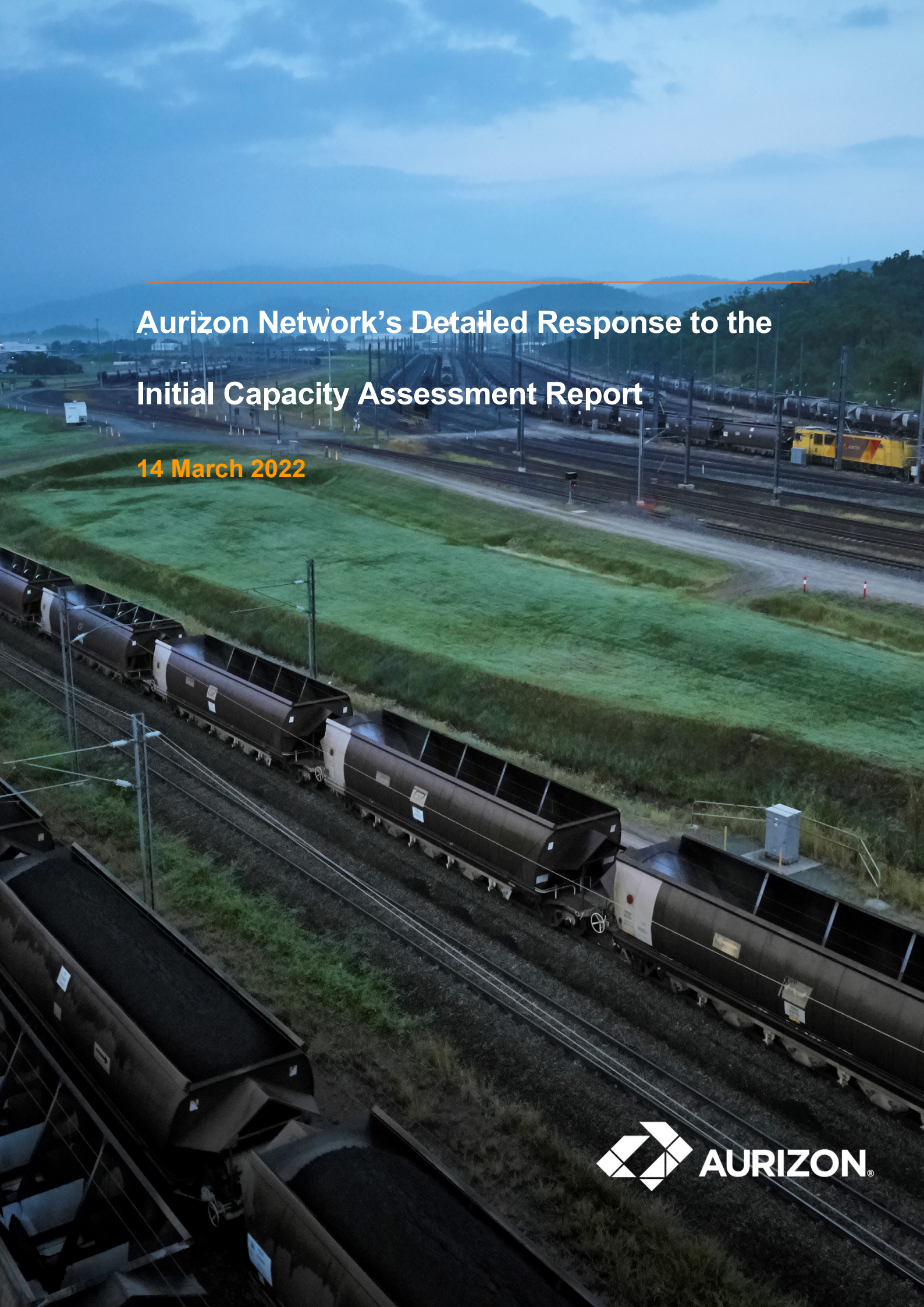

Aurizon Network's Detailed Response to the Initial Capacity Assessment Report

14 March 2022

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Executive Summary

On 28 October 2021, Coal Network Capacity Co Pty Ltd, the Independent Expert jointly appointed by Aurizon Network and its customers under Aurizon Network's UT5 Access Undertaking (**UT5**) released its Initial Capacity Assessment Report (**ICAR**). This report identified an Existing Capacity Deficit across all coal systems. In accordance with UT5, Aurizon Network must provide a recommendation to the Independent Expert and the Queensland Competition Authority (**QCA**) on how to improve capacity and resolve these Existing Capacity Deficits. This Detailed Report provides Aurizon Network's recommendation following extensive analysis and consultation with customers.

Since delivering the Preliminary Report on 12 November 2021, Aurizon Network has been engaging extensively with our customers. From this engagement, customers are seeking a pragmatic program of work to resolve the Existing Capacity Deficits that is low cost and considers changes to demand and operational performance.

Aurizon Network has sought to recommend a flexible process that provides a pathway to achieve the required capacity, while ensuring prudency of investment as follows:

- Where the choice or need for a Transitional Arrangement is clear, Aurizon Network has recommended proceeding with these; and
- Where there are alternate options remaining to resolve the Existing Capacity Deficit, Aurizon Network recommends proceeding with Expansion studies to assess the benefits of these options further, and to enable a more informed investment decision to be made.

In making its recommendation, Aurizon Network has undertaken detailed analysis to understand constrained sections of the network. Options to alleviate these constraints have been tested and simulated to determine their effectiveness in improving capacity. Options have then been assessed based on risk to project delivery, and certainty of capacity. Some options have been ruled out where more efficient options exist. Additionally, where modelling results were inconclusive, Aurizon Network has also considered current operational performance, and management of the Rail Infrastructure, to ensure solutions proposed will address actual constraints. Where possible, Aurizon Network has also sought verification of results by the Independent Expert, ahead of making this recommendation. Cost-effective Transitional Arrangements have been recommended, that will efficiently deliver capacity improvements.

A summary of the recommended approach is detailed below.

NEWLANDS AND GAPE SYSTEMS

The Deliverable Network Capacity in the Newlands and GAPE Systems combined is approximately 32mtpa. Demand has been consistently lower than the Committed Capacity of 50Mtpa, averaging approximately 34mtpa over the past 4 years. Customers have however signalled an increase to this demand, and as such, Aurizon Network recommends implementation of the proposed Transitional Arrangements in a staged manner, providing capacity to meet the changing demand. The following Transitional Arrangements are recommended:

Stage	Transitional Arrangements	Capacity Benefit	Cost Estimate
Stage 1: Implement immediately	***NG1: Installation of RCS Signalling***	5.8Mtpa	$17.6m
	NG2: Optimised BCM	0.2Mtpa	Nil
	NG3: Collinsville Passing Loop Extension	2.0Mtpa	$334,000
	NG4: Collinsville Passing Loop 24hrs	1.7Mtpa	$10m[1]

[1] Final costs will be dependent on investigations into 24hr use.

Stage	Transitional Arrangements	Capacity Benefit	Cost Estimate
Stage 2: Implement when demand is above 38Mtpa and assess between 2 options	***NG5: Coral Creek Passing Loop***	2.5Mtpa	$19.9m
Stage 3: Implement when demand is nearing 50mtpa and assess prudency of option	***NG6: Pring Yard Additional Road***	2Mtpa	$15.9m

In addition to the above, Aurizon Network considers that due to the current low levels of demand, an assumption around the number of consists currently operating may increase as demand nears 50mtpa. Aurizon Network considers that by, when Rail Infrastructure constraints are relieved, increasing consists from 18, as assumed in the ICAR, to 22, additional throughput of up to 8mtpa can be achieved.

90% of affected End Users in GAPE and Newlands have approved Stage 1, and over 50% approve stage 2. There is 30% support for Stage 3. As such, Aurizon Network is seeking the Independent Expert to review the recommendations detailed in this Report, and for the QCA to make a determination as to what Transitional Arrangements will effectively and efficiently resolve the Existing Capacity Deficit.

GOONYELLA SYSTEM

The Existing Capacity Deficit in the Goonyella System is approximately 11Mtpa. Aurizon Network's assessment indicates that there is no one major project that can resolve the deficit; rather a program of smaller projects is proposed. In line with customer feedback, Aurizon Network proposes initially implementing low-cost operating changes, and conducting further concept studies on certain Expansion options, to better inform investment decisions. The following Transitional Arrangements are recommended:

Implementation Approach	Transitional Arrangements	Capacity Benefit	Cost Estimate
Immediate Implementation	**G1: Optimised BCM**	2.8Mtpa	Nil
	G2: Yard Scheduling Improvements	1.1Mtpa	Nil
	G3: Connors Range Track Strengthening	1.6Mtpa	$163,000
Expansion Concept Study into the following:	**G4: Connors Range Track Stability**	2Mtpa	$41.5m - $71.5m
	G5: Jilalan Yard Additional Road	2.5Mtpa	$19.9m - $36.3m
	G6: Removal of operating restrictions on Balloon Loops	1Mtpa	$10m - $30m

Aurizon Network has received 100% approval for Transitional Arrangement G1, and 90% approval for G2. 70% approval has been received for the remaining Transitional Arrangements. As such, Aurizon Network is seeking the Independent Expert to review the recommendations detailed in this report, and for the QCA to make a determination as to what Transitional Arrangements will effectively and efficiently resolve the Existing Capacity Deficit.

