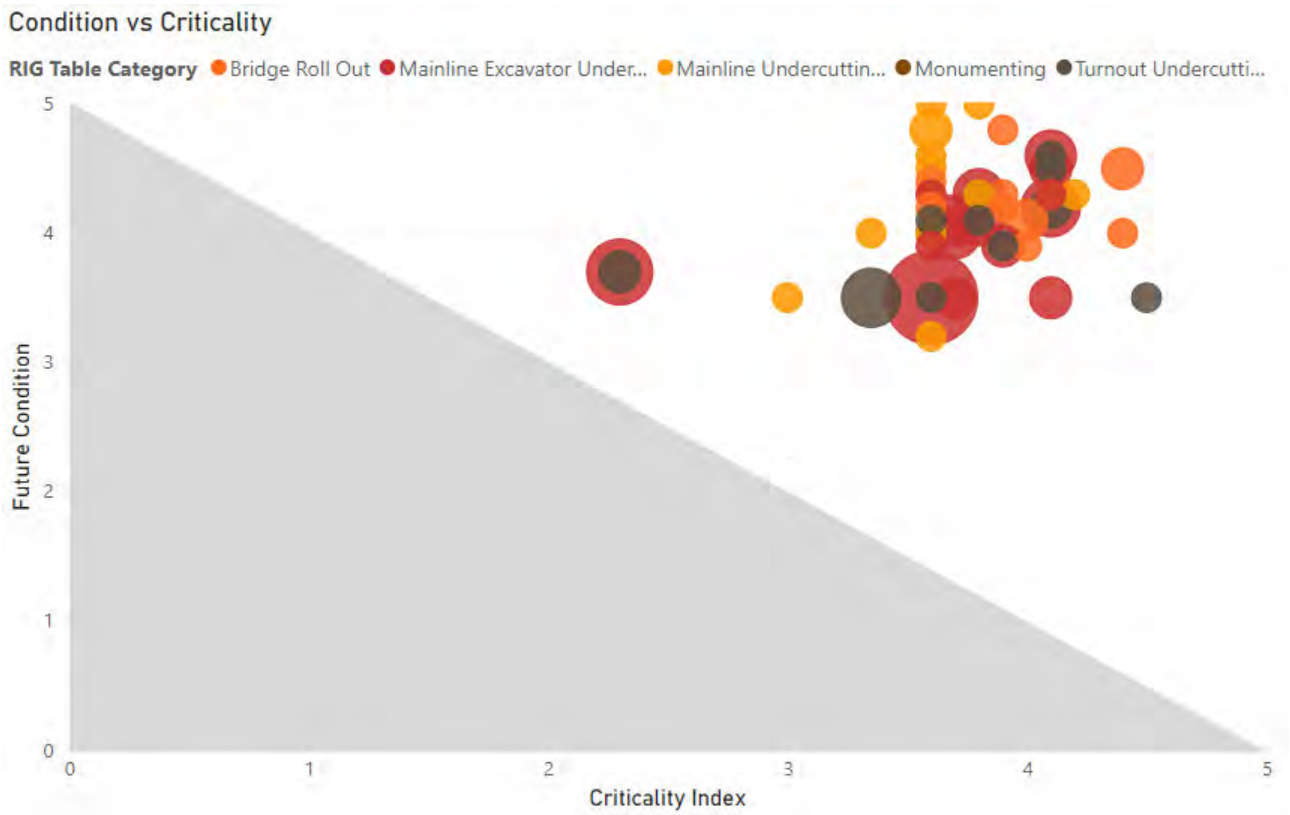


Figure 13 Ballast Cleaning – FY25 Scope Priority Ratings – Blackwater System

All Bridge Rollout scope locations are assessed as a condition of 3.9 or above. The condition of these sites is the primary driver for their selection for renewal in FY25.

The Turnouts at Callemondah are prioritised for ballast cleaning in the FY25 program with a criticality index of 2.1 which is a lower criticality scope due to their location in the yard however the condition of 3.7 makes these renewals a priority for FY25.

3.7 Civil Assets – Structure Renewals

Structures Renewal Program

The Blackwater System has a total of 140 Bridges and 1,335 Culverts which are designed to allow the natural flow of water through the rail network. In FY25, Aurizon Network proposes to undertake the renewal of 17 structures and design of an additional 26 sites at a cost of $23.6m.

Table 15 FY25 Structures Renewal Scope – Blackwater System

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Bridges Design	Future Scope	1	Site	0.0
Bridges Renewal	Baseload	4	Site	8.3
	Strategic	1	Site	4.8
Culvert Design	Future Scope	25	Site	0.9

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Culvert Renewals	Baseload	12	Site	9.6
				23.6

The FY25 forecast for Bridge Renewal scope in the Blackwater system is higher than FY24. The main contributing factor to this is the inclusion of the Bridge Renewal at Archer, 613.140Km on the North Coast Line (Oaky Creek).

Forecast Culvert renewals are lower in the Blackwater system with 12 planned for FY25 compared to 18 in FY24. The largest culvert renewal site, excluding the bridge at Archer, is located at Wallaroo with a 7/1200x900 Reinforced Concrete Box Culvert **(RCBC)** renewal.

Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Structured assets.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. However, Aurizon Network has adopted alternate approaches for the Structures scope in FY25, by lining aged pipes for 3 of the 12 sites. The Cured In Place Pipe **(CIPP)** option for these locations can be completed without impacting capacity while providing a new load rated structure, thereby avoiding cost and access impacts associated with a total renewal / replacement of the culvert.

Strategic Scope:

Bridge Renewal 613.140km point on the North Coast Line (Oaky Creek) ($4.8m)

The scope of this major scope renewal will replace 28 1500x1500 RCBC, 6 1500x1500 RCBC and a 2 span bridge with a 7 span bridge.

The culverts are condition 4 & 4.5 and criticality 4.5 on engineering review it was recommended to replace the culverts and the existing bridge with a 7-span bridge.

As part of the FY23 structures design work, a Multi Criteria Analysis **(MCA)** was completed to develop and agree on the most cost-effective solution for replacement of the structures at the 613.08 and 613.14 km points on the North Coast Line section of the Blackwater system. These are two banks of multiple culverts with a bridge structure connecting them both. The design solution selected was to remove the culverts and bridge at these locations and replace these with a multiple span bridge structure.

Piling works are planned to be completed in July 2025 partially aligned to the July integrated possession. The works in FY24 will be completed within the existing integrated possession plan.

This site was included in the FY24 and FY25 MRSB Scope Preview Presentations.

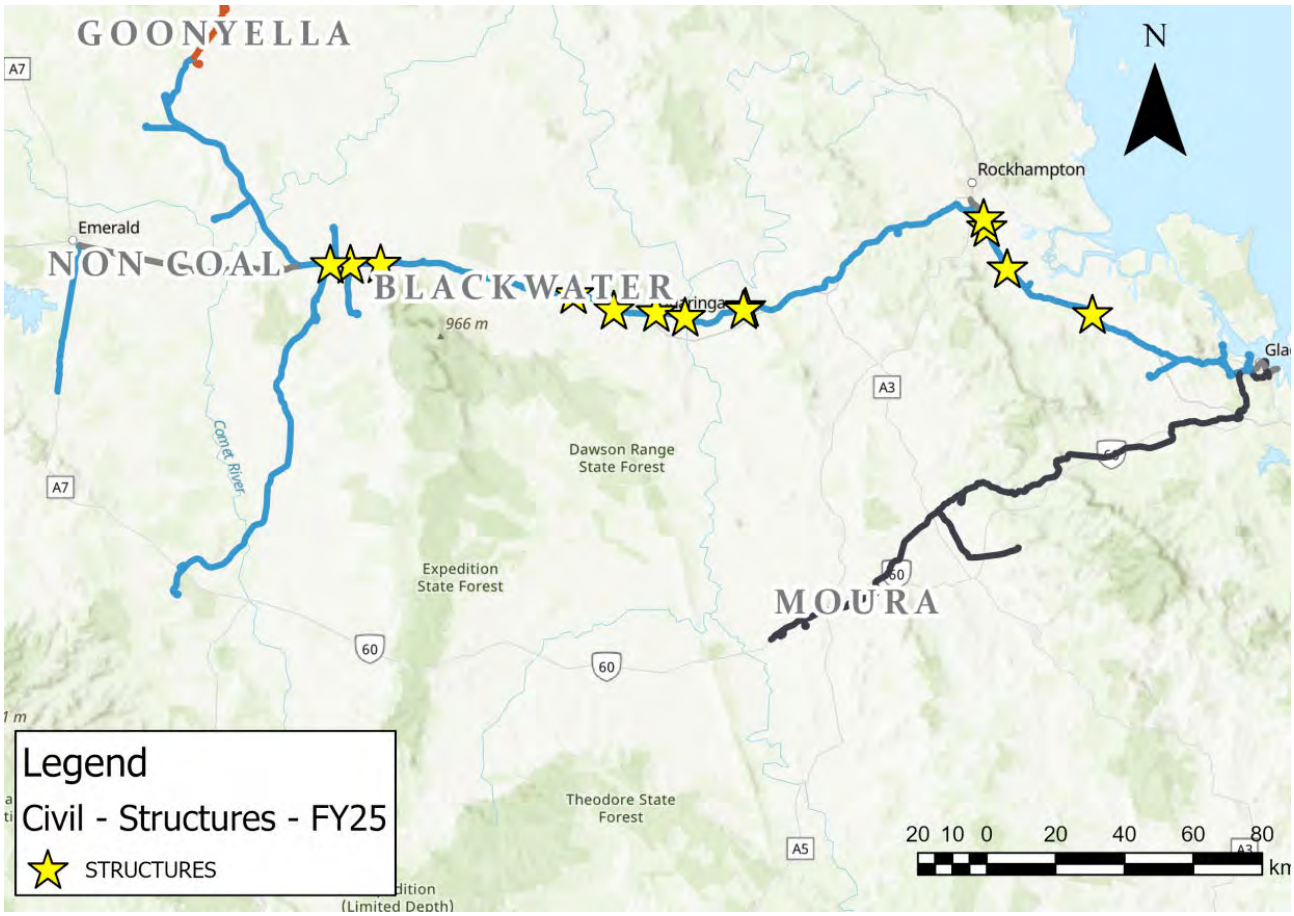


Figure 14 Structures Renewal Sites – Blackwater System

Structures FY25 Scope – Asset Condition and Criticality Assignment

Figure 15 plots the planned Structures renewals against asset condition and location / operations criticality. All planned FY25 renewals have poor to near end of life condition.

The sites at Archer vary from condition 3 to 4.5 however the strategic site has identified delivery efficiencies when renewing these assets together.

While culvert renewals at Sagittarius and Blackwater are identified as lower criticality areas, their condition rating of 4 or above sees these renewals prioritised for FY25.

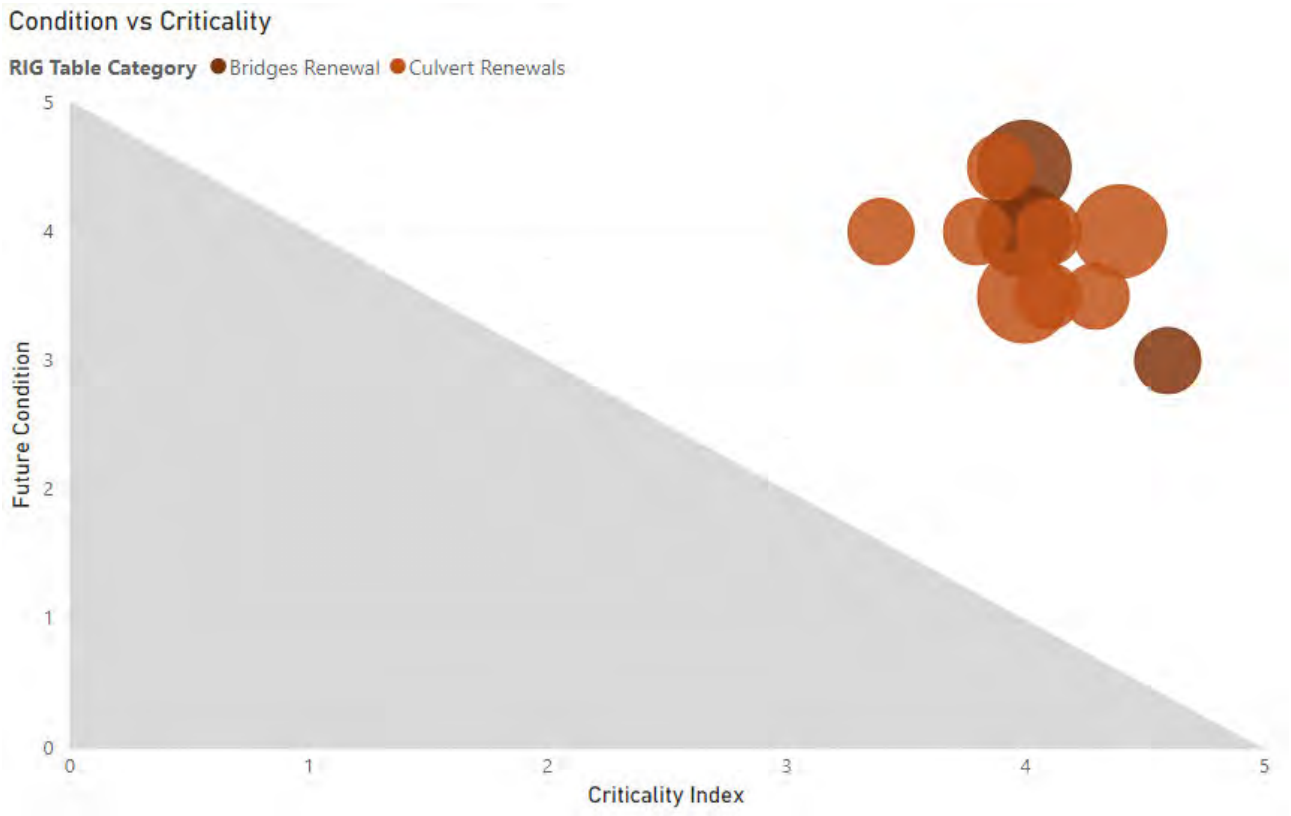


Figure 15 Structures – FY25 Scope Priority Ratings – Blackwater System

3.8 Civil Assets – Civil Renewals

Civil Asset Renewal Program

In FY25, Aurizon Network proposes to undertake the scope listed below at a cost of $14.4m. Table 16 below summarises the scope and budget for each relevant renewal item.

Table 16 FY25 Civil Asset Renewal Program – Blackwater System

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Level Crossing Renewals	Baseload	3.0	Site	3.7
Level Crossing Design	Future Scope	8.0	Site	0.3
Level Crossing Other	Reactive Renewals		Lumpsum	0.2
Formation Renewals	Baseload	0.8	km	4.4

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Formation Other	Future Scope		Lumpsum	0.0
Formation Reactive	Reactive Renewals		Lumpsum	3.8
Slope Stability	Future Scope	2	Site	0.2
Corridor Fencing & Security Fencing	Reactive Renewals		Lumpsum	1.2
Access Points & Roads	Future Scope	6	Site	0.1
	Reactive Renewals		Lumpsum	0.4
				14.4

Two formation renewal locations support and integrate with other FY25 priority scope. The Marmor formation renewal will integrate with the planned track renewal at Marmor and the formation renewal at Callemondah will integrate with the turnout renewals planned for Callemondah. Cost estimates are based on prior years tendered prices.

The proposed level crossing scope includes additional costs for temporary road diversions to provide alternate access for users while the level crossing upgrade and renewal works are in progress.

Corridor and Security (fencing) cost estimate is increased in FY25 to allow for the completion of increased identified scope to manage the condition of fences and decrease cost impacts and track interruptions due to trespassers and animals in the corridor at identified locations.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset Strategy for Civil Assets.

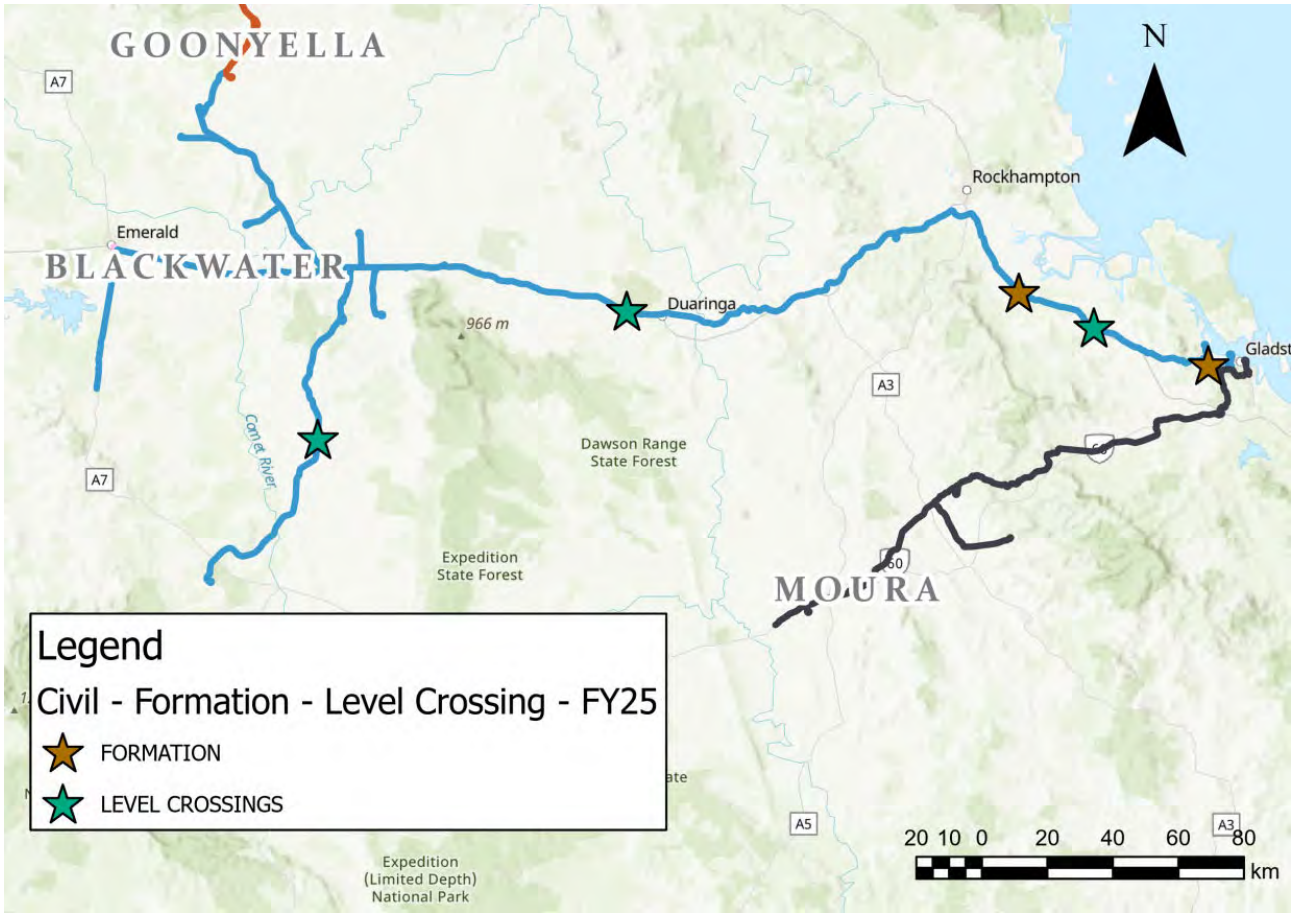


Figure 16 Formation and Level Crossing Renewal Sites – Blackwater System

Civil Renewals FY25 Scope – Asset Condition and Criticality Assignment

Figure 17 plots the Civil renewals against asset condition and location/operational criticality.

The two planned formation sites at Marmor and Callemondah have a condition rating above 3.8. This scope is considered high priority due to condition.

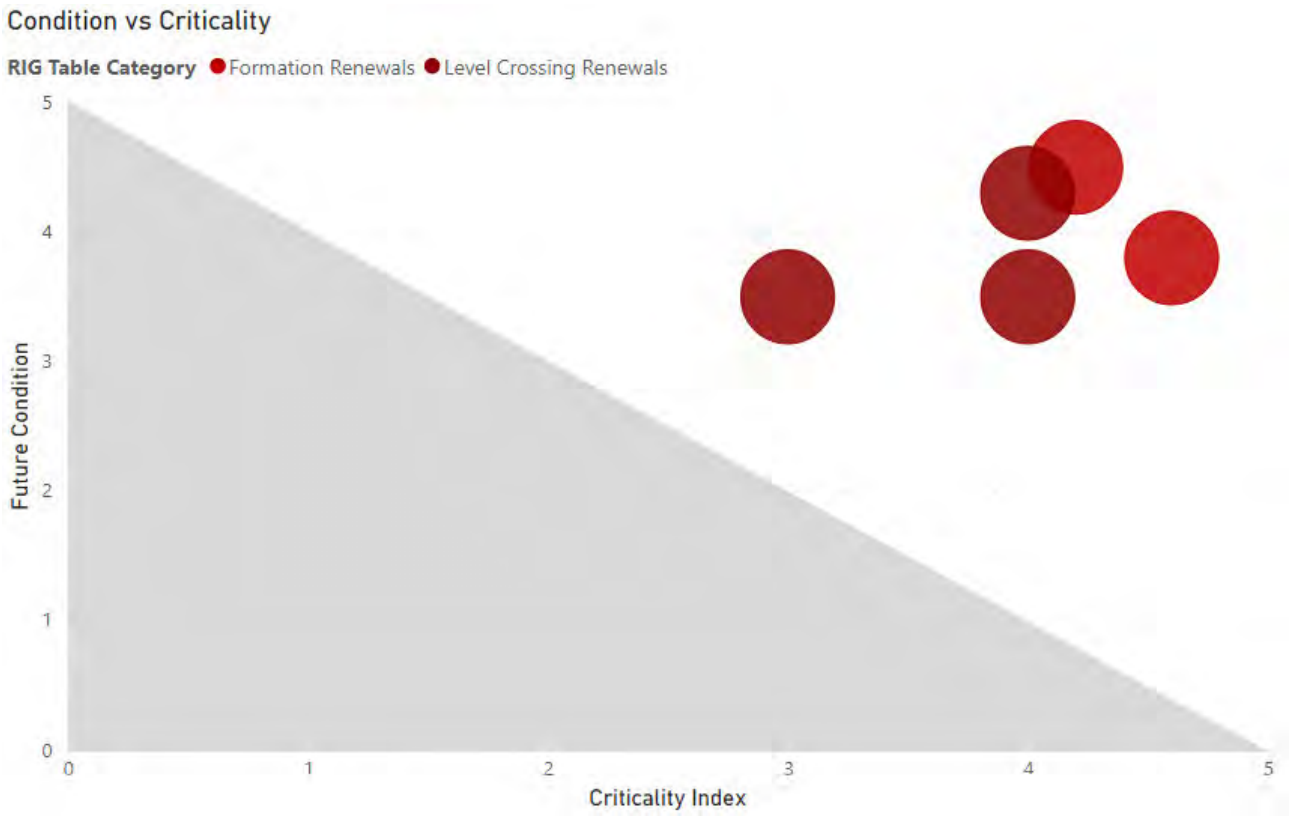


Figure 17 Civil Renewals – FY25 Scope Priority Ratings – Blackwater System

3.9 Control Systems Assets

Control Systems Renewal Program

In FY25, Aurizon Network proposes to undertake the following Control Systems Renewals or enhancements in the Blackwater System, representing at a total cost of $18.1m. Of the proposed FY25 scope, $5.1m of scope relates to design works for renewals in future years. Table 17 summarises the scope and budget for each relevant renewal item.

Table 17 FY25 Control Systems Renewal Program – Blackwater System

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Safe Working Systems – Asset Protection	Baseload	1	Unit	1.5
	Future Scope	1	Site	0.2
Safe Working Systems – Interlockings	Baseload	5	Unit	0.5
	Future Scope	1	Site	0.3
	Strategic	1	Unit	2.9
Safe Working Systems – Train Detection	Future Scope	1	Station	0.1
Safe Working Systems – Minor	Baseload	9	Unit	0.2
	Future Scope	2	Site	4.3
Telecommunication Asset (optic fibre)	Strategic	26,981	Metres	4.0

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Transmission & Data Renewals	Baseload	20	Site	2.4
	Future Scope	3	Site	0.2
	Strategic	1	Site	0.6
UTC DTC	Strategic		Lumpsum	0.9
Total				**18.1**

In FY25, the major Safeworking – Asset Protection scope will be the renewal of the Kalapa Mainline Weighbridge, which will be designed in FY24.

The Safeworking – Interlocking baseload scope will renew signals for Front of Post **(FOP)** locations.

Safe Working Systems – Minor future scope includes the major designs and procurement with an external vendor for the Callemondah interlocking renewals as part of the Callemondah Strategy. Future scope included in the Interlocking Program will complete the design for the Relay to Processor Based Interlocking at Archer.

Telecommunications Asset, Optical Fibre Renewal for FY25 will renew a similar distance compared to FY24. The unit rate is comparable to the FY24 forecast and is the basis of the estimate using a rate schedule and detailed site investigations (i.e., location of rock, existing conduits, etc) to determine a more accurate estimate. Depending on the actual site requirement it will drive variation in unit rates.

Transmission and Data Renewal TETRA Radio Scope will focus on minor renewals to improve coverage of TETRA Radio.

Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Control Systems.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Given the high proportion of these renewals being triggered by obsolescence, Aurizon Network will generally seek to replace the current technology with modern-day equivalents that provide an uplift in speed and/or capacity.

Strategic Scope:

Callemondah Strategy for Interlockings and Turnouts ($2.9m)

A multi-year strategy has been developed and forecast to stage the replacement of the interlocking, cabling and power supplies in Callemondah yard using modern networked interlockings. The majority will be delivered within the possession constraints for this yard.

In FY24 preliminary works (control tables and design) will be delivered.

In FY25, the Callemondah yard renewal strategy will continue coordinated renewal of interlocking and turnout assets to renew life expired assets and minimise, where possible, track outage requirements. Note the completion of some tasks at the same time will not be possible due to the sequencing of turnout removal, formation works, turnout install, overhead alignment then signalling changes. These elements are planned to de-risk works within required closures times.

This critical and complex interlocking is beyond service life. Cabling between the interlocking and field equipment is regularly failing, and the condition of some cables has required re-routing of control functions over alternate paths by local cables. Power supplies supporting signalling are also beyond service life.

Replacement of the interlocking in one stage is beyond possession constraints for this yard.

TETRA Radio ($0.6m)

The digital based Terrestrial Trunked Radio (**TETRA**) network has been in operation since late 2019 and will eventually replace the analogue train control radio system, which is more than 20 years old and occupies radio frequencies that need to be handed back to the federal government. The radio system primarily provides vital voice communications between Network Control Officers and Rail Traffic Crew throughout the CQCN. It also allows Rail Traffic Crew to communicate with Rail Transfer Facilities (**RTF**) and workers on the corridor.

In FY25, an additional tower and base will be installed at Stanwell and improvements to existing sites will continue to improve coverage to address identified black spots within the CQCN.

Optic Fibre Renewal ($3.6m)

This is the fifth year of the Optic Fibre Renewal Program renewing life expired 6 core fibre optic cable installed in 1980's with modern 24 core optic fibre. This modernisation also supports the increasing data network security and capacity requirements between field and control centre systems, and for monitoring asset condition in real time. FY25 will see a new vendor transitioning to the program from FY24 introduction, however scope remains similar to FY24 in FY25 to reduce the risk of any delivery delays moving to a new vendor.

UTC/DTC ($0.9m)

Safety and Operational Improvements for Network Train Control system. Scope includes train control system applications, user interface changes and engineering controls for safety processes. Operational requirements for delivery of individual scope items are subject to change due to criticality requirements, e.g. post an incident or process breakdown.

In FY25, the purpose of the UTC Digital Telemetry renewal is to remove obsolete VF based telemetry equipment in the control centre and use the well supported Operational Data Network. This renewal requires the changing over the telemetry system at each interlocking. This renewal started in 2018 with Westrace interlockings. In 2023, the first relay interlocking was changed over and in 2024 the first Microlok2 interlocking is due to be changed over. This renewal program is planned to be completed in FY30. In FY25, 3 Relay and 2 Westrace interlockings will be implemented in the Blackwater System.

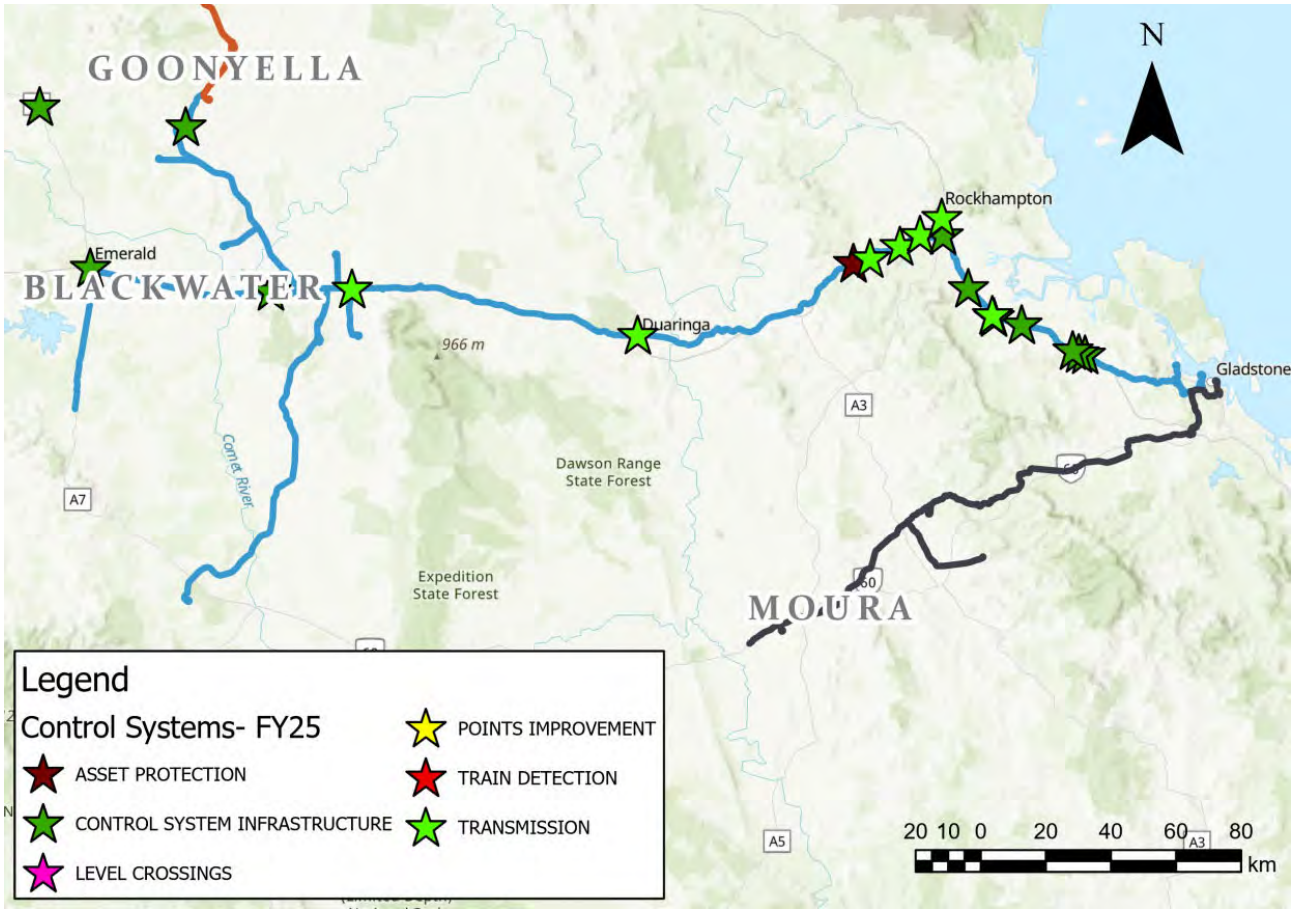


Figure 18 FY25 Control Systems Renewal Locations – Blackwater System

Control Systems Assets – FY25 Scope Asset Condition and Criticality Assignment

Figure 19 plots the planned Control Systems renewals against asset condition and location / operational criticality.

The location to the far left of the figure above is a microwave tower site at Capella that, despite being located away from the rail corridor, provides part of the microwave radio network that serves as a communication path for coal carrying train services in the Blackwater system.

All scope items are listed as condition rating 4 or above. This reflects the age of assets targeted for renewal in FY25. Control Systems assets are mostly electronic, so renewal is a trigger of support, spare parts or software obsolescence. As such, condition is more a matter of asset age against design life rather than a physical demonstration of wear.

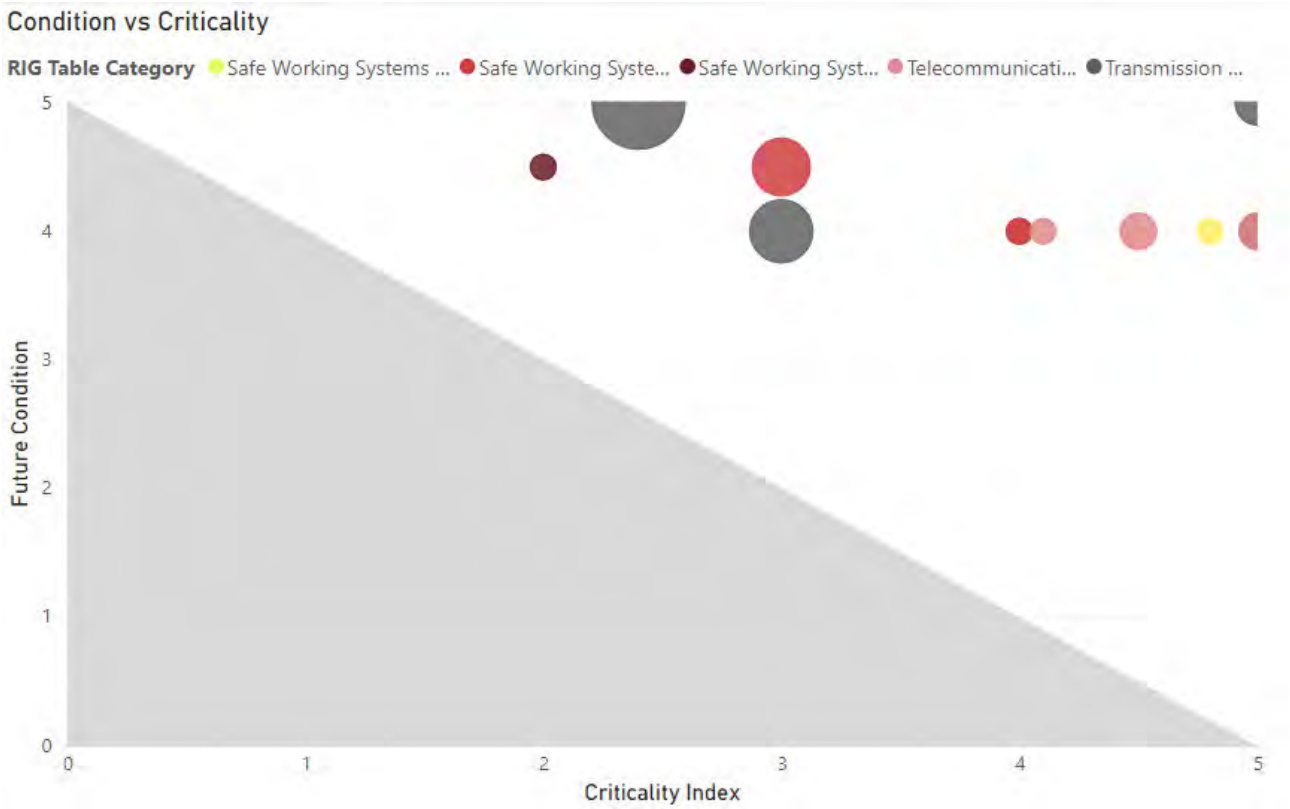


Figure 19 Control Systems Assets – FY25 Scope Priority Ratings – Blackwater System

3.10 Electrical Assets

Electrical Renewal Program

Several of Aurizon Network's power systems assets are nearing the end of their design life. Aurizon Network is progressing its analysis to better understand options with respect to future power systems renewal requirements. As this work develops, Aurizon Network will engage with the RIG in relation to the preferred options.

In FY25, Aurizon Network proposes to undertake the following Electrical Renewals or enhancements in the Blackwater System at a cost of $4.0m. Table 18 summarises the scope and budget for each relevant renewal item.

Table 18 FY25 Electrical Renewal Program – Blackwater

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Overhead Line Equipment Renewal	Baseload		Lumpsum	1.0
	Future Scope	1	Site	0.1
Power Systems Renewal	Baseload	8	Unit	0.4
	Future Scope	4	Site	0.1
	Strategic	3	Unit	2.5
				4.0

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Electrical Assets.

Strategic Scope:

Autotransformer Renewal ($2.5m)

The autotransformer renewal program seeks to renew aged equipment that is operating beyond its design life.

Following identification of a bow wave of electrical asset renewal activity as the assets installed in the 1980's approached end of life, Aurizon Network has been proactively managing the renewals task by smoothing the work over time. This approach sees Aurizon Network target the renewal of three autotransformer sites per year. Sites are prioritised based on asset condition.

Traction Substation Renewals

In FY25, the proposed expenditure is in line with what was proposed in the FY24 MRSB submission, continuing feasibility stage for the renewal of the 8 Air-Insulated Switchgear traction substations which will reach the end of their nominal service life in the next 5 to 10 years.

The FY25 scope includes early works packages commencing detailed designs and continuing coordination with Powerlink for renewal of Feeder Station connection infrastructure, and commencement of procurement.

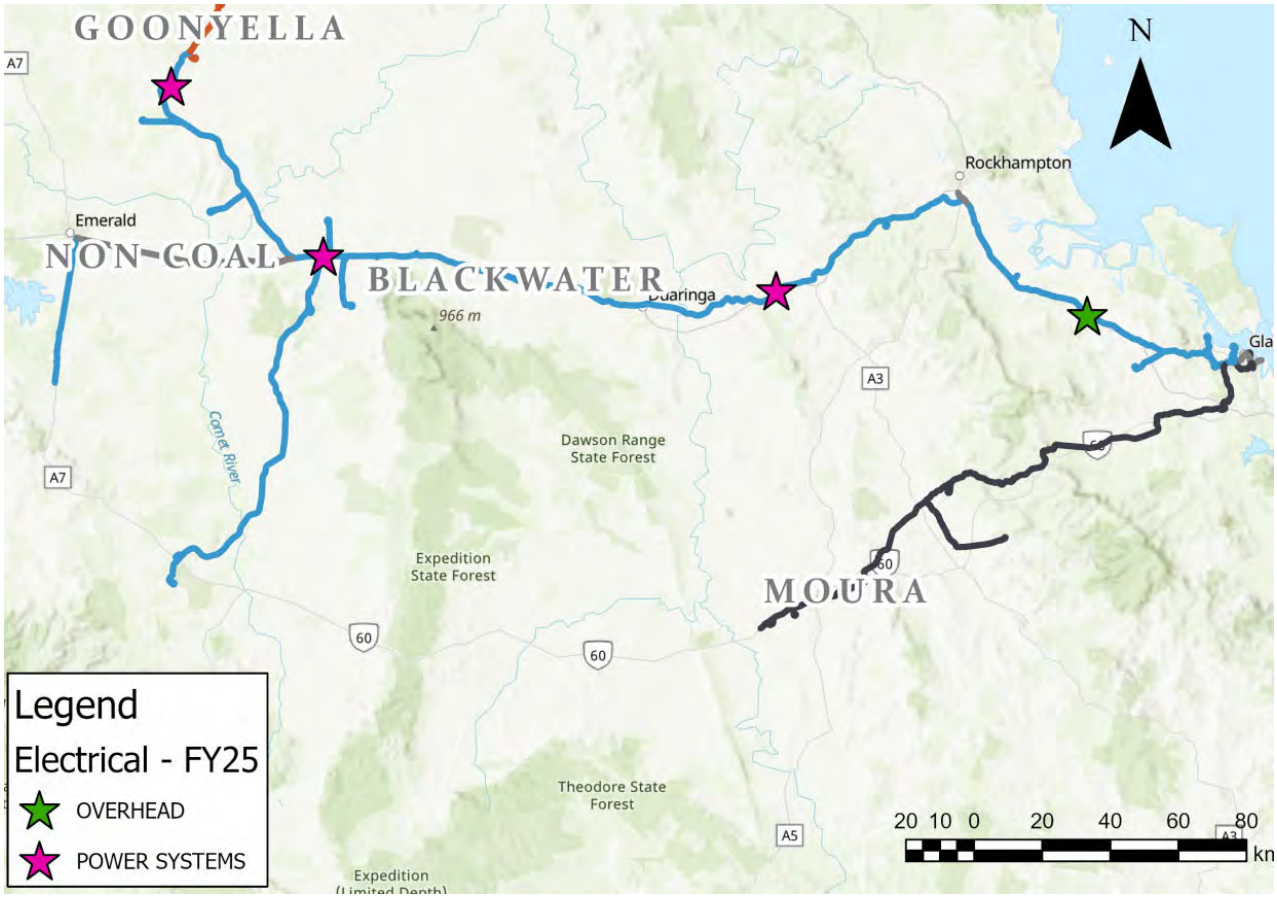


Figure 20 FY25 Electrical Renewal Sites – Blackwater System

Electrical Assets – FY25 Scope Asset Condition and Criticality Assignment

Figure 21 plots the planned Electrical renewals against asset condition and location / operational criticality. Although these renewal scope items have lower condition scores, they are important assets in the traction network and must be renewed as they are reaching end of life. The Protection relay renewals at Grantleigh have a condition of 3.5 with a criticality of 2.9 are prioritised to replace obsolete units with modern equipment.

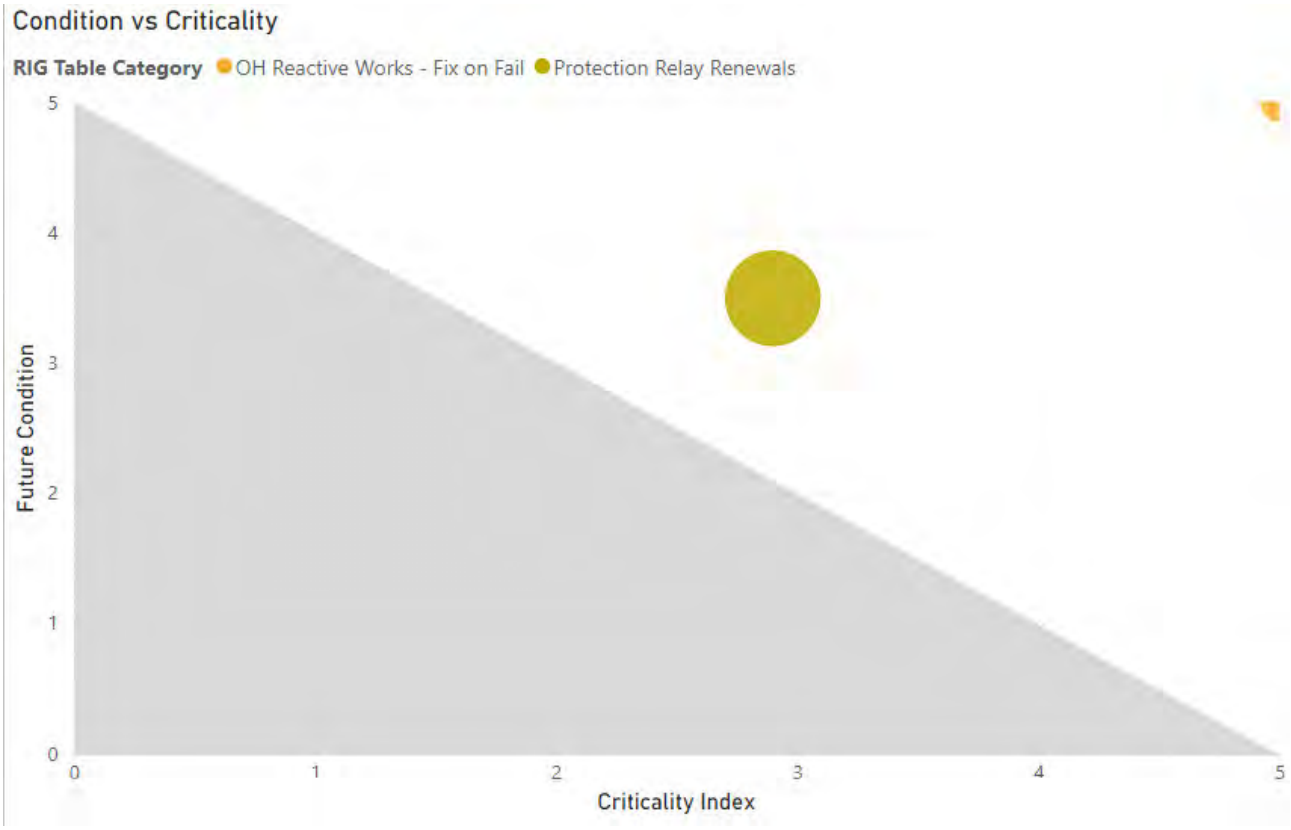


Figure 21 Electrical Assets – FY25 Scope Priority Ratings – Blackwater System

3.11 Likelihood of Change Assessment – Maintenance and Renewals

Aurizon Network notes that the identification and evaluation of renewals scope for inclusion in the MRSB is based on currently available information that may change over the period prior to execution (of up to 18 months) due to environmental factors, relative degradation rates or other considerations. Additionally, potential changes may be related to specific items of scope or applicable to the broader renewals program for each system.

In the preparation of the FY25 Final Draft Proposal, Aurizon Network conducted a likelihood of change review to assess potential areas of change to either cost or delivery, time to complete or location. Further detail for this review process is included in Section 0.

This section provides details of scope items with a high likelihood of change where controls have been identified and where a residual risk will be managed. These scope items are also identified in the Scope Detail BI Report. Changes to the proposed scope will be dealt with through reporting and change management processes as appropriate.

Additionally, potential areas of change are identified in the development of the maintenance program based on Aurizon Network Maintenance leader reviews and lessons learned from recent periods. Potential risks and controls specific to the maintenance program are also included in the table below.

Table 19 provides a summary of the deliverability assessment completed in the development of the FY25 MRSB program of work. Scope items with a high likelihood of change are summarised including their potential impact, the controls implemented, and the residual risk being managed as the program develops toward execution. Changes will be reported in the RIG Quarterly Report. Potential Areas of Change at Program Level in the Blackwater System

Table 19 Likelihood of Change Assessment and Deliverability Review for Maintenance and Renewal Programs

Program Category	Program	Risks and Controls	Total Scope Items	# High Likelihood of change	% of Program	Residual Risk Post Control
Total Blackwater Scope Items for delivery in FY25 (Baseload or Strategic Scope)			195	25	13%	
Civil	Permanent Way Renewals	**Risk: Scope not completed or increased cost as** no ability to transfer scope between closures due to integration of construction resources and site-specific requirements (turnouts).				High
		Control: Detailed planning based on designs to minimise risk of scope creep. The likelihood remains high for 3 turnouts as IFC designs are yet to be finalised. As a result, scope creep may occur extending the duration of the closure and costs. The IFC designs will be provided in March 24 ahead of delivery.	34	3	9%	

Program Category	Program	Risks and Controls	Total Scope Items	# High Likelihood of change	% of Program	Residual Risk Post Control
	Ballast Cleaning	**Risk: Increased access and cost to complete scope due to** increased percentage of unscreenable material over planned assumption. **Control:** Initial pre-digs completed FY24 and again during year of delivery to re-evaluate cost and capacity prior to execution for ballast cleaning activities (RM902). The likelihood remains high for 3 sites. Pre-digs have yet to be performed on 1 site, indication that remnants of previously treated sections of lime slurry may exist on another and evidence of pockets of clay within the ballast at another. All of these can lead to high variability in production of RM902, but full extent is not known.	102	3	3%	High
	Structure Renewals	**Risk: Scope not completed or increase in access or cost due to** inability to perform detailed planning **Control:** Early design and methodology. The likelihood remains high for 1 site at Blackwater yet to have a full design completed, however due to the asset condition is critical to proceed. Assumptions have been made to grout the existing structure to enable this work to proceed. The likelihood also remains high for the 3 scope items at Oaky Creek which is unique in construction methodology and has an extended construction period for piling works. Limited contingency has been allocated for the duration of these works to be refined after contractor onboarding (Dec 23).	17	4	24%	High
	Civil Renewals	**Risk: Scope not completed or increased access or cost due to** inability to access neighbouring land for material handling. **Control:** Desktop analysis of known environmental and cultural heritage to be completed. The 2 formation sites remain a high likelihood of change. Negotiations are in progress to gain access to neighbouring properties for temporary stockpiling of new materials and spoil if this is not possible, material management may increase cost or capacity or reduce scope.	5	2	40%	High

Program Category	Program	Risks and Controls	Total Scope Items	# High Likelihood of change	% of Program	Residual Risk Post Control
	Safe Working Systems	**Risk: Scope note completed due to** high design requirement for specialised signalling design. **Control:** Early design and determination of supplier. Early determination has occurred with Callemondah, although final pricing is not yet received. The limited availability and specialised nature of the design and testing resources may see schedule slip on this multi-year scope item. As such there is still a high likelihood of change. **Risk: Scope not completed and/or costs** for Front of Post signals as design is not yet completed or tested. **Control:** Engagement of external deign resource to complete. The likelihood of change remains high as in FY24 a pilot will be implemented to modify the existing foundations to support new tilt signals. In FY25 it is planned to trial this further (5 signals) to inform future methodology and costs for a broader program across the network. As this is still in pilot there is potential for variability in cost and methodology.	8	6	75%	High
	Transmission	**Risk: Scope not delivered, or cost is increased** due to specialised resources required for design and delivery. **Control:** Engagement of external deign resource to complete. A high likelihood of change exists for certain scope items that require proof of concept and test lab simulations due to be complete in FY24.	19	4	21%	Med
Electrical	Power Systems Renewals	**Risk: Cost increase or scope not delivered** as program requires environmental and community engagement for delivery of equipment. **Control:** Early identification of site access requirements – planning for corridor access to site for major plant (cranes) and material delivery to site The assessment for the 3 FY25 sites is yet to be completed. As such, the level of potential access road upgrade/creation to allow site access and potential other site-specific requirements are yet to be determined.	10	3	30%	High

Program Category	Program	Risks and Controls	Total Scope Items	# High Likelihood of change	% of Program	Residual Risk Post Control
		Risk: Cost increase and Scope not delivered as Autotransformer prices based on FY23 prices, with contracts still to be finalised and lead times extending. **Control:** Contracts to be finalised early 2024. The likelihood of change remains high as lead times have extended from 9 months to 12-14 months for Autotransformers.				
	Electrical (Maintenance)	**Risk: Overdue Maintenance Activities** due to insufficient specialised overhead maintenance staff and/or staff being prioritised to other work, e.g. asset renewals scope, mechanised production or civil maintenance and renewal support resulting in increased component failure, dewirement and increased regulatory risk. **Control:** Dedicated overhead line maintenance windows have been introduced in FY24 and continued in the FY25 closure strategy. **Risk: Increase in costs** associated with apprentice recruitment strategies to provide succession of qualified traction linespersons in response to higher than expected attrition levels. Reductions in contract labour hire support is tied to expected qualification timeframes.		Maintenance not assessed		
General Track Maintenance		**Risk: Additional maintenance activity required** driven by further asset degradation requiring rectification to support network safety, reliability and performance resulting in additional costs (Materials, Resources) **Control:** Single line maintenance activity has been included in the capacity assessment and is planned throughout the year.		Maintenance not assessed		

Goonyella System

Goonyella System

This Section presents Aurizon Network's Draft Maintenance and Renewal Strategy and Budget for the Goonyella System during FY25. In line with 7A.11.3 of UT5, this section will be subject to vote by the relevant Goonyella End Users.

Aurizon Network's FY25 Draft Proposal for the Goonyella System provides for:

- **A strategy to maintain stable level of service over the long-term**

  The asset management and integrated closure strategy for the Goonyella system recognises the high utilisation rate and seeks to minimise the capacity impact of unplanned outages due to infrastructure failures. Where possible the strategy is to rectify faults in a planned manner ahead of faults becoming a service disrupting failure.

- **A Direct Maintenance Cost Allowance of $72.6m**

  The proposed Direct Maintenance Cost Allowance, which excludes ballast undercutting plant depreciation, represents an increase of $3.8m compared to Aurizon Network's current FY24 full year maintenance forecast and an increase of $8.2m compared to the approved FY24 Maintenance Strategy and Budget.

  The increase in maintenance spend is predominantly driven by escalation, additional internal labour costs and FTE to support mitigation of ageing workforce and attrition risks, an increase in corrective maintenance activities to rectify the condition of certain structures, additional grinding requirements and additional maintenance activities for resurfacing plant and equipment.

- **A Renewals Allowance of $110.6m**

  This represents a decrease of $8.5m compared to Aurizon Network's current FY24 renewals forecast and a decrease of $3.1m compared to the approved FY24 Renewals Strategy and Budget.

  The decrease in renewal spend is due to a reduction in scope in Ballast Cleaning, Structures, Control Systems and Electrical Assets which has been largely offset by the increases in labour and non-labour escalation, particularly the cost of materials (steel, concrete), mainly in Permanent Way Assets – Rail Renewal and Track Upgrade.

- **Integrated Closures**

  There are seven integrated closures planned in Goonyella for FY25, including one contingency closure that will be used to recover lost scope if required. 8% YoY increase in planned System Integrated Closure hours if contingency closure is not required, and a 25% increase in hours should it be required.

  Aurizon Network capacity assessment highlighting risk around system usable capacity versus ACAR 2023 FY25 DNC during Q1, primarily due to Port in-loader outages. Q2 – Q4 showing adequate system usable capacity to deliver the DNC.

- **Likelihood of Change**

  Completion of prior year scope and weather remain key program risks for the Goonyella system with potential impacts on the ability to complete planned renewal scope.

3.12 Goonyella System – Characteristics and Corridor Strategy

The Goonyella System is Aurizon Network's largest Coal System by coal volume. The Goonyella System services coal mines in the central and northern Bowen Basin, predominantly carrying product to the ports at

Dalrymple Bay and Hay Point as well as railings north via the Goonyella to Abbot Point Expansion (**GAPE**) to Abbot Point. The Goonyella System includes approximately 1,006km of electrified track.

Trains move predominantly east towards the ports at Dalrymple Bay, but trains originating in the Goonyella system also rail north to Abbot Point via Newlands or south to Gladstone via Blackwater, so loaded trains operate in both directions in the western areas.

Maintenance and renewal activities in the Goonyella System are primarily delivered from depots located in Jilalan and Moranbah, with mobile mechanised plant based in Yukan and Rockhampton.

Aurizon Network's depots are strategically located to enable incident response times within approximately two and a half hours, depending on whether significant travel is required within the rail corridor, such as between South Walker Creek and Hail Creek. Mechanised plant (e.g., resurfacing) is typically able to respond to an urgent defect (e.g., a buckle or geometry defect) in the Goonyella System within one day.

Figure 22 Depot Locations – Goonyella System

Aurizon Network has considered asset conditions specific to this Coal System when developing the FY25 Final Draft Proposal, particularly in relation to:

Civil Assets – The civil assets in the Goonyella System see the highest tonnage of the four Coal Systems and the highest train density, this decreases the time between renewals and maintenance activities that are linked to usage or wear. The Great Dividing Range crossing at Black Mountain is a substantial rail crossing with high grades and tight curves resulting in significant train dynamics and inertia forces applied to the rail, sleeper and formation assets. Given the steepness of the terrain and the fact that the area can record high rainfall in short periods, there is a significant network of drains, culverts and spillways to assist water shed from the mountainous areas, aiming to minimise impact on rail operations.

Control Systems Assets – A significant proportion of the Control Systems assets in the Goonyella System are original 1980's infrastructure from the initial installation. These assets are nearing or beyond their nominal service life in particular signal interlockings. The radio system across Goonyella was upgraded in recent years to a digital based Terrestrial Trunked Radio (**TETRA**) system. Trains are detected through a mix of track circuits and axle counter track sections with ongoing renewals programmed for life expired track circuit assets. A program to modernise the optic fibre in Goonyella commenced in FY22 and continues in FY25.

Electrical Assets – The Electrical assets were largely installed during the mid-1980's Main Line Electrification Project. A significant proportion of the assets are approaching the end of their 30 to 40-year design life. The assets nearest the ports see significant corrosion due to the coastal environment. A focus of FY24 is the planning for the renewal of original installed power substation assets as well as lifting the reliability and ability to recover from defects around the Goonyella ports area.

Corridor Strategy

The Goonyella System is a purpose-built Coal System and has seen significant expansions both in terms of extensions and section duplications. There is a mix of asset conditions given age and use.

The Goonyella system is highly utilised and as such, the maintenance focus seeks to minimise the capacity impact of unplanned outages due to infrastructure failures. Where possible, the strategy is to rectify faults in a planned manner ahead of faults becoming a service disrupting failure.

The arrangement of the Black Mountain range crossing requires highly strengthened assets including track structure to operate under the train load and intensity, but also significant drainage structures to move water away from the railway in rain events.

The system is predominately serviced by electric traction, so feeder stations are located closer together in Goonyella than in Blackwater, and the impact of an outage is magnified in the system with little ability to substitute rollingstock during electrical outages.

The below graphs in Figure 23 indicate some deterioration in performance and reliability metrics against the 4-year average due, in part, to high impact events and wet weather. Scope has been prioritised based on asset condition and balanced with resource and access availability. Please refer to the Glossary for interpretation of these graphs.

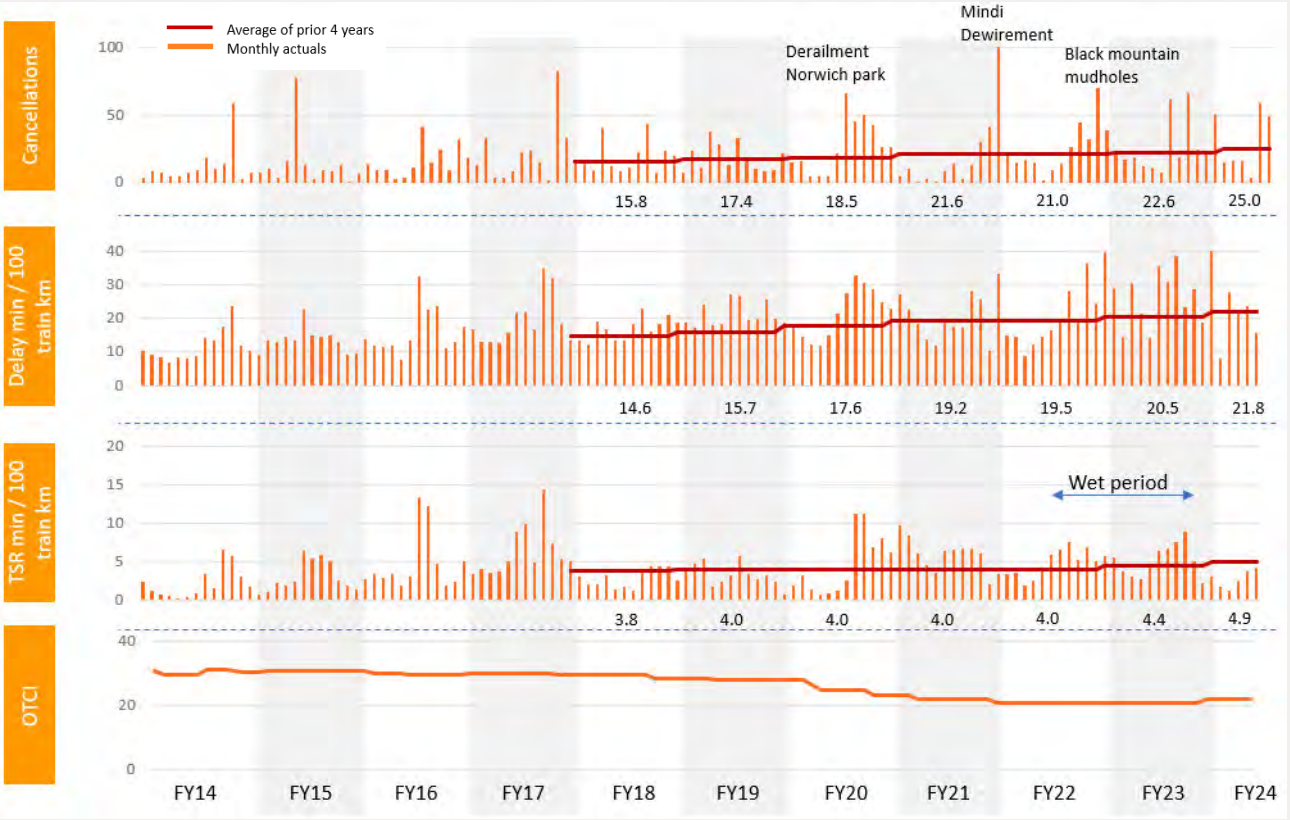


Figure 23 Goonyella Below Rail Performance 4-year average trends using FY2014 to December FY2024 monthly performance

Notes:

- The number of months with over 50 below rail caused cancellations in Goonyella has increased from 3 in the period FY14- FY19 to 6 in the period FY20 – FY24, driven by high impact incidents
- The 4-year average for delays has been tracking higher every year. Approximately half of the increase (2.4min) is due to the introduction of the delay code “Network Stowing Delay” in FY2022
- Remaining increase can be attributed to increases in TSR delays (1.1min), Network control decisions (1.0min), Track defects (0.8min), Train scheduling (0.6min), Track circuit failures (0.6min), Track maintenance and repairs (0.5min) and Network possessions (0.5min)
- The OTCI index has recently increased from 21 to 22, resulting from challenges during the prolonged wet period between Nov 2021 – March 2023. OTCI does not account for localised reliability impacts, traction or control systems assets.

3.13 Goonyella System – Integrated Closure Plan

Aurizon Network has engaged with the RIG and other stakeholders to better understand end user requirements. Aurizon Network has taken the following into consideration when developing the FY25 Integrated Closure Plan:

Specific Goonyella Supply Chain considerations

- **Port operating mode and mine stockpile capacity**

  Goonyella Ports have somewhat independent operating modes, but the system operates in demand-pull/cargo assembly mode with limited Port inventories and larger mine buffers

  Aligning and structuring work considerate of port stockpile capacities and cross-system traffic requirements and optimisation

  Key focus on alignment of high impact Network maintenance in the shadow of extended Port in-loader outages to mitigate supply chain impacts.

- **Closure timing**

  Closure planning considers peak demand periods of December and June, and closure conflicts with adjacent corridors/branch lines are avoided where possible

Table 20 outlines the proposed Goonyella System integrated closure hours for FY25, including integrated system and branch line closures.

Table 20 Planned integrated closures and branch closures – Goonyella System

FY25 Integrated System Closures													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Hours	60	0	104	76	0	0	36	0	54	60	60	0	450
FY25 Integrated Branch Line Closures													
Location		Gregory (North and South)		Wotonga to Blair Athol and North Goonyella							Gregory North		
Hours		84	0	60	0	0	0	0	0	0	60	0	204

In addition to these Integrated System and Branch Line closures, single line maintenance activities have also been planned throughout the year. Timing and durations are tested against delivering DNC (ACAR 2023 FY25) and more broadly, Committed Capacity as well as being coordinated with other supply chain participants, where possible, to maximise supply chain alignment and throughput. MRSB Single Line Planned Possession hours for FY25 are 1206 hours consistent with Asset Activities. Note hours are not reflective of customer impact as it does not consider works planned in the shadow of port outages or other works to reduce impact. These hours do not include: moving products such as rail grinders, resurfacing, RTI and Road Patrols; maintenance works to be planned throughout the year or asset activity planned around train services (Plan throughs) as they do not impact capacity or services.

A Contingency closure is planned in May that will be used to recover scope. This is already a Gregory branch line closure but will be extended to ports for the contingency closure. If this contingency window is not used than the capacity will be returned for revenue services.

Critical path activities listed in Table 21 have determined the duration of the planned integrated closures and access requirements in the Goonyella System during FY25.

Table 21 Critical Scope – Goonyella System

Planned Delivery (Hours)	Asset	Location
60	Formation Renewal	Broadlea to Mallawa
104	Reinforced Concrete Box Culvert	Waitara
76	BCM	Wandoo – Waitara
36	Rail Renewal	Jilalan – Yukan
54	Rail Renewal	Hatfield –Bolingbroke
60	Track Upgrade	Black Mountain – Hatfield

Figure 24 illustrates the historical Goonyella integrated system closure hours in comparison to the FY25 Final Draft Proposal.

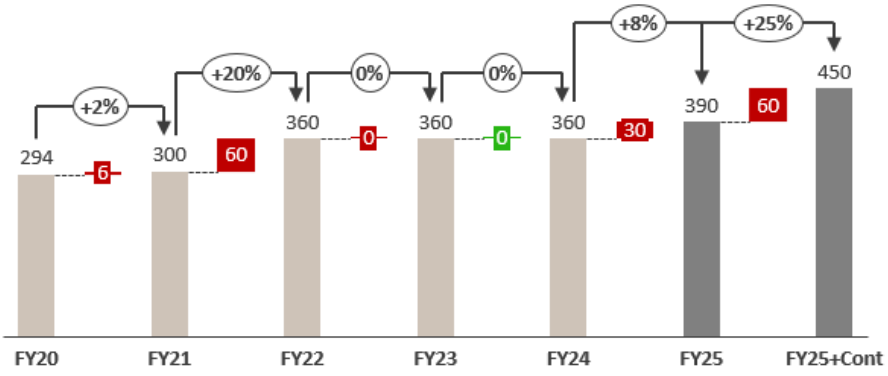


Figure 24 Trend of Integrated Closure Hours from FY20 to FY25 – Goonyella System

Aurizon Network's assessment of Useable Capacity for FY25 in the Goonyella system indicates an elevated level of risk (particularly during Q1 FY25, February 2025 and May 2025) of the system being able to deliver the proposed renewals and maintenance program as well as both Committed Capacity and DNC (ACAR 2023 FY25) from a Planning and Scheduling perspective.

These periods of high risk in Q1 FY25 and May 2025 are being driven primarily by extended in-loading outages at either one or both Ports. Aurizon Network aligned as much high impact Network maintenance in the shadow of the in-loader outages to take advantage of the reduced system capacity and therefore mitigate the impacts of this work.

February 2025 is predominately constrained by BCM undercutting and a relatively higher number of rail stress management jobs.

3.14 Goonyella System – FY25 Maintenance Strategy and Budget

Aurizon Network has developed its Draft Maintenance Strategy and Budget for the Goonyella System having regard to all relevant matters outlined in clause 7A.11 of UT5, including the Maintenance Objectives. Aurizon Network considers its FY25 Final Draft Proposal provides an appropriate level of asset activity that will promote the safety, reliability and performance of Goonyella System Rail Infrastructure and seeking to deliver Committed Capacity.

Summary of Historic, Forecast and FY24 Maintenance Strategy and Budget

Aurizon Network's FY25 Final Draft Maintenance Strategy and Budget for the Goonyella System provides for a Direct Maintenance Cost Allowance of $72.6m (excluding ballast undercutting plant depreciation) which is:

- $8.2m higher than the approved FY24 Maintenance Strategy and Budget
- $3.8m higher than Aurizon Network's current FY24 full-year forecast.

provides a summary of historic direct maintenance costs as well as the proposed direct maintenance cost allowance in respect of FY25.

To ensure comparability with prior periods, the direct maintenance costs shown in and Figure 26 exclude depreciation on ballast undercutting plant.

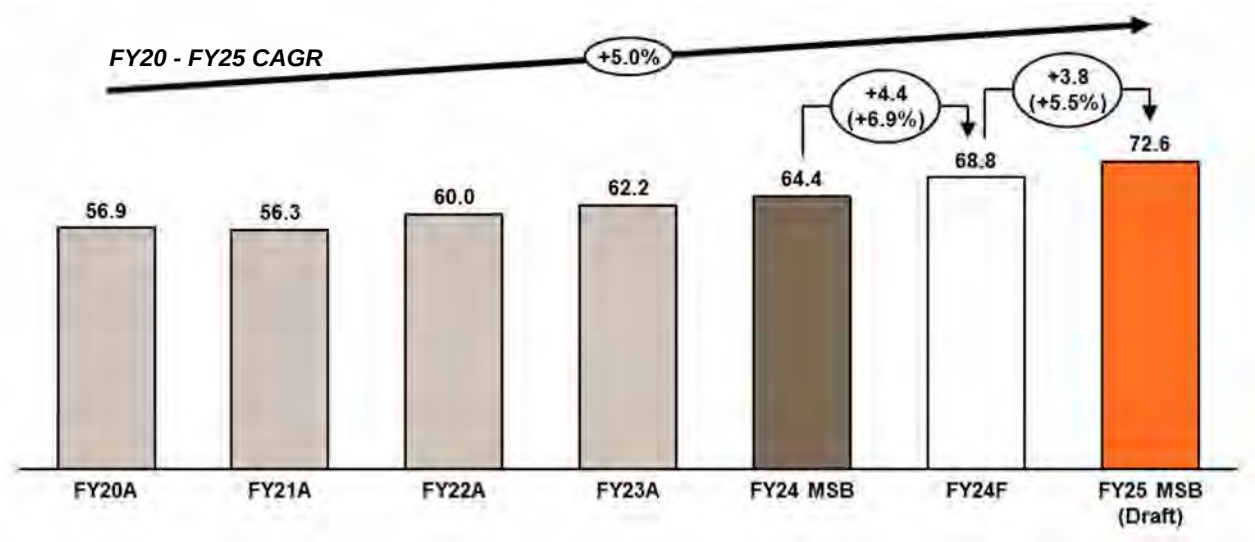


Figure 25 Direct Maintenance Costs – Goonyella System

Aurizon Network acknowledges that the FY25 Draft Proposal for Goonyella maintenance is c.5.5% higher than the current FY24 full-year forecast. Further information on the key drivers of this increase is outlined in Figure 4 below.

Aurizon Network notes, however, that annual cost increases of this magnitude have been observed in recent years for a multitude of inputs required for maintenance and renewal activities. To help put the FY25 Final Draft Proposal into context, Aurizon Network has considered the impact of actual inflationary outcomes over time.

While CPI can be used to measure the inflationary pressures in the broader economy, the basket of goods used to determine CPI are not representative of the necessary inputs for the asset maintenance and renewal task.

Consequently, the QCA has previously approved the use of a 'Maintenance Cost Index' **(MCI)**, to assess the expected change in maintenance costs over time.

The MCI is a weighted index that measures changes in four key cost categories, namely, Accommodation, Consumables, Fuel and Labour. The impact of CPI is considered within the 'Consumables' category. Aurizon Network has considered the inflationary impacts for these key categories over time, having regard to publicly available data[7]:

- actual published index values to June 2023
- annual growth rates to June 2025 using forecasts for CPI and the Wage Price Index published by the Reserve Bank of Australia.

Aurizon Network has assessed the compounding annual rate of growth **(CAGR)** in maintenance costs over the five-year period ending 30 June 2025. During this period, Aurizon Network estimates that the Goonyella System maintenance costs have increased at a rate of approximately 5.0% per annum.

In comparison, Aurizon Network notes that over the same 5-year period the:

- accommodation index is expected to increase 43% overall, or 7.4% per annum
- CPI is expected to increase 28% overall, or 5.0% per annum
- consumables index is expected to increase 48.5% overall, or 8.2% per annum
- fuel index is expected to see an increase 61% overall, or 10.0% per annum
- Labour index is expected to increase 16% overall, or 3.0% per annum.

The application of the QCA-approved MCI methodology indicates that input costs have increased at a rate of 5.6% per annum over the same period.

Aurizon Network has also assessed the annual change against two other indices with similar input costs. Specifically, the:

- Road and Bridge Construction Index[8]
- Coal Mining Index[9].

Results are summarised in Table 22 below, but on balance, Aurizon Network's observation is that it's cost performance over time has generally been favourable when considering actual inflation outcomes.

Table 22 Comparison of cost indices FY20 – FY25

FY20 to FY25 CAGR (% Change p.a)	MCI	Road and Bridge Construction	Coal Mining	AN's Maintenance Costs
Goonyella	5.6%	4.8%	5.1%	5.0%
Total CQCN				4.8%

[7] Publicly available data sourced from Australian Bureau of Statistics (actual published index results to June 2023) and the Reserve Bank of Australia CPI and Wage Price Index forecasts for FY24 and FY25.
[8] ABS, 6427.0 Producer Price Index, Table 11, Coal Mining, Series ID: A83737106J
[9] ABS, 6427.0 Producer Price Index, Table 17, Road and Bridge Construction, Series ID: A2333727L

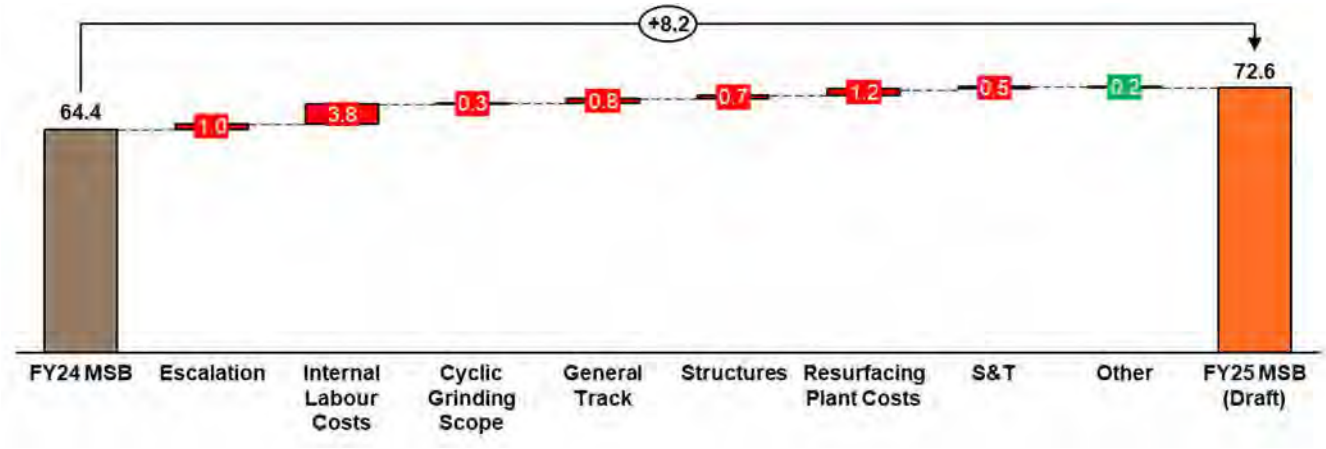


Figure 26 Direct Maintenance Cost Movement – Goonyella System

The FY25 Final Draft Maintenance costs (excluding ballast undercutting plant depreciation) is $72.6m. The increase in spend of $8.2m against the approved FY24 Maintenance Strategy and Budget is primarily driven by:

- cost escalation (+$1.0m) on contractors, materials and plant and other consumables
- internal labour costs (+$3.8m) associated with Infrastructure Enterprise Agreement outcomes, additional FTE to support mitigation of ageing workforce and attrition risks and costs associated with attraction and retention initiatives for critical roles and locations
- resurfacing Plant Costs (+$1.2m) driven by cyclic plant maintenance activities due in FY25 and an increase in plant maintenance labour costs to mitigate future attrition risk
- structures repairs program (+$0.7m) to rectify culvert drainage and cleaning and concrete bridge repairs, with the program of works expected to be completed over the next 3 years.

The current FY24 forecast takes account of actual conditions and is informed by actual conditions and maintenance costs from FY23 and Q1 FY24 and other identified costs expected to be incurred[10]. The Signalling and Telecommunications maintenance item is forecast to breach the materiality thresholds set in UT5. This is predominately driven by the additional labour costs and challenges in the Electrical discipline as described above. The FY24 forecast is subject to review and will be updated at the end of Q2 FY24.

An overview of the methodology used to establish the FY25 maintenance cost budget is provided in Section 0.

FY25 Maintenance Strategy and Budget

As detailed in Section 11.3, Aurizon Network's Asset Management approach is based on achieving the appropriate level of asset availability which will best meet customer requirements in each Coal System. The scope and closure requirements in different systems is influenced by demand, track arrangement, operating parameters, traction mode and signalling and communications systems.

Goonyella is the largest system by volume and by train density with some sections seeing a train every 21 minutes. The high tonnage and concentration of train movements results in a maintenance and renewal mix very similar to the Blackwater system that has longer haul lengths and aged infrastructure. The mix of maintenance to renewal costs for Goonyella can be seen in Table 23.

[10] Refer to Q1 FY24 Quarterly Performance Report for more detailed information on costs expected to be incurred.

Table 23 FY25 Draft Proposal – Maintenance and Renewal spend % split – System Comparison – Goonyella System

System	FY25 Renewals and Maintenance Cost ($m)	% Maintenance	% Renewal
Blackwater	225.4	34%	66%
Goonyella	**183.3**	**40%**	**60%**
Moura	38.9	43%	57%
Newlands	49.0	34%	66%

The planned and preventive maintenance activities and inspections, as well as the planned mechanised production scope, are derived in line with the intervention periods as detailed in the Asset Maintenance and Renewal Policy. This Policy determines the inspection regime and period based on asset type condition and locations.

For the scope listed above the typical approach is to take forward a like-for-like renewal. Appendix 2 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset Strategy for Permanent Way.

The proposed FY24 maintenance scope and budget for the Goonyella System is outlined in Table 24.

Table 24 FY25 Final Draft Proposal – Maintenance – Goonyella System

Maintenance Item	Scope Units	FY24 Budget Scope	FY24 Budget ($m)	FY24 Forecast Scope	FY24 Forecast ($m)	FY25 Budget Scope	FY25 Budget ($m)
Resurfacing			9.3		9.3		10.5
Mainline	Km	956	7.6	956	7.5	956	8.6
Turnout	Site	189	1.7	189	1.7	189	1.9
Rail Grinding			11.3		11.0		12.0
Mainline	Km	[redacted]	8.8	[redacted]	8.7	[redacted]	9.0
Turnout	Site	[redacted]	2.4	[redacted]	2.2	[redacted]	2.9
Level Crossing	Track LX	[redacted]	0.1	[redacted]	0.1	[redacted]	0.1
General Track Maintenance			16.0		17.4		17.4
General Track	Activity		15.4		16.3		16.7
Track Recording	Km	-	-	1,019	0.4	-	-
Ultrasonic Testing	Km	5,455	0.7	5,455	0.7	5042	0.7
Signalling and Telecoms			10.8		13.3		13.0
Signalling Corrective	Activity		3.2		3.6		3.6
Signalling Preventive	Inspection		4.8		6.8		6.4
Telecoms Corrective	Activity		0.3		0.4		0.3
Telecoms Preventive	Inspection		2.4		2.6		2.7
Electrical			7.4		7.7		8.8
OHLE Corrective			3.0		2.6		2.8

Maintenance Item	Scope Units	FY24 Budget Scope	FY24 Budget ($m)	FY24 Forecast Scope	FY24 Forecast ($m)	FY25 Budget Scope	FY25 Budget ($m)
OHLE Preventive			2.7		3.2		3.5
Power Systems Corrective			0.7		0.6		0.7
Power Systems Preventive			0.9		1.3		1.7
Structures and Facilities			2.3		2.4		3.0
Trackside Systems			1.5		1.9		2.1
Other Civil Maintenance			3.4		3.5		3.4
Other General Maintenance			2.4		2.4		2.5
Sub-Total			**64.4**		**68.8**		**72.6**
Ballast Undercutting Plant Depreciation			3.0		3.0		2.3
Total Direct Maintenance Costs			67.4		71.8		74.9
Non-Coal Allocation			(0.2)		-		(0.1)
Total			**67.2**		**71.8**		**74.9**

Note: Figures may not add due to rounding.