BLACKWATER AND MOURA SYSTEMS

The Existing Capacity Deficit in the Blackwater System is approximately 5Mtpa, and a further 1Mtpa in the Moura System. The constraint has been identified as common between the two coal systems, being Callemondah Yard and the operations in and around the port. In the Blackwater System, requests to relinquish Access Rights have been received. Aurizon Network recommends these proceed as part of the Transitional Arrangements and recommends delivery of other projects to rectify the full deficit. The Following Transitional Arrangements are recommended:

Implementation Approach	Transitional Arrangements	Capacity Benefit	Cost Estimate
Immediate Implementation	**Relinquishment**	Up to 3Mtpa	Nil
	BM1: Optimised BCM	0.2Mtpa	Nil
	BM2: Yard Scheduling Improvements	2Mtpa	Nil
Expansion Concept Study into the following:	**BM3: Callemondah Yard Additional Road**	2Mtpa	$15.7m
	BM4: Moura provisioning at Stirrit	1Mtpa	13.7m

Aurizon Network received feedback from 82% of affected End Users. Of those that responded, 100% approval was provided for BM1 and BM2. A further 57% approved the progression of BM3 and BM4. As such, Aurizon Network is seeking the Independent Expert to review the recommendations detailed in this report, and for the QCA to make a determination as to what Transitional Arrangements will effectively and efficiently resolve the Existing Capacity Deficit.

EXPANSION PROCESS AND IMPLEMENTATION

Aurizon Network is required to provide a recommendation on the Transitional Arrangements to resolve the full Existing Capacity Deficit and ensure full Committed Capacity can be achieved. This Report provides the pathways to resolve the full Existing Capacity Deficit in each system. Consideration has however been given to the implementation approach, recognising customer feedback in terms of changing environments.

In calculating the Existing Capacity Deficit, the Independent Expert has used a number of information points to inform the modelling. These points do not remain static, and changes, such as to Committed Capacity or operating parameters, can influence the prudency of investments. Aurizon Network has sought to consider these changes in recommending its proposed Transitional Arrangements. We recommend an implementation approach that seeks to stage certain investments where they align with demand, and in some cases, further study and quantify the benefits of mutually exclusive Transitional Arrangements through Expansion concept studies.

Aurizon Network notes that this approach is not considered in UT5, where a recommendation must be made on Transitional Arrangements, and those implemented. Aurizon Network will be submitting a Draft Amending Access Undertaking (**DAAU**) to the QCA to ensure this process aligns with UT5.

Aurizon Network will propose a DAAU that seeks to enable the process detailed above. The objective of the DAAU is to address the following:

- Provide the ability for the Independent Expert to request additional information or Concept Studies to be undertaken by Aurizon Network, prior to them making a recommendation to the QCA on the most efficient and effective Transitional Arrangements to resolve an Existing Capacity Deficit;
- Ensure the Independent Expert has regard to the most up to date Annual Capacity Assessment when making its recommendation to the QCA on the most efficient and effective Transitional Arrangements; and
- Provide appropriate and effective regulatory certainty that any costs reasonably incurred by Aurizon Network in undertaking Concept Studies to determine the required Transitional Arrangements will be recoverable by Aurizon Network.

Aurizon Network will seek to submit this DAAU to the QCA promptly and will be further seeking support from Customers to streamline the process.

Introduction

Overview

This Report details Aurizon Network's detailed review of the ICAR released on 28 October 2021 by the Independent Expert under UT5.In this Report, Aurizon Network provides the outcome of Aurizon Network's analysis and consultation on the Existing Capacity Deficit and the recommended Transitional Arrangements to address the Existing Capacity Deficit most effectively and efficiently. This includes:

- Advice on whether any Access Holder is willing to, within 30 days, voluntarily relinquish any of its Access Rights;
- Whether changes can be made to the operation and maintenance practices for the Rail Infrastructure, Rollingstock, or in respect of load-out facilities; and
- Expansions considered by Aurizon Network and through consultation, any of which have been agreed by affected Access Holders.

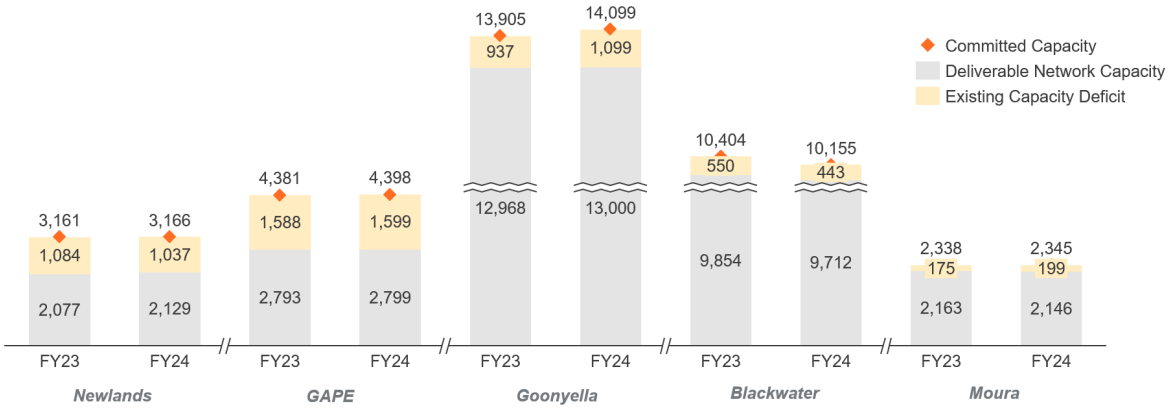
Capitalised terms in this report have the meaning given to those terms in UT5 unless otherwise defined.

ICAR and the Existing Capacity Deficits

In accordance with Part 7A.2 of UT5, the Independent Expert has been appointed to undertake an assessment of the Deliverable Network Capacity (**DNC**) of Aurizon Network's Rail Infrastructure. This assessment seeks to simulate the maximum throughput of each of the Coal Systems, taking into consideration real world performance inputs detailed in the System Operating Parameters (**SOPs**).

The ICAR provides the Independent Expert's analysis on the Deliverable Network Capacity of the Rail Infrastructure in each of Aurizon Network's Coal Systems. The Existing Capacity Deficits are summarised below in Figure 1.

Figure 1: Summary of Existing Capacity Deficits



The ICAR provides an indication as to the likely cause of the constraint in each Coal System. A summary of the constraints identified by the Independent Expert is provided below.

Table 1 – Summary of constraints identified in the ICAR

System	Constraint
Newlands	Pring to Newlands Junction Branch Lines
GAPE	Pring to Newlands Junction Branch Lines
Goonyella	Cargo Assembly operations at DBCT and yard congestion
Blackwater	Yard congestion
Moura	Yard congestion

The results detailed in the ICAR are not representative of the capability of the supply chain in its totality. For supply chain throughput to be assessed, other elements, from coal availability through to port stockpile and ship loading capacity, must be considered. The System Capacity Assessment to be undertaken by the Independent Expert will further inform the industry of overall supply chain capability.

The modelling approach for the Deliverable Network Capacity analysis differs from the historical way that Aurizon Network has undertaken capacity modelling and that has been required by previous undertakings, which was largely based on parameters specified in Access Agreements and assessed the capability of the Rail Infrastructure without consideration of the effect of constraints and operational losses in other parts of the supply chain. The Deliverable Network Capacity assessment is required to consider all constraints in the network including external factors outside of Aurizon Network's control, such as rollingstock capability, mine and port availability, delays and failures, and the supply chain operating mode.

With these changes, the Deliverable Network Capacity differs from what Aurizon Network has previously reported. Where the Independent Expert has identified an Existing Capacity Deficit, Aurizon Network is committed to addressing this through proposed Transitional Arrangements.

Regulatory Process Overview

Part 7A of UT5 sets out the process for the Independent Expert to undertake the ICAR, and for Aurizon Network's response. This process is summarised below:

Independent Expert releases the ICAR	The ICAR has identified Existing Capacity Deficits in the Newlands, GAPE, Goonyella, Blackwater, and Moura Systems
Preliminary Report	Within 20 Business Days, Aurizon Network must provide a preliminary response to the ICAR. Aurizon Network's Preliminary Report provides our customers with our initial views on the causes of the Existing Capacity Deficits, and potential Transitional Arrangements.
Customer Engagement	Aurizon Network consults with affected End Users to seek agreement on Transitional Arrangements required to address the Existing Capacity Deficits.
Detailed Report	Aurizon Network consolidates customer feedback and finalises recommendations on Transitional Arrangements in the Detailed Report and provides this to the QCA, the Independent Expert and the Chair of the RIG. Aurizon Network notes that this detailed response was required to be delivered within 3 months of the ICAR being published. In consultation and agreement with our customers, this timeframe was agreed to be extended to provide more time for detailed consultation, with consideration to leave over the Christmas period. A further extension was sought by customers to better consider Aurizon Network's proposal. The detailed response has therefore been delayed by 6 weeks. However, this additional time has been valuable to both customers and Aurizon Network in developing this recommendation.
Transitional Arrangement Approval	If agreement is reached on the proposed Transitional Arrangements, the Independent Expert will consider and approve the efficiency of any capital spend before it's incurred. If no agreement is reached, the Independent Expert will make a recommendation to the QCA for its determination as to the most efficient way of addressing capacity deficits.
Implementation	Following QCA determination, Aurizon Network will implement those Transitional Arrangements which are within its control, and which would not place it in breach of UT5, any Access Agreements or any applicable Safeworking Procedures and Safety Standards.

Transitional Arrangements to create capacity

Transitional Arrangements are changes that can be made to address any Existing Capacity Deficits identified within the ICAR. These changes can be classified under five different categories:

- Changes to the operation and maintenance practices for the Rail Infrastructure;
- Changes to the operations of Rollingstock by Railway Operators;
- Changes to the operation and maintenance practices in respect of load-out facilities by customers and other interfaces forming part of the Supply Chain;
- Voluntary relinquishment of Access Rights by Access Holders, where they are entitled to do so in accordance with their Access Agreement; and
- Options for Expansions.