For the Goonyella System:

- **Direct Maintenance Costs** (excluding ballast undercutting plant depreciation) are budgeted to increase by $3.8m from the current FY24 forecast to $72.6m in FY25. Key movements in RIG maintenance categories are:
  - **Resurfacing (+$1.2m)** – increase in cost primarily driven by cyclical On Track Vehicle maintenance activities due in FY25 and an increase in plant maintenance labour driven by apprentice trade staff to mitigate future attrition risk.
  - **Rail Grinding (+$1.0m)** – FY25 mainline activities remain largely in line with FY24 with cost escalation and an increase in FY25 turnout grinding scope (due to an uplift in grind cycles) within the Dalrymple Bay precinct to address asset condition.
  - **General Track Maintenance ($0.0m)** – spend expected to be broadly in line with FY24 forecast. Reflects cost impact of additional FTE to support mitigation of ageing workforce and attrition risk across in the Civil discipline. These increases largely offset by non-recurring costs in FY24 for contract labour hire support and QR Track Geometry Recording Car contract both forecast to cease from January 2024.
  - **Signalling & Telecommunications (-$0.3m)** spend expected to be broadly in line with FY24 forecast. The maintenance cost impact of additional FTE to support mitigation of ageing workforce and attrition risk across in the Electrical discipline and increased maintenance activity levels. This is being largely offset by the progressive cessation of labour hire arrangements as apprentices and trainees become qualified.
  - **Electrical (+$1.0m)** – reflects the maintenance cost impact of additional FTE to support mitigation of ageing workforce and attrition risk across in the Electrical discipline and increased maintenance activity levels. Increased contractor costs to complete corrective oil regeneration

task. Marginally offset by the progressive cessation of labour hire arrangements as apprentices and trainees become qualified.

- **Structures (+$0.6m)** – driven by increased culvert drainage, paint protection & concrete defect repairs (as highlighted in the FY24 MRSB), FY25 planned commencement of higher scope to address the increasing number of defects under management. The draft budget also includes additional culvert cleaning costs to standardise the use of remote inspections by contractors for culverts less or equal to 900mm in height (as inspectors are unable to access entire culvert to assess asset condition). The quantity of defect scope in Goonyella indicates that 3 years are needed before this system returns to a lower "normal" maintenance scope and cost trend, and as the assets age there is still the potential of additional defects appearing that will need to be planned in for repair or could push out planned works due to criticality and/or location.

- **Ballast Undercutting Plant Depreciation (-$0.7m)** – ballast undercutting plant depreciation in total is largely in line with FY24F, with the allocation between systems based on the number of days that the ballast plant is expected to be operating in the Goonyella system in FY25.
- **Non-Coal Allocation** – this adjustment reflects an allocation of costs to non-coal services and is calculated by applying the actual non-coal volumes railed in Goonyella during FY23 to the QCA-approved AT1 Reference Tariff for FY25.

The scope of planned corrective and reactive maintenance tasks is heavily dependent on the faults identified via the planned inspection programs. Aurizon Network has assumed that in FY25 the Coal System will see a similar level of faults that require planned corrective or immediate response as in prior years.

For the Goonyella System, the following activities will be considered "items" for the purpose of UT5, clause 7A.11.5(f)(ii)(B)(2) – Resurfacing, Rail Grinding, General Track Maintenance, 'Signalling and Telecoms' and Electrical. The remaining activities, including 'Structures and Facilities', Trackside Systems, Other Civil Maintenance and Other General Maintenance are to be considered as an aggregated single item.

Figure 27 sets out a summary of historic, forecast and budgeted direct maintenance costs by maintenance category. To ensure comparability between periods, the direct maintenance costs presented in the chart exclude depreciation on ballast undercutting plant.

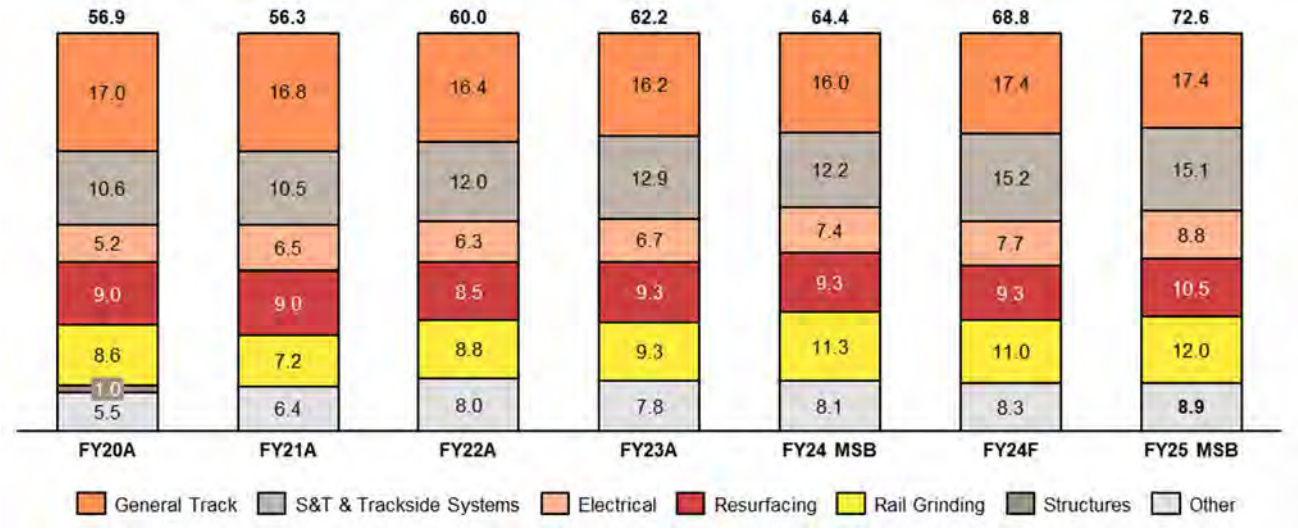


Figure 27 Direct Maintenance Costs – Goonyella System

Structures maintenance activity is expected to be higher in FY25 to support the rectification of culvert drainage and cleaning and concrete bridge repairs. With the program of works expected to be completed over the next 3 years, maintenance costs are expected to be sustained at this higher level until the program is completed.

Figure 28 illustrates the proportion of preventive, planned corrective and reactive maintenance expense in the Goonyella System over time. Approximately 57% of the Goonyella System maintenance spend in FY24 is expected to be preventive in nature.

As resurfacing activities are predominately preventative in nature, the impact of Cyclic maintenance activities on the Resurfacing equipment are the predominate driver of fluctuations in the proportion of preventative maintenance activities year on year, with costs associated with these activities forming part of the plant rate allocated to the resurfacing maintenance activity in the relevant year.

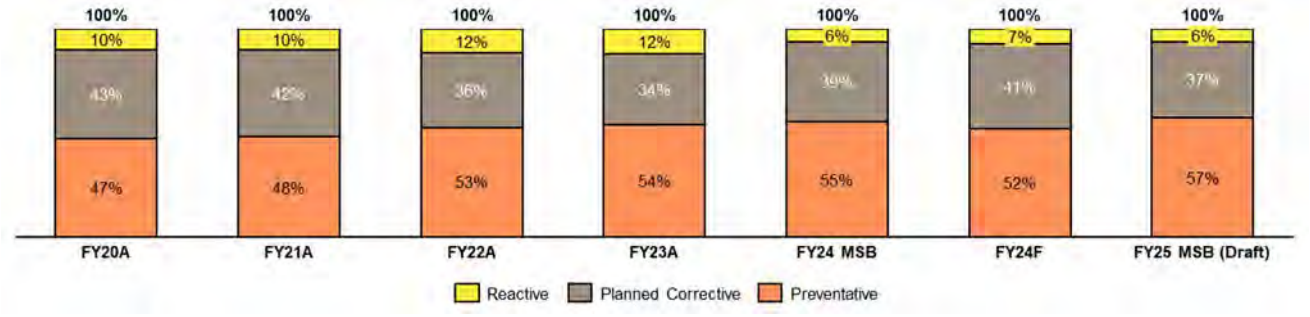


Figure 28 Preventive / Corrective Maintenance Spend Composition – Goonyella System

Further information in relation to the costing methodology used by Aurizon Network in the development of the FY25 Draft Proposal is outlined in Section 11.3. Additional detail in relation to the make-up of costs for each maintenance activity has also been provided to the RIG Expert Advisor.

3.15 Goonyella System – FY25 Renewals Strategy and Budget

Aurizon Network has developed its Draft Renewals Strategy and Budget for the Goonyella System having regard to all relevant matters outlined in clause 7A.11 of UT5. Aurizon Network considers its FY25 Final Draft Proposal provides an appropriate level of asset activity that will promote the safety, reliability and performance of Goonyella System Rail Infrastructure and seeking to deliver Committed Capacity.

Summary of FY25 Renewals Strategy and Budget

Aurizon Network's FY25 Final Draft Renewals Strategy and Budget for the Goonyella system provides for an asset Renewals requirement of $110.6m which is:

- $3.1m lower than the FY24 approved Renewals Strategy and Budget
- $8.5 m lower than Aurizon Network's current FY24 forecast.

A summary of the FY25 renewals budget for the Goonyella System is outlined below Table 25.

Table 25 FY25 Final Draft Proposal – Renewals – Goonyella System

Renewals Item ($m)	Assets Included	FY24 Approved Budget	FY24 Forecast	FY25 Draft Budget
Civil Assets		85.1	91.1	86.1
Permanent Way	Rail, Track, Sleeper, Turnouts	24.5	27.1	30.8

Renewals Item ($m)	Assets Included	FY24 Approved Budget	FY24 Forecast	FY25 Draft Budget
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	38.1	38.6	35.8
Structures	Culverts, Bridges	11.3	12.0	8.2
Civil Renewals	Formation, Level Crossings, Access Points	11.2	13.4	11.3
Control Systems Assets	Safe Working, Train Control and Detection, Interlocking, Telecoms, Power Resilience, Transmission	17.8	17.2	14.7
Electrical Assets	Overhead Line Equipment and Power Systems	10.8	10.8	9.8
Total		**113.7**	**119.1**	**110.6**

Note: Figures may not add due to rounding.

The FY24 forecast variance to the approved FY25 Renewals Strategy and Budget is primarily driven by:

- **Cost Escalation –** Variations across program largely impacted by labour and non-labour escalation outlined in Section 11.3.2.
- **Permanent Way (+$3.7m)** – Planned scope has remained steady for FY25, however the increase in renewal spend is a function of labour and non-labour escalation, particularly the cost of materials (steel, concrete).
- **Ballast Cleaning (-$2.8m)** – Planned scope is reduced in FY25 in Goonyella compared to previous years due to the Ballast Cleaning Machine moving to Newlands in FY25, scope will return to previous levels in FY26. Costs for Mainline Undercutting have been estimated having regard to the expected ballast return rate which have in turn been informed by pre-dig assessments completed during development of the FY25 MRSB. This pre-dig information has been used to help inform estimates of ballast quantity requirements, ballast delivery costs and ballast removal (spoil) costs.
- **Structures (-$3.8m)** – Planned Bridge Renewal scope has decreased in FY25, with focus on Bridge Design Scope in the Goonyella system for future renewal scope.
- **Control Systems (-$2.4m)** – Optical Fibre – FY25 will see a new vendor transitioning to the program from FY24 introduction, however scope is reduced in FY25 to previous year to lower the risk of any delivery delays moving to a new vendor.

The detail of the changes to the FY25 program and all variances in FY25 will be detailed as part of the Quarterly RIG reporting process.

Figure 29 below shows the distribution of scope locations as well as the relative spend per scope. As is typical of prior years in the Goonyella system the works completed are most concentrated on the Goonyella mainline aligned to these track sections seeing 100% of system traffic. There is also investment on branch lines and individual mine balloon loops.

The largest single scope item for FY25 is the renewal of a bank of nine (9) 2400x1200 box culverts each 19m long at Waitara, 98.8km point on the Goonyella mainline.

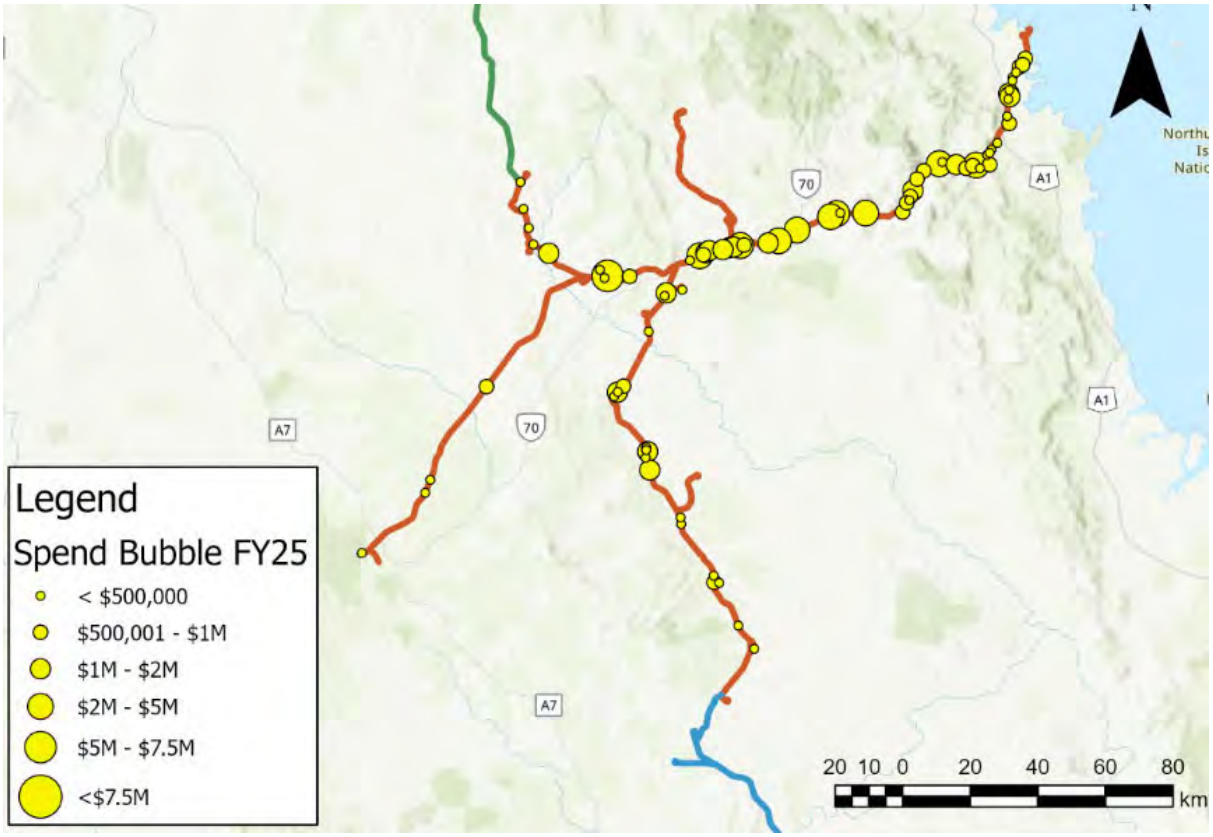


Figure 29 – Map of scope location and Spend FY25

Table 26 details a summary of Goonyella system asset renewals as a percentage of total system assets.

Table 26 FY25 Final Draft Proposal – Renewals as a % of Total System Assets – Goonyella System

Renewals Item	Assets Include:	Total system Assets	FY24 RIG Approved Scope	FY25 Proposed Scope	FY25 scope % Total System Assets
Civil Assets					
Permanent Way	Rail, Track, Sleeper, Turnouts	• 2,032 rail km Rail • 1,016km sleepers • 1,016km track • 399 turnouts	• 22.8 rail km Rail • 0km sleepers • 8.4km track upgrade • 2 turnouts	• 24.0 rail km Rail • 0km sleepers • 8.3km track upgrade • 0 turnouts	• 1.2% • Nil • 0.8% • Nil
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	• 1,016km track • 399 turnouts • 103 bridges	• 61.5km Mainline • 23 turnouts • 1 bridge	• 50.1km Mainline • 19 Turnouts • 0 bridge	• 4.9% • 4.8% • Nil
Structures	Culverts, Bridges	• 103 bridges • 1,169 culverts	• 1 bridge • 9 culverts	• 0 bridge • 8 culverts	• Nil • 0.7%
Civil Renewals	Formation, Level Crossings, Access Points	• 1,016km formation • 277 level crossings	• 1.9km formation • 3 level crossings	• 0.6km formation • 2 level crossings	• 0.1% • 0.7%
Control Systems Assets	Safe Working, Train Control and Detection, Interlocking, Telecoms, Power Resilience, Transmission		• 49 Sites • 21 Units • 52.3km Optic Fibre	• 39 Sites • 9 Units	
Electrical Assets	Overhead Line Equipment, Feeder Stations, Autotransformers, SCADA system		• 22 Sites • 31 Units • 29 Structures	• 3 Sites • 31 Units • 14 Structures	

Note:

- Control Systems count of assets is a collective of sites, nodes, cable routes, communications assets and systems and is included to indicate level of work comparable to prior year.
- Electrical count of assets is a collective of sites, earthing and bonding, current detection, insulator renewal, transformer renewal, protection relay replacement etc.

Figure 30 illustrates the FY24 Approved Budget and draft FY25 asset renewal program by renewal type (categorised as baseload scope, reactive renewals, strategic scope, future scope).

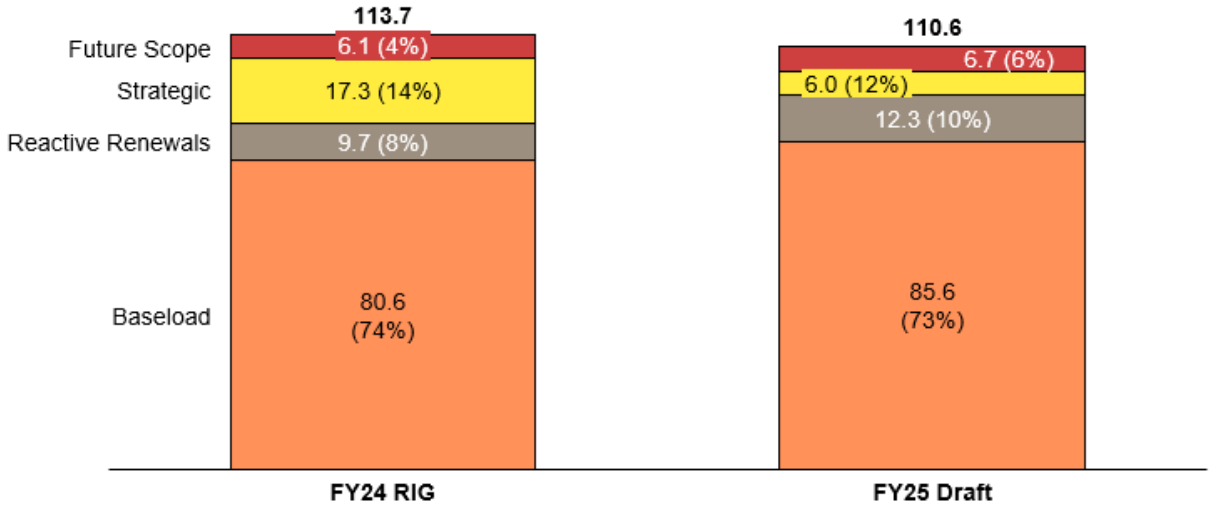


Figure 30 Split of Renewals by Category FY24B and FY25 – Goonyella System ($m)

In relation to the above chart, the following comments are made:

- **Baseload renewal** – represents the majority of the proposed FY25 Asset Renewal program. Reduction against prior period driven by a reduction in permanent way renewals triggered by condition
- **Reactive renewal** – includes 3.6km allowance for ballast cleaning reactive scopes
- **Strategic scope** – includes the continuation of the strategic Goonyella Ports OHLE Renewals program, UTC/DTC, TETRA Radio rollout and scope development relating to the Substation Renewal Program
- **Future scope** – includes cost of designs relating to structures, level crossings, turnouts and formation to be delivered in future years.

Further information in relation to the scope categorisation used by Aurizon Network in the development of the FY25 Final Draft Proposal is outlined in Section 11.1

Details of the FY25 Renewals Strategy and Budget

This section provides detailed information in relation to the individual scope items selected for renewal in FY25, along with the rationale for those selections and alternative options considered.

Additional information is provided in relation to strategic scope items given these are either new or continuing programs of scope that are not typical of scope seen in previous years.

This section should be read in conjunction with Aurizon Network's Detailed Scope Report. This Power BI report provides detail on the individual scope items including works location, Combined Risk Assessment (**CRA**) score and comments supporting the rationale for those selections.

Section 0 provides further detail on how asset condition and criticality is used to determine whether scope is critical, required for system reliability or strategic, and alternate approaches considered when planning a renewal. For each scope item:

- the location of the bubble indicates the Scope Priority Model ranking for asset condition and location or operational criticality

- the size of the bubble represents the number of sites and/ or tasks to be renewed.

The maps included in this section indicate the location of the proposed scope.

Aurizon Network notes that the prioritisation of renewals scope is based on currently available information and that this prioritisation may change over the period prior to execution (of up to 18 months) due to environmental factors, relative degradation rates or other considerations. Changes to the proposed scope will be dealt with through the reporting and change management processes as appropriate.

3.16 Civil Assets – Permanent Way

Permanent Way Renewal Program.

Aurizon Network's FY25 Final Draft Proposal provides $30.8m to deliver the scope of permanent way renewals in the Goonyella System. Table 27 summarises the scope and budget for each relevant renewal item.

Table 27 FY25 Permanent Way Renewals – Goonyella System

Renewal Item	Scope Type	FY25 Scope	Scope Unit	FY25 Budget ($m)
Rail Renewal	Baseload	24.0	Rail km	11.0
Track Upgrade	Baseload	8.3	Track km	14.3
Turnout Components	Reactive Renewals		Lumpsum	3.6
Turnouts Designs	Future Scope	16	Turnout	0.9
Permanent Way Other	Reactive Renewals		Lumpsum	1.0
				30.8

In FY25, 4 Track Upgrade scope items will be completed in the Dalrymple Bay Balloon loop to renew rail, sleepers and ballast due to corrosion from the coastal location paired with high coal fouling resulting in a corrosive environment for the steel for rail, lugs and sleeper fasteners.

There are 16 Turnout Designs planned for FY25. Turnout designs are delivered over a multi-year program and are grouped where possible for efficiency, which can lead to variations between design costs for each design.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Permanent Way.

However, Aurizon Network has adopted alternate approaches for the Permanent Way scope in FY25. All sleeper renewals conducted as part of track upgrade scope will involve replacement of existing fist clip sleepers with concrete pandrol e clip sleepers.

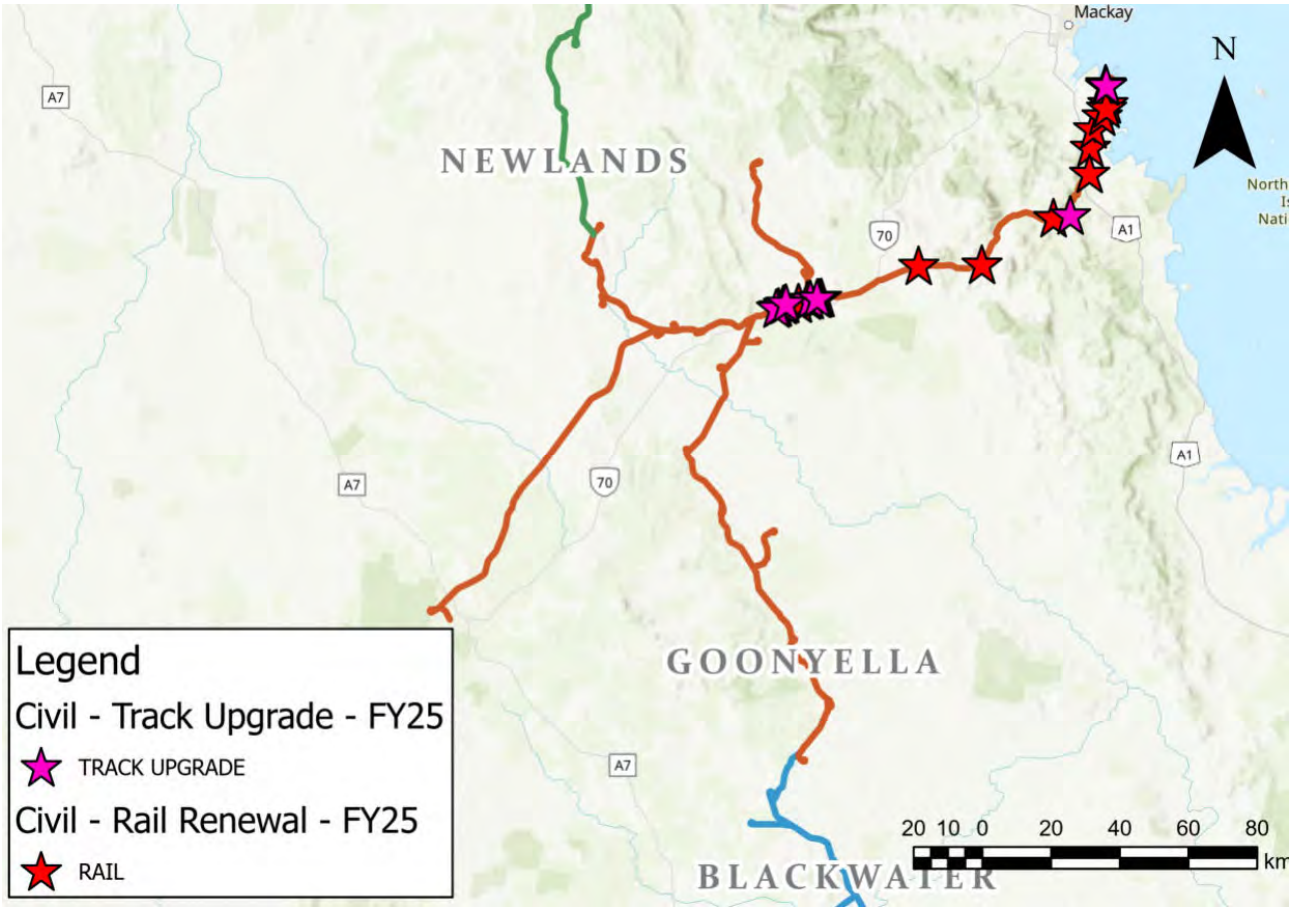


Figure 31 Rail Renewal, Track Upgrade and Turnout Sites – Goonyella System

Permanent Way FY25 Scope – Asset Condition and Criticality Assignment

Figure 32 plots the planned permanent way renewals against asset condition and location / operational criticality. All planned FY25 renewals are either advanced in wear or degradation and/or located in track sections identified as critical to maximising throughput. All rail renewal sites and track upgrade sites have a condition score above 3.5.

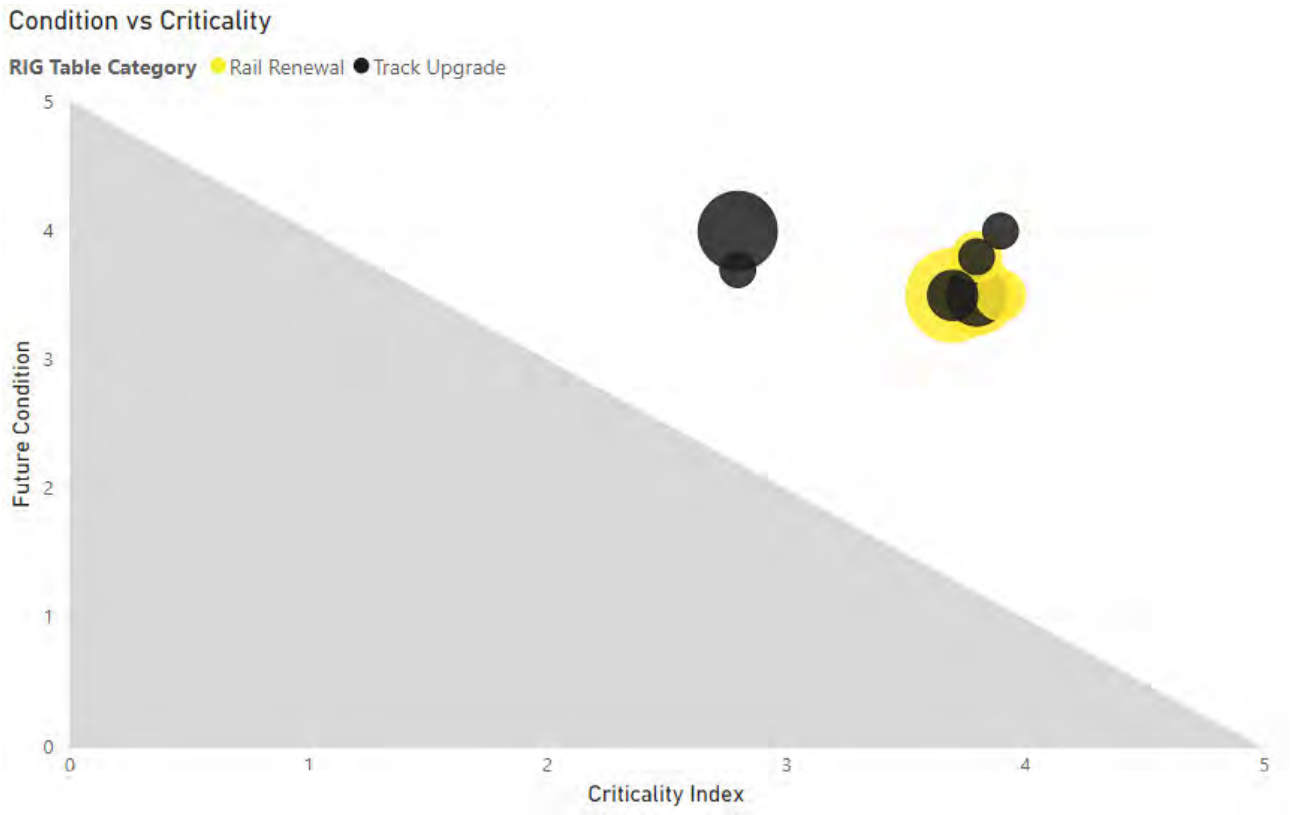


Figure 32 Permanent Way – FY25 Scope Priority Ratings – Goonyella System

3.17 Civil Assets – Ballast Cleaning and Renewals

Ballast Cleaning Renewal Program

In FY25, Aurizon Network proposes to undertake 50km of ballast cleaning across mainline undercutting and reactive undercutting works at a cost of $35.8m. Table 28 below summarises the scope and budget for each relevant renewal item.

It should be noted that for Ballast Cleaning, historical performance indicates that approximately 10% of scope can be lost due to unplanned impacts (e.g., wet weather, incidents). In such circumstances, a loss of scope will not directly translate to a proportional reduction in cost given the predominantly fixed-cost nature of Ballast Undercutting.

Table 28 FY25 Ballast Cleaning Program – Goonyella System

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Mainline Undercutting	Baseload	42.6	km	25.3
Mainline Excavator Undercutting	Baseload	4.0	km	2.7
	Reactive Renewals	3.6	km	3.0
Turnout Undercutting	Baseload	19	Turnout	3.3
Bridge Rollout	Future Scope	2	Site	0.0
Monumenting	Baseload	10	Site	0.8
Ground Penetrating Radar	Future Scope		Lumpsum	0.7

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
				35.8

Planned scope for mainline undercutting is reduced in FY25 in Goonyella compared to previous years due to the Ballast Cleaning Machine operating in the Newlands system in FY25 thus reducing the availability of the Ballast Undercutter in other systems. Aurizon Network expects the ballast undercutting scope in Goonyella to return to more typical levels in FY26.

The traditional approach to setting mainline ballast cleaning scope was to apply an assumed ballast return rate across the program. Actual ballast condition can vary significantly between locations and can lead to fluctuations in the actual return rates that can be achieved compared to the assumed amount. Such variation can result in scope not being completed within the assigned access opportunity.

The proposed budget for FY25 Ballast Cleaning mainline scope includes costs for early pre-dig assessments at each site. This information will be used to increase planning accuracy of return rates and closure duration requirements as well as reducing the risk of not completing scope within planned. This deeper understanding of latent ballast condition has seen an increase in the assumed volume of ballast required given the high spoiling rates of the selected locations.

The increase in ballast material requirements coupled with the need to remove the spoiled ballast from the worksite has contributed to an increase in estimated unit cost compared to prior years.

The pre-dig information has enabled an improved level of certainty with respect to closure requirements for site specific scope items.

Detailed information on the development of the ballast cleaning program is included in Section 11.3 Budget Setting and Procurement.

In the FY25 Mainline Program, the average length of scope is longer than previous years with an average site length of 3.5kms, greater than 1.6km average site length for the last 3 years. These longer sites lead to improved undercutting delivery efficiency as there are less cut in and cut out activities as well as a reduction in machine repositioning.

An allocation to re-establish a portion of monuments is included in the Ballast Cleaning Program in FY25. This includes detailed survey, design and installation of new track data plaques. This enables future track maintenance activities to align to the design alignments. The alignment and height of track moves over time due to temperature changes, train operations, maintenance and construction activities which can give rise to track buckles, breaks, accelerated rail wear and contact wire geometry exceptions (in electrified systems). Track monuments are located within the rail corridor immediately adjacent to track as fixed in-ground posts or on electrical masts to indicate the correct level or position of the track. Measurements are taken from these to confirm the correct position of the track to ensure that the ballast cleaning activity and associated resurfacing correctly locates the track to the design alignment.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Ballast Cleaning.

There are no bridge rollout sites proposed in FY25 for the Goonyella System.

Ground Penetrating Radar (GPR) data continues to provide important information to help understand sub ground conditions. This information is used to measure fouling and to allow comparison of the FY24 data against prior data sets to plan for future renewal requirements. GPR is a critical input to the Aurizon Ballast

Condition Analyser tool that utilises historical GPR, historical undercutting and track resurfacing and rainfall data to predict ballast fouling growth at the site level to identify future scope locations and volume.

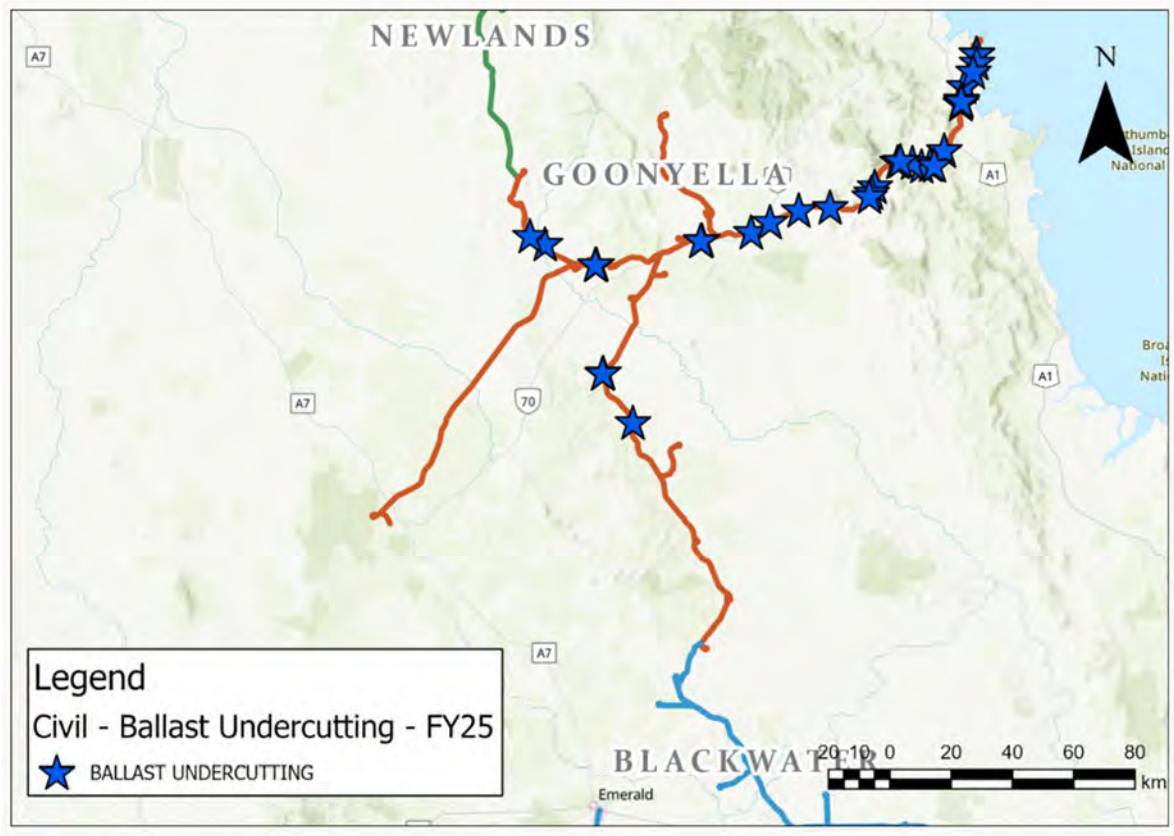


Figure 33 Ballast Cleaning Sites – Goonyella System

Ballast Cleaning FY25 Scope – Asset Condition and Criticality Assignment

Figure 34 plots the planned Ballast renewals against asset condition and location / operational criticality. All identified Ballast Undercutting scope has a current condition of 3.5 or above. The average condition for the FY25 program is 4.0.

The Turnouts at Peak Downs and Dalrymple Bay are prioritised for ballast cleaning in the FY25 program with a criticality index of below 3.0 which is a lower criticality scope due to their location however the condition of 3.5 makes these renewals a priority for FY25.

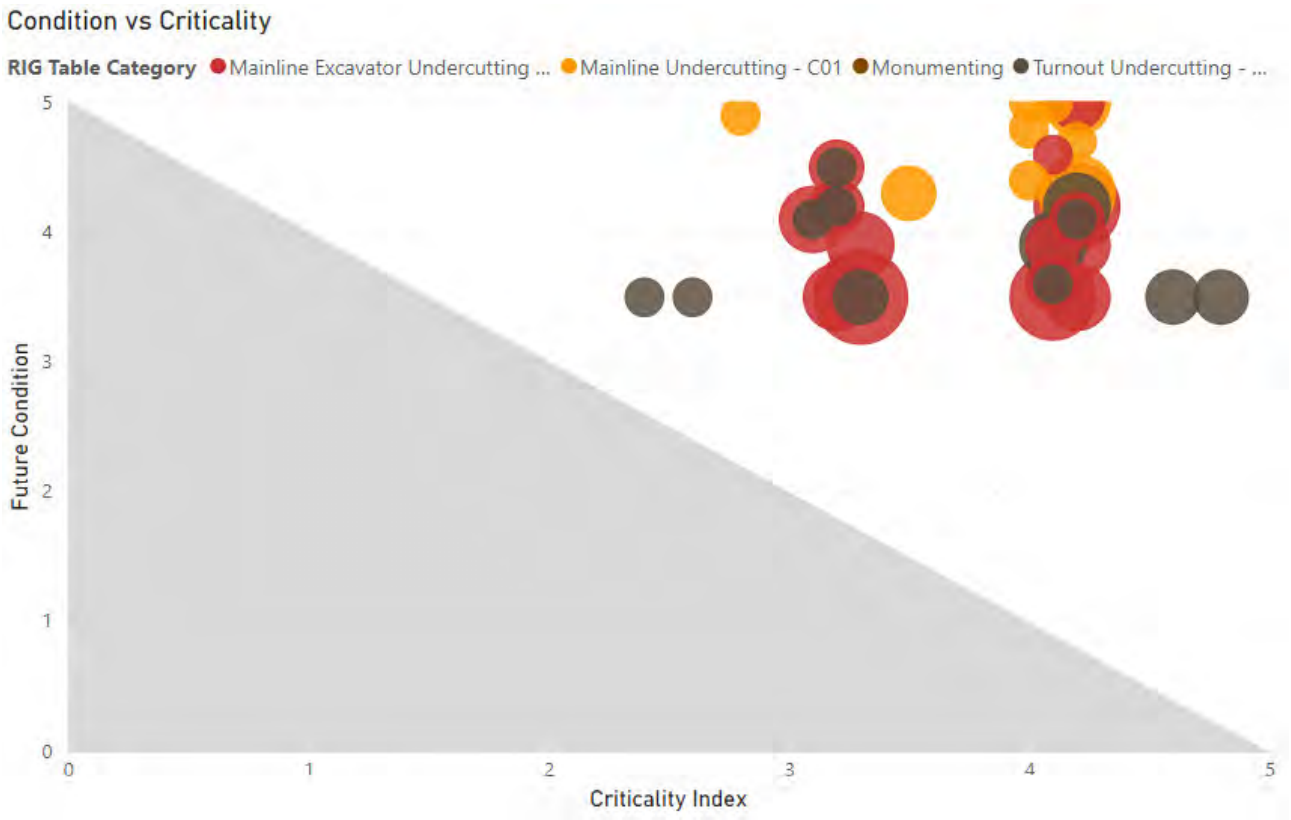


Figure 34 Ballast Cleaning – FY25 Scope Priority Ratings – Goonyella System

3.18 Civil Assets – Structure Renewals

Structure Renewals Program

The Goonyella System has a total of 103 Bridges and 1,169 Culverts which are designed to allow the natural flow of water through the rail network. Aurizon Network proposes to undertake $8.2m of structures renewal works in FY25. Table 29 summarises the scope and budget for each relevant renewal item.

Table 29 FY25 Structure Renewals – Goonyella System

Description	Scope Type	FY25 Scope	Scope Unit	FY25 Budget ($m)
Bridges Design	Future Scope	1	Site	0.1
Culvert Design	Future Scope	18	Site	0.6
Culvert Renewals	Baseload	8	Site	7.5
				8.2

The largest Culvert Renewal site in the FY25 program is at Waitara and will remove and replace a 19m culvert across three tracks with 9/2400x1200 Reinforced Concrete Box Culverts This culvert has previously been propped to extend the life and now requires renewal. The FY25 program includes an additional 6 culvert designs over FY24.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Structures Assets.

However, Aurizon Network has adopted alternate approaches for the Structures scope in FY25:

- Renewing with shorter life assets:
  - 2 of the planned 8 sites will see aged pipes lined with CIPP opposed to full remove and replace.
  - 2 of the planned 8 sites will see the existing concrete box culverts sleeved with a reinforced concrete lining system. Again, opposed to full remove and replace.

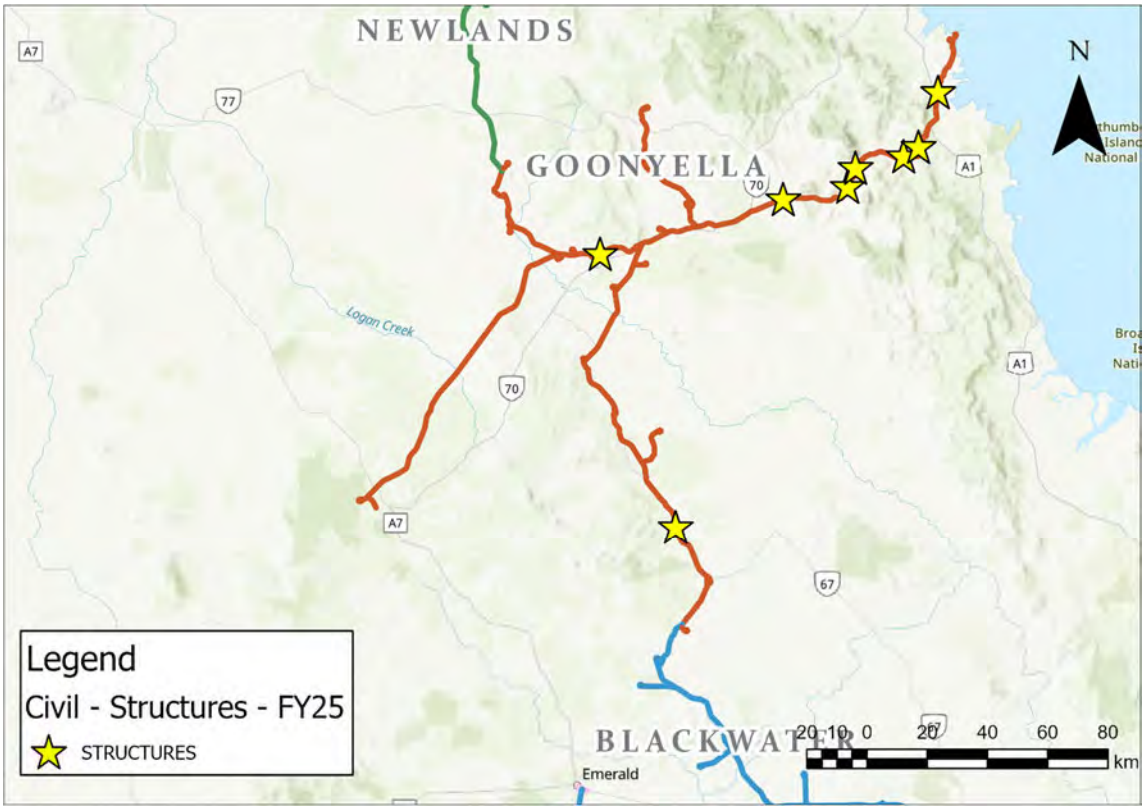


Figure 35 Structures Renewal Sites – Goonyella System

Structures FY25 Scope – Asset Condition and Criticality Assignment

Figure 36 plots the Structures against asset condition and location / operational criticality. The average condition for the FY25 program is 3.8.

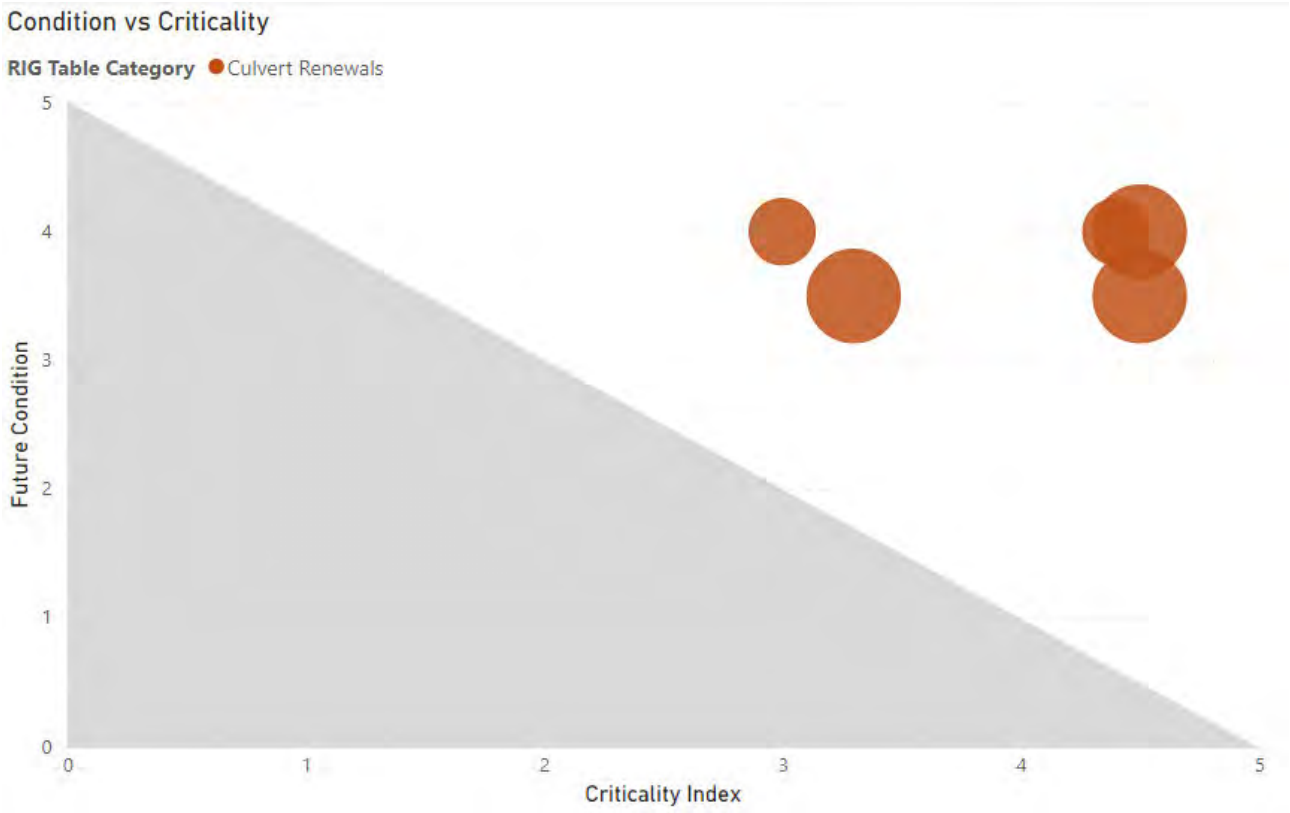


Figure 36 Structure Renewals – FY25 Scope Priority Ratings – Goonyella System

3.19 Civil Assets – Civil Renewals

Civil Asset Renewal Program

In FY25, Aurizon Network proposes to undertake $11.3m in renewals for these assets. Table 30 summarises the scope and budget for each relevant renewal item.

Table 30 Civil Asset Renewal Program – Goonyella System

Description	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Level Crossing Renewals	Baseload	2	Site	3.0
Level Crossing Design	Future Scope	3	Site	0.1
Level Crossing Other	Reactive Renewals		Lumpsum	0.1
Formation Renewals	Baseload	0.6	km	3.2
Formation Other	Future Scope		Lumpsum	0.0
Formation Reactive	Reactive Renewals		Lumpsum	3.0
Slope Stability	Future Scope	2	Site	0.2
Corridor Fencing & Security Fencing	Reactive Renewals		Lumpsum	1.1
Access Points & Roads	Future Scope	3	Site	0.1
	Reactive Renewals		Lumpsum	0.4

Description	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
				11.3

The Level Crossing Renewal at Ingsdon has significant drainage issues and culverts will be installed with the renewal which has added to the scope cost at this location. The site also requires a diversion for road traffic while the level crossing is constructed. There is no alternate access for the Level Crossing at Hay Point, which is currently also experiencing significant drainage issues, making this site a priority in FY25.

Corridor and Security (fencing) cost estimate is increased in FY25 to allow for the completion of increased identified scope to manage the condition of fences and decrease cost impacts and track interruptions due to trespassers and animals in the corridor at identified locations.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Civil Assets.

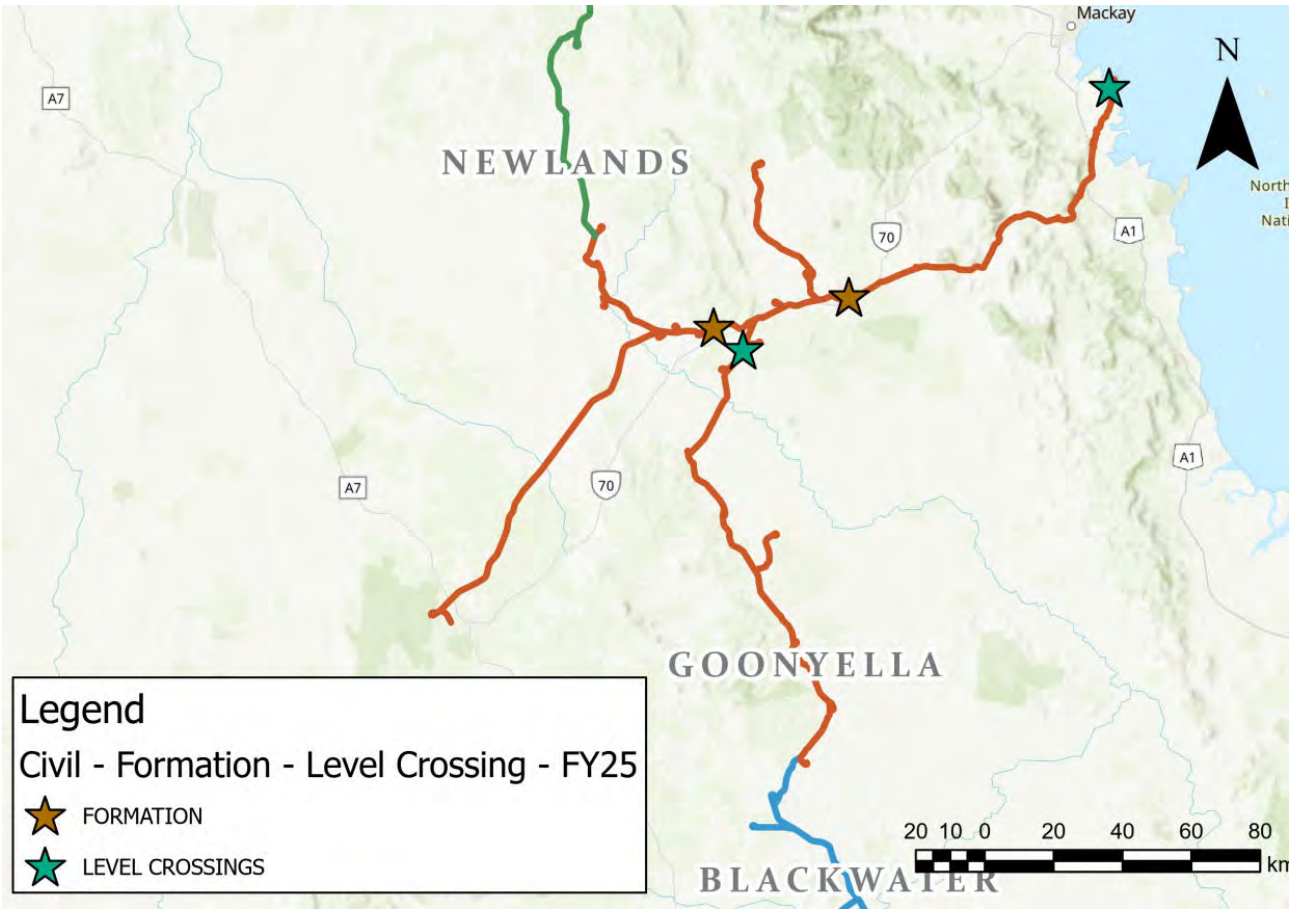


Figure 37 Formation and Level Crossing Renewal Sites – Goonyella System

Civil Renewals FY25 Scope – Asset Condition and Criticality Assignment

Figure 38 plots the civil renewals against asset condition and location / operational criticality.

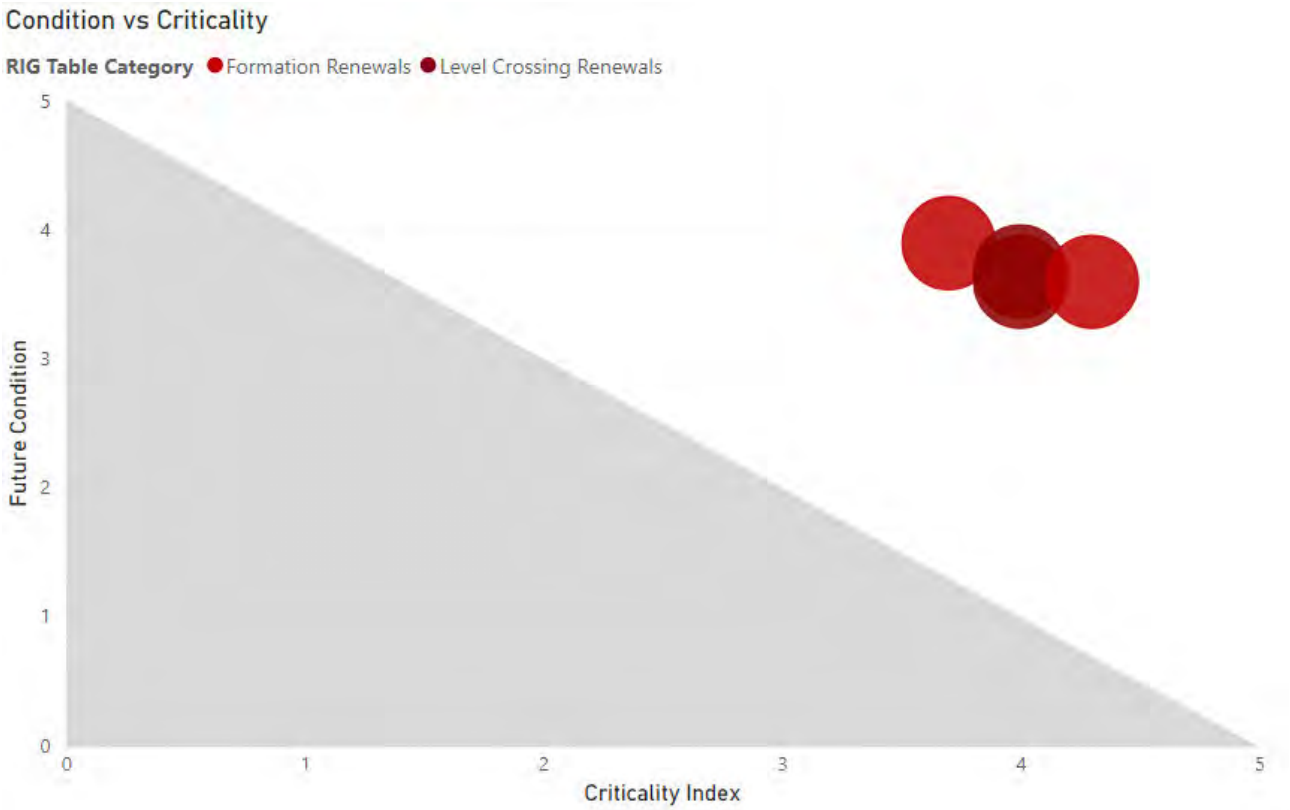


Figure 38 Civil Renewals – FY25 Scope Priority Ratings – Goonyella System

3.20 Control Systems Assets

Control Systems Renewal Program

In FY25, Aurizon Network proposes to undertake the following Control systems renewal in the Goonyella system at an estimated cost of $14.7m. Table 31 summarises the scope and budget for each relevant renewal item.

Table 31 Control Systems Renewal Program – Goonyella System

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Safe Working Systems – Asset Protection	Future Scope	2	Unit	0.2
Safe Working Systems – Train Detection	Baseload Future Scope	2 4	Site Site	7.0 1.6
Safe Working Systems – Minor	Baseload Future Scope	13 18	Site Unit	1.2 0.4
Transmission & Data Renewals	Baseload Future Scope Strategic	17 2	Site Site Lumpsum	1.4 0.1 0.1
UTC DTC	Future Scope Strategic	10	Site Lumpsum	0.9 0.9
Other Control System Renewals	Baseload	5	Site	0.7

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
				14.7

FY25 Safe Working Systems Baseload Scope will include Train Detection renewal at Mallawa and Peak Downs which will replace frequency track circuits with axle counters. Mallawa is a full replacement and Peak Downs is a partial critical parts replacement. In the Asset Protection Program, 2 designs will also be completed for Weighbridges at North Goonyella and Wandoo.

The Safe Working Systems Minor program includes Points Improvements with contactor upgrades at 9 sites as well as design for future programs.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Control System.

Given the high proportion of these renewals being triggered by obsolescence, the technology will be typically the modern-day equivalents and provide an uplift in speed and/or capacity.

Strategic Scope:

TETRA Radio ($0.1m)

The digital based Terrestrial Trunked Radio **(TETRA)** network has been in operation since late 2019 and will eventually replace the analogue train control radio system, which is more than 20 years old, occupies radio frequencies that need to be handed back to the federal government. The radio system primarily provides vital voice communications between Network Control Officers and Rail Traffic Crew throughout the CQCN. It also allows Rail Traffic Crew to communicate with Rail Transfer Facilities **(RTF)** and workers on the corridor.

In FY25, TETRA radio bases and software will be upgraded to address coverage for identified black spots.

UTC/DTC ($0.9m)

Safety and Operational Improvements for Network Train Control system. Scope includes train control system applications, user interface changes and engineering controls for safety processes. Operational requirements for delivery of individual scope items are subject to change due to criticality requirements, e.g. post an incident or process breakdown.

FY25 UTC/DTC scope will include Future Scope for digital telemetry designs at 10 sites. This is a strategic program to upgrade the telemetry system at each interlocking.

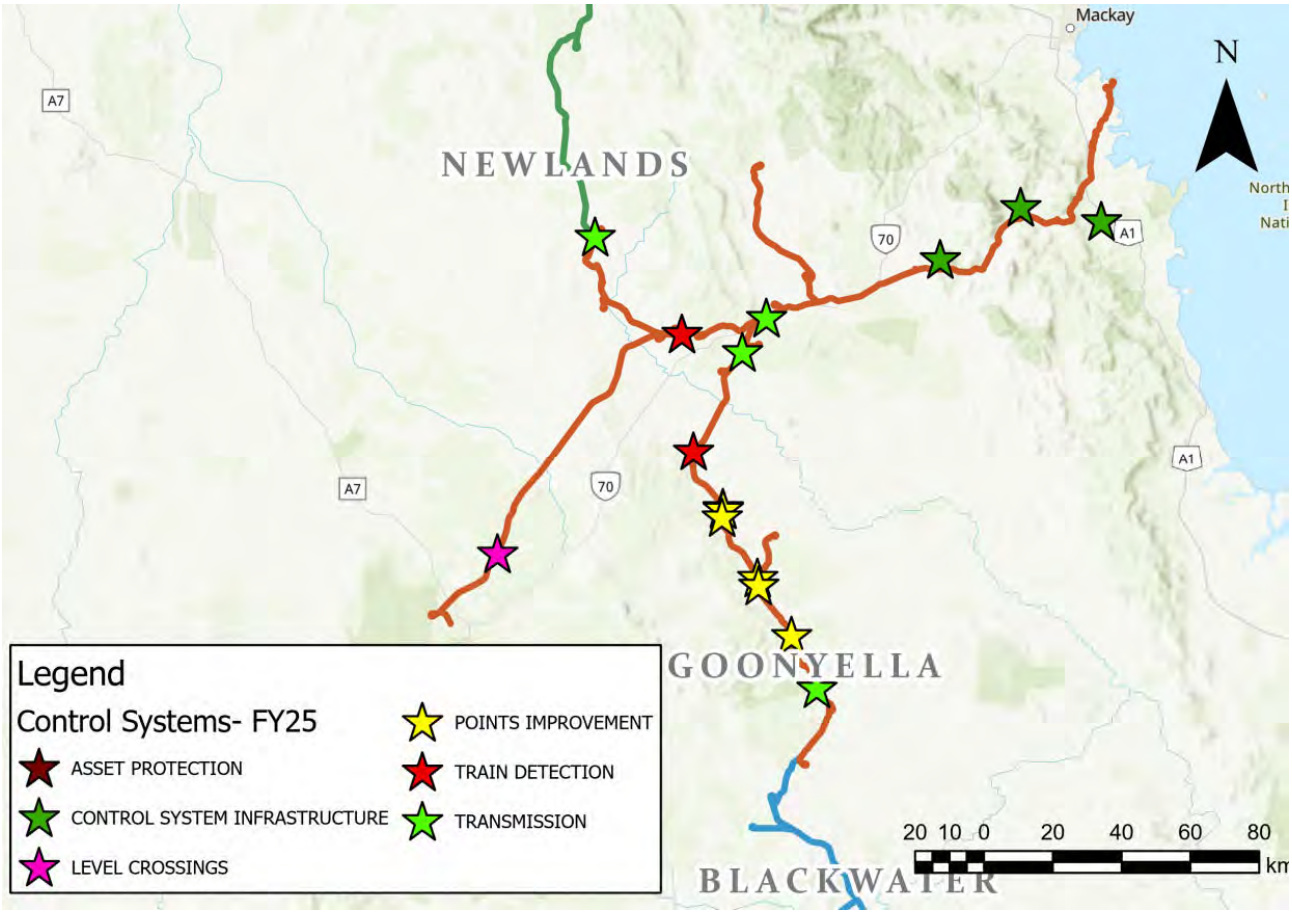


Figure 39 FY25 Control Systems Renewals – Goonyella System

Control Systems Assets – FY25 Scope Asset Condition and Criticality Assignment

Figure 40 plots the Control Systems renewals against asset condition and location / operational criticality.

All scope items across all items are listed as condition rating 4. This reflects the age of assets targeted for renewal in FY25. Control Systems assets are mostly electronic, so renewal is triggered by a lack of software support, spare parts, or obsolescence. As such, condition is more a matter of asset age against design life rather than a physical demonstration of wear.

Of note:

- Safe Working Systems – Minor Diagnostic PC Renewal site at Hay Point has a criticality of 2 and a condition score of 4.5.

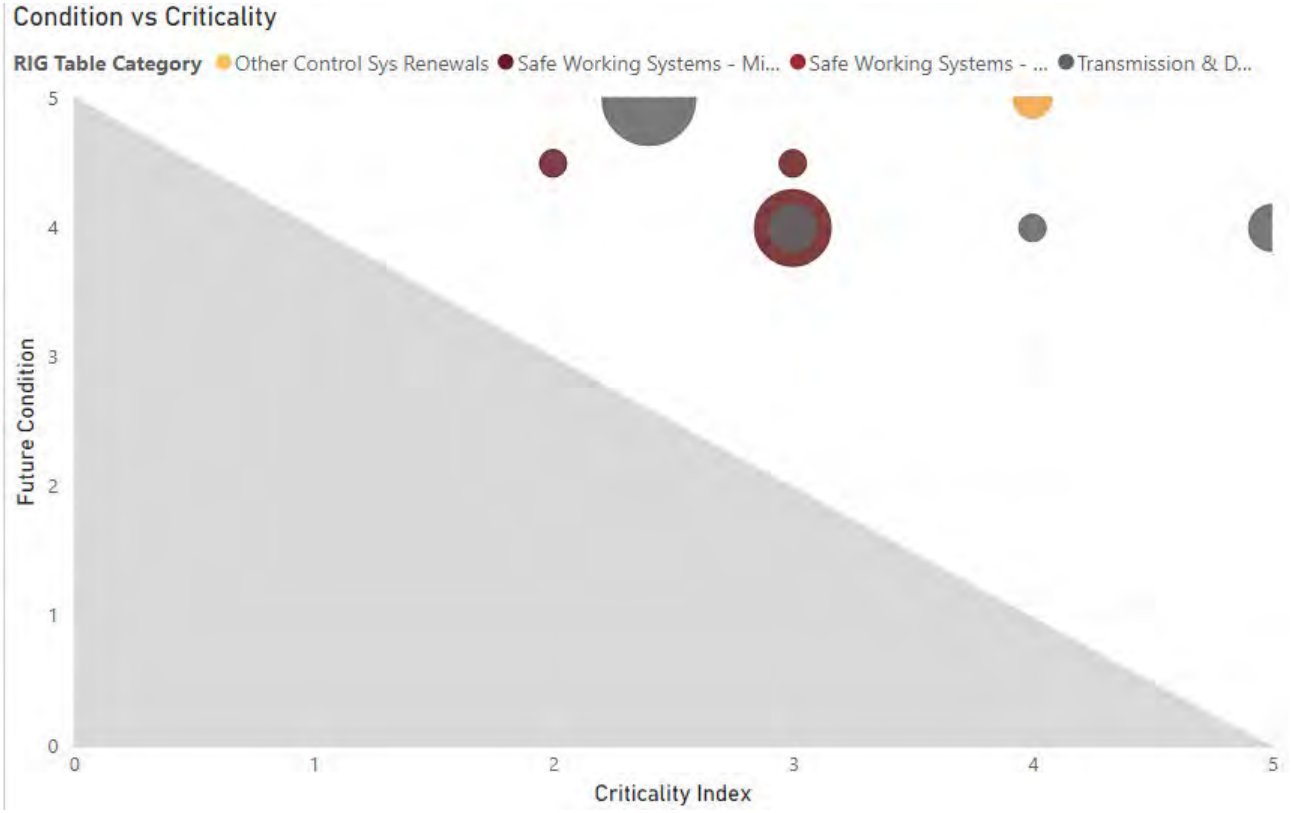


Figure 40 Control Systems – FY25 Scope Priority Ratings – Goonyella System

3.21 Electrical Assets

Electrical Renewal Program

Several of Aurizon Network's power systems assets are nearing the end of their design life. Aurizon Network is progressing its analysis to better understand options with respect to future power systems renewal requirements. As this work develops, Aurizon Network will engage with the RIG in relation to the preferred options.

In FY25, Aurizon Network proposes to undertake the following Electrical renewals or enhancements in the Goonyella system at a cost of $9.8m. Table 32 summarises the scope and budget for each relevant renewal item.

Table 32 Electrical Asset Renewal Program – Goonyella System

Renewal Item	Scope Type	FY25 Scope	Scope Unit	FY25 Budget ($m)
Overhead Line Equipment Renewal	Baseload	25	Unit	3.0
	Future Scope	1	Site	0.5
	Strategic	1	Site	2.4
Power Systems Renewals	Baseload	19	Site	1.2
	Future Scope	7	Site	0.1
	Strategic	3	Unit	2.5
				9.8

The FY25 Overhead Line Equipment renewal scope will include 14 termination portals across 7 sites and Headspan renewals across 11 sites at Peak Downs and Dysart. One major design will be completed for Feeder Wire Clearance Improvements at Balook in FY25.

Power Systems Baseload scope will renew 12 Motorised Isolators and 5 Relays as well as renewals at two sites for Earthing and Bonding at Dalrymple Bay Coal Terminal and the Power Sectioning Cabin renewal at Peak Downs. 7 Future Scope designs will be completed for Autotransformers and PSC **(Power Sectioning Cabins)**.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Electrical Assets.

Strategic Scope:

Autotransformer Renewal ($2.5m)

The autotransformer renewal program seeks to renew aged equipment that is operating beyond its design life.

Following identification of a bow wave of electrical asset renewal activity as the assets installed in the 1980's approached end of life, Aurizon Network has been proactively managing the renewals task by smoothing the work over time. This approach sees Aurizon Network targets the renewal of three autotransformer sites per year. Sites are prioritised based on asset condition.

Goonyella Ports Overhead Renewals ($2.4m)

In November 2018, a dewirement occurred at Dalrymple Bay Coal Terminal (**DBCT**) on Departure Road 2. This single event resulted in 18 train service cancellations, 11,976 minutes of train service delays and closure of DBCT. This incident highlighted some inherent weaknesses in the Overhead Line (**OHL**) infrastructure at the critical ports section of the Goonyella System and triggered an investigation into how such failure events could be addressed.

Building on the investigation and analysis, Aurizon Network has developed a new OHL Asset Management Strategy and conducted a review of the OHL configuration at the Goonyella Ports. Several key observations have been made which are pertinent to the Goonyella Ports:

- The levels of corrosion in OHL supporting steelwork are very high due to its coastal, high corrosion environment, and if not addressed will substantially reduce the reliability, safety, and service life of the traction asset in this region.
- Inherent weakness in the original OHL configuration design for this region, specifically the mechanical coupling between adjacent roads, results in two disadvantages. Firstly, the configuration does not enable single line isolations to make use of small access windows. Secondly, the operational impact of a dewirement can be quite extensive (as experienced in November 2018).

This project will be delivered over several years and Aurizon Network will engage with the RIG on the proposed scope and options considered for the full project delivery. The delivery of this project over the next 5 years – 7 years includes some opportunities to trade off cost, access and reliability in a way that meets the service level expectations of users of the Goonyella Supply Chain.

The works proposed for FY25 include completion of mechanical separation of wire-runs and continuation of corrosion remediation activities.

Traction Substation Renewals

In FY25, the project is not seeking further budget, continuing spend of $2.56m for residual scope. The Feasibility stage for the renewal of the 8 Air-Insulated Switchgear traction substations which will reach the end of their nominal service life in the next 5 to 10 years.

The FY25 scope includes early works packages commencing detailed designs and continuing coordination with Powerlink for renewal of Feeder Station connection infrastructure, and commencement of procurement.

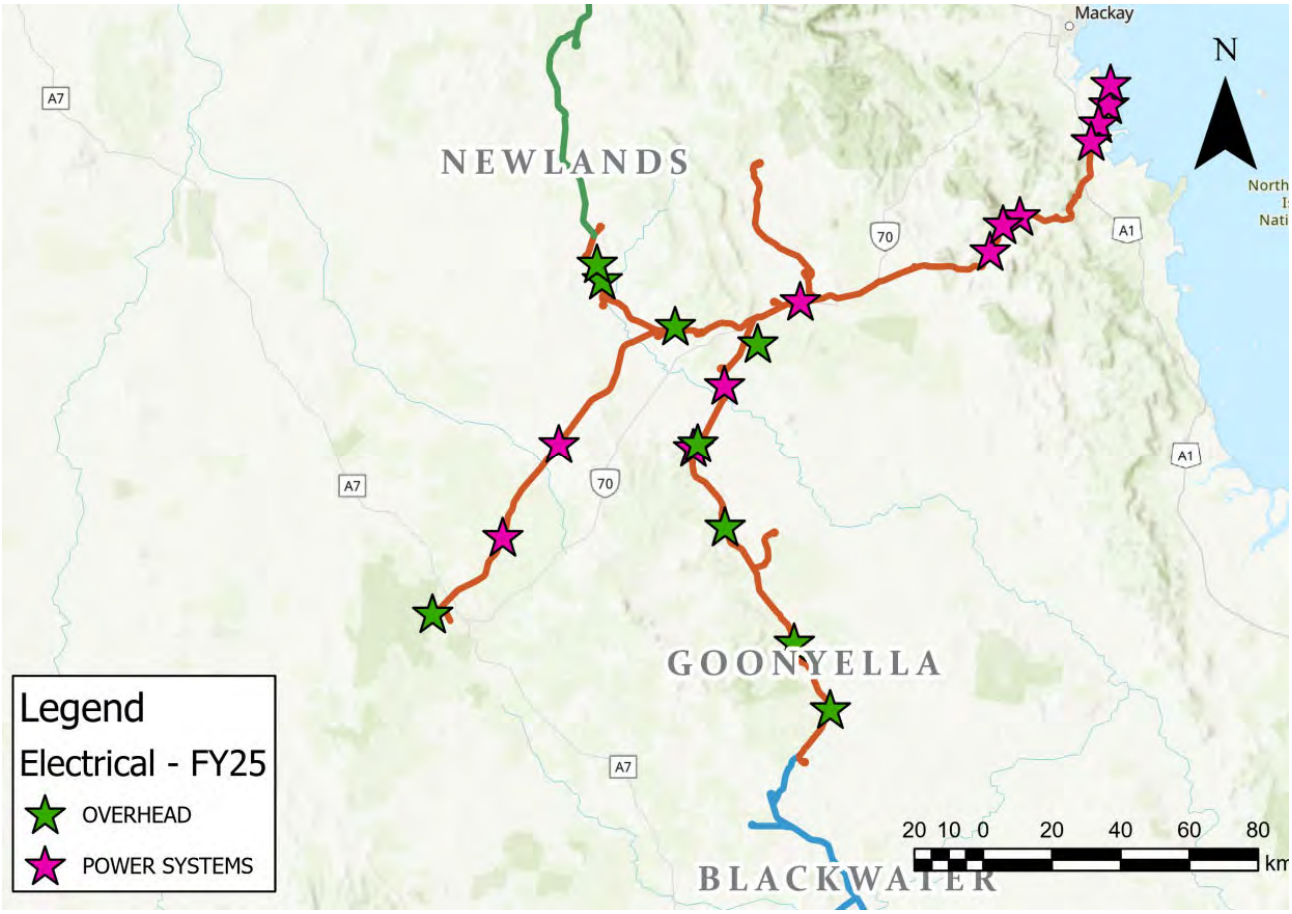


Figure 41 FY25 Electrical Renewal Sites – Goonyella System

Figure 42 plots the Electrical renewals against asset condition and location/ operational criticality. Headspan renewals have a future condition of 3 however, the 6 headspans nominated for renewal at Peak Downs in FY25 have been selected because their masts are leaning inwards towards the track resulting in unstable wire geometry. This presents an elevated risk of overhead line asset failure, which would impact train operations.

The Earthing and Bonding renewal at Dalrymple Bay has a condition of 3, however there is an exposed earth bar mounted to a mast. Renewing this asset will improve safety and asset protection by enclosing the asset in a cabinet.

Mt McLaren Relay Renewal has a criticality of 1.2 prioritised to replace obsolete units with modern equipment.

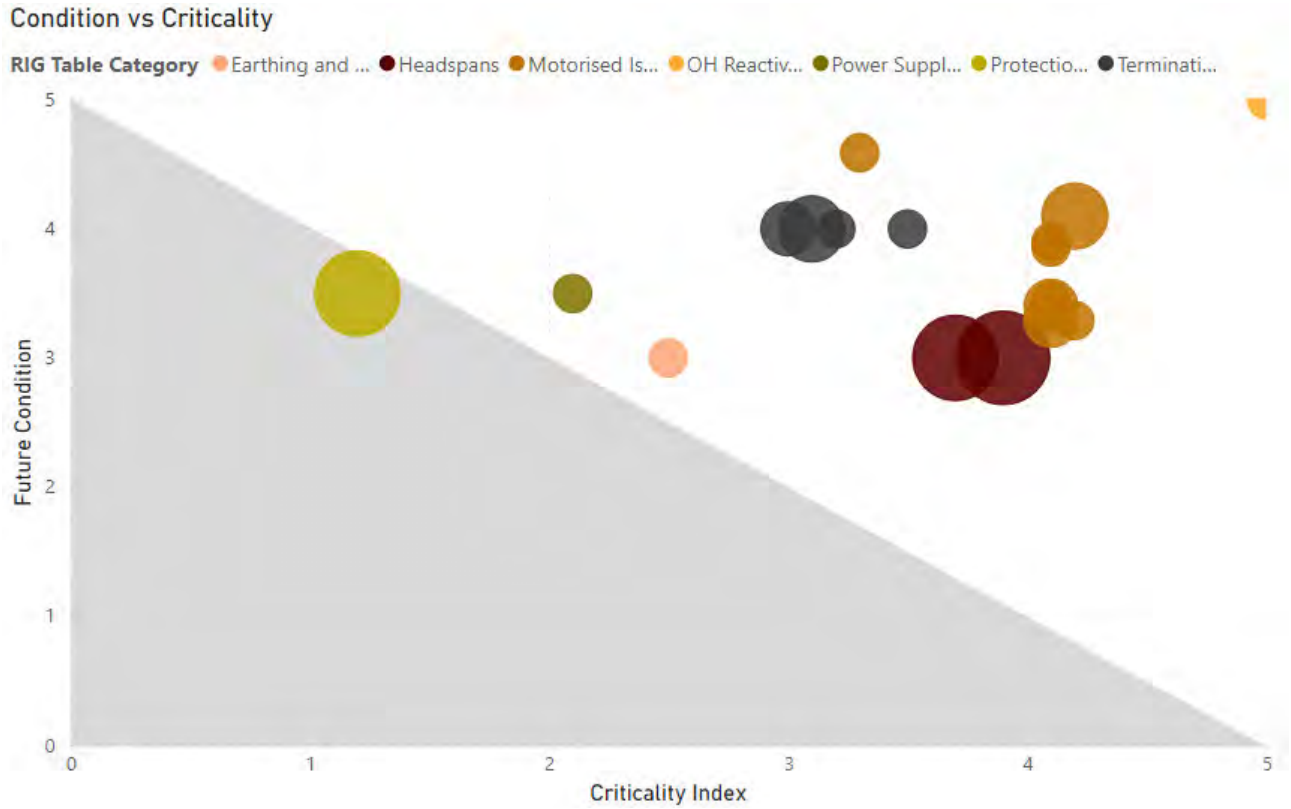


Figure 42 Electrical Assets – FY25 Scope Priority Ratings – Goonyella System

3.22 Likelihood of Change Assessment – Maintenance and Renewals

Aurizon Network notes that the identification and evaluation of renewals scope for inclusion in the MRSB is based on currently available information that may change over the period prior to execution (of up to 18 months) due to environmental factors, relative degradation rates or other considerations. Additionally, potential changes may be related to specific items of scope or applicable to the broader renewals program for each system.