Interaction with the Independent Expert

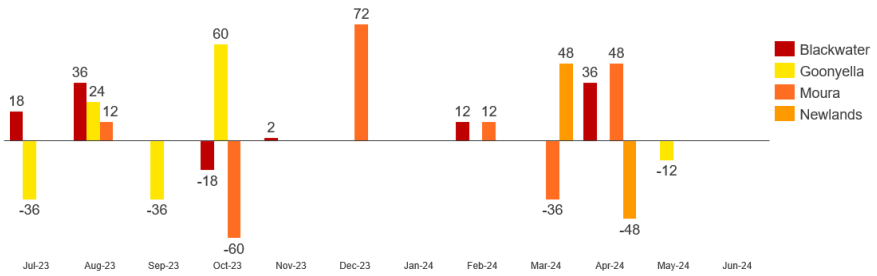
In accordance with Part 7A.4.1(f) of UT5, it is intended that Aurizon Network will receive a copy of the dynamic model developed by the Independent Expert, subject to any confidentiality and intellectual property restrictions. Unfortunately, Aurizon Network has not been provided with direct access to this dynamic simulation model.

As detailed in the Preliminary Report, Aurizon Network has developed its own model which reflects the requirements of Deliverable Network Capacity. Aurizon Network's model has been used to initially determine constrained sections, and test various alternatives. As options have been narrowed down, Aurizon Network has been working with the Independent Expert to verify results. Where requested, the Independent Expert has performed its own analysis, and provided advice to Aurizon Network on its results.

Aurizon Network recognises that the Independent Expert's model is the only model to be considered when determining Available Capacity. Where the results have been verified, Aurizon Network has indicated so for each of the Transitional Arrangements in Appendix 1.

There are however several differences seen between the results. Aurizon Network understands that these are due to different assumptions, and modelling variances. The differences in modelling approach can influence the capacity benefits seen. Where there are differences in the results, Aurizon Network proposes that for those Transitional Arrangements, further study and verification is required prior to making an investment decision. Aurizon Network remains confident in the overall Deliverable Network Capacity numbers provided in the ICAR. The intention of further study is to ensure that investments made are directly resolving constraints on the network.

Focus	***Details***
Scheduling Environment	• Simulation modelling takes a set demand input and seeks to achieve this demand. It always assumes that demand remains constant and available. • In reality, variation exists during each stage of the scheduling process from ordering through to execution. Variation comes from commercial overlays for ordering, coal availability, port availability, and issues from the previous schedule carrying forward. • Aurizon Network understands this variation is not considered in DNC modelling but acknowledges that variation to schedule creates lost opportunity for system throughput.
Schedule Delivery and Pathing	• Aurizon Network's train planning and scheduling process produces a schedule of services that seeks to optimise for throughput. Each crossing activity is planned. In the day of operations, Network Control manages out of course running in accordance with the Traffic Management Principles in UT5.

	• This varies from the approach used in the Independent Expert's dynamic simulation model. The Independent Expert's model uses a run when ready approach, where movements are based on a "node-to-node" movement. To manage crossing of trains, the model uses an algorithm to define locations where crossing activities can and can't occur, to ensure trains do not deadlock. It seeks to ensure that where a train stops, should another train approach on the same line, that train can cross. This approach means that longer sections of track are booked ahead, to ensure a clear path is always available. • Aurizon Network's model uses a Train Control logic, that looks ahead to manage potential clashes. The model first looks for trains in the vicinity. It will look ahead to the next possible crossing location. It then calculates the time both trains will take to get there, and whether they may clash. Where there is the potential for a clash, either of the trains will hold, or be re-routed to enable the cross to occur. This approach uses nodes that reflect the signalling locations of the network. Where there is no approaching train, the service may book the section and keep moving. • The models are producing similar results overall, however the different approaches can result in the constraint manifesting in different parts of the network. • Aurizon Network considers that modelled outcomes by the Independent Expert are likely to produce longer cycle times and result in higher congestion on branch lines. There is also the risk that with this approach, the impact on yard congestion is underestimated as trains are simulated to depart the yard as soon as they are ready, rather than to meet scheduled connections, and are spending more time on the network.
Yard Management	• Simulating the number of activities that occur in each of the yards requires a large amount of detail to be constructed in the model. • The Independent Expert's model replicates yards at a macro level. This means that specific roads for activities such as provisioning are not represented, and unplanned activities have not been recognised. In addition, other activities in the yard, such as above rail shunting and connection requirements may not be captured. • Aurizon Network's model seeks to replicate the operation of the yard by ensuring dwells on each road represent activities as they occur in specific locations. This enables identification of potential constraints associated with yard capacity and operations.
Maintenance Activities - FY23 Maintenance input	• Aurizon Network provided maintenance inputs for FY23 and FY24 to the Independent Expert prior to the FY23 MRSB process commencing. As such, the maintenance input was largely based on the FY22 program, with some changes for known major works. • Aurizon Network has reviewed the now developed FY23 closure program with the FY23 maintenance input. The following variation was identified (hrs): *Figure 2 – Variance in FY23 MRSB proposed system closures from SOP assumption (hrs)*  • Aurizon Network considers that the above-described variations are minimal when considered annually, and unlikely to materially affect the Deliverable Network Capacity.
Maintenance Activities – Moving Maintenance	• Moving maintenance includes resurfacing, ballast trains, turnout and mainline grinding, rail inspection vehicles, vegetation management traffic, and work trains carrying materials to job sites. • Over the past 4 years, these services account for 4500 trains each year. This is an additional 6.3% of Train Paths above Committed Capacity.

	• Historical information on the number and location of each moving maintenance train was provided to the Independent Expert, along with a schedule for Hi-rail track inspections. • The SOPs indicate that an assumption for moving maintenance has been included, but do not provide details of the amount of moving maintenance services assumed. • If these maintenance activities have not been adequately accounted for, there is the potential that the Existing Capacity Deficit could be understated. Aurizon Network has sought to address this in its response, by testing all Transitional Arrangements with simulations inclusive of moving maintenance activities.
Delays	• Aurizon Network understands that the Independent Expert's model has used historical delay data to generate an amount of delay to be applied to services based on distance travelled. All delays are grouped and applied at set intervals. • Aurizon Network's model implements delays differently, based on the historical risk of an incident occurring on each track section. This seeks to ensure that where incidents occur on critical parts of the network, their locational specific impact is considered. • The SOP does not provide a breakdown on the number of delays, and their cause that have been included in the simulation, and therefore cannot be directly compared against actual results to ensure that the simulation is applying delays adequately. It is not clear whether congestion caused by delays at specific locations, such as yards and critical mainline locations is being adequately modelled.

Newlands and GAPE Systems Recommendation

ICAR Results Overview

The ICAR indicated that an Existing Capacity Deficit exists in both the Newlands and GAPE Systems. It indicates that the cause of the constraint is common across both systems. The ICAR findings are summarised below:

Table 2: Summary of ICAR Results for Newlands and GAPE

ICAR Results *(Train Paths)*		**FY20**	**FY21**	**FY22**	**FY23**	**FY24**
Newlands	Committed Capacity	3110	2410	3097	3161	3166
	Deliverable Network Capacity	1899	1727	2047	2077	2129
	Existing Capacity Deficit	1211	684	1050	1084	1037
	% of Committed Capacity Achieved	**61%**	**72%**	**66%**	**66%**	**67%**
GAPE	Committed Capacity	4419	4286	4389	4381	4398
	Deliverable Network Capacity	2651	2962	2798	2793	2799
	Existing Capacity Deficit	1769	1324	1591	1588	1599
	% of Committed Capacity Achieved	**60%**	**69%**	**64%**	**64%**	**64%**

The constraining section has been identified by the Independent Expert as the Newlands to Pring section of the mainline. As this section is common to both Newlands and GAPE system traffic, Aurizon Network has sought to provide a common solution for both coal systems.

Factors contributing to the Existing Capacity Deficit

Aurizon Network has reviewed the information provided in the ICAR and has undertaken analysis to determine the cause of the Existing Capacity Deficit. Factors identified are summarised below. Full details can be found in Aurizon Network's Preliminary Report.

- **DTC Signalling:** Signalling between Sonoma Junction and Havilah uses Direct Train Control (DTC) signalling. This older form of signalling requires trains to stop to change points and can add significant time to the train cycle.
- **Almoola to Birralee section:** This section is the longest section on the Newlands mainline and sets the headway between trains to 60 minutes. The Collinsville Passing Loop lies within this section and is not currently used as the predominant trains in the system are too large to stop safely.
- **Rollingstock Fleet:** Aurizon Network has reviewed the number of consists operating across the Newlands and GAPE Systems. Aurizon Network considers that the peak assumed fleet across the GAPE and Newlands Systems of 18 consists is an appropriate number to meet current demand. Currently, the Rail Infrastructure in place cannot support more fleet, as this will lead to congestion. It is reasonable to assume that should real demand equal Committed Capacity, Rail Operators would look to support this demand with increased fleet, or through productivity improvements. When Rail Infrastructure constraints are relieved, increased fleet will significantly improve system throughput.
- **Yard Congestion:** When modelling to achieve full committed capacity, and with increased fleet numbers, Aurizon Network's analysis indicates that Pring Yard will not be sufficient to support yard operations and staging to NQXT. The level of constraint in the yard is influenced by assumptions on the number of consists each operator is using, and the time they spend in the yard.

Factors influencing Deliverable Network Capacity

Aurizon Network is required to provide a recommendation on the Transitional Arrangements required to resolve the full Existing Capacity Deficit and ensure full Committed Capacity can be achieved. In calculating the Existing Capacity Deficit, the Independent Expert has used a number of information points to inform the modelling. These data points do not remain static, and changes can influence the potential outcome. Aurizon Network has sought to consider these changes in recommending its proposed Transitional Arrangements, and the proposed implementation approach.

VARIATIONS IN COMMITTED CAPACITY

Aurizon Network has reviewed the Committed Capacity of the GAPE and Newlands systems, to determine whether any material changes have occurred since the ICAR was published. For the Newlands and GAPE systems, no material changes have occurred. The variations listed below are due to minor transfers occurring. Transfers have occurred for the origins of GAPE traffic. The branch line impact of these changes is considered in Table 10.

Aurizon Network has also simulated the demand provided to the Independent Expert in August 2021, that was used in the ICAR, compared to the current demand. No change in throughput was identified. Accordingly, no further consideration for changes in Committed Capacity have been included.

Table 3: Committed Capacity variances between Aug 21 and Feb 22 - Newlands and GAPE

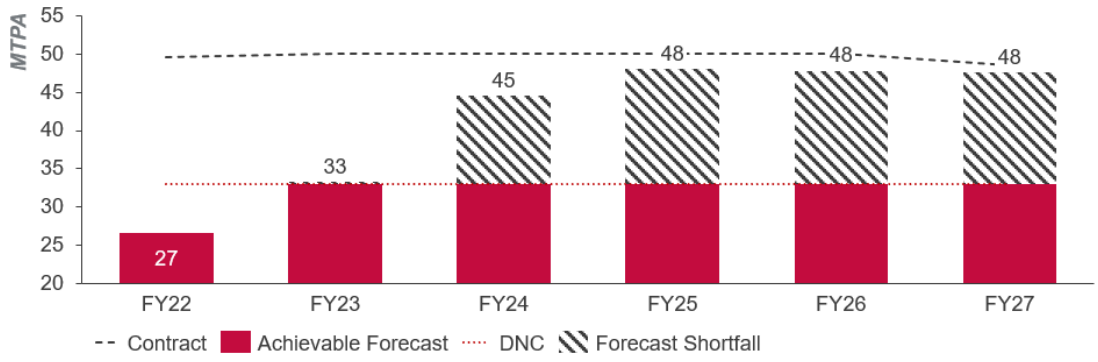
Variance from ICAR Demand (Train Paths)	FY23	FY24
1A: Pring to Abbot Point	-	-
1B: Newlands Junction to Collinsville	-12	-
ML: Pring to Collinsville	-	-
2A: North Goonyella Junction to Newlands Junction	-	-

SYSTEM DEMAND

As detailed in Aurizon Network's Preliminary Report, there is a large difference between the demand currently operating in the Newlands and GAPE Systems, and the Committed Capacity. Through consultation with Customers of these systems, it was clear that while an Existing Capacity Deficit exists, rectification of that deficit is sought to meet demand increases in the systems.

Aurizon Network sought for customers to provide a forecast of demand over the coming years. The results are detailed below in Figure . With this, certain customers are expecting to increase production in the coming years. Aurizon Network has used this demand forecast to inform the proposed Transitional Arrangements, and their staging.

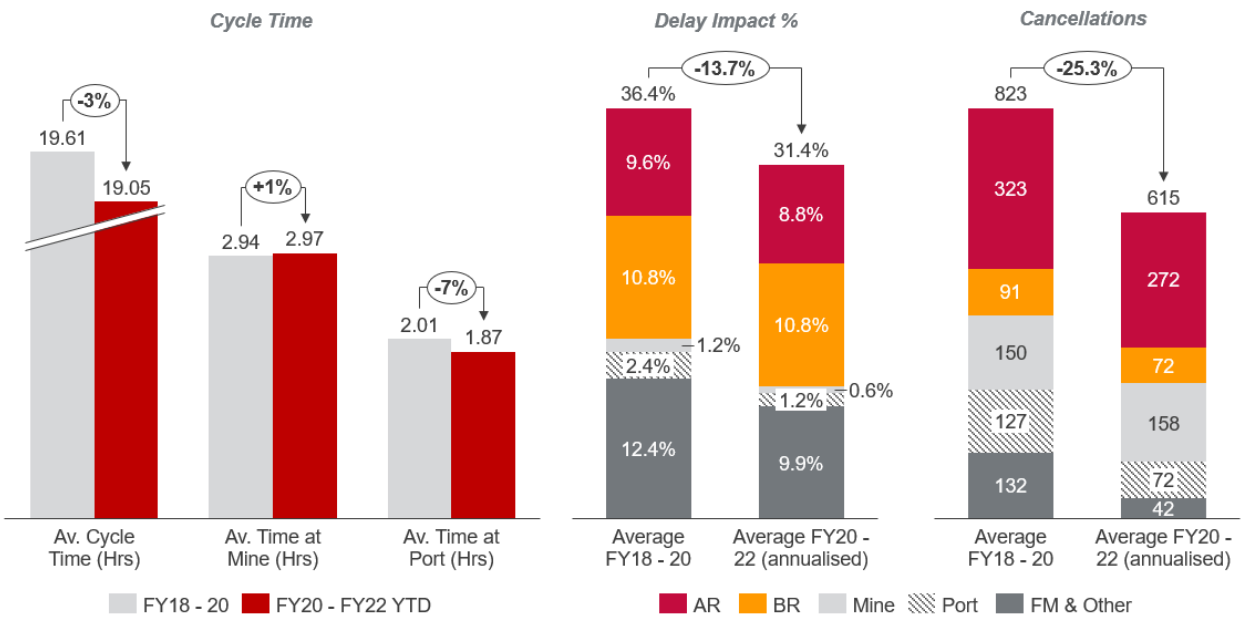
Figure 3: Newlands and GAPE Demand Forecast



OPERATIONAL PERFORMANCE

Aurizon Network has reviewed key operational performance metrics to determine whether there have been any major changes that could impact capacity. The below provides a snapshot of variations in performance from the ICAR data period of FY18 – 20, to a revised sample between FY20, to YTD FY22.

Figure 4: Newlands and GAPE system performance metrics review



From the above, there are some noticeable changes to consider in terms of their impact on capacity:

- The average time at port has reduced by 7%
- Overall, there is also a reduction in delay impact of 13%
- Cancellations have also decreased by 25%

With reference to the sensitivities undertaken by the Independent Expert in the ICAR[2], these reductions may contribute to a 0.3% - 0.8% improvement in overall capacity. The updated impact of these changes will be modelled as part of the Annual Capacity Assessment Process.

Outcome of Customer Consultation

CONSULTATION ACTIVITINDEPENDENT EXPERTS

Since November 2021, Aurizon Network has been engaging with Customers to discuss options for Transitional Arrangements to resolve the Existing Capacity Deficit. The following activities have been undertaken:

Nov 21	1:1 Customer engagement to seek feedback on Preliminary Report and Transitional Arrangements
6 Dec 21	Newlands and GAPE Customer Forum
22 Dec 21	Further information provided to customers closing out outstanding questions
Jan 22	Further 1:1 engagement and consultation as required

[2] Figure 20 in the Independent Expert's Initial Capacity Assessment Report published on 1 November 2021.

22 Jan 22	Customers provided formal notice of willingness to Relinquish Access Rights
1 Feb 22	Newlands and GAPE Customer Forum
14 Feb 22	Aurizon Network provides customers with detailed proposal for consideration and approval
4 Mar 22	Customers provide formal feedback and approval on proposal
14 Mar 22	Detailed Report published

Aurizon Network considers the overall engagement has been constructive, and balanced. Customer consultation has influenced the approach for Aurizon Network's proposal for Newlands and GAPE. From engagement, we understand Aurizon Network's customers:

- are seeking for capacity to be increased to match demand;
- are conscious of previous expansion outcomes from the GAPE project; and
- recognise the changing demand across the two systems and are seeking a fair allocation of cost.

CUSTOMER APPROVAL

On 14 February, Aurizon Network provided its proposal as detailed below to resolve the Newlands and GAPE Existing Capacity Deficit, to affected End Users.

Aurizon Network has received feedback from each of the GAPE and Newlands End Users. While largely supportive of the proposal, some approval was provided conditionally. As such, Aurizon Network will seek for the Independent Expert to review the proposed Transitional Arrangements and make a recommendation to the QCA for its determination in accordance with Part 7A.5(d) of UT5. Aurizon Network seeks for the feedback from End Users to be considered in making such recommendation and determination.

The below provides an overview of customer support and feedback:

Table 4: Summary of End User Feedback for GAPE and Newlands

Transitional Arrangement	Customer Approval		Approval Conditions	Feedback where approval not provided
	Newlands *3 End Users*	GAPE *6 End Users*		
Stage 1 - NG1: RCS - NG2: Optimised BCM - NG3: Collinsville Passing Loop Extension	100%	83%	- Adherence to terms agreed with GAPE customers as part of a confidential agreement entered into a few years ago - Requirement to accelerate NG1: RCS in Newlands - Some customers seeking inclusion of RCS in GAPE only, while others are seeking allocation to reflect both systems usages.	- Support for Stage 1 Scope, but not approved based on cost allocation proposal, but seeking cost allocation across both systems
Stage 2 - NG4: Collinsville Passing Loop 24hrs	66%	50%	- Approved to commence concept studies only - Preference for Coral Creek Passing loop rather than Collinsville 24hrs from 5 out of 7 End Users	- Need for this option to be considered later, and with consideration of demand changes.

Transitional Arrangement	Customer Approval		Approval Conditions	Feedback where approval not provided
	Newlands *3 End Users*	GAPE *6 End Users*		
- NG5: Coral Creek Passing Loop				
Stage 3 - NG6 Pring Yard	0%	50%		- Further study required to determine if needed, or if issue can be resolved through above rail changes.