In the preparation of the FY25 Final Draft Proposal, Aurizon Network conducted a likelihood of change review to assess potential areas of change to either cost or delivery, time to complete or location. Further detail for this review process is included in Section 0.

This section provides details of scope items with a high likelihood of change where controls have been identified and where a residual risk will be managed. These scope items are also identified in the Scope Detail BI Report. Changes to the proposed scope will be dealt with through reporting and change management processes as appropriate.

Additionally, potential areas of change are identified in the development of the maintenance program based on Aurizon Network Maintenance leader reviews and lessons learned from recent periods. Potential risks and controls specific to the maintenance program are also included in the table below.

Table 33 provides a summary of the deliverability assessment completed in the development of the FY25 MRSB program of work. Scope items with a high likelihood of change are summarised including their potential impact, the controls implemented, and the residual risk being managed as the program develops toward execution. Changes will be reported in the RIG Quarterly Report. Potential Areas of Change at Program Level in the Goonyella System

Table 33 Potential areas of change at program level in the Goonyella

System Program Category	Program	Risks and Controls	Total Scope Items	# High Likelihood of change	% of Program	Residual Risk Post Control
Total Summary			205	26	13%	
Civil	Ballast Cleaning	**Risk: Increased access and cost to complete scope due to** increased percentage of unscreenable material over planned assumption **Control:** Initial pre-digs completed FY24 and again during year of delivery to re-evaluate cost and capacity prior to execution for ballast cleaning activities (RM902).	88	6	7%	High

System Program Category	Program	Risks and Controls	Total Scope Items	# High Likelihood of change	% of Program	Residual Risk Post Control
		The likelihood remains high for 6 sites yet to have pre-digs completed (action to progress in advance of execution).				
	Civil Renewals	**Risk: Scope not completed or increased access or cost due to** inability to access neighbouring land for material handling. **Control:** Desktop analysis of known environmental and cultural heritage to be completed. Formation sites remain with a high likelihood of change. It is ideal to gain access to neighbouring properties for temporary stockpiling of new materials and spoil. As this is outside of the corridor, the assessments and agreements have not yet been completed for the two sites and if this is not possible, then the material management can increase cost or capacity or reduce scope. Negotiations are in progress. The Level Crossing at Ingsdon will require an alternate access road to complete, which is yet to be agreed with neighbouring owners. Detailed designs are still being prepared so negotiations can occur.	4	3	75%	High
Control Systems	Train Detection	**Risk: Scope not completed or budget needed to complete scope** due to scope maturity. **Control:** Multi-year program of work to enable additional time to design. The two sites in Goonyella are yet to have determination of the final cable routes and thus the site-specific variances (e.g. rock). The likelihood of change is high until these designs and site investigations are completed.	2	2	100%	High

System Program Category	Program	Risks and Controls	Total Scope Items	# High Likelihood of change	% of Program	Residual Risk Post Control
Electrical	Overhead Renewals	**Risk: Scope not completed in full due** to inability to execute within the closure. **Control:** Early engagement of resources (Goonyella headspan program) As the headspan program extends over multiple years, an optimistic scope quantity has been nominated to encourage high productivity of what is likely a specialist's contracted resource. There is high likelihood that not all scope items will be completed due to this stretch target.	20	11	55%	High
	Power Systems Renewals	**Risk: Cost increase or scope not delivered** as program requires environmental and community engagement for delivery of equipment. **Control:** Early identification of site access requirements – planning for corridor access to site for major plant (cranes) and material delivery to site The assessment for the 3 FY25 sites is yet to be completed. As such, the level of potential access road upgrade/creation to allow site access and potential other site-specific requirements are yet to be determined.	22	4	18%	Med
		Risk: Cost increase and Scope not delivered as Autotransformer prices have been based on FY23 prices, with contracts still to be finalised and lead times extending. **Control:** Contracts to be finalised early 2024, The likelihood remains high as lead times have extended from 9 months to 12-14 months for Autotransformers.				Med

System Program Category	Program	Risks and Controls	Total Scope Items	# High Likelihood of change	% of Program	Residual Risk Post Control
Maintenance General Track Maintenance	Overhead (Maintenance)	**Risk: Overdue Maintenance Activities** due to insufficient specialised overhead maintenance staff and/or staff being prioritised op to other work, e.g. asset renewals scope, mechanised production or civil maintenance and renewal support resulting in increased component failure, dewirement and increased regulatory risk. **Control:** Dedicated overhead line maintenance windows have been introduced in FY24 and continued in the FY25 closure strategy. **Control:** Outsource asset renewal and support activities where possible, allowing internal resources to focus on maintenance delivery. **Risk: Increase in costs** due to engaging contractors to supplement low internal staff in the delivery of overhead maintenance. **Control:** Leverage Aurizon procurement process to achieve contract value. **Risk: Increase in costs** associated with apprentice recruitment strategies to provide succession of qualified traction linespersons in response to higher than expected attrition levels. Reductions in contract labour support is tied to expected qualification timeframes.		Maintenance not assessed		
	General Track Maintenance	**Risk: Additional maintenance activity required** driven by further asset degradation requiring rectification to support network safety, reliability and performance (Materials, Resources and Access). **Control:** Single line maintenance activity has been included in the capacity assessment and are planned throughout the year.		Maintenance not assessed		


Moura System

4 Moura System

This Section presents Aurizon Network's Draft Maintenance and Renewal Strategy and Budget for the Moura System during FY25. In line with 7A.11.3 of UT5, this section will be subject to vote by the relevant Moura End Users.

Aurizon Network's FY25 Final Draft Proposal for the Moura System provides for:

- **A strategy to maintain stable level of service over the long-term**

  The asset management and integrated closure strategy for the Moura system recognises the lower tonnage profile which facilitates a greater reliance on corrective maintenance and renewals and results in a higher maintenance to capital ratio than other systems.

  This strategy can mean lower operational performance including unplanned outages in conjunction with longer periods of temporary speed restrictions than other systems.

- **A Direct Maintenance Cost Allowance of $16.6m**

  The proposed Direct Maintenance Cost Allowance, which excludes ballast undercutting plant depreciation, represents an increase of $2.0m compared to Aurizon Network's current FY24 full year maintenance forecast and an increase of $3.3m compared to the approved FY24 Maintenance Strategy and Budget.

  The increase in maintenance spend is predominately driven by escalation, additional internal labour costs and FTE to support mitigation of ageing workforce and attrition risks and additional maintenance activities required to support the ageing civil and electrical infrastructure across General Track, Structures and Signalling & Telecommunications categories.

- **A Renewals Allowance of $22.3m**

  This represents an increase of $2.5m compared to Aurizon Network's current FY24 asset renewals forecast and an increase of $3.5m compared to the approved FY24 Renewals Strategy and Budget.

  The increase in renewal spend is a function of labour and non-labour escalation, particularly the cost of materials (steel, concrete) and electrical components, and additional scope requirements including Mainline Undercutting and the proposed installation of two weighbridges.

- **Integrated Closure**

  Three closures are planned in Moura for FY25 with no contingency closures, one is the 60hr from the Blackwater cross-system impact.

  FY25 sees a 31.0% increase in YoY hours (excluding FY24 wet weather contingency window which was not taken).

  Aurizon Network's capacity assessments indicate a low risk of inability to provide adequate network usable capacity to deliver DNC (ACAR 2023 FY25) and contracts across FY25.

- **Likelihood of Change**

  Completion of prior year scope and weather remain key program risks for the Moura system with potential impacts on the ability to complete planned renewal scope.

4.1 Moura System – Characteristics and Corridor Strategy

The Moura System is the smallest of Aurizon Network's Coal Systems in terms of both tonnage and distance. The Moura System services coal mines in the Moura region and Callide Basin, with coal being hauled to Gladstone for use at domestic industrial plants, Gladstone Power Station or for export via RG Tanna coal export terminal. The system is not electrified other than a 7km section near Gladstone which forms part of the Blackwater System electric asset base and provides an alternate path from Gladstone back to Callemondah.

Maintenance and minor renewal activities in the Moura System are primarily delivered from Aurizon Network's depot located in Gladstone, with mobile mechanised plant based in Rockhampton. Aurizon Network's depots are strategically located to enable incident response times within approximately two and a half hours. Mechanised plant (e.g., resurfacing) is typically able to respond to an urgent defect (e.g., a buckle or geometry defect) in the Moura System within 2 days.

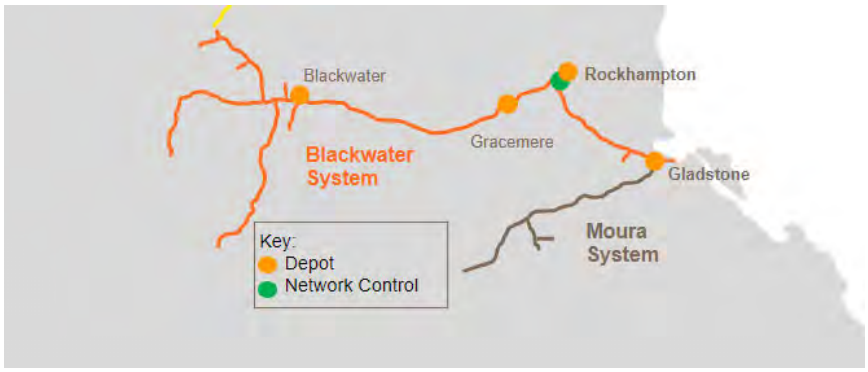


Figure 43 Depot Locations – Blackwater and Moura System

Aurizon Network has considered asset conditions specific to this Coal System when developing the FY25 Final Draft Proposal, particularly in relation to:

Civil Assets – The Moura System was constructed in the 1960's as a purpose-built coal line. However, the assets installed did not consider the axle loads or train sizes now being operated in the system. It also has some geographical challenges with track access and alignment. The Moura System traverses sections of black soil leading to formation and alignment issues when wet or very dry. It also has a large range crossing, tight radius curves, several original constructed corrugated metal pipe culverts inside large embankments and has poor drainage on the plateau west of Mt Rainbow. The lower volumes on the Moura System mean that the time between tonnage-based inspection and interventions is longer than in higher-volume systems.

Control Systems Assets – Processor based interlockings installed in the Moura System in the 1990's are nearing the end of their design life, with two of these interlockings identified for design works in FY24 and one site planned to be renewed in FY25. Trains are detected through a mix of track circuits and axle counter track sections with ongoing renewals programmed for life expired axle counter assets in future years. There is no optic fibre linkage in the Moura System, with telecommunications carried by the microwave radio systems. As a result, multiple failures of microwave links can result in lost communications. A single link failure is not generally an issue. The radio system across Moura was upgraded in recent years to a digital based Terrestrial Trunked Radio (**TETRA**) system.

Corridor Strategy:

The Moura System is subject to asset inspection and intervention requirements consistent with the three other Coal Systems, however, the lower tonnage profile results in less frequent intervention, leading to a higher proportion of planned corrective maintenance and reactive renewals scope and lower operational performance, including temporary speed restrictions and unplanned outages.

Due to fewer services associated with lower tonnages, the Moura system can achieve the required throughput with more reliance of corrective maintenance and reactive renewals and longer periods of temporary speed restrictions than other systems.

Maintenance and Renewal activity is planned to hold the system in a fit for purpose manner to achieve the required throughput while maintaining sufficient operational performance and safety at an efficient cost.

The below graphs in Figure 44 indicate the asset management strategy is effective in maintaining performance and reliability consistent with 4-year averages. Please refer to the Glossary for interpretation of these graphs.

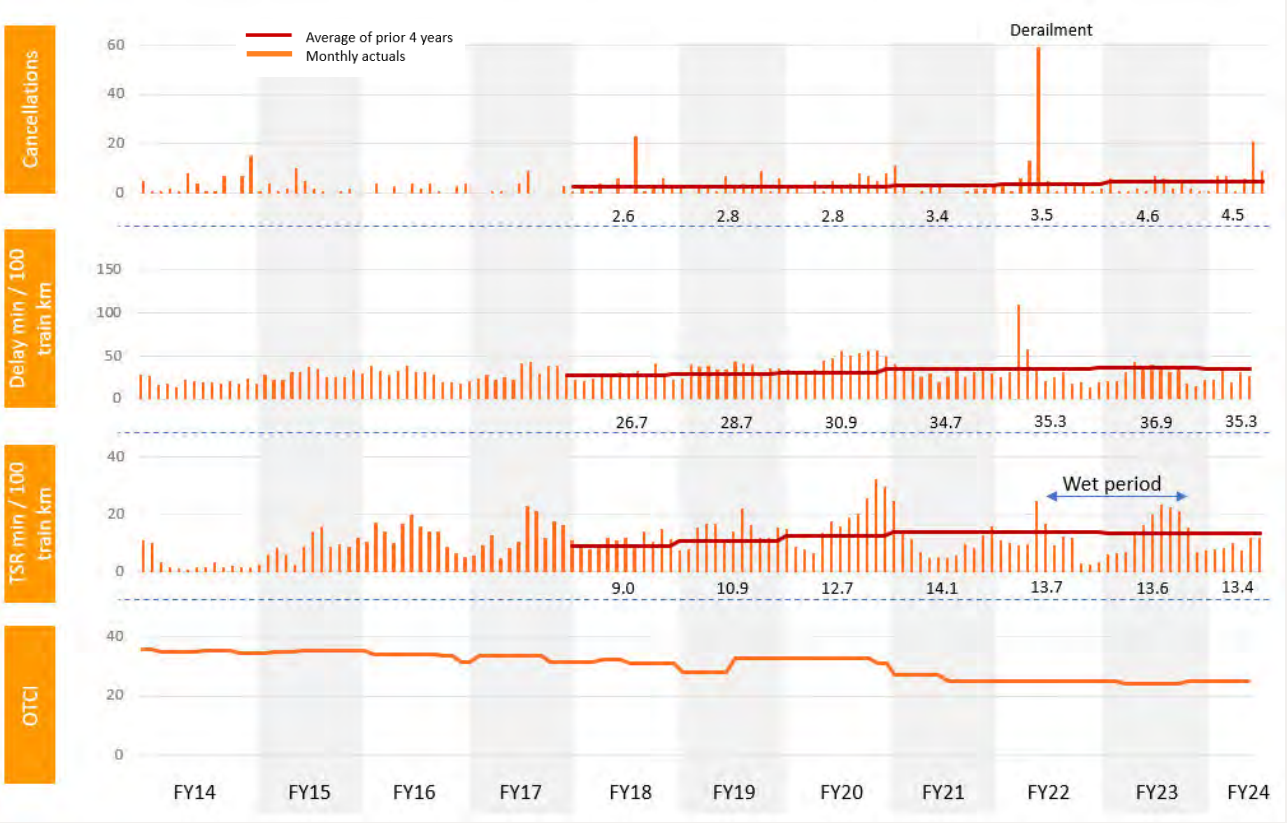


Figure 44 Moura Below Rail Performance 4-year average trends using FY2014 to December FY2024 monthly performance

Notes:

- The derailment in FY22 is largely responsible for the rise in 4-year average in FY2023
- Single line running on Moura results in more planning delays than other systems with duplicated track. Planning delays are dependent on traffic volume, eg the more trains in the corridor, the more crossing delays need to be scheduled
- OTCI index has reduced overtime indicating an overall improvement to average track geometry condition. OTCI does not account for localised reliability impacts, traction or control systems assets.

4.2 Moura System – Integrated Closure Plan

Aurizon Network has engaged with the RIG and other stakeholders to better understand end user requirements. Aurizon Network has taken the following into consideration when developing the FY25 Final Draft Proposal, Integrated Closure Plan:

Specific Moura Supply Chain considerations

- **Avoiding closure conflicts with adjacent corridors**

  Integrated closures in the Moura System are typically aligned with those in the Blackwater System to minimise capacity impacts from closures in the adjacent system.

- **Reducing impact of major closures**

  Major scope delivery is packaged and executed in extended integrated closures twice per year (scope dependent).

  All other planned maintenance activities are completed in scheduled maintenance blocks or in-between trains. The execution of works in-between trains is favoured due to the higher frequency of available time in-between trains, which enables asset activity to be completed outside of closures with minimal disruption to throughput.

- **Closure timing**

  Where possible, peak demand periods of December and June are avoided to maximise railings at these times.

Table 34 outlines the proposed closure hours for FY25.

Table 34 Planned integrated closures – Moura System

FY25 Integrated System Closures													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Hours	0	84	0	0	0	0	0	84	0	0	60	0	228

Moura will be impacted for 60 hours in May due to the signal interlocking of 293AB points in Callemondah affecting all access to RGTCT and QAL. Opportunities to complete maintenance or renewals scope during this period will be pursued as part of routine in-year planning processes and pending resource availability.

In addition to the planned integrated closures, single line maintenance activities have also been planned throughout the year. Timing and durations are tested against delivering DNC (ACAR 2023 FY25) and more broadly, Committed Capacity as well as being coordinated with other supply chain participants, where possible, to maximise supply chain alignment and throughput. MRSB Single Line Planned Possession hours for FY25 are 121 hours consistent with Asset Activities. Note hours are not reflective of customer impact as it does not consider works planned in the shadow of port outages or other works to reduce impact. These hours do not include: moving products such as rail grinders, resurfacing, RTI and Road Patrols; maintenance works to be planned throughout the year or asset activity planned around train services (Plan throughs) as they do not impact capacity or services.

Critical path activities listed in Table 35 have determined the duration of the planned integrated closures and access requirements in the Moura System during FY25.

Table 35 Critical Scope – Moura System

Planned Delivery (hours)	Asset	Location
84	BCM	Belldeen – Moura
76	Reinforced Concrete Box Culvert	Boundary Hill Jct
60	Interlocking	Callemondah 293AB Moura Main

Figure 45 illustrates the historical Moura integrated system closure hours in comparison to the FY25 Final Draft Proposal.

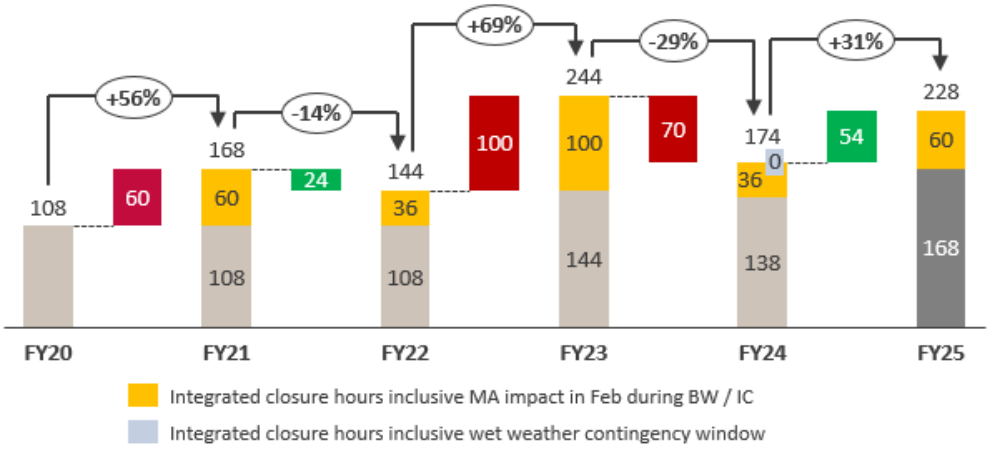


Figure 45 Trend of Integrated System Closure Hours FY20 to FY25 – Moura

4.3 Moura System – FY25 Maintenance Strategy and Budget

Aurizon Network has developed its Draft Maintenance Strategy and Budget for the Moura System having regard to all relevant matters outlined in clause 7A.11 of UT5, including the Maintenance Objectives. Aurizon Network considers its FY25 Draft Proposal provides an appropriate level of asset activity that will promote the safety, reliability and performance of Moura System Rail Infrastructure and seeking to deliver DNC and more broadly, Committed Capacity.

Summary of Historic, Forecast and FY25 Maintenance Strategy and Budget

Aurizon Network's FY25 Final Draft Maintenance Strategy and Budget for the Moura System provides for a Direct Maintenance Cost Allowance of **$16.6m** (excluding ballast undercutting and plant depreciation) which is:

- $3.3m higher than the approved FY24 Maintenance Strategy and Budget
- $2.0m higher than Aurizon Network's current FY24 full-year forecast.

Figure 46 provides a summary of historic direct maintenance costs as well as the proposed direct maintenance cost budget in respect of FY25.

To ensure comparability with prior periods, the direct maintenance costs shown Figure 46 and Figure 47 exclude depreciation on ballast undercutting plant.

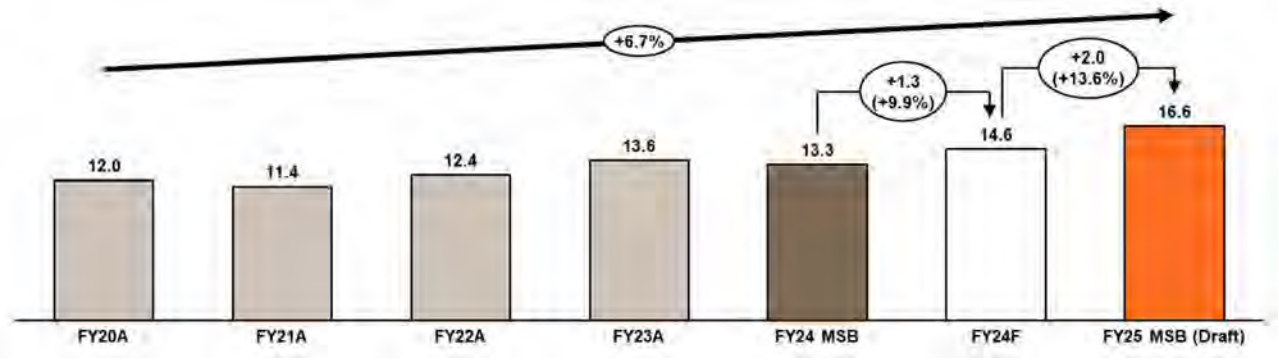


Figure 46 Direct Maintenance Costs – Moura System

Aurizon Network acknowledges that the FY25 Draft Proposal for Moura maintenance is c.13.6% higher than the current FY24 full-year forecast. Further information on the key drivers of this increase are outlined in Figure 4 below.

Aurizon Network notes, however, that annual cost increases of this magnitude have been observed in recent years for a multitude of inputs required for maintenance and renewal activities. To help put the FY25 Final Draft Proposal into context, Aurizon Network has considered the impact of actual inflationary outcomes over time.

While CPI can be used to measure the inflationary pressures in the broader economy, the basket of goods used to determine CPI are not representative of the necessary inputs for the asset maintenance and renewal task. Consequently, the QCA has previously approved the use of a 'Maintenance Cost Index' **(MCI)**, to assess the expected change in maintenance costs over time.

The MCI is a weighted index that measures changes in four key cost categories, namely, Accommodation, Consumables, Fuel and Labour. The impact of CPI is considered within the 'Consumables' category. Aurizon Network has considered the inflationary impacts for these key categories over time, having regard to publicly available data[11]:

- Actual published index values to June 2023
- Annual growth rates to June 2025 using forecasts for CPI and the Wage Price Index published by the Reserve Bank of Australia.

Aurizon Network has assessed the compounding annual rate of growth **(CAGR)** in maintenance costs over the five-year period ending 30 June 2025. During this period, Aurizon Network estimates that the Moura System maintenance costs have increased at a rate of approximately 6.7% per annum

In comparison, Aurizon Network notes that over the same 5-year period the:

- Accommodation index is expected to increase 43% overall, or 7.4% per annum
- CPI is expected to increase 28% overall, or 5.0% per annum
- Consumables index is expected to increase 48.5% overall, or 8.2% per annum
- Fuel index is expected to see an increase 61% overall, or 10.0% per annum

[11] Publicly available data sourced from Australian Bureau of Statistics (actual published index results to June 2023) and the Reserve Bank of Australia CPI and Wage Price Index forecasts for FY24 and FY25.

- Labour index is expected to increase 16% overall, or 3.0% per annum.

The application of the QCA-approved MCI methodology indicates that input costs have increased at a rate of 5.6% per annum over the same period.

Aurizon Network has also assessed the annual change against two other indices with similar input costs. Specifically, the:

- Road and Bridge Construction Index[12]
- Coal Mining Index[13]

Results are summarised in Table 36 below, but on balance, Aurizon Network's observation is that its cost performance over time has been broadly in line when considered against actual inflation outcomes.

Table 36 Comparison of cost indices FY20 – FY25

FY20 to FY25 CAGR (% Change p.a)	MCI	Road and Bridge Construction	Coal Mining	AN's Maintenance Costs
Moura	5.6%	4.8%	5.1%	6.7%
Total CQCN				4.8%

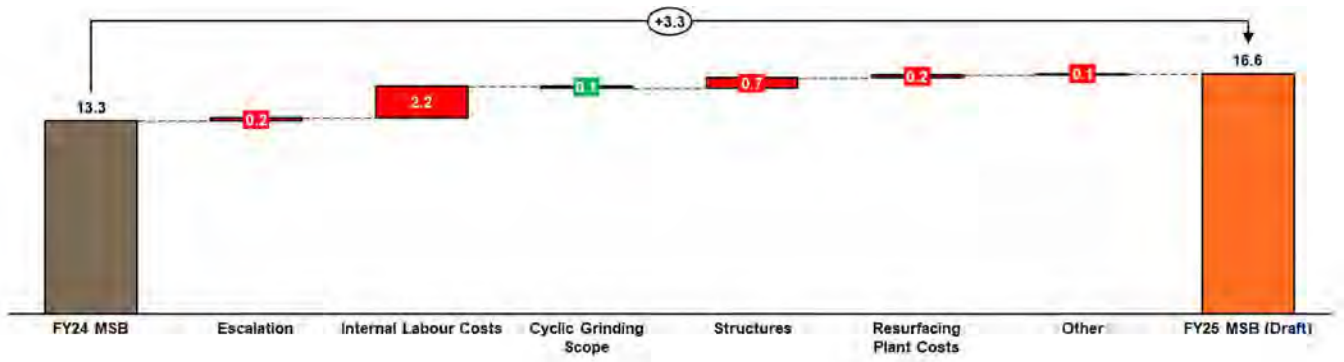


Figure 47 Direct Maintenance Cost movement – Moura System

The FY25 Final Draft Maintenance costs (excluding ballast undercutting plant depreciation) is $16.6m. The increase in spend of $3.3m against the approved FY24 Maintenance and Strategy Budget is primarily driven by:

- Cost escalation (+$0.2m) on contractors, materials and plant and other consumables.
- Internal labour costs (+$2.2m) associated Infrastructure Enterprise Agreement outcomes, additional FTE to support mitigation of ageing workforce and attrition risks and costs associated with attraction and retention initiatives for critical roles and locations. Additionally, the Moura system includes an increase in the level of maintenance activity, informed by historical actual activity levels and forecast activity levels, to support the ageing infrastructure. This work will be delivered by internal resources in the Civil and Electrical disciplines.
- Structures repairs program (+$0.7m) to rectify culvert drainage and cleaning defects and concrete bridge repairs, with program of works expected to continue for the next 3 years.

[12] ABS, 6427.0 Producer Price Index, Table 11, Coal Mining, Series ID: A83737106J
[13] ABS, 6427.0 Producer Price Index, Table 17, Road and Bridge Construction, Series ID: A2333727L

- Grinding scope to remain broadly in line with FY24 requirements in an effort to manage emergent rail surface condition.

The current FY24 forecast is informed by actual conditions and maintenance costs from FY23 and Q1 FY24 and other identified costs expected to be incurred[14]. All items are currently within the indicative materiality thresholds set in UT5. The FY24 forecast is subject to review and will be updated at the end of Q2 FY24.

An overview of the methodology used to establish the FY25 maintenance cost budget is provided in Section 0.

FY25 Maintenance Strategy and Budget

As detailed in Section 10, Aurizon Network's Asset Management approach is based on achieving the appropriate level of asset availability which will best meet customer requirements in each Coal System. The scope and closure requirements in different systems is influenced by demand, track arrangement, operating parameters, traction mode and signalling and communications systems.

In addition to the lower volume profile, Moura operates with shorter train sets as compared to Blackwater and Goonyella and sees no passenger traffic. As a result, the maintenance and renewal pattern in Moura is different than other systems with a closer mix of maintenance and renewal spend, as per Table 37.

Table 37 FY25 Final Draft Proposal – Maintenance and Renewal spend % split – System Comparison – Moura System

System	FY25 Renewals and Maintenance Cost ($m)	% Maintenance	% Renewal
Blackwater	225.4	34%	66%
Goonyella	183.3	40%	60%
Moura	**38.9**	**43%**	**57%**
Newlands	49.0	34%	66%

The time between renewals for those assets that wear (such as rail) is longer in Moura than other systems. For example, rail in tight radius curves in Blackwater has an average life of 8 years, whilst rail in the same arrangement in Moura has an average life of 33 years.

The planned and preventive maintenance activities and inspections, as well as the planned mechanised production scope, are derived in line with the intervention periods as detailed in the Asset Maintenance and Renewal Policy. This Policy determines the inspection regime and period based on asset type condition and location.

Section 10, Strategies by Asset Class, outlines the different approaches with regards to maintaining the Rail Infrastructure. These approaches lead to the application of the maintenance tasks across the system.

The proposed FY25 maintenance scope and budget for the Moura System is outlined in Table 38.

Table 38 FY25 Final Draft Proposal – Maintenance – Moura System

Maintenance Item	Scope Units	FY24 Budget Scope	FY24 Budget ($m)	FY24 Forecast Scope	FY24 Forecast ($m)	FY25 Budget Scope	FY25 Budget ($m)
Resurfacing			1.6		1.6		1.9

[14] Refer to Q1 FY24 Quarterly Performance Report for more detailed information on FY24 costs expected to be incurred.

Maintenance Item	Scope Units	FY24 Budget Scope	FY24 Budget ($m)	FY24 Forecast Scope	FY24 Forecast ($m)	FY25 Budget Scope	FY25 Budget ($m)
Mainline	km	170	1.6	170	1.6	170	1.7
Turnout	Site	10	0.1	10	0.1	10	0.1
Rail Grinding			1.3		1.2		1.2
Mainline	km	[redacted]	1.1	[redacted]	0.9	[redacted]	0.9
Turnout	Site	[redacted]	0.3	[redacted]	0.3	[redacted]	0.2
Level Crossing	Track LX	[redacted]	-	[redacted]	-	[redacted]	0.1
General Track Maintenance			5.9		6.9		7.2
General Track	Activity		5.8		6.8		7.2
Track Recording	km			259	0.1	-	-
Ultrasonic Testing	km	348	0.0	348	0.0	380	0.1
Signalling and Telecoms			2.2		2.4		2.8
Signalling Corrective	Activity		0.8		0.8		0.9
Signalling Preventive	Inspection		1.1		1.2		1.4
Telecoms Corrective	Activity		0.1		0.1		0.1
Telecoms Preventive	Inspection		0.3		0.4		0.4
Structures and Facilities			0.9		0.9		1.6
Trackside Systems			0.3		0.3		0.3
Other Civil Maintenance			0.9		0.9		1.1
Other General Maintenance			0.2		0.3		0.3
Sub-Total			**13.3**		**14.6**		**16.6**
Ballast Undercutting Plant Depreciation			-		-		0.3
Total Direct Maintenance Costs			13.3		14.6		16.9
Non-Coal Allocation			(0.2)		-		(0.1)
Total			**13.2**		**14.6**		**16.8**

Note: Figures may not add due to rounding.

For the Moura System:

- **Direct maintenance costs** (excluding ballast undercutting plant depreciation) are budgeted to increase by $2.0m from the current FY24 forecast to $16.6m in FY25. Key movements in RIG maintenance categories are summarised below:
  - **Resurfacing (+$0.3m)** – increase in cost primarily driven by cyclical On Track Vehicle maintenance activities due in FY25 and an increase in plant maintenance labour driven by apprentice trade staff to mitigate future attrition risk.
  - **Rail Grinding ($0.0m)** – The approach to the final FY25 grinding activities seeks to minimise the significant variations in scope year-on-year and manages emergent rail surface condition for Moura's standard carbon rail. It is considered that moving from a bi-annual approach to a sustained, smoother paradigm will assist managing the rail asset and mitigate defect growth. This approach has the effect of ensuring that the scope remains largely in line with FY24.
  - Turnout scope increases following a detailed review of the grinding program, resulting in an increase in grind cycles, changing from a 24-month cycle to a 12-month cycle. This is necessary to account for the predominant turnout type and rail condition.
  - **General Track Maintenance (+$0.3m) –** increase reflects cost impact of additional FTE to support mitigation of ageing workforce and attrition risk across in the Civil discipline and increased maintenance activity to support ageing civil infrastructure. These increases marginally offset by non-recurring costs in FY24 for contract labour hire support and QR Track Geometry Recording Car contract both forecast to cease from January 2024.
  - **Signalling and Telecoms (+$0.5m) –** spend increase reflects cost impact of additional FTE to support mitigation of ageing workforce and attrition risk across in the Electrical discipline and increased maintenance activity to support ageing electrical infrastructure.
  - **Structures (+$0.7m)** – driven by timing of the condition-based preventive culvert clean & inspection program (historically mainly in odd years), additional corrective cleaning and culvert maintenance scope (as identified in the FY24 MRSB) plus additional costs to standardise the use of remote inspections by contractors for culverts less or equal to 900mm in height (as inspectors are unable to access entire culvert to assess asset condition). The quantity of defect scope in Moura indicates that 3 years are needed before this system returns to a lower "normal" maintenance scope and cost trend, and as the assets age there is still the potential of additional defects appearing that will need to be planned in for repair, or could push out planned works due to criticality and/or location.
- **Ballast Undercutting Plant Depreciation** – (+$0.3m) – ballast undercutting plant depreciation as a total is largely in line with **FY24F**, with the allocation between systems based on the number of days that the ballast plant is expected to be operating in the Moura system in FY25**.**
- **Non-Coal Allocation** – this adjustment reflects an allocation of costs to non-coal services and is calculated by applying the actual non-coal volumes railed in Moura during FY23 to the QCA-approved AT1 Reference Tariff for FY25.

The scope of planned corrective and reactive maintenance tasks is heavily dependent on the faults identified via the planned inspection programs. Aurizon Network has assumed that in FY25, this Coal System is expected to see an increase in levels of planned corrective or immediate maintenance response, driven by the ageing infrastructure and asset condition.

For the Moura System, the following activities are to be considered as an aggregated single "item" for the purpose of UT5, clause 7A.11.5(f)(ii)(B)(2) – Resurfacing, Rail Grinding, General Track Maintenance, 'Signalling and Telecoms', 'Structures and Facilities', Trackside Systems, Other Civil Maintenance and Other General Maintenance.

Figure 48 sets out a summary of historic, forecast and budgeted direct maintenance costs by maintenance category. To ensure comparability between periods, the direct maintenance costs presented in the chart exclude depreciation on ballast undercutting plant.

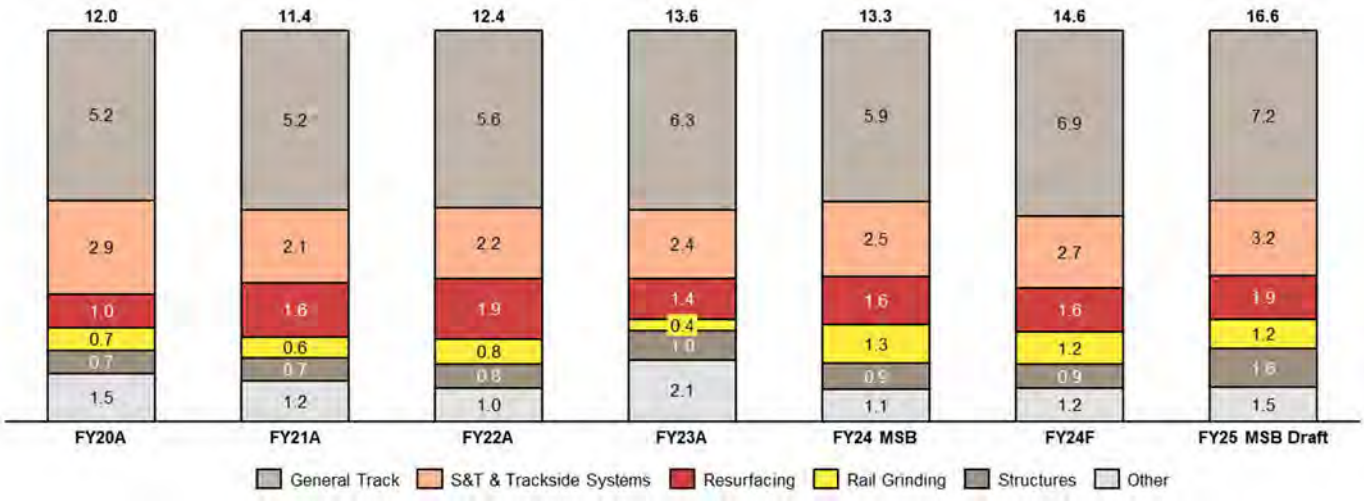


Figure 48 Direct Maintenance Costs – Moura System

Structures maintenance activity is expected to be higher in FY25 to support the rectification of culvert drainage and cleaning and concrete bridge repairs. With the program of works expected to be completed over the next 3 years, maintenance costs are expected to be sustained until the program is completed.

Figure 49 illustrates the proportion of preventive, planned corrective and reactive maintenance costs in the Moura System over time. Approximately 38% of the Moura System maintenance spend in FY25 is expected to be preventive in nature, which is lower when compared to the other Coal Systems in the CQCN. It reflects the asset management approach and operational performance.

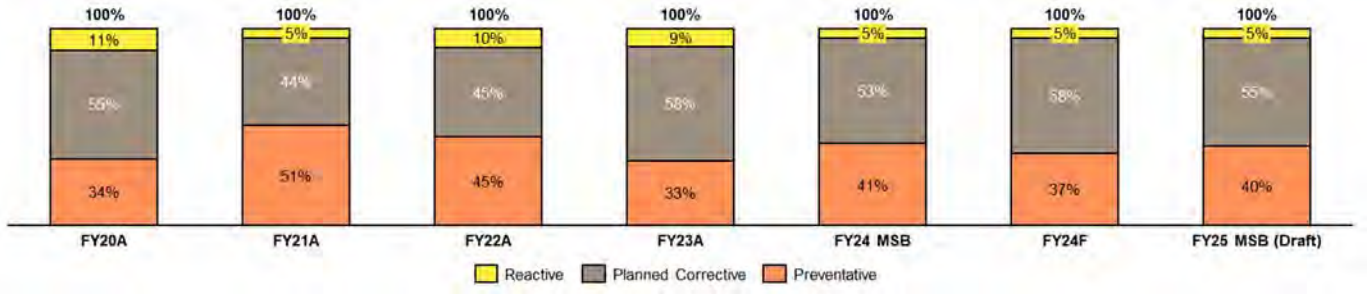


Figure 49 Preventive / Corrective Maintenance Spend Composition – Moura System

Further information in relation to the costing methodology used by Aurizon Network in the development of the FY25 Final Draft Proposal is outlined in Section 0. Additional detail in relation to the make-up of costs for each maintenance activity has also been provided to the RIG Expert Advisor.

4.4 Moura System – FY25 Renewals Strategy and Budget

Aurizon Network has developed its Draft Renewals Strategy and Budget for the Moura System having regard to all relevant matters outlined in clause 7A.11 of UT5. Aurizon Network considers that its FY25 Final Draft Proposal provides an appropriate level of asset activity that will promote the safety, reliability and performance of Moura System Rail Infrastructure and seeking to deliver Committed Capacity.

Summary of FY25 Renewals Strategy and Budget

Aurizon Network's FY25 Final Draft Renewal Strategy and Budget for the Moura System provides for an asset Renewals requirement of $22.3m which is:

- $3.5m higher than the approved FY24 Renewals Strategy and Budget; and
- $2.5m higher than Aurizon Network's current FY24 forecast.

A summary of the FY24 renewals budget and scope quantity compared to FY25 for the Moura System is outlined in Table 39.

Table 39 FY25 Final Draft Proposal – Renewals – Moura System

Renewals Item ($m)	Assets Include	FY24 Approved Budget	FY24 Forecast	FY25 Draft Budget
Civil Assets		13.8	15.9	17.6
Permanent Way	Rail, Track, Sleeper, Turnouts	4.7	5.9	5.5
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	3.5	3.6	5.2
Structures	Culverts, Bridges	1.7	1.6	2.7
Civil Renewals	Formation, Level Crossings, Access Points	4.0	4.8	4.3
Control Systems Assets	Safe Working, Train Control and Detection, Interlocking, Telecoms, Power Resilience, Transmission	5.0	3.8	4.7
Total		**18.8**	**19.8**	**22.3**

The FY24 forecast variance to the approved FY25 Strategy and Budget is primarily driven by:

- **Cost Escalation** – Variations across program largely impacted by labour and non-labour escalation outlined in Section 11.3.2.
- **Ballast Cleaning (+$1.6m)** – FY25 will see the RM902 utilised to target a section that has an existing temporary speed restriction. It is more effective and efficient to complete as 1 site over 8.1km utilising the RM902.
- **Structures (+$1.1m)** – The Culvert Renewal at Annandale is the largest of the 3 renewals for FY25, scope will remove and replace 5x1500 x 600 Reinforced Concrete Box Culverts. This larger site increases the FY25 forecast $1.1m over the FY24 program.
- **Control Systems (+$0.9m)** – Safe Working Systems Interlockings in FY24 had no renewal scope, however in FY25 it will renew a Vital Processor Interlocking **(VPI)** Replacement at Annandale.

The detail of the changes to the FY25 program and all variances in FY25 will be detailed as part of the Quarterly RIG reporting process.

Figure 50 below shows the distribution of scope locations as well as the relative spend per scope. The FY25 scope is distributed across the full length of the system including works on mainline and individual mine balloon loops.

The largest single scope item for FY25 is the mainline ballast undercutting between the 162.2km and 155.6km point of the Moura system.

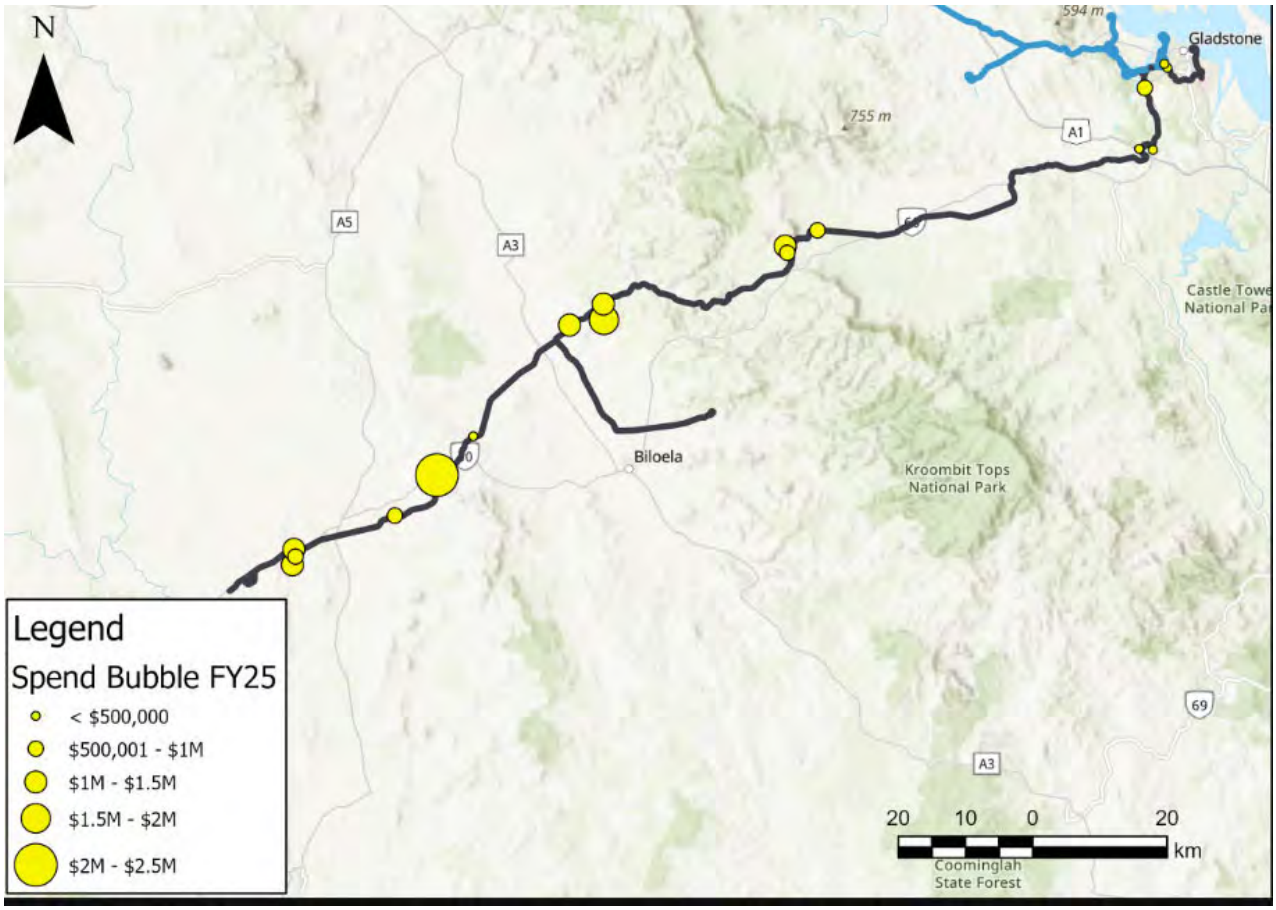


Figure 50 – Map of scope location and Spend FY25

Table 40 details a summary of Moura system asset renewals as a percentage of total system assets.

Table 40 FY25 Final Draft Proposal – Renewals as a % of Total System Assets – Moura System

Renewals Item	Assets Include	Total system Assets	FY24 RIG Approved Scope	FY25 Proposed Scope	FY25 Scope % Total system Assets
Civil Assets					
Permanent Way	Rail, Track, Sleeper, Turnouts	• 550km rail • 275km sleepers • 275km track • 62 turnouts	• 7.9km rail • 0km sleepers • 0km track upgrade • 1 turnout	• 4.9km rail • 0km sleepers • 0.9km track upgrade • 0 turnout	• 0.9% • Nil • 0.3% • Nil
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	• 275km Mainline • 62 turnouts • 39 bridges	• 2.7km Mainline • 3 turnouts • 1 bridge	• 8.4km Mainline • 2 turnouts • 0 bridge	• 3.0% • 3.2% • Nil
Structures	Culverts, Bridges	• 39 bridges • 550 culverts	• 0 bridges • 3 culverts	• 0 bridges • 3 culverts	• Nil • 0.5%
Civil Renewals	Formation, Level Crossings, Access Points	• 275km formation • 148 level crossings	• 0.3km formation • 1 level crossings	• 0.0km formation • 1 level crossings	• Nil • 0.7%

Renewals Item	Assets Include	Total system Assets	FY24 RIG Approved Scope	FY25 Proposed Scope	FY25 Scope % Total system Assets
Control Systems Assets	Safe Working, Train Control and Detection, Interlocking, Telecoms, Power Resilience, Transmission		• 18 sites • 0 units • 0km optic fibre	• 5 sites • 3 units • 1 Link	

Note:

Control Systems count of assets is a collective of sites, nodes, cable routes, communications assets and systems and is included to indicate level of work comparable to prior year. Detail of actual scope is provided later in this Moura section.

Figure 51 illustrates the FY24 Approved Budget and FY25 proposed asset renewals categorised as (baseload scope, reactive renewals, strategic scope, future scope).

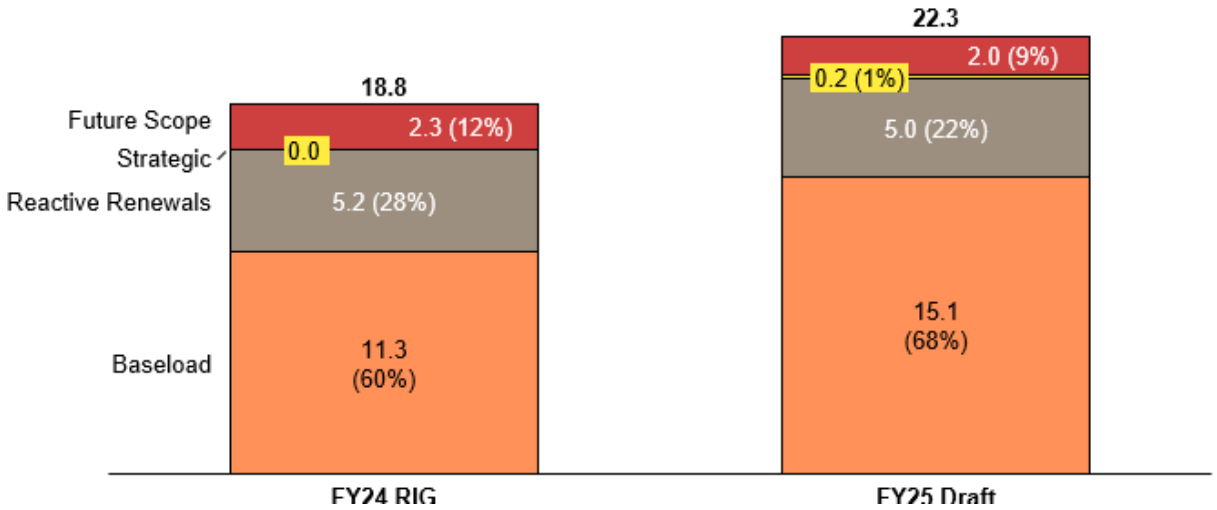


Figure 51 Split, and % of Total of Renewals by Category FY24B and FY25 – Moura System ($m)

Note:

- **Baseload scope –** represents the majority of the proposed Asset Renewal program and includes rail renewal, formation, and ballast cleaning
- **Reactive renewals** – has increased as a percentage of the total in FY24 with the inclusion of Reactive Formation Renewal scope. The average 20% for Reactive Renewals is aligned to the asset strategy in Moura of investing at a level that maintains tonnage demand with the higher rate of Reactive Renewals and Reactive Maintenance
- **Strategic scope** – includes the continuation of the UTC/DTC program
- **Future scope** – increases as a percentage of the total in FY25 driven by the strategy to extend design over multiple years for Control Systems projects, particularly Process Based Interlockings, to improve information for construction and access planning.

Further information in relation to the scope categorisation used by Aurizon Network in the development of the FY25 Final Draft Proposal is outlined in Section 0

This section provides detailed information in relation to the individual scope items selected for renewal in FY25, along with the rationale for those selections and alternative options considered. More detailed information is provided in relation to strategic scope given it is not typical scope seen in previous years.

This section should be read in conjunction with the Detailed Scope Report provided by Aurizon Network. This Power BI report provides detail on the individual scope items including works location, Combined Risk Assessment (**CRA**) score and comments supporting the rationale for those selections.

Section 0 provides further detail on how asset condition and criticality is used to determine whether scope is critical, required for system reliability or strategic, and alternate approaches considered when planning a renewal. For each scope item:

- the location of the bubble indicates the Scope Priority Model ranking for asset condition and location or operational criticality
- the size of the bubble represents the number of sites and/ or tasks to be renewed.

The maps included in this section indicate the location of the proposed scope.

4.5 Civil Assets – Permanent Way

Permanent Way Renewal Program

Aurizon Network's FY25 Final Draft Proposal provides $5.5m to deliver permanent way renewals in the Moura System. Table 41 summarises the scope and budget for each relevant renewal item.

Table 41 FY25 Permanent Way Renewals – Moura System

Description	Scope Type	FY25 Scope	Scope Unit	FY25 Budget ($m)
Rail Renewal	Baseload	4.9	Rail km	2.8
Track Upgrade	Baseload	0.9	Track km	1.9
Turnout Components	Reactive Renewals		Lumpsum	0.7
Permanent Way Other	Reactive Renewals		Lumpsum	0.1
				5.5

The rail renewal in Moura will be phase 3 of 3 for renewals on the Mt Rainbow Range, having completed similar scope in FY23/24.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Permanent Way.

However, Aurizon Network has adopted alternate approaches for the Permanent Way scope in FY25:

- renewing with longer life assets: Track Upgrade sites at Moura Mine will replace 47kg rail, fist clip sleepers with longer life 60kg rail and Eclip fastenings.

In FY25, there are 3 fatigue-driven rail renewal sites planned for Fry. These will be delivered in the August 2024 closure, however the renewals will need separate delivery resources due to distances between sites leading to higher cost for these renewals.

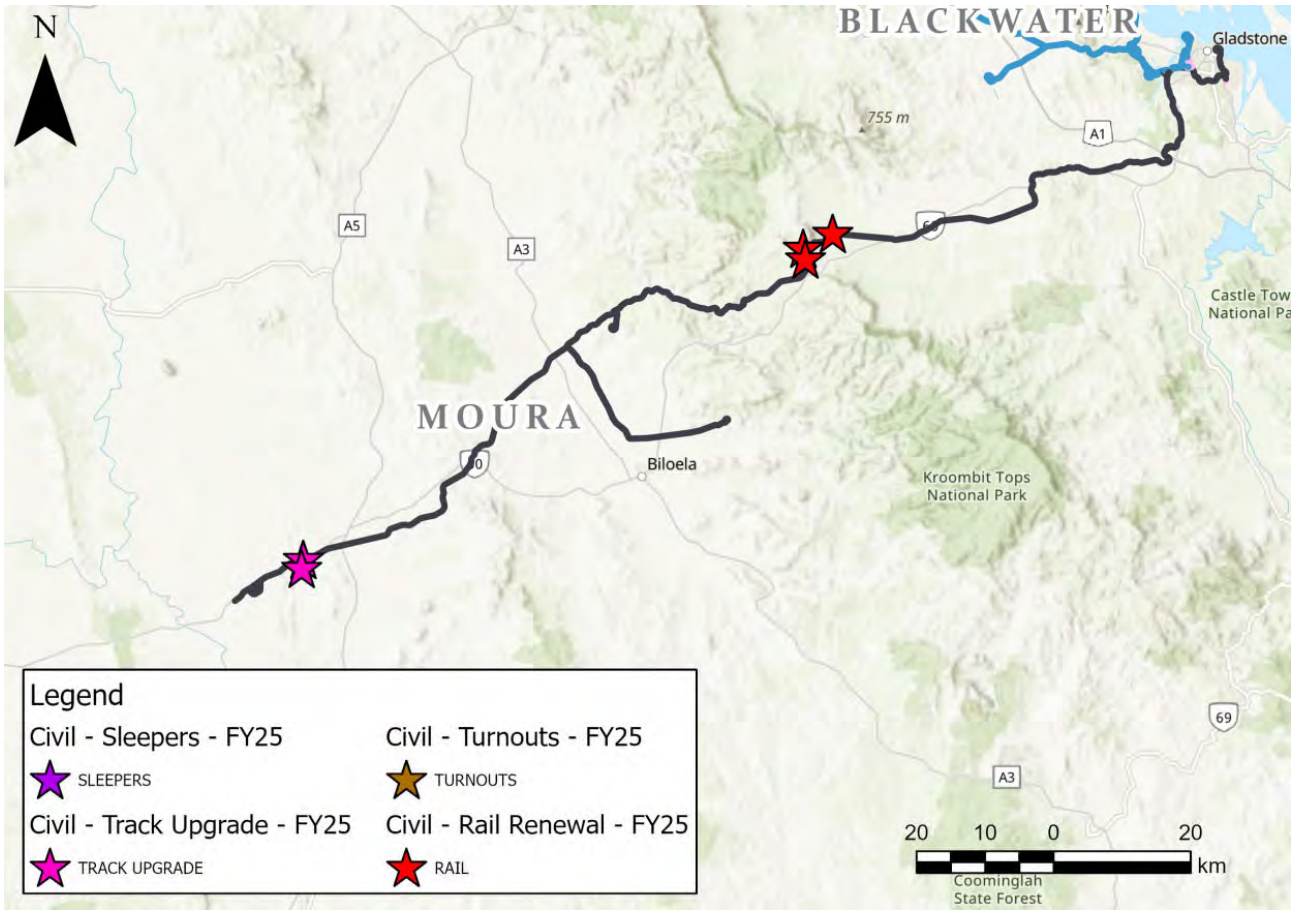


Figure 52 Rail Renewal and Turnout Sites – Moura System

Permanent Way FY25 Scope – Asset Condition and Criticality Assignment

Figure 53 plots the planned permanent way renewals against asset condition and location / operational criticality, all renewal scopes have a condition score of 3.7 or above.

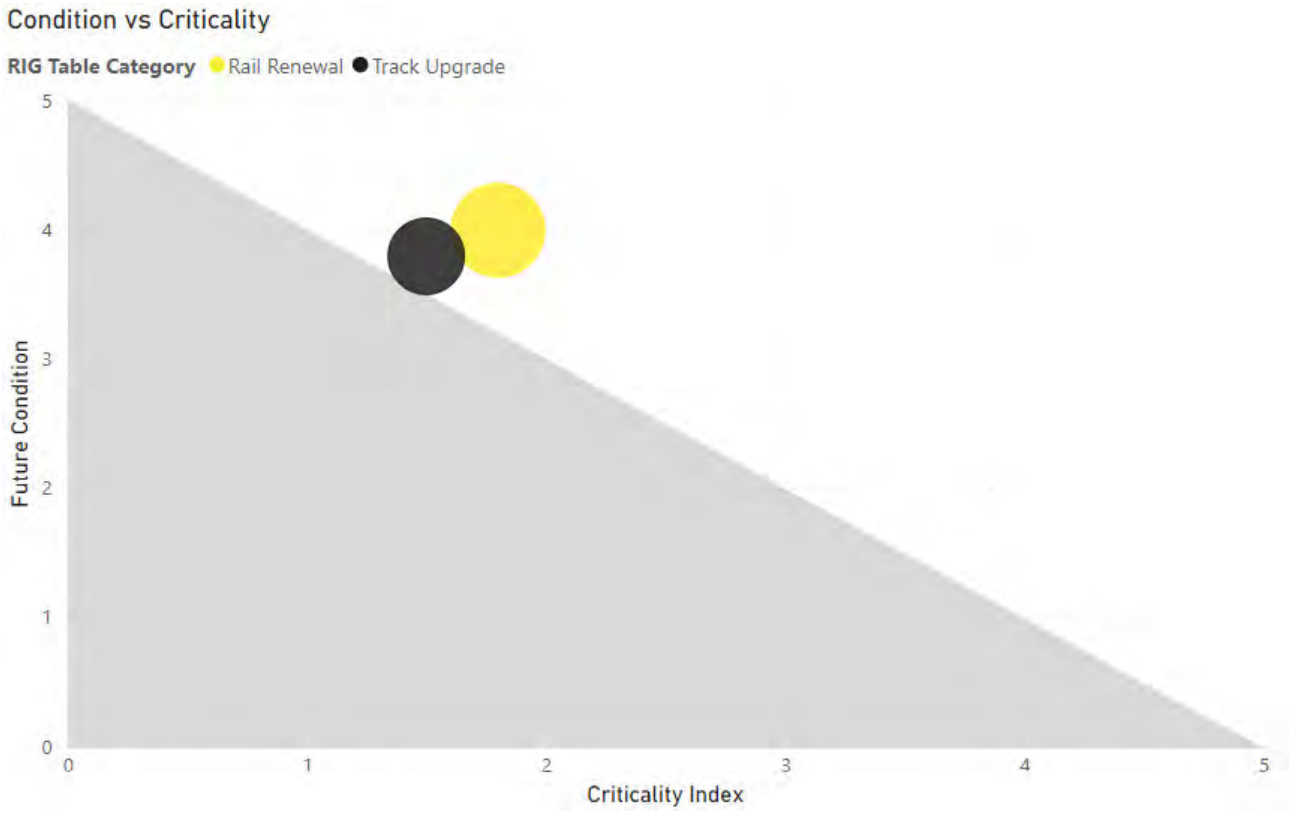


Figure 53 Permanent Way – FY25 Scope Priority Ratings – Moura System

Note – The Moura system has a lower assignment of criticality index attributed to lower tonnages compared to other coal systems.

4.6 Civil Assets – Ballast Cleaning and Renewals

Ballast Cleaning Renewal Program

In FY25, Aurizon Network proposes to undertake 10.9km of ballast cleaning across mainline and reactive undercutting works at a cost of $5.2m. Table 42 summarises the scope and budget for each ballast cleaning renewal item.

Table 42 Ballast Cleaning Program – Moura System

Description	Scope Type	FY25 Scope	Scope Unit	FY25 Budget ($m)
Mainline Undercutting	Baseload	8.1	km	2.5
Mainline Excavator Undercutting	Baseload	0.3	km	0.2
	Reactive Renewals	2.5	km	1.9
Turnout Undercutting	Baseload	2	Turnout	0.3
Bridge Rollout	Future Scope	1	Site	0.0
Monumenting	Baseload	1	Site	0.4
				5.2

In FY25, the Ballast Cleaning Machine will complete approximately 8km of scope at Belldeen. Given the length of this site and the poor access for excavator undercutters, the use of the Ballast Undercutting machine is considered the most efficient application to undercut the 8km.

The condition at this site was assessed as 4.3 and cannot be deferred to a future year.

An allocation to re-establish monuments is included in the Ballast Cleaning Program in FY25. This includes detailed survey, design and installation of new track data plaques. This enables future track maintenance activities to align to the design alignments. The alignment and height of track moves over time due to temperature changes, train operations, maintenance and construction activities which can give rise to track buckles, breaks, accelerated rail wear and contact wire geometry exceptions (in electrified systems). Track monuments are located within the rail corridor immediately adjacent to track as fixed in-ground posts or on electrical masts to indicate the correct level or position of the track. Measurements are taken from these to confirm the correct position of the track to ensure that the ballast cleaning activity and associated resurfacing correctly locates the track to the design alignment.

Detailed information on the development of the ballast cleaning program is included in Section 11.3 Budget Setting and Procurement.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Ballast Cleaning.

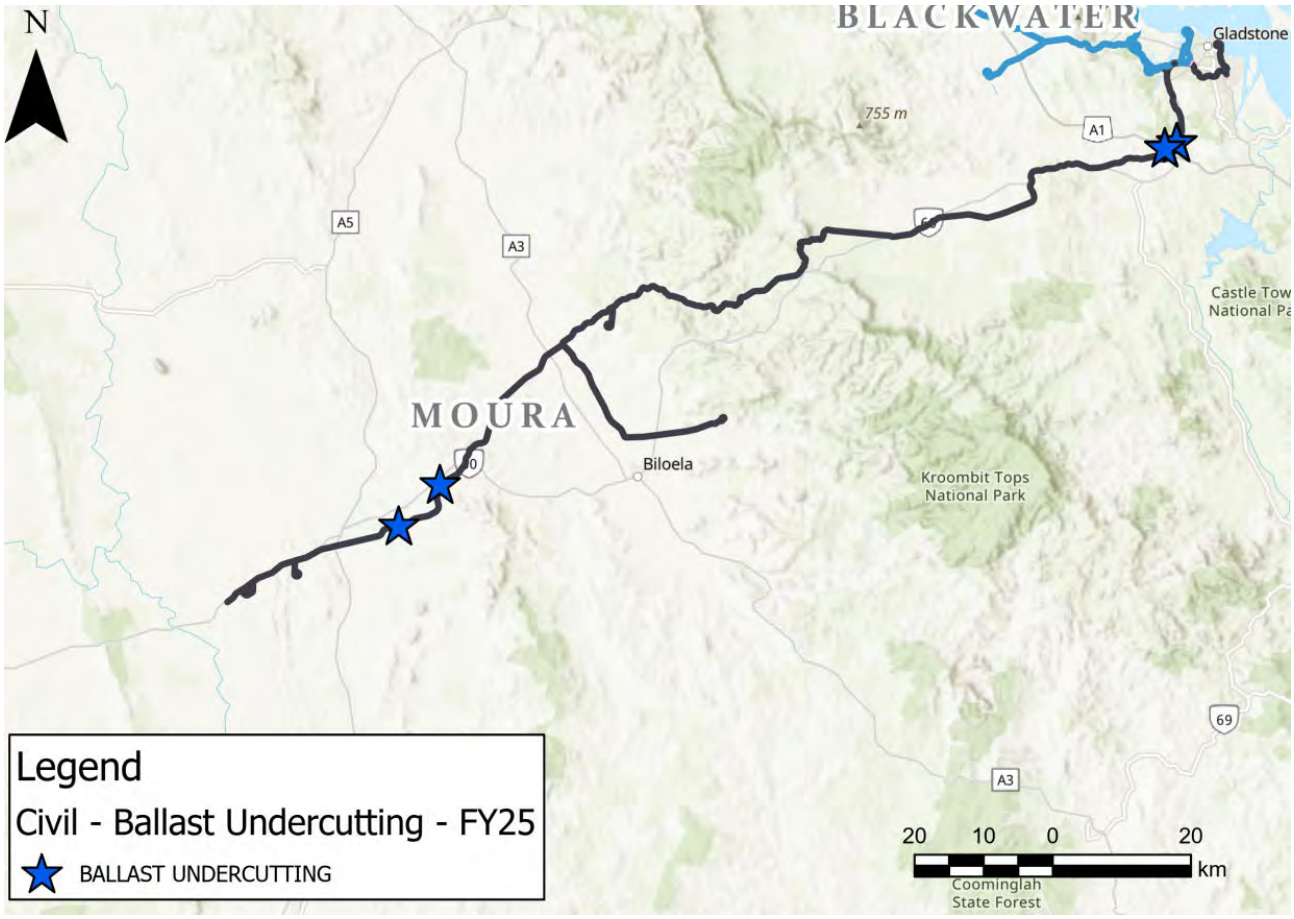


Figure 54 Ballast Cleaning Sites – Moura System

Ballast Cleaning FY25 Scope – Asset Condition and Criticality Assignment

Figure 55 plots the Ballast renewals against asset condition and location/ operational criticality. All sites identified for undercutting in FY25 have an identified future condition above 3.7 with criticality as low as 2.5 which is typical of locations in the Moura System which see lower traffic.

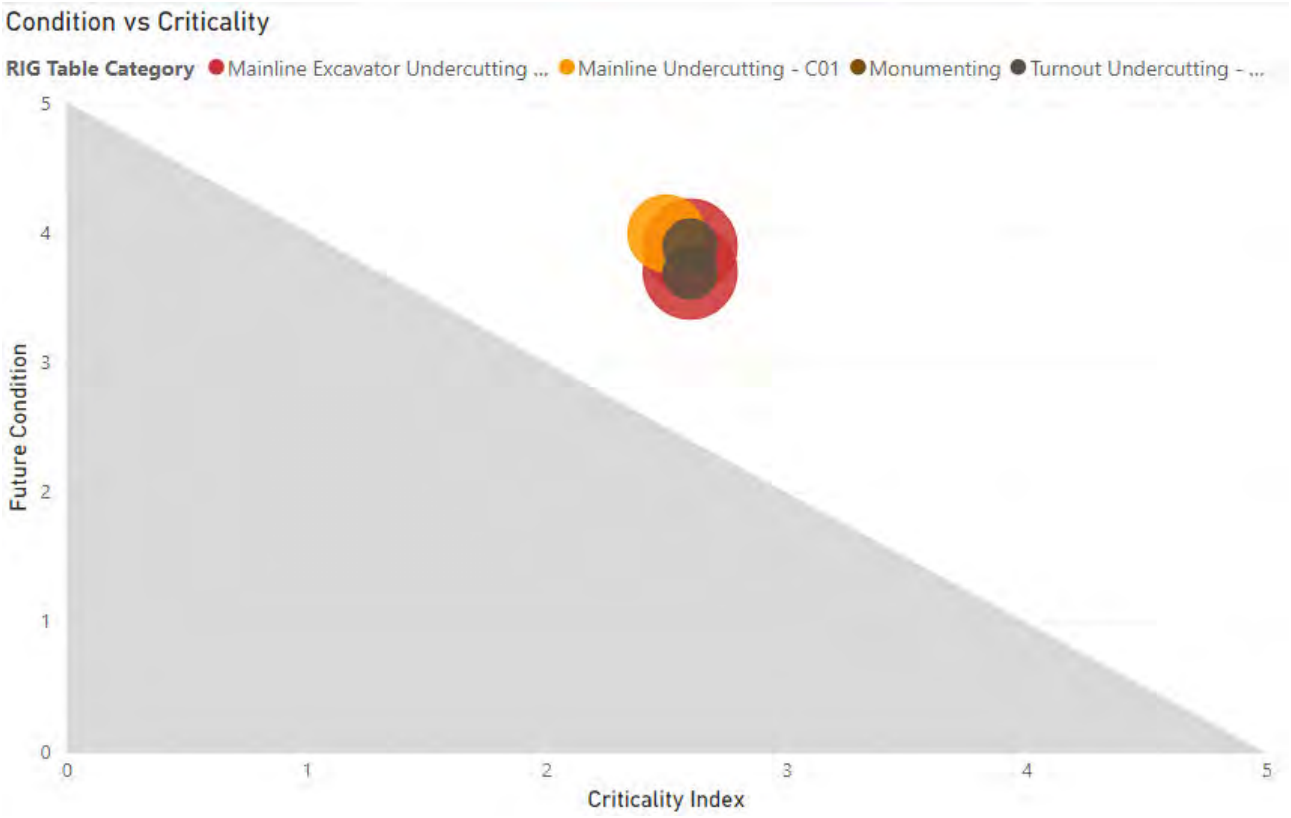


Figure 55 Ballast Cleaning – FY25 Scope Priority Ratings – Moura System

4.7 Civil Assets – Structure Renewals

Structure Renewals Program

The Moura System has a total of 39 bridges and 550 culverts which are designed to allow the natural flow of water through the rail network. In FY25, Aurizon Network proposes to undertake $2.7m of structures renewal works in the Moura System. Table 43 summarises the scope and budget for each relevant renewal item.

Table 43 FY25 Structure Renewals – Moura System

Renewal Item	Scope Type	FY25 Scope	Scope Unit	FY25 Budget ($m)
Culvert Design	Future Scope	4	Site	0.1
Culvert Renewals	Baseload	3	Site	2.5
Total				**2.7**

The Culvert Renewal at Annandale is the largest of the 3 renewals for FY25, scope will remove and replace 5/1500 x 600 Reinforced Concrete Box Culverts. This larger site increases the program budget in FY25 compared to the FY24 program.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Structures Assets.

However, the culvert renewal at Earlsfield will adopt the alternate approach by lining aged pipes with CIPP. This is a lower cost option that provides a load rated structure to current standards while preventing track capacity impacts.

+

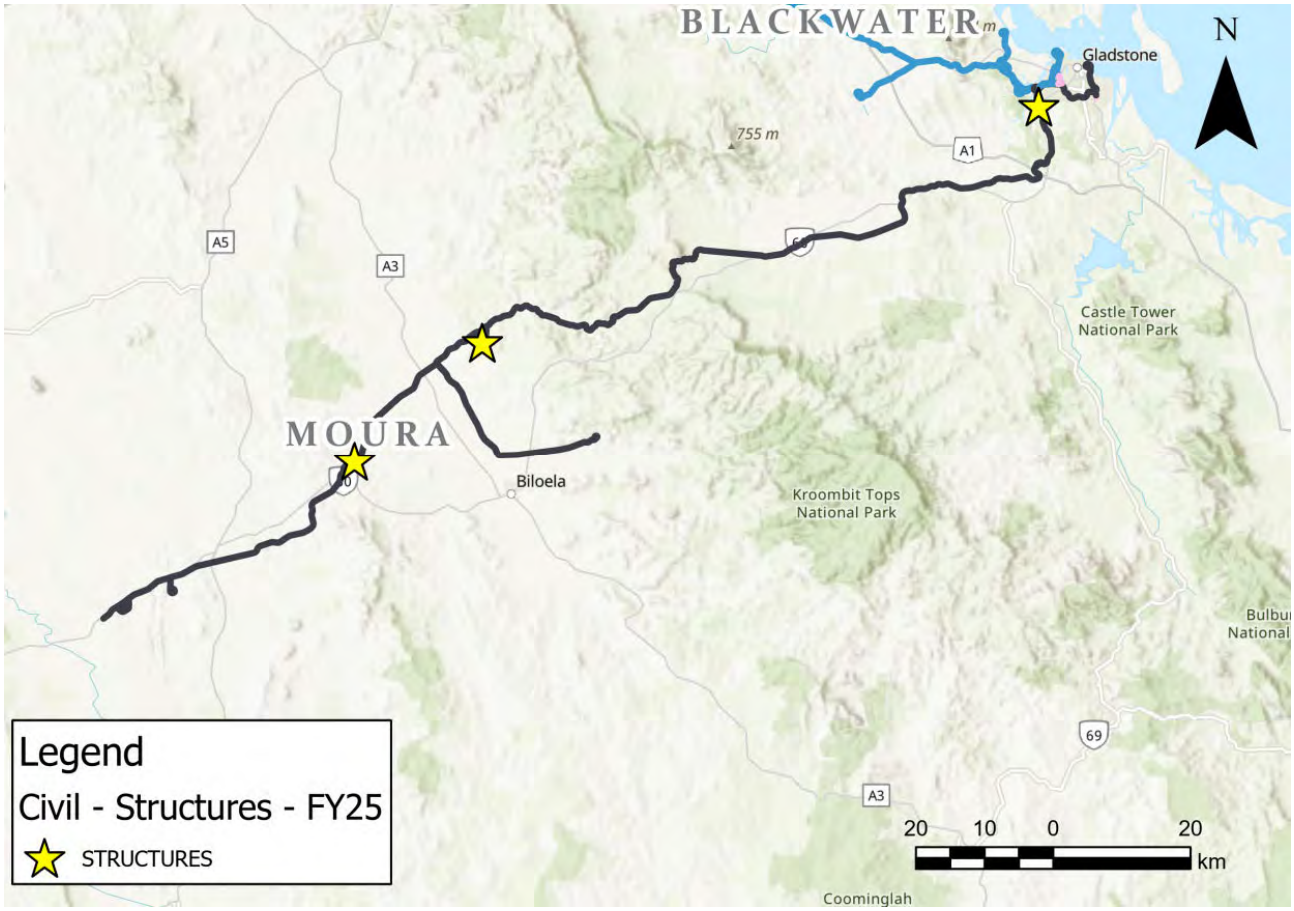


Figure 56 Structures Renewal Sites – Moura System

Structures FY25 Scope – Asset Condition and Criticality Assignment

Figure 57 plots the Structure renewals against asset condition and location / operations criticality. All planned FY25 renewals have poor to near end of life condition.

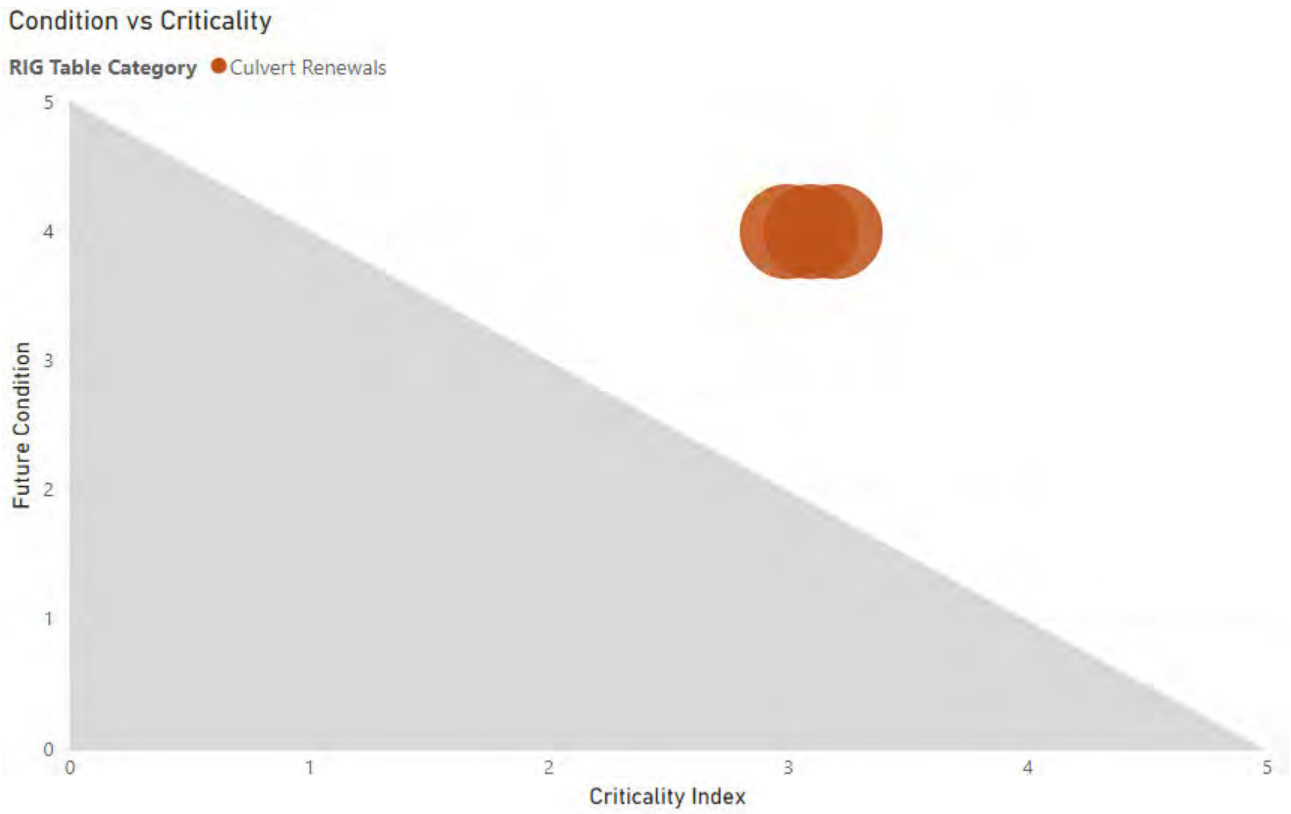


Figure 57 Structures – FY25 Scope Priority Ratings – Moura System

4.8 Civil Assets – Civil Renewals

Civil Asset Renewal Program

In FY25, Aurizon Network proposes to undertake $4.3m in renewals for these assets. Table 44 summarises the scope and budget for each relevant renewal item.

Table 44 Civil Assets Renewal Program – Moura System

Description	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Level Crossing Renewals	Baseload	1	Site	1.3
Level Crossing Design	Future Scope	7	Site	0.5
Level Crossing Other	Reactive Renewals		Lumpsum	0.2
Formation Other	Future Scope		Lumpsum	0.0
Formation Reactive	Reactive Renewals		Lumpsum	1.6
Corridor Fencing & Security Fencing	Reactive Renewals		Lumpsum	0.3
Access Points & Roads	Future Scope Reactive Renewals	2	Site Lumpsum	0.0 0.2
				4.3

Moura has high number of public level crossings, with 45 Public Level Crossings in the system. A Level Crossing Renewal is planned for the Public Level Crossing at Boundary Hill in FY25. Site access in this

location is difficult, and Aurizon Network's cost estimates have allowed for the fact that stockpiles and laydown areas will be located away from site. Cost estimates have also allowed for the installation of culverts to assist with drainage issues at this location.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Civil Assets.