OUTSTANDING MATTERS

Based on feedback received from Customers, Aurizon Network has formed its proposal below. Aurizon Network recognises the following outstanding issues for resolution with End Users:

- **Cost allocation** - Differing views remain around the allocation of costs to the Newlands and GAPE systems. Aurizon Network has outlined its proposal below. For Expansions, Aurizon Network will provide a Pricing Proposal to the QCA for consideration in accordance with the principles of Part 6 of UT5.

- **Timing for Expansions** - Aurizon Network recognises customers desire to accelerate the program for Stage 1, and in some cases, Stage 2 works. Aurizon Network will seek to accommodate this where possible, while ensuring the prudency of the project remains.

- **Requirements for later stages** – At this stage, support to resolve the full Existing Capacity Deficit is low. Given uncertainty in demand, Stage 3 has received only 30% support. Aurizon Network is required to provide Transitional Arrangements to resolve the full Existing Capacity Deficit. We have however sought to incorporate flexibility in the proposal below to recognise changes.

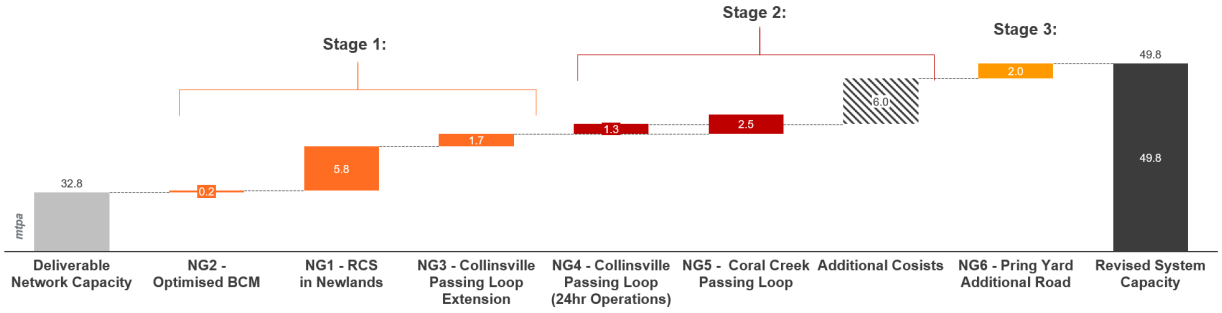
Proposed Transitional Arrangements

For the GAPE and Newlands Systems, Aurizon Network is proposing to resolve the Existing Capacity Deficit through a staged implementation approach. This approach is recommended to match demand in the GAPE and Newlands system, and also to enable the impact of changing demand to be recognised in investments.

Demand in GAPE and Newlands is generally being serviced with the Existing Capacity. Customers have provided a demand forecast, from which we expect to see growth in demand over the next 2 – 5 years. The staged approach seeks to ensure that capacity can be installed when required by our existing Access Holders. It provides a pathway for the full volume to be installed, and enables further Expansions beyond the current 50Mtpa, should they be required.

The staged approach is described below. Details of each of the projects can be found in Appendix 1.

Figure 5: Newlands and GAPE Transitional Arrangement Bridge



TRANSITIONAL ARRANGEMENTS TO BE IMPLEMENTED:

Stage 1

Stage 1 seeks to implement capacity to meet near term demand. Demand currently remains below the Deliverable Network Capacity of 32.8Mtpa, however Customers have indicated that demand is likely to increase over the coming 2 - 5 years. The target for Stage 1 is to deliver capacity for 8mtpa.

Aurizon Network considers it prudent to commence Stage 1 as soon as approved, to deliver capacity as soon as practicable. Below provides an overview of the proposed Transitional Arrangements in Stage 1. Details on each of the Transitional Arrangements are available in Appendix 1.

Aurizon Network recognises that some customers in the GAPE and Newlands systems have requested the timeframes for Stage 1 Transitional Arrangements are improved. Aurizon Network will review these timeframes for efficiencies in the initial design stages. Options for improved timeframes will also consider resourcing options, and the cost impact of those.

Table 5: Recommended Transitional Arrangements – Stage 1

Transitional Arrangement	Potential Capacity Created		Concept Design Costs	Capital Cost Estimate	Cost vs. Capacity[3]	Implementation Timeframe
NG1: Installation of RCS Signalling	773 Train Paths	5.8Mtpa	$25,000	$17.6m[4]	$22,700 per train path $0.11nt increase in reference tariff	30 Months
NG2: Optimised BCM	30 Train Paths	0.2Mtpa	Nil	Nil	No cost	Immediate from July 2023
NG3: Collinsville Passing Loop Extension	253 Train Paths	1.7Mtpa	$33,000	$304,000	$1,200 per train path Minimal impact on reference tariff	9 months

Stage 2

Stage 2 seeks to increase the capacity across the Newlands and GAPE systems by a further 8Mtpa. The primary capacity increase in this stage is driven by the assumed number of consists operating in the system. When Stage 1 is complete, additional pathing is provided to enable more consists in the Newlands and GAPE systems. It is also assumed that as demand increases above current operating levels, Operators will seek to service this demand with more consists. As the assumed number of consists increases, the paths created through additional infrastructure in Stage 1 and 2 can be optimally used.

Stage 2 involves a decision between Projects NG4, and NG5. These projects are direct alternatives. To make this decision, Aurizon Network proposes a Newlands and GAPE Expansion study to develop the details required to support a recommendation as to a proposed way forward. The Expansion study process is summarised as:

- A Concept study report will be developed providing the scope, design, cost, and risk elements for each of the projects.
- Based on the Concept study outcome, Aurizon Network will recommend an approach for implementation
- In making this recommendation, Aurizon Network will also undertake a review of the capacity requirements at that time, considering improvements made from the first wave of Transitional Arrangements, contractual adjustments, and any changes in operational performance.
- Customers will have the opportunity to provide feedback in response to the recommendation prior to further study work commencing.
- The proceeding stages of design will further refine the scope and costs. This approach will ensure prudency of investment.

Aurizon Network notes that this approach is not considered in UT5, where a recommendation must be made on Transitional Arrangements, and those implemented. Aurizon Network considers a further study prudent to ensure the

[3] Comparison of capital cost to number of train paths created in a calendar year from the investment, assuming volume forecast remains constant. Should volume forecast increase, cost is likely to reduce.

[4] Costs indicated above are reflective of scope from Sonoma Junction to McNaughton Junction. Full RCS Enhancements involve scope from North Goonyella to McNaughton junction already constructed and operational. Capital costs associated with this portion of the scope ($12.5m ($FY14) when constructed and are currently not included in the GAPE pricing RAB. Aurizon Network will continue to adhere to the terms agreed with GAPE customers as part of a confidential agreement entered into a few years ago.

most efficient outcome is recommended. This will enable variables such as demand, Committed Capacity, and operational performance metrics to be considered in line with maturing modelling. Aurizon Network will be seeking a Draft Amending Access Undertaking to ensure UT5 can accommodate this process. Further details of the proposed process and Draft Amending Access Undertaking are set out in Appendix 2.

Table 6: Recommended Transitional Arrangements - Stage 2

Transitional Arrangement	Potential Capacity Created		Concept Design Costs	Capital Cost Estimate	Cost vs. Capacity[5]	Implementation Timeframe
NG4: Collinsville Passing Loop 24hr use	253 Train Paths	1.4Mtpa	$100,000	$10m	$39,500 per train path $0.07nt increase to reference tariffs	24 Months
NG5: Coral Creek Passing Loop	380 Train Paths	2.5Mtpa	Nil – completed as part of Newlands Expansion Project	$19.9m	$52,400 per train path $0.12nt increase to reference tariffs	18 Months

Stage 3

Stage 3 focus is to create the full 50Mtpa capacity. The requirement for this stage 3 is largely dependent on operations of the Newlands and GAPE Coal Systems at the time, and its scope is likely to change. Aurizon Network does not consider it prudent to invest in Stage 3 at this point in time given the current demand, and until Stage 2 has been implemented.

Based on information known today, Aurizon Networks modelling recommends the following Transitional Arrangement be considered in Stage 3. However, further review will be required prior to implementation, having regard to changing dynamics across the system.

Table 7: Recommended Transitional Arrangements – Stage 3

Transitional Arrangement	Potential Capacity Created		Concept Design Costs	Capital Cost Estimate	Cost vs. Capacity[6]	Implementation Timeframe
NG6: Pring Yard additional road	88 – 200 Train Paths	0.5 – 2Mtpa	$150,000	$15.8m	$79 – 180k per train path $0.10nt increase to reference tariffs	24 Months

COST ALLOCATION PROPOSAL

Where Expansions are approved through the ICAR process, Aurizon Network will make a Pricing Proposal to the QCA for cost allocation in accordance with Part 6 of UT5.

[5] Assuming volume forecast remains constant. Should volume forecast increase, cost is likely to reduce.
[6] Assuming volume forecast remains constant. Should volume forecast increase, cost is likely to reduce.

For the Newlands and GAPE System, a key issue identified through consultation is the allocation of cost between the two systems. Aurizon Network has therefore sought to provide its intention, subject to the Pricing Proposal to be developed.

As an overarching principle, Aurizon Network considers that where all Access Holders are affected, costs should be included within the relevant Regulated Asset Base on a fully socialised basis. However, in the GAPE and Newlands systems, Aurizon Network is seeking to have regard to prior commitments made following the GAPE project, to install RCS when sufficient demand existed.

The proposed staged implementation also means any changes in the Committed Capacity can be factored into any cost allocation decisions at the time of investment. Changes in the origin of future demand and the consists used may also influence the allocation of any future deficit and will be picked up through the Independent Expert's Annual Capacity Assessment process. Aurizon Network therefore proposes high level principles in terms of cost allocation. Aurizon Network recognises that pending the timing of these projects, and subject to Newlands and GAPE remaining separate systems for pricing purposes, these principles will need to be further refined.

A summary of Aurizon Network's intended approach for each stage and Transitional Arrangement for the GAPE and Newlands system is provided below:

Table 8: Summary of cost allocation proposal

	Ref.	Project Name	Cost Allocation Principle
Stage 1	NG1	Installation of RCS Signalling	100% allocation to GAPE RAB
	NG2	Optimised BCM Program	Included in MRSB
	NG3	Collinsville Passing Loop Extension	Allocation to Newlands and GAPE RAB based on proportion of Existing Capacity Deficit as identified in the ICAR
Stage 2	NG4	Collinsville Passing Loop 24hr Use	Proportionate allocation based on Existing Capacity Deficit at a System level, with reference to any revised capacity assumptions identified by the Independent Expert.
	NG5	Coral Creek Passing Loop	
Stage 3	NG6	Pring Yard additional road	

Where study costs are incurred in order to assess and determine the most efficient and effective Transitional Arrangement to proceed, but studied Transitional Arrangements are not progressed, or the Expansion is no longer required, Aurizon Network will also seek to recover these costs in the Regulated Asset Base, as we consider this cost prudent in order to meet the requirements of UT5.

IMPLEMENTATION

For each stage, Aurizon Network proposes a slightly varied implementation approach. This is intended to reflect and manage future uncertainty in demand, ensuring Expansions are only constructed as required. Details are as follows:

Stage 1	Subject to approval, Aurizon Network will commence the scopes of work as described in Appendix 1 for Stage 1 Transitional Arrangements. In undertaking the Expansions associated with NG1 and NG3, Aurizon Network will ensure that the Expansions remain prudent, reviewing changes in Committed Capacity, and with reference to the Annual Capacity Assessment Report.

Aurizon Network will provide customers with reporting to provide updates on the progress of implementation. This will include updates on cost, timing, and capacity delivered.

For NG1 and NG3, the Transitional Arrangements will be considered to be complete once the Expansions are practically complete. 6 months after practical completion, the Independent Expert will be required to review and confirm the capacity delivered.

For NG2, Aurizon Network considers the benefit of this project can be immediately seen, as no works are required. Implementation is underway via the approval of the FY23 MRSB.

Stage 2

Given the current level of demand, Aurizon Network does not consider it prudent to fully undertake Stage 2 at this point in time. Aurizon Network recommends however that the Concept studies for Stage 2 commence. This will ensure that design can be completed to a stage where a decision can be made between using Collinsville Passing Loop 24hrs a day, and the alternative of Coral Creek passing loop.

Aurizon Network proposes that the Expansion Concept Study detailed above follow the proposed DAAU process detailed in Appendix 2.

Aurizon Network proposes that once these studies have been completed, Stage 2 is put on hold until:

- Actual demand to North Queensland Export Terminal is above 38 Mtpa;
- As otherwise agreed with Access Holders in the GAPE and Newlands Systems; or
- As otherwise required in accordance with the Access Undertaking.

Stage 3

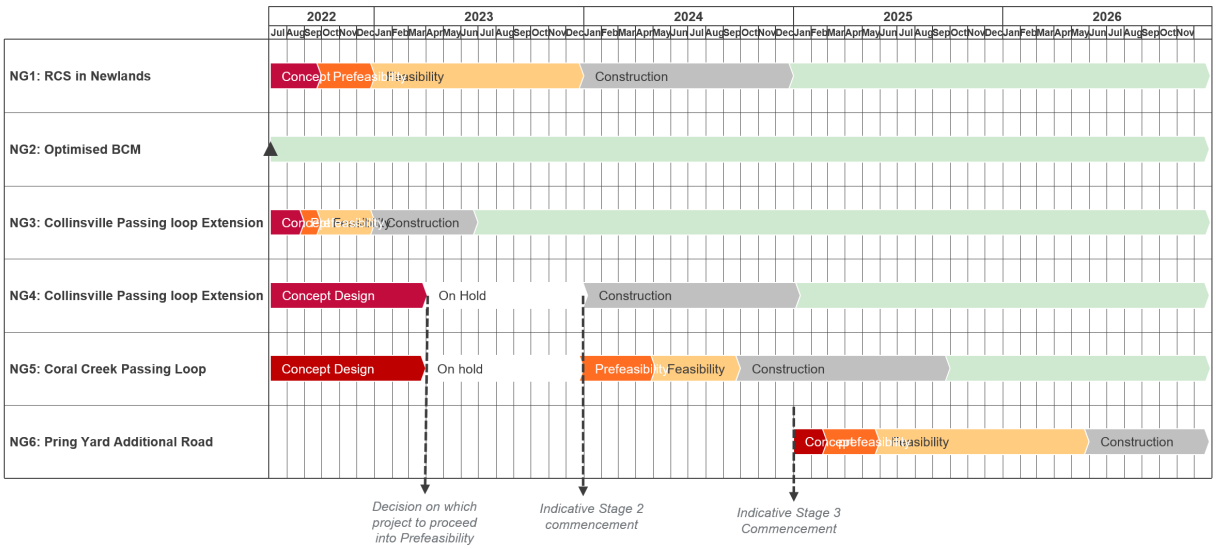
Aurizon Network also proposes to delay Stage 3 until demand signals are close to 50Mtpa. Stage 3 will be triggered by:

- Stage 1 and 2 being implemented; or
- Actual demand being near to 45Mtpa; or
- Yard operational requirements of the fleet operating at the time; or
- As otherwise agreed with Access Holders in the GAPE and Newlands Systems.

At that point in time, the scope requirement may also change given the change in users, operating fleet, and network performance. Stage 3 will commence with a full review of operating and performance parameters, with reference to the Annual Capacity Review at that point in time.

The following provides a high-level implementation timeframe. Please note dates indicates are indicative only, and will depend on time take for QCA Determination, and resource availability. So

Figure 6: Newlands and GAPE Implementation Timeframes



ALTENATIVE TRANSITIONAL ARRANGEMENTS NOT RECOMMENDED

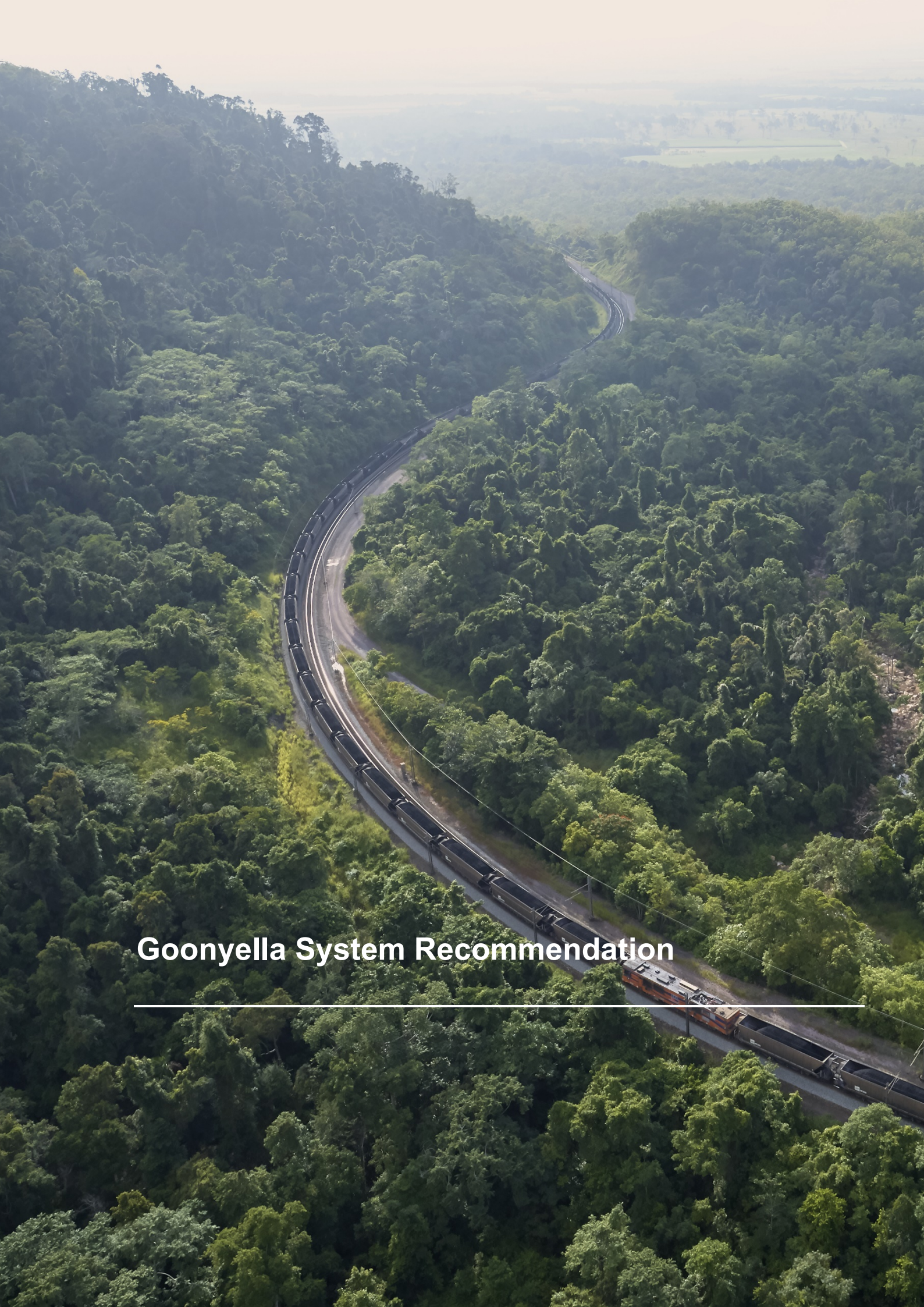
Aurizon Network's recommended Transitional Arrangements have been determined based on their potential benefit to system throughput, ensuring constraints identified can be alleviated, and the options provide an efficient and effective solution.