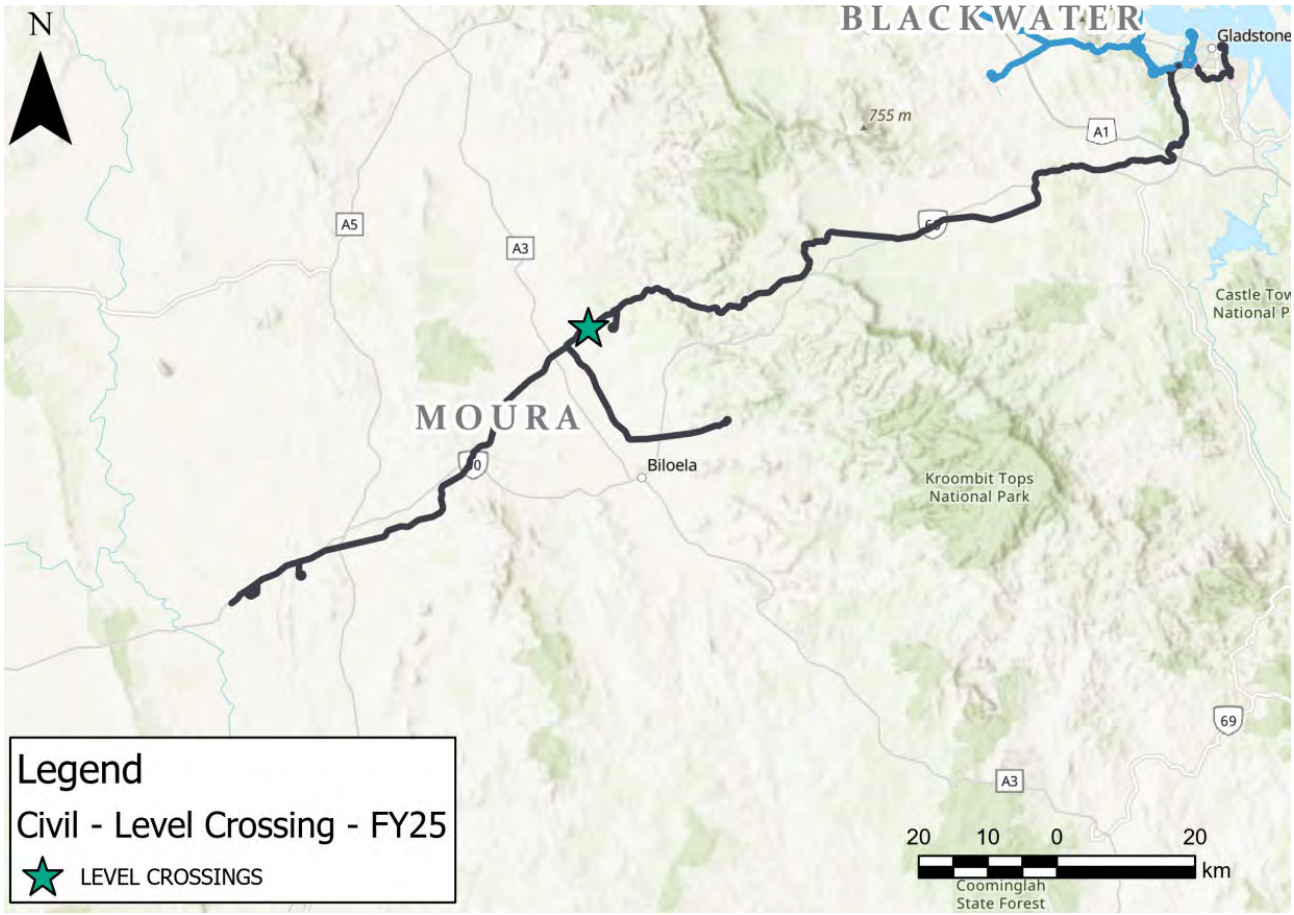


Figure 58 Level Crossing Renewal Sites – Moura System

Civil Renewals FY25 Scope – Asset Condition and Criticality Assignment

Figure 59 plots the civil renewals against asset condition and location/ operational criticality. There is one level crossing renewal site planned at Boundary Hill for FY25 with a poor condition score of 4.4.

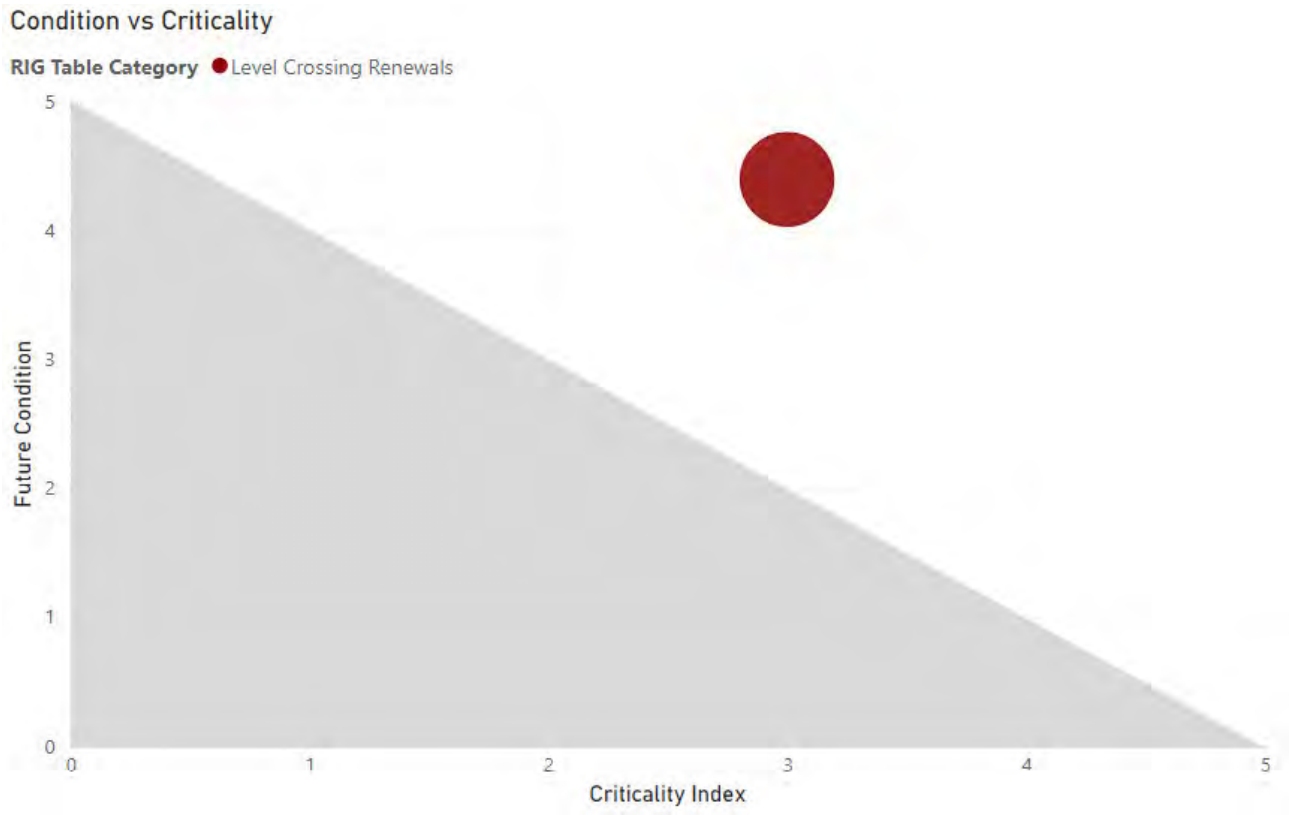


Figure 59 Civil Renewals – FY25 Scope Priority Ratings – Moura System

4.9 Control Systems Assets

Control Systems Renewal Program

In FY25, Aurizon Network proposes to undertake $4.7m of Control Systems renewals or replacement in the Moura System. Of the $4.7m proposed in FY25, $1.3m across 3 sites are assigned to future works for design for renewals in future years.

Table 45 summarises the scope and budget for each relevant renewal item.

Table 45 Control Systems Renewal Program – Moura System

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Safe Working Systems – Asset Protection	Baseload	1	Unit	1.4
	Future Scope	1	Unit	0.1
Safe Working Systems – Interlockings	Baseload	1	Site	1.2
Safe Working Systems – Minor	Baseload	2	Unit	0.0
	Future Scope	1	Site	1.2
Transmission & Data Renewals	Baseload	5	Sites	0.7
	Future Scope	1	System	0.0
UTC DTC	Strategic		Lumpsum	0.1
				4.7

In FY25, the Asset Protection scope will renew the Moura Mine Balloon Weighbridge. The interlocking scope will renew the Vital Processor Interlocking **(VPI)** Annandale which is planned to be completed and commissioned in FY26. The program also includes design for a future renewal site at Dumgree FY27.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Control Systems.

The Digital Microwave Radio Link replacement will renew this life expired asset with new generation equipment Banana Range.

Given the high proportion of these renewals being triggered by obsolescence, the technology will be typically the modern-day equivalents and provide an uplift in speed and/or capacity.

Strategic Scope:

UTC/DTC ($0.1m)

Safety and Operational Improvements for Network Train Control system. Scope includes train control system applications, user interface changes and engineering controls for safety processes. Operational requirements for delivery of individual scope items are subject to change due to criticality requirements e.g. post an incident or process breakdown.

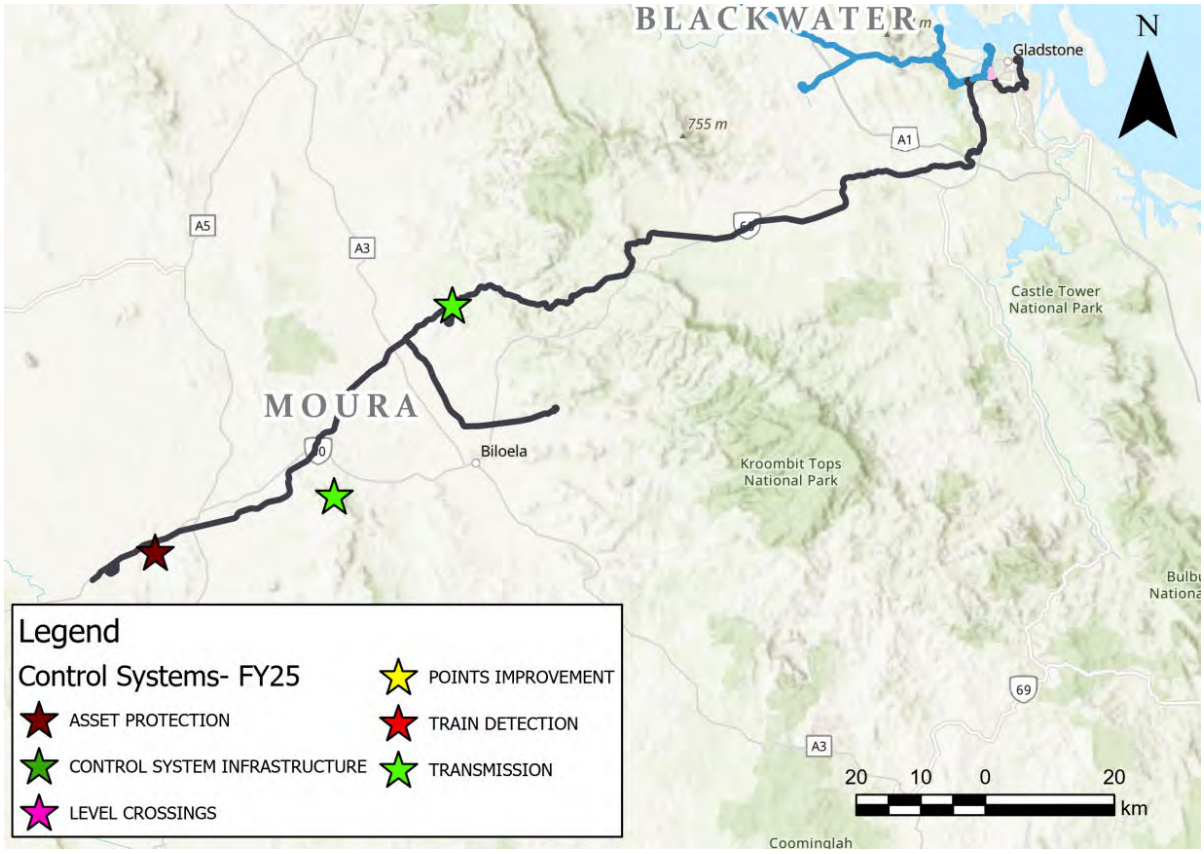


Figure 60 FY25 Control Systems Renewals – Moura System

Control Systems Renewals FY25 Scope – Asset Condition and Criticality Assignment

Figure 57 plots Control Systems renewals against asset condition and location/ operational criticality. All scope items are listed as condition rating 4 or above. This reflects the age of assets targeted for renewal in FY25. Control Systems assets are mostly electronic, so renewal is a trigger of support, spare parts or software obsolescence. As such condition is more a matter of asset age against design life rather than a physical demonstration of wear.

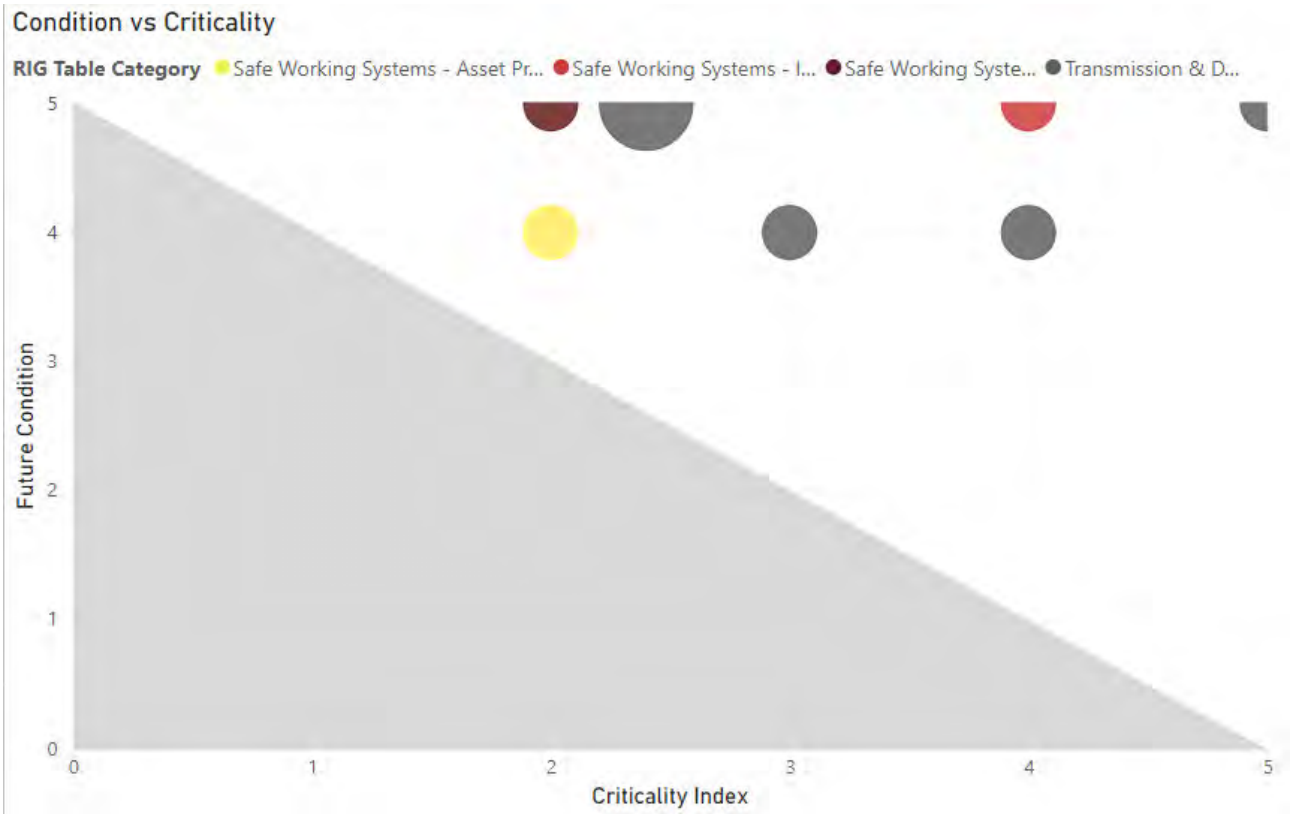


Figure 61 Control Systems – FY25 Scope Priority Ratings – Moura System

4.10 Likelihood of Change Assessment – Maintenance and Renewals

Aurizon Network notes that the identification and evaluation of renewals scope for inclusion in the MRSB is based on currently available information that may change over the period prior to execution (of up to 18 months) due to environmental factors, relative degradation rates or other considerations. Additionally, potential changes may be related to specific items of scope or applicable to the broader renewals program for each system.

In the preparation of the FY25 Final Draft Proposal, Aurizon Network conducted a likelihood of change review to assess potential areas of change to either cost or delivery, time to complete or location. Further detail for this review process is included in Section 0.

This section provides details of scope items with a high likelihood of change where controls have been identified and where a residual risk of will be managed. These scope items are also identified in the Scope Detail BI Report. Changes to the proposed scope will be dealt with through reporting and change management processes as appropriate.

Additionally, potential areas of change are identified in the development of the maintenance program based on Aurizon Network Maintenance leader reviews and lessons learned from recent periods. While not quantified under the same likelihood of change profile as the renewal program, risks and controls specific to the maintenance program are also included in the table below.

Table 46 provides a summary of the deliverability assessment completed in the development of the FY25 MRSB program of work. Scope items with a high likelihood of change are summarised including their potential impact, the controls implemented, and the residual risk being managed as the program develops toward execution. Changes will be reported in the RIG Quarterly Report. The table also includes a high-level assessment of key maintenance deliverability risks together with identified controls.

Potential Areas of Change at Program Level in the Moura System

Table 46 Potential areas of change at program level in the Moura

System Program Category	Program	Risks and Controls	Total Scope Items	# High Likelihood of change	% of Program	Residual Risk Post Control
Total Summary			30	4	13%	
Civil	Ballast Cleaning	**Risk: Increased access and cost to complete scope due to** increased percentage of unscreenable material over planned assumption **Control:** Initial pre-digs completed FY24 and again during year of delivery to re-evaluate cost and capacity prior to execution for ballast cleaning activities (RM902) The likelihood remains high for 2 sites yet to have pre-digs completed (action to progress in advance of execution).	11	2	18%	High
Control Systems	Asset Protection	**Risk: Increased cost to complete due** to scope creep through design solutions still to be determined. **Control:** Confirm scope prior to delivery and review options A design solution for the telecommunication component of the Moura weighbridge is yet to be determined and high cost variability is still possible for this site.	6	1	100%	Med
	Transmission	**Risk: Scope not delivered, or cost is increased** for CS Transmission Supervisory Card due to specialised resources required for design and delivery. **Control:** Engagement of external deign resource to complete A high likelihood of change exists for certain scope items that require proof of concept and test lab simulations due to be complete in FY24.	4	1	25%	Med
General Track Maintenance		**Risk: Additional maintenance activity required** driven by further asset degradation requiring rectification to support network safety, reliability and performance (Materials, Resources and Access)		Maintenance not assessed		

System Program Category	Program	Risks and Controls	Total Scope Items	# High Likelihood of change	% of Program	Residual Risk Post Control
		Control: Single line maintenance activity windows have been included in the capacity assessment and are planned throughout the year				

Newlands System and GAPE

5 Newlands System and GAPE

This Section presents Aurizon Network's Draft Maintenance and Renewal Strategy and Budget for the Newlands System and the Goonyella to Abbot Point Expansion (**GAPE**) during FY25. In line with 7A.11.3 of UT5, each of the Newlands and GAPE sections will be subject to vote by the relevant Newlands and GAPE End Users.

Aurizon Network's FY25 Draft Proposal for the Newlands System and GAPE provides for:

- **A strategy to maintain stable level of service over the long-term**

  The asset management and closure strategy for the Newlands System and GAPE is reflective of the current tonnage profiles and asset age mix. Asset Renewals seek to renew or replace aged assets ahead of unplanned failure or obsolescence to minimise supply chain interruption.

- **Direct Maintenance Cost Allowance of $16.7m**

  The proposed Direct Maintenance Cost Allowance, which excludes ballast undercutting plant depreciation, represents an increase of $2.1m compared to Aurizon Network's current FY24 full year maintenance forecast and an increase of $2.9m compared to the approved FY24 Maintenance Strategy and Budget.

  This includes an adjustment for non-coal traffic and provides for a total Maintenance Indicator of $16.9m. Aurizon Network proposes to allocate the total Maintenance Indicator as follows:

  $6.3m allocation to Newlands System Allowable Revenues and Reference Tariffs; and
  $10.7m allocation to GAPE Allowable Revenues and Reference Tariffs.

  The increase in maintenance spend is predominantly driven by escalation, additional internal labour costs and FTE to support mitigation of ageing workforce and attrition risks, an increase in corrective maintenance activities to rectify the condition of certain structures, additional grinding requirements and additional maintenance activities for resurfacing plant and equipment. The draft budget also provides for an increase in planned rail grinding to manage fatigued 53kg rail and additional grinding scope.

- **A Renewals Allowance of $32.3m**

  This represents an increase of $7.2m compared to Aurizon Network's current FY24 renewals forecast and an increase of $8.6m compared to the approved FY24 Renewals Strategy and Budget.

  Aurizon Network proposes to allocate the total Capital Indicator as follows:

  $29.3m allocation to Newlands System Allowable Revenues and Reference Tariffs; and
  $3.0m allocation to GAPE Allowable Revenues and Reference Tariffs.

  The increase in renewal spend is a function of labour and non-labour escalation, particularly the cost of materials (steel, concrete) and an increase in scope for Ballast Cleaning and Structures associated with additional planned Mainline Undercutting and Culvert Renewals. This increase is partially offset by reduction in scope for Rail Renewals, Mainline Excavator Undercutting and Bridge Rollout Renewal activities.

- **Integrated System Closures**

  A key feature of the Newlands Integrated System Closure plan is that major scope items are delivered in extended integrated closures once or twice per year (scope dependent). All other planned maintenance activities are completed in scheduled maintenance blocks or in-between trains where possible.

Planned Integrated System Closures in the Newlands System and GAPE in FY25 total 246 hours

- **Likelihood of Change**

  Completion of prior year scope and weather remain key program risks for the Newlands system with potential impacts on the ability to complete planned renewal scope.

5.1 Alternative allocation methodology for the shared rail corridor

Aurizon Network understands that the allocation of both the FY25 Direct Maintenance Cost Allowance and the Renewals Allowance between Newlands and GAPE Train Services is a matter of interest to customers. Following the withdrawal of a previous DAAU that sought to address the allocation methodology issue (amongst other things), on 6 April 2023, following extensive engagement with Newlands and GAPE End Users, Aurizon Network submitted its Newlands and GAPE Pricing Draft Amending Access Undertaking (**April GAPE DAAU**) to the QCA for approval. The April GAPE DAAU proposed an alternative allocation methodology for asset replacement and renewal expenditure in the shared Newlands rail corridor.

On 23 November 2023, the QCA made a final decision to 'refuse to approve' the April GAPE DAAU in the way submitted by Aurizon Network. It should be noted that he QCA's decision to 'refuse to approve' was driven by other matters within the April GAPE DAAU rather than the allocation methodology.

Aurizon Network is developing a revised Newlands/GAPE DAAU consistent with the QCA's November 2023 Decision, inclusive of the allocation methodology. For the benefit of Newlands and GAPE End Users, Aurizon Network has provided a draft estimate of the alternative renewal expenditure allocations, which may apply in the event the QCA approves a revised DAAU. This information is outlined below and should be considered indicative only.

Alternate Asset Replacement and Renewals Expenditure Allocation (Indicative Only)

Under the allocation methodology proposed in the April GAPE DAAU, asset replacement and renewal expenditure in the shared rail corridor would be allocated as follows:

- $20.2m allocation to Newlands System Allowable Revenues and Reference Tariffs; and
- $12.1m allocation to GAPE Allowable Revenues and Reference Tariffs.

5.2 Newlands System and GAPE - Characteristics and Corridor Strategy

The Newlands System is located at the northern end of the Bowen Basin connecting to the port at Abbot Point. The system serves mines located in the Newlands System, as well as mines located in the Goonyella System via the GAPE Link and coal services from the Galilee coal basin. The Newlands System and GAPE are not electrified.

Maintenance and renewal activities in the Newlands System and GAPE are primarily delivered from depots located in Moranbah and Merinda, with mobile mechanised plant based in Yukan and Rockhampton.

Aurizon Network's depots are strategically located to enable incident response times across the Newlands and GAPE Systems within approximately two and half hours. Mechanised plant (e.g., resurfacing) is typically able to respond to an urgent defect (e.g., a buckle or geometry defect) in the Newlands and GAPE Systems within 2 days.

Figure 62 Depot Locations – Newlands System and GAPE

Aurizon Network has considered asset conditions specific to this Coal System when developing the FY25 Final Draft Proposal, particularly in relation to:

- **Civil Assets** – The GAPE project built a 65km greenfield connection between the Goonyella and existing Newlands Systems in 2012. This project also upgraded the sections of the pre-existing Newlands System designed to carry loaded traffic from 20 tone axle load to 26.5 tonne axle load. These upgrades included rail replacements, formation strengthening and structure renewal. Current activity is centred around the sections that were not upgraded in 2012 which include sections of 53kg rail and fist fastener sleepers associated with the original 20 tonne axle load operations. There is approximately 213km of track left in the Newlands system with 53kg rail (including passing and balloon loops). Current strategy is to replace 118 rails or 6.37km of track each year in Newlands, of which approximately 5.1km is targeting 53kg rail. Prioritisation of locations is decided based on wear, fatigue, defect history, fit for purpose and criticality. Quantity replaced for future years may increase depending on annual tonnage.

Control Systems Assets – This asset class was also modernised during the GAPE project with upgraded sections making use of the installed optical fibre cable which was part of GAPE. . Like the civil assets, these upgrades are intermixed with aged assets. For Control Systems, these aged assets include the section of Direct Traffic Control **(DTC)** controlled track between the Newlands Junction section and Collinsville and aged interlockings. Trains are detected through a mix of track circuits and axle counter track sections with ongoing renewals programmed for life expired axle counter assets in future years. The radio system across Newlands was upgraded in recent years to a digital based Terrestrial Trunked Radio (**TETRA**) system. The non-upgraded sections of the Newlands System attract most of the maintenance and renewal activity given these assets are aged and there are sections of 53kg rail and fist fastener sleepers, and short span bridges associated with the original 20 tonne axle load operations.

Corridor Strategy

The Newlands System (which includes Rail Infrastructure constructed as part of the GAPE project) is a mix of new, recently upgraded, and original assets. As such most of the maintenance and renewal efforts are focused on the aged assets not upgraded or renewed during the GAPE.

The asset management strategy for the Newlands System and GAPE is to hold availability required in a fit for purpose manner. The Newlands System and GAPE rail infrastructure is being maintained for forecast tonnages and not name plate capacity.

The maintenance approach is consistent with the other Coal Systems being planned inspections and planned corrective maintenance to address identified defects, and reactive maintenance to address service interrupting asset failures and incident response.

Asset Renewals seek to renew or replace aged assets ahead of unplanned failure or obsolescence to minimise supply chain interruption.

The below graphs in figure 63 indicate the asset management strategy is effective in maintaining performance and reliability consistent with 4-year averages. Please refer to the Glossary for interpretation of these graphs.

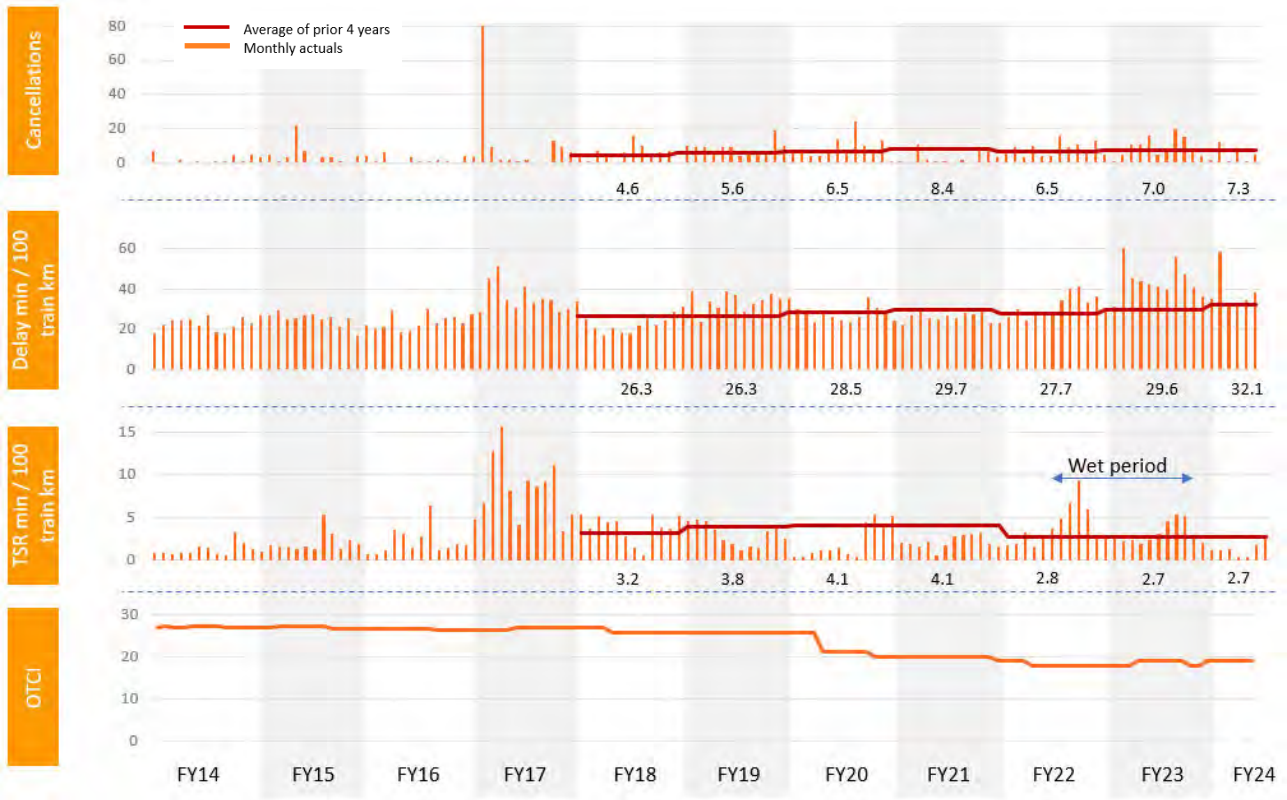


Figure 63 Newlands and GAPE Below Rail Performance 4-year average trends using FY2014 to December FY2024 monthly performance

Notes:

- Cancellation levels in Newlands have increased as traffic volumes increase
- Increases in delays from FY23 are driven by increased traffic on the Newlands line, increasing planning delays
- 4-year average of TSRs has improved although overall system delays have increased
- OTCI index has reduced overtime indicating an overall improvement to average track geometry condition. OTCI does not account for localised reliability impacts, traction or control systems assets.

5.3 Newlands System and GAPE - Integrated Closure Plan

Aurizon Network has engaged with the RIG and other stakeholders to better understand their requirements and has taken the following into consideration when developing the FY25 Final Draft Proposal, Integrated Closure Plan:

Specific Newlands System and GAPE Supply Chain considerations

- **Port alignment**

  Major scope delivery is preferably aligned with port outages.

- **Reducing impact of major closures**

  Major scope delivery is packaged and executed in extended integrated closures once or twice per year (scope dependent)

  All other planned maintenance activities are completed in scheduled maintenance blocks or in-between trains.

- **Closure timing**

  December and June are avoided to provide the opportunity to maximise railings for the end of calendar and financial year respectively.

- **Transitional Arrangements**

  No allowance has been made for construction works related to Transitional Arrangements in FY25. Any approved Transitional Arrangements may require further closure hours. Timing of works would be subject to refinement of costs, available resources, availability of long lead items as well as the prudency and efficiency assessment by the IE prior to construction as per clause 7A.5(i) of UT5

Table 47 outlines the proposed closure hours for FY25. System closure hours have reduced compared to the FY24 Strategy and Budget.

Table 47 Planned integrated closures – Newlands System and GAPE

FY25 Integrated System Closures													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Hours	78		108						60				246

Total integrated system closure hours were reduced by 48hrs between this submission and what has presented at the end of Phase 2 because of the scope on the NCL planned in March-25 (was 108hrs now 60hrs) now being undertaken as a single line closure. RCS works have been brought into July 2024, increasing the hours to 246.. Aurizon Network has verbal agreement with Abbot Point Coal Terminal regarding this closure.

Abbot Point Coal Terminal have not provided any FY25 port in-loader closure information (additional to the proposed July 2024 closure) at the time of submitting the Final Draft Proposal. Assumptions based on prior year in-loader closures has been made in developing this plan. An opportunity to move the currently planned May-24 dump station 2 closure to align with the Sept-24 integrated system closure was raised with Abbot Point Coal terminal, however at the time of publishing this MRSB, the dump station outage is unable to be aligned with the system closure due to scope integration issues within the dump station closure. This

opportunity will continue to be pursued with Abbot Point Coal Terminal due to the material production benefit alignment provides.

Timing and duration of both the Integrated Closures and single line possessions are tested against delivering both DNC (ACAR 2023 FY25) and Committed Capacity as well as being coordinated with other supply chain participants where possible, to maximise supply chain alignment and throughput. The final Critical Asset Activities Power BI report that aligns with this FY25 Final Draft Proposal was published on 30 November 2023. Critical path activities listed in Table 48 have determined the duration of the planned integrated closures and access requirements in the Newlands System and GAPE during FY25.

MRSB Single Line Planned Possession hours for FY25 are 177 hours consistent with Asset Activities. Note hours are not reflective of customer impact as it does not consider works planned in the shadow of port outages or other works to reduce impact. These hours do not include: moving products such as rail grinders, resurfacing, RTI and Road Patrols; maintenance works to be planned throughout the year or asset activity planned around train services (Plan throughs) as they do not impact capacity or services.

Table 48 Critical Scope - Newlands System and GAPE

Planned Delivery (Hours)	Asset	Location
78	RCS Completion	Collinsville - Newlands
108	Reinforced Concrete Culvert Unibox	Buckley - Armuna
60	Reinforced Concrete Culvert Unibox	Havillah

Figure 64 illustrates the historical Newlands and GAPE integrated system closure hours in comparison to the FY25 Draft Proposal. The increase in Integrated Closure hours between FY24 and FY25 is reflective of the inclusion of RCS commissioning as part of the Transitional Arrangements to address the Existing Capacity Deficit.

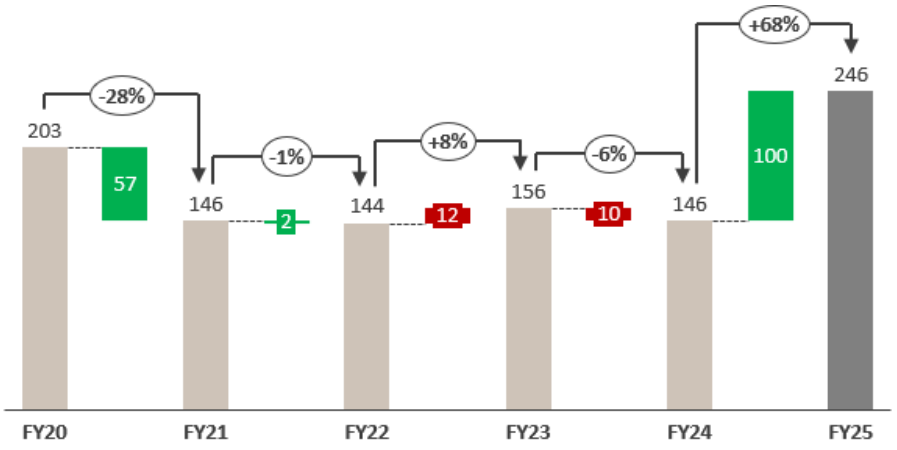


Figure 64 Trend of Integrated System Closure Hours from FY20 to FY25 – Newlands System and GAPE

Aurizon Network's assessment of Useable Capacity for FY25 in the Newlands and GAPE systems indicates a low level of risk of inability to provide adequate network usable capacity to deliver DNC across FY25.

5.4 Newlands System and GAPE - FY25 Maintenance Strategy and Budget

Aurizon Network has developed its Draft Maintenance Strategy and Budget for the Newlands System and GAPE having regard to all relevant matters outlined in clause 7A.11 of UT5, including the Maintenance Objectives. Aurizon Network considers that its FY25 Final Draft Proposal provides an appropriate level of asset activity that will promote the safety, reliability and performance of the Newlands System and GAPE Rail Infrastructure.

Summary of Historic, Forecast and FY25 Maintenance Strategy and Budget

Aurizon Network's FY25 Final Draft Maintenance Strategy and Budget for the Newlands System and GAPE provides a Direct Maintenance Cost Allowance of $16.7m (excluding ballast undercutting plant depreciation) which is:

- $2.9m higher than the approved FY24 Maintenance Strategy and Budget; and
- $2.1m higher than Aurizon Network's current FY24 full-year forecast.

Figure 65 provides a summary of historic direct maintenance costs as well as the proposed direct maintenance cost allowance in respect of FY25.

To ensure comparability with prior periods, the direct maintenance costs shown in Figure 65 and Figure 66 exclude depreciation on ballast undercutting plant.

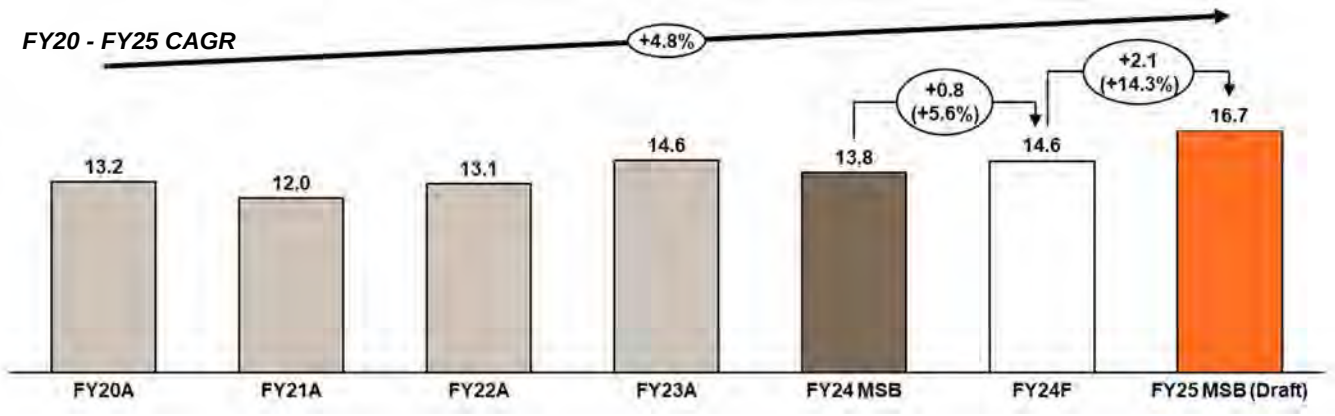


Figure 65 Direct Maintenance Costs – Newlands System and GAPE

Aurizon Network acknowledges that the FY25 Draft Proposal for Newlands maintenance is c.14.3% higher than the current FY24 full-year forecast. Further information on the key drivers of this increase are outlined in Figure 4 below.

Aurizon Network notes, however, that annual cost increases of this magnitude have been observed in recent years for a multitude of inputs required for maintenance and renewal activities. To help put the FY25 Final Draft Proposal into context, Aurizon Network has considered the impact of actual inflationary outcomes over time.

While CPI can be used to measure the inflationary pressures in the broader economy, the basket of goods used to determine CPI are not representative of the necessary inputs for the asset maintenance and renewal task. Consequently, the QCA has previously approved the use of a 'Maintenance Cost Index' **(MCI)**, to assess the expected change in maintenance costs over time.

The MCI is a weighted index that measures changes in four key cost categories, namely, Accommodation, Consumables, Fuel and Labour. The impact of CPI is considered within the 'Consumables' category. Aurizon Network has considered the inflationary impacts for these key categories over time, having regard to publicly available data[15]:

- Actual published index values to June 2023
- Annual growth rates to June 2025 using forecasts for CPI and the Wage Price Index published by the Reserve Bank of Australia.

Aurizon Network has assessed the compounding annual rate of growth **(CAGR)** in maintenance costs over the five-year period ending 30 June 2025. During this period, Aurizon Network estimates that the Newlands System maintenance costs have increased at a rate of approximately 4.8% per annum

In comparison, Aurizon Network notes that over the same 5-year period the:@

- accommodation index is expected to increase 43% overall, or 7.4% per annum
- CPI is expected to increase 28% overall, or 5.0% per annum
- consumables index is expected to increase 48.5% overall, or 8.2% per annum
- fuel index is expected to see an increase 61% overall, or 10.0% per annum
- labour index is expected to increase 16% overall, or 3.0% per annum.

The application of the QCA-approved MCI methodology indicates that input costs have increased at a rate of 5.6% per annum over the same period.

Aurizon Network has also assessed the annual change against two other indices with similar input costs. Specifically, the:

- Road and Bridge Construction Index[16]
- Coal Mining Index[17]

Results are summarised in the Table 49, but on balance, Aurizon Network's observation is that it's cost performance over time has generally been favourable when considering actual inflation outcomes.

Table 49 Comparison of cost indices FY20 – FY25

FY20 to FY25 CAGR (% Change p.a)	MCI	Road and Bridge Construction	Coal Mining	AN's Maintenance Costs
Newlands and GAPE	5.6%	4.8%	5.1%	4.8%
Total CQCN				4.8%

[15] Publicly available data sourced from Australian Bureau of Statistics (actual published index results to June 2023) and the Reserve Bank of Australia CPI and Wage Price Index forecasts for FY24 and FY25.
[16] ABS, 6427.0 Producer Price Index, Table 11, Coal Mining, Series ID: A83737106J
[17] ABS, 6427.0 Producer Price Index, Table 17, Road and Bridge Construction, Series ID: A2333727L

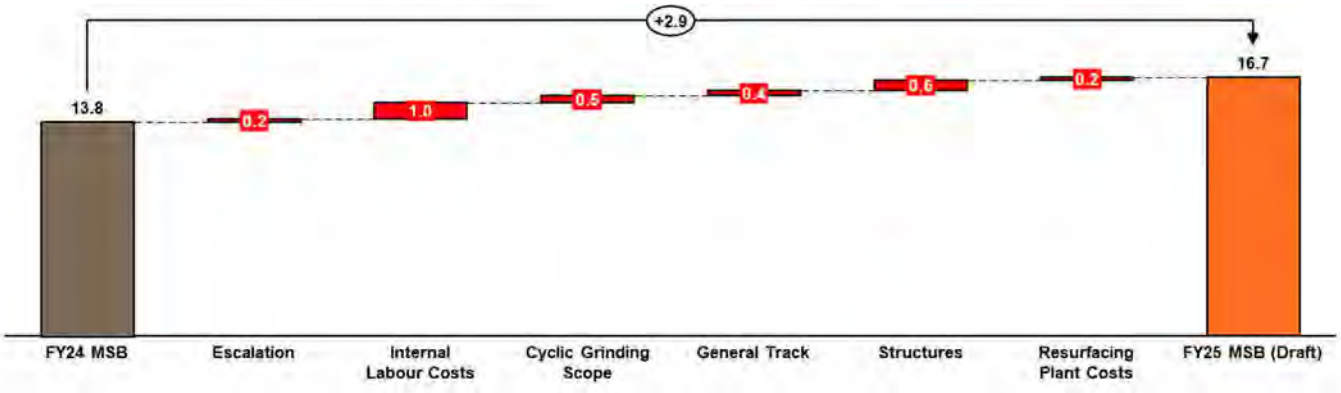


Figure 66 Direct Maintenance Cost Movement – Newlands System and GAPE

The FY25 Final Draft Maintenance costs (excluding ballast undercutting plant depreciation) is $16.7m. The increase in spend of $2.9m against the approved FY24 Maintenance and Strategy Budget is primarily driven by:

- Cost escalation on contractors, materials and plant and other consumables (+$0.2m).
- Internal labour costs (+$1.0m) associated Infrastructure Enterprise Agreement outcomes, additional FTE to support mitigation of ageing workforce and attrition risks and costs associated with attraction and retention initiatives for critical roles and locations.
- Structures repairs program (+$0.6m) to rectify culvert drainage and cleaning defects and concrete bridge repairs.
- Rail Grinding program (+$0.5m) including additional scope to manage fatigued 53kg rail and asset condition around Newlands Junction to North Goonyella Junction.

The current FY24 forecast is informed by actual conditions and maintenance costs from FY23 and Q1 FY24 and other identified costs expected to be incurred[18]. All items are currently within the indicative materiality thresholds set in UT5. The FY24 forecast is subject to review and will be updated at the end of Q2 FY24.

An overview of the methodology used to establish the FY25 maintenance cost budget is provided in Section 0.

FY25 Maintenance Strategy and Budget

As detailed in Section 11.3, Aurizon Network's Asset Management approach is based on achieving the appropriate level of asset availability which will best meet customer requirements in each Coal System. The scope and closure requirements in different systems is influenced by demand, track arrangement, operating parameters, traction mode and signalling and communications systems.

The maintenance and renewal pattern in the Newlands System and GAPE is aligned to the larger systems regarding the mix of maintenance in total renewals and maintenance cost, as per Table 50.

Table 50 FY25 Final Draft Proposal – Maintenance and Renewal spend % split – System Comparison – Newlands System and GAPE

System	FY25 Renewals and Maintenance Cost ($m)	% Maintenance	% Renewal
Blackwater	225.4	34%	66%
Goonyella	183.3	40%	60%

[18] Refer to Q1 FY24 Quarterly Performance Report for more detailed information on costs expected to be incurred.

Moura	38.9	43%	57%
Newlands	**49.0**	**34%**	**66%**

In the Newlands System and GAPE, Aurizon Network's maintenance approach holds the system fit for purpose for forecast tonnages. The planned and preventive maintenance activities and inspections, as well as the planned mechanised production scope, are derived in line with the intervention periods as detailed in the Asset Maintenance and Renewal Policy. This Policy determines the inspection regime and period based on asset type condition and location.

Section 10, Strategies by Asset Class, outlines the different approaches with regards to maintaining the Rail Infrastructure. These approaches lead to the application of the maintenance tasks across the system.

The proposed FY24 maintenance scope and budget for the Newlands System and GAPE is outlined in Table 51.

Table 51 FY25 Final Draft Proposal – Maintenance – Newlands System and GAPE

Maintenance Item	Scope Units	FY24 Budget Scope	FY24 Budget ($m)	FY24 Forecast Scope	FY24 Forecast ($m)	FY25 Budget Scope	FY25 Budget ($m)
Resurfacing			1.5		1.4		1.8
Mainline	km	188	1.3	188	1.3	188	1.5
Turnout	Site	21	0.2	21	0.2	21	0.3
Rail Grinding			2.4		2.4		3.0
Mainline	km	[redacted]	2.1	[redacted]	2.1	[redacted]	2.5
Turnout	Site	[redacted]	0.3	[redacted]	0.3	[redacted]	0.4
Level Crossing	Track LX	[redacted]	0.0	[redacted]	0.0	[redacted]	0.0
General Track Maintenance			4.4		5.1		5.4
General Track	Activity		4.3		4.8		5.2
Track Recording	km	-	-	253	0.1	-	-
Ultrasonic Testing	km	1,618	0.2	1,618	0.2	2,254	0.2
Signalling and Telecoms			3.5		3.5		3.8
Signalling Corrective	Activity		1.1		1.0		1.3
Signalling Preventive	Inspection		1.8		1.7		1.8
Telecoms Corrective	Activity		-		0.1		0.1
Telecoms Preventive	Inspection		0.6		0.7		0.6
Structures and Facilities			1.0		1.0		1.6
Trackside Systems			0.3		0.3		0.4
Other Civil Maintenance			0.2		0.3		0.3
Other General Maintenance			0.5		0.5		0.5
Sub-Total			**13.8**		**14.6**		**16.7**

Maintenance Item	Scope Units	FY24 Budget Scope	FY24 Budget ($m)	FY24 Forecast Scope	FY24 Forecast ($m)	FY25 Budget Scope	FY25 Budget ($m)
Ballast Undercutting Plant Depreciation			-		-		0.3
Total Direct Maintenance Costs			13.8		14.6		17.0
Non-Coal Allocation			(0.0)		-		(0.1)
Total			**13.8**		**14.6**		**16.9**

Note: Figures may not add due to rounding.

For the Newlands System and GAPE:

- **Direct maintenance costs** (excluding ballast undercutting plant depreciation) are budgeted to increase by $2.1m from the current FY24 forecast to $16.7m in FY25. Key movements in RIG maintenance categories are summarised below:
    - **Resurfacing (+$0.4m)** - increase in cost primarily driven by cyclical On Track Vehicle maintenance activities due in FY25 and an increase in plant maintenance labour driven by apprentice trade staff to mitigate future attrition risk.
    - **Rail Grinding (+$0.6m)** - reflects impacts of cost escalation and increased mainline and turnout grinding frequencies to manage fatigued 53kg rail and asset condition around Newlands Junction to North Goonyella Junction.
    - **General Track (+$0.2m) –** Reflects cost impact of additional FTE to support mitigation of ageing workforce and attrition risk across the Civil discipline. Additional contractor costs for access roads and cess drain corrective maintenance included to rectify degrading asset condition. These costs are largely offset by non-recurring costs in FY24 for contract labour hire support and QR Track Geometry Recording Car contract both forecast to cease from January 2024.
    - **Signalling and Telecoms (+$0.3m)** - Increase reflects cost impact of additional FTE to support mitigation of ageing workforce and attrition risk across in the Electrical discipline. These costs are marginally offset by the progressive cessation of labour hire arrangements as apprentices and trainees become qualified.
    - **Structures (+$0.6m) –** driven by timing of the condition-based preventive culvert clean & inspection program (historically mainly in odd years), additional corrective cleaning and culvert maintenance scope (as identified in the FY24 MRSB) plus additional costs to standardise the use of remote inspections by contractors for culverts less or equal to 900mm in height (as inspectors are unable to access entire culvert to assess asset condition). The quantity of defect scope in Newlands indicates that 3 years are needed before this system returns to a lower “normal” maintenance scope and cost trend, and as the assets age there is still the potential of additional defects appearing that will need to be planned in for repair, or could push out planned works due to criticality and/or location.
- **Ballast Undercutting Plant Depreciation –** (+$0.3m) - ballast undercutting plant depreciation as a total is largely in line with FY24F, with the allocation between systems based on the number of days that the ballast plant is expected to be operating in the Newlands system in FY25.
- **Non-Coal Allocation** – this adjustment reflects an allocation of costs to non-coal services and is calculated by applying the actual non-coal volumes railed in the Newlands System and GAPE during FY23 to the QCA-approved AT1 Reference Tariff for FY25.

The scope of planned corrective and reactive maintenance tasks is heavily dependent on the faults identified via the planned inspection programs. Aurizon Network has assumed that in FY25, this Coal System will see a similar level of faults that require planned corrective or immediate maintenance response as in prior years.

For the Newlands System and GAPE, the following activities are to be considered as an aggregated single "item" for the purpose of UT5, clause 7A.11.5(f)(ii)(B)(2) - Resurfacing, Rail Grinding, General Track Maintenance, 'Signalling and Telecoms', 'Structures and Facilities', Trackside Systems, Other Civil Maintenance and Other General Maintenance.

Figure 67 is a summary of historic, forecast and budgeted direct maintenance costs by maintenance category.

To ensure comparability between periods, the direct maintenance costs presented in the chart exclude depreciation on ballast undercutting plant.

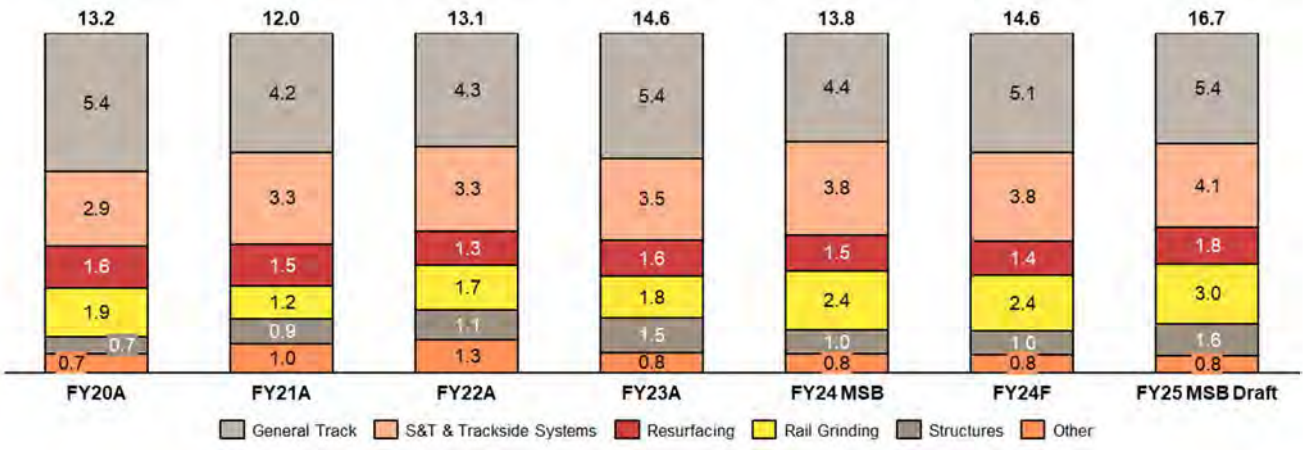


Figure 67 Direct Maintenance Costs – Newlands System and GAPE

Structures maintenance activity is expected to be higher in FY25 to support the rectification of culvert drainage and cleaning and concrete bridge repairs. With the program of works expected to be completed over the next 3 years, maintenance costs are expected to be sustained at this higher level until the program is completed.

Figure 68 illustrates the proportion of preventive, planned corrective and reactive maintenance expenses in the Newlands System and GAPE over time. Approximately 54% of the Newlands System and GAPE maintenance spend in FY25 is expected to be preventive in nature. The cyclic rail grinding program and the scheduled plant maintenance activities on the resurfacing plant both contribute to the variation in preventative maintenance activity proportions year on year.

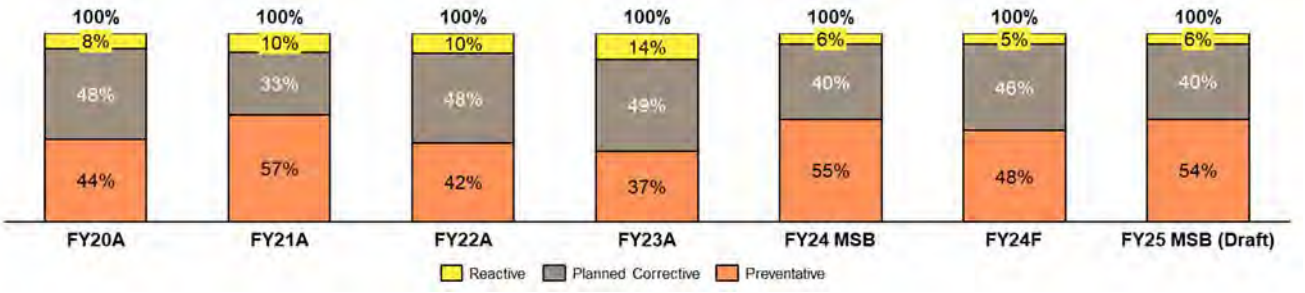


Figure 68 Preventive / Corrective Maintenance Spend Composition – Newlands System and GAPE

Further information in relation to the costing methodology used by Aurizon Network in the development of the FY25 Final Draft Proposal is outlined in Section 11.3. Additional detail in relation to the make-up of costs for each maintenance activity has also been provided to the RIG Expert Advisor.

5.5 Newlands System and GAPE – FY25 Renewals Strategy and Budget

Aurizon Network has developed its Draft Renewals Strategy and Budget for the Newlands System and GAPE having regard to all relevant matters outlined in clause 7A.11 of UT5. Aurizon Network considers that its FY25 Final Draft Proposal provides an appropriate level of asset activity that will promote the safety, reliability and performance of Newlands System and GAPE Rail Infrastructure and seeks to deliver DNC and more broadly, Committed Capacity.

Summary of FY25 Renewals Strategy and Budget

Aurizon Network's FY25 Final Draft Renewal Strategy and Budget for the Newlands System and GAPE provides for an asset Renewals requirement of $32.4m which is:

- $8.7m higher than the approved FY24 Renewals Strategy and Budget; and
- $7.2m higher than Aurizon Network's current FY24 forecast.

A summary of the FY25 renewals budget and scope quantity compared to FY24 for the Newlands System and GAPE is outlined in Table 52.

The summary has been further separated in Table 53 to call out the proposed FY25 scope relating to the replacement of assets constructed as part of the GAPE infrastructure enhancements.

Table 52 FY25 Final Draft Proposal – Renewals – Newlands System and GAPE

Renewals Item ($m)	Assets Include	FY24 Approved Budget	FY24 Forecast	FY25 Draft Budget
Civil Assets		21.9	23.4	31.4
Permanent Way	Rail, Track, Sleeper, Turnouts	8.6	7.9	9.2
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	3.4	3.3	7.8
Structures	Culverts, Bridges	6.6	7.1	9.2
Civil Renewals	Formation, Level Crossings, Access Points	3.3	5.1	5.1
Control Systems Assets	Safe Working, Train Control and Detection, Interlocking, Telecoms, Power Resilience, Transmission	1.8	1.7	1.0
Total		**23.7**	**25.2**	**32.3**

Note: Figures may not add due to rounding.

The FY24 forecast variance to the approved FY25 Strategy and Budget is primarily driven by:

- **Cost Escalation** – Variations across program largely impacted by labour and non-labour escalation outlined in Section 13.3.
- **Permanent Way (+$1.3m)** – Increase planned renewal scope in Track Upgrade program to target large sections in Havilah Yard (1.8km), Kali (1.8km) and Aberdeen (0.8km). Increase in Turnout Renewal program with renewals at Eaglefield are prioritised in FY25 to phase out Welded Heel Rail Bound Manganese crossing.
- **Ballast Cleaning (+$4.5m)** – Planned Mainline Undercutting scope is increased in FY25 in Newlands compared to previous years due to the Ballast Cleaning Machine moving to Newlands

in FY25. Costs have been estimated having regard to the expected ballast return rate which have in turn been informed by pre-dig assessments completed during development of the FY25 RSB. This information has informed ballast quantity requirements, ballast delivery costs and ballast removal (spoil) costs.

- **Structures (+2.1m) –** Planned Culvert Renewal scope is higher in FY25 including continuing the strategic scope renewing 2 short span bridges at Armuna and the culvert renewal site at MacNaughton is a large site replacing a High-Density Polyethylene Pipe **(HDPE)** with 5, 1500 Reinforced Concrete Pipes, the site is also difficult to access increasing the cost of renewal at this site.
- **Control Systems (-$0.7m)** – decrease primarily driven by reduction in scope for Safe Working Systems Asset Protection and Power Resilience in FY25

The detail of the changes to the FY25 program and all variances in FY25 will be detailed as part of the Quarterly RIG reporting process.

Table 53 FY25 Draft Proposal – Highlight for GAPE Specific Renewals

Renewals Item ($m)	Assets Included	FY25 Draft Budget
Civil Assets		3.0
Permanent Way	Rail, Track, Sleeper, Turnouts	1.7
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	1.3
Structures	Culverts, Bridges	--
Civil Renewals	Formation, Level Crossings, Access Points	0.0
Control Systems Assets	Safe Working, Train Control and Detection, Interlocking, Telecoms, Power Resilience, Transmission	0.0
Total		**3.0**

Figure 69 below shows the distribution of scope locations as well as the relative spend per scope. The FY25 Newlands System scope is distributed across the full length of the system including works on mainline and individual mine balloon loops.

The largest scope items for FY25 are the mainline ballast undercutting between the 92.3km and 84.9km points on the Newlands system, and the short span bridge replacements at the 13.5.km and 14.1km points.

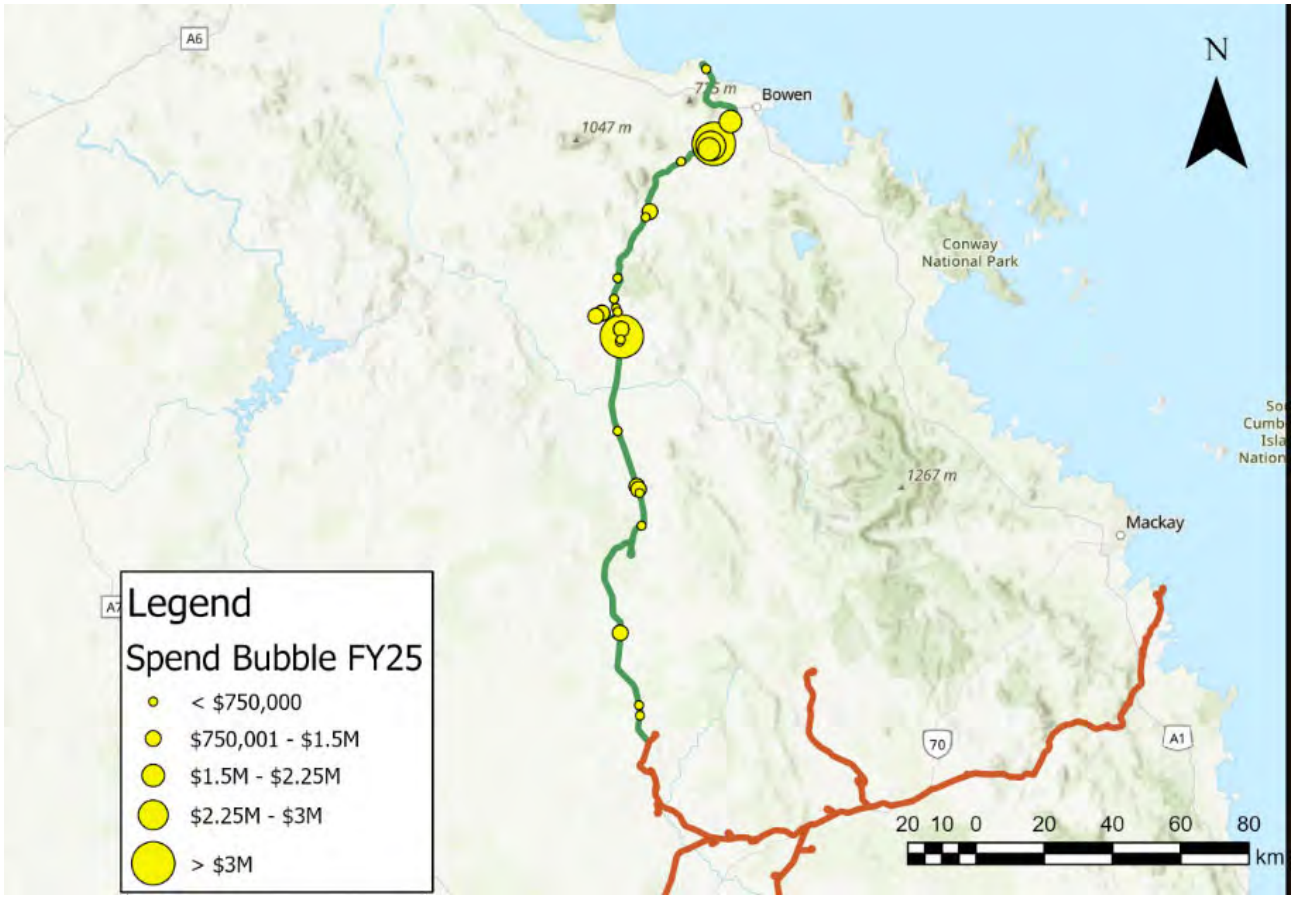


Figure 69 – Map of scope location and Spend FY25

Table 54 details the percentage of total system assets that are proposed to be renewed in FY25.

Table 54 FY25 Draft Proposal – Renewals as a % of Total System Assets – Newlands System and GAPE

Renewals Item	Assets Included	Total system Assets	FY24 RIG Approved Scope	FY25 Proposed Scope	FY25 scope % Total System Assets
Civil Assets					
Permanent Way	Rail, Track, Sleeper, Turnouts	• 634km rail • 317km sleepers • 317km track • 77 turnouts	• 7.0km rail • 0 sleepers • 3.1km track upgrade • 0 turnout	• 0.9km rail • 0.7km sleepers • 4.3km track upgrade • 2 turnouts	• 0.2% • 0.2% • 1.5% • 2.6%
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	• 276km Mainline • 77 turnouts • 50 bridges	• 2.9km Mainline • 2 turnouts • 1 bridge	• 10.9km Mainline • 3 turnouts • 1 bridge	• 3.6% • 3.9% • 2.5%
Structures	Culverts, Bridges	• 50 bridges • 664 culverts	• 3 bridges • 5 culverts	• 2 bridges • 5 culverts	• 4.0% • 0.8%
Civil Renewals	Formation, Level Crossings, Access Points	• 317km formation • 94 level crossings	• 0.8km formation • 0 level crossings	• 0.8km formation • 0 level crossings	• 0.1% • Nil

Renewals Item	Assets Included	Total system Assets	FY24 RIG Approved Scope	FY25 Proposed Scope	FY25 scope % Total System Assets
Control Systems Assets	Safe Working, Train Control and Detection, Interlocking, Telecoms, Power Resilience, Transmission		• 28 sites	• 10 sites	

Note: Control Systems count of assets is a collective of sites, nodes, cable routes, communications assets and systems and is included to indicate level of work comparable to prior year.

Figure 70 illustrates the FY24 Approved Budget and Final Draft FY25 proposed asset renewals (categorised as baseload scope, reactive renewals, strategic scope and future scope).

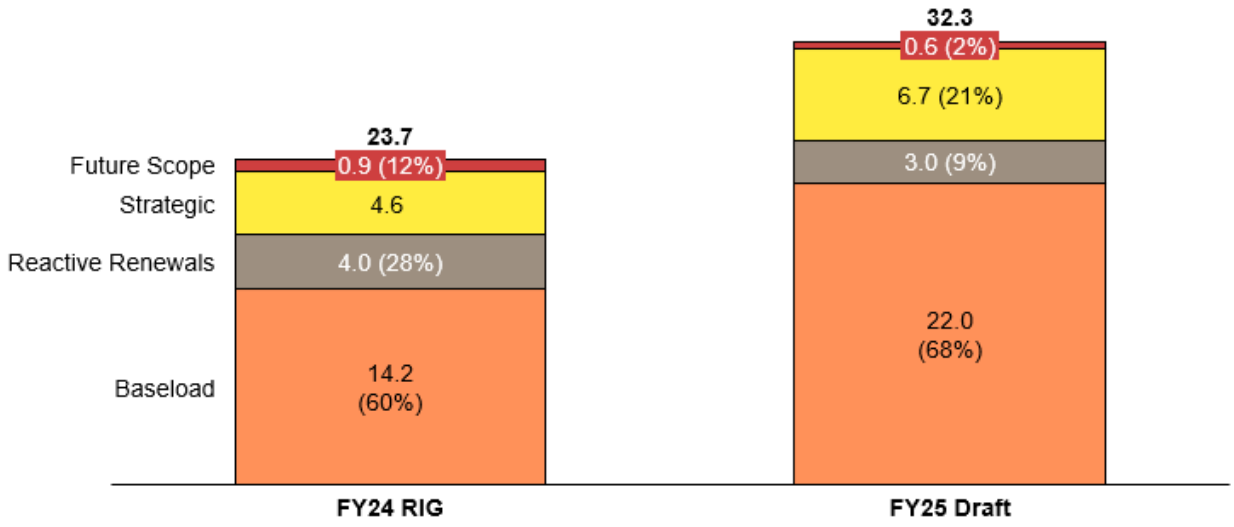


Figure 70 Split of Renewals by Category FY24B and FY25 – Newlands System and GAPE ($m)

In relation to the above chart, the following comments are made:

- **Baseload renewals** – represents the majority of the proposed Asset Renewal program in FY25 and includes rail renewal, formation renewal and ballast cleaning.
- **Reactive renewals** – reflects the inclusion of a 1.0km allocation for Ballast cleaning reactive scopes.
- **Strategic scope** – In FY23, Aurizon Network commenced the strategic renewal of 10 short span bridges between the 16.600 and 6.000 point. The FY25 Strategic scope is the continuation of the is 5-year program. It also includes the continuation of the UTC/DTC program.
- **Future scope** - includes design of structures, level crossings, turnouts and formation to be delivered in future years.

Further information in relation to the scope categorisation used by Aurizon Network in the development of the FY25 Final Draft Proposal is outlined in 11.1.

This section provides detailed information in relation to the individual scope items selected for renewal in FY25, along with the rationale for those selections and alternative options considered. More detailed information is provided in relation to strategic scope given it is not typical scope seen in previous years.

This section should be read in conjunction with the Detailed Scope Report provided by Aurizon Network. This Power BI report provides detail on the individual scope items including works location, Combined Risk Assessment (**CRA**) score and comments supporting the rationale for those selections.

11.1 provides further detail on how asset condition and criticality is used to determine whether scope is critical, required for system reliability or strategic, and alternate approaches considered when planning a renewal. For each scope item:

- The location of the bubble indicates the Scope Priority Model ranking for asset condition and location or operational criticality; and
- The size of the bubble represents the number of sites and/ or tasks to be renewed.

The maps included in this section indicate the location of the proposed scope.

Unless otherwise indicated, the asset renewal scope relates to Newlands System Rail Infrastructure and does not relate to the replacement of assets constructed as part of the GAPE infrastructure enhancements.

5.6 Civil Assets – Permanent Way

Permanent Way Renewal Program

Aurizon Network's FY25 Final Draft Proposal provides $9.2m to deliver the scope of permanent way renewals in the Newlands System and GAPE. Table 55 summarises the scope and budget for each relevant renewal item.

Table 55 FY25 Permanent Way Renewals – Newlands System and GAPE

Description	Scope Type	FY25 Scope	Scope Unit	FY25 Budget ($m)
Rail Renewal	Baseload	0.9	Rail km	0.4
Sleeper Renewal	Baseload	964	Sleepers	0.7
Track Upgrade	Baseload	4.3	Track km	6.2
Turnout Renewals	Baseload	2	Turnout	1.2
Turnout Components	Reactive Renewals		Lumpsum	0.6
Permanent Way Other	Reactive Renewals		Lumpsum	0.1
				9.2

The Track Upgrade program in FY25 will target large sections in Havilah Yard (1.8km), Kali (1.8km) and Aberdeen (0.8km).

The turnout renewals at Eaglefield are prioritised in FY25 to phase out Welded Heel Rail Bound Manganese crossing.

Scope relating to the replacement of assets constructed as part of the GAPE infrastructure enhancements includes a Rail Renewal at Briaba (0.864km) and 2 Turnout Renewals at Eaglefield Creek (EC12A & EC7A)

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Permanent Way.

Aurizon Network has adopted alternate approaches for the Permanent Way scope in FY25. All sleeper renewal scopes and track upgrade scopes will involve renewing existing fist clip sleepers with concrete pandrol e clip sleepers

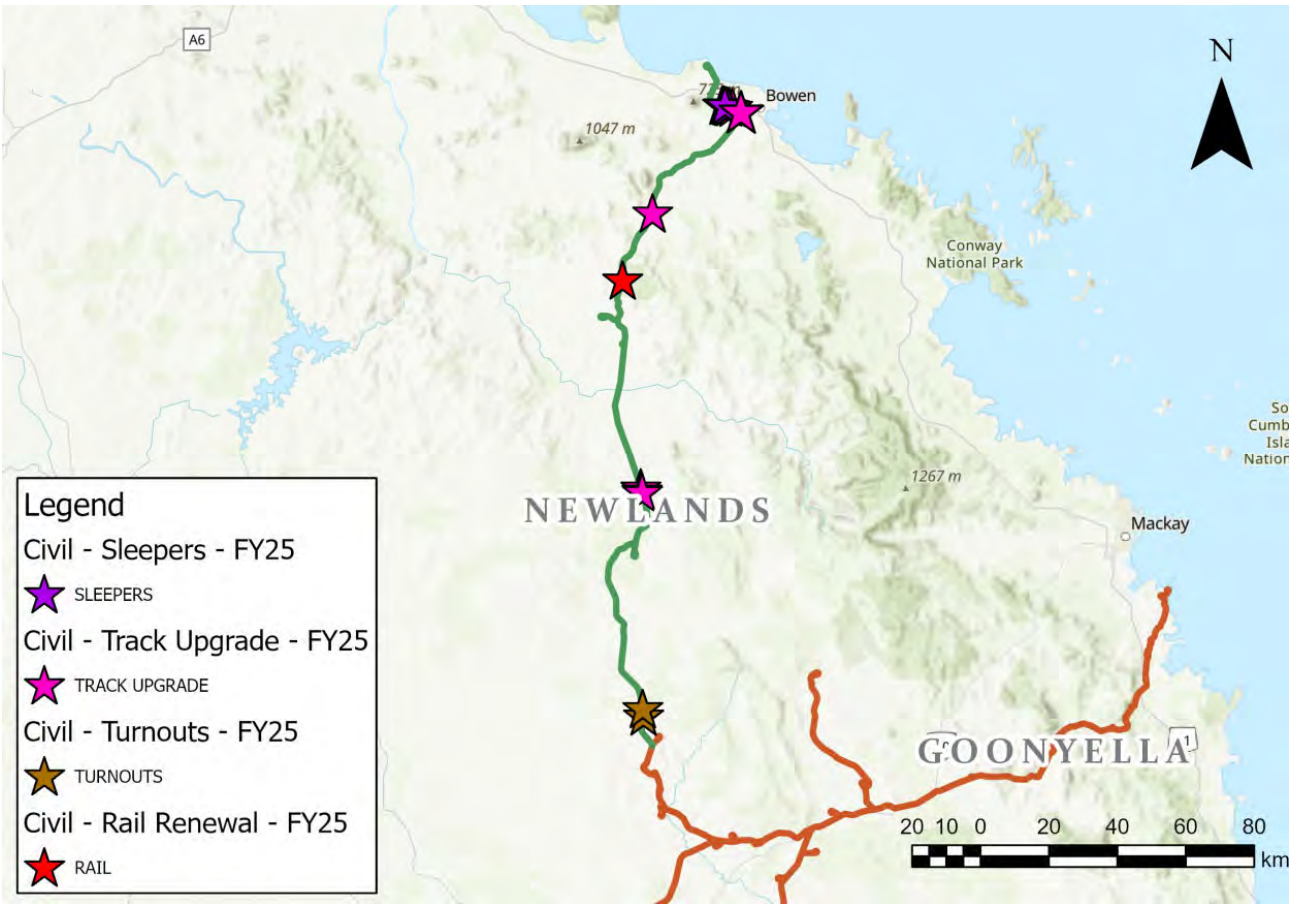


Figure 71 Rail Renewal and Track Upgrade Sites - Newlands System and GAPE

Permanent Way FY25 Scope – Asset Condition and Criticality Assignment

Figure 72 plots the permanent way renewals against asset condition and location / operational criticality.

All planned FY25 renewals are either in an advanced state of wear or degradation. Criticality ratings are lower in the Newlands system with the highest rating being 3.2 and the lowest 1.9. The turnout at Eaglefield Creek has a criticality of 2.5 but is prioritised due to the need to upgrade components at the Turnout for assets that are currently condition 4.

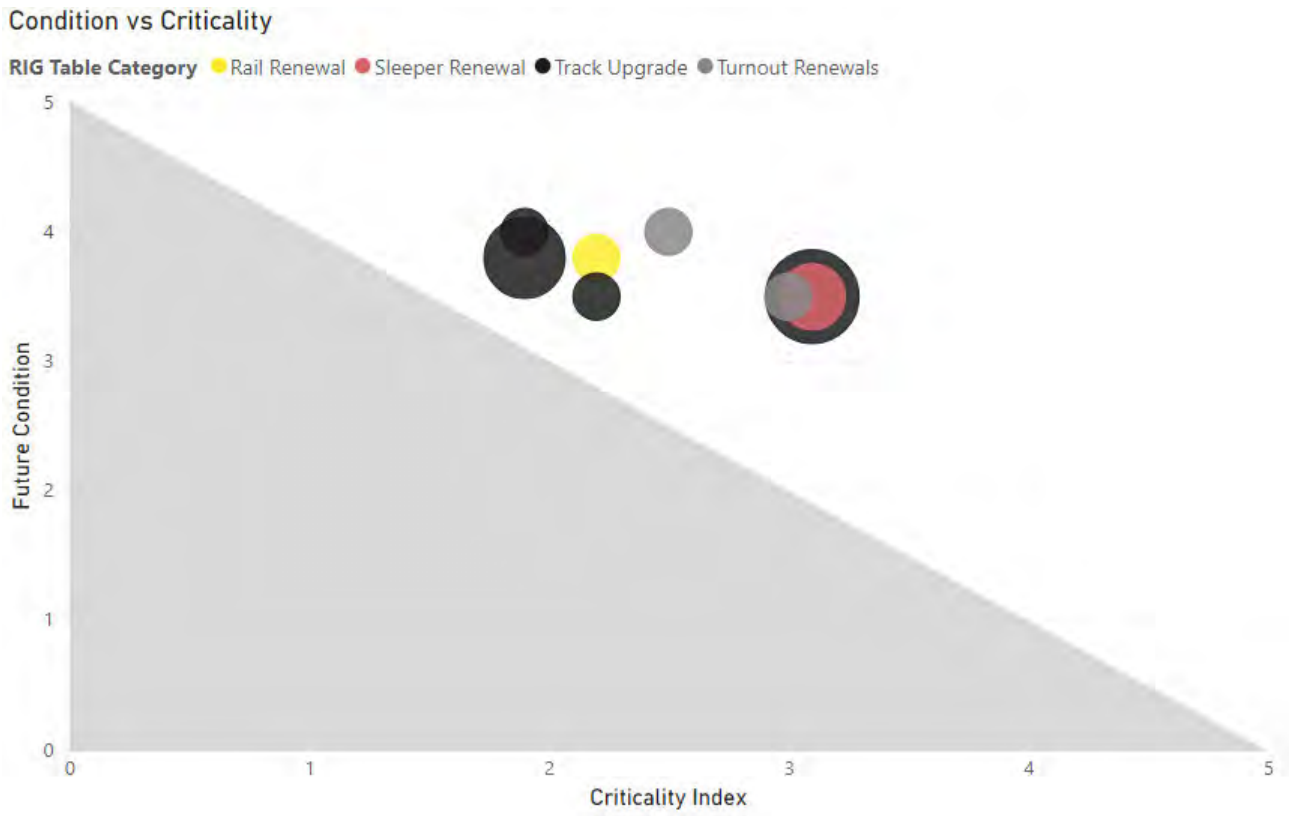


Figure 72 Permanent Way – FY25 Scope Priority Ratings – Newlands System and GAPE

5.7 Civil Assets – Ballast Cleaning and Renewals

Ballast Cleaning Renewal Program

In FY25, Aurizon Network proposes to undertake 11.0 km of ballast cleaning via mainline ballast undercutting reactive undercutting using excavator undercutters and bridge ballast renewal at a cost of $7.9m. Table 56 summarises the scope and budget for each relevant renewal item.

Table 56 Ballast Cleaning Program – Newlands System and GAPE

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Mainline Undercutting	Baseload	9.6	km	4.4
Mainline Excavator Undercutting	Baseload	0.3	km	0.3
	Reactive Renewals	1.0	km	1.1
Turnout Undercutting	Baseload	3	Turnout	0.6
Bridge Rollout	Baseload	0.0	Km	0.9
Monumenting	Baseload	1	Site	0.4
Ground Penetrating Radar	Future Scope		Lumpsum	0.2
				7.8

The Ballast Cleaning Machine will travel to the Newlands System in FY25 completing 2.2km at McNaughton and 7.4km at Sonoma Junction. Other undercutting activities will utilise excavator undercutting units.