Through this process, other options have been considered for Newlands and GAPE. These are detailed below.

Relinquishment	Aurizon Network sought formal advice from Newlands and GAPE customers as to whether they were willing to relinquish any Access Rights. No Access Holders provided advice that they were willing to relinquish any Access Rights.
Improve Network Availability by lowering time on track	The Independent Expert has modelled a 10% reduction across the board for all planned maintenance activities and achieves a 0.4% improvement in capacity. Aurizon Network has also reviewed options to increase availability through changes to planned maintenance. Aurizon Network's approach to modelling this sensitivity is to reduce the duration of a single system closure, rather than across all maintenance hours. Results indicate a similar outcome, with a minimal increase of 0.4% in throughput seen. This option involves prioritising access for coal carrying services over maintenance requirements. To ensure the track conditions remain to standard, this will likely impact the approach to maintenance, requiring more resources to undertake more maintenance in less time. This will lead to increased maintenance costs. Based on the minor capacity benefit, at this stage, Aurizon Network considers that the impact to maintenance cost may outweigh the benefit.
Improve Network Reliability through less delays	To achieve better reliability, additional preventative maintenance would be required, as well as resourcing to respond and rectify incidents quicker. A 10% improvement has been modelled. Cycle time improvements are seen; however, this change contributes to less than 0.1% improvement in throughput. This approach is similar to the reduction in general delays as proposed in the ICAR. In the ICAR, a 0.5% capacity improvement is reported. The difference between Aurizon Network's approach is that we have focused only on below rail delays. To reach the 0.5% indicated by the Independent Expert, improvements in rollingstock, mine and port delays would be required.
Improvements to DTC Crossing Times	Consideration has been given to whether DTC crossing activities can be undertaken quicker, to reduce crossing times. Risk assessments have previously been undertaken to determine whether simultaneous crossing activities can occur. Aurizon Network considers this is not in line with our Safeworking System, and as such, recommend RCS as a more safe and efficient alternative.
Goonyella Length Trains	Through the Newlands Expansion study, Aurizon Network has previously undertaken a review of infrastructure changes required to accommodate Goonyella length trains in the Newlands and GAPE systems. This option has the potential to unlock a significant (>10mtpa) amount of capacity. However, it requires the lengthening of all passing loops, and loading and unloading facilities. The cost estimate for this is above $100m. As such, Aurizon Network does not consider this option prudent at this time.
Stop/Start delays	The ICAR reports a potential improvement in capacity of up to 1.4%, by reducing Stop/Start delays by 1 minute. Aurizon Network has reviewed the practicality of achieving this. Based on the below, Aurizon Network does not consider reductions achievable: • Starting Time is governed by the available tractive power of locomotives. To accelerate a loaded coal train from standstill to 80 km/h on a level gradient takes 3 minutes 15 seconds longer than to travel the same distance at a constant speed of 80 km/h.

	• Stopping time is governed by the layout of signalling and the requirements of safety standards[7]. This standard requires that stopping trains reduce speed to 20 km/h below boarded speed when passing the approach signal to a signal set at stop. The distance between the approach and target signal in the Newlands system would typically be about 1500m depending on gradient and other factors. A stopping train takes at least 4 minutes more to travel this distance than a train travelling at line speed.
Teviot Brook Passing Loop	Aurizon Network has previously identified Teviot Brook Passing Loop as required for expansion volumes across the North Goonyella section. However, modelling indicates that the change in assumptions from theoretical to DNC parameters does not cause added congestion on this section. Aurizon Network does not consider that this passing loop is essential to resolve an Existing Capacity Deficit. Teviot Brook Passing Loop provides a 10-minute cycle time benefit, and overall TSE improvement of 0.1%.
ATIS	An Automatic Track Inspection System is currently being trialled in the Blackwater system. The immediate quantifiable capacity benefit is a reduction in access required for the track recording car. Aurizon Network considers this could improve capacity marginally. More frequent data collection may lead to improvements in reliability and condition-based maintenance strategies; however, the extent of these benefits has not been quantified at this stage.
Yard performance to plan	On average, Rail Operators are spending 2 - 3hrs in Pring yard. This time is in addition to provisioning and maintenance examinations, and represents time waiting to meet a connection, unplanned dwell, maintenance activities, and shunting time. Modelling indicates that a 1hr reduction in this time can improve capacity by 3%. To achieve this, Rail Operators may focus on reducing shunting activities, improving rollingstock reliability, and compliance to plan, which means planned connections can be met.
Port Unloading Time	The ICAR reports that a 10% increase in the unload rate at NQXT can achieve a 0.3% increase in capacity. Aurizon Network has similarly tested whether a 10% improvement in the overall time at port can contribute to a capacity increase. Clear of any other initiatives, a 1% improvement in TSEs achieved is seen. Aurizon Network considers that this result is limited by other constraining factors. Full benefits are not seen due to congestion through Pring Yard, and insufficient consists to take advantage of additional port slots. Should these constraints be resolved, there is potential for further capacity gains.
Above Rail and Mine Cancellations	In FY21, 33% of cancellations across GAPE and Newlands were due to mine cancellations, and 45% were due to Above Rail. This contributed to a 3.4% reduction in performance to plan. When a train is cancelled, the train will likely store in the yard until a new job is found, creating yard congestion. When the yard is congested, further delays are seen on the mainline, as other trains stage for a yard slot. Decreasing the number of cancellations could contribute to improved accuracy of the schedule, reducing the time in yards, and translating to increased throughput. Sensitivities outlined in the ICAR indicate that capacity can be improved by reducing delays and cancellations across the supply chain. Aurizon Network is not proposing a specific initiative to lower this as a Transitional Arrangement, as a process and quantification requires further industry engagements. To the extent efficiencies can be made in this area, these results will be captured through the Annual Capacity review process and can be considered when assessing the prudency of the proposed Expansions.

[7] Safety standard HWD-00995 Version 2.1 Observance and Reaction to Signals



Goonyella System Recommendation

ICAR Results Overview

An Existing Capacity Deficit was identified in the Goonyella System. Table 9 below provides a summary of the ICAR findings:

Table 9: Summary of ICAR Results for Goonyella

***ICAR Results** (Train Paths)*		FY20	FY21	FY22	FY23	FY24
Goonyella	Committed Capacity	13,782	13,893	13,879	13,905	14,099
	Deliverable Network Capacity	12,449	12,441	12,933	12,968	13,000
	Existing Capacity Deficit	1,333	1,452	946	937	1,099
	% of Committed Capacity Achieved	**90%**	**90%**	**93%**	**93%**	**92%**

The ICAR indicates an Existing Capacity Deficit of up to 8% in the Goonyella System and indicates that the primary cause of this deficit is cargo assembly operations at Dalrymple Bay Coal Terminal (**DBCT**).

Factors contributing to the Goonyella Existing Capacity Deficit

Aurizon Network has reviewed the information provided in the ICAR and undertaken analysis to determine the cause of the Existing Capacity Deficit. Factors identified are summarised below. Full details can be found in Aurizon Network's Preliminary Report.

- **Cargo Assembly**: The Independent Expert has identified that cargo assembly operations at DBCT are contributing to 5% of the overall system deficit. Aurizon Network has historically not included cargo assembly operations in its modelling. The impact of cargo assembly operations may lead to peaking capacity requirements on the network, and in yards.

- **Yard Congestion**: Analysis indicates that Jilalan yard is capacity constrained when the system is modelled at full contract volumes. As consist numbers rise to meet all committed capacity, demand for roads in Jilalan yard causes a significant increase in yard occupancy time.

- **Rollingstock Assumptions:** With the yard constraints detailed above, analysis indicates that the throughput of the Goonyella System is particularly sensitive to the number of consists operating in the system. Reviewing the current operating fleet, together with consideration for planned fleet, the peak assumed fleet in the Goonyella System is 35 consists. By simulating a gradual increase in the number of consists, there is a tipping point where additional consists have a detrimental effect on achieving contracted demand and cycle time. A maximum of 38 to 39 consists can be accommodated with the existing infrastructure.

- **Connors Range:** The Connors Range is a steep downhill gradient on the trunk of the Goonyella System between Coppabella and Jilalan. This section (Hatfield to Yukan) carries all Goonyella traffic to the ports and has the longest headway on the Goonyella trunk. To increase capacity in the system, shorter headways facilitate more train services on this section. There is a known heat risk on Connors Range, which can cause delays and cancellations to trains when the temperature of the track is too high. This heat is caused by the rail-wheel interface and ambient heat.

Factors influencing Deliverable Network Capacity

Aurizon Network is required to provide a recommendation on the Transitional Arrangements required to resolve the full Existing Capacity Deficit and ensure full Committed Capacity can be achieved. In calculating the Existing Capacity Deficit, the Independent Expert has used a number of information points to inform the modelling. These data points do not remain static, and changes can influence the potential outcome. Aurizon Network has sought to consider these changes in recommending its proposed Transitional Arrangements, and the proposed implementation approach.

VARIATIONS IN COMMITTED CAPACITY

Aurizon Network has reviewed the Committed Capacity of the Goonyella System, to determine whether any material changes have occurred since the ICAR was published. There have been a number of changes occurring due to transfers in capacity in the Goonyella and GAPE Systems. This has resulted in lower demand on the Hail Creek, Wotonga to North Goonyella, and Blair Athol branch lines. Committed Capacity across the Coppabella to Wotonga, and Oaky Creek branch lines has increased. Overall demand to the port of Hay Point remains consistent.

Aurizon Network has modelled the overall effect of these changes. For FY23, a -0.1% variation in overall throughput achieved was identified. This is within the margin of error for capacity modelling.