An allocation to re-establish monuments is included in the Ballast Cleaning Program in FY25. This includes detailed survey, design and installation of new track data plaques. This enables future track maintenance activities to align to the design alignments. The alignment and height of track moves over time due to temperature changes, train operations, maintenance and construction activities which can give rise to track buckles, breaks, accelerated rail wear and contact wire geometry exceptions (in electrified systems). Track monuments are located within the rail corridor immediately adjacent to track as fixed in-ground posts or on electrical masts to indicate the correct level or position of the track. Measurements are taken from these to confirm the correct position of the track to ensure that the ballast cleaning activity and associated resurfacing correctly locates the track to the design alignment.

One Bridge Rollout for ballast renewal is included in the FY25 program at Suttor Creek. Cost drivers within the program are more dependent on, site mobilisation/demobilisation as well as site specific scope (e.g. rail/sleepers/formation renewal).

Scope relating to the replacement of assets constructed as part of the GAPE infrastructure enhancements GAPE includes the undercutting of 2 turnouts at Kaili, 0.067km of Mainline Excavator Undercutting at Kaili and 0.08km of Bridge Rollout Renewal at Suttor Creek.

Ground Penetrating Radar **(GPR)** data provides important information to help understand sub ground conditions. This information is used to measure fouling and to allow comparison of the FY25 data against prior data sets to plan for future renewal requirements. GPR data is a critical input to the Aurizon Ballast Condition Analyser tool that utilises historical GPR, historical undercutting and track resurfacing and rainfall data to predict ballast fouling growth at the site level to identify future scope locations and volume.

Detailed information on the development of the ballast cleaning program is included in Section 11.3 Budget Setting and Procurement.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Ballast Cleaning.

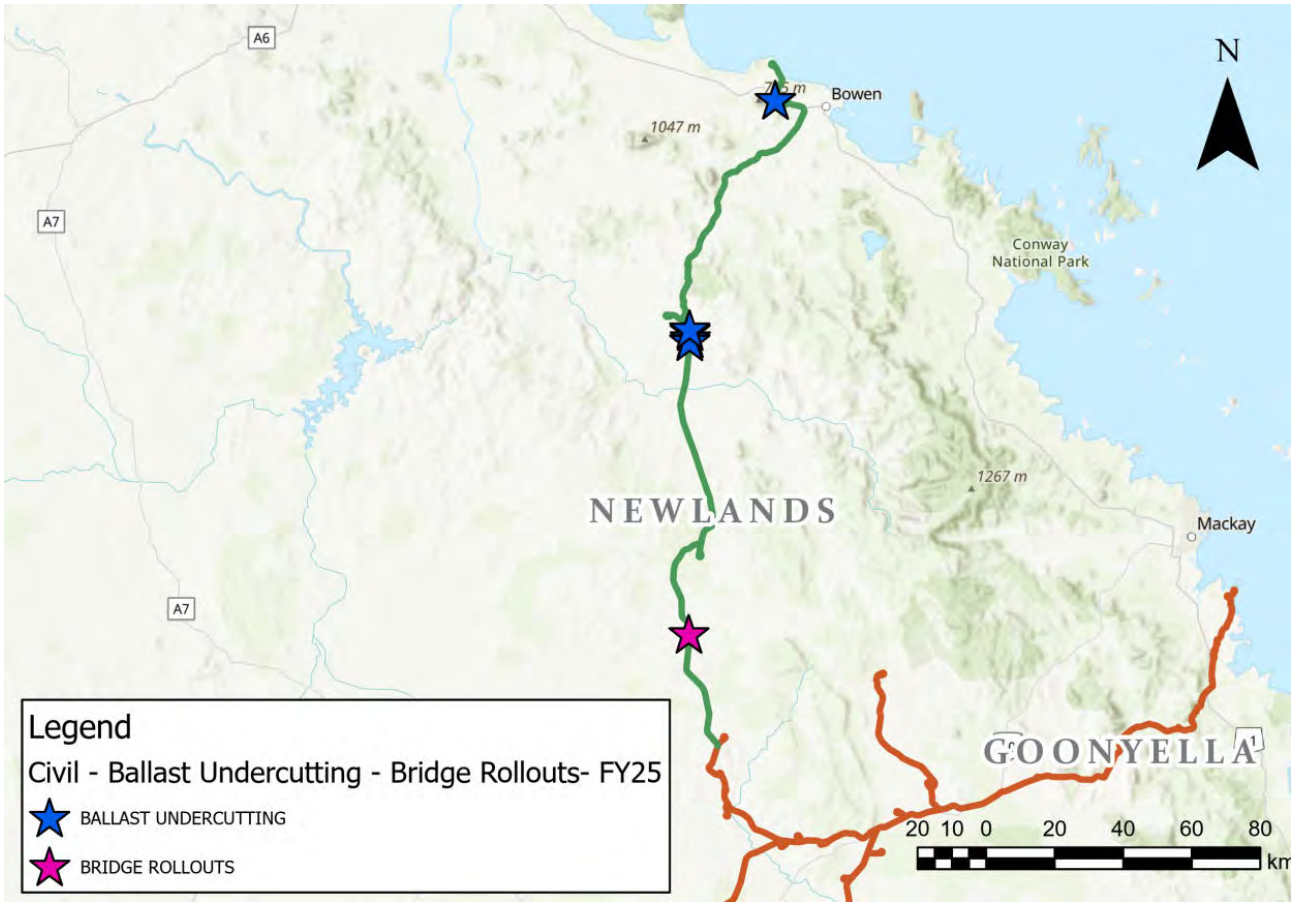


Figure 73 Ballast Cleaning and Bridge Rollout Sites – Newlands System and GAPE

Ballast Cleaning FY25 Scope – Asset Condition and Criticality Assignment

Figure 74 plots ballast renewals against asset condition and location / operational criticality. This illustrates that all identified scope has a current condition of 3.2 or above with advanced fouling which will degrade further without intervention.

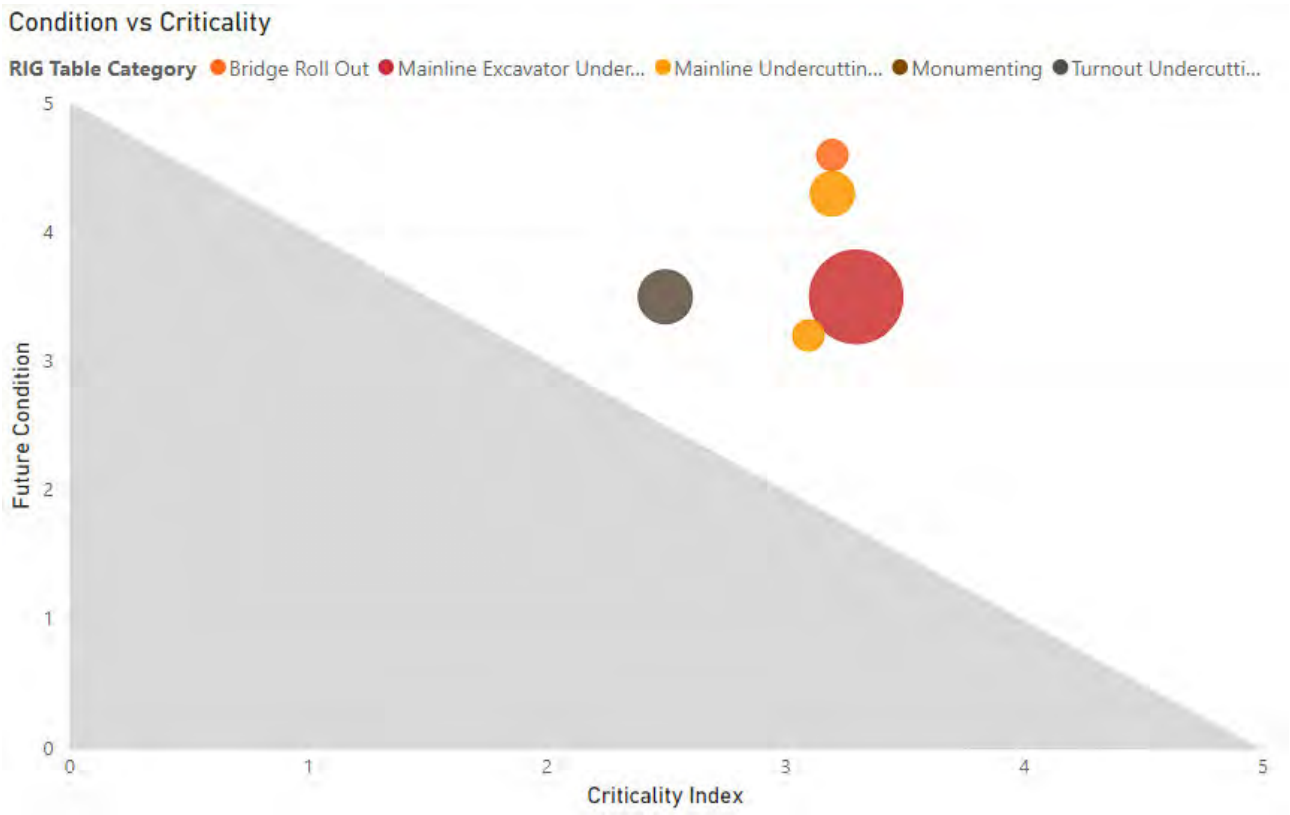


Figure 74 Ballast Cleaning – FY25 Scope Priority Ratings – Newlands System and GAPE

5.8 Civil Assets – Structure Renewals

Structures Renewal Program

The Newlands System and GAPE has a total of 50 bridges and 664 culverts which are designed to allow the natural flow of water through the rail network. In FY25, Aurizon Network proposes to undertake $9.1m of structures renewal works in the Newlands System and GAPE. These works for FY25 are outlined in Table 57.

Table 57 FY25 Structure Renewals Program – Newlands System and GAPE

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Culvert Design	Future Scope	7	Site	0.2
Culvert Renewals	Baseload	5	Site	2.6
Bridge Renewals	Strategic	2	Site	6.3
Total				**9.2**

The continuing strategic scope renewing 2 short span bridges at Armuna with a strengthened solution makes up most of the structures program for FY25 in Newlands. The delivery of these two sites is forecast to be at a higher cost than the two sites renewed in FY24. The sites in FY24 were located beside each other and could be established as one work site with a shared staging and laydown area. Given the distance between the FY25 sites, they will be delivered as separate work sites and not attract the same cost saving as in FY24.

The culvert renewal site at McNaughton is a large site replacing an existing left side extension due to condition with 5/1500 diameter Reinforced Concrete Pipes, the site is also difficult to access increasing the cost of renewal at this site.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Structures.

Strategic Scope:

Short Span Bridge Renewals ($6.3m)

Continuing from FY24, 2 short span bridges will be renewed in FY25. This scope replaces 20 tonne axle load (tal) short span bridges with 30tal Uni Cell box culverts. This is the preferred renewal option when the structure requiring renewal was originally designed to a lesser standard than current standard and when traffic task is constant or increasing and performance is to be kept constant or improved.

This program is expected to be finalised in FY26.

Figure 75 Structures Renewal Sites – Newlands System and GAPE

Structures FY25 Scope – Asset Condition and Criticality Assignment

Figure 76 plots the Structures against asset condition and location / operational criticality.

- All planned FY25 renewals have poor to near end of life condition with an average condition of 3.9 for the FY25 program.

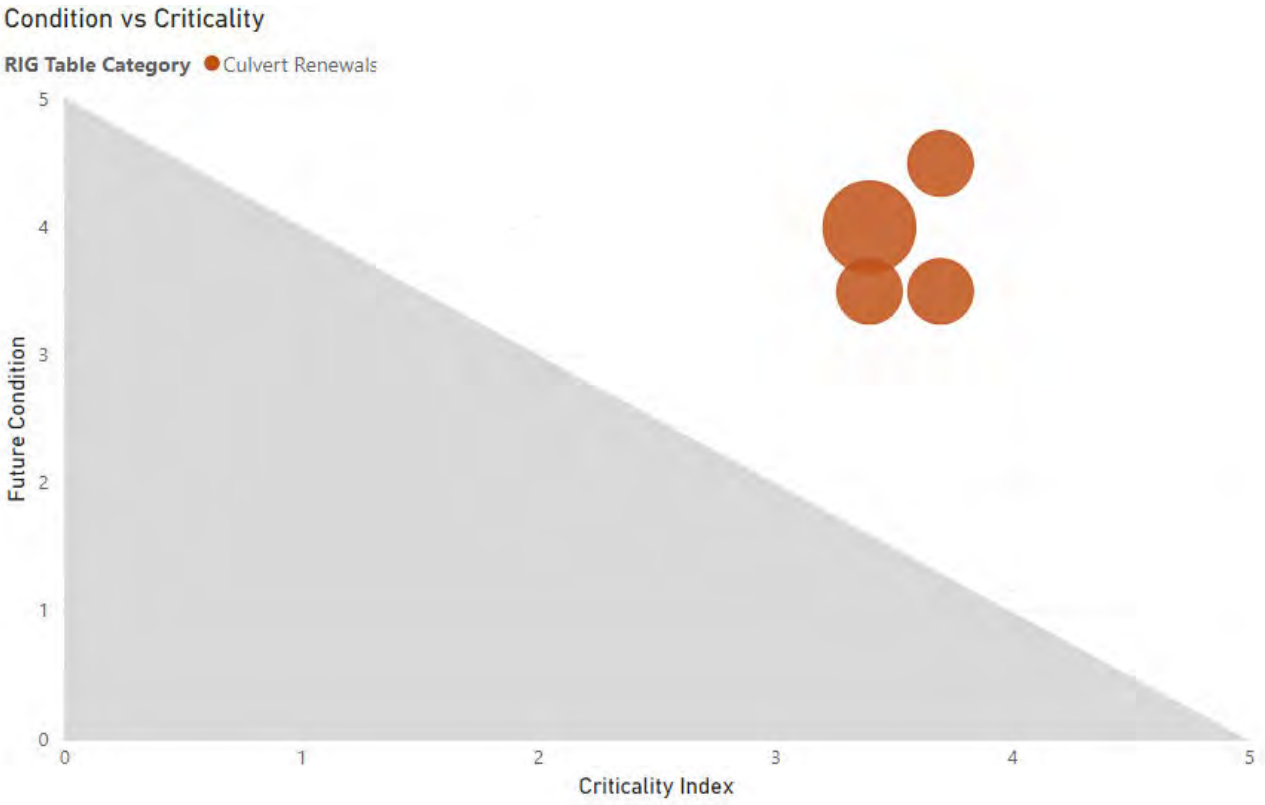


Figure 76 Structures – FY25 Scope Priority Ratings – Newlands System and GAPE

5.9 Civil Assets – Civil Renewals

Civil Asset Renewal Program

In FY25, Aurizon Network proposes to undertake $5.2m in renewals for Civil Assets, summarised in Table 58.

Table 58 Civil Asset Renewal – Newlands System & GAPE

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Level Crossing Design	Future Scope	2	Site	0.0
Level Crossing Other	Reactive Renewals		Lump sum	0.1
Formation Renewal	Baseload	0.8	Km	3.9
Formation Other	Future Scope		Lump sum	0.0
Formation Reactive	Reactive Renewals		Lump sum	0.5

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Corridor Fencing & Security Fencing	Reactive Renewals		Lump sum	0.3
Access Points & Roads	Future Scope Reactive Renewals	2	Site Lump sum	0.0 0.2
				5.1

FY25 scope will include 2 sites of formation renewal at Pring and Buckley. These sites are a continuation of previous formation renewals in this region. Cost estimates have been informed by the outcomes of the FY24 competitive tender process.

Scope relating to the replacement of assets constructed as part of the GAPE infrastructure enhancements includes a Level Crossing Design at Dry Creek Road (Durroburra).

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Civil Assets.

Figure 77 Formation and Level Crossing Renewal Sites – Newlands System and GAPE

Civil Renewals FY25 Scope – Asset Condition and Criticality Assignment

Figure 78 plots the two formation renewals planned in FY25 against asset condition and location / operational criticality.

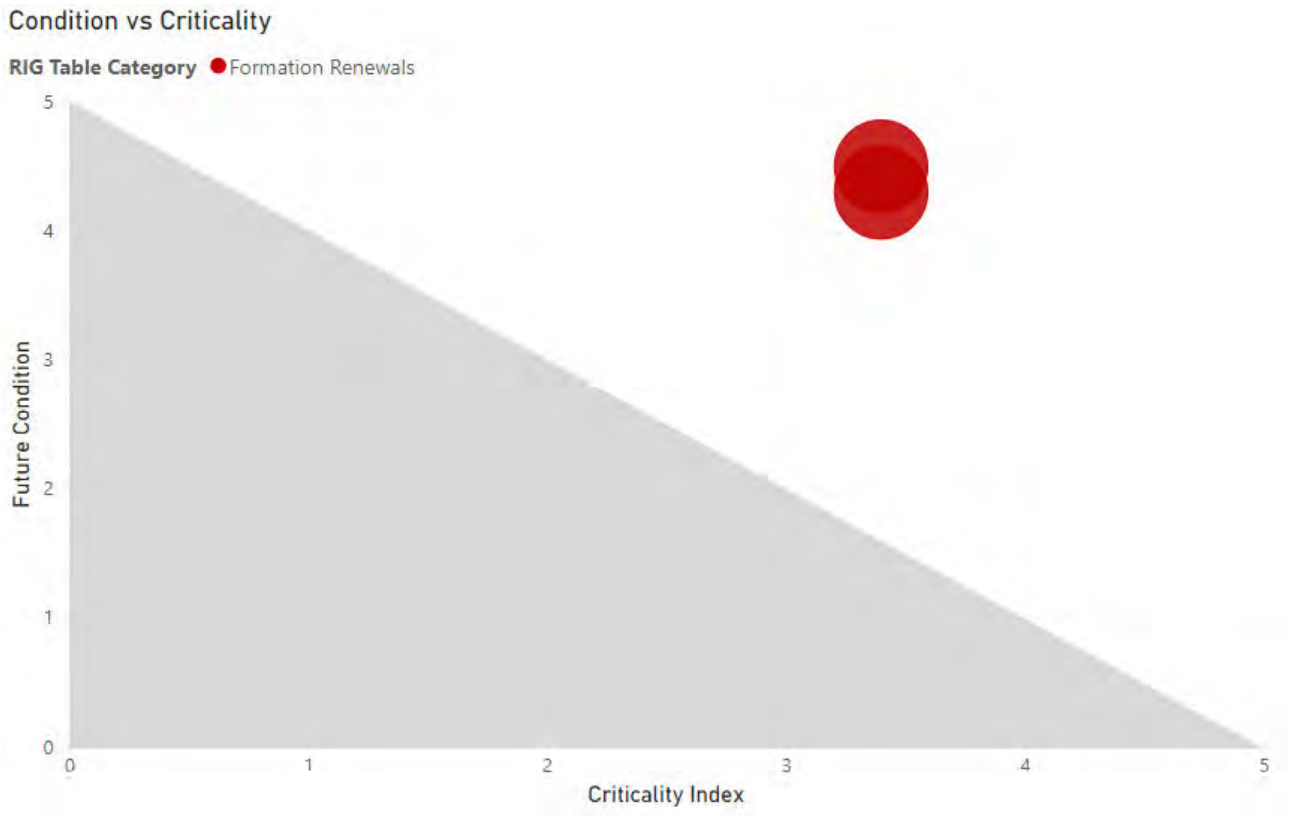


Figure 78 Civil Renewals – FY25 Scope Priority Ratings – Newlands System and GAPE

5.10 Control Systems Assets

Control Systems Renewal Program

In FY25, Aurizon Network proposes to undertake $1.0m of Control Systems renewals or enhancements in the Newlands System and GAPE. Of the $1.0m proposed in FY25 $0.1m across 1 site and 1 system are assigned to future works for design for renewals in future years. Table 59 summarises the scope and budget for each relevant renewal item.

Table 59 Control Systems Program – Newlands System and GAPE

Renewal Item	Scope Type	FY25 Scope	Scope Units	FY25 Budget ($m)
Safe Working Systems – Minor	Baseload	2	Site	0.0
Transmission & Data Renewals	Baseload	8	Site	0.5
	Future Scope	2	Site	0.0
UTC DTC	Strategic		Lumpsum	0.4
				1.0

Transmission and Data Renewals includes a lump sum for the renewal of data network routers and firewalls as well as 6 power supplies and batteries, replacement of a Dehydrator and a Radome. A Dehydrator monitors air quality in the waveguide and ensures that it remains dry as moisture would attenuate the signal from the equipment and eventually corrode the tube. A Radome is a structural, weatherproof enclosure that protects a radar antenna.

The FY25 Program also includes future design for a communications structure at Collinsville and ACOM system design, an ACOM system is a voice switching unit directly associated with and intrinsic to the Train Control function.

Interlocking renewal scope in FY25 includes the renewal of two obsolete diagnostic computers as part of Safe Working Systems Minor.

Scope relating to the replacement of assets constructed as part of the GAPE infrastructure enhancements includes a Power Supply Renewal at Cockool SER.

For the scope listed above, the typical approach is to take forward a like-for-like renewal. Appendix 3 details the alternate options considered when an asset requires renewal and Section 10 provides a summary of the Asset strategy for Control Systems.

Given the high proportion of these renewals being triggered by obsolescence, the technology will be typically the modern-day equivalents and provide an uplift in speed and/or capacity.

Strategic Scope:

UTC/DTC ($0.4m)

Safety and Operational Improvements for Network Train Control system. Scope includes train control system applications, user interface changes and engineering controls for safety processes. Operational requirements for delivery of individual scope items are subject to change due to criticality requirements e.g. post an incident or process breakdown.

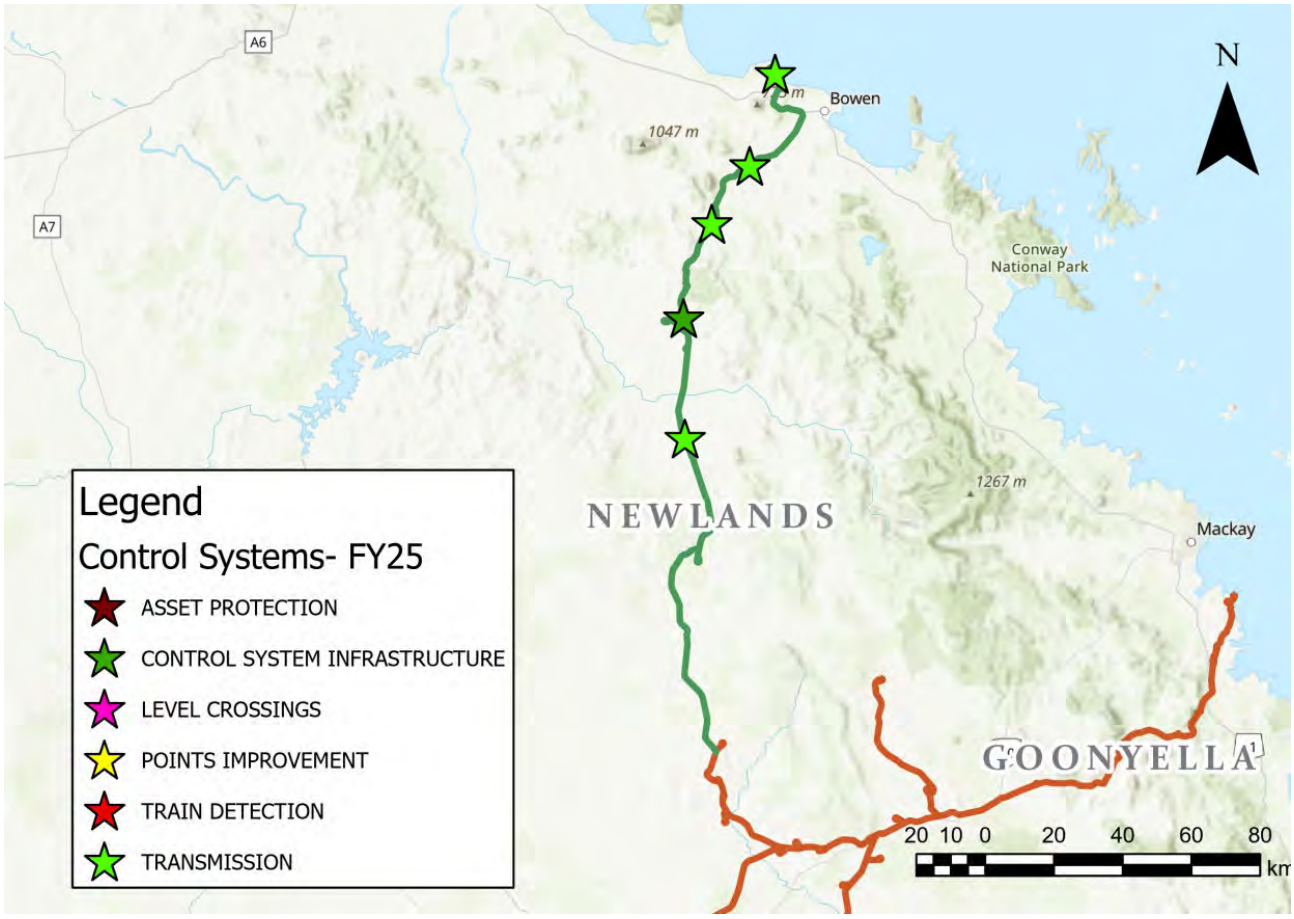


Figure 79 FY25 Control Systems Renewal Sites Newlands System and GAPE

Control Systems FY25 Scope – Asset Condition and Criticality Assignment

Figure 80 plots the Control Systems renewals against asset condition and location/ operational criticality.

The two diagnostic computer renewal sites at Briaba and Abbot Point have a criticality index of 2, however these two sites are part of a wider strategy to renew life expired diagnostic PCs with new technology.

The identified data card renewals at eight sites have a condition rating of 5 as hardware is now unavailable.

Obsolete SDH to IP connection renewals have a criticality index of 5 as failures affect large sections, managed with a level of redundancy within equipment however there is a potential for a large operational impact.

The radio tower site at Briaba also has a criticality index of 5 as the tower site supports a large area of the network.

All scope items are listed as condition rating 4 or above. This reflects the age of assets targeted for renewal in FY25. Control Systems assets are mostly electronic, so renewal is a trigger of support, spare parts or software obsolescence. As such, condition is more a matter of asset age against design life rather than a physical demonstration of wear.

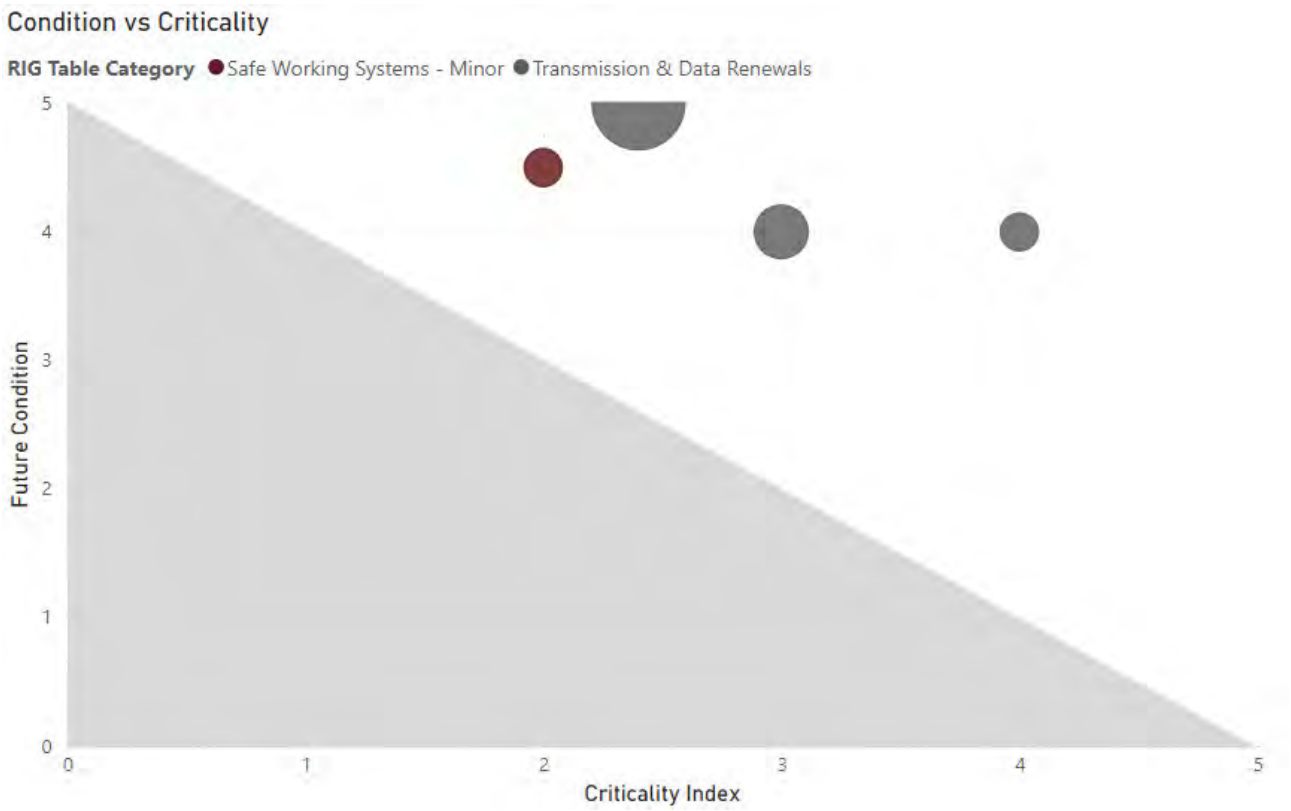


Figure 80 Control Systems – FY25 Scope Priority Ratings – Newlands System and GAPE

5.11 Likelihood of Change Assessment – Maintenance and Renewals

Aurizon Network notes that the identification and evaluation of renewals scope for inclusion in the MRSB is based on currently available information that may change over the period prior to execution (of up to 18 months) due to environmental factors, relative degradation rates or other considerations. Additionally, potential changes may be related to specific items of scope or applicable to the broader renewals program for each system.

In the preparation of the FY25 Final Draft Proposal, Aurizon Network conducted a likelihood of change review to assess potential areas of change to either cost or delivery, time to complete or location. Further detail for this review process is included in Section 0.

This section provides details of scope items with a high likelihood of change where controls have been identified and where a residual risk of will be managed. These scope items are also identified in the Scope Detail BI Report. Changes to the proposed scope will be dealt with through reporting and change management processes as appropriate.

Additionally, potential areas of change are identified in the development of the maintenance program based on Aurizon Network Maintenance leader reviews and lessons learned from recent periods. While not quantified under the same likelihood of change profile as the renewal program, risks and controls specific to the maintenance program are also included in the table below.

Table 60 provides a summary of the deliverability assessment completed in the development of the FY25 MRSB program of work. Scope items with a high likelihood of change are summarised including their potential impact, the controls implemented, and the residual risk being managed as the program develops toward execution. Changes will be reported in the RIG Quarterly Report. The table also includes a high-level assessment of key maintenance deliverability risks together with identified controls.

Potential Areas of Change at Program Level in the Newlands System

Table 60 Potential areas of change at program level in the Newlands System

Program Category	Program	Risks and Controls	Total Scope Items	# High Likelihood of change	% of Program	Residual risk post control
Total Summary			51	4	8%	
Civil	Ballast Cleaning	**Risk: Increased access and cost to complete scope due to** increased percentage of unscreenable material over planned assumption. **Control:** Initial pre-digs completed FY24 and again during year of delivery to re-evaluate cost and capacity prior to execution for ballast cleaning activities (RM902)	16	2	13%	High

Program Category	Program	Risks and Controls	Total Scope Items	# High Likelihood of change	% of Program	Residual risk post control
		The likelihood remains high for 2 sites yet may have sections of poor ballast characteristics (Byweran Quarry) which have not been identified as part of the pre-digs but maybe present (action to progress in advance of execution).				
	Civil Renewals	**Risk: Scope not completed or increased access or cost due to** inability to access neighbouring land for material handling. **Control:** Desktop analysis of known environmental and cultural heritage to be completed. Formation sites remain with a high likelihood of change. It is ideal to gain access to neighbouring properties for temporary stockpiling of new materials and spoil. As this is outside of the corridor the assessments and agreements have not yet been completed for the two sites and if this is not possible then the material management can increase cost or capacity or reduce scope.	2	2	100%	Med
General Track Maintenance		**Risk: Additional maintenance activity required** driven by further asset degradation requiring rectification to support network safety, reliability and performance (Materials, Resources and Access). **Control:** Single line maintenance activity windows have been included in the capacity assessment and are planned throughout the year.		Maintenance not assessed		

6 Four-year forward indicative cost forecast

This Section outlines Aurizon Network's indicative cost forecasts for Maintenance and Asset Renewal activity in each Coal System. Information is provided for the FY24 approved MRSB, the FY25 MRSB (as outlined in this FY25 Final Draft Proposal), plus a forecast period of a further four years, i.e., FY26 – FY29.

The FY26 – FY29 indicative cost forecasts are provided to increase transparency on forward looking asset renewals and maintenance expenditure. It is a high-level estimate based on currently available information. The forecast will be progressively refined as further information about asset condition, viability of alternate multi-year asset management approaches and engineering designs become available.

This future forecast has taken into consideration scope that has been re-phased to future years and scope that has been brought forward into the FY25 period between the November FY25 Draft Submission and this FY25 Final Draft Proposal.

Total expenditure for the outlook period is forecast to increase by 6% in real terms from FY26 to FY29 or by $33m. The movement in cost is predominantly driven by Control Systems and Electrical asset renewals in Blackwater and Goonyella.

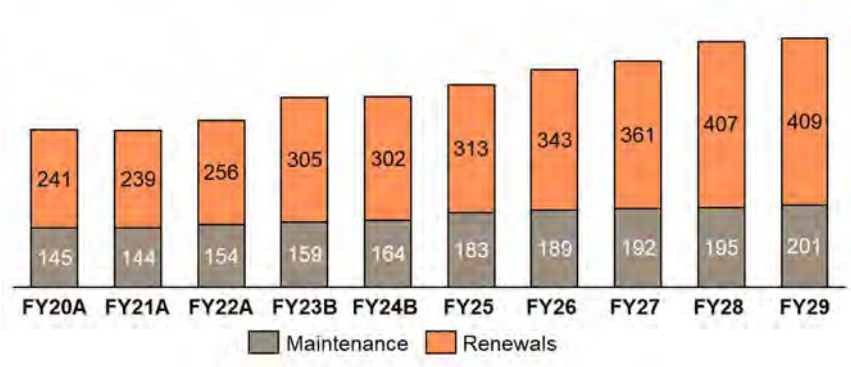


Figure 81 Total Expenditure FY20 – FY29 (Nominal)

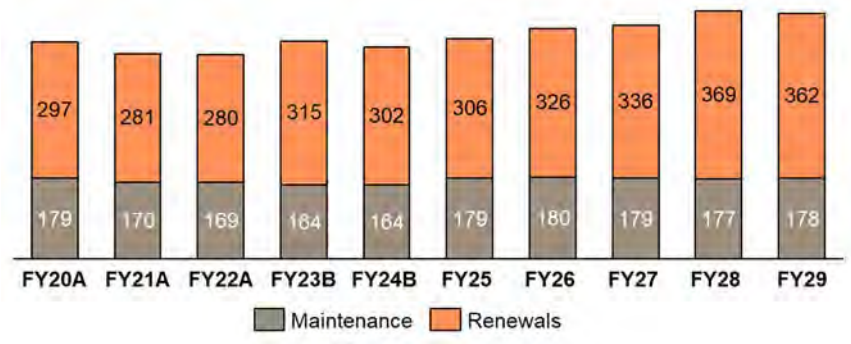


Figure 82 Total Expenditure FY20 – FY29 (Real $FY25)

6.1 Blackwater System – Four-Year Forecasts

Table 61 FY25 plus four-year Maintenance Cost Forecast – Blackwater System (Nominal $m)

Blackwater System Maintenance	FY25	FY26	FY27	FY28	FY29
Resurfacing	10.2	10.8	10.2	11.4	11.2
Rail Grinding	9.9	9.4	10.4	9.8	10.9
General Track Maintenance	24.0	24.8	25.4	26.0	26.7
Structures & Facilities Maintenance	5.5	5.7	5.8	5.8	6.0
Other Civil Maintenance	3.1	3.2	3.3	3.4	3.5
Signalling & Telecommunications Maintenance	12.5	12.9	13.2	13.6	13.9
Electrical Overhead	7.7	7.9	8.2	8.3	8.6
Trackside Systems Maintenance	1.0	1.1	1.1	1.1	1.2
Other General Maintenance	3.9	4.0	4.1	4.2	4.3
Total Direct Maintenance Costs (excl. Ballast Undercutting Plant Depreciation)	**77.3**	**79.8**	**81.7**	**83.7**	**86.3**
Ballast Undercutting Plant Depreciation	3.1	3.1	3.1	3.1	3.1
Total Direct Maintenance Costs	**80.4**	**82.9**	**84.8**	**86.8**	**89.4**
Non-Coal Allocation	(0.8)	(0.8)	(0.8)	(0.9)	(0.9)
Total Direct Maintenance Costs	**79.6**	**82.0**	**84.0**	**85.9**	**88.5**

Notes:

- Rail Grinding forecast includes cost escalation and scope variation year on year driven by anticipated grinding requirements and stable management of rail asset condition. Future estimates are indicative only and may be subject to change and will be iterated in future MRSB submissions for RIG review and approval.
- Resurfacing variation primarily driven by annual plant maintenance cycles.
- Structures increase from FY25 primarily driven by management of known drainage and concrete defects with additional costs for maintenance activities to be delivered by specialist contractors. The program of work is expected to continue over the next 7 years.

Table 62 FY25 plus four-year Renewals Cost Forecast – Blackwater System (Nominal $m)

Renewals Item	Assets Included	FY24 MRSB	FY25	FY26	FY27	FY28	FY29
Civil Assets		119.4	126.0	130.7	134.0	139.5	143.0
Permanent Way	Rail, Track, Sleeper, Turnouts	31.5	33.8	34.5	35.3	37.5	38.4

Renewals Item	Assets Included	FY24 MRSB	FY25	FY26	FY27	FY28	FY29
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	49.8	54.2	57.0	58.4	59.3	60.8
Structures	Culverts, Bridges	24.6	23.6	24.6	25.2	26.8	27.5
Civil Renewals	Formation, Level Crossings, Access Points	13.4	14.4	14.6	15.0	15.9	16.3
Control Systems Assets	Safe Working, Train Control and Detection, Interlocking, Telecoms, Power Resilience, Transmission, Optical Fibre	20.5	18.1	17.4	14.6	18.0	15.7
Electrical Assets	Overhead Renewal, Power systems, Traction Substation Renewals	5.5	4.0	11.7	18.4	24.3	11.1
Total		**145.4**	148.1	**159.8**	**166.9**	**181.7**	**169.8**

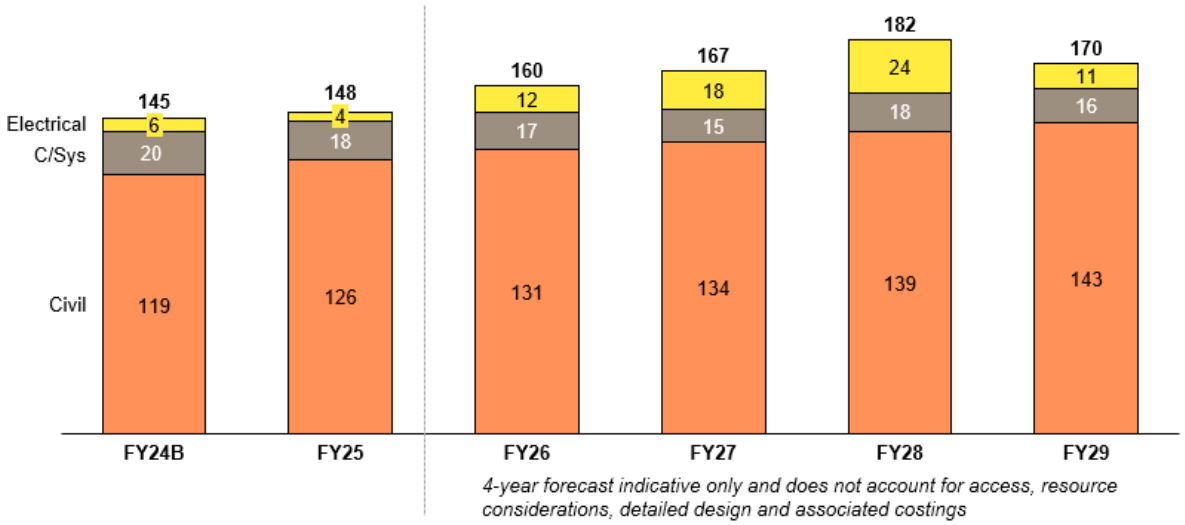


Figure 83 FY25 plus four-year Renewals cost by Scope Category – Blackwater System (Nominal $m

- Civil – Largely stable with moderate increase in FY25/FY26 driven by the Ballast program. FY28 increase driven by Track rerail, Turnout renewal in Callemondah.
- Control Systems: Continuation of interlocking program partially offset by a slowdown in train detection renewals in FY25 followed by Optical fibre scope deferral from FY26 to FY28 and strategic interlocking program completion in FY27.
- Electrical: FY26-FY29 spend driven by Traction Substation renewal program (Concept estimate).

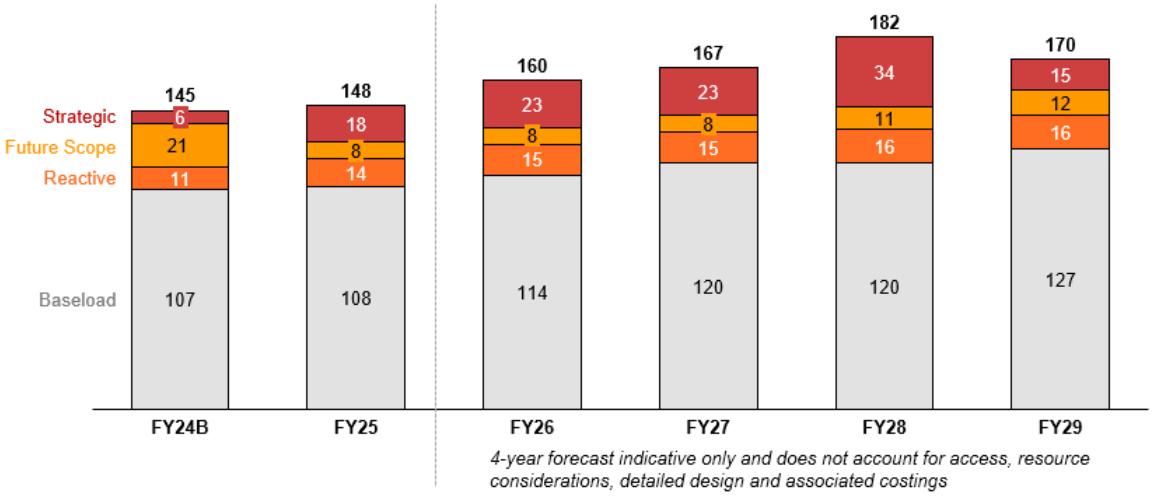


Figure 84 FY25 plus four-year Renewals cost by Scope Type – Blackwater System (Nominal $m)

- Baseload Reactive and Future Scope: relatively stable over the forecast period with movements largely reflecting civil programs.
- Strategic Scope: driven by the following programs:
  - Electrical Traction Substation Renewals – FY26-FY29 (Based on concept estimates and program)
  - Control Systems – Callemondah interlocking program remains a priority in FY26
  - Optical Fibre Renewal – partial deferral FY26 to FY28 contributing to peak in FY28.

6.2 Goonyella System – Four-Year Forecasts

Table 63 FY25 plus four-year Maintenance Cost Forecast – Goonyella System (Nominal $m)

Goonyella System Maintenance	FY25	FY26	FY27	FY28	FY29
Resurfacing	10.5	11.1	10.4	11.7	11.5
Rail Grinding	12.0	12.1	12.6	12.7	13.2
General Track Maintenance	17.4	18.0	18.4	18.9	19.4
Structures & Facilities Maintenance	3.0	3.1	3.2	2.1	2.2
Other Civil Maintenance	3.4	3.5	3.6	3.7	3.8
Signalling & Telecommunications Maintenance	13.0	13.5	13.4	13.7	14.1
Electrical Overhead	8.8	9.1	9.0	9.1	9.4
Trackside Systems Maintenance	2.1	2.2	2.2	2.3	2.3
Other General Maintenance	2.5	2.6	2.7	2.8	2.8

Goonyella System Maintenance	FY25	FY26	FY27	FY28	FY29
Total Direct Maintenance Costs (excl. Ballast Undercutting Plant Depreciation)	**72.6**	**75.0**	**75.5**	**76.9**	**78.8**
Ballast Undercutting Plant Depreciation	2.3	2.3	2.3	2.3	2.3
Total Direct Maintenance Costs	**74.9**	**77.3**	**77.8**	**79.2**	**81.1**
Non-Coal Allocation	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Total Direct Maintenance Costs	**74.9**	**77.2**	**77.7**	**79.2**	**81.0**

Notes:

- Rail Grinding forecast includes cost escalation and scope variation year on year driven by anticipated grinding requirements and stable management of rail asset condition. Future estimates are indicative only and may be subject to change and will be iterated in future MRSB submissions for RIG review and approval.
- Resurfacing variation primarily driven by annual plant maintenance cycles.
- Electrical Overhead variation from FY27-29 for reduced level of external contractors as apprentices and trainees become qualified.
- Signalling & Telecommunications variation from FY27-29 for reduced level of external contractors as apprentices and trainees become qualified.
- Structures increase from FY25 primarily driven by management of known drainage and concrete defects with additional costs for maintenance activities to be delivered by specialist contractors. The program of works is expected to continue for the next 3 years.

Table 64 FY25 plus four-year Renewals Cost Forecast – Goonyella System (Nominal $m)

Renewals Item	Assets Included	FY24 MRSB	FY25	FY26	FY27	FY28	FY29
Civil Assets		85.1	86.1	93.6	95.9	100.2	102.8
Permanent Way	Rail, Track, Sleeper, Turnouts	24.5	30.8	32.2	33.0	35.0	35.9
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	38.1	35.8	39.0	39.9	40.3	41.3
Structures	Culverts, Bridges	11.3	8.2	10.6	10.9	11.6	11.8
Civil Renewals	Formation, Level Crossings, Access Points	11.2	11.3	11.8	12.1	13.4	13.7

Renewals Item	Assets Included	FY24 MRSB	FY25	FY26	FY27	FY28	FY29
Control Systems Assets	Safe Working, Train Control and Detection, Interlocking, Telecoms, Power Resilience, Transmission, Optic Fibre	17.8	14.7	15.0	17.4	20.2	22.6
Electrical Assets	Overhead and Goonyella Ports OHL Renewal, Power systems, Traction Substation Renewals	10.8	9.8	13.6	20.3	49.8	57.9
Total		**113.7**	**110.6**	**122.2**	**133.6**	**170.2**	**183.2**

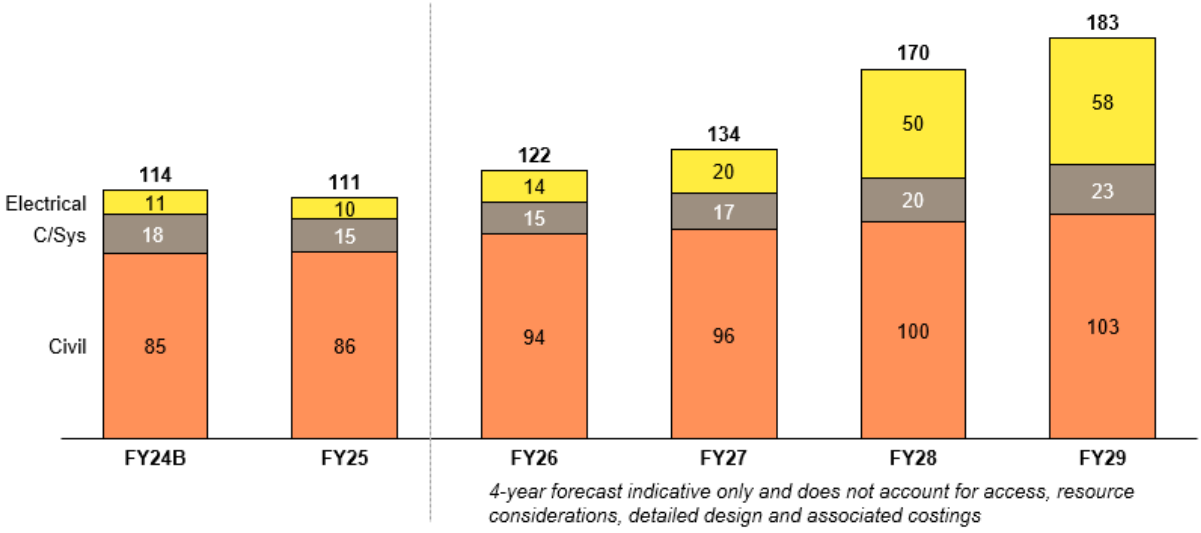


Figure 85 FY25 plus four-year Renewals Cost by Renewal Category – Goonyella System (Nominal $m)

- Civil: largely stable with an increase driven by FY26 Ballast Cleaning program. FY28 increase driven by Track rerail (Black Mountain to Hatfield) and bridge bearing replacement.
- Control Systems: Strategic program of 10 Goonyella system interlocking renewals has been delayed pending commercial negotiations. Program accelerates in outer years as interlocking and train detection renewal accelerates, and the remaining fibre optic program is complete.

- Electrical: increases FY26-FY29 due to the Strategic Traction Substation and Goonyella Ports OHLE Renewal Projects.

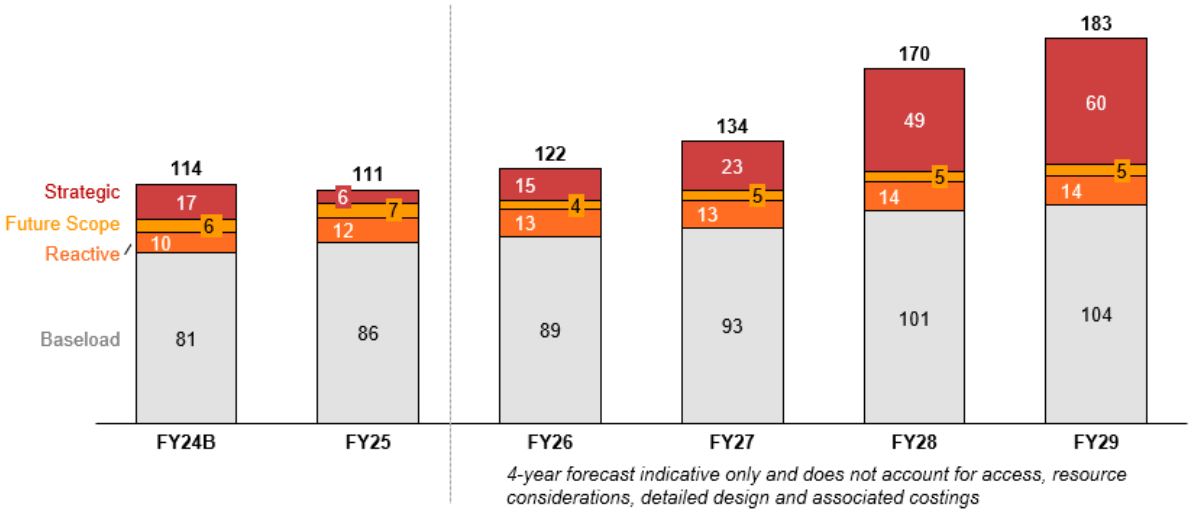


Figure 86 FY25 plus four-year Renewals Cost by Scope Type – Goonyella System (Nominal $m)

- Baseload cost FY24B to FY25 increased $7m largely due to labour and materials cost escalation (steel, concrete) in the Permanent Way Product.
- Baseload Reactive and Future Scope are relatively stable over the forecast period with movements largely reflecting civil program increase in FY28.
- Strategic Scope driven by the following programs:
    - Electrical Traction Substation Renewals (Based on concept estimates) FY26-FY29 and OHLE Renewals Project
    - Control Systems – specifically interlocking, train detection and fibreoptic program renewal.

6.3 Moura System – Four-Year Forecasts

Table 65 FY25 plus four-year Maintenance Cost Forecast – Moura System (Nominal $m)

Moura System Maintenance	FY25	FY26	FY27	FY28	FY29
Resurfacing	1.9	2.0	1.9	2.1	2.1
Rail Grinding	1.2	1.5	1.3	1.4	1.6
General Track Maintenance	7.2	7.5	7.7	7.8	8.1
Structures & Facilities Maintenance	1.6	1.7	1.7	1.1	1.1
Other Civil Maintenance	1.1	1.2	1.2	1.2	1.2
Signalling & Telecommunications Maintenance	2.8	2.9	3.0	3.1	3.1

Moura System Maintenance	FY25	FY26	FY27	FY28	FY29
Trackside Systems Maintenance	0.3	0.4	0.4	0.4	0.4
Other General Maintenance	0.3	0.3	0.3	0.4	0.4
Total Direct Maintenance Costs (excl. Ballast Undercutting Plant Depreciation)	**16.6**	**17.4**	**17.5**	**17.4**	**18.0**
Ballast Undercutting Plant Depreciation	0.3	0.3	0.3	0.3	0.3
Total Direct Maintenance Costs	**16.6**	**17.4**	**17.5**	**17.4**	**18.0**
Non-Coal Allocation	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Total Direct Maintenance Costs	**16.8**	**17.6**	**17.7**	**17.6**	**18.2**

Notes:

- Rail Grinding forecast includes cost escalation and scope variation year on year driven by anticipated grinding requirements and stable management of rail asset condition. Future estimates are indicative only and may be subject to change and will be iterated in future MRSB submissions for RIG review and approval. The approach to the mainline grinding program from FY25 seeks to minimise the significant variations in scope year-on-year and will manage emergent rail surface condition in the standard carbon rail that exists within the Moura System. It is considered that moving from a bi-annual approach to a sustained, smoother program will assist in mitigating defect growth, which is anticipated to reduce unplanned disruption. Future estimates are indicative only and may be subject to change and will be iterated in future MRSB submissions for RIG review and approval.
- Structures increase from FY25 primarily driven by management of known drainage and concrete culvert and concrete bridge defects with additional costs for maintenance activities to be delivered by specialist contractors. The program of works is expected to continue for the next 3 years.

Table 66 FY25 plus four-year Renewals Cost Forecast – Moura System (Nominal $m)

Renewals Item	Assets Included	FY24 MRSB	FY25	FY25	FY26	FY27	FY28	FY29
Civil Assets		13.8	17.6	17.6	19.3	19.8	20.7	21.2
Permanent Way	Rail, Track, Sleeper, Turnouts	4.7	5.5	5.5	6.0	6.1	6.5	6.6
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	3.5	5.2	5.2	5.8	6.0	6.0	6.2
Structures	Culverts, Bridges	1.7	2.7	2.6	2.9	3.0	3.2	3.2
Civil Renewals	Formation, Level	4.0	4.3	4.3	4.6	4.7	5.0	5.2

Renewals Item	Assets Included	FY24 MRSB	FY25	FY25	FY26	FY27	FY28	FY29
	Crossings, Access Points							
Control	Safe	5.0	4.7	4.7	4.0	2.3	2.3	2.4
Total		**18.8**	**22.3**	**22.3**	**23.3**	**22.1**	**23.0**	**23.5**

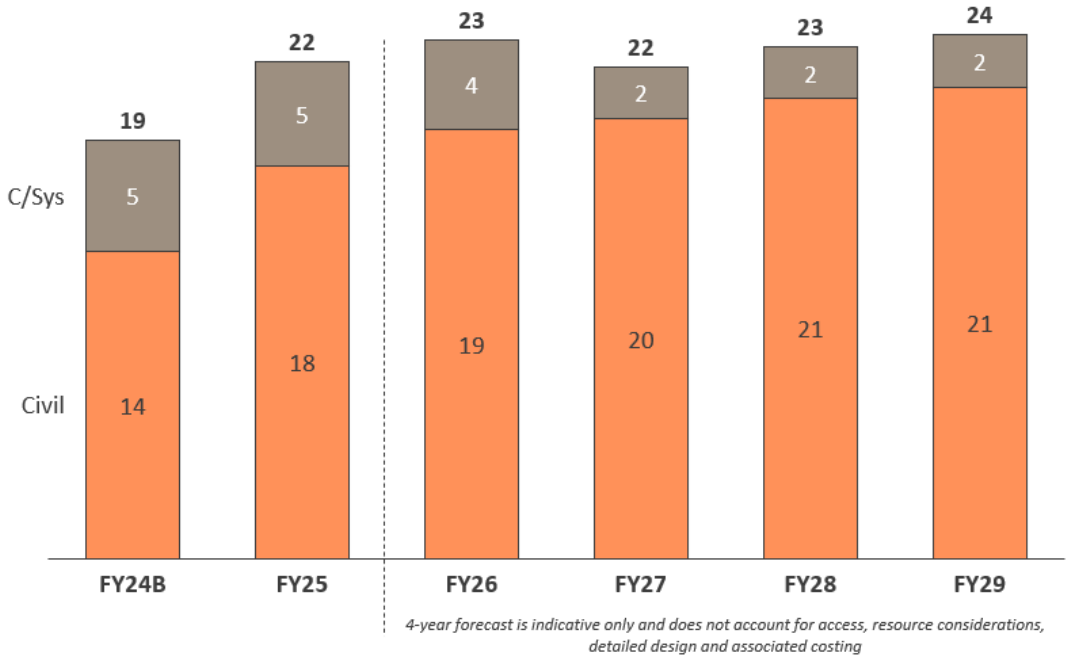


Figure 87 FY25 plus four-year Renewals Cost by Renewal Category – Moura System (Nominal $m)

- Civil: largely stable and with an increase in FY26 onwards driven by Ballast Cleaning program.
- Control Systems: Hot Bearing Detector renewal program completes in FY26 with the progressive interlocking program continuing as planned into the outer years.

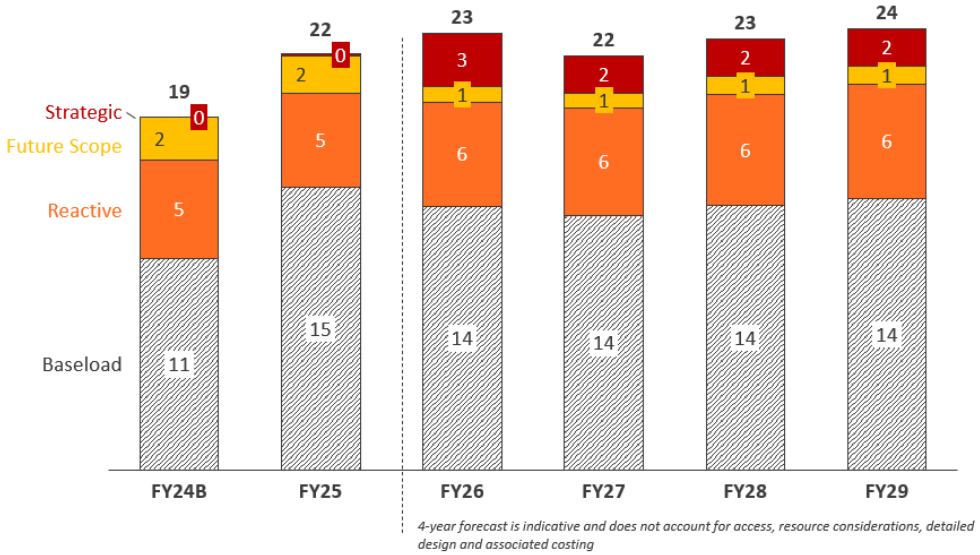


Figure 88 FY25 plus four-year Renewals Cost by Scope Type – Moura System (Nominal $m)

- Baseload Reactive and Future Scope: are relatively stable over the forecast period with movements largely reflecting completion of the HBD program in FY25/ FY26 and a moderate increase in civil spend in FY28.
- Strategic Scope driven by the following programs:
    - interlocking renewal program largely represents strategic spend and has been calibrated to maintain critical inventory of obsolete components.

6.4 Newlands System and GAPE – Four-Year Forecasts

Table 67 FY25 plus four-year Maintenance Cost Forecast – Newlands System and GAPE (Nominal $m)

Newlands System Maintenance ($m)	FY25	FY26	FY27	FY28	FY29
Resurfacing	1.8	1.9	1.8	2.0	2.0
Rail Grinding	3.0	2.8	3.3	3.0	3.5
General Track Maintenance	5.4	5.6	5.8	5.9	6.1
Structures & Facilities Maintenance	1.6	1.6	1.7	1.1	1.4
Other Civil Maintenance	0.3	0.3	0.3	0.3	0.3
Signalling & Telecommunications Maintenance	3.8	3.9	4.0	4.1	4.2
Trackside Systems Maintenance	0.4	0.4	0.4	0.4	0.4
Other General Maintenance	0.5	0.5	0.5	0.6	0.6
Total Direct Maintenance Costs (excl. Ballast Undercutting Plant Depreciation)	**16.7**	**17.1**	**17.7**	**17.4**	**18.3**
Ballast Undercutting Plant Depreciation	0.3	0.3	0.3	0.3	0.3
Total Direct Maintenance Costs	**17.0**	**17.4**	**18.0**	**17.7**	**18.6**
Non-Coal Allocation	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Total Direct Maintenance Costs	**16.9**	**17.3**	**18.0**	**17.6**	**18.6**

Notes:

- Rail Grinding forecast includes cost escalation and scope variation year on year driven by anticipated grinding requirements and stable management of rail asset condition. Future estimates are indicative only and may be subject to change and will be iterated in future MRSB submissions for RIG review and approval.
- Signalling & Telecommunications variation from FY27-29 for reduced level of external contractors as apprentices and trainees become qualified.

- Structures increase from FY25 primarily driven by management of known drainage and concrete defects with additional costs for maintenance activities to be delivered by specialist contractors. The program of works is expected to continue for the next 3 years.

Table 68 FY25 plus four-year Renewals Cost Forecast – Newlands System and GAPE (Nominal $m)

Renewals Item	Assets Included	FY24 MRSB	FY25	FY26	FY27	FY28	FY29
Civil Assets		21.9	31.4	34.2	35.8	29.5	30.1
Permanent Way	Rail, Track, Sleeper, Turnouts	8.6	9.2	9.9	10.2	10.9	11.1
Ballast Cleaning	Mainline and Turnout Undercutting, Bridge ballast	3.4	7.8	8.8	9.0	9.2	9.4
Structures	Culverts, Bridges	6.6	9.2	9.9	10.1	3.3	3.4
Civil Renewals	Formation, Level Crossings, Access Points	3.3	5.1	5.6	5.7	6.1	6.2
Control Systems Assets	Safe Working, Train Control and Detection, Interlocking, Telecoms, Power Resilience, Transmission	1.8	1.0	3.4	3.6	2.8	2.8
Total		**23.7**	**32.3**	**37.6**	**38.7**	**32.2**	**32.9**

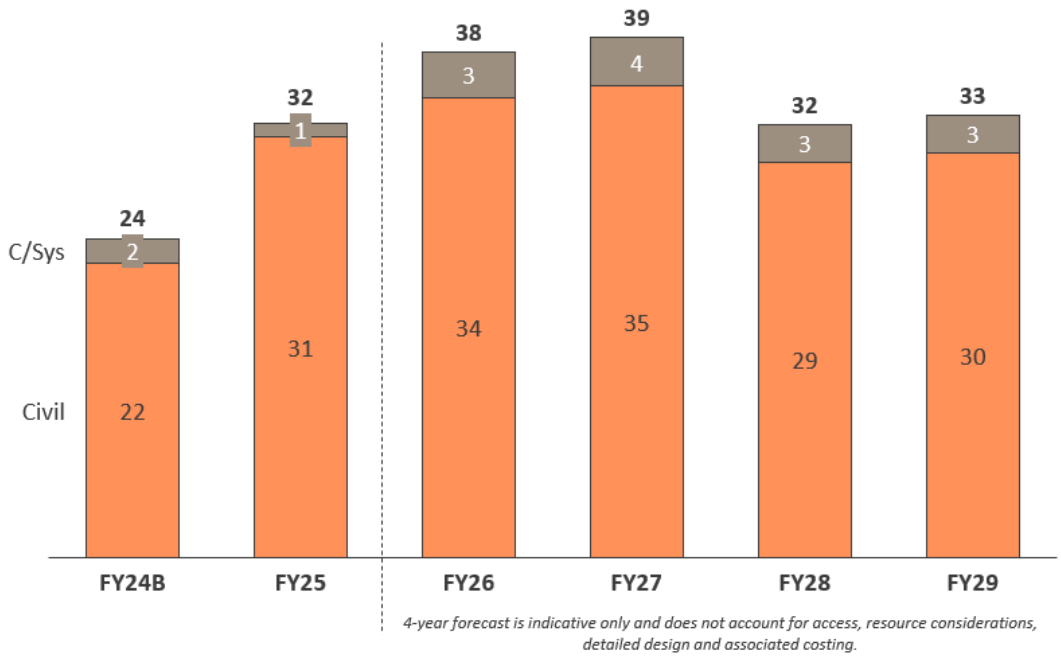


Figure 89 FY25 plus four-year Renewals Cost by Renewal Category – Newlands System (Nominal $m)

- Civil: Completion of Short Span Bridge renewal program in FY26 sees expenditure reduce in outer years partially offset by Turnout re-orientation at Durroburra in FY28.

- Control Systems: Reference Weigher and Hot Bearing Detection renewals have been prioritised in FY26/FY27 to deliver the operational calibration and maintenance ecosystem for Newlands operations.

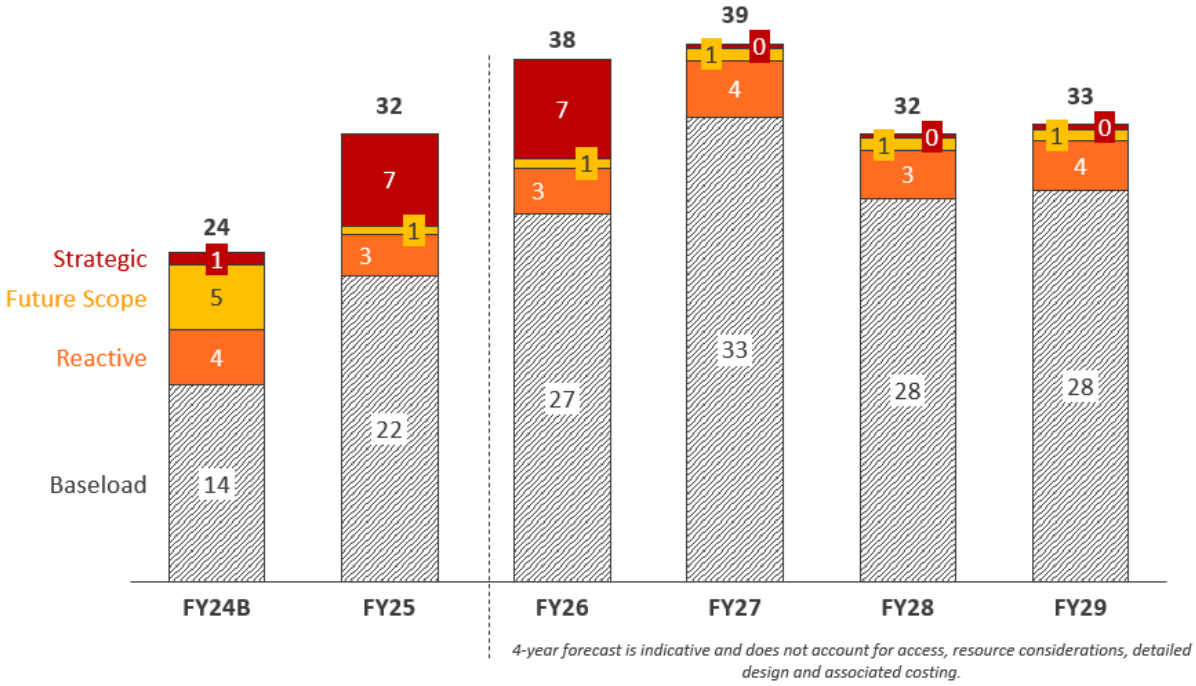


Figure 90 FY25 plus four-year Renewals Cost by Scope Type – Newlands System (Nominal $m)

- Baseload cost FY24B to FY25 increased $6m largely driven by Ballast Cleaning program.
- Baseload Reactive and Future Scope are relatively stable over the forecast period with movements largely reflecting control systems which has been scheduled to provide a more consistent program across the 5-year program based on identified obsolescence risk.
- Strategic Scope driven by the following programs:
    - completion of Short Span Bridges program in FY26 sees strategic spend reduce substantially in outer years.

7 Stakeholder Engagement

7.1 Engagement on the FY25 Draft Access Regime 11.5

As part of the development of the FY25 MRSB, customers provided feedback on the draft access regime in both Phase 1 and Phase 2 of the process. This process is outlined in 0. Key feedback provided during the planning process from customers is detailed in11.5 the table below.

Table 69 Customer Feedback Draft Access Regime

	Customer Feedback Received	Access Planning Customer Feedback and Response
1	Managing contingency closure; customers seeking clarity around guidelines, capacity impacts, lead times for alignment and purpose	Aurizon Network has developed a **protocol to determine the need to maintain or remove the contingency closure** and set lead times to do so. Protocol sent to customers in July-23 for review. Aurizon Network has since finalised this Protocol which will be implemented in FY25.
2	One Operator raised feedback about the length of closure durations	Aurizon Network stated that the closures are being driven by the critical path of the critical scope items. A stakeholder survey in FY22 noted that broadly stakeholders are supportive of a closure strategy that sees longer and fewer closures. **Outcome: Aurizon Network have, and will continue to, critically review and assess critical path durations with a view of optimising overall closure durations.**
3	Closures over weekends will see some customers faced with challenges, particularly around costs and resourcing	This is driven by two key factors; Network resourcing availability & retention as well as increased closure durations. The development of the closure plan assumes a Thursday to Thursday roster. We have made some changes to accommodate a reduction in weekend closures. **Outcome: Aurizon have reduced closures over the weekend by 63% since Phase 1 engagement, from 19 days down to 7.**
4	OHLE window placement in FY24 causing disruption to services before & after Integrated Closures	**Aurizon Network agree there are opportunities to better place these outage windows in FY24 & FY25**. Timing of remaining FY24 OHLE have been **reviewed and moved where required**. These learnings have been **applied to the FY25 plan.** Overall the OHLE windows are delivering a **significant amount of value** in terms of asset condition and reliability with approx. **400 electrical work orders being completed in these windows YTD**
5	Reduction in Newlands March 2025 closure hours	The standard delivery method for TLM is to take out both tracks due to plant, property, separation issues. Aurizon Network has reviewed the standard delivery method for this closure and for this particular section on the NCL the TLM can be undertaken in a single line closure. By changing the plan of works, we are able to reduce the March closure to 60hrs with a post 48hrs single line on the NCL.

Additionally in February 2023, Aurizon Network developed an engagement plan for calendar year 2023 with the RIG representative group. The details of the outcomes of that engagement are included in section 0.

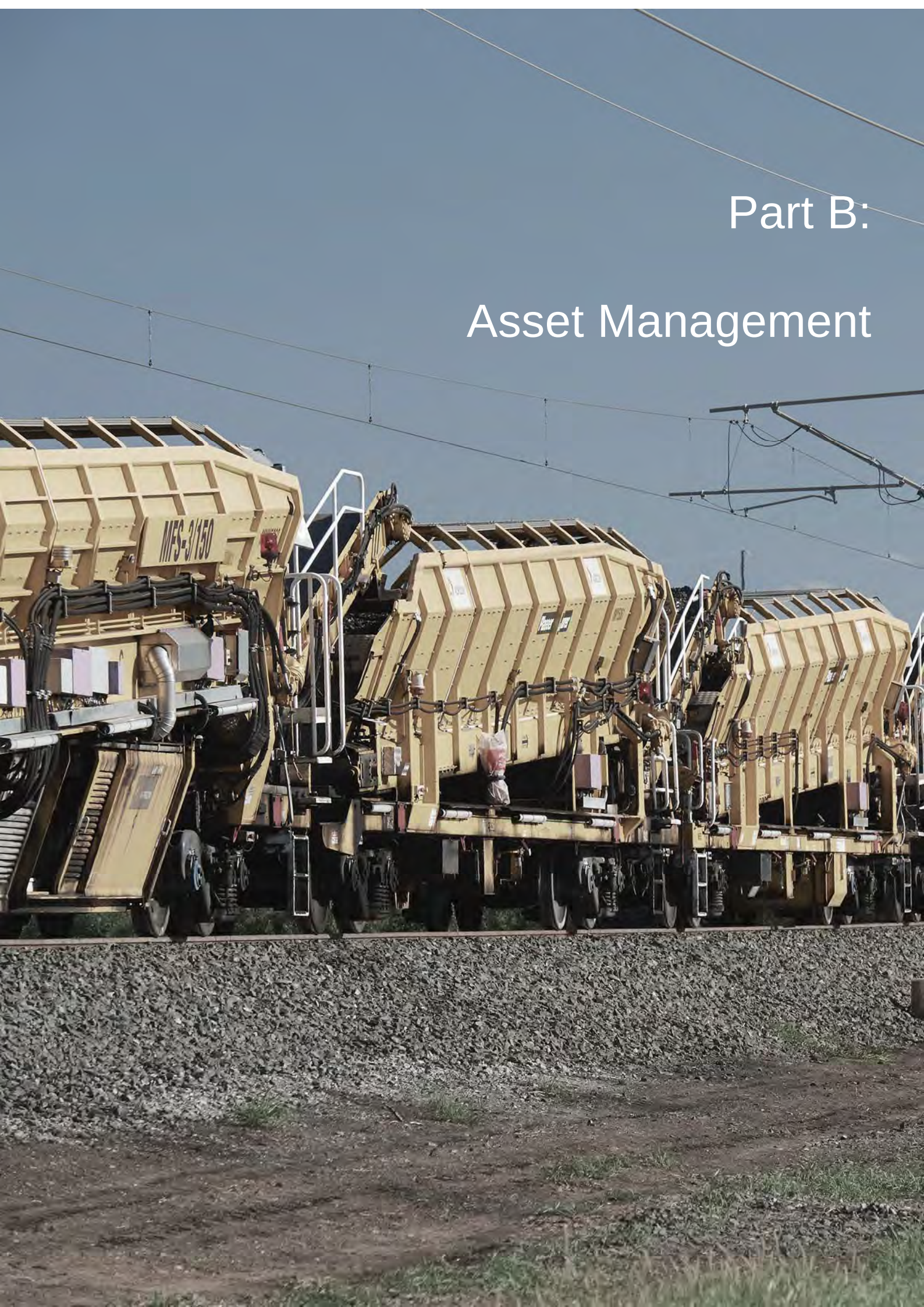
7.2 FY25 Commitments

Aurizon Network believes the development of the annual engagement plan with the RIG representative group provided a step change in the quality of engagement between Aurizon Network and the RIG. As such, and subject to RIG approval of the FY25 Final Draft Proposal, Aurizon Network proposes to continue this process post the vote on the FY25 Final Draft Proposal in February 2024. Suggested topics for consideration as part of the Engagement Plan include:

1. Work with RIG to develop efficiency initiatives that can be reported against and used to inform the FY26 MRSB.
2. Work with RIG to scope and engage an external provider to conduct a review of maintenance and renewal contract expenditure to identify those tasks which are both out-sourced and occur every year (e.g. rail stress management, excavator undercutting, culvert inspections and repairs).
3. Provide updates of progress against plan for the long-term strategies presented to the RIG (e.g. interlocking, fibre optics, OHLE upgrades, ATIS etc.). Timing of updates to be discussed at February RIG Producer Group Meeting
4. Provide confidence of selection of Ballast Scope so that when scope is presented as part of the MRSB each year, the RIG understand the condition and criticality of the scope item to support their decision to approve or otherwise the Renewal budget.
5. Continue to progress 2023 engagement actions identified within RIG Producer Group 2023 engagement.

Part B:

Asset Management



Part B

Asset Management & Delivery Approach

AURIZON

8 Part B Structure

Part B provides CQCN-wide information regarding Aurizon Network's asset management approach. It details the strategies applied to deliver on the requirements of the Asset Maintenance and Renewal Policy to maintain reliability, and deliver rail infrastructure efficiency and performance (each in the long and short term) while seeking to ensure that Committed Capacity or Deliverable Network Capacity can be achieved.

The FY25 Part B includes:

- the guiding principles and application of the asset management strategies used in the CQCN
- asset strategies applied to each asset class for both maintenance and renewals
- the process and other relevant information in the development of the MRSB from scope identification, access and works planning, budget setting and procurement, execution or delivery of the asset activity and reporting and engagement. Aurizon Network identifies this process as its Works End to End process
- climate change considerations and the impact on Aurizon Network's asset management approach.

Additional information is provided in a series of appendices that provide additional information on certain items.

9 Maintenance and Renewal Activities

Aurizon Network applies a coordinated approach to managing the CQCN rail infrastructure by applying maintenance and renewal strategies that are designed to complement each other through each stage of the asset's life cycle.

The average age of the assets in the CQCN is approximately 30 years, with most assets having been constructed during the 1980s and the 1990s. The average is reduced by deviations, duplications and spurs/balloon loops being built during the 2000s and 2010s and the asset renewals undertaken each year which is a small percentage of the total network.

Maintenance of rail infrastructure refers to the inspection, testing, identification of faults and subsequent adjustment or repair of the asset.

Renewal of rail infrastructure refers to the replacement of an asset that is life-expired, obsolete or part of a strategic renewal program.

There are a wide variety of assets that make up the Rail Infrastructure. These assets wear and degrade at differing rates due to a variety of factors, which may include:

- location
- climate
- construction material
- use or movement (e.g., tonnage railed over a rail section)
- movements of mechanical parts
- obsolescence – either because operating systems are no longer supported, spare part availability or advances in alternate technologies.

To manage variability, Aurizon Network applies several approaches to inspect, test and measure deterioration and respond to asset condition in a manner that seeks to minimise disruption to train services.

Ultimately, the underlying scope of asset activity (both maintenance and renewals) outlined in each annual MRSB is a function of well-defined standards and processes, that have been designed to ensure Aurizon Network can comply with its safety, legislative and regulatory obligations while seeking to deliver Committed Capacity in each Coal System. Aurizon Network is continuously reviewing and improving our internal engineering capability, standards, and processes to deliver increased throughput in a safe and reliable way.

9.1 Guiding principles and application

There is a direct linkage between the applied asset management strategy and the annual MRSB draft proposal.

- asset management strategies inform asset policy and standards
- the Standards inform renewal and maintenance triggers resulting in the required scope
- this scope is then fit to access, resources and plant
- the materials, labour and contract costs then derive the cost forecast
- this in turn develops the proposed MRSB scope and costs for approval by the Rail Industry Group.

The guiding principles informing asset management strategies are outlined in Table 70.

Table 70 Guiding Principles and their application in the development of Aurizon Network's Asset Management Strategies

Guiding Principle	Description	Application of Guiding Principles (Considerations)
Minimise the impact of asset activity	Asset activity is undertaken to support the safe and reliable provision of rail services for users of the CQCN. Aurizon Network seeks to manage the time required on track to deliver the required asset activity while seeking to ensure that Committed Capacity or Deliverable Network Capacity can be achieved.	Aurizon Network seeks to minimise the impact to the supply chain of Track Possessions by: • Appropriately scheduling major, high impact asset renewal activity in a series of planned, integrated closures. • Managing the impact of unplanned defects or rail infrastructure failures, both in duration and intervals, through application of engineering standards based on condition and criticality of the asset to the relevant supply chain. • Using critical path scope to plan closures and maximise the number maintenance and renewal activities planned for delivery during those closures, while also balancing essential plant and resources. • Where scheduling planned maintenance activities outside of closures, asset activity is delivered between revenue services where possible. • Coordinating and aligning other supply chain maintenance activities (e.g., Mine, Port, other Rail Networks etc.) to minimise overall supply chain impact and maximise throughput.
Achieve below rail asset reliability and performance	Aurizon Network's asset management strategy prioritises a preventive maintenance regime with fit for purpose renewal of Rail Infrastructure. Aurizon Network's approach seeks to maintain performance and reliability consistent with 4-year averages by identifying, planning and rectifying faults to minimise the impact of planned and unplanned failures.	Aurizon Network has varying levels of risk tolerance which take into consideration the condition, location and criticality of assets in each system. Aurizon Network considers this when setting asset management strategies for different asset types within each Coal System. It may be appropriate for the asset condition of different corridors to vary to reflect the level of service, reliability and flexibility required by customers. At all times, Aurizon Network's approach seeks to mitigate the risk of rail incidents (such as derailment, dewirement or collision) that could result in serious injury, fatality or cause significant throughput disruption and recovery costs.
Managing to long-term demand	Aurizon Network's asset management strategy is based on the future demands on the rail infrastructure using information known at the time. Renewals and maintenance plans consider this long-term demand to determine the appropriate asset activity to ensure the asset is fit for purpose for the economic life of the corridor.	The CQCN has multiple subsets of asset categories and products with varying engineering lives to support more than 50 coal mines and other bulk and general freight commodities. Asset strategies are considered at a corridor level to best align asset capability and performance with the expected demand. However, future demand uncertainties exist at a corridor level, particularly for assets with 20+ year engineering lives. .
Meet legislative requirements	Aurizon Network's asset management strategy is developed within the context of the parameters set out by relevant legislative requirements	Legislative and regulatory obligations underpin Aurizon Network's commitment to provide safe and reliable services to customers. These obligations are articulated in the Asset Standards that form part of

Guiding Principle	Description	Application of Guiding Principles (Considerations)
	including the Rail Safety National Law (Queensland) Act 2017 (RSNL), the Transport Infrastructure Act 1994 (Qld), the Work Health and Safety Act 2011 (Qld), and the Electrical Safety Act 2002 (Qld) and Security of Critical Infrastructure Act 2018.	the Aurizon Network Safety Management System (SMS). Application of these ensure the safety of track workers (both internal and external), rail operations and public interfaces.
Cost effective	Aurizon Network endeavours to ensure that the level of expenditure incurred to deliver the asset activity is reasonable	Maintenance and renewal activities are delivered in a way that seeks to maintain reliability and Deliverable Network or Committed Capacity of the CQCN. Aurizon Network completes a market based approach when needing to outsource labour, services or materials. Awarding of any contracts will include assessments of past performance, cost, quality and safety.

9.2 Legislative and regulatory obligations

In addition to complying with the provisions of UT5, Aurizon Network's asset management approach is underpinned by relevant sections under the *Rail Safety National Law (Queensland) Act 2017* (**RSNL**), the *Transport Infrastructure Act 1994* (Qld), the *Work Health and Safety Act 2011* (Qld), and the *Electrical Safety Act 2002* (Qld) and *Security of Critical Infrastructure Act 2018*.

To undertake Rail Infrastructure Manager (**RIM**) tasks in the CQCN, Aurizon Network must be accredited by the Office of the National Rail Safety Regulator (**ONRSR**) and may only undertake such tasks in accordance with an SMS that has been approved by ONRSR.

Under the RSNL, Aurizon Network must ensure, so far as is reasonably practicable, rail safety is not affected by the carrying out of its prescribed railway operations.

A breach of Aurizon Network's statutory rail safety duty as a 'rail transport operator' may lead to ONRSR determining to suspend, revoke or impose conditions upon Aurizon Network's accreditation. Given that Aurizon Network may only conduct its railway operations in accordance with the terms of its accreditation, any such measures by ONRSR could bring Aurizon Network's railway network to a temporary or permanent standstill or lead to regulator-imposed operational constraints or restrictions.

Any contractor performing rail safety work on behalf of Aurizon Network must also comply with the SMS, failure to do so can constitute an offence for both Aurizon Network and the relevant contractor.

The Security of Critical Infrastructure Act 2018 was last amended in April 2022 and identifies transport infrastructure (rail) as critical infrastructure if it transitions two regional centres within a state.

Safety Management System (SMS)

Aurizon Network has safety duties under the RSNL, and its SMS provides, in part, the mechanism for Aurizon Network to meet its specific obligations. The detail for the safe design, construction, testing, commissioning and operation of the railway is contained in Aurizon Network's SMS which, amongst other things, includes:

- systems and procedures for eliminating, or reducing, the risks to safety caused by railway operations
- a documented set of engineering standards for monitoring, maintaining and repairing rail infrastructure.

Aurizon Network's SMS is subject to periodic assurance audits by ONRSR and annual review by the Electricity Regulator (as a prescribed Electricity Entity). In addition, Aurizon Network operates a targeted self-assurance program to assess the quality of delivered works against the SMS.

Consequently, each annual MRSB includes a level of asset activity that is consistent with its safety obligations and complies with the SMS that is statutorily applicable to Aurizon Network.

Asset Standards (Asset Maintenance and Renewals Policy)

Aurizon Network's Asset Maintenance and Renewals Policy (**AMRP**) provides an overview of the requirements in the SMS in a single document and outlines the maintenance and renewal processes that are relevant to each class of asset.

The AMRP includes Aurizon Network's policies on how each asset will be managed through its useful life. Furthermore, the AMRP provides the rationale for the intervention frequency levels necessary for each activity. It should be noted that these intervention frequency levels may vary between individual Coal Systems to account for, amongst other things, the level of service (e.g., reliability) and flexibility that is required by customers.

Defined intervention frequency levels can include:

- usage-based, e.g., track resurfacing is required every 50 million gross tonnes
- time-based, e.g., turnouts requiring weekly visual inspections and a detailed annual inspection
- age-based, e.g., 22.5 tonne axle load concrete sleepers being replaced every 40 years
- fix on failure.

All preventive maintenance activities and resulting asset operating parameters are developed in accordance with the engineering standards and technical specifications necessary to ensure Aurizon Network's compliance with its legislative and regulatory obligations.

The next section outlines the asset strategies by class, with further information on the asset maintenance and renewal options available in the appendices:

- Appendix 1 provides a description of the alternate maintenance options for each maintenance activity
- Appendix 2 the alternate renewal options for each asset class
- Appendix 3 outlines the maintenance activities, benefits and risks as well as the triggers for intervention and access implications of the activity.

10 Strategies by Asset Class

Assets for Renewal and Maintenance are presented in the MRSB in the classes and products as per the following Table 71

Table 71 Asset Classes

Class	Renewal Products	Maintenance Products
Permanent Way	Rail. Sleepers, Turnouts, Track Upgrade	Resurfacing, Rail Grinding, General Track Maintenance. Track Inspection, Ultrasonic Testing
Ballast	Mainline and Turnouts Ballast Cleaning, Bridge Ballast Renewal	Maintenance Ballast
Structures	Bridges, Culverts	Structures Preventive, Structures Corrective
Civil Renewals	Formation, Level Crossings, Access Roads, Fencing, Access Points, Corridor Drainage. Cuttings and Embankments Stow & Crew Change Infrastructure	General Track Maintenance, Other Civil Maintenance
Control Systems Assets	Safe Working (Asset Protection, Interlockings, Train Detection, Train Detection, Minor), Power Resilience, Telecommunications Assets, Transmission Data & Renewal, UTC/DTC Systems Upgrades, Other Control Systems Renewals.	Signalling Corrective, Signalling Preventive, Telecoms Corrective, Telecoms Preventive
Electrical Assets	Overhead Line Equipment, Feeder Stations, Autotransformers, SCADA system	OHLE Corrective, OHLE Preventive, Traction Corrective, Traction Preventive

This section describes the Asset Management Strategies applied to each of these products. This is a summary of information contained in the Network Asset Maintenance and Renewal Policy (AMRP). The AMRP is reviewed on an annual basis to incorporate changes in strategic approach, enhancements in process or changes in asset policy.

Further detail on the preferred Maintenance and Renewal activities per class and product and the alternative options that are assessed at the point of renewal are contained in the appendices to Part B

10.1 Permanent Way

Permanent Way assets in a railway refer to the infrastructure that makes up the tracks, including rail, sleepers, turnouts and friction management equipment. These assets are also the connection point between rollingstock and the below rail assets.

If efficient to do so, rail and sleeper products may be combined for renewal concurrently. Combined works are referred to as ‘Track Upgrade’ within the MRSB.

Effective maintenance and renewal of the Permanent Way assets provide the following benefits to the Coal supply chain.

- **Asset Reliability** – Reduces network delays associated with unplanned asset activity. Asset components such as rail, sleepers and turnouts have a low likelihood of failure in a new state and require minimal maintenance once renewed.
- **Throughput** – Renewing in a planned manner within an identified closure pattern avoids unplanned outages and associated throughput losses. Managing defects via temporary speed restrictions reduces the risk of a more severe operational impact resulting from an unplanned outage ahead of planned maintenance.
- **Safety**- Reduces derailment risk.

10.2 Rail

Given rail is a crucial component in the railway, it is manufactured to exacting standards suited to the operating environment, ensuring durability and safety.

Rail is managed through its asset life by undertaking patrol inspections, geometry inspections, ultrasonic inspections, rail reprofiling via rail grinding, alignment correction via resurfacing, lubrication on its curves and management of temperature-driven steel expansion and contraction through effective rail stress management.

Typical Description	• Mix of rail types across the CQCN ranging from 47kg to 60kg • Current standard is 60kg through head hardened rail 110m continuous welded lengths joined by aluminothermic welds in field or Insulated Rail Joints **(IRJ)**
Maintenance	• **Rail Inspection** – Track inspections, ultrasonic testing, track geometry recording, and visual inspections are utilised to identify rail wear and rail faults. The severity of the fault drives the timing of correction. • **Friction Management** – Lubrication of track on straights and curves and maintenance. That is, filling of any lubrication systems or devices, and testing and maintenance of remote monitored lubricators and software licences. • **Rail Break Repair** – the immediate action after a rail break. Depending on the location and severity of the break this will typically be a temporary correction (plug rail insertion, break platting) to allow operations to resume ahead of a planned further repair or renewal. This includes weld and IRJ breaks. • **Rail Joint Corrective Maintenance** –Maintenance of a rail joint including flash-butt welding or thermite welding of mechanical joints, grinding to remove metal flow from an IRJ, bolt and fish plate maintenance of mechanical joints, and lifting and lining joints (manual/mechanised spot tamping) • **Rail Stress Management** – Ensuring rail is at the correct stress-free temperature to accommodate both rail expansion associated with summer heat and rail contraction associated with cooler winter periods. Uncontrolled rail expansion results in track misalignments or buckles in summer and rail breaks in winter • **Rail Grinding** – Removes micro cracks and small surface defects from the rail surface and restores the rail profile to minimise wheel/rail contact stresses and assist rollingstock steerability. Planned maintenance activities include rail grinding, track resurfacing and inspections to measure track profile and geometry compliance
Asset Renewal	Rail reaches the end of its life by either: • **Rail Fatigue** – The failure mechanism from an increase in rail defects which are caused through millions of wheel cycles over the rail (analogous to continuous bending of a paperclip). Rail fatigue generally only manifests itself in straight track where the rail has been in service for significant periods of time.

	• **Rail Wear** – Progressive loss of steel in the rail head caused by the very high lateral forces under train operations and preventive grinding. The rail wears to the point where it is not sufficiently strong enough to sustain the heavy axle loads; rail wear generally only manifests itself in curved track. The sharper (i.e., tighter) the curve, the higher the wear rate. • **Rail Corrosion** – Corrosion on the rail results in thinning or reduction of the rail section and instability of the rail. This introduces a potential risk of displacement and large stresses that could lead to rail failure. Corrosion is difficult to manage, especially in highly corrosive environments such as loadouts where the rail contacts coal which traps moisture. These locations are difficult to visually inspect and assess therefore require proactive replacement to reduce failure.
Typical Scope Requirements	There is over 5,400km of rail across the CQCN. The volume and weight of rail traffic is measured in Million Gross Tonnes (MGT) and is the key driver of rail wear and fatigue. About 60% of rail km have less than 30MGT/year, 35% corresponds to 30-70 MGT/year and 5% above 70MGT/year. In 2016, Network identified, after assessing rail deterioration in the future years considering forecast tonnage growth, that the number of rails renewed (500 rails per annum) was not sufficient to be compliant with standards and policies. The assessment concluded that rail requirements through to 2050 need to be smoothed out over time. This would require 120km of rail or 1,150 rails to be renewed across the CQCN per annum for the next 10 years. Since the assessment in 2016, Aurizon Network has introduced new rail profiles, improved identification of rollingstock wheel defects, improved alignment between rollingstock speed and track cant, transitioned to procuring head-hardened rail, and changed its weld and rail stress policies, resulting in improved rail performance and a reduction in rail defects. With these improvements in rail management practices and the actual tonnages being less than the predicted tonnages used in the assessment, the scope of required rail renewal has been adjusted accordingly. The driver for planned rail renewal is changing. There is an increase in rail renewals driven by fatigue and corrosion which was previously managed through Reactive Renewals. Data science methods are being leveraged to enable site-specific forecasts for planning of baseload renewals program. This has resulted in a rerail program going forward to be on average 910 rails or 100km per annum in the period FY25 – FY29. A renewal rate of 100km per annum equates to around 1.9% of the total rail assets renewed each year or a renewal period of 53 years. At this level, rail renewal scope is forecast to remain constant into FY29.

10.3 Sleepers

Sleepers perform the function of holding the rails to correct gauge and distributing the loads imposed on the rails to the ballast and critically, providing lateral stability to track. Other than some sidings, low traffic spurs and mine loops, all sleepers in the CQCN are concrete of varying size and capacity.

Typical Description	• 28 tonne axle limit full depth reinforced concrete sleepers • 685mm sleeper spacing • Pandrol e-clip sleeper fastenings • Galvanized e-clips in coastal locations
Maintenance	• **Sleeper Cluster Management** – The repair of sleepers with defects in a row or cluster which may require spot insertion of sleepers, reboring, regauging, replating, respacing and/or spot replacement of pads, insulators and fasteners to rectify the defects and remove the cluster from the track. • **Sleeper Inspection** – Sleepers are visually inspected, and defects are reported. The condition of all fasteners including clips, shoulders, pads and insulators and any damage are also reported during inspections. In addition to the visual condition inspection, timber sleepers are also tested at required intervals to check for defects that render the sleeper ineffective. • **Spot Tamping** – Involves localised top and line restoration using manual or mechanised assisted processes to realign the sleepers within the track alignment. • **Track Geometry Recording** – Measuring the track geometry parameters for sleeper defects. For example, gauge issues may be the result of missing fasteners or defective pads and insulators.
Asset Renewal	Sleeper renewal is the standalone replacement of sleepers in a section of track. The life of a sleeper is affected by many factors, but generally the design loading, quality and type of the sleeper, density of the traffic, curvature (i.e., the amount of curves in the track), maintenance conditions and the effect of derailments or other damage. Sleepers require replacement when there is a group or cluster classed as defective. Sleepers are renewed via the Sleeper Laying Machine, Track Laying Machine or inserted using on-track machines depending on the quantity being replaced and their location. Sleepers have a design life of 40 – 50 years for concrete (depending on type), 40 years for steel and 12 years for timber.
Typical Scope Requirements	There are over 4 million sleepers in the CQCN. The sleepers renewed each year are selected due to age and condition and the ability of the sleeper section to perform required functions. The FY25 – FY29 renewal program is the replacement of concrete fist sleepers inserted in the 1980s in Blackwater, Moura and Goonyella to concrete Pandrol e-clip sleeper and steel sleepers with concrete Pandrol e-clip sleepers on the Gordonstone Mine Spur. Sleeper renewal is a baseload scope item, as defined in **Table 72**. With the level of renewals expected to fluctuate over the coming periods dependant on the location of aged sleepers being renewed.

10.4 Turnouts

A turnout (also known as Switches or Points & Crossings) joins two tracks and enables a train to move from one track to the other or exit the mainline to a spur, siding or loop. Depending on the direction, a turnout is classified as right hand or left hand. When turnouts are provided at both ends of a connection between two tracks, the arrangement is known as a crossover.

A complete turnout consists of switch assembly, crossing assembly, all closure rails, insulated rail joints, base plates, any special plates and pads, blocks, guard rail assemblies, fasteners, rodding, and bearer set (sleepers).

Typical Description	Due to the arrangement of track, size of rail and required turnout speed, there are many variations of turnouts across the CQCN. These assets are designed to suit the requirements of each site and whilst endeavours are underway to rationalise turnout configurations, there are few typical arrangements. Turnouts are graded by three parameters: • rail size – The weight of the rail within the turnout (e.g., 60 kg, with 41 kg being smallest and 60 kg largest) • crossing rate – The angle of divergence that defines the speed through the turnout (e.g., 1 in 12, with 1 in 7 being smallest and 1 in 25 being largest) • crossing type – The specific design of a crossing, with fabricated being the lowest standard, rail bound manganese next and Swing Nose Crossing the highest.
Maintenance	• **Turnout Maintenance** – Minor maintenance on turnouts including minor repairs of components, rail and jewellery, maintenance welding, chair lubrication, manual spot tie replacement (< 10 sleepers), manual top and line, manual (hand) grinding and any signalling and traction support to undertake the maintenance activities. • **Turnout Inspections** – Scheduled and unscheduled inspections of turnouts to determine condition and defects of and in the turnout. • **Turnout Resurfacing** – Mechanised resurfacing carried out on turnouts involving mechanical lifting, lining and tamping of the turnout with a Tamper Liner, followed by ballast profiling by a Ballast Regulator and includes the associated activities such as signalling support. • **Turnout Grinding** – High production mechanised process of establishment and maintenance of rail head profile on turnouts. Includes the removal and reinstatement of trackside equipment. • **Non-Destructive Testing** – Manual ultrasonic testing of rail and other non-destructive testing methods for turnout components. • **Maintenance Ballast** – The distribution of ballast for restoration of ballast profile for turnouts. Includes ballast ploughing or regulator ballast profiling after distribution of ballast (but without tamping).
Asset Renewal	Renewals for turnouts are either full turnout replacement or turnout component repair. Full turnout renewal is the replacement of a complete turnout, including bearers, ballast, formation, steel components and all signalling equipment. Turnout component renewal is the renewal of the major components such as switches, stock rails, lead rails, crossings (vees) and bearers due to fatigue and/or wear and/or rollingstock damage (e.g. derailment). Turnouts are complex assets that require a coordinated design between civil, signalling and electrical designers. The steel, bearer (sleepers) components, subgrade, and tie-in to the existing track are civil assets. The turnout motors, detection and tie in to the safeworking interlocking systems are control systems assets. Any changes to the turnout geometry will have an effect on the overhead wires. Due to the site-specific variability turnout design and turnout renewal are managed as multiple project deliverables with design completed in one (or more) MRSB period and renewal in a future MRSB period.

	The tonnage lives of the turnouts are dependent on the type. Rail wear is usually the determining factor in swing nose crossings, while mechanical damage to the vee and components affects life in rail bound manganese turnouts. Fabricated turnouts are used only in existing track in low tonnage lines (20 TAL) and yard track. On average, the life of a swing nose crossing turnout is 1000MGT, while rail bound manganese turnouts have an average life of 320MGT and fabricated turnouts have an average life of 100MGT. The average life of turnouts in the CQCN is approximately 25 years excluding replacement of major components which have an average life of 10yrs for Switch Assemblies and 20yrs for Crossing Assemblies. At sites subject to high traffic demands, average lives for switch and crossing assemblies can be as low as 12-18 months.
Typical Scope Requirements	Turnout renewal is baseload scope as some renewals are typically required each year. The specific scope is dependent on the configuration of the turnout, traffic task and performance of the turnout. Strategic Renewals are required in locations such as Callemondah Yard where there are several turnouts requiring renewal and requires integration with interlocking upgrades.

10.5 Ballast

Ballast is the material placed between and under the sleepers and its function is to:

- Provide a firm and even bearing for the sleepers and to distribute the loads imposed by traffic as evenly as possible to the formation
- Permit drainage of the track
- Resist lateral movement of the track
- Resist longitudinal movement of the track
- Provide a convenient, globally-leveraged, medium for packing the track to vertical and horizontal alignment.

During usage, the condition of ballast degrades, primarily by:

- •Ballast particle attrition
- •Filling of ballast voids with fouling material, such as coal fines and subgrade material. Where track has ballast of poorer condition, this will result in the development of mudholes and a loss of track geometry manifesting in an irregular running surface and interface with rollingstock.

When the effects of fouled ballast become evident it results in speed restrictions. This in turn leads to increased maintenance, including tamping to restore top and line and more extensive track closures to undertake remedial work. Both speed restrictions and extra maintenance requirements reduce the capacity of the system, increasing train operating and track maintenance costs. The condition of the ballast and formation for the CQCN is determined through testing via Ground Penetrating Radar (GPR). GPR is a globally-recognised and non-invasive method of objectively quantifying the ballast condition. As GPR testing is a cyclic activity and a management tool to monitor the condition of ballast and formation, it is considered an operational activity and will be undertaken at a frequency as determined for each type of location.

Ballast cleaning is delivered by the Ballast Cleaning Machine or excavator undercutting, for mainline and turnout undercutting or via removal and replacement of ballast as part of Bridge Ballast renewals.

The Ballast Cleaning Machine (BCM or RM902) is a high production mainline resurfacing machine. The RM902 is most efficient at delivering undercut and shoulder cuts simultaneously over longer sections and entered production in May 2021.

Excavator Undercutting is undertaken using wet hire contractors and is appropriate for smaller sections and/or areas difficult to access either due to location or condition.

Fouled ballast is removed and replaced via front end loader on bridges due to the inability to spoil ballast to the side of track and work at heights risk on bridge decks. Importantly, neither the RM902 nor excavator undercutters are afforded the work space on bridge decks – put simply, the machines are too wide to be used for ballast renewal on bridge decks in the CQCN.

Railway monuments are located within the rail corridor as a fixed points or on electrical masts to indicate the correct level or position of the track. Measurements are taken from these to confirm the correct position of the track to ensure that the ballast cleaning activity and associated resurfacing correctly locates the track to design alignment.

Effective maintenance and renewal of the ballast provides the following benefits to the supply chain:

- **Asset Reliability** – Reduce network delays due to asset failure associated with track geometry defects and mudholes linked to poor ballast condition due to coal fouling.
- **Throughput** – Maintaining and renewing in a planned manner within identified closure pattern avoids unplanned outages and associated throughput losses. Proactive ballast condition management mitigates TSR's caused by poor ballast condition.
- **Safety**- Improve the wet weather resilience of track (reduced unplanned defects which need to be responded to in a reactive manner). Reduces train derailment risk by managing asset condition.

Typical Description	Ballast is sourced from a number of quarries across the CQCN. Location is a critical consideration to reduce transit distance and delivery costs. Ballast is required to meet Aurizon Network's specifications and standards. This engineering standard details: • Size and Gradation: Railway ballast typically consists of crushed stone with a range of particle sizes, from small fragments to larger pieces. The gradation, or distribution of particle sizes, is deliberately specified to provide stability and drainage. • Angularity: The ballast material should have angular or rough-edged particles. This angularity helps interlock the particles, providing stability and preventing excessive lateral and longitudinal movement of the track. • Durability: Ballast must be durable and resistant to wear and degradation, as it is subjected to heavy loads and continuous stress from passing trains under varying climatic conditions.
Maintenance	• **Track Resurfacing** – Mechanised resurfacing by a tamper restores the geometry of the track by lifting (vertical) and lining (lateral) the track to the appropriate level and alignment, and consolidating and stabilising the ballast underneath the sleepers. It is followed by ballast profiling by a Ballast Regulator. • **Turnout Resurfacing** – Mechanised resurfacing carried out on turnouts involving mechanical lifting, lining and tamping of the turnout with a Tamper Liner, followed by ballast profiling by a Ballast Regulator and includes the associated activities such as signalling support. • **Track Inspection** – Ballast is visually inspected and defects/mudholes are reported, with speed restrictions imposed to manage track geometry degradation and hold ballast condition until repair or renewals are able to be undertaken.

	• **Track Geometry Recording** – Involves localised top and line restoration using manual or mechanised assisted processes to realign the sleepers within the track alignment. • **Maintenance Ballast** – The purchase and distribution of ballast for restoration of ballast profile on track and turnouts. • **Ballast Undercutting – Minor** – This planned corrective maintenance activity involves the excavation of the fouled ballast and mud holes from beneath and adjacent to the sleepers. Fresh ballast is added and tamped to restore the track to the correct height and ballast depth for a length of track up to 40 sleeper bays (as a guide). This is for full width or shoulder ballast. • **Ballast Undercutting – Turnout Minor** – This planned corrective maintenance activity involves the excavation of the fouled ballast and mud holes from beneath and adjacent to a turnout by minor mechanised equipment such as an excavator (with attachments) or by other means for less than 10 sleeper bays (as a guide). Fresh ballast is added and tamped to restore the turnout to the correct height and ballast depth. • **Top and Line Spot Resurfacing** – Localised management of geometry defects within track using manual or mechanically assisted processes. Involves restoring top and line on bridge ends, open track using manual processes or small spot tamping machinery, e.g., modified bobcat, portable hand tamper. • **Turnout Maintenance** – Turnout spot resurfacing is included in this maintenance activity and is used to improve ballast and geometry profile through a turnout. • **Level Crossing Maintenance** – Includes the resurfacing at the crossing interface to maintain ballast condition and improve the top and line through the level crossing. This includes removal of the road surface pre-resurfacing activities and thereafter reinstatement of the road surface as well as any requisite traffic management activities.
Asset Renewal	GPR is a globally-recognised and non-invasive method of objectively quantifying the ballast condition. It is leveraged to understand current ballast condition and also, by comparison to prior GPR runs, enables an understanding of fouling rates. GPR is one of a few key metrics utilised to direct ballast renewal efforts. Scope is determined based on the number and frequency of resurfacing activities (a lag indicator of deteriorating track geometry), track geometry and GPR which is then reviewed and validated by Track Inspectors and Supervisors. The most fouled locations or those showing the greatest degradation are matched to the production of the Undercutting fleet and track access constraints. Aurizon Network utilises a ballast condition analyser model to assist in identifying future years renewal requirements based on ballast and geometry condition to determine renewal intervention. Once locations of significant fouling have been identified, pre-digs are performed prior to execution. Pre-digs confirm the makeup of the material that is fouling the ballast (e.g., clay, coal) and the moisture content of the fouled ballast; this field testing informs site specific expected return rates and ballast requirements. The primary long-term treatment method to renew ballast is ballast undercutting. This involves removing fouled material from ballast in track and turnouts, replacing with clean ballast and restoring track alignment and geometry. The intent of this activity is to re-establish a drainage path away from the sleepers and track infrastructure. Ballast Renewal products are:

	• **Mainline Ballast Cleaning** (also referred to as Ballast Undercutting Mainline) – Utilising the Ballast Cleaning Machine **(BCM)** or excavator undercutting units. The ballast is removed from under the track structure via an undercutting bar for ballast beneath the sleepers and a shoulder cutter for ballast adjacent to the sleepers. The ballast is either screened and replaced by the BCM or removed from track in its entirety and replaced with new clean ballast via ballast trains. Utilisation of the excavator undercutter will see all fouled ballast removed and replaced with new ballast. The depth of the undercut and replacement ballast amount is site dependant driven by the amount of fouling present and the moisture content of the ballast being undercut. • **Turnout Ballast Cleaning** (also referred to as Turnout Undercutting) – Using excavator undercutting units, the ballast under the turnout is removed and replaced with clean ballast. The BCM cannot cut through turnouts given the additional width and complexity of turnouts. • Bridge Ballast Replacement (also referred to as Bridge Rollout) – Given the access constraints on bridge structures, undercutting by the BCM or **Excavator Undercutting** units is not possible. Bridge ballast replacements see the entire track structure removed (rail and sleepers), the fouled ballast removed via loader, bridge deck inspected, new ballast placed and the track structure re-instated. This results in a full ballast replacement for the selected bridge. • **Monumenting** – Detailed survey, design and installation of new track data plaques. This enables future track maintenance activities align to the design alignments. Ballast renewal can also be completed as part of Track Upgrade scope where more than one element of the permanent way assets is renewed together, for example rail and sleepers.
Typical Scope Requirements	Aurizon Network has historically planned for approximately 140 linear track km and approximately 45 turnouts of ballast renewal each year, based on scoping activities aligned to an averaged intervention threshold of 38% percentage void contamination (PVC). Aurizon Network determines the ballast renewal scope via the Ballast Condition Analyser. The achievement of this scope Is heavily dependent on weather conditions, access time, and the extent of fouling encountered at each work location. As a result of developments over recent years, Aurizon Network has a reduced focus on achieving the 140 linear track km each year and identifies and prioritises scope based on both asset condition, priority and factors affecting execution. These developments include: • the introduction of the Ballast Condition Analyser, which looks at current and historic GPR data and planned and historical maintenance activities (resurfacing, mudhole repair etc) to determine the future year scope locations • the improved understanding of site specific conditions including depth of ballast (volumetric conditions), the existence of clay and other material through pre-digs (screenability) • the efficiency of the RM902 over longer sections of track. Aurizon Network continues to progress further targeted improvements to address the root cause of coal fouling and improve the effective and transparent use of data in the scoping processes. One initiative delivered in FY23 has been the establishment of a robust warehouse of historical data that can be integrated and interrogated within the scope development phase. The next phase of targeted improvements to the Ballast Condition Analyser will focus on improved scope grouping (less manual intervention to aggregate scope into lengths driving effective

	utilisation of the RM902 and excavator undercutters) and improved scoping metrics (site-specific summaries of the key metrics such as, number of mudholes within the past 5 years and percentage of site extent greater than 38% PVC). This will deliver improvements to the scoping duration targeting the highest priority scope. The next stage of development is aimed for FY25 to inform FY27 scope.

10.6 Structures

Structures assets include the renewal and maintenance of:

- **Bridges** – over waterways and Aurizon owned road over rail, rail over road bridge and pedestrian bridges
- **Culverts** – of varying sizes and construction
- **Other Ancillary structures** – retaining walls, load slabs, inspection structures.

Effective maintenance and renewal of Structures provide the following benefits to the coal supply chain:

- **Asset Reliability**–- Reduce network delays associated with unplanned asset activity. Structures have a low likelihood of failure in a new state and require minimal maintenance once renewed.
- **Throughput–-** Renewing in a planned manner within identified closure pattern avoiding unplanned outages and associated throughput losses. Renewing prior to culvert or pipe misalignment resulting in renewals completed under loaded traffic rather than requiring a dedicated track possession.
- **Safety**–- Reduce derailment risk with trains by managing asset condition to be fit for purpose.

Typical Description	The choice and arrangement of culverts or bridge structures is dependent on the purpose of the structure and the hydrology required at the site. Structures can provide access for either permanent waterways, creeks and overflows or for flood mitigation and storm runoff. Culverts in the CQCN are either: • Reinforced concrete box culverts of varying sizes • Reinforced concrete pipe culverts of varying sizes • Concrete or masonry arch culverts • Cast in situ pipe culverts • Corrugated metal pipes. Bridges in the CQCN are: • Concrete substructure (piers) and bridge (decks) • Steel substructure and bridge • Concrete substructure and steel bridge.
Maintenance	• **Structures Inspection** – All inspections of structures, collecting and recording of the condition of structures and prioritising defects for repair. This includes Civil Engineering Structures Standards inspections such as patrol, general and detail inspections – scheduled and unscheduled • **Bridge Repairs** – Corrective maintenance on concrete, steel or steel and concrete composite or timber bridges which result in the repair or replacement of minor components or defects • **Drainage Maintenance** – Corrective maintenance of drainage culverts and pipe defects including concrete repair works, painting protection, lining protection systems, scour repairs, embankment protection repairs or temporary supports

	• **Ancillary Structures Maintenance** – Corrective maintenance of ancillary structures such as retaining walls, slabs and loadouts, electrification barriers and inspection pits • **Culvert Cleaning** – Corrective and preventive cleaning of culverts including inlets, outlets and, through the culverts.
Asset Renewal	The renewal decision for structures is primarily based on condition. Other factors considered are location, size and long-term demand on the track section. • **Remove and Replace Culvert** – removal of track structure and ballast and full replacement of the culvert with a same size replacement, larger capacity to increase water flow capacity, or a smaller size that will still provide the required flood immunity • **Remove and Replace Bridge and Bridge Components** – From replacement of small components such as bridge bearing pads, more significant components such as girders or strengthening of girders to upgrade the loading capacity, or removal and replacement of an entire bridge super- and sub-structure • **Lining Pipes** – Corrugated Metal Pipes **(CMP's)** were historically installed on many parts of the network and have a considerably lower design life. The thin-walled section CMPs are very susceptible to severe corrosion. Several lining options have been considered for these assets to prevent the removal of the track above. Currently cured in place pipe **(CIPP)** and reinforced concrete lining are the main options for renewal of these assets without removing the existing asset. Aurizon Network continues to investigate alternative structural options for these lining techniques. CIPP lining and concrete lining is also being applied to deteriorated existing reinforced concrete pipes on the network • **Concrete lined Box Culverts** – There are many box culverts on the CQCN network where concrete lining is a structural solution for a deteriorated box culvert, subject to suitable height and width, hydrology studies demonstrate a reduction of the waterway will still meet flood immunity and afflux requirements. The reinforced concrete lining provides for the full structural capacity of the track loading and has the benefit of generally not requiring any track closure • **Delete Structure** – During hydrology assessments for assets to be renewed, if it is determined that the asset is not required to meet flood immunity and it is reasonable to divert any water to neighbouring structure then the asset will be considered for deletion. The deletion of an asset will also involve grout filling of the culvert and the earthworks on the inlet and outlet sides to provide reasonable drainage to any nearby structures.
Typical Scope Requirements	Across the CQCN there are 354 bridges and 3911 culverts. These structures can be categorised by their age and design load ratings. The installation dates of these structures range across the network, with some assets greater than 100 years old. The average age of Blackwater structures is 46 years, Goonyella is 45 years, Moura is 49 years, Newlands is 32 years and GAPE is 12 years. These assets are predominantly concrete structures and have design lives of up to 50-100 years. Several of these structures are operating above their design load capacity. Each Coal System currently operates at 26.5tal, whilst a significant number of culverts and bridges within the CQCN have load ratings from 15tal to 22tal. This overloading of structures is managed with regular inspections, and specific maintenance practices such as propping of culverts and speed restrictions, however the overloading increases the rate at which defects propagate and ultimately reduces the design life of the structure. As with all structural assets, the condition of the asset is the primary driver for renewal.

	Aurizon Network's condition monitoring regime informs the development of both the maintenance and renewal planning of the structural assets operating at and beyond their original design function. Structures renewals are considered as Baseload scope renewals. Three out of the four systems have an average age within 5 years of their original 50-year design life and therefore renewals are expected to continue at similar or increased rate in future financial years.

10.7 Civil Assets

Civil assets are those assets that support the Permanent Way assets and include:

- Formation
- Level Crossings
- Corridor Assets (Access roads, access point, corridor security)
- Civil (cuttings, embankments and slope stability)

Effective maintenance and renewal of the Civil assets provide the following benefits to the coal supply chain:

- **Asset Reliability** – Reduce network delays associated with asset failure and lifting renewed sections to the current required tonnages.
- **Throughput** – Renewing in a planned manner within identified closure pattern avoiding unplanned outages and associated throughput losses.
- **Safety**–- Reduce derailment risk with trains by managing asset condition. Removal of redundant assets reduces the risk of rail staff accessing the rail corridor and members of the public accessing no longer required live crossings.

Typical Description	Formation is the track substructure in which ballast and the track superstructure is laid. The formation depth and material across CQCN varies dependant on when that particular asset was constructed or last renewed. When renewing formation Aurizon Network now has a typical formation depth of 600mm extending deeper where required to bridge unsuitable embankment/fill material. The formation is made up of capping material which is a blended material intended to help seal the surface under the ballast and reduce water ingress and prolong the life of the formation. Geotextiles and geogrids are also added to the formation structure to improve the tensile strength of the formation. A level crossing or an 'at grade' crossing is an intersection where a railway line crosses a road or a pedestrian path at the same level. The type of level crossings managed are Public, Private/Occupation, Pedestrian, Hi-Rail Access Points and Maintenance which have either passive or active protection and sealed or unsealed surfaces depending on use and risk. Access roads traverse along the rail corridor and link access points (entrances and exits) to the public road network. Like formation, access road make up across CQCN varies depending on when the asset was constructed or last renewed, with gravel unsealed surface being the most common. Fencing is installed along the rail corridor to provide security. A risk-based approach and consultation with adjoining landholders is completed to determine the type and standard of fencing required. Fencing ranges from high security fences to no fences depending on risk. The majority of the fencing in CQCN is barbed wire fencing.

	As the railway traverses the natural ground topography the ruling grade (steepness of track) is managed via cuttings and embankments that allows the railway to pass at an acceptable level and gradient. In some areas, the baters (walls) of these embankments and cutting require specialised strengthening to improve slope stability. Preventive Fire and Vegetation Management–- Moving this product to be a preventive maintenance task away from corrective to allow for effective contractor engagement with define scope and cost. Also allows for planned location selection.
Maintenance	• **Inspections** – scheduled and unscheduled inspections are annually undertaken to assess and record the condition of the asset and identify defects for testing, monitoring or rectification • **Earthworks** – non-formation earthworks and drainage clearing and cleaning to open waterways, spot repairs of access roads, access points, stow locations, walkways and maintaining cuttings and embankments • **Fencing** – repairs of existing fencing including associated signage, gate repairs, spot fence repairs and wire tensioning • **Fire and Vegetation Management** – control by chemical, mechanical and burning off operations to manage interference with the running of trains, electrical overhead and sighting distances along the corridor. • **Level Crossing maintenance** – road surface repair, signage, repair and cleaning of the flangeways, resurfacing of the track at the road interface
Asset Renewal	• **Formation Renewals Planned** – Correction of longer track sections that have presented reliability issues and attracted increased amount of corrective maintenance as either formation repair or track geometry faults. Preventive formation renewal activity targets locations with poor formation material performance to prevent future failures • **Formation Renewal Reactive** – An allocation made for each system to rectify smaller sections of formation that have an accelerated condition degradation or are not receptive to holding works such as track resurfacing (e.g., lift and pack and tamping) to address track geometry issues • **Level Crossing Renewals Planned** – The scope of these works varies at a site level and may include upgrading of the safety systems from passive protection (stop signs) to active protection (flashing lights boom gates etc). The scope can also include road surface upgrades, subgrade formation strengthening, installation of rubber flangeways to the rail, upgrades to warning signage and lighting • **Level Crossing Renewal Reactive** – Allocation per system for minor safety enhancements such as signage and road marking upgrades • **Corridor Assets Reactive** – An allocation is made for access roads, access points and Corridor Security (fencing). Given the size of the rail corridor and the effects that localised weather can have on these civil assets this allocation will be directed at these assets as issues and safety concerns present during the period
Typical Scope Requirements	Civil Assets are a combination of Baseload Renewals and allocations for Reactive Renewals. Formation deterioration is impacted by multiple factors and especially by unfavourable wet weather conditions which effect the formation integrity and associated reliability. This requires significant corrective maintenance of small sections of track due to geometry degradation likely resulting in multiple Temporary Speed Restrictions **(TSRs)**. A strategic approach is to create an optimum balance between corrective/reactive works and preventive works. Planned renewals for formation across key problem locations across CQCN increases the reliability and performance of the asset whilst reducing the corrective action requirements to maintain the asset. Future Corridor

	Security (fencing) programs will also move toward a higher proportion of planned scope identification.

10.8 Control Systems

Control Systems assets are the physical and digital assets that provide, train control, telecommunications and wayside monitoring systems. These assets provide the capacity multiplier for the track assets, that is they allow for the safe movement of more train services over the track structure.

Control Systems include the renewal and maintenance of:

- Train Control Systems
- Telecommunications
- Wayside Systems

Effective maintenance and renewal of the Control systems assets provide the following benefits to the coal supply chain:

- **Asset Reliability**–- Given these assets do not wear but rather age to a point where they are no longer supported, renewal ahead of failure is required to retain the assets' reliability.
- **Throughput** - Renewal and system improvements to best move trains through the system in an efficient and safe way.
- **Safety** - Ensuring the critical signalling and train control systems are robust and effective in the separation of trains. Providing clear communications functionality across the CQCN systems.

Typical Description	Train Control Systems: Signalling system, level crossing active protection, interlockings and point motors. Telecommunications: the data network required to connect assets to train control, includes the optic fibre network, digital radio and microwave radio systems. Wayside Systems: assets in the rail corridor that provide a level of monitoring and alarming to protect track and overhead assets.
Maintenance	An assessment has been performed on all asset types to determine the consequence of asset failure, and the viability of preventing failure. If asset failure would have significant safety, environmental, or operational impact, and the occurrence of failure can be mitigated by preventive intervention, then the assets will undergo further analysis to determine specific maintenance activities and intervals. Assets identified as having minimal consequence because of failure and/or no viable measures to minimise failure, are classified as fix on fail. Control Systems maintenance can broadly be grouped in 3 areas. ***Telecommunications maintenance*** • **Telecom Network Maintenance** – maintenance of the major bearer systems and infrastructure providing bandwidth for train control, voice and communication services including Train Control Radio and Maintenance Services Radio. • **Cable Route Maintenance** - Maintenance and repair of all cableways, markers, troughing and cables including fibre testing and repairs.

	Signalling maintenance • **Signalling Field Maintenance** – maintenance of all field equipment associated with signalling control. This activity primarily involves inspections of equipment and correcting identified out of tolerance items. • **Signalling Control Systems** – maintenance of control centre-based equipment relating to the signalling control of trains including the central computer systems: Universal Train Control **(UTC)** and Direct Traffic Control **(DTC)** • **Level Crossing Protection –** maintenance of equipment such as pedestrian gates, boom gates, flashing lights and associated circuitry. It involves the inspection of equipment and where necessary spot replacement of early failure or damaged components. • **Westect Automatic Train Protection (Westect ATP) Maintenance –** maintenance of Westect ATP Transponders, Westect ATP Radio and other specialised equipment through performance servicing and where necessary spot replacement of early failure or damaged components. ***Asset Protection and other maintenance*** • **Wayside Maintenance –** maintenance of Dragging Equipment Detectors, Hot Bearing Detectors / Hot Wheel Detectors, Train Acoustic Detection, Coal Dust Monitoring Sites and other specialised equipment through performance servicing and where necessary spot replacement of early failure or damaged components. • **Weighbridge Maintenance** - inspections of weighbridge equipment, performance servicing and where necessary spot replacement of early failure or damaged components. • **Power Systems Control** - maintenance of field and master station control centre-based equipment including the Power Supervisory Control System (SCADA) such as Remote Terminal Units **(RTU)**. • **Remote Monitor System (RMS)** – maintenance of field and master station control centre-based equipment, which includes Field RTUs. Monitors Black Mountain Headways, Level Crossings and corridor weather stations.
Asset Renewal	Control Systems assets are predominantly technology assets and electrical in nature. These assets are characterised by having a higher level of failure on install as latent defects are identified followed by a stable period where the rate of failure is relatively low and constant. As components wear out and reach the end of their service life, the rate of failure rapidly increases. Additionally, obsolescence of vendor supply support and componentry parts (e.g., operating systems no longer being supported, a reduction in spare part availability or advances in alternate technologies.) can trigger the end of life and the need to modernise the asset. The inherent nature of these assets is such that the exact point of failure is unknown. To promote reliability of operations, a level of redundancy can be typically built into these systems. Renewals are targeted where the rate of failure increases to a point where unacceptable throughput losses may occur. The design lives of Control System assets are typically: • Asset Protection – 10 to 15 years • Posts, Gantries, Relay interlockings – 35 years • Track circuits, Axle counters, Processor Based Interlockings – 25 years • Points machines, Telemetry units – 20 years • LED signal modules – 15 years. ***Telecommunications Renewals*** The Telecommunications Operational Network consists of layers of infrastructure with the base component being optical fibre cable and the digital microwave radio

	system. Upon this sits the Synchronous Digital Hierarchy and Operational Data Communications Network over which operational systems such as TETRA, Power Supervisory System and signalling telemetry operate. A condition-based approach is generally applied to all the discrete equipment and is reflective of the age of the asset. Other factors that can affect condition of the asset include supportability, spares availability, and cyber-security vulnerabilities. Renewal programs will also consider changes in systems that use the telecommunications network. For example, a move from analogue telemetry to networked connectivity introduces different requirements for the telecommunications network. ***Signalling Renewals*** The Signalling Operational Network consists of layers of infrastructure and systems with the base components being signal heads and mounting structures, housing, interlockings, points, level crossings and UTC and DTC systems. A condition-based approach is generally applied to all the discrete equipment and is reflective of the age of the asset and the safety impact of failure and level of built-in redundancy. Other factors that can affect condition of the asset include supportability, spares availability, and cyber-security vulnerabilities. ***Asset Protection Renewals*** Asset Protection consists of a wide array of infrastructure and systems that measure, monitor and protect Network and Rollingstock assets as well as support safe-working systems. Some key components being environmental monitors, weighing systems, rollingstock monitors, train detection, flood switches and train protection systems. A condition-based approach is generally applied to all the discrete equipment and is reflective of the age of the asset. Other factors that can affect condition of the asset include supportability, spares availability, and cyber-security vulnerabilities.
Typical Scope Requirements	Control Systems assets renewals are typically a combination of Baseload Renewals and allocations for Reactive Renewals. Some Control System assets renewals, such as interlockings and optic cables are considered Strategic renewals as these renewal plans require significant optioneering and result in multi-year investment plans. The trigger for the renewal of Control Systems assets is predominantly driven by the age of the asset along its life cycle. These assets do not necessarily wear with tonnage, and often don't show degradation until the point of failure. Obsolescence of data systems or components is also a key trigger for asset renewal.

10.9 Electrical Assets

The Electrical Safety Act in Queensland requires that as a Prescribed Entity, Aurizon Network must ensure that the asset is operated in a way that is electrically safe. This includes managing the high voltage electrical assets through effective maintenance and renewals activities.

Electrical Assets include the renewal and maintenance of:

- Overhead Line Equipment

- Power Systems
- Traction Substations

Effective maintenance and renewal of the Electrical assets provide the following benefits to the coal supply chain:

- **Asset Reliability** - These are typically long-run assets which will eventually fail due to age-related defects and/or environmental factors. Renewal decisions are typically made based on failure risk or safety.
- **Throughput** - Traction power systems have built-in redundancy and typically allow normal throughput to continue in the event of an outage of one major piece of plant. By contrast, a single dewirement on the overhead line system will impact both electric and diesel services.
- **Safety** - Many of the High Voltage traction assets have inherent safety functions (e.g., protection and earthing systems). As a Prescribed Electricity Entity, Aurizon Network has clearly defined obligations to maintain an electrically safe system. This includes a mandatory annual Safety Management System audit by a qualified external auditor who has been accredited by the Electrical Safety Regulator.

Typical Description	The Overhead Line Equipment comprises conductors (wires), insulators and mast structures, headspans and termination portals. Power System comprises substations (including transformers, switchgear and secondary systems), trackside autotransformers, and motorised isolators.
Maintenance	Inspection and maintenance is regularly performed on the electrical substation and overhead line assets to manage the risk of failure. • **Preventive Overhead Maintenance** - inspections of overhead equipment, performance servicing and where necessary spot replacement of early failure or damaged components. This includes inspections of critical equipment such as section insulators, neutral sections, isolators, balance weights (position and condition) and other specialised equipment, and inspection for vegetation clearing around overhead. • **Corrective Overhead Maintenance** - is undertaken for all field equipment associated with overhead infrastructure to correct an identified fault and restore network availability. • **Preventive Traction Power System Maintenance** - involves the maintenance inspection, operation and performance servicing of all substation equipment. This includes transformers, switchgear, secondary systems, buildings and substation compounds and ancillary equipment such as fault locators. • **Corrective Traction Power System Maintenance** - is undertaken for all power systems equipment to correct any identified faults and restore network availability. Maintenance for this product covers the inspection, operation and performance servicing of all the power system equipment and substation equipment. This includes transformers, switchgear, secondary systems, buildings and substation compounds and ancillary equipment such as fault locators.
Asset Renewal	Primary Electrical system equipment are typically long-run assets with renewal intervals guided by the nominal asset service life and asset condition. The service life of Overhead Line can be reduced by environmental factors such as proximity to the coast. Examples of typical nominal service life for primary systems is: • Contact wire: 70 - 80 years • Section insulators & Neutral Sections: 10 - 20 years

	• Power Transformers and Autotransformers: 25 – 40 years • Switchgear – 40 years Secondary system assets typically have a shorter nominal service life than primary assets. Their renewal intervals are governed by this service life and other factors such as obsolescence of hardware. The replacement of legacy electro-mechanical protection relays with modern digital protection relays is an example of this. Examples of typical nominal service life for secondary systems is: • Protection relays: 15 years • DC supply systems: 15 years • Fault locators: 10 years
Typical Scope Requirements	Electrical assets renewals are typically a combination of Baseload Renewals and allocations for Reactive Renewals. Some Electrical assets renewals, such as traction substations, are considered Strategic renewals as these renewal plans require significant optioneering and result in multi-year investment plans. Some Traction Power Systems asset renewal is primarily driven by the age of the assets against their lifecycle. The renewal of other Traction assets including the Overhead Line and transformers is driven by a combination of age, environmental factors and tonnage.

11 Works End to End Application

In the identification, prioritisation, planning and execution of works, Aurizon Network applies a Works End to End (E2E) process. The E2E provides a structure for the works to be managed within a timeframe that leads to MRSB delivery. The E2E process is similarly used for capacity growth projects, third party works such as connections or system augmentations and wayleave work.

The E2E is separated into 5 elements as described by **Error! Reference source not found.**. This section provides detail on each of the elements and how they interface.

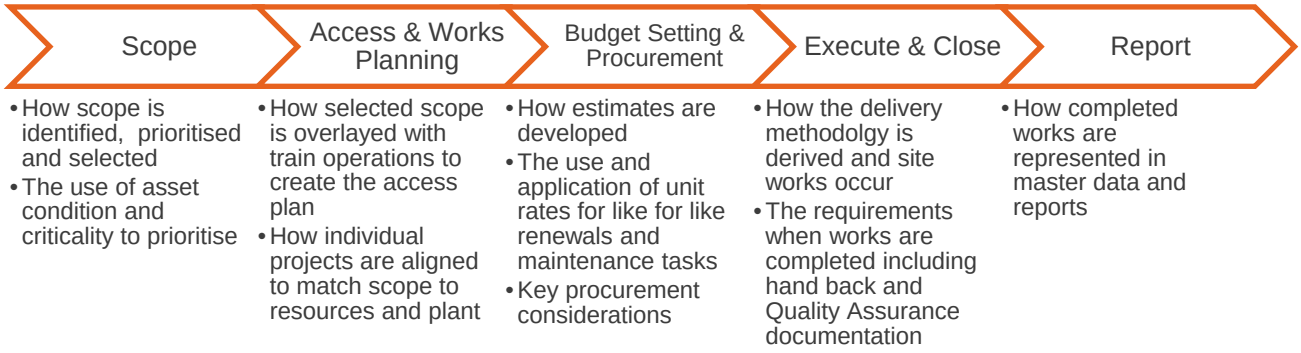


Figure 91 Works End to End Process

11.1 Scope

Aurizon Network's asset management lifecycle strategy is focused on inspecting and maintaining assets to prolong the useful life; and to monitoring assets to identify the commencement of the deterioration of the condition of the asset signified by increases in planned corrective and reactive maintenance. At this point, renewal is planned as the asset approaches end of service life.

The asset management process begins with understanding the life cycle model, failure mechanism and design life of the asset. Aurizon Network's assets can broadly be categorised into two asset life cycle models:

- Type 1 - Assets that gradually wear through use, e.g., rail, sleepers, contact wire and turnouts
- Type 2 - Assets which operate until a point where there is a marked increase in asset failures, e.g., electrical interlockings.

Aurizon Network monitors the asset condition through preventive maintenance inspections and historical failure trends to determine required planned corrective scope and requirements and timing of renewal intervention to ensure the supply chain objectives are met.

This section outlines the activities undertaken to:

- **Identify asset renewal scope**
- **Identify maintenance scope**
- **Recent improvements in the identification of both asset renewals and maintenance scope**

Asset Renewal Scope Identification

The scope of renewal activity in each Coal System is identified and prioritised through a process which takes into consideration supply chain requirements, asset condition, strategic principles, relevant standards, design processes, resource and access planning, detailed execution planning and delivery optimisation, the key steps are outlined in Figure 92.

Figure 92 Asset Renewal Scope Identification Process

Asset Condition

The identification process commences three years prior to the execution of the relevant MRSB, using the relevant combinations of data available based on inspections and maintenance and renewal history. For example, in this financial year (FY24) preliminary scope for FY27 will be identified, prioritised and confirmed for refinement.

Profile Smoothing

In the development of the strategies for each asset class, Aurizon Network has identified the extent to which the renewal profile, based on the age of the asset, will result in significant peaks in renewal activity over limited timeframes, that is a 'bow wave' of renewals. Where large scale renewal is forecast to be required in a limited number of years, Aurizon Network applies a strategic smoothing of these renewals to better manage the risk of failure as the asset approaches end of life and the significant access and resources that would be required. Examples of smoothed asset products include rail and autotransformers.

Scope Categorisation

To assist in comparing levels of scope year on year, identified scope is categorised in accordance with the relevant asset strategy for that asset product. Four scope categories have been defined in Table 72 .

Table 72 Definition of Scope Categories

Scope Category	Description	Examples		RIG Consideration
Baseload	Renewal scope expected year-on-year and consistent with scope provided, and endorsed in previous financial years	Rerail Track Renewal Structures	Ballast Cleaning UTC upgrades Power Systems	*This is scope that is generally repeated year on year following standard processes for scope identification.*
Future Scope	Scope proposed in FY24 that is preparation works for renewals to be completed in future years. This includes design works and procurement of long lead items	Turnout Design Structures Design Power Systems Design	Interlocking Design Level crossing design	*This is design effort required to get to issued for construction design for works that will be completed in a future year*

Scope Category	Description	Examples		RIG Consideration
Strategic Scope	Scope on projects that are not Baseload Scope, that is required renewals on a particular asset class due to the age profile of those assets or a change in safety requirement This is scope that is required to be completed due to asset condition or safety requirements. The "strategic" description refers to the decisions made with regards to timing of scope delivery (single year or over a number of years) or the methodology of delivery	Optic Fibre Renewal TETRA Radio, Short Span Bridge renewal	Autotransformer Renewals Traction Substation Renewal	*Aurizon Network will consult with the RIG for Strategic Scope Programs of material value*
Reactive Renewals	An allocation made to renew assets that experience accelerated condition degradation against the expected condition change. Also utilised to rectify assets that fail in operation	Formation Reactive Works Turnout Reactive Works	Level Crossing Reactive Works Fencing and Access Roads	*The railway is a dynamic environment where asset condition degradation can change. An allocation for addressing assets that have accelerated degradation is used to create a realistic estimate of costs*

Combined Risk Assessment (CRA)

To determine the priority of each asset renewal, the Combined Risk Assessment (**CRA**) framework is utilised.

The CRA is a methodology for assessing condition-based risk, used for Civil, Electrical and Control System renewal scope, and specifies the parameters, values, and conditions to be used.

The reporting framework for CRA comprises three components:

i. The **Condition** Index, in a continuous scale between 1 and 5, which is an evaluation of the Probability of Failure (**PoF**). This is described as the likelihood of condition-based failure per annum for individual assets

ii. The **Criticality** Index, in a continuous scale between 0.5 and 5, which is an evaluation of the Consequence of Failure (**CoF**). This is described as the consequence associated with condition-based failures for individual assets (i.e., the duration of interrupted operations caused by a failure, assuming no risk controls or maintenance interventions)

iii. The CRA Index, in a continuous scale of 0.5 – 25, represents the overall risk of condition-based failure. The risk of condition-based failure, associated with an individual asset, is the product of PoF and the CoF.

Condition

The definitions in Table 73 are guides and each asset group develops criteria-based condition scoring to access the condition as accurately as possible.

Table 73 Condition Rating Descriptions

Condition State	Subjective Rating	Description of Rating
1	**GOOD** (“as new”)	Free of defects with little or no deterioration evident.
2	**FAIR** (Preventive Maintenance)	Free of defects affecting performance, integrity and durability. Deterioration of a minor nature that is monitored via preventive maintenance activities.
3	**POOR** (Corrective Maintenance)	Defects that are beginning to affect the durability/serviceability, which may require monitoring and/or remedial action. Some components or elements show quantitative signs of advancing deterioration. Corrective Maintenance activities are normally required. There is an increased probability of asset failure due to condition.
4	**VERY POOR** (Action Required)	Significant defects affecting the performance and structural integrity of the asset are present. Such defects require immediate intervention including inspection or operational restrictions. Asset shows advanced deterioration and/or evidence that it is acting differently to its intended design mode or function. Very high likelihood of a failure of the assets primary function.
5	**FAILED** (Immediate Action Required)	The asset has failed or has impending failure to one or more primary functions. Asset integrity is severely compromised. The asset has reached the end of its useful life

The Future Condition Score is derived using similar age-based deterioration assumptions to those used in the determination of the Current Condition Score. It is derived by forecasting forward the Current Condition Score using a defined relationship, relevant to the asset (for example linear or exponential), for the assigned renewal date.

The Future Condition is the Condition Index which is used in the determination of the CRA for the purposes of the development of the MRSB.

Criticality

The criticality of an asset is represented by a Criticality Index using a continuous scale between 0.5 and 5. The criticality of an asset is determined by considering the location of the asset and its criticality to system operations (location criticality) and the magnitude of the consequence of failure at its location (performance impact)

Location criticality differs across each system and each track section within a system. As such, each track section is assigned a location criticality ranking. This ranking is a combination of parameters including system tonnes, traffic tasks and system capacity under restriction across each track section. Tonnes have the largest weighting in the calculation of location criticality.

Performance impact for each individual asset type is separately determined and uses Mean Down Time **(MDT)** to provide a 0.5 to 5 score for the Performance Impact Score, based on the number of historical incidences and how long the system is shut to train services, as outlined in Table 74

Table 74 Performance Impact Score

Performance Impact Score	Performance Impact (MDT)
0.5	No Downtime
1	< 12-hours
2	1 day
3	3 days
4	7 days
5	> 14 days

The Criticality Index is the result of factorisation between Performance Impact and the Location Criticality, in accordance with the following equation, rounded to one decimal place. The objective of the factorisation is to balance the prioritisation of asset location and the appetite of asset failure within the network.

$$Criticality\ Index = mround(5 \times \log10(Performance\ Impact\ Score + Location\ Criticality), 0.1).$$

CRA Index

- The CRA Index is calculated as the product of the future condition index and the criticality index
- CRA Index= Future Condition Score X Criticality Index
- CRA Index scores are plotted on a 5x5 matrix and can range from 1 to 25.

CRA Index provides guidance for prioritising asset renewals scope. However, there may be instances where the CRA Index score cannot take account of all relevant factors. To accommodate these situations the CRA Index can be adjusted by using a factor called the CRA Modifier. The CRA Modifier is always present and by default has the value of 1. If a CRA Modifier other than 1 is applied the application must be documented and approved by the discipline Asset Management Leader, including the reason for the CRA Modifier, the scope of its application and the timeframe/review period.

Table 75 CRA Score Matrix

Future Condition Score	Criticality Index				
	1	2	3	4	5
0.5	0.5	1	1.5	2	2.5
1.0	1	2	3	4	5
1.5	1.5	3	4.5	6	7.5
2.0	2	4	6	8	10
2.5	2.5	5	7.5	10	12.5
3.0	3	6	9	12	15
3.5	3.5	7	10.5	14	17.5
4.0	4	8	12	16	20
4.5	4.5	9	13.5	18	22.5
5.0	5	10	15	20	25

New assets and strategic renewals will be set with a CRA score of 100 so that they are easily distinguished from scope that does not include a modifier.

The Reactive Renewals allocations is assigned a CRA score of 25.

Maintenance Scope Identification

Aurizon Network's approach to maintenance uses qualitative and quantitative data to minimise unplanned response or intervention, the key steps are outlined in Figure 93**Error! Reference source not found.**.

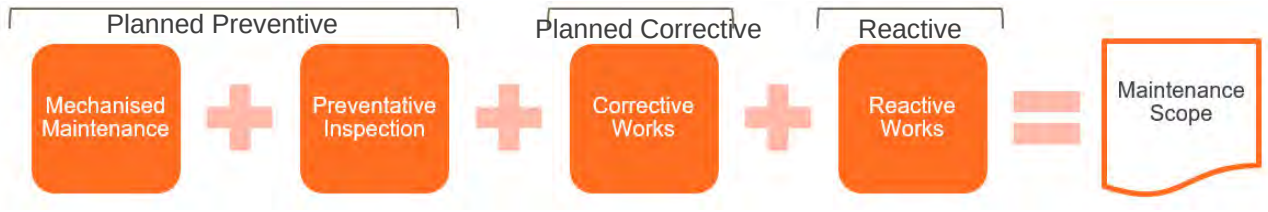


Figure 93 Maintenance Scope Identification Process

Preventive maintenance is conducted at the intervention levels specified in Maintenance Product Tables within Aurizon Network's AMRP, which are based on intervals of time, condition and usage (Appendix 3 provides further information on the triggers for intervention for maintenance activity). Due to their predictive nature, Aurizon Network seeks, wherever possible, to align the delivery of preventive maintenance activities with adjacent supply chain outages.

Preventive maintenance generally has a less intrusive impact on the supply chain, due to its planned and coordinated nature. Planned maintenance activities are packaged to maximise the amount of scope completed during planned closures in each location, which in turn can create access, delivery and cost efficiencies.

Not all activities can be planned. The forces exerted through the passage of rollingstock, and Queensland's weather will, on occasion, create the need for unplanned interventions, which include reactive maintenance or planned corrective maintenance. Depending on rectification timeframes, reactive and planned corrective maintenance may be able to be scheduled in between train services to minimise impact to train operations.

Aurizon Network prioritises reactive and planned corrective maintenance activities based on impact to immediate operations, taking into consideration tonnage, traffic purpose and longer-term capacity impact, which informs the rectification timeframe options as outlined in **Figure 94**

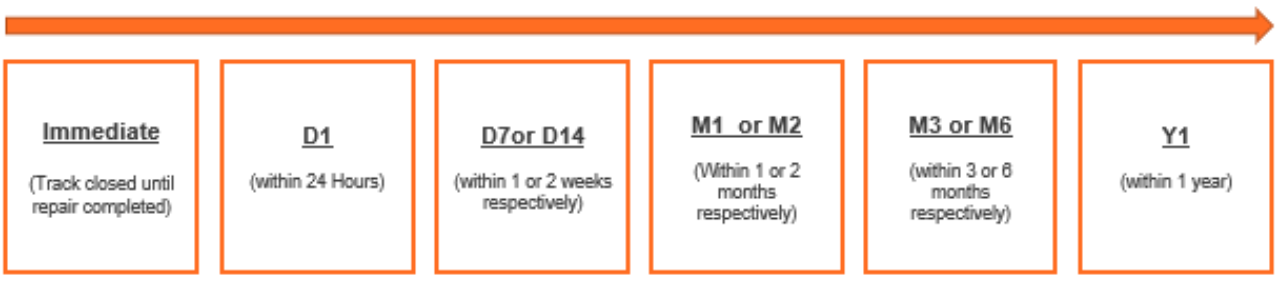


Figure 94 Timeframes Associated with Corrective Maintenance Activities

Table 76 outlines Aurizon Network's maintenance approach across each asset type.

Table 76 Maintenance approach

Maintenance Approach	Description	Applied to Assets	Maintenance Activity
Condition or Tonnage Based Intervention	Maintenance programmed to occur once a usage threshold is met. Maintenance can be programmed ahead of time due to forecast traffic movements.	Rail, turnouts and ballast.	**Rail grinding** – of both track and turnouts to return the rail profile to design and remove any minor faults **Resurfacing** – of both track and turnouts to maintain track to the design geometry and ensure track alignment
Planned Inspection and Service (**Preventive Maintenance**)	Periodic inspection of assets to understand condition and identify items that may cause a future fault. Period of inspection is known and can be planned.	Rail, sleepers, turnouts, ballast, formation, culverts and bridges	**Track geometry recording** – specialised track vehicles or ATIS, to measure geometric characteristics of track alignment **Ultrasonic rail testing** – non-destructive testing to identify internal rail defects **On track inspection** – road rail vehicle inspection of the rail corridor **Structures inspection** – inspection of critical elements of the structures to categorise defect type and quantify severity – ultimately providing an overall condition rating. **Ground Penetrating Radar** – specialised non-destructive testing employed to help understand and quantify ballast fouling severity. This data complements other contributory datasets (e.g., track geometry) to develop and determine ballast cleaning scope more accurately.
		Signals, interlockings, level crossing protection, optic fibre, standby power system, SCADA system, radio system	**Control Systems Inspection -** planned periodic inspection and minor servicing. Includes function testing, signal alignment testing, battery testing, cleaning and security check.
		Power systems and overhead line equipment	**Electrical Inspection** - planned periodic inspections and minor servicing. Includes condition testing, oil sampling and isolator testing.
Planned Corrective Maintenance [19]	Planned rectification of faults found from inspections or remote monitoring. Period to rectify is dependent on the severity of the fault or risk to operations.	Rail, sleepers, turnouts, ballast, formation, culverts and bridges	**Rail joint maintenance** – rail welding, rail plating and lifting and lining rail joints, squat removal **Maintenance Ballast** – small section ballast repair / replacement, removal of mud holes Sleeper cluster management – spot insertion of sleepers to repair damaged sleepers, sleeper testing, fastening repairs and sleeper respacing **Rail stress adjustment** – rail stress testing and adjustment to manage compression and expansion of the rail

[19] Most of the 'Planned Corrective Maintenance' effort is found in the general track maintenance and corrective signalling maintenance items. The nature of the works typically involves responding to faults identified by track inspection, specific asset inspection and rollingstock operators. Activity can be planned according to the severity and the time for fault remedy of the identified fault.

Maintenance Approach	Description	Applied to Assets	Maintenance Activity
			Top and line resurfacing – hand track tamping and small machinery tamping **Structures repairs** – minor concreting works, kerb repair, walkway repair, bridge drain cleaning **General earthworks maintenance** – embankments and cutting repair, drain cleaning and access road maintenance
		Signals, interlockings, level crossing protection, optic fibre, standby power system, SCADA system, radio system	**Control Systems** - maintenance and component repair.
		Power systems, overhead line equipment	**Electrical** - general maintenance and component repair
Reactive Maintenance	Immediate remedy of faults that have disrupted operation of the rail network	Rail, sleepers, turnouts, ballast, formation, culverts and bridges	**Rail repairs** – immediate repair of broken rails, failed welds or internal defects **Mud hole removal** – saturated fouled ballast sections dug out and repaired to maintain track alignment
		Signals, interlockings, level crossing protection, optic fibre, standby power system, SCADA system, radio system	**Communication failure response** – rectification of a brake in the telecommunication chain across the CQCN. This can be a fibre optic breakage, microwave radio fault or digital radio issue **Wayside equipment alarm response** – investigation as to the trigger of an alarm such as a dragging equipment detector or bearing acoustic detector Power failure response – rectification of mains power to signalling and wayside equipment. Solar and generator provide immediate power but for limited periods
		Power systems, overhead line equipment	**Dewirement repair** – infrastructure requiring replacement because of a dewirement **Trip investigation** – to understand the cause of electrical trips and to remedy fault ahead of re-energisation

General Maintenance and Renewal Scope Improvements

Table 77 identifies the improvements and changes made to scope identification since the FY24 MRSB.

Table 77 Maintenance and Renewal Scope Improvements

Category	Key Variation	Benefit Lever	Expected Benefits
ATIS	By FY25, ATIS project will be rolled into BAU. Frequent track and overhead geometry measurements for mainline are reported by ATIS from which geometry defects and condition are identified, resulting in maintenance and renewal scope	Performance /Reliability	Over time, geometry defects identified by ATIS will result in planned/preventive maintenance and renewal activities with a reduction in reactive break in maintenance causing cancellations and delays.
Event Threshold Reporting	Introduced trigger for Asset Management assessment of asset related below rail events that cause 4 or more cancelations or 3000 or more delay minutes. These events cause significant operational disturbance and are investigated to a greater level of detail than other asset failures.	Performance /Reliability	Deeper understanding of root cause of asset failures to better inform asset policy and recovery approaches to avoid or reduce future incidents and associated impacts. Learnings from individual events are applied through corrective actions and trending of events over time help identify focal areas for management attention.
Structures condition-based inspections	In FY24, the inspection frequency moved from time-based to condition based. FY25 will see the change to condition based frequency inspections being embedded.	Reliability	Inspection frequency is determined by condition. This will ensure resources are focusing inspection time on those assets that are deteriorating.
Cleaning ahead of Culvert Inspections	Culvert cleaning ahead of inspections is now embedded as a preventive activity rather than a corrective activity.	Safety/ Reliability	Three key benefits have been identified by moving away from a reactive approach: • Safer access to and from structures, allowing inspectors to confidently assess defects • Defect notifications likely to reduce and be more focused on true structural defects • Better condition data will be collected on the asset as more of the structure will be accessible and viewable.
Turnout Manual Grinding and Repair Cycles	Turnout Manual Grind and Repair Maintenance has been corrective with increase trend of reactive maintenance as turnout component's condition deteriorates. In FY25, a preventive program of manual grind and repair on a cycle will be embedded across all turnouts with additional sites being repaired to extend life.	Reliability	Undertake manual hand grinding of the turnout through the toe of switch and nose of the crossing and repairs on a frequency to manage rolling contact fatigue in line with the rest of the turnout. This preventive program will remove rolling contact fatigue and extend the life of the turnout.
Planned Turnout Manual Grind after new component is installed	Currently, grinding is not undertaken after turnout steelworks are installed. The current approach is to monitor until components fail and repair and replacement is required. Ad hoc grinding currently completed on severe defects to hold condition before full component replacement is undertaken. In FY25, the approach will change to include manual grinding of every steel	Performance /Reliability	Manual grinding will remove the outer surface and correct the profile, reducing surface cracking and improve the lifecycle of the steel components.

Category	Key Variation	Benefit Lever	Expected Benefits
	component replacement on a turnout. This will increase the unit cost of the component replacement.		
Single Trip Investigations	Stop investigations of single OHLE trip events. Linepersons now physically investigate for OHLE double trip events only or those areas that are considered high risk.	Safety/ Performance	Key benefits identified: • Reduced exposure to vehicle driving • Reduced unplanned call outs impacting planned work
IoT Devices	Embed the process of managing the installed remote temperature devices that can autonomously report ambient temperatures to each of the districts. In FY25, spares will be purchased to be available to replace devices not working.	Safety/ Reliability	Management of heat restrictions in CQCN requires significant resources to measure, and specific equipment to measure and impose accurate (section specific) restrictions. This leads to conservative restrictions being placed to cover potential worst-case scenarios (e.g. blanket restrictions). Installation of remote temperature devices allows the more accurate condition-based application of speed restrictions.
Network OT Cyber Security	As part of the Cyber Security Transformation Program, an architectural model has been implemented that identifies separate zones for Information and Operational technology systems. Information technology covers the processing, creation, storage and exchange of data and information. Operational Technology is used to monitor and control systems used in production or the operations of the business. The critical OT owned by Aurizon Network includes the rail signalling equipment, electrical traction equipment, and the communications equipment. The architecture design for the Cyber Security Transformation Program was initiated in FY22/23, and the IT/OT interface layer was implemented during FY24. Progressively the OT systems will be migrated to the new cyber managed environment in FY25.	Safety/ Reliability	The Cyber Security Transformation program will improve vulnerability management by designing and testing cyber incident preparedness. The objective is to understand and minimise the risk of malicious cyber attacks designed to disrupt or halt train services. The new zonal architectural model will support active monitoring of activity between the various IT and OT zones.
Early Fault Detection	Installed a pilot/trial of the “Early Fault Detection” **(EFD)** system which the vendor claims will easily detect and locate the position of conductor stranding and other defects. If the trial is successful then a wider rollout of the EFD system will be scoped.	Safety/ Reliability	Reduction in dewirements due to conductor stranding. Early detection of conductor stranding will allow repairs to be made and avoidance of a dewirement.

Category	Key Variation	Benefit Lever	Expected Benefits
	Decision to be made in FY24 of whether to proceed in FY25.		
Rail Stress Visualisation	Visualised restressing data available in SAP and Aurizon Webmap	Reliability/ Performance	High risk track assets can be managed effectively in the hot and cold periods, particularly with regard to track buckling and general track stability Informs scope and allow the targeting of areas requiring inspections to assess condition. Other Non-tangible benefits include better planning techniques, more knowledge of the effectiveness of the plan and required maintenance works.

11.2 Access & Works Planning

Once the scope has been identified and prioritised for Maintenance and Renewals, access and works planning is undertaken. In this phase of the E2E process, asset activities are subject to a progressively detailed review to align all the required scope and develop high level possession, resourcing and work execution plans. The process considers the requirements of customers and other Supply Chain Participants.

The process is iterative and may result in scope shifting between closures in the year or between financial years, driven primarily by the assessment of likelihood of change or delivery risk based on information known at the time.

This section outlines the key elements of access and works planning as depicted in Figure 95**Error! Reference source not found.** includes improvements captured in the development of the FY25 MRSB.

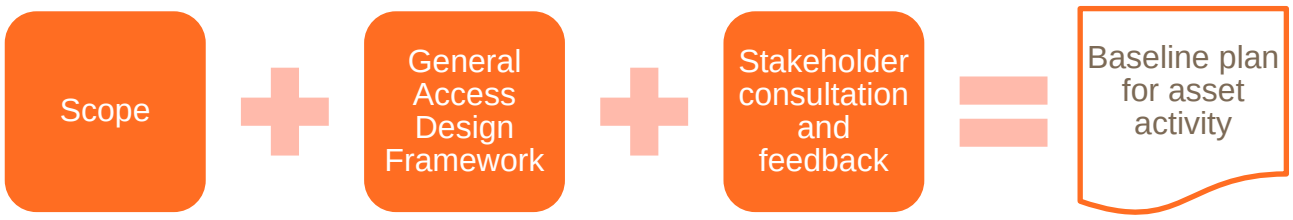


Figure 95 Overview of Access Planning Process

Access Design Framework

A key part of meeting the Guiding Principle outlined in 9.1 to minimise the impact of asset activity is the Access Design Framework. and engagement and consultation with stakeholders to deliver an access plan that aligns maintenance and renewal activities, as much as possible, with customer and supply chain stakeholder plans.

Possession planning is typically undertaken based on the scope identified and the resulting level of customer impact. Aurizon Network assesses each element of scope and attempts to deliver it in such a way as to minimise the overall impact to all customers.

Key assumptions of the design framework are outlined in Table 78

Table 78 Assumptions of the Access Design Framework

Description	Realised benefits
Avoid June and December	Customers require these months to be kept free from major maintenance activities to allow for maximum railings for end of financial year and end of calendar year targets.
Strategic closure sequencing	Allowing adequate timing between corridor integrated closures, offsetting with other closures and alignment with the Queensland Rail network (NCL) closures provides for railing opportunities and gives people and plant time to move between corridors.
Alignment of major supply chain interfacing infrastructure outages (Port unloading closures, Train Loadout closures) with high impact Network activity and/or locations	Active engagement with customers and unloading facilities on their interfacing infrastructure maintenance outage plans to look for opportunities to coordinate Network maintenance activities, reducing customer impacts and maximising throughput for the supply chain.
Export terminals with overlapping major unloading/dump station	Early engagement with ports allows Aurizon Network to facilitate collaborative sessions to understand their requirements, align closures and identify opportunities to minimise supply chain disruption where possible.
Separation of major works across weeks/months	Separating works over the period allows the supply chain opportunity to recover in a stable way across the year, assists in delivery of monthly contractual obligations and the management of internal and external resources.
High impact Ballast Undercutting planned inside Integrated Closures where possible	Given the access required to deliver ballast undercutting, access planning targets high impact locations to be executed in integrated closures, with residual scope targeted for delivery in alignment with major supply chain outages where possible.
Planning and levelling of work to best manage scope delivery risk	Consideration is given to the periods of known low resource availability, rosters and periods of high weather risk to the delivery of the program.
Consideration of critical support staff	With detailed consideration of critical support required including protection officers and electrical staff, works have been planned to ensure they are executable, having the resources required to deliver.
Resurfacing Plant Shutdown adjustments	Adjustments are made to resurfacing plant shutdowns to maximise plant availability inside Integrated Closures
Maintaining availability for cross-system producers	During Integrated Closures where there are cross-system customers, access planning looks to maintain an opportunity for railings and where possible, minimal disruption in the opposing corridor

Works Planning Considerations

During the development of the Access Plan, high level factors impacting the planning of work that drive the duration of access are considered, including preparation, mobilisation, works duration, demobilisation and delivery risk.

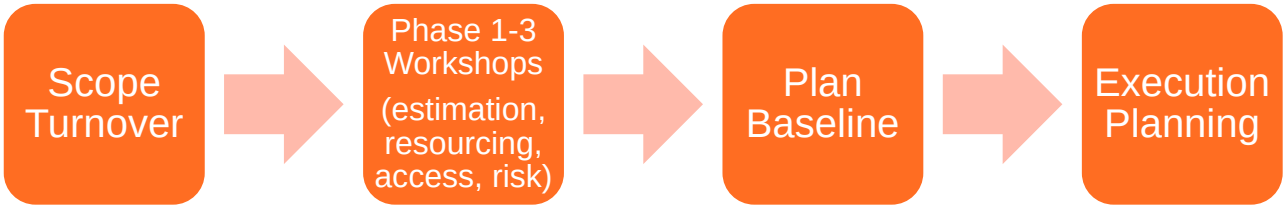


Figure 96 Overview of Works Planning

In developing the plan, Aurizon Network reviews each major renewal activity and the asset works program as a whole. The matters considered are listed in **Table 79**. Further detail on execution of works and possession types is included in section Works Execution & Close.

Table 79 Works planning considerations

Matter for consideration	Description
Can work be packaged together (integrated)?	For example, ballast cleaning, rerail and overhead work all occurring within the same vicinity would be undertaken as one block of work utilising the same possession, track protection and electrical isolation.
Can the work be undertaken during an integrated possession?	Generally, work activities are planned during integrated possessions to the limit of available resources (people, machines and equipment and/or available contractors) and reducing the impact to customers by minimising the footprints where possible.
Can the work be undertaken on a single line allowing trains to run on the adjacent track?	If the worksite is on duplicated track, a single line closure can be taken which would allow trains services to continue to operate on the adjacent track.
Does the work need to be undertaken during daylight or under specific weather conditions?	For example, welding is influenced by track temperatures so is planned to occur early morning or early evening, particularly in the warmer months. Other activities are also limited to daylight hours for either safety or visibility reasons.
Does the activity require specialised skills not within the Aurizon Network workforce?	External contractors may be engaged to supplement the Aurizon Network workforce where there are capacity constraints, equipment constraints or specific skills required. For example, the bridge bearing replacement program will be delivered by specialist bridge contractors that have the specific skills and equipment required to undertake the tasks.
Does the activity require long lead-time items?	Some inventory has greater than 6-month lead time for delivery. Activities that have inventory risk, start prior to the MRSB being approved. This increases the risk of having stranded inventory if projects are not approved or are delayed into future years.
Are we maintaining a consistent roster pattern?	Operational teams have communicated the need for a consistent roster pattern. During the planning phase, the closure regime and single line activities were planned into a consistent roster pattern.
Are seasonal conditions considered?	Larger closures are generally planned in the dryer / cooler months.
Is the work activity fixed, flexible or can be undertaken between trains in the day of operations?	All work activities are categorised into one of three categories with appropriate planning horizons applied. 1. Fixed: work activities that require large teams, involve major plant and equipment or require pre-delivered materials. This work is deemed fixed and is planned up to 12 months in advance. 2. Flexible: work activities that are flexible and could occur on different days of the week (with some notice). These activities are moved to minimise impact to train services.

Matter for consideration	Description
	3. Between trains or 'plan through': work activities that are short in duration (e.g., inspections), don't involve breaking the track and could occur between trains in the day of operations.

Customer Consultation and Feedback

Aurizon Network's decision making during the access planning process is informed by feedback received from customers through planned and/or informal engagements.

The publication of the CQCN – Asset Activities Power BI report provides transparency around the detail of the relevant years renewal plan and subsequently informs the Capability Train Plan. The CQCN – Asset Activities Power BI report is the output from the Access strategy and planning processes.

To facilitate customer engagement as the plan is being developed, Aurizon Network has developed a three-phase access planning process (outlined in Table **80**). This represents the evolution and maturity of the access plan leading to the submission of the Final Draft Proposal each year.

Table 80 Key elements of access planning process

Maturity of planning lifecycle		Maturity of Plan	Action to Progress Plan
Aurizon Network shares 1st draft of possible closure requirements for consultation			
Phase 1	Project Location (First draft CQCN Integrated Closure Plan)	Output of the Scope Priority Model shows the type and location of work required. This is used to determine an indication of required time on track and the level of impact to customers.	Early engagement with QR and the Ports to work through any misalignment issues on integrated closures across the supply chain. Discussions with producers on demand projections over the year to determine high demand/low demand months. **Output: Draft CQCN Integrated Closure Plan highlighting critical path scope and locations.**
Customers provide feedback as part of consultation process on proposed CQCN Integrated Closure Plan.			
Phase 2	Project Scope (Second draft CQCN Integrated Closure Plan)	Includes customer feedback from Phase 1 and what we need to consider as part of Phase 2. A high-level project scope design informed by engineers and site walkouts, provides a clearer picture of the scope requirement and site-specific issues.	Incorporate customer feedback in development of plan and provide updates on relevant considerations or changes. **Output: Draft CQCN Integrated Closure Plan highlighting changes from Phase 1 and Integrated Branch line Closures and Draft Power BI CQCN Asset Activities Report.**
Customers provide feedback as part of consultation process on Customer specific issues.			
Phase 3	Project Delivery (Maintenance Strategy and Budget, Renewals Strategy and Budget and CQCN Asset Activities Report)	A detailed design, delivery method and procurement methodology for some asset activities with maturity continuing to increase closer to execution. The customers have provided feedback on the access plan, to inform the Draft Proposal.	**Output: Draft Proposal and related Power BI CQCN Asset Activities Report (representing the CAAC)**

Likelihood of Change

Aurizon Network notes that the development of the MRSB is an iterative process. Rail Infrastructure in each Coal System is exposed to extreme forces through the passage of rollingstock, climatic extremes, and localised geological and hydrological conditions. It is expected that asset condition will change over time and therefore, scope, cost and access will need to be amended in line with those changes.

Scope identified for inclusion in the MRSB in March each year, may not be executed for another 15 to 27 months. Leading into the Final Draft Proposal there are three key milestones to identify the likelihood of change for each scope item as depicted in the graph below:

- When the scope is handed over to the Access and Works Planning teams for the development of the draft integrated closure footprint. A key impact to scope at this point is the extent to which detailed designs have been completed and the impact design work may have on the delivery method. For example, the initial design assumptions for a structure renewal may indicate that 4 cells of a culvert need to be renewed. The detailed design for the specific culvert may indicate that the renewal of 5 cells is required.
- After the site walkouts, pre-digs and constructability review are undertaken to refine the scope.
    - Site walkouts may identify access issues/opportunities specific to the worksite. For example, the condition of access roads may be poor and require an upgrade to accommodate materials being transported to site. Alternatively, Aurizon Network may need to reach an agreement with private landowners prior to the works being completed.
    - Pre-digs and hydrology assessments are undertaken to understand the sub grade (soil) and hydrology factors. A variation in the expected sub grade and soil conditions compared with design assumptions may impact site access and construction methodology assumptions.
    - Assumptions relating to the construction methodology and works plan may require amendment. For example, a turnout can be built within the track, or it could be built alongside the track and then lifted into place via cranes. Differences in construction methodology can impact resource requirements.
- As part of the assessment of deliverability, that is the level of confidence in the ability to deliver the plan.

Following the Final Draft Proposal, the likelihood of change continues to be managed leading into execution of the plan.

Figure 97 FY25 Likelihood of Change Timeline

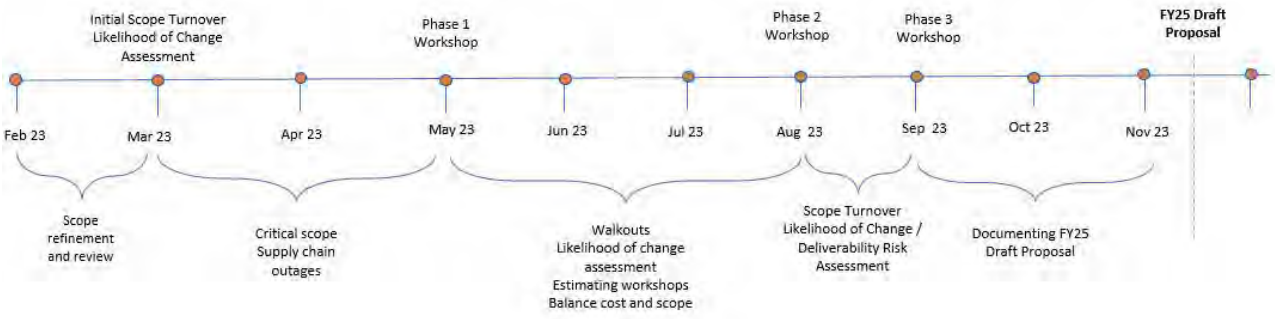


Figure 98 FY25 Likelihood of Change Timeline

Likelihood of Change Categories

Aurizon Network uses three main categories when assessing the likelihood of change of each scope item, cost, scope and time or duration.

Table 81 describes these categories, the items assessed and the indicative thresholds that characterise the likelihood of change as either low, moderate or high. While there are some common factors that can impact cost, scope and time, the likelihood of change may be different for each category dependent on the controls in place. In each MRSB, Aurizon Network will identify the relevant controls in place to mitigate the scope items assessed as a high likelihood of change.

Table 81 Likelihood of Change Categorisation

Likelihood Category	Description	Low	Moderate	High
Cost	Cost changes against estimates provided in MRSB • Increase / decrease due to change in contractor costs on engagement • Increase / decrease due to procurement of materials.	+/- 10%	+/- 25%	+/- 50%
Scope	Change of scope location or size against proposed MRSB • Size of scope or distance of works at specific location changes. For example, a Bridge Rollout site distance is extended to take in beyond the bridge ends to clean the ballast not accessible by the BCM Location change – an asset considered for renewal in a future year is brought forward as it has degraded at an accelerated rate.	+/- 10%	+/- 25%	+/- 50%
Duration & Time	Change to the track access time and delivery year as proposed in the MRSB. • Effect of scope change on required time to complete additional task and/or what year it can be delivered in • Whether the scope can be completed within the allocated closure time	+/- 10%	+/- 25%	+/- 50%

To develop the FY25 Program, an additional level of deliverability review was added to the final round of Likelihood of Change reviews post planning assessments (Phase 2 workshop). These additional deliverability factors draw on learnings from previous programs where deliverability was impacted for example due to limited availability of specialist vendors or difficulty accessing site due to adjacent landholders. Controls have been identified for these common factors and will be implemented. The 10 deliverability factors are included in **Table 82**. Scope items that present residual high likelihood of change, or where controls are yet to be implemented, are identified in the system summaries in Part A.

Table 82 Likelihood of Change and Deliverability Risk – Items Assessed

Impacts to Scope Delivery	Controls Implemented
Limited external availability / capability to perform scope (Specialist Vendor)	• Onboarding of new and alternate supply vendors • Contracting Vendors with options for future works based on indicative rate schedules • Detailed resource scheduling / leveling developed in detailed during long-term planning
Limited specialists internal support availability	• Investigating engagement of increased external support

Impacts to Scope Delivery	Controls Implemented
	• Detailed resource scheduling developed during long-term planning. • Attraction and Retention initiative being implemented
Works limited to specific closure footprint	• Detailed design available during long-term planning to limit scope creep and impacting closure footprint
Scope additions as greater design maturity / definition is reached	• Earlier design activities to increase certainty of long-term planning activities
Site specific ballast Characteristics	• Site specific management plans will be developed to manage identified risks e.g. unknown clay soil quantity
Environmental approvals	• Complete desktop analysis using Government & Internal database Mapping
Cultural heritage approvals	• Complete desktop analysis using Government & Internal database Mapping • Preferred Vendor in place to perform more detailed investigations depending on the outcome of the desktop analysis
Neighbouring land property approvals to access	• Early identification of requirement
Approvals from other authorities required to complete adjacent works	• Early Vendor engagement for constructability input
External resourcing availability reduces due to other construction activities	• Procure Materials and free issue to contractors from point of manufacture (e.g., precast concrete items)
Increasing durations on long lead material / equipment	• Obtain early design and Bill of Quantities **(BOQ)** establishment

Table 83 Program level considerations for areas of change (not scope specific)

Program	Risks and Controls
Resourcing	**Risk:** Resource availability across public holidays **Control:** High risk periods (Easter, School Holidays) have been avoided in Integrated Closures where possible **Risk:** Contractor labour retention for closures **Control:** Early procurement processes to secure resources, onboarding of new and alternate supply vendors **Risk:** Insufficient resourcing or specific skillsets to complete planned scope **Control:** Detailed schedules developed to identify specific resource requirement **Control:** Electrical Inspectors and Apprentice programs for key Mechanised productions and Electrical trades **Control:** additional FTE for Protection Officers and Rail Infrastructure Workers (RIW) have been included to support execution of higher levels of corrective maintenance activity requirements **Control:** level of contract labour hire has been maintained to support electrical trade apprentices and the delivery of planned MRSB activities

	Control: Retention payment for qualified Electrical trade staff in critical roles, Western depot location payment **Control:** Additional attraction and retention benefits for critical roles and locations
Closure	**Risk:** Risk events highlighted above materialise in Integrated Closures causing over runs or scope deferral **Control:** Those stated above and dedicated Integrated Closure management teams **Risk:** Deliverability risk due to wet weather **Control:** Contingency closure in April 2024 for Blackwater system **Control:** Single line maintenance activities have also been planned throughout the year

Variation Management

Program change is managed through a structured Change Management process and approved under a tiered review system. Figure 99**Error! Reference source not found.** outlines the agreed engagement for escalation to the RIG Representative Group in relation to variation. Options for change are assessed for impact to scope, access and cost.

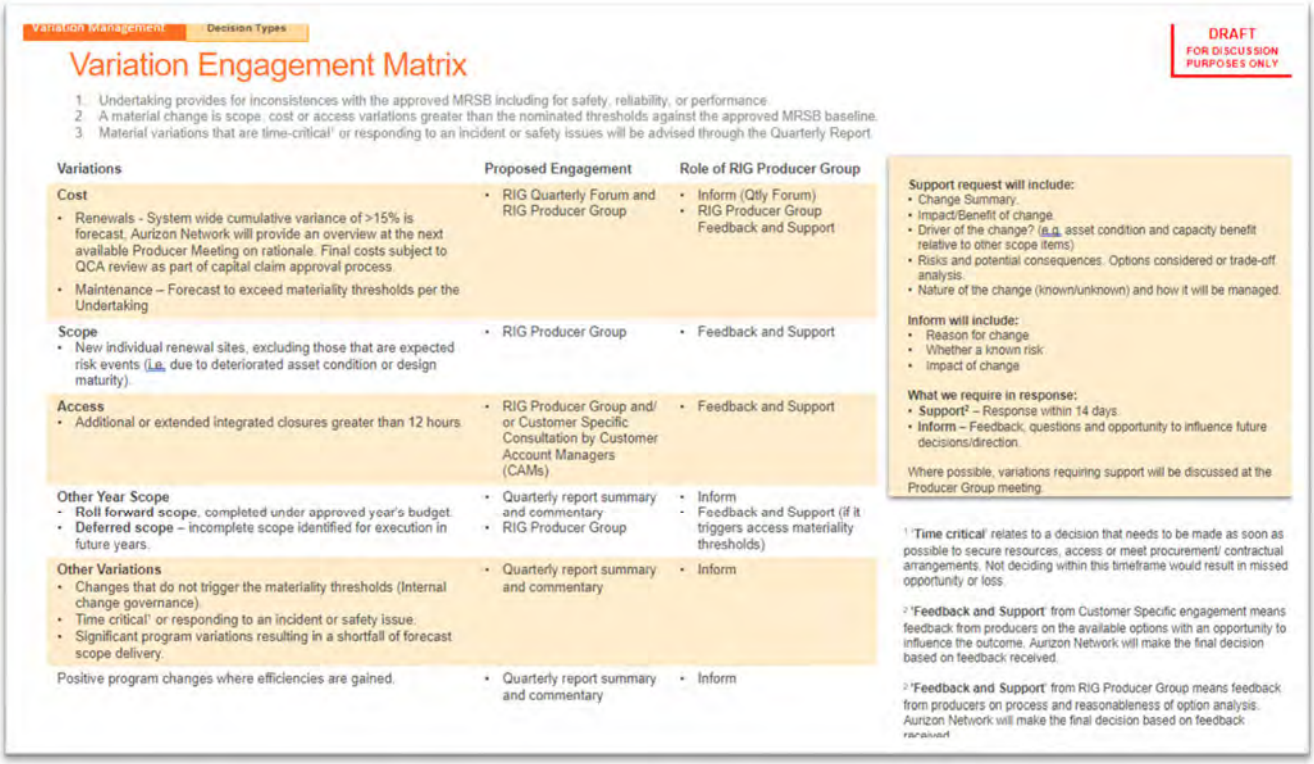


Figure 99 Variation Escalation as agreed with RIG Representative Group

Risk controls to maintain Train Service operability.

Aurizon Network may implement operational controls as a means of managing the risk of asset failure in each Coal System. Aurizon Network applies these temporary measures as a means of allowing continued Train Service operability in the period between the fault being identified through to Asset Activity to rectify the fault. The five types of controls are outlined in Table 84.

Table 84 Operational risk controls which may allow continued train operation

Control	Description
Inspection Frequency	Aurizon Network completes additional targeted maintenance inspections to monitor the rate of degradation of the defect. The intent of this approach is to ensure that the defect does not result in asset failure ahead of the planned date of intervention.
Engineering Inspections	Aurizon Network utilises internal engineering capability to perform inspections, modelling and testing to understand the root cause and rectifications for complex defects.
Temporary Speed Restriction (**TSR**)	Track defects that are identified via inspections will be assessed as requiring either immediate rectification or the assets can be managed via a TSR until their rectification can be scheduled within a planned outage. Train speed is lowered during the period from fault identification to planned corrective action. This in turn, will reduce the risk of derailment or incident and the impact of dynamic forces caused by the passage of rollingstock. TSR's are also applied to manage risk of incident resulting from the environmental effects of heat or wet weather.
Alternative Authority	A manual process used to authorise train movement where a Control Systems asset has failed, and a normal movement authority (signal) cannot be provided. While this process cannot maintain the throughput of a fully functioning system due to additional procedures necessary to ensure safety, it does mitigate the impact of a failure. This is the signalling equivalent of a TSR.
Temporary Authorised Non-Conformance (**TANC**)	A TANC is applied if an asset is operating outside its minimum operational requirements or function (often contemplated within a Standard). An engineering and safety risk assessment is undertaken to determine the appropriate controls required to safely manage these assets until the point that they can be rectified. Track speed may also be reduced, and the typical risk treatment is increased inspection to monitor asset performance. A TANC is only raised in exceptional circumstances for defects that cannot be actioned within the required timeframe. The TANC form is completed by the inspecting officer detailing the defect and control measures to mitigate the defect until repairs can be undertaken. The actions required for closure of the TANC are also detailed. The maintenance superintendent then ratifies the TANC to provide assurance that the details are correct and that the resources are available to implement the required controls for mitigation of the defect until rectified. Once completed, the qualified engineer will review the proposal and ensure that the controls are robust and do not import unnecessary risk to the operation. The TANC is then able to be approved by the asset manager. Not all TANC's will require a TSR to be imposed. An assessment will be made based on the nature and location of the defect. Where a TANC does require a TSR, the impact is incorporated within Aurizon Network's TSR reporting. The number and status of TANC's are monitored internally by Aurizon Network.
Temporary Track Closure	If a fault has been identified on a section of track, it may be isolated by temporarily removing that section from service, and operating train services on alternate tracks around the fault. This is achieved by putting a coded block in the train control system to remove the ability to route a train into the affected area

Access Planning and Works Planning Improvements

Table 85 identifies the improvements and changes made to the Access & Work Planning element since the FY24 MRSB.

Table 85 Access Planning and Works Planning Improvements

Category	Key Variation to FY24	Benefit Lever	Expected Benefits
Works Planning for Electrical	OHLE windows and integration to support critical electrical maintenance and de-risk closures (data)	PerformanceReliability	Increased ability of critical planned electrical work and maintenance to be completed providing short-and long-term electrical reliability improvement.
Planning Maintenance Windows	Adjustments made to the way in which non-renewal maintenance allowances are made in the plan which will provide more flexibility in terms of maintenance placement and timing	Performance	More flexibility to be provided in the placement of non-renewals maintenance to allow better overall supply chain alignment and options to accommodate expected demand.
	Proposed trial of 'contingency closures' to manage unplanned events resulting in missed critical scope	Performance	Critical missed scope able to be recovered in a planned and transparent manner in the year of approval
Inclusion of non-coal capacity	Updates and refinements made to non-coal traffic capacity impact assessments.	Performance	More accurate and robust capacity allocations for Coal traffic on the North Coast Line providing more accurate assessments of available coal capacity on any given day. It is expected this will increase in plan robustness and performance to plan
High Risk resourcing	Planning and sequencing closures away from high-risk resourcing periods to support performance to plan	Performance	Mitigating scope cancellation/deferral and or outage overrun by not planning work in periods of known high risk periods to secure required resources
Works Planning for Ballast Cleaning	Ballast Cleaning Pre-digs and Volumetric Planning Model	Performance	Minimise variation to plan in the year of execution. Increased accuracy of return rates and closure duration requirements. Reduce risk of not completing scope within planned closures.
Packaging of Pre-work and Ballast Transport (renewal)	Pre-work site inspections, minor road maintenance to delivery pad, preparation of stockpile pad, dust suppression, traffic management plan, packaging delivery of ballast	Cost Out	Reduction in costs (unable to estimate currently)
Resource Planning	Improved Resource Assessment and Resource Leveling prior to the Phase 2 Workshop to ensure external Rail Infrastructure Worker requirements are achievable	Performance	Improved utilisation of internal staff and reduced utilisation of external resources. Reduce risk of not completing scope within planned closures Improved confidence of permanent way product resourcing and delivery.
Execution stakeholder involvement in planning	Improved Involvement of Key Operational Staff and Leaders. Increased execution team involvement in plan development (safe working,	Performance	Increased accuracy of plan and understanding of individual site variations. Additional scope planned in the long-term space (e.g., maintenance closures).

Category	Key Variation to FY24	Benefit Lever	Expected Benefits
	resurfacing, Asset Managers, and operational representatives).		Improved development of assumptions and risks
Site-specific planning refinement	Improved site-specific information and resource alignment	Performance	Reduce scope lost and closure overrun due to insufficient site-specific information on community issues, access, asset and location variations. Improved understanding of key resource interactions and availability (e.g., resurfacing movements between worksites).
MRSB development timeline	Support Workshop added to planning milestones	Planning	Improved understanding of site specific electrical and control system requirements (key resource). Improved ability to resource level and high-risk closures and scope items.
MRSB development timeline	Excavator Undercutting Deliverability Workshop added to planning milestones	Performance	Increased confidence of delivering planned scope on time and within budget. Securing external resources earlier.
Ballast Packaging	Packaging of ballast purchases	Cost Out	Reduction in costs $0.4m to $0.6m
Structures Packaging of Works	Packaging of planned structures scope	Cost Out	Reduction in costs $0.5m to $0.7m
Civil Vendor Review	Packaging of various services provided for Civil works	Cost Out	Reduction in costs $0.3m to $0.5m

11.3 Budget Setting & Procurement

This section presents an overview of Aurizon Network's costing methodology for maintenance and renewal activities. It outlines the framework for setting the proposed budgets for each Coal System that are outlined in Part A of this FY25 Final Draft Proposal.

Aurizon Network confirms that it's methodology for allocating costs between operating expenses and maintenance / renewal activities is consistent with the QCA-approved approach under UT5. Furthermore, it should be noted that Aurizon Network's below rail regulatory financial statements are subject to an annual review by an external auditor appointed by the QCA. The scope of this review includes any such cost allocations.

Budget Development for Maintenance Activities

Overview

Aurizon Network's approach to setting the draft maintenance budget varies according to the nature of the asset activity categories that are required to be presented under UT5. While some activities, such as mechanised activities and preventive maintenance activities, are predictable and have a clearly defined scope, other activities are corrective (e.g., fix-on-fail) in nature which results in Aurizon Network utilising historical expenditure levels to inform annual budget forecasts.

Aurizon Network ensures clear separation between the costs attributable to asset activities in each Coal System. Any costs associated with asset renewals, asset activities on Third Party Private Infrastructure, asset activities on Non-Coal Infrastructure and Review Events (such as extreme weather events where losses exceed $1 million) are separately captured which enables Aurizon Network to exclude such costs in their entirety when forecasting the maintenance budgets for each Coal System.

Different methodologies are applied to determine the costs relevant to the various maintenance items. The appropriate method varies according to the individual maintenance activity. Due to the more routine nature of the major mechanised maintenance activities, these activities are budgeted at a more granular level than non-mechanised activities. Preventive maintenance activities are informed by the seeded asset maintenance plan.

Aurizon Network is continuing to pursue opportunities to enhance its SAP systems, data and processes to provide greater transparency of cost drivers and improve budgeting and forecasting process for future years.

The primary drivers of Aurizon Network's maintenance costs are discussed below. Additional information was provided in the FY25 Draft Maintenance Budget Presentation provided in October 2023.

Labour and Indirect Costs

Labour and indirect costs account for approximately half of Aurizon Network's maintenance costs.

Aurizon Network's maintenance and asset renewal program is executed primarily by Aurizon's Network Operations and Network Asset Management divisions in conjunction with externally procured resources.

An overview of Aurizon Network's operating structure together with the primary activities performed by each of the teams are summarised in Figure 100.

Figure 100 Aurizon Network Operating Structure

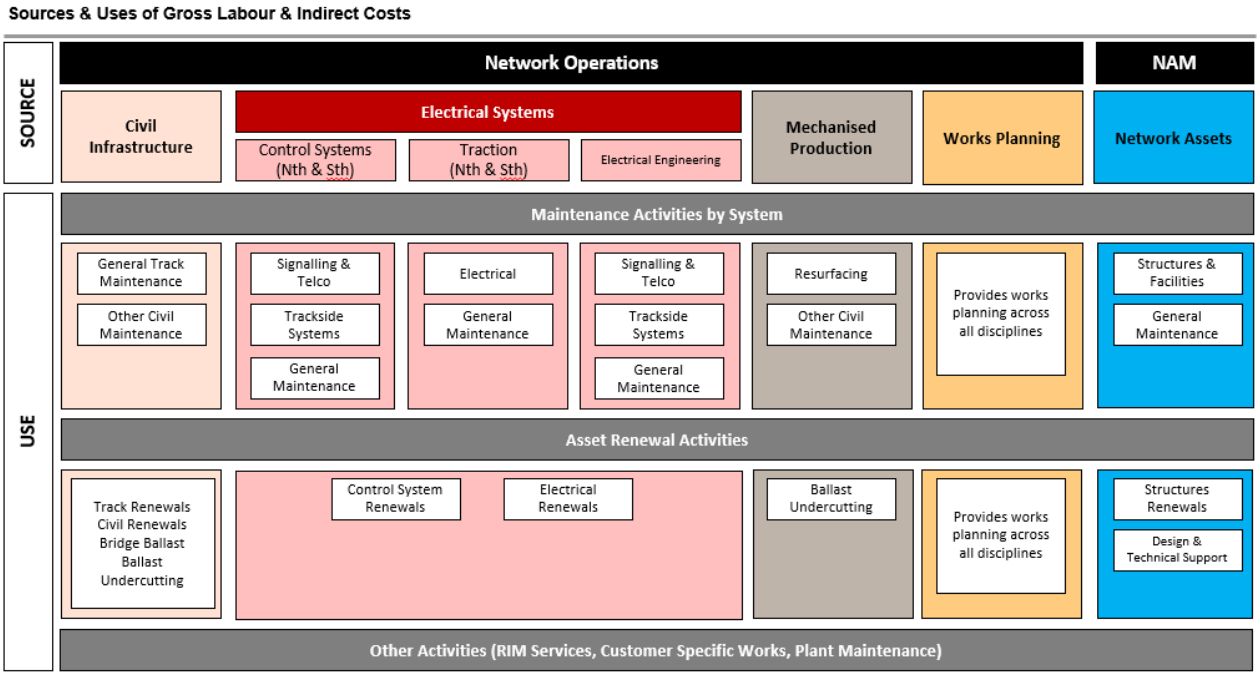


Figure 101 Aurizon Network Operating Structure

Aurizon Network's internal maintenance labour costs are relatively fixed over the short term. Indirect costs refer to minor consumables, materials and depreciation incurred to facilitate staff in the delivery of

maintenance and renewal activities within the depots (e.g., travel and accommodation, PPE, other minor depot costs). These costs represent ~15% of total labour and indirect costs and are escalated in line with forecast CPI.

The key drivers of Aurizon Network's labour costs together with an overview of the FY25 budget approach are summarised in Table 86.

Table 86 Labour Cost Drivers

Labour Cost Drivers	Description	Budget Approach
Workforce Size	The number of FTE's employed across Aurizon Network's operating disciplines (Civil Infrastructure, Electrical Systems, Mechanised Production, Works Planning, Network Asset Management, Structures)	• Draft budget sees an uplift in Civil, Mechanised Production and Electrical resourcing to address skill shortages and an ageing workforce • FTE levels assume a stable level of attrition during the period. To address future attrition and skills shortage risks, FTE levels include additional roles for Electrical Inspectors and Apprentice programs for key Mechanised Production and Electrical trades. Additional FTE for Protection Officers and Rail Infrastructure Workers (RIW) have been included to support execution of higher levels of corrective maintenance activity in FY24 and continuing through FY25. Additionally, a level of contract labour hire has been maintained to support electrical trade apprentices and the delivery of planned MRSB activities (~8 FTE by June 2025)
Gross Labour Costs	During FY24, Aurizon Network has introduced a number of attraction and retention initiatives for critical roles to mitigate future attrition, ageing workforce and skills shortage risks	• A provision for attraction and retention initiatives proposed to be implemented during FY24 and FY25 have been included in the labour budget including; Retention Payment to be paid to Electrical qualified trade staff in critical roles and locations. • Western Depot Location Payment, implemented in September 2023, is paid to all eligible staff who work in the Blackwater and Moranbah depots.
Gross Labour and Indirect Cost Escalation	Increase in Labour and Oncosts to account for Enterprise Agreement rate increases. Aurizon Network	• During FY23 & FY24, Network successfully renegotiated both the Staff Enterprise Agreement and the Infrastructure Enterprise Agreement, which covers the majority of the operational workforce. • For the Staff Enterprise Agreement, labour has been escalated at 3.3% including the SGC Superannuation Levy) • For the Infrastructure Enterprise agreement, labour has been escalated at

Labour Cost Drivers	Description	Budget Approach
		4.5% (Aurizon EA 4.00% plus legislated SGC Superannuation Levy: 0.5%) • The labour cost base for Electrical trade staff includes additional costs associated with Electrical workforce retention for critical roles and locations, heavily influenced by the limited pool of skilled resources and external market competition for these qualifications. During FY23, Aurizon Network faced a number of challenges in securing and retaining skilled electrical resources, driven by the high demand for these qualifications across the construction, mining and energy sectors. To mitigate further attraction and retention risks, Aurizon Network implemented a number of additional terms including: alignment of wage schedules to national qualification framework for all qualified trade staff; implementation of a shift count wage schedule; on call allowances to be paid in addition to annual salary; reimbursement of annual electrical licence costs; inclusion of progressed trainees and apprentices to shift count salary wage schedule. • Indirect costs escalated at 3.1% in line with RBA June 2025 CPI forecast at end of August 2023
Activity Mix (Maintenance, Capital / Other)	Proportion of time (and therefore cost) allocated to RIG maintenance, non-contract maintenance, asset renewal and other activity. Activity mix varies by team and sub-function.	• Activity mix by team is forecast to be broadly consistent with mix observed in prior periods. • Activity mix is influenced by the forecast levels of activities (maintenance/asset renewals/other) with variation mostly driven by changes in corrective maintenance or asset renewal requirements. • In FY25, Aurizon Network is forecasting an increase in maintenance activities for the Electrical discipline, driven by levels of preventive and corrective maintenance activities. • In FY25, the Moura system is expected to require a higher level of maintenance activity across both Civil and Electrical disciplines compared to prior years in response to the ageing infrastructure.

Labour Cost Drivers	Description	Budget Approach
Coal System Mix	Proportion of maintenance hours allocated to each Coal System (Blackwater, Goonyella, Moura, Newlands)	• Depots (or cost centre) costs generally flow to one or potentially two systems depending on location. The budget assumes that maintenance allocations by depot / team to each of the coal systems are broadly consistent with the mix seen in prior years. • The Moura system is forecast to increase slightly compared to prior years, influenced by the activity level required in response to the ageing infrastructure.
RIG Category Mix	There are 9 RIG maintenance categories. (General Track, Other Civil Maintenance, Structures and Facilities Maintenance, Signalling and Telecommunications, Trackside Systems, Electrical, Track Resurfacing, Rail Grinding).	• Activity by RIG category within each system is assumed to be broadly consistent with activity levels observed in prior years. Where there is a change in activity requirements, Aurizon Network will adjust forecast activity levels as required. In FY25, Aurizon Network is forecasting an increase in the activity levels for Signalling & Telecoms, General Track, Resurfacing, Structures and Facilities Maintenance and Rail Grinding.

Non-Labour Costs

Non-labour costs comprise externally procured contractor resources, materials and plant usage, consumables and rail grinding. A summary of the key non-labour cost categories as well as an overview of the FY25 budget approach are summarised Table 87.

Table 87 Non-Labour Cost Drivers

Non-Labour Costs	Description	Budget Approach
Externally Procured Resources	Costs associated with external contractors, hire charges and trade services. Aurizon Network supplements its own labour and plant resources with externally procured contractors where specialist skills / equipment is required, or where a large volume of activity is delivered concurrently. Most of the contractor activity is used to support activity in the General	• Budgeted cost of known contracts including escalation rates (e.g., ultrasonic rail testing contract, rail grinding) • Other contractor costs estimated having regard to historic spend and escalated at 3.7% in line with RBA June 2025 WPI forecast at end of August 2023 • FY25 assumes that the cessation of QR Track Geometry car occurs in December 2023. No costs have been included in FY25.

Non-Labour Costs	Description	Budget Approach
	Track, Other Civil and Structures and Facilities RIG maintenance categories.	
Materials and Plant Usage	The cost of materials (ballast, rail, sleepers etc) used in project operations either charged directly or consumed from inventories stores and pass-through costs for Aurizon Network owned major plant. All costs associated with major plant (e.g., operational and plant maintenance) are charged to jobs via a unit rate. The unit rate is used to allocate work between systems. Under and overs in the year of execution are apportioned on a ratio of work completed.	• Machine charges are based on a detailed build-up of plant costs • Other materials costs estimated having regard to historic spend and escalated at 3.1% in line with RBA June 2025 CPI forecast at end of August 2023 • In FY24, Aurizon Network has seen an increase in the price of ballast materials (~16%), predominantly driven by a change in the competitive market of quarries in Central Queensland, which has informed the base assumption of the FY25 program. FY25 costs escalated at 3.1% in line with RBA June 2025 CPI forecast at end of August 2023 • An increase in resurfacing costs in FY25 is driven by cyclical plant maintenance activities and an increase in plant maintenance labour driven by the inclusion of apprentices
Consumables	The cost of computer hardware and software, technology costs, safety equipment, consultant fees, minor tools and plant, travel and accommodation, external freight and waste disposal	• Budgeted cost of known contracts (e.g., Freight Services contract) • Other contractor costs estimated having regard to historic spend and escalated at 3.7% with RBA June 2025 WPI forecast at end of August 2023

Inflation

Aurizon Network acknowledges that the FY25 Final Draft Proposal is c.9% higher than the current FY24 Full Year Forecast. Aurizon Network notes, however, that in terms of cost performance over time, maintenance spend has generally been favourable when considered in the context of inflationary outcomes over time.

To illustrate this, Aurizon Network has assessed the compounding annual rate of growth (CAGR) in maintenance costs over the five-year period ending 30 June 2025 (i.e. FY20 to FY25) and compared that to inflationary outcomes for the same period (based on the cost indices considered by the QCA when constructing the Maintenance Cost Index **(MCI)** under the original form of UT5.

The relevant indices for each cost category are as follows:

Table 84 Summary of Relevant Indices

Cost Category	Index Reference
Accommodation	6427.0 Producer Price Indexes, Australia Series ID: A4406608F
CPI	6401.0 Consumer Price Index, Australia Series ID: A2325816R
Consumables	6427.0 Producer Price Indexes, Australia Series ID: A2305805K, A2305907X, A2307785X
Fuel	Australian Institute of Petroleum (AIP) https://aip.com.au/historical-ulp-and-diesel-tgp-data Series ID: AIP Diesel
Labour	6345.0 Wage Price Index, Australia Series ID: A2705076L, A2705060V, A2704548F

While Aurizon Network's maintenance costs have, on average, increased at a rate of 4.8% per annum, MCI outcomes have seen market price outcomes increase in the order of 5.6% per annum.

Aurizon Network considers FY20 to be an appropriate starting point for this comparison because;

- The organisational structure in FY20 is consistent with Aurizon Network's current operation; and
- The level of maintenance activity required in FY25 is generally expected to be equal to or greater than that of FY20.

The assessment over a 5-year period provides a comparable data point with the 5-year forward forecast (i.e. the FY25 MRSB plus four years) that must be provided as part of the MRSB process.

The key drivers of the expected increase in activity levels are described in Table 84 above and in the strategy and budget for each Coal System.

Non-Mechanised Activities

The budget for delivering non-mechanised maintenance activities has been developed with reference to the actual maintenance costs incurred during FY21, FY22 and FY23, planned preventive maintenance activities, as well as Aurizon Network's FY24 Forecast.

Preventive Maintenance Activities

Budget forecasts for controllable or preventive maintenance expenditure categories have been set having regard to seeded maintenance plans for each activity and the allocated resource costs associated to complete.

Corrective Maintenance Activities

Corrective maintenance activities tend to vary year-on-year and are reactive in nature, predominantly due to inclement weather and degradation of asset condition. Consequently, Aurizon Network has estimated the costs for corrective maintenance activities with reference to historical corrective activities completed in FY21, FY22, FY23 and forecast costs for FY24 (at the end of September 2023). Any additional corrective maintenance activity requirements identified during the planning process are assessed in accordance with 10.1.2 Maintenance Scope Identification and have been adjusted for in FY25. Additionally, actual work completed in FY25 will also be assessed in accordance with 10.1.2 Maintenance Scope Identification.

Mechanised Activities

The costing methodology for the Aurizon Network's mechanised maintenance activities is summarised in 0.

Table 88 Summary of costing methodology for mechanised maintenance activities

Maintenance Activity	Costing Methodology
Rail Grinding	Budget for the forecast scope of works required in each Coal System reflect the contractual arrangements with the external Service Provider.
Resurfacing	Forecast costs for the total resurfacing program with an allocation of cost between maintenance and capital activities.

Rail Grinding

The Rail Grinding costs include the costs paid to an external third party for provision of rail grinding services (currently Loram) as well as an allowance for the cost associated with the removal and re-installation of signalling and rail lubrication equipment from track before and after the rail grinding activity (predominantly labour and consumables). The budgeted cost of the rail grinding program in each Coal System is a function of the:

- Forecast mainline, turnout and level crossing grinding scope expected to be required in each Coal System
- Pricing in accordance with Rail Grinding Services Agreement.

As planning is based on when track sections will reach throughput threshold triggers, grinding activity may vary from year to year particularly in lower volume areas of the Network. Rail Grinding scope variation year on year is driven by anticipated grinding requirements and stable management of rail asset condition.

Resurfacing

Aurizon Network uses a fleet of four high production tampers and regulators and two Unimat tampers and regulators (collectively, the **Resurfacing Plant**) to deliver the resurfacing program of work required in each Coal System.

The Resurfacing Plant are not dedicated to any individual Coal System although individual plant items will predominantly work in one system to deliver maintenance activities and renewal activities outside of Integrated Closures.

Each consist (comprised of an MMA and MMB machine) may be used to either:

- Perform maintenance scope (i.e., mainline and turnout resurfacing and civil support); or
- Support asset renewal activities, where resurfacing is required after all track disturbing works to consolidate ballast and restore top and line, therefore forming part of the track renewal program.

This means that for day-to-day activities travel time is reduced but flexibility is retained to support delivery of major scope during Integrated Closures. Additionally, when planning travel to Integrated Closures, resurfacing work for any priority defects identified on route is also undertaken.

The flexibility afforded by this approach not only helps to reduce the supply chain impact of resurfacing activities but also helps to promote operational efficiency, by:

- Minimising the number of Train Paths consumed by Resurfacing Plant; and

- Maximising production time per labour shift.

It should be noted that the resurfacing cost base is materially fixed year-on-year and is informed by the planned maintenance activity plans.

Resurfacing budget forecast

To set a budget for the FY25 resurfacing work program, Aurizon Network has:

- Estimated a forecast budget for operational labour and plant costs having regard to actual costs incurred in FY21, FY22 and FY23 and forecast / budget costs in FY24; and
- Apportioned the labour and plant cost forecast budget between maintenance (mainline resurfacing, turnout resurfacing and civil support by Coal System) and renewals activities based on the defined and agreed activities planned for FY25.

The cost of resurfacing support for renewal works are incorporated within the track renewal program and are allocated to Coal Systems based on the location of planned scope for completion. Also, the resurfacing consist that primarily supports the ballast cleaning operation is included within the ballast cleaning program costs.

Budget development for renewal activities

Overview

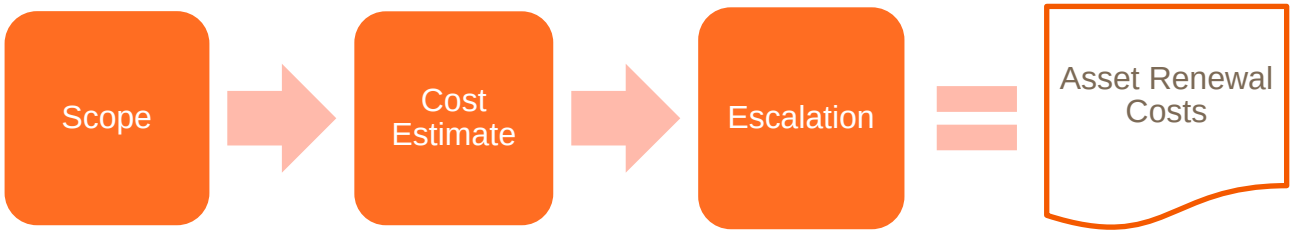


Figure 102 Renewal Budget Development Process

Aurizon Network's budgeting approach for high-volume renewal activities, such as Track, Rail and Sleepers, has typically relied on standardised rates. In order to provide more accurate estimates from a cost, access and resource perspective, Aurizon Network has adjusted this budget approach to be informed on historical costs incorporating provisions and estimates for any relevant site-specific variables. The average cost per scope item will be reflective of these variables.

Budgets for other renewal activities rely on a combination of standard rates, generally informed by historical performance and adjusted to reflect common site-specific variables.

Costing methodology for renewal activities

High Volume Asset Renewal Activity

Renewal activities such as track, rail and sleeper renewals are ongoing, annual programs of work that will generally see Aurizon Network undertaking a large volume of the same activity year-on-year.

These activities typically follow a standardised work methodology which includes:

- Standard designs (that are adapted where necessary to account for site specific conditions)
- A repeatable construction methodology at each work site.

Drivers of average cost variability in this asset category include, but are not limited to the following:

- Scope quantity per site
- Construction methodology – using plant such as the Track Laying Machine allows for a greater amount of scope to be completed within a shorter timeframe, however, will incur plant costs
- Geographical factors – accessibility, space to store materials and manoeuvre plant and proximity to other track infrastructure (level crossings, culverts, turnouts, signalling equipment.
- Ability to share resources such as signalling and electrical isolation support
- Weather impacts
- Available closure hours.

Aurizon Network developed cost estimates based on the historical level of activity required for each cost element. Adjustments have been made for known items that cause variability as described above, therefore there will be cost variability between individual worksite and may influence the average cost per activity. Meteorological factors/conditions on the day of execution, and days leading up to execution can further influence actual costs incurred.

Other Renewal Activity

Other renewal activities include Civil Assets (such as formation, structures and turnout renewals), Control Systems Assets and Electrical Assets. These activities generally have lower volumes of scope and require either a detailed, site-specific design, or the assembly of standard design elements appropriate for a specific site.

The budget for these asset renewal items is informed by the scope of work required to be delivered, guided by historical costs, site specific requirements and scheduling constraints. In addition to this, actual costs will also be a function of operational, geographical and meteorological factors and conditions.

Reactive Renewal Activity

Aurizon Network will, from time to time, experience asset failure in some renewal categories such as formation, ballast undercutting and turnouts. The failure or imminent failure of these assets will be identified as part of routine asset inspections and will result in a reactive replacement of the asset. Wet weather is the single biggest driver of reactive renewal work.

Given the difficulties associated with accurately forecasting the occurrence of asset failure, Aurizon Network has made provision for ‘reactive’ works within the forecast budget for formation, ballast cleaning, turnout, level crossing, electrical overhead corridor asset renewals. These amounts are broadly based on historical average spend on reactive activities in each individual Coal System.

Mainline Ballast Cleaning

Mainline ballast cleaning is made up of three specific items being the Ballast Cleaning Machine (BCM), excavator undercutting and turnout undercutting.

Mainline ballast cleaning costs have been built up by BCM with total forecast costs allocated to systems based on forecast scope that is planned for completion each financial year. Key assumptions underpinning the cost build up are summarised below.

Budgeted costs for excavator undercutting and turnout undercutting have been informed by a combination of the contractor schedule of rates, where packaged works have been executed and historical costs for other support activities as required. It will also consider site specific operational requirements, including safeworking support, where required.

A summary of the approach to developing the FY24 budget is outlined in Figure 103.

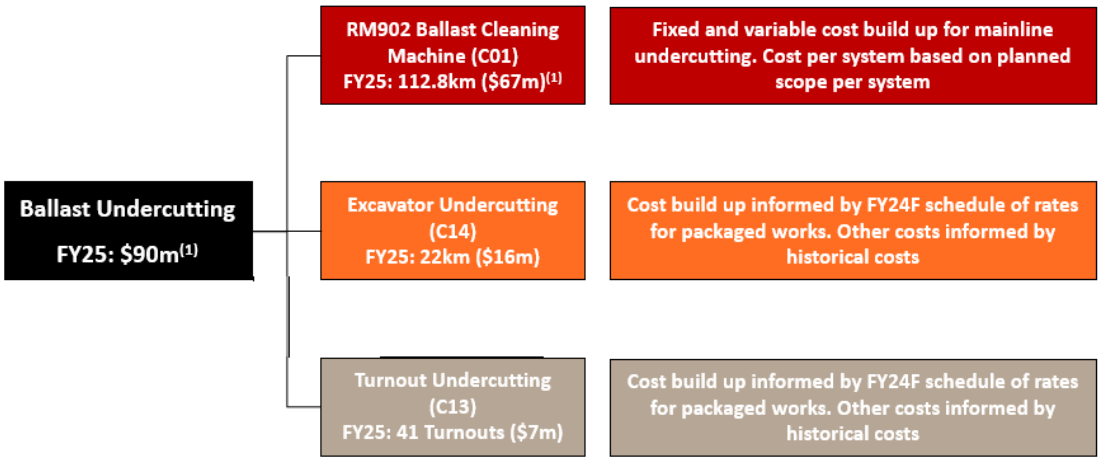


Figure 103 Approach to forecasting the budget for Ballast Cleaning

Mainline Ballast Cleaning Cost Build Up

Mainline ballast cleaning costs have been built up by BCM. Total forecast cost (excluding Ballast Undercutting plant depreciation) associated with the operation of the BCM have been allocated to each Coal System based on forecast scope that is planned for completion each financial year. Ballast undercutting plant depreciation has been allocated to systems based on the number of days that the BCM is planned for operation in each system.

Costs associated with the ballast cleaning operation are largely fixed costs, the majority of which are still incurred irrespective of scope that may be achieved and is subject to highly variable operating conditions.

Additional detail in relation to the make-up of costs has also been provided to the RIG Expert Advisor. Key assumptions underpinning the cost build up are summarised in Table 89.

Table 89 Mainline Ballast Cleaning Cost Assumptions

Assumptions	BCM Only
Scope	FY25: 112.8km
Machine Operation	BCM RM902
Freight	Model A – 10 dedicated train crew and 5 locomotives Costs reflective of current contracting arrangements.
FTE	The new BCM entered production in May 2021. The increase in workstations and increased componentry requires additional labour to maintain. At present there is also a requirement for the existing employees to be ticketed and trained in the BCM which is being filled by labour hire. Mechanised Production is reviewing the optimal structure for future operational and plant maintenance staff requirements.

Assumptions	BCM Only
Plant Depreciation	Ballast Undercutting plant depreciation has been allocated to systems based on the number of days that the BCM is planned for operation in each system.
Resurfacing Support	Utilise existing dedicated tamper and regulator.
Ballast	Cost estimates based on estimated ballast return rates utilising pre-dig (an excavated sample of track) screenability assessment and historical trends, returning track to the standard ballast profile, and the forecast average price per tonne. A change in conditions (wet or dry), material composition, variation in ballast depth and a change in material price may result in variability in ballast costs required.
Production Rate	The production rate of the machine is the assumed rate of the cutting speed of the RM902 consist whilst in operation and can vary depending on site characteristics. FY25 average rate is 327 linear metres per hour. The machine production rate is different to the closure hour rate which can vary from 25m to 99m per closure hour. These rates vary greatly based on site specific characteristics and what work is included in the closure (e.g., rail stress management may occur in the closure reducing closure production rate).
Ballast Return Rate	The ballast return rate is an assumed amount of ballast returned to track through the screening process. This return rate is based on a historical undercutting at these locations and a pre-dig assessment. The average across all FY25 sites is 29% crib and 49% shoulder. Where a 0% return rate has been nominated, this has been deemed unscreenable with all ballast to be replaced.
Ballast Volume	The planned ballast being returned to track is at the standard track volume of 2.8m^3 per linear metre, which equates to approximately 300mm depth below bottom of sleeper. This depth may vary between sites. The higher the volume required to be replaced, the lower the machine production rate.

A summary of the estimated costs of mainline ballast cleaning for FY25 is set out in Table 90.

Table 90 Mainline Ballast Cleaning – BCM Cost Summary

BCM (C01) ($m)	BCM FY25 Draft Budget
Expenses by Type	
Labour	15.4
Ballast Cleaning Machine (RM902)	29.9
Contracted Services	17.3
Support Plant	3.0
Other	7.1
Total (including ballast undercutting plant depreciation)	**72.7**
Ballast Undercutting Plant Depreciation	(6.0)
Total (excluding ballast undercutting plant depreciation)	**66.7**

Note:

- **Labour** – includes labour relating to plant operation, plant engineers, site safety, track protection and pre and post signalling system works, reliability and planning staff in the Network Operations team
- **Ballast Cleaning Machine** – includes plant maintenance labour, machine components, train crew, fuel and depreciation. Noted that maintenance cycle varies each year due to componentry that needs to be changed out

- **Contracted Services** – includes external work groups conducting pre and post earthworks, rail stressing, stress testing, spoil removal, delivery of ballast to site, as well as freight costs for ballast trains
- **Support Plant** – includes resurfacing plant and ballast wagons
- **Other** – includes ballast and other minor consumable costs
- **Ballast Undercutting Plant Depreciation** – the cost of ballast undercutting plant depreciation is recouped via the maintenance cost allowance but is shown in the cost build up for completeness.

Mainline ballast cleaning costs by Coal System are outlined in Table 91.

Table 91 Mainline Ballast Cleaning Costs by System

BCM (C01) ($m)	BCM FY25 Draft Budget
Ballast Cleaning Costs	
Blackwater	34.6
Goonyella	25.3
Moura	2.5
Newlands	4.4
Total	**66.7**
Ballast Undercutting Plant Depreciation	
Blackwater	3.1
Goonyella	2.3
Moura	0.3
Newlands	0.3
Total Ballast Undercutting Plant Depreciation	**6.0**
Total Ballast Cleaning	
Blackwater	37.7
Goonyella	27.6
Moura	2.8
Newlands	4.7
Total	**72.7**

NB: Figures may not add due to rounding.

Table 92 Mainline Excavator Ballast Cleaning Cost Assumptions

Assumptions	Mainline Excavator (C14)
Scope	FY25: 22 km Includes
Machine Operation	Excavator Undercutters (contractors)
FTE	Excavator work will be completed by contractors with Aurizon staff providing support services
Resurfacing Support	Utilise existing tampers and regulators

Assumptions	Mainline Excavator (C14)
Ballast	Cost of ballast and delivery of ballast isn't included in contractor packaging. Full ballast replacement occurs when undercut by excavators.

Table 93 Mainline Excavator Ballast Cleaning – Cost Summary

Excavator (C14) ($m)	Excavator FY25 Draft Budget
Expenses by Type	
Contracted Services – Excavator Undercutting	2.6
Contracted Services – Ballast & Ballast Delivery/Removal	2.0
Contracted Services – Rail Stress Management	0.5
Mechanised Production Labour	0.5
Support Labour	0.4
Sub-Total	***6.0***
Reactive Works	10.5
Total	**16.5**

Note:

- **Contracted Services** – includes external work groups conducting excavator undercutting and rail stress management tendered through packaged works and costs for ballast materials and the associated costs relating to ballast delivery and spoil removal.
- **Support Labour/Plant and Other** – includes site safety, track protection and pre and post signalling system works, reliability and planning staff in the Network Operations team and accommodation and travel
- **Mechanised Production Labour** – includes resurfacing plant and labour costs and Mechanised Production labour providing planning and execution support
- **Reactive** – allocation for scope assumed to require rectification in the year of execution.

Table 94 Turnout Excavator Ballast Cleaning Cost Assumptions

Assumptions	Turnout Excavator (C13)
Scope	FY25: 41 Turnouts
Machine Operation	Excavator Undercutters (contractors)
FTE	Excavator work will be completed by contractors with Aurizon staff providing support services
Resurfacing Support	Utilise existing tampers and regulators (turnout specific tampers)
Ballast	Cost of ballast and delivery of ballast isn't included in contractor packaging. Full ballast replacement occurs when undercut by excavators.

Table 95 Turnout Excavator Ballast Cleaning – Cost Summary

Excavator (C13) ($m)	Excavator FY25 Draft Budget
Expenses by Type	
Contracted Services – Excavator Undercutting	2.1

Excavator (C13)	Excavator
Contracted Services – Rail Stress Management	1.8
Mechanised Production Labour	1.1
Support Labour	1.0
Ballast & Ballast Delivery/Removal	0.8
Total	**6.8**

Note:

- **Contracted Services** – includes external work groups conducting excavator undercutting and rail stress management tendered through packaged works and costs for ballast materials and the associated costs relating to ballast delivery and spoil removal
- **Support Labour/Plant and Other** – includes site safety, track protection and pre and post signalling system works, reliability and planning staff in the Network Operations team and accommodation and travel
- **Mechanised Production Labour** – includes resurfacing plant and labour costs and Mechanised Production labour providing planning and execution support.

Table 96 Escalation Methodology

Escalation	Description	Budget Approach
Internal Direct Labour costs	In line with maintenance budget assumptions, increase in labour and oncosts to account for Enterprise Agreement rate increases.	• During FY23 & FY24, Network finalised both the Staff Enterprise Agreement and the Infrastructure Enterprise Agreement, which covers most of the workforce • For the Staff Enterprise Agreement, labour has been escalated at 3.3% and incorporates the legislated SGC Superannuation levy • For the Infrastructure Enterprise Agreement, labour has been escalated at 4.5% (4.00% plus legislated SGC Superannuation Levy: 0.5%) • The labour cost base for electrical trade staff includes additional costs associated with electrical workforce retention for critical roles and locations, heavily influenced by the limited pool of skilled resources and external market competition for these qualifications. During FY23, Aurizon Network faced a number of challenges in securing and retaining skilled electrical resources, driven by the high demand for these qualifications across the construction, mining and energy sectors. To mitigate further attraction and retention risks, Aurizon Network implemented a number of additional terms including; alignment of wage schedules to national qualification framework for all qualified trade staff; implementation of a shift count wage schedule; on call allowances to be paid in additional to annual salary; reimbursement of annual electrical licence costs; inclusion of

Escalation	Description	Budget Approach
		progressed trainees and apprentices to shift count salary wage schedule. • Indirect costs escalated at 3.1% in line with RBA June 2025 CPI forecast at end of August 2023
Subcontractors	Costs associated with subcontractors engaged to deliver renewal activities.	• The forecast rate of escalation has been estimated using a 5-year Compounded Annual Growth Rate (CAGR) based on both CPI (all groups Brisbane; 6401.0 Consumer Price Index, Australia) and 2462 Mining and construction machinery manufacturing (6427.0 Producer Price Indexes, Australia) • In FY24, Aurizon Network engaged 4 suppliers as part of a market-based competitive tender for planned formation renewals. The FY24 cost base has informed the base assumption of the FY25 program.
Materials	The cost of materials (ballast, rail, sleepers, electrical components) used in renewal programs either charged directly or consumed from inventories stores	• The forecast rate of escalation has been estimated using 5-year Compounded Annual Growth Rate (CAGR) based on a combination of the following indices; CPI (all groups Brisbane; 6401.0 Consumer Price Index, Australia); 203 Cement, lime, plaster and concrete product manufacturing; 22 Fabricated metal product manufacturing; Domestic materials and Electrical Equipment (6427.0 Producer Price Indexes, Australia) • In FY24, Aurizon Network has seen an increase in the price of ballast materials (~16%), predominantly driven by a change in the competitive market of quarries in Central Queensland, which has informed the base assumption of the FY25 program.
Other Costs	Other costs including an allocation of associated Asset Management, Project Management, Design Management, Contract Management and Construction Management costs.	• Costs escalated at 3.1% in line with RBA June 2025 CPI forecast at end of August 2023

Procurement and Inventory

Contractor resources

Aurizon Network seeks to apply the most efficient resources to deliver the scope derived by the maintenance and renewal strategies. It maximises the use of its internal Aurizon Network delivery teams and augments internal resource requirements with suitably qualified contractor staff and plant.

If the scope requires a specific skill set or plant not held within Aurizon Network, or if resources are deployed on alternative more critical work activities, pre-qualified contractors are engaged to perform work either under supervision or if approved, as principal contractors for short periods of time. Aurizon Network has established

a series of engineering and technical service contractor panels (managed through Aurizon's enterprise-wide procurement function) where competitive rates are pre-agreed with vendors. These include asset specific service panels, skilled labour hire, plant hire and plant transportation services.

Contractors are either engaged through these panel arrangements or one-off engagements for specific work packages. For one-off engagements, Requests for Proposal **(RFP)** are released through Aurion's sourcing tool Zycus. RFP's are evaluated against set criteria including cost, capability, safety, construction methodology/program and contract departures. An evaluation panel determines a preferred vendor and following negotiation, contracts are awarded.

Depending on the activity, work is packaged to attract multiple vendors and competitive pricing. Packaging could include multiple sites over a specified duration or greater scope within the one site. Aurizon Network implemented multi-year work packages for excavator undercutting, rail stress management and earthworks support for FY24 – FY26.

All internal and external contract workers are required to be accredited Rail Industry Workers and hold the appropriate qualifications for the activity they are undertaking. Aurizon Network has an internal assurance program for external contractors to ensure they have the required business and safety processes and policies that align with Aurizon Network's requirements.

In developing the FY25 program, the availability of contractor resources has been considered. Given the competition for locally based resources from other programs and sectors, for larger packages of works planned for integrated possessions early consultation is undertaken with key contractors, where possible.

Materials Procurement

Aurizon Network utilises the Aurizon enterprise centralised procurement function for all source to award activities required for the maintenance and renewal of the Rail Infrastructure.

Enterprise procurement has a performance-focused governance framework that ensures a market-based price for the required goods and services are procured to support Aurizon Network, at the specified quality and ensuring delivery when and where required. The major materials utilised by Aurizon Network are ballast, sleepers, rail and fuel:

Rail

Aurizon Network mainly purchases premium deep head hardened 60 kg rail. The hardness of the rail has a direct impact on its usable life, while the weight of the rail is associated with the axle load of the train consists being run on the network. Rail is delivered to the Port of Brisbane, welded into 110m lengths at the Aurizon Rail Weld Facility in Brisbane and then transported via dedicated rail delivery rollingstock to trackside locations as per renewal scope.

Rail is currently sourced from two international rail suppliers. Aurizon Network's rail contracts with both suppliers were awarded through a competitive tender process and are both evergreen contracts. Aurizon Network employs a dual supply strategy, to promote continuity of supply and price competitiveness throughout the contract life and optimal technical collaboration from both suppliers.

Ballast

Aurizon Network sources ballast and other rock and soil materials to defined Aurizon Network standards from various quarries across Central Queensland. Location is a critical consideration to reduce transit time and delivery cost.

The Aurizon Ballast Panel consists of [16] suppliers and 15 quarries throughout the CQCN. Suppliers were selected based on:

- Geographic proximity to the network to support improved network coverage, and preference for multiple quarries/supply points to assist with disaster recovery plans and supply continuity
- Compliance to the ballast quality and testing standards as set out in Aurizon Network's specifications
- Competitive pricing against existing average rates of all suppliers and specifically regional competitors
- Understanding and compliance with chain of responsibility and general safety standards.

The range of suppliers ensures adequate and reliable supply to meet Aurizon Network's demand for ballast. Each system has a rail siding and a contracted supplier providing loading, unloading and stockpile management services.

Aurizon Network ensures cost competitiveness of ballast through the multi-supplier arrangement and consolidated internal supply planning arrangements. An emerging issue for ballast supply is the consolidation of ownership in 2022 and 2023 by one supplier who now own 9 of Aurizon Network's ballast supply quarries in strategic locations.

In FY23, all Ballast Panel pricing was renegotiated based on committed volumes for FY24. Where practical, volumes were redirected to the most cost-effective quarry, taking into consideration cost of delivery.

Sleepers

In FY21, Aurizon conducted a sourcing event focussed on finding the best quality and best value supply of quality pre-stressed narrow gauge concrete sleepers. The outcome of this open tender was a Standing Offer Arrangement with one supplier producing and storing Aurizon Network specified sleepers in Central Queensland.

Fuel

Fuel expenditure within the Aurizon Group is significant. Aurizon's existing contractual arrangement for fuel was awarded to one supplier following a competitive tender process.

Aurizon Network's maintenance and renewal activities comprise a relatively low proportion of the Aurizon Group's total fuel consumption, with the majority being consumed by the above rail business. Aurizon Network's maintenance and renewal program benefits from the ability to leverage the larger purchasing power of the Aurizon Group.

Inventory

For asset renewal activities, inventory strategies are focused on limiting the number of variations of the same asset type being installed, e.g., rationalising turnout types and sizes in a system to reduce the supporting component types required in inventory. Asset Managers set and monitor emergency spares and component renewal inventory levels to ensure that a minimum amount of inventory is held with an ability to respond to emergencies and maintain continuity of service operations.

Control Systems inventory levels are managed to achieve system availability requirements and the renewals deployment schedule as well as maintaining critical spares for assets near obsolescence such as Relay Based Interlockings.

Specialist replacement inventory is typically held at depot sites to support emergency response and expediting the return of the Rail Infrastructure to service following an incident. Three centralised stores at Gracemere, Rockhampton and Paget are maintained for high volume consumables, and replacement stock for depot stores.

For maintenance activities, the quantity of maintenance replacement inventory is typically set by procurement lead time requirements and usage frequency. Additional inventory is held for equipment items that are becoming obsolete in the marketplace, to defer renewal based on obsolescence. Recovered obsolete components are retained in inventory to extend renewal intervals of components that are obsolete and beyond their economic life.

11.4 Works Execution & Close

This section outlines Aurizon Network's considerations to delivering and executing the asset activity required in each Coal System along with the supporting procurement.

Track Possession Types

Asset activity is executed using a variety of track possession approaches outlined in **Table 97** which seek to minimise customer impacts and maximise safe access for people and plant.

Table 97 Summary of track possession types

Type	Definition	Key Objectives	Example
Integrated Closures	When asset activity is required in high impact locations, requiring significant track time or results in significant capacity impacts. Track is typically non-operational to revenue services	To combine asset activities into an integrated closure to enable maximum works to be completed as efficiently as possible. Where possible, this is in line with other supply chain outages (i.e., port closures).	Culvert Replacement, and Ballast Cleaning
Single line closures	When asset activity can be completed on one track in a duplicated section whilst the other track is kept operational to allow for continuous train services.	To allow execution of scope that can't be completed in Integrated Closures while allowing some services to continue, minimising network impact.	Rail Replacement
Shadow possessions	When asset activity can be completed in sections by taking advantage of areas of the network that are unviable for coal trains due to other renewal or maintenance activity occurring and doesn't consume any additional capacity.	To maximise scope being completed without consuming additional capacity.	Rail Stress Management
In-between train services	When smaller asset activity tasks can be undertaken in a safe and controlled manner on track whilst no trains are present or by utilising capacity not required for coal services (in low demand weeks).	To minimise the impact to capacity by working between trains. However, cost could increase due to inefficiencies (waiting access).	Points Maintenance
As a scheduled rail service (moving maintenance or resources)	There are track vehicles or track machines requiring access to perform inspections or maintenance such as, but not limited to, recording cars, high rail inspections, grinding and movement of rail plant.	To complete scope / inspections as efficiently as possible without impacting rail traffic.	Mainline Track Resurfacing
Plan throughs (nil access required)	When asset activity or general maintenance is completed outside the operational areas of the railway having no impact to train services.	To complete scope with no impact to capacity.	Fault Inspection

Asset activity undertaken during Integrated Closures

In planning for the execution of works in integrated closures, particularly for critical path work packages, consideration is given to the scope planned to be delivered and whether a portion may be able to be undertaken prior to the closure. Strategies used to manage the work include consideration of:

- Whether activities can be split across multiple closures
- Scheduling work activity whilst the system is in ramp up or ramp down, e.g., as consists are being stowed in preparation for the closure
- Ensuring that the work site has adequate access, or if prework may be completed to improve access (and safety) prior to the start of the closure
- Consideration given to asset condition as related to safety and operational performance and the associated interruptions to supply chains.
- Locations of laydown areas or equipment pads
- Lead times to source and transport material
- Activities which can be performed in parallel
- Interface management requirements and assignment of resources for these, including isolations, protection etc
- Access to key plant and labour resources e.g., resurfacing plant.

Critical Path Activities

Each year, the closure pattern is driven by required renewals scope. For every integrated closure there is typically one significant renewal activity (i.e., the driving path activity) that will determine the length of the closure. Driving scope or critical path activities are identified and distributed across the year during the access planning process.

Other scope in the impacted locations is subsequently identified and planned for delivery within the same possession to ensure that Aurizon Network can maximise the scope of work to be delivered during the time the rail infrastructure is closed.

Internal resources, contractor availability and other support facilities (e.g., accommodation) are considered to allow for on average 100-150 independent activities per closure. Some spare capacity is maintained to allow for any corrective maintenance to occur within the possession. These activities are often not known until 84 to 28 days prior to the planned closure.

Other work may be added provided it can be completed safely, does not impact the resources or equipment that are required for the driving activity, and that it will not cause a delay in handing back the track at the expected end of the closure.

Asset activity undertaken outside of Integrated Closures

Not all asset activities can occur within integrated closures due to the limited duration of these possessions, resourcing availability and the nature of delivering these activities.

Mechanised Maintenance and Renewal

Table 98 outlines some of the principles Aurizon Network applies to minimise supply chain impacts when planning activities that take place outside of closures.

Table 98 Mitigating the capacity impact of works that take place outside of Integrated Closures

Task	Planning Principle
Ballast Cleaning	Ballast cleaning scope is delivered predominantly inside integrated closures. Where necessary, single closures are required to deliver identified scope. Supply chain impacts are minimised by planning the highest-impact locations for completion within closures. Where possible, the BCM follows and utilises all systems closures to minimise its requirement for access outside of closures.
Rail Grinding	Rail grinding is a planned activity with frequency rates defined within track standards. The frequency is dependent on the track alignment, i.e., more grinding is required on curves than on straights. Planning is based on when track sections will reach throughput triggers. As a result of throughput triggers, grinding activity may vary from year to year to ensure stable management of rail condition.
Track Resurfacing	Track resurfacing is a planned task triggered by geometry condition deterioration to rectify identified defects after inspections. Track resurfacing is also undertaken as part of renewal activities where the track has been disturbed. This activity is planned between coal trains to minimise impact.
Road Runs	On-track inspections as part of the planned inspection strategy mandated by the SMS. Road Runs are a cyclic activity conducted each 96 or 192 hours dependant on location. Road runs are a activities planned as part of the MRSB process.
Asset Inspections	Asset inspections include track geometry measurements, overhead alignment (Blackwater and Goonyella), fault identification and ultrasonic rail testing This work can vary in terms of capacity impact, typically it will be packaged and aligned to integrated closures, single line possessions, or where possible, in between revenue services.

Non-mechanised asset activity

Where possible, Aurizon Network plans non-mechanised asset activities to take place in the shadow of other work to minimise potential adverse impacts on train operations or system capacity. This allows multiple activities to occur simultaneously without consuming additional capacity.

An asset activity may also be planned and delivered after the Intermediate Train Plan has been laid down (which allows flexible activities to be planned in the spaces between trains) or in-between trains on the day of operations. This is achieved through direct consultation with Train Control. Where asset activities can be conducted efficiently and safely between trains, Aurizon Network's operational teams will opportunistically utilise this time to minimise the impact of required asset activity on supply chain operations.

Asset activities that can be planned in this manner are outlined in **Table 99**.

Table 99 Activities that can be completed within the shadow of other asset activity or in-between trains

Activity
Inspections and walkouts
Preventive maintenance and repair of signalling, overhead and civil components (e.g., rail lubricators)
Top and line spot resurfacing
Glued Insulated Joints (GIJ) management
Fencing
Fire and vegetation management
Drainage
Monument and signage maintenance
Power systems

Key plant and equipment utilised in work execution

Aurizon Network uses a combination of owned and operated and external sourced plant and equipment. The decision to in-source is based on level of specialisation and availability in the market, baseload scope to support utilisation, dependency of scope delivery on availability of plant and equipment and ability to respond to incidents. A large proportion of plant and equipment from external suppliers is procured under wet-hire contracts and the rail grinding contract. The major owned and operated equipment relate to resurfacing, ballast cleaning and other minor plant and equipment including that required for vegetation control.

Resurfacing

Aurizon Network's resurfacing plant was progressively put into operation between 2013 to 2016 and replaced its aging fleet of tampers and regulators. The newer high production resurfacing plant are more efficient and can deliver the required scope of work with less track time.

Aurizon Network also has a resurfacing consist (MMA 505 Tamper and MMB 505 Regulator) that primarily supports the ballast cleaning operation.

The Resurfacing Plant are not dedicated to any individual Coal System, which provides flexibility for each resurfacing consist (comprised of an MMA and MMB machine) to be planned in a way that provides operational efficiency.

Ballast Cleaning

Ballast cleaning is made up of three specific items being the Ballast Cleaning Machine, Excavator undercutting and Turnout undercutting.

Ballast Cleaning Machine (BCM) is undertaken by the RM902. RM902 is most efficient at delivering undercut and shoulder cuts simultaneously over longer sections. The RM902 entered production in May 2021. As mentioned above, the BCM has a resurfacing consist as part of its configuration.

The Excavator Undercutting and Turnout Undercutting are undertaken using contractors (work packages). Excavator undercutting is appropriate for smaller sections and/ or areas difficult to access either due to location or condition.

Factors impacting delivery of ballast cleaning scope by the above plant and equipment are:

- Wet weather
- Ballast fouling and return rates. This relates to the moisture content and the presence of clay mixed with ballast contaminants. Heavily fouled ballast is unable to pass through the machine screens, hence is deemed unscreenable and requires all ballast to be replaced (total excavation). This factor has a significant influence on machine production rate with total excavation slowing production. The costs and scope that Aurizon Network can achieve during production is highly sensitive to changes in asset condition relative to plan. Aurizon Network has sought to mitigate this risk by implementing an additional pre-dig performed 234pprox.. 3 months prior to execution]
- Increased ballast depth results in a higher volume of ballast material required to be processed, reducing the production rate
- Resources shortages including product management and qualified skilled labour
- Machine breakdowns
- Site access.

Given the significant fixed costs of undertaking ballast cleaning, where delivery risk materialises, focus is on pivoting in a planned way to alternate locations to maintain efficiency and reliability of track. For example:

- Site A is impacted by heavy weather and through inspections and testing of moisture content it is identified that the planned scope cannot be delivered by RM902
- However, Site B has been pre-identified as the next priority site for ballast cleaning
- RM902 resources are then mobilised to Site B and a plan is developed to come back to site A when conditions and access allow
- In meantime, for site A, execute excavator undercutter or other track and formation strategies to maintain capacity and reduce TSRs (holding works) or deliver the full scope in a different way
- This supports RM902 machine and labour utilisation, mitigates performance and reliability of sites impacted by wet weather, and appropriately managing the condition of the system as a whole.

Where excavator undercutting undertaken as part of holding works or responding to wet weather is higher than that approved, ballast cleaning costs increase.

Works Completion and Reporting

From the outset of scope identification, information is captured, built, and stored to enable the planning process, execution, reporting and close out. System statuses in SAP allow users to indicate the readiness for scope to pass from one step in the process to the next. As work progresses, the scope, plan and actuals are captured in SAP consistently and enables the monthly, quarterly, and yearly financial reporting of actuals against planned scope and budget to the RIG. Work moves from a notification to a work order in SAP. Purchase orders are attached to work orders when work is procured externally.

As scope is identified through to execution, the status of the work is updated, and artefacts are retained in SAP to support decisions. This information is used to report on the status of the work and ultimately informs reporting and trend analysis for performance improvement. When work is identified as commissioned (or Technically Complete) it is included as part of the Capital Claim process.

During the year, closure and completion reports are undertaken which provide information for the Quarterly RIG Report and CAPEX Claim for that financial year. Post closure or completion reviews are also undertaken to improve processes going forward for maintenance and renewal activities.

Works Execution & Close Improvements

The table below identifies the improvements and changes made to the Works Execution & Close Processes element since the FY24 MRSB.

Category	Key Variation to FY24	Performance Lever	Expected Benefits
Manual Handling	Improve manual handling processes	Safety	Reduced risk of manual handling related injuries
External Precise GPS **(EPG)**	EPG units to be supplied to workgroups as a form of verification when taking track protection	Safety	Reduced risk of taking protection on the incorrect track, therefore reducing the risk of serious injury or fatality.
Preventive fire & vegetation management	Moving this product to be a preventive maintenance task away from corrective to allow for effective contractor engagement with defined scope and cost. Also allows for planned location selection.	Reliability	Contractor utilisation uplift and associated unit rate improvement for product.

Category	Key Variation to FY24	Performance Lever	Expected Benefits
Friction Management Strategy	Packaging of works for maintenance of track lubricators on a preventive cycle	Cost Out, Performance	Reduction in costs (unable to estimate at this time)
Location Based Maintenance for Mechanised Production Plant	Reduce the requirement for resources to travel between Rockhampton and Mackay to undertake maintenance on plant	Cost Out	Reduction in travel and accommodation costs (unable to estimate at this time) Increase in labour productivity (reduction in travel time) 200 – 300 shifts (benefits dependant on successful employee consultation)
Mechanised Production Vendor Review	Internalise 2 x boilermaker resources	Cost Out	Reduction in costs $0.1m to $0.2m
Project Close Documentation	Standardised per program the relevant project close documentation required	Performance	Improved reporting on variances to approved scope and budget resulting in timely master data updates and clarity in investment reporting

11.5 Engagement and Reporting

In addition to the regulatory obligations in the 2017 Undertaking, that is for Aurizon Network to provide annually the Draft Proposal on 30 November, to respond to RIG questions and feedback in the Final Proposal by 21 January and submit Maintenance Claim and Renewal Capex Claim to the QCA following the end of the financial year (by September and October respectively), Aurizon Network, with stakeholders, has developed a pattern of engagement to support both the development of each years MRSB and an update on the status of the execution of the current years MRSB. This engagement involves (as outlined in Figure 104)) :

- the development of an engagement plan in February each year, subject to the approval status of the MRSB escalation to the RIG representative group or affected stakeholders on variations to the approved MRSB.
- The publication of a Quarterly Report providing cumulative information by system on.

For the current calendar year, Aurizon Network proposed success criteria for the engagement with the RIG. The RIG representative group chose to acknowledge the success criteria as Aurizon Network's success criteria rather than recommend any changes. Therefore, Aurizon Network's success criteria for the engagement with the RIG is:

- approval of the FY25 MRSB
- FY24 investments accepted into RAB through CAPEX Claim using RIG and Project Reporting
- RIG requests for information and clarification assist Aurizon in decision making
- The engagement builds and maintains confidence in Aurizon Network's management and governance in maintenance and renewals.

Error! Reference source not found. Figure 104 outlines the agreed engagement with the RIG representative group, for the development of the FY25 MRSB, quarterly reporting and progress of both the FY23 and FY24 MRSB, noting the FY24 RSB for the Newlands/ GAPE system was not approved by RIG given the allocation of costs between the Newlands and GAPE system was still to be resolved.

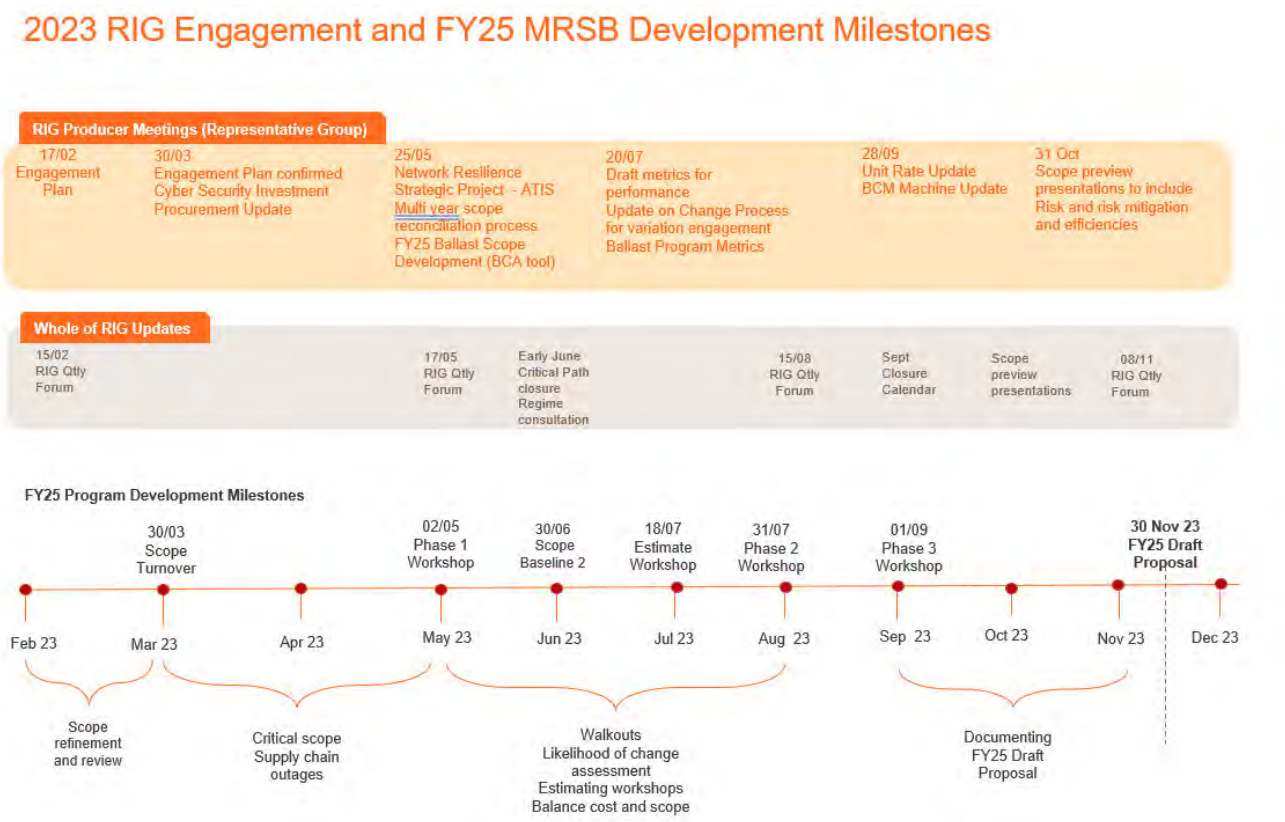


Figure 104 Stakeholder Engagement Commitment Milestones

Rail Industry Group Producer Group Meetings

In February 2023, the Chair of the RIG advised Aurizon Network that the FY24 Final Draft Proposal (FY24 MRSB) had been approved by the voting members of the RIG. The approved FY24 MRSB included commitments to engage with the RIG during the development of the FY25 Final Draft Proposal, including the development of an annual engagement plan. The plan included engagement on the topics included in Table 100. Aurizon Network has been progressing these engagement topics with the RIG producer group, with updates on engagement provided in each Quarterly Report.

Table 100 RIG Engagement Topics or Focus Areas for 2023

	1. Specific 2023 Projects or Focus Areas:	Results/ Actions
A	Improve presentation and analysis of material unit rate variances (compared to prior years) in budgets and MRSB presentations.	Summarised unit cost information is provided as part of the quarterly report. Aurizon Network notes that feedback from the RIG is that notwithstanding unit cost information can vary significantly for some products, the trends are useful to RIG members to identify areas requiring more information. The FY25 MRSB and Quarterly reports have been updated to provide commentary on either cost or scope variations where unit rate trends have varied materially.
B	Develop performance metrics and demonstrate alignment of the Asset Maintenance and Renewals Policy to achievement of those metrics.	RIG Producer Group request for future discussion on whether 'consistency to 4-year average' should be the target. AN to consider items to bring forward to RIG producer group that for example will improve reliability or reduce access but potentially cost more (with measure on value for money).
C	Develop a plan to capture value from the work previously completed by the Ballast Working Group.	**Network Initiatives** *Apply Ballast* Condition *Analyser Tool to support scope development in FY25.* The outcome of discussions was for Aurizon Network to consider in subsequent versions opportunity to include asset life and volume of traffic as input to BCA. *Develop* KPI *measurement and reporting.* More development of performance metrics is required for the Ballast Program. Network to undertake pilot test of PVC in H1 CY24. RIG to review existing performance metrics supporting asset management strategy discussed in July RIG producer meeting and advise feedback. *Improve Customer Reporting for Ballast related Temporary Speed Restrictions.* Clarification provided on the Customer Portal Temporary Speed Restriction reporting. Additional work to be completed to review and refine the list. **Supply Chain Initiative** *Investigate an opportunity to mitigate coal fouling resulting from improvements to Port Unloading Cleanliness & Compliance.* Aurizon Network has provided additional maintenance cost data to the RIG expert advisor for analysis of coal fouling cost trends near ports.
D	Develop processes for gaining RIG support for variations in scope or cost relative to the approved MRSB.	RIG Producer Group comfortable in providing feedback on process to reach decisions (including positive feedback or opportunities to improve process or information to reach decision). Opportunities for RIG to suggest agenda items in relation to emerging risks or opportunities identified in the quarterly report.
E	Develop and report clear multi-year reconciliation between MRSB renewals budget, actual expenditure and capital expenditure claims.	Noted that the approach is to report on the program of work approved for the year regardless of what year it is delivered in. RIG seeking to be able to easily reconcile work that comes in from previous year, current year approved scope delivered and current year approved scope deferred. Also noted that understanding the expenditure in current year is relevant for tariff calculations, whereas expenditure for the program (across years) is relevant for the assessment of value. FY24 Q1 Report includes first phase of updated reporting.
F	Review the status of the BCM currently in 'care and maintenance'.	RIG Chair advised support from RIG for no longer maintaining RM900 as backup.
G	Consider whether targeted expenditure is required to improve	Following discussion, action is to engage on trade-off between cost pass through on upfront investment versus remediation to

	1. Specific 2023 Projects or Focus Areas:	Results/ Actions
	network resilience regarding assets or locations requiring frequent maintenance or renewals interventions.	recover from an event and including indirect cost to customers as part of UT6 development. FY25 MRSB Part B includes overview of Climate Change Resilience.
H	Review and clarify the risk and risk mitigation section included in the MRSB, highlighting key risks which are specific to individual projects and particularly risks which may impact the timing or duration of closures.	RIG producer group indicated support for improvements from FY23 MRSB and requested consideration for inclusion in MRSB, of: • Ensuring that it is clear on whether the risk is to cost/ access or scope and the residual risk after controls are in place • Referencing macro issues in one area • Providing information on FY23 issues and how these have been assessed and are being managed in FY24 e.g. late handbacks • Providing clarification on whether risk really is high, noting all activities being undertaken e.g. the contingency closures and increased labour. In response, Aurizon Network has included updated information in Part B on the Likelihood of Change Process, with the results of the assessment included in each system section with updated risk information for the FY25 MRSB.
	2. "Business as usual": Activities which will continue beyond 2023:	
A	Continue to engage on multi-year asset replacement strategies and strategic scope.	Cyber Security: RIG Producer Group supported the Cyber Security Investment as a reasonable investment based on the information presented
B	Update RIG on material sourcing decisions or expiring contracts and agree a procurement strategy and schedule for upcoming contracts.	RIG Producers provided broad support for H2 Excavator Undercutting and multi-year procurement strategy for Excavator Undercutting, rail restressing and earthworks and noted the improvement in scope-based contracting for ballast Signalling Equipment Room, Axle Counters and Weighbridge have also been identified for multi-year procurement opportunities in FY25, these sourcing strategies were presented to the RIG Producer Group in October.
C	Provide explanation of how efficiencies are being achieved and are applied to maintenance cost forecasts.	Feedback on RIG Representative Group was to provide information on all improvement activities, not just cost out. FY25 MRSB Part B has been updated to provide an overview of the application of the works end to end process for developing the maintenance and renewals strategies and budgets and includes improvement activities related to safety, performance, reliability and cost.
D	Consult on material variations to MRSB cost, scope or unit cost ahead of submission of capital expenditure claims.	wing feedback from the RIG Representative Group, additional commentary has been provided within the Quarterly Performance reports, the draft submission and in the Supplementary Information accompanying the draft submission to provide visibility and explanation of material variations in costs and scope.
E	Continue to improve quarterly reporting based on RIG feedback.	Reviewed ARTC reporting and updated format and content in Q1 FY24 Quarterly Report
F	Report on outcomes and measurable benefits of projects previously supported by or discussed with RIG, such as ATIS, the optimised BCM operation, the Ballast Condition Analyser and excavator undercutter procurement.	• ATIS: Provide update to RIG on options for OTV/ RRV to attach ATIS equipment. Include cost or timing impact to project. Target Mar 24 • BCM Optimisation: RIG noted improvements in single line possessions since FY21, even if less than business case this reduction would still be a benefit. With challenges achieving scope there is an outstanding question on whether benefit

	1. Specific 2023 Projects or Focus Areas:	Results/ Actions
		has been achieved. Network to review measures of success and provide update next year. • BCA: Refer Item 1. C above

Quarterly report

The RIG Quarterly Report provides a year to date performance snapshot against the approved plan as well as providing a summary of system health and efficiency of delivery. By system, the report covers three key areas:

- System performance and impact to customers
- Performance to the approved strategy and budget
- Infrastructure reliability (by exception)

In addition, the Quarterly Report includes appendices for:

- Progress of Transitional Arrangements
- System Scope Reconciliation
- Previous Year Deferred Scope

12 Climate Change considerations

12.1 Context

In October 2022, the QCA published a discussion paper seeking stakeholder views on whether its existing regulatory frameworks are sufficiently robust to accommodate climate change related expenditure.[20] Aurizon Network responded to this process. In September 2023 the QCA published its final position paper "Approach to Climate Related Expenditure".

Climate change related risks (either physical or transition risks) are expected to present a range of challenges which will become increasingly relevant to Aurizon Network's asset management and delivery approach.

The QCA final position paper noted the following risks related to Climate change.

1) Key Physical risks, including:

    - damage to infrastructure due to changes in weather patterns resulting from climate change (such as flooding or rising sea levels) or increased heat stress.

2) Key Transition risks, including:

    - changing market conditions due to changes in customer demand (such as reduced demand for thermal coal);
    - evolving government policy – around Commonwealth and state emissions reduction targets (and the implications for regulated businesses making long-lived investments in this context);
    - reputational issues – where reducing or offsetting emissions is viewed as being consistent with a businesses' social licence to operate;
    - supply chain pressure – where other businesses put pressure on regulated businesses to reduce emissions and/or retreat as a supplier; and
    - financing, insurance and investor preferences, where access to financing or insurance is tied to emissions levels or to achieving emissions reduction targets, and where investors decline to invest (or reduce investment) in particularly "dirty industries".

12.2 Physical Climate Change Risk

Aurizon Network faces direct and indirect impacts from Physical climate change, which can manifest through:

- direct physical risks relating to extreme weather events; and
- changes to asset standards to promote asset resilience and targeted investment in known areas prone to weather related impacts.

As indicated in Aurizon's FY2022 Sustainability Report, the key regions in which Aurizon operates may experience increasingly severe weather events under multiple climate change scenarios. Analysis completed

[20] QCA (2022), Discussion Paper – Approach to climate change related expenditure, October, page 1.

by an external consultant in 2023 provided a range of outcomes from climate change, anticipating a hotter and dryer climate in both 2030 and 2050 with more intense (albeit less) rainfall events.

At the Monthly Producer Meeting on 25 May 2023, the “Network Resilience to Climate Change” presentation was discussed. This presentation provided an overview of the work completed by Aurizon Network to understand the forecast climate future of the CQCN. It outlined the exposure and existing mechanisms for treatment and possible future levers to further strengthen climate resilience in the CQCN.

Aurizon Network applies a range of physical and process controls to identify and monitor locations across the CQCN that are more susceptible to climate impacts, which in turn provides opportunities to target expenditure to improve asset resilience. These controls are summarised in Table below.

Table 101 CQCN Physical and Process Controls

Control	Description
Physical Control	
Temperature Sensors	Rail mounted temperature sensors that provide rail and ambient temperatures across the CQCN. Utilised as the trigger for the application and removal of heat related TSRs.
Flood Height Monitors	Flood warning sensors at known river areas susceptible to flooding. Also used in electronic huts to cut power if water reaches a certain height to protect the equipment and reduce recovery time.
Flood Rock	Rock placed on the downstream side of known flood locations to reduce the impact of track scour in flood events, strengthen the track and reduce damage (and in turn, recovery time) post flooding.
All Weather Access Roads	Sections of access road in hard to access locations have been upgraded to “all weather” to aid with inspection and recovery from rain events.
Slip and Rock Fall Detection Systems	These devices monitor for land slips and rock falls on the upslope of the railway that may influence track condition. Rock fall fencing is also present at select locations on sleeper banks.
Process Control	
Hazard Identification Register	Identifies locations that attract a higher number of defects and/or require asset inspection after a weather event (i.e. hot weather, heavy rain).
NETCON – which represents the status of a track section	NETCON 1: normal operating mode NETCON 2: annual preparation and readiness for the summer wet season NETCON 3: notifying a potential threat, such as a cyclone NETCON 4: notifying an imminent threat NETCON 5: threat has stopped system operations
Incident Response Standards	Organisational standard for the response to incidents including weather events such as floods and cyclones. Standards detail management response, communication requirements and safety considerations during both the event and recovery.
Hot Weather Precaution Standard	Part of the Civil Engineering Track Standards outlining preparations for hot weather and the precautions taken during periods of heat above 38 degrees to manage track alignment risk through TSRs and railway inspections.
Hydrological Assessment	A hydrology assessment of existing culverts at each maintenance location to assess flood immunity and verify compliance with flood immunity criteria.

In considering the above risks and controls, it is important to have regard to the economic balance between investments in network resilience and network remediation. Investments in:

- network resilience, can help to reduce the impact of weather events and the length of potential outages and may require amendments to the asset management standards and strategy. Consideration must also be given to longer term demand utilisation of the asset, capacity impacts and the willingness of customers to pay for improved resilience, particularly when the exact location and extent of disruption may be unknown.
- network remediation (i.e. rectification expenditure following a known event), while scope and expenditure would be a known quantity, may result in greater supply chain disruption due to network outages and a loss of capacity or availability.

The annual MRSB process provides an opportunity for Aurizon Network to outline and consult on the forecast scope and expenditure that is necessary to address not only the 'BAU' level of asset activity, but also the anticipated works that Aurizon Network considers will help to improve asset resilience to climate change. Further details on options for Cost Recovery and Residual Risk are discussed in Aurizon Network's submissions to the QCA's climate change discussion paper, available at: http://www.qca.org.au/wp-content/uploads/2022/10/an-sub-climate-change-expenditure-16-dec-2022.pdf.

12.3 Transition Climate Change Risk

Aurizon Network faces Transition climate change risk, which can manifest through:

- Maintenance and renewal investment trade-offs which are of particular relevance where Aurizon Network is required to invest in long life assets where future demand may be uncertain;
- Access to labour and existing suppliers becoming constrained or requiring a premium due to a preference to service low emission or non-fossil fuel based businesses;
- increased cost of materials as a result of suppliers emission reduction targets;
- Corporate emission reduction targets and social licence requiring alternative procurement or investment activities; and
- Financing, insurance and investor preferences for lower emission businesses resulting in premium charges.

The following are broad examples that Aurizon Network are observing and is not intended to be exhaustive.

Maintenance Renewal Trade Off Decisions in Demand Uncertainty

An example of a current maintenance and renewal trade-off is the Traction Substation Renewal Program.

Traction substations form the backbone of electrified railways systems, supplying reliable and efficient power to trains and electric traction systems. Aurizon Network has two electrified rail systems Goonyella and Blackwater.

The Traction Substation Renewals Program encompasses 22 of the 45 electrical traction substations which are at or near end of life. Each substation services a discrete section of the network and /or provides a level of redundancy for the electric traction system.

The Concept analysis incorporated 9 renewal options (including hybrid maintenance/renewal alternatives) scored against 23 risk nodes. RIG engagement took place on 11 April 2022 (RIG Producer Group Meeting highlighting the study approach.

The Pre-Feasibility study is well progressed and Aurizon Network will provide a further update to the RIG on Pre-Feasibility outcomes during FY24.

Labour & Supplier Markets

Aurizon Network has an ageing operational workforce with approximately 28% of the workforce greater than 50 years old.

Securing and retaining skilled labour continues to remain challenging due to the high demand for qualified resources across the construction, mining, energy and rail sectors. Various mitigation strategies were implemented in FY23 including engagement of contract labour support and the rollout of targeted trainee and apprenticeship programs, particularly for Electrical trades.

Additionally, attracting and retaining staff in a competitive environment where labour may prefer non-fossil fuel facing industries is and will be an ongoing challenge. Aurizon Network has commenced the introduction of attraction and retention initiatives with a focus on critical roles in critical locations.

While current and future labour shortages may result in an increase in sub-contractor labour reliance (and associated costs), Aurizon Network has seen instances of suppliers, including Siemens (Control, Signalling & Traction systems) and Holcim (Concrete Culverts), issuing highly publicised emission statements.

- Siemens Energy Sustainability Report 2022 noted that Siemens Energy would no longer participate in tenders for pure coal fired power plants, the report further noted that internal capital decisions incorporated a shadow price for emissions of €100 per metric ton of CO2.

- Holcims 2023 Climate Report noted the commitment to reduce Scope 1 and Scope 2 GHG emissions 95 percent per ton of cementitious materials by 2050 from a 2018 base year and the upgraded target to reduce its Scope 1 emissions per ton of cementitious material by over 22% by 2030.

Considering current and prospective labour challenges, Aurizon launched an external talent marketing campaign to attract staff on 4 October 2023.

Corporate & Social Licence

Aurizon's 2020 Climate Change Strategy and Action Plan targeted a 30% emission intensity reduction by 2030 based on 2010 operations and a Net Zero operational GHG emission by 2050.

Aurizon Network has sought to integrate Renewable Energy into the energy procurement mix through its Energy Supply Agreement (ESA) with Clean Co Queensland. Over the course of the ESA, 25% of Aurizon Network's electricity and associated large-scale generation certificates will be sourced from three renewable energy projects (solar and wind) as they come online. Aurizon Network procure and manage energy supply for the electric traction network on behalf of customers.

Insurance

Recent experience from the insurance market has seen a tightening over recent years. Entities looking to place insurance are competing on a global scale for market capacity with insurers looking for embedded risk management and risk prevention strategies. Insurers have varying approaches to managing climate change or ESG risks, and it is expected that insurers will continue to be wary of infrastructure that is exposed to significant natural events.

As noted within its December 2022 submission to the QCA, Aurizon has opted to not commercially insure the majority of the CQCN. As a result, there is no external commercial insurance coverage for damage to the rail network (i.e. track, sleepers, ballast) or loss in revenue from factors such as extreme weather events.[21]

Aurizon Network self-insures for certain events over $1 million. Aurizon Network's self insurance risk cover primarily relates to those that commercial insurance markets typically do not have the appetite to underwrite, including:

- derailment
- dewirement
- third-party repairs.

In the event of weather damage (storms, floods and extreme heat) large weather losses are eligible for pass through consideration where the total loss from each event exceeds the $1 million pass through threshold.

Finance

Access to and the term of Senior Debt in Australia for climate change exposed business' has reduced over recent years, with investors and financial institutions placing tighter financial conditions on their lending and investment activities. This is evident from:

- Statistical evidence of June 2022 Debt Risk Premium data, which suggests a coal premium relative to similar rated infrastructure peers (Toll roads, Airports, Gas and Electricity Networks); and
- Anecdotal evidence from equity analysts and a United States Private Placement suggests a coal premium will be incorporated into Network debt refinancings.

A reduction in available debt and equity financing, may ultimately result in an increase in the cost of capital, and/or an impact on credit ratings and counterparty risk, which has implications for pricing and risk allocation between Aurizon Network's Customers.

12.4 QCA Identified Process Challenges

The QCA identified some circumstances where the assessment of climate change related expenditure may raise challenges within the existing regulatory frameworks including where:

- there are differences between the willingness of a regulated business to undertake climate change related expenditure and the willingness of customer to pay for such expenditure;
- the expenditure may mitigate negative externalities that affect third parties and the regulated party or some or all its customers are reluctant to fund the cost;
- there are disagreements between customers about the nature of investments and asset lives;
- options for replacement assets have varying lives; or
- businesses are seeking to undertake long lived investments in an environment where climate policies and obligations are rapidly evolving.

[21] Aurizon Network (2022), Submission to QCA Request for Comments on Approach to Climate Change Related Expenditure Discussion Paper, page 6.

As Aurizon Network identifies expenditure or other relevant factors relating to climate change, this will be incorporated in the development and engagement of each year's MRSB.

Appendices

Appendix 1 Renewal Scope Detail Report

Explanatory Notes

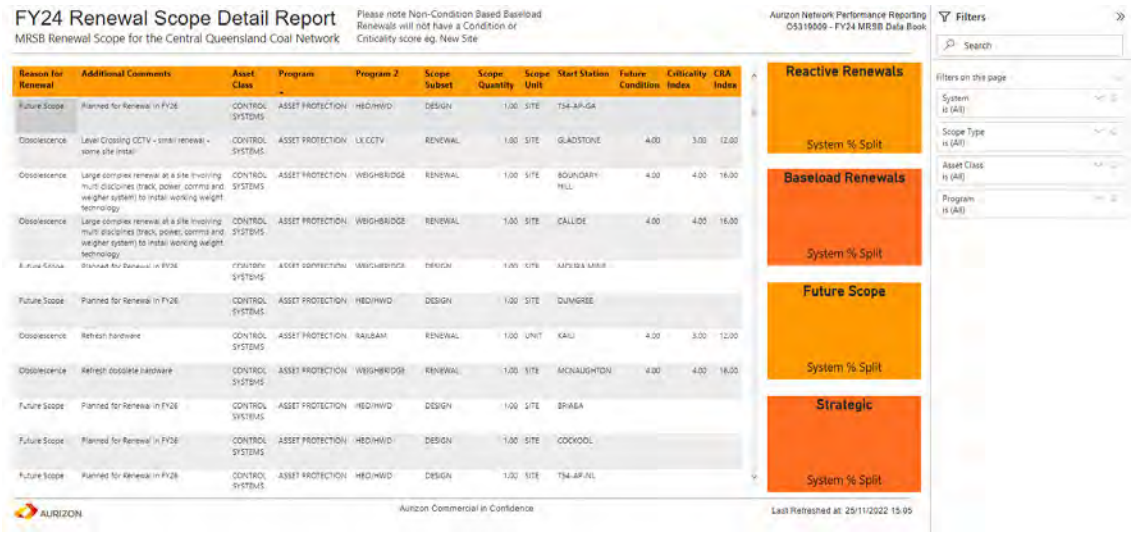
The Renewal Scope Detail Report for each system is provided in this appendix and also as a Power BI report. All customers who have access to the Aurizon Network Customer Portal will be able to access the Renewal Scope Detail Report in PowerBI.

The Renewal Scope Detail Report includes four selectors at the side of the report to filter to relevant scope, these are:

- System
- Scope Type
- Asset Class
- Program.

For each selection made, the proportion of program by investment type will be calculated in the boxes on the right.

The report data can be extracted by hovering the cursor to the top right of the table and selection more options from the '…' Icon.



Renewal Scope Detail Reports

Provided below is an export of the Renewal Scope Detail Report for each system.

Appendix 2 - Alternate Considerations for Maintenance

The different approaches that Aurizon Network applies in maintaining the rail infrastructure result in the application of maintenance tasks across the system. A summary of alternate considerations used to support each approach is detailed in Section 10.

Table 102 Maintenance Consideration

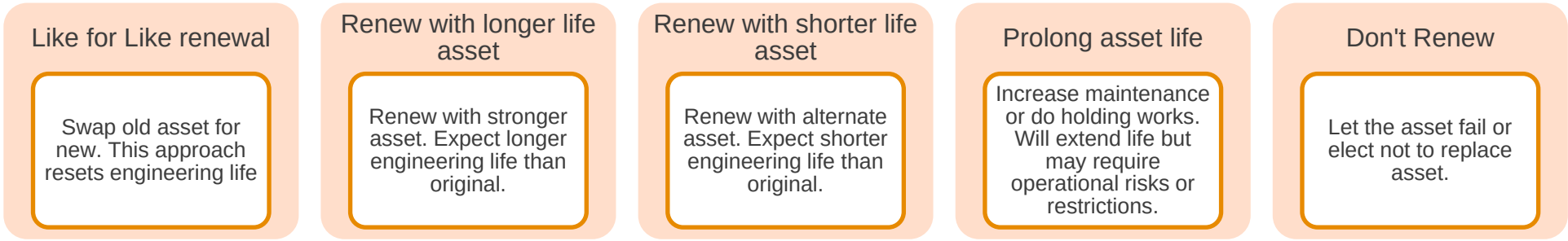
Activity	Description	Alternative maintenance option
Mainline and Turnout Resurfacing	Track settlement occurs in heavy haul railway conditions, presenting as track geometry defects that can result in derailments if not maintained effectively. Track resurfacing is an essential maintenance activity in railways to maintain safe track geometry for rolling stock. Track geometry defects can be symptomatic of an underlying defect, which is creating excessive or rapid track settlement. Multiple resurfacing interventions to maintain safety is a key consideration when determining whether ballast cleaning and formation renewal work is required. Resurfacing activities are currently delivered in a way that provides operational flexibility with these activities currently scheduled after customer train orders. Planned works are delivered in the shadow of other maintenance activities and/or where customer demand permits. Resurfacing scope is both preventive and corrective based.	1. Higher maintenance production / lower cost / high short-term access impact option, provides: • Larger blocks of uninterrupted maintenance access planned before trains are pathed • Focuses on plant productivity and cost minimisation • Negatively impacts access providing less flexibility to schedule between train services • Potential to increase response time to TSR's due to a longer planning horizon • Maintenance targets more easily achieved 2. Lower maintenance production / higher cost / low short-term access impact option, provides: • Smaller blocks of maintenance access planned between trains • Focus on capacity • Able to take advantage of periods of low demand (or advantageous access due to incidents) to increase production • Harder to meet maintenance targets • Closures utilised to target TSR's Aurizon Network follows option 2 in Blackwater and Goonyella due to availability of access, resources and required performance, whereas in Moura and Newlands, Aurizon Network follows the approach of option 1 as it delivers the most appropriate and balanced outcomes for the supply chain given the resurfacing plant and possessions available in the respective corridors
Preventive Rail Grinding	Rail grinding is a critical maintenance activity to reduce rail breaks and extend the life of rail. The rail grinding approach through the CQCN seeks to control surface-initiated rail defects under a	Preventive grinding strategy with a small amount of corrective allowance Corrective rail grinding strategy of allowing rail surface defects to propagate to a severe condition, before reactively programming the rail grinder to perform deep rail grinding to remove the severe defect. This approach would reduce the rail grinding scope however

Activity	Description	Alternative maintenance option
	preventive regime. Intervention thresholds are based on throughput tonnage which are translated into a time-based frequency to allow long-term planning. These frequencies are dictated by the tightness of the curve as rail defects are directly correlated to the dynamic curving forces of trains. Rail grinding is also undertaken in a reactive way to remedy identified rail defects which are initiated from high traction locomotives or other unpredictable mechanisms.	significantly increases the risk that surface defects grow into the rail causing rail breaks. This approach would also restrict long-term planning leading to disruption in the network for unplanned maintenance. Corrective rail grinding also reduces the rail asset life as more rail is removed during rail grinding to remove surface defects and cracks. Corrective rail grinding strategies are adopted in other rail networks that have lower throughput with plenty of maintenance windows or where the demand is seasonal. Aurizon Network currently utilises option 1 across CQCN to ensure high availability and reliability of the rail asset.
General Track	The current inspection approach for General Track is a mix of the Track Recording Car, ATIS, Ultrasonic Test Car, High Rail Vehicle inspections, walking inspections and non-destructive hand testing as detailed in the Asset Maintenance and Renewal Policy.	Reduce Inspection Frequencies - reduce inspection frequencies and revert to additional fix on fail methodology. A move to reduce the frequency of inspections would require consultation and approval from the Rail Safety Regulator. This option is not recommended and would likely lead to an increase in unplanned delays and increased cost to rectify in an unplanned manner. Operational Intervention - to reduce the impact of high priority defects, Aurizon Network can apply temporary restrictions to manage risks e.g., Temporary Authorised Non-Conformance, Temporary Speed Restrictions, Axle Load Restrictions or rerouting of loaded and empty trains. These interventions can be localised to the defect to keep the rail line open whilst working with the above rail operators to find a least impact time to rectify the defect. Whilst this keeps the rail line open, this will potentially impact operational performance and could result in unplanned closures if the defect changes. Aurizon Network currently utilises option 2 across CQCN as it delivers the most appropriate outcomes for the supply chain. Aurizon Network will be phasing in ATIS as a replacement to the Track Recording Car.
Control Systems	Maintenance is based on defined time-based inspections of equipment items (e.g., points, level crossings) and of equipment enclosures and power supplies. The frequency of inspection varies between equipment types and is based on failure modes and criticality.	Maintain only on failure – not recommended and would likely lead to an acceleration of faults which will reduce the reliability of the systems which in turn reduces the capacity of the railway. Planned frequency - the current planned frequencies are reviewed on an annual basis to align the required inspections to the condition of the assets. Frequencies and activities are adjusted where it is believed that the in-service performance will be materially improved. Any change to the inspection frequencies requires consultation and approval from the Rail Safety Regulator Increased inspection frequency and/or accelerated replacement and refurbishment to reduce the likelihood of service affecting failures - this is not recommended outside of the annual

Activity	Description	Alternative maintenance option
	Frequency and tasks are reviewed annually for effectiveness based on observed asset condition, fault performance, and impact on rail services.	review of planned frequencies and would increase the cost of control systems maintenance. Any change to the inspection frequencies requires consultation and approval from the Rail Safety Regulator. Aurizon Network currently utilises option 2 in line with its guiding principles of identifying and correcting defects before they become service disrupting faults
OHLE and Power Systems	The Electrical Safety Act in Queensland requires that a Prescribed Entity, such as Aurizon Network, ensures that the asset is operated in a way that is electrically safe. This includes managing the high voltage electrical assets through effective maintenance and renewals activities. Maintenance is predominantly based on defined time-based inspections of equipment items (e.g., overhead lines, transformers, isolators, etc). The frequency of inspection varies between equipment types and is based on failure modes and criticality. Frequency and tasks are reviewed for effectiveness based on observed asset condition, fault performance, and impact on rail services. The maintenance frequency is defined in the Asset Maintenance and Renewal Policy, and forms part of the RIM accreditation.	1. Maintain only on failure – not recommended: expect to see an acceleration of faults as asset condition drifts from an acceptable performance level. Move to a fix on fail approach would lead to more component failures and dewirements, potentially resulting in a notification of a dangerous electrical event to the Electrical Safety Regulator. 2. Planned frequency - the current planned frequencies are reviewed on an annual basis to align the required inspections to the condition of the assets. Frequencies and activities are adjusted where it is believed that the in-service performance, including safety outcomes, will be materially improved. Any change to the inspection frequencies requires consultation and approval from the Rail Safety Regulator. 3. Increased inspection frequency and/or accelerated replacement and refurbishment to reduce the incidence of service affecting failures: not recommended outside the annual maintenance process review and would increase the cost of power systems maintenance. Aurizon Network currently utilises option 2 in line with its guiding principles of identifying and correcting defects before they become service disrupting faults

Appendix 3 - Options for Renewal Approach

When an asset is presenting for renewal several options are worked through to determine the renewal approach. These include.



The following tables aligns these 5 options with each of the asset classes.

Rail Renewal is the standalone replacement of rail in a section of track due to fatigue (increased defect occurrence rate) and/or wear. The timing of renewal is dependent on the weight of the rail, its location in track (loaded / unloaded, on straights or curves), rail compassion (head-hardened, standard carbon on through-head hardened) and forecast tonnage.

Table 103 Rail Renewal Options

	Option	Description	When used
1	**Renew with like-for-like asset**	Like-for-like renewal looking to re-life asset	Majority of rail renewals are like-for-like replacements for mainline tangents and curves and passing Loops, Mine and Unloading Balloon Loops, Station Yards and sidings. This is undertaken when traffic task and performance are kept constant
2	**Renew with longer life asset**	On renewal install rail of higher quality or properties to achieve longer life on installed asset.	Renewing 60kg standard carbon rail with higher quality 60kg variant (i.e., head-hardened or through-head-hardened). Renewing aged 53kg rail and renewing with 60kg rail variant. This is more common in Mine and Unloading Loops, Station Yards and sidings where older rail exists (i.e., lesser quality and size). This is undertaken when traffic task is constant or increasing and performance is to be kept constant or improved.

	Option	Description	When used
3	**Renew with shorter life asset**	On renewal install rail of lower quality or properties to install fit for purpose asset Matching asset life to required task	Renewing rail in low traffic mine balloons and areas or sidings with cascaded part-worn rail Renewing aged 60kg rail with a lower quality 60kg variant. (i.e., standard carbon rail) Undertaken when future traffic task and operational environment is uncertain
4	**Increase maintenance to prolong asset life**	Tangents: Increase Ultrasonic Testing frequency (closure rails). General: Additional rail grinding, temporary plating of breaks or spot resurfacing to prolong period to required renewal Replace worn or fatigued rail as a reactive renewal. Use part-worn material with lesser life where appropriate.	To carry asset to planned future renewal point or known end of life point Can only be held to a point, once head wear goes below renewal trigger risk of asset failure increases along with associated service disruption, reactive renewal is required
5	**Choose not to renew**	Not applicable unless Operational Risk measures taken, Increase Maintenance Activities and impose corridor restrictions to manage impact of traffic.	Rail repairs will increase with part-worn closure rails. Increase Ultrasonic Testing related to defect rates to monitor degradation of the rail condition.

Rail renewal can also be completed as part of Track Upgrade scope where more than one element of the permanent way assets is renewed together, for example rail and sleepers.

Table 104 Sleeper Renewal Options

	Option	Description	When used
1	**Renew with like-for-like asset**	Like-for-like renewal looking to re-life asset in a row for a section of track	Sleeper renewal like-for-like replacements where new sleeper and fasteners being installed are the same as the existing. Generally, this relates to 28tal concrete sleeper with Pandrol e-clip or fast clip. Like-for-like replacement of sleepers can also include using galvanised fasteners to replace older style fist clip fasteners and higher quality pads and insulators which are the modern-day equivalent. Replacing timber with new timber sleepers is also like-for-like Renewal. This is undertaken when traffic task and performance are kept constant

	Option	Description	When used
2	**Renew with longer life asset**	On renewal, install sleeper of higher quality or properties to achieve longer life on installed asset.	Renewing 22.5tal Concrete Fist Sleepers with new 28tal Concrete Pandrol e-clip sleepers. Replacing timber sleepers with new full depth or 30tal or 20tal low profile concrete sleepers. Replacement of Steel Sleepers with full depth concrete sleepers is a renewal with a longer life asset. This is undertaken when traffic task is constant or increasing and performance is to be kept constant or improved.
3	**Renew with shorter life asset**	Renewal in a section of track with new or part-worn concrete sleepers.	Renewal of timber or concrete sleepers with part-worn sleepers, or low-profile concrete sleepers that would have a reduced life. This may occur in yards, sidings or branches with reduced traffic. This undertaken when future traffic task and operational environment is uncertain
4	**Increase maintenance to prolong asset life**	To prolong the life of the sleepers, cluster management rather than the full section renewal is undertaken Cluster management can be undertaken using new or part-worn concrete full depth sleepers or low-profile concrete sleepers in an interspersed pattern. As fastener and component deteriorate, replacement will occur through maintenance to improve holding the rail to the sleepers	To carry asset to planned future renewal point or known end of life point. Cluster management of defective and damaged sleepers can only be held to a point. Once a cluster of defective sleepers go above the sleeper replacement limits in standards the risk of asset failure increases along with associated service disruption. Inspections will be increased to monitor the condition of the sleeper asset Speed restrictions may be imposed to prolong the life of the sleepers with the reduction in operational speed and loading.
5	**Choose not to renew**	Increase inspections, reactive repairs and cluster management with like-for-like spot replacement to keep within engineering standards. Repair and replace fasteners through maintenance when defective.	Defective and damage sleepers are monitored at an increased frequency Speed and load restrictions may be imposed to manage the deteriorated condition. This is triggered as a corridor is approaching economic end of life.

Sleeper renewal can also be completed as part of Track Upgrade scope where more than one element of the permanent way assets is renewed together, for example rail and sleepers.

Table 105 Turnout Renewal Options

	Option	Description	When used
1	**Renew with like-for-like asset**	New Modern day equivalent full turnout renewal like-for-like or major turnout component renewal like-for-like	This is when the renewed turnout is the same angle, crossing, rail and sleepers e.g., 1 in 12, 60kg/m Rail Bound Manganese (**RBM**) on concrete sleeper turnout is replaced with a 1 in 12 60kg/m RBM on concrete sleeper turnout. This is also for major component replacement when replaced like with like such as Swing Nose Crossing (**SNX**) to SNX. This is undertaken when traffic task and performance are kept constant.
2	**Renew with longer life asset**	New full turnout renewal which is an upgrade from the existing turnout with at least one parameter of crossing rate, rail size, crossing type, or type of sleepers being a higher standard than existing and the others remaining the same	This is when a turnout renewal increases the crossing rate from 1 in 12 to 1 in 16 or a change to the crossing from RBM to SNX, 53kg/m rail to 60kg/m rail. This is undertaken to improve performance of the asset and efficiency of operation and may be required as traffic task/operational environment changes.
3	**Renew with shorter life asset**	Repair / replace components as required.	Planned major component replacement will renew parts of the asset as they deteriorate over time. The turnout is not fully renewed. This is undertaken when future traffic task and operational environment is uncertain. Formation failures may drive full upgrade and therefore shorter life replacement not possible.
4	**Increase maintenance to prolong asset life**	Increase inspections, maintenance repairs and servicing, repair / replace components as part of reactive maintenance	To carry asset to planned future renewal point or known end of life point Can only be held to a point, once component wear goes below renewal trigger, risk of asset failure increases along with associated service disruption. Reactive replacement of components is required.
5	**Choose not to renew**	Turnout condition is deteriorating however speed and operational restrictions are imposed to manage the condition.	This is used for low tonnage and low traffic lines when the turnout condition is deteriorating but has not failed its primary function. This is triggered as corridor is approaching economic end of life.

Table 106 Ballast Mainline and Turnout Renewal Options

Option		Description	When used
1	**Renew with like-for-like asset**	Ballast renewal on a face with the high production machine. Intended to include an effective combination of corrective and preventive ballast renewal, linked to asset condition and performance Typical approach is for ballast replacement to be a combination of new and screened ballast, varying from site-to-site as appropriate. Functionality of the RM902 enables screening in comparison to excavator undercutting and bridge rollouts where only new ballast is introduced. New ballast will provide ballast characteristics of the highest integrity whilst screened ballast seeks (as far as is practical) to remove fouling material and smaller particles from track and return the larger particles. Wet weather can compromise the effectiveness of screening.	Mainline ballast undercutting machine (BCM or RM902) ballast cleaning and replacement of large scopes, typically in the range of 900m-5km. Complimented with excavator undercutting for smaller scopes and/or gaps in large scopes. This is undertaken when traffic task and performance are kept constant
2	**Renew with longer life asset**	This option seeks too either: - 1. Renew the full ballast profile with new ballast, that is, no screening. 2. Transition from ballasted track to slab-track (i.e., no ballast) where the rails are fastened to an extended length of concrete. This solution has been used at Cooling Channel Bridge within the Callemondah and Gladstone Port precinct.	This option will be used where the condition of the ballast is such that it is unable to be screened due to the inability to effectively remove fouling material and/ or the ballast is degraded to the extent it is unable to perform its required function (e.g., rounded ballast). The mainline ballast undercutting machine (RM902) can be used for the renewal of large scopes, typically in the range of 900m-5km, whilst the excavator undercutter is utilised for smaller scopes and/or gaps in large scopes where the large machine is unable to reach. Slab track is used where the adjacent physical infrastructure and/ or the operational paradigm at the location is such that ballast degradation (i.e., rate of change of condition) has a sustained and detrimental impact on performance and maintenance and renewal efforts. The transition to slab track eliminates coal fouling impacts on ballast performance and the associated operational impacts. This is undertaken when traffic task is constant or increasing and performance is to be kept constant or improved.

Option		Description	When used
3	**Renew with shorter life asset**	This option seeks too either: - • Ballast renewal is limited to screening only, performed on a face by the high production machine or the utilisation of excavator undercutting in short sections only. Intended to reduce fouling and restore ballast size distribution, but not necessarily equivalent to new ballast fouling levels (PVC) and ballast material specifications. Not viable in all locations, where the material is unscreenable (due to moisture and material characteristics such as fouling composition). • Ballast shoulder cleaning only, performed on-a-face to aid ballast drainage. - Not viable in all locations, where the material is unscreenable (due to material characteristics such as fouling composition).	This is undertaken when future traffic task and operational environment is uncertain 1. This option is anticipated to be more viable in scenarios where coal contamination is low-moderate, but ballast particle degradation is moderate-high, producing a more screenable material (i.e., loaded, high MGT track, not near loading or unloading facilities / mines and ports). Alternatively, it is potentially viable where the ballast depth is high and only the top approximately 300mm of less coal/clay contaminated material is screened. The result would correspond with a reduced economic life 2. Anticipated to be more viable in scenarios where the shoulders are moderately to highly fouled, and the ballast shoulder cleaner is still able to process the material. Potentially more suited to locations where the source of coal contamination is from the top of wagons, falling to the shoulders, rather than carry back from ports which results in fouling more focussed toward the track centre (i.e., Loaded track or duplicated track adjacent to loaded track, in close and moderate proximity to loading facilities/mines). The result is an anticipated minor improvement in track drainage and therefore we anticipate an increased resilience to wet weather impacts.
4	**Increase maintenance to prolong asset life**	Perform increased resurfacing and reactive maintenance mudhole dig outs only (increased maintenance costs/requirements) Train speed restrictions to reduce dynamic forces. For turnouts: Increased partial dig outs, focussing on the highest fouling/poorest geometry locations (typically around the switch and the vee) For Non-electrified infrastructure: Increase the depth of ballast (up to 500mm) with additional clean ballast drops. Intended to improve load transfer to fouled ballast, decrease settlement and improve drainage compared to fouled ballast alone, decreasing the rate of resurfacing and dig outs in the short to mid term	To carry asset to planned future renewal point or known end of life point Performance of track with poor condition ballast is managed by more frequent resurfacing to restore geometry, as well as reactive mudhole dugouts where (note that resurfacing is not effective in managing geometry local to mudholes). Consider maintenance resources in western districts. Speed Restrictions may be imposed to prolong the life of the ballast with the reduction in operational speed and loading. Performance of track with poor condition ballast is managed by adding new clean ballast on top of fouled ballast, typically by ballast train and mechanised resurfacing. Likely to be effective or more suited to when fouled ballast in the depth range of up to 300mm is increased by approximately 100mm to 400mm. Beyond c.500mm ballast depth, negative impacts to track stability are believed to outweigh the benefits of increased clean ballast

	Option	Description	When used
5	**Choose not to renew**	Perform a standard rate of resurfacing, with typically an increase in the rate of mudhole dig outs to manage operational impacts from not performing renewals	This is triggered as corridor is approaching economic end of life Intervention by ballast dig outs and resurfacing is typically only adopted when operational risk or impacts are above appetite. An alternative lever in addition to ballast [mudhole] dig outs may be to place 20mm aggregate in mud holes to improve ballast interlocking and reduce the rate of settlement as a lower cost / impact option, more suited to short to mid-term situations

Table 107 Bridge Ballast Renewal Options

	Option	Description	When used
1	**Renew with like-for-like asset**	Full Bridge Ballast Rollout (C20) which may include upgrades or renewals to rail, sleeper or formation renewals to align remaining asset lives. Includes curb raising and bridge modifications to achieve minimum 300mm ballast requirements.	This is undertaken when traffic task and performance are kept constant Overall ballast condition is very fouled with rough track. Bridges with poor maintainability due to height, access (no handrails) and length. For non-mainline track sections, bridges to be rolled out at poor condition where visible deterioration of ballast and shorter planning horizons are acceptable. Lower dependency on condition-based renewal because of acceptance of lower reliability.
2	**Renew with longer life asset**	Not applicable. As Bridge Rollouts are a 100% replacement of ballast there is no longer life asset option	
3	**Renew with shorter life asset**	Partial Bridge Ballast Rollout (C20) which will only include ballast replacement Curb raising and ballast depth lift. Partial bridge ballast renewal by vac truck. Explore: Rail mounted vac truck. Currently being imported by LORAM.	This is undertaken when future traffic task and operational environment is uncertain. Removes fouled track and reduces material costs for the renewal activity. Formation is not renewed unless catastrophically failing. Raise the ballast depth across the bridge without removing fouled ballast. Only applicable to ballast with shallow depths where this has not been performed before. Rail mounted vac truck, low production machine that can fit across the bridges. Remove sections of contaminated ballast on bridges, top up ballast as required and resurfaced. This is a technical solution to align asset life with economic life that has not been employed in the CQCN to date and is still being investigated.

	Option	Description	When used
4	**Increase maintenance to prolong asset life**	Perform mudhole dig outs, resurfacing or introduce smaller aggregate to increase asset life. Increase detailed inspections of bridge ballast. Increase the depth of ballast (up to 500mm) with additional clean ballast drops. Intended to improve load transfer to fouled ballast, decrease settlement and improve drainage compared to fouled ballast alone, decreasing the rate of resurfacing and dig outs in the short to mid-term. Note that height and stagger of over heads will need to be check and adjusted as required. Explore: Rail mounted vac truck. Currently being imported by LORAM.	To carry asset to planned future renewal point or known end of life point. For long bridges with sections of severe ballast fouling only. Mudhole replacement is expected to extend the life of the remaining bridge ballast. This option differs from B due to curb raising already installed and available. Spot ballast replacement with hi-rail vac truck. Less invasive and lower safety requirements to remove mudholes on bridges.
5	**Choose not to renew**	BAU – perform mechanised resurfacing based on track geometry thresholds Increased inspections, TSRs and spot ballast renewals Add small aggregate to improve ballast integrity.	Depends on asset condition and financial life. Operational restricts and maintenance become ineffective after prolonged periods of time. Will lead to shut truck.

Table 108 Structure Renewal Options

	Option	Description	When used
1	**Renew with like-for-like asset**	Replace existing structure with like-for-like based on waterway size E.g. - Replace culverts and other structures with same waterway size assets. E.g. - replace Reinforced Concrete Box Culvert (RCBC) with RCBC.	This is the preferred renewal option when the structure that requires renewal still meets the hydrology requirements for the site when traffic task and performance are kept constant.
2	**Renew with longer life asset**	Strengthen or replace existing structures with 300LA Load Rates structures E.g. - Remove and replace existing culverts with 300LA RCBC or Reinforced Concrete Pipe (RCP) units	This is the preferred renewal option when the structure requiring renewal was originally designed to a lesser standard than current standard and when traffic task is constant or increasing and performance is to be kept constant or improved.

3	**Renew with shorter life asset**	All new structures are renewed with 300LA Load Rating structures Culverts and other structures: e.g., install a Corrugated Metal Pipe (CMP) which has a shorter life span online with reducing demand and defined remaining life.	For safety reasons, this option is not pursued for Bridges. This option can be considered with a variation to standard practice where corridors have lower tonnages and forecast declining demand.
4	**Increase maintenance to prolong asset life**	Complete maintenance inspections and repairs annually to maintain safe operating conditions. Propping and speed restrictions may be required to manage condition of the assets. Renewal will occur when condition has deteriorated to a point where the risk of failure is considered unreasonable.	This option may be considered fit for purpose in circumstances when future traffic task and operational environment is uncertain. This option requires regular inspections to collect condition data and will increase maintenance costs over the remaining life of the asset to ensure safe rail operations and time to maintain the structure to an acceptable standard.
5	**Choose not to renew**	The structure remaining life based on condition is within the life of the rail line above it, or remaining demand for the line.	This option can be considered if a structure is no longer required for safe operation of the rail network. This could apply for culverts that are no longer to provide corridor drainage to meet flood immunity requirements or when the line is expected to be closed prior to the remaining life of the asset. This strategy may or may not lead to additional maintenance costs depending on the condition and remaining life of the asset.

Table 109 Formation Renewal Options

	Option	Description	When used
1	**Renew with like-for-like asset**	Renew formation to Aurizon specification, typically 600mm depth, with 50-year design life	This is the default option for renewal of formation and is undertaken when traffic task and performance are kept constant
2	**Renew with longer life asset**	Renew with formation with longer design life	This option only applies in scenarios when the formation to be replaced is of lesser standard than Aurizon specification (50 years)
3	**Renew with shorter life asset**	Renew with formation with shorter design life The following techniques provide a shorter design life where relevant: Application of shear keys for formation failures. Reduction in capping layer thickness Lime slurry pressure injection	This is undertaken when future traffic task and operational environment is uncertain. A shear key (applied to resist lateral sliding failure of the formation) may only be used at a location for up to 2 years. The other techniques are not Aurizon Network standard practice but are investigated for specific location conditions and expected life of the corridor.

	Option	Description	When used
		Cement stabilisation	
4	**Increase maintenance to prolong asset life**	Extend formation life through preventive actions. Preventive drainage program Ballast renewal Increase the depth of ballast	To carry asset to planned future renewal point or known end of life point The extent to which formation life can be extended via a preventive drainage program is subject to a review and design, of program specific to the local conditions Ballast options will reduce stress on the formation and further reduce the track geometry deterioration to prevent differential permanent settlement in both the ballast layer and the formation beneath, which may ultimately prolong the useful life of the formation.
5	**Choose not to renew**	Manage existing formation through operational actions: Apply speed restrictions Reduce axle load allowance Heavy resurfacing, shear keys and drainage works	This is triggered as corridor is approaching economic end of life

Table 110 Level Crossing Renewal Options

	Option	Description	When used
1	**Renew with like-for-like asset**	Renewal of Level Crossings with like-for-like components or properties as per current Aurizon Network standards	This is the default option for renewal of level crossings and is undertaken when traffic task and performance are kept constant

2	**Renew with longer life asset**	Two options to renew asset with longer life asset: Renewal of Level Crossings with higher quality components or properties as per current Aurizon Network standards to achieve longer asset life. Upgrade of Level Crossings from passive to active controls either to primary flashing lights or flashing lights and half boom gates	1. Option 1 can be considered when the level crossing to be renewed was constructed to a lower standard (e.g., replace black steel sleepers/fastenings with new galvanised sleepers and fastening systems, installing flangeways to reduce grease retention on road surfaces and to facilitate rail grinding works at level crossings, increasing effective drainage around level crossings by upgrading culverts and installing megaflow and tracktex to reinforce formation material.) **2.** Option 2 will apply when a level crossing has inadequate sighting distances - This mainly applies to public crossings where major road usage with long vehicles has changed over time
3	**Renew with shorter life asset**	Renewal of Level Crossings achieving shorter design life through: Partial renewal – replacement of selected components only	This option will only be considered if it does not affect the safety of the level crossing This is undertaken when future traffic task and operational environment is uncertain Partial renewal can involve replacing two or more components but not including formation When Formation failure is causing rapid deterioration of track geometry, formation renewal can extend the life of the level crossing. Rail, sleepers and other components can be reused
4	**Increase maintenance to prolong asset life**	Perform maintenance to rail, ballast and drainage to extend the life of the crossing	This option can be considered in corridors with relatively low tonnages and includes: Inspection and monitoring to ensure that asset component replacement is not required Condition based maintenance intervention – i.e., ballast replaced when fouled at approaches rather than when the ballast has failed
5	**Choose not to renew**	Decommission level crossing if appropriate. Divert traffic to alternative level crossings, lower accessibility to corridor	This option can be considered if the level crossing has very low traffic and can be safely decommissioned and traffic diverted to a nearby Level Crossing with minimal impact on the user

Table 111 Access Road Renewal Options

	Option	Description	When used
1	**Renew with like-for-like asset**	Renew assets to like-for-like standard or modern-day equivalent to provide safer access to the rail corridor	When traffic demand is consistent and certain, and the renewal reduces required maintenance and/or increases accessibility to the rail corridor
2	**Renew with longer life asset**	Renew to a higher standard of asset For access roads, renew to type 1 (i.e., positioned at formation level of the track) from type 2 (i.e., adjacent to the track at natural ground level or similar) For access points, upgrade road surface, signage and drainage to a higher standard For corridor security, upgrade from stock fencing to a higher standard for a longer life asset	This option is considered when existing access roads do not meet current Aurizon Network Corridor Access Road standards
3	**Renew with shorter life asset**	Renew small sections or minor components, as part of reactive renewals to the current standard	This option can be considered for access roads with reducing usage or when condition has deteriorated further than maintenance can manage, and a level of reactive renewal is required
4	**Increase maintenance to prolong asset life**	Perform maintenance, manage vegetation and improve drainage to extend life of the access road	This option can be considered when existing access road is overall fit for purpose and its more cost effective to repair than replace
5	**Choose not to renew**	Remaining asset life is in line with remaining track asset life and is fit for purpose (local landholder considerations)	When existing maintenance schedule is sufficient to maintain assets fit for purpose status

Table 112 Telecommunications Renewal Options

	Option	Description	When used
1	**Renew with like-for-like asset**	Like-for-like renewal looking to replacing an asset with same performance	This is undertaken when traffic task and performance are kept constant. For telecom structures and equipment rooms, this option will be chosen if the asset condition is beyond refurbishment potential This option is typically pursued when replacing assets such as Generators, Dehydrators and Batteries

	Option	Description	When used
			This option may also be chosen if spares are exhausted, or there is a risk of major component failure
2	**Renew with longer life asset**	On renewal, install equipment signalling of higher quality or properties to achieve longer life on installed asset	This is undertaken when traffic task is constant or increasing and performance is to be kept constant or improved This is the preferred option for renewal of older fibre-optic cables in the CQCN (with design life of 30 years). These cables are subject of an annual renewal programme with modern fibre-optic cables with improved capacity and longer expected life (design life of 50 years) This option can also be considered when renewing batteries, as higher capacity options are becoming available
3	**Renew with shorter life asset**	Replacing an asset with a lower specification	This option can be considered for certain types of assets in corridors with lower tonnages and forecast declining demand The option may be considered on small and secure sites, e.g., Equipment Room – use of cabinets on external skids as opposed to constructed structures, and use of portable generators
4	**Increase maintenance to prolong asset life**	Increase inspection and repair or replace components as part of reactive maintenance	To carry asset to planned future renewal point or known end of life point For Telecommunication assets, preventive maintenance typically keeps the asset operating within limits, and does not prolong life. Additional condition monitoring, however, can detect problems before they impact asset life This option may be considered for assets such as telecom structures for which repairs can prolong life
5	**Choose not to renew**	Systems decommissioning	This option will be considered for assets which are no longer required to fulfill a certain function in the corridor As improved optical fibre is deployed, the need for Time-Division Multiplexing (TDM) systems will progressively be eliminated. The asset management plan for TDM systems is therefore based on progressive elimination rather than renewal

Table 113 Signalling Renewal Options

Option	Description	When used
Renew with like-for-like asset	Involves the replacement of the asset with the same make and model or equivalent	Replacement usually occurs at the end of the design life or at failure when the equipment cannot be repaired. This is the default option for Signalling equipment renewals

Option	Description	When used
		This is undertaken when traffic task and performance are kept constant
Renew with longer life asset	Involves the replacement of an asset with a new make or model that has a greater design life	This option applies when the original equipment cannot be replaced like-for-like with the same design life because of new technology or obsolescence There are limited opportunities to pursue this option for Signalling assets as they are designed to specified standards This is undertaken when traffic task is constant or increasing and performance is to be kept constant or improved
Renew with shorter life asset	Involves the replacement of an asset with a new make/model that has a lesser design life	There are limited opportunities to pursue this option for Signalling assets as they are designed to specified standards
Increase maintenance to prolong asset life	Involves the increase of maintenance interventions to keep asset running past its design life	For Signalling assets, preventive maintenance typically keeps assets operating within limits, and does not prolong life. Additional condition monitoring, however, can detect problems before they impact asset life This option can be considered when there are sufficient spares available. For some Signalling assets, components from previously renewed assets are retained as spares for the remaining assets e.g., interlocking. Additionally, for Interlockings, individual relays can be replaced, rather than the renewing the whole interlocking.
Choose not to renew	Systems decommissioning	This option will be considered for assets which are no longer required to fulfill a certain function in the corridor This option could be considered if for example a level crossing is no longer required or if new technology has made the old system redundant

Table 114 Asset Protection Renewal Options

Option	Description	When used
Renew with like-for-like asset	Involves the replacement of the asset with the same make and model or equivalent	Replacement usually occurs at the end of the design life or at failure when the equipment cannot be repaired This is the default option for Asset Protection equipment renewals. This is undertaken when traffic task and performance are kept constant

Option	Description	When used
Renew with longer life asset	Involves the replacement of an asset with a new make/model that has a greater design life	This option applies when the original equipment cannot be replaced like-for-like with the same design life Obsolescence can drive the need to replace with an asset that may have a longer design life To improve operational reliability, track circuits are often replaced by axle counters, that may result in a longer life asset This is undertaken when traffic task is constant or increasing and performance is to be kept constant or improved
Renew with shorter life asset	Involves the replacement of an asset with a new make or model that has a lesser design life	There are limited opportunities to pursue this option for Asset Protection assets as they typically have a limited design life of 10-15 years
Increase maintenance to prolong asset life	Involves the increase of maintenance interventions to keep asset running past its design life	For Asset Protection, preventive maintenance typically keeps assets operating within limits, and does not prolong life. Additional condition monitoring, however, can detect problems before they impact asset life This option can be considered when there are sufficient spare available. To carry asset to planned future renewal point or known end of life point
Choose not to renew	Systems decommissioning	This option could be considered for assets which are no longer required to fulfill a certain function in the corridor, e.g., track circuits made redundant because of the introduction of axle counters

Table 115 Overhead Line Equipment Renewal Options

	Option	Description	When used
1	**Renew with like-for-like asset**	Like-for-like renewal – replacing a life-expired asset with an identical unit, or a modern equivalent, which will deliver the same level of performance	This is undertaken when traffic task and performance are kept constant Some areas of the OHLE in the CQCN are life expired and like-for-like replacement of components and structural steelwork is appropriate. The Goonyella Ports OHLE which is affected by significant corrosion due to its coastal environment is an example of this. However, overall, the OHLE in the CQCN is only at half-life. There are no current plans to renew this asset across the entire CQCN as it still has another (approx.) 35 years of life left

	Option	Description	When used
2	**Renew with longer life asset**	On renewal, install OHLE of higher quality or properties to achieve longer life on installed asset	Not relevant to the OHLE – see comments above in 1
3	**Renew with shorter life asset**	Renew life-expired components with second-hand components which meet the required service life for the application	This is undertaken when future traffic task and operational environment is uncertain and suitably rated second-hand components are available
4	**Increase maintenance to prolong asset life**	Increase inspection and repair or replace components as part of reactive maintenance	To carry asset to planned future renewal point or known end of life point Inspections can identify key components (normally small parts) requiring renewal Many of these components have a shorter service life than the overall asset. Note that masts have a service life of 80+yrs, conductors 70yrs, insulators 50yrs, small parts circa. 30 years
5	**Choose not to renew**	This option will be considered for assets which are no longer required to fulfill a certain function in the corridor	This option can be considered for end-of-life branch-line that is no longer required to support Electric locomotive traffic

Table 116 Power System Renewal Options

	Option	Description	When used
1	**Renew with like-for-like asset**	Like-for-like renewal – replacing a life-expired asset with an identical unit, or a modern equivalent, which will deliver the same level of performance	This is the default option for Power systems renewals and is undertaken when traffic task and performance are kept constant Replacement usually occurs at the end of the design life or at failure This is used when the expected corridor life exceeds the expected asset life (e.g., an autotransformer on the Goonyella trunk)
2	**Renew with longer life asset**	Involves the replacement of an asset with a new make or model that has a greater design life	If longer life assets are available, this option can be considered for secondary system assets (DC supplies, protection relays). Rarely used with primary equipment as these assets typically have a service life of 40-50 years This is undertaken when traffic task is constant or increasing and performance is to be kept constant or improved

	Option	Description	When used
3	**Renew with shorter life asset**	Renew life-expired components with second-hand components which meet the required service life for the application	This is undertaken when future traffic task and operational environment is uncertain. The required remaining service life for the asset is less than the service life of a new component, and suitably rated second-hand components are available
4	**Increase maintenance to prolong asset life**	Increase inspection and repair / replace components as part of reactive maintenance	This option can be considered for Transformers which may have their service life extended by a process called “oil regeneration” if the asset is in a suitable condition for this treatment
5	**Choose not to renew**	This option will be considered for assets which are no longer required to fulfill a certain function in the corridor	This option can be considered for end-of-life branch-line that no longer need to support Electric locomotive traffic

Table 117 Traction Substation Renewal Options

	Option	Description	When used
1	**Renew with like-for-like asset**	Like-for-like renewal – replacing a life-expired asset with an identical unit, or a modern equivalent, which will deliver the same level of performance	This is the default option for renewals of traction substations and is undertaken when traffic task and performance are kept constant
2	**Renew with longer life asset**	Involves the replacement of an asset with a new asset that has a greater design life	N/A
3	**Renew with shorter life asset**	Renew life-expired components with second-hand components which meet the required service life for the application	This option may be considered for traction substation componentry where a full renewal of the substation is not recommended This is undertaken when future traffic task and operational environment is uncertain

	Option	Description	When used
4	**Increase maintenance to prolong asset life**	Increase inspection and repair or replace components as part of reactive maintenance	This option may be considered for traction substations serving corridors with lower tonnages and forecast declining demand
5	**Choose not to renew**	This option will be considered for assets which are no longer required to fulfill a certain function in the corridor	This option may be considered for traction substations serving corridors that no longer require electric traction The substations on the Bauhinia line (Struan Rd Feeder Station and Kinrola TSY) are examples of this

Appendix 4 - Description of practices used to carry out asset activity

This section provides a description of the key maintenance activities, maintenance practices and renewal activities that are used to carry out asset activity. It also provides a general overview of:

- the benefit of completing the works;
- the risks mitigated; and
- the relevant trigger for intervention.

Maintenance Activities

Summary of CQCN Maintenance Activities

Activity	Description	Benefits and risks managed	Trigger for intervention	Access Management
Resurfacing	Restores geometry of the track and turnouts by lifting and lining to the appropriate level and alignment and compacting the ballast underneath the sleepers.	Mitigates the need for temporary speed restrictions applied as a risk control prior to component renewal or full asset renewal.	Triggered by tonnage over a rail section. **Track resurfacing: 50 million gross tonnes (MGT)** **Turnout resurfacing: 80 MGT** Resurfacing to remedy geometry faults identified often required ahead of these limits.	Resurfacing tasks are typically managed between trains and planned after the ITP (Intermediate Train Plan) has been agreed. This minimises the impact to capacity and allows the work to be targeted for priority locations.
Rail Grinding	Grinding rail in track and turnouts to remove micro cracks and small surface faults from the rail, restoring a profile that spreads the contact band, and positions it for better wheel set tracking around the curves.	Reduces risk of severe defects (rail failure or breakage) and prolongs the life of the rail.	Triggered by tonnage over a rail section or curve. **Straights: 40 MGT** **Curves 1001m to 2500m radius: 40 MGT** **Curves less than 1000m radius: 20 MGT** **Turnouts: 40 MGT**	Annual programs are developed and negotiated to avoid conflicts with other regulated inspection vehicles.
General Track Maintenance	Encompasses the planned corrective maintenance effort, responding to faults identified by drivers, track inspection, specific asset inspection, and Track	Identification of faults through inspection – notification and prioritisation managed via SAP to minimise impact on capacity	Time based inspection regimes for track geometry recording, ultrasonic testing and track inspections.	Tasks are planned in accordance to Network Maintenance Block rules. Predominately on nominated

Activity	Description	Benefits and risks managed	Trigger for intervention	Access Management
	Recording and Rail Flaw Detection inspections. Activity can be planned according to the severity and the time for fault/fault remedy of the identified fault. Fault severity ranges from: - Immediate - Track closed until repair completed; to - 'Y1' – repair required within 1 year of identification	Faults managed to mitigate against infrastructure failure leading to unplanned outages Localised depots responding to infrastructure faults to reinstate operability of the network in a controlled manner	Planned corrective dependent on fault severity	maintenance days or in shadow of existing renewal works.
Other Civil Maintenance	Minor activities on track, turnouts and corridor assets. Includes minor ballast cleaning, a corrective maintenance activity to replace the fouled ballast and mud holes from beneath the sleepers for a length of track up to approximately equal or less than 40 sleeper bays (as a guide).	Identification of faults not visible via person inspections allows for fault rectification in a controlled manner prior to the fault resulting in a failure. Undercutting Minor Activities Spot repair mudholes and small areas of ballast fouling which cause track defects and increase the risk of derailment and remove TSRs.	Dependant on defect severity and time to remedy	Tasks planned in accordance to Network Maintenance Block rules, predominately on nominated maintenance days or in shadow of renewal works.
Structures and Facilities Maintenance	Periodic inspection of bridge and culvert structures to monitor asset condition and performance	Trend of condition allows for component or renewal works to be forward programmed given the wear rate of the assets Faults managed to mitigate against infrastructure failure leading to unplanned outages	Inspection frequency takes into consideration the structure condition, structural capacity, deterioration rates, age, rail traffic operating conditions and other environmental or local conditions.	Tasks are planned in closures or in accordance to Network Maintenance Block rules, predominately on nominated maintenance days or in shadow of renewal works.
Signalling and Telecommunicatio n Maintenance	Inspection and maintenance that is regularly performed on the signalling asset to lessen the likelihood of it failing. Performed whist the asset is in place and working so that it does not break down unexpectedly.	Faults managed to mitigate against infrastructure failure leading to unplanned outages	Time based – planned periodic inspection and repair activities Planned rectification works on identified faults to return equipment to working condition	Tasks are planned in closures or in accordance to Network Maintenance Block rules. Predominately on nominated maintenance days or in shadow of existing renewal works.

Activity	Description	Benefits and risks managed	Trigger for intervention	Access Management
Trackside Systems Maintenance	Inspection and maintenance that is regularly performed on the wayside equipment assets to lessen the likelihood of it failing. Performed whist the asset is in place and working so that it does not break down unexpectedly.	Faults managed to mitigate against infrastructure failure leading to unplanned outages	Time based – planned periodic inspection, servicing and repair activities Planned rectification works on identified faults to return equipment to working condition	Where these tasks have an impact to train running, these tasks are planned in closures or in accordance to Network Maintenance Block rules. Predominately on nominated maintenance days or in shadow of existing renewal works.
Electrical Overhead Maintenance	Inspection and maintenance that is regularly performed on the electrical substation and overhead line assets to lessen the likelihood of failure. Performed whist the asset is in place and working so that it does not fail unexpectedly.	Defects managed to mitigate against infrastructure failure leading to unplanned outages	Time based – planned periodic inspection and repair activities Planned rectification works on identified defects to return equipment to working condition	Tasks planned in accordance to Network Maintenance Block rules, predominately on nominated maintenance days or in shadow of renewal works.
Other General Maintenance	Asset Management and Inventory Management	Inventory is held and managed at specific location across the network so as materials required for recitation works are available	Critical spares determined by lead time to obtain parts, level of supplier support and availability of materials / component	Tasks planned in accordance to Network Maintenance Block rules, predominately on nominated maintenance days or in shadow of renewal works.

Renewal Activities

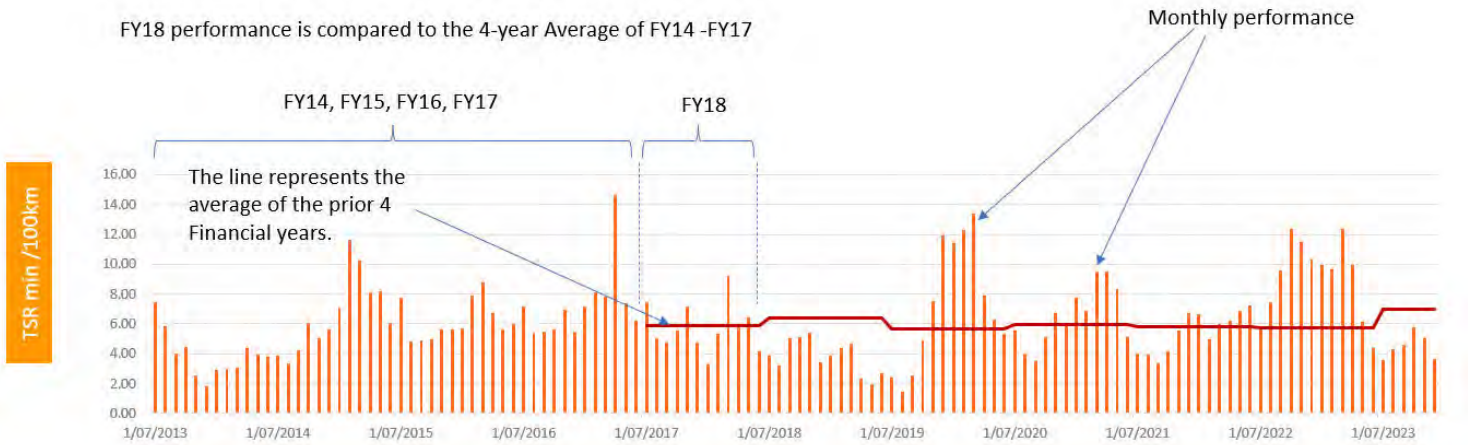
Description of CQCN Renewal Activities

Activity	Description	Benefits and risks managed	Trigger for intervention
Ballast	Over time ballast becomes fouled through, coal dust general degradation, and sub soil contamination. Ballast fouling is managed via the following approaches dependant on the location of the fouling: BCM - excavating the fouled ballast from beneath the sleepers by a dedicated ballast cleaning consist, Ballast replacement as part of a formation repair or track upgrade – ballast is replaced as part of the formation repair activity and only where required as part of a track upgrade activity. Ballast undercutting turnouts - excavating the fouled ballast and mud holes from beneath a turnout by minor mechanised equipment such as an excavator Bridge ballast rollout – due to the width, height and environmental constraints on bridges fouled ballast on bridges is completely removed and new ballast added.	Ballast cleaning removes these contaminants from the ballast and restores the drainage and load management properties of the ballast moving water away from the formation and spreading loads across the track structure to reduce the risk of track geometry defects and formation failures.	Ground Penetrating Radar (GPR) provides a measure of ballast fouling severity comparative to prior GPR runs. This provides a non-destructive level of fouling. Scope is determined based on the number and frequency of resurfacing activities (a lag indicator of deteriorating track geometry), track geometry and GPR which is then reviewed and validated by Track Inspectors and Supervisors. The most fouled locations or those showing the greatest degradation are matched to the production of the Undercutting fleet and track access constraints. Network utilises a ballast condition analyser model to assist in identifying future years renewal requirements based on ballast and geometry condition to determine renewal intervention
Rail Renewal	Replacement of rail in a section of track due to rail fatigue (increased defect rates) and/or wear approaching wear limits. Rail Renewal includes rail stressing to restore continuously welded rails to a design stress state, reducing risk of rail misalignment (buckles) and rail breaks	Renewing rail in a planned way reduces rail breaks and rail faults that would otherwise lead to unplanned delays Reduces derailment risk related to rail break or rail misalignments	The timing of renewal is dependent on the weight of the rail, its location in track (loaded / unloaded, on straights or curves) and rail compassion (head hardened, standard carbon on through hardened) Network utilises a rail condition analyser model to identify future years renewal requirements based on rail wear against standard to determine the required renewal intervention The Rail Renewal Strategy includes scope focused on smoothing the anticipated bow wave of tangent

Activity	Description	Benefits and risks managed	Trigger for intervention
			rail renewals through renewing tangent rails that have fatigue related issues, such as squats and shelling. Where appropriate, rail which has been subjected to significant cyclic loading is renewed with sleepers to gain efficiencies in renewal.
Turnouts and Component Renewal	(sometimes called Switches) allow trains to move between tracks in duplicated sections, as well to allow entry and exit from passing loops and to move from the main line into spurs and balloon loops. A turnout is a combination of civil assets being the steel rail and sleepers and Control Systems Assets being the points motors, rodding and electronics.	Component renewal extends the life of the turnout Full renewal and maintain operability of turnout providing operational flexibility	Renewal - Condition and location of assets and degradation rate Component – items within the turnout that require renewals based on asset component condition
Sleeper Renewal	Sleepers (or ties), along with sleeper clips, hold the rails to gauge and alignment. There is a variety of sleeper types across the CQCN with most being 28 tal concrete for 60kg/m rail. Other sleepers are older styles with different rail fastening (clips). In sidings and older track sections there are both timber and steel sleepers.	Reduction in track alignment issues relating to gauge and rail twist leading to temporary speed restrictions or unplanned delays. Reduces derailment risk cause by loss of gauge or rail twist	Sleepers are condition rated based on weight, material and condition. The sleeper renewal program is renewing aged underweight sleepers with the 28 tal concrete standard.
Structures Renewal	Structures are bridges and culverts that allow for the flow of water through the rail formation or for access under the track Bridges are located at large hydrological water flows (rivers, creeks etc) Culverts are located at low points allowing overland flows through the track infrastructure	Renewal of assets prior to failure to reduce unplanned delays or safety risks associated with structure failures Strategy to review hydrology in renewal locations to reduce number of culverts.	Structures are inspected and assigned a condition rating and allotted a location criticality. Structures are then ranked based on condition and operational criticality rating
Civil Asset Renewals	Civil assets are those assets that support the Permanent Way assets and include formation, level crossings, access roads, access points and corridor security	Formation renewals reduces formation failures, track geometry issues and requirements for track resurfacing. Renewals of level crossings, access roads and corridor security ensure continuity of safe operations.	Civil assets are inspected and assigned a condition rating and allotted a location criticality

Activity	Description	Benefits and risks managed	Trigger for intervention
Control Systems Renewals	Control Systems assets are the physical and digital assets that provide, train control, telecommunications and wayside monitoring systems. These assets provide the capacity multiplier for the track assets, that is they allow for the safe movement of more train services over the track structure. The main classes within the Control Systems grouping are: Train control Systems: signalling system, level crossing active protection, interlockings and point motors Telecommunications: the data network required to connect assets to train control, includes the optic fibre network, digital radio and microwave radio systems Wayside Systems: assets in the rail corridor that provide a level of monitoring and alarming to protect track and overhead assets	Train control renewals ensure the continuity of the train control systems and provides incremental improvement to the operability of the system Telecommunications renewals reduce telecommunication interruptions and ensure the integrity of the safe working systems and track side equipment Wayside systems renewals ensure integrity for the real time monitoring across the network to identify out of tolerance or non-controlled rollingstock interface issues	The trigger for the renewal of Control Systems assets is predominantly driven by the age of the asset along its life cycle These assets do not necessarily wear with tonnage, and often don't show degradation until the point of failure Obsolescence of data systems or components is also a key trigger for asset renewal
Electrical Renewals	Blackwater and Goonyella Systems are electrified, enabling the operation of electric rollingstock. The traction system comprises two main asset groups, - Overhead Line Equipment (OHLE) - infrastructure distributes traction power to trains on the system - Traction Substations - stations provide a means of connecting to the high voltage transmission network (Powerlink or Ergon) and converting the transmission voltage (132kV or 275kV) down to 50kV for the traction system	Renewals of components across the 2000Km of OHLE infrastructure reduce the instances of faults causing disruptions and cancelations Renewals of Traction substations manage the risks associated with the control of high voltage electricity	Some Traction Power Systems assets are like Control Systems assets in that the renewal is primarily driven by the age of the assets against their lifecycle. The renewal of other Traction assets including the Overhead Line and transformers, is driven by age, environmental factors and tonnage.

Appendix 5 - Glossary

Term	Definition
2017 Access Undertaking or UT5	Aurizon Network's 2017 Access Undertaking, as approved by the QCA on 191 December 2019, together with any subsequent changes approved by the QCA from time to time
4-year averages	
Access Holder	A person or organisation that holds access rights to the Central Queensland Coal Network
ACOM	Communication System
AM	Asset Maintenance
AMRP	Asset Maintenance and Renewal Policy
APS	Advanced Planning and Scheduling
AT Renewal	Autotransformer Renewal
ATIS	Automated Track Inspection System

Term	Definition
Aurizon Network	Aurizon Network Pty Ltd, the provider of access services in accordance with the 2017 Access Undertaking
AZJ	Aurizon Holdings Limited
Ballast	Ballast is the material that is laid on the rail bed under the sleepers, providing stability and drainage to the track structure
BCM	High Production Mainline Ballast Undercutter Machine
BOQ	Bill of Quantities
BW	Blackwater
BWG	Ballast Working Group
CAGR	Compounding Annual Growth Rate
Capex	Capital Expenditure
Capital Indicator	An in-principle summary of the extent to which assets in the proposed Renewals Budget would be allocated to each of the Newlands System and GAPE RABs
CER	Communication Equipment Room
CETS	Civil Engineering Track and Standards
CIPP	Cured in Place Pipe
CMP	Corrugated Metal Pipe
CMP-CIPP	Corrugated Metal Pipe to Cured in Place Pipe
Condition Based	MRSB Comment – reason for renewal is due to the condition of the asset
Corrosion	MRSB Comment – reason for renewal is due to corrosion of the asset
CPI	Consumer Price Index
CQCN	Central Queensland Coal Network

Term	Definition
CWL	Central West Line
DBCT	Dalrymple Bay Coal Terminal
Defective Asset	MRSB Comment – Reason for renewal is the asset is defective and no longer performing function effectively
DMR Link	Digital Microwave Radio Link
DNC	Deliverable Network Capacity
DTS	Dynamic Track Stabilisers
EFD	Early Fault Detection
egtk	Electric gross tonne kilometres
Electrical Safety Act	Electrical Safety Act 2002 (Qld)
FD	Final Decision
Fouled Ballast	MRSB Comment – reason for renewal is due to fouling of the ballast
FOP	Front of Post - a FOP signal is a type of signal
FTE	Full Time Equivalents
FY	Financial year
FY22 ARRT	FY22 Annual Review of Reference Tariff submission
FY24 Final Draft Proposal	Draft Maintenance and Renewals Strategies and Budgets for each Coal System for the Financial Year ending 30 June 2023 2024
GA	Goonyella
GAPE	Goonyella to Abbot Point Expansion
GAPE Link	Greenfield track between North Goonyella Junction and Newlands Junction
GPR	Ground Penetrating Radar – A non-destructive subsurface inspection technology that is used to measure the condition of Aurizon Network's Assets, in particular ballast.

Term	Definition
gtk	Gross tonne kilometres
HBD/HWD	Hot Bearing Detector/Hot Wheel Detector
HDPE	High-Density Polyethylene Pipe
HPCT	Hay Point Services Coal Terminal
ICAR	Initial Capacity Assessment Report as defined the 2017 Access Undertaking
IE	Independent Expert
Improve Reliability	MRSB Comment – Reason for renewal is to improve reliability of the asset
Improve Safety	MRSB Comment – Reason for renewal is to improve safety of the asset
IOT	Internet of Things
IRJ	Insulated Rail Joint
ITP	Intermediate Train Plan
LV System Earthing	Low Voltage System Earthing
LX CCTV	Level Crossing Closed Circuit Television
MA	Moura
Maintenance Indicator	An estimate of the share of the proposed Maintenance Budget which would be recovered from each of the Newlands System and GAPE under the current pricing arrangements
MCA	Multi Criteria Analysis – Engineering analysis tool
MCI	Maintenance Cost Index
MDT	Mean Down Time

Term	Definition
MGT	Million gross tonnes
MI	Motorised Isolator
MNT	Million net tonnes
MRSB	Maintenance and Renewal Strategy and Budget
Mt	Million tonnes
Mtpa	Million tonnes per annum
NAMS	Network Asset Management System
NCL	North Coast Line
Newlands System Infrastructure Enhancements	Significant upgrades and renewal of Newlands System Rail Infrastructure as part of the scope of the GAPE project
NL	Newlands
NMS	Communications Network Management System
NSAP	Network Strategic Asset Plan
nt	Net tonnes
ntk	Net tonne kilometres
Obsolescence	MRSB Comment – Reason for renewal is the asset is outdated and no longer used or supported
OHLE	Overhead Line Equipment
Opex	Operational Expenditure
OTCI	Overall Track Condition Index – a measure of quality of the geometry of the track calculated from track geometry recording vehicle outputs
PSC Site	Power Supply Cubicle

Term	Definition
PVC	Percent Void Contamination – calculated by dividing the volume of contaminates by the volume of voids within the ballast profile. PVC is determined in a compacted state to simulate actual track conditions
QCA	Queensland Competition Authority
QCA Act	Queensland Competition Authority Act (Qld) 1997
QR	Queensland Rail Limited
QRC	Queensland Resources Council
RAB	Regulated Asset Base
Rail Fatigue	MRSB Comment – Reason for renewal due to the rail fatiguing over time
Rail Wear	MRSB Comment – Reason for renewal due to the wear of rail due to friction and heavy loading.
RAILBAM	Bearing Acoustic Monitor
RBM	Rail Bound Manganese
RCBC	Reinforced Concrete Box Culvert
RCP-CIPP	Reinforced Concrete Pipe - to Cure in Place Pipe
Relay to PBI	Relay to Processor Based Interlocking
Reveloc	Processes Radio Location Information
RGTCT	RG Tanna Coal Terminal
RIG	Rail Industry Group
RIM	Rail Infrastructure Manager
RIW	Rail Infrastructure Workers
RMS CT	Remote Monitoring Systems Current Transducer
RTF	Rail Transfer Facilities

Term	Definition
SDH to IP	Synchronous Digital Hierarchy to Internet Protocol
SI Replacement	Sunny Island Inverter Replacement (Control Systems)
Single line possessions	When asset activity can be completed on one track in a duplicated section whilst the other track is kept operational to allow for continuous train services.
Sleeper Type Change	MRSB Comment – Reason for renewal due to the change in sleeper material or technical type of sleeper.
SMS	Safety Management System
TC to Axle Counter	Track Circuit to Axle Counter
TETRA	Terrestrial Trunked Radio system
TLM	Track Laying Machine
TRSA	Transport (Rail Safety) Act 2010
TSR	Temporary Speed Restriction
Turnout	A section of railway track-work that allows trains to pass from one track on to a diverging path
UT5	Aurizon Network's 2017 Access Undertaking, as approved by the QCA on 19 December 2019 and subsequently amended from time to time.
UTC	Universal Train Control
UTC	Universal Train Control
VPI Replacement	Vital Processor Interlocking (a form of PBI)
Wear – removing 107lb rail	MRSB Comment – Reason for renewal due to worn, old 107lb/yd rail being replaced with modern day equivalent.
WICET	Wiggins Island Coal Export Terminal
WIRP	Wiggins Island Rail Project