Aurizon Network does not consider this will have a material impact on the overall Deliverable Network Capacity, as the branch lines do not appear to be a constraint. Additionally, each of the Transfer transactions has been modelled by the IE, to confirm no material impact to other Access Holders, or the Deliverable Network Capacity.

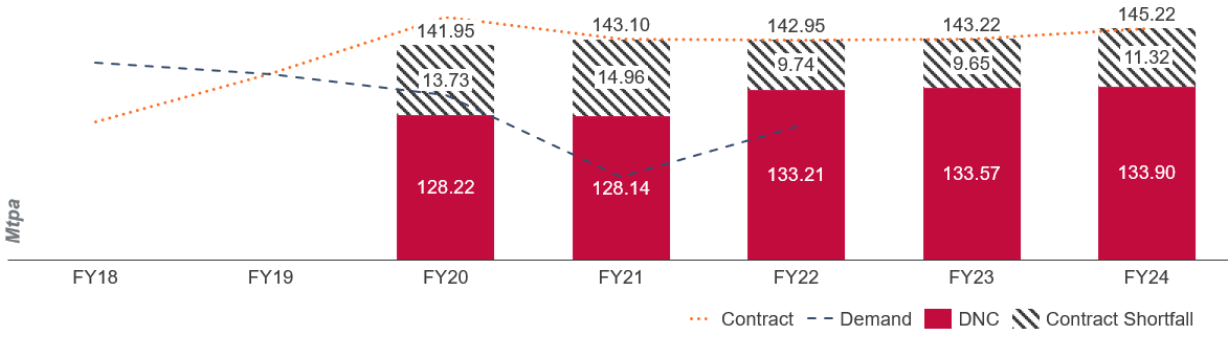
Table 10: Committed Capacity variances between Aug 21 and Feb 22 - Goonyella

Variance from ICAR Demand (Train Paths)	FY23	FY24
M.L. - Coppabella to Jilalan	-	-
B.L. - Jilalan to Port of Hay Point	-	-
B.L. - Hail Creek Mine to South Walker Creek Junction	-458	-408
B.L. - Oaky Creek Junction to Coppabella	914	1106
B.L. - Coppabella to Wotonga	1740	838
B.L. - Wotonga to North Goonyella	-180	-250
B.L. - Blair Athol to Wotonga	-1608	-1330

SYSTEM DEMAND

In FY18, the Goonyella system had a record year, delivering just over 121 Mtpa. Since then, demand has declined, with a recovery currently being seen in FY22. Should this trend continue, it is anticipated that demand will return to levels above the Deliverable Network Capacity as identified in the ICAR. Aurizon Network considers that Transitional Arrangements will be required in the near term to ensure this demand can be met.

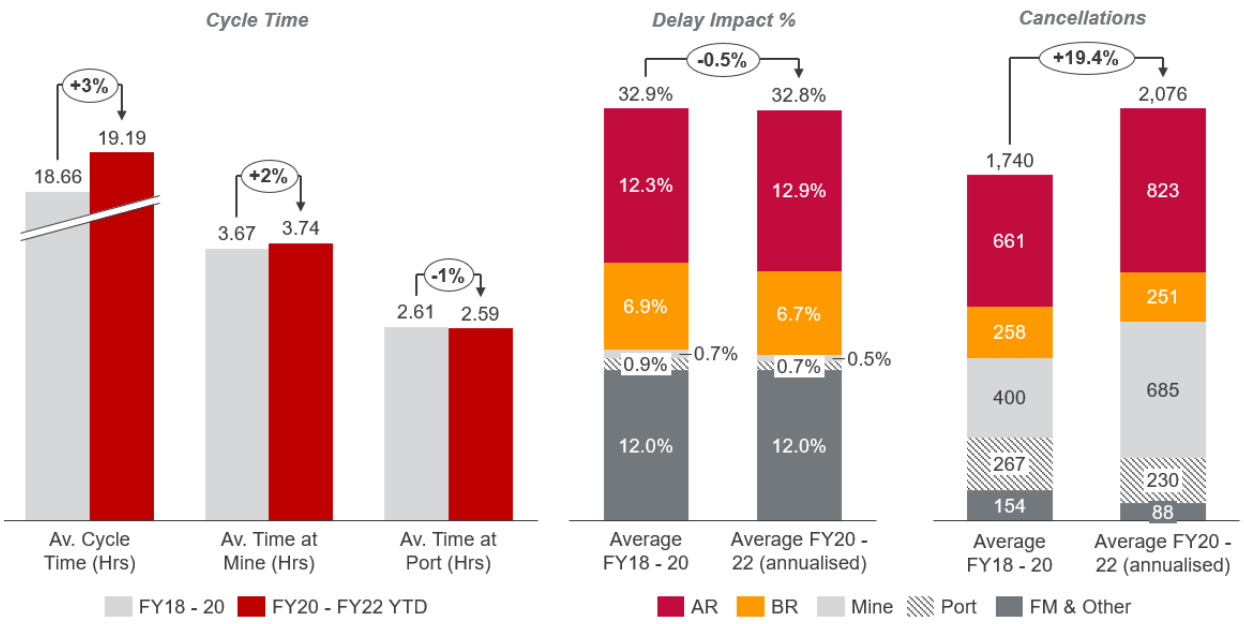
Figure 7: Goonyella System Committed Capacity



OPERATIONAL PERFORMANCE

Aurizon Network has reviewed key operational performance metrics to determine whether there have been any major changes that could impact capacity. The below provides a snapshot of variations in performance from the ICAR data period of FY18 – 20, to a revised 3-year sample between FY20, to YTD FY22.

Figure 8: Goonyella system performance metrics review



From the above, there has been minimal change to cycle times and delays. There is however a noticeable difference in the number of cancellations. The increase is largely attributable to Above Rail and mine caused cancellations. The updated impact of these changes will be modelled as part of the Annual Capacity Assessment Process.

Outcome of Customer Consultation

CONSULTATION ACTIVITIES

Since November 2021, Aurizon Network has been engaging with Customers to discuss options for Transitional Arrangements to resolve the Existing Capacity Deficit. The following activities have been undertaken:

Nov 21	1:1 Customer engagement to seek feedback on Preliminary Report and Transitional Arrangements
14 Dec 21	Goonyella Customer Forum
22 Dec 21	Further information provided to customers closing out outstanding questions
Jan 22	Further 1:1 engagement and consultation as required
22 Jan 22	Customers provided formal notice of willingness to Relinquish Access Rights
2 Feb 22	Goonyella Customer Forum
14 Feb 22	Aurizon Network provides customers with detailed proposal for consideration and approval
4 Mar 22	Customers provide formal feedback and approval on proposal
14 Mar 22	Detailed Report published

Aurizon Network considers the overall engagement has been constructive, and balanced. Feedback received has been incorporated into Aurizon Network's proposal and recommendation below. From this engagement, Aurizon Network understand that mixed opinions prevail. Broadly, the following principles are common:

- Customers are seeking low-cost solutions in the first instance;
- Customers are seeking certainty in capacity created, and low risk options; and
- Customers are looking for more detailed assessments prior to making investment decisions.

CUSTOMER APPROVAL

On 14 February, Aurizon Network provided a proposal to affected End Users, seeking their approval for Transitional Arrangements and implementation as outlined below.

Aurizon Network has received feedback from each of the Goonyella End Users. While largely supportive of the proposal, some approval was provided conditionally. As such, Aurizon Network requests that the Independent Expert review the proposed Transitional Arrangements and make a recommendation to the QCA for their determination in accordance with Part 7A.5 (d). Aurizon Network requests that the feedback from End Users be taken into consideration when making this determination.

The below provides an overview of customer support and feedback:

Table 11: Summary of End User Feedback for Goonyella

Proposed Transitional Arrangements	Customer Approval *(14 End Users)*	Approval Conditions	Feedback where approval not provided
Full Proposal (Appendix B)	50%	-	-
G1: Optimised BCM	100%	-	-
G2: Yard Scheduling Improvements	90%	- Seeking to ensure if there is a negative impact on operations and throughput, alternatives can be considered.	- IRP process requires further work to incorporate efficient short term transfer process. Difficulties in quantifying the benefits
G3: Connors Range Headway Reduction	70%	- Risk assessment and further business case to be developed, with benefits to consider thermal issues	- More information on thermal issues is required, and further modelling to be undertaken to incorporate this.
Stage 2: Review of the following initiatives: - G4: Connors Range track Stability - G5: Jilalan Additional Road - G6: Removal of operating restrictions on Balloon Loops	70%	- Many customers seeking for this stage 2 to follow a standard Expansion process, enabling more detail to be developed, risk assessments undertaken, and alignment of modelling	- Consider other alternatives such as DBCT delivery windows should be considered. - Further work and study required to quantify the benefit, and ensure alignment of modelling

OUTSTANDING MATTERS

Based on feedback received from Customers, Aurizon Network has formed its proposal below. Aurizon Network recognises the following outstanding issues for resolution with End Users:

- **Further Details and Analysis:** A number of End Users raised that there was insufficient detail to provide approval of the full proposal. Aurizon Network considers that the detail required can only be developed through concept studies, including undertaking risk assessments, design, and developing cost and timing estimates. Our proposal seeks to address this by offering options to be further considered, and due diligence undertaken before a final recommendation is made.

- **Alignment of Industry simulation models**: Some End Users have provided feedback that further work is required to align Aurizon Network's model, and the Independent Experts model, to ensure project benefits can be confirmed. As detailed in the introduction to this report, Aurizon Network recognises some differences in the modelling approach. Aurizon Network has been working with the Independent to review and assess the best approach moving forward. Ultimately, the Independent Experts model is the definitive model, and its results must be used.

Aurizon Network's Recommended Transitional Arrangements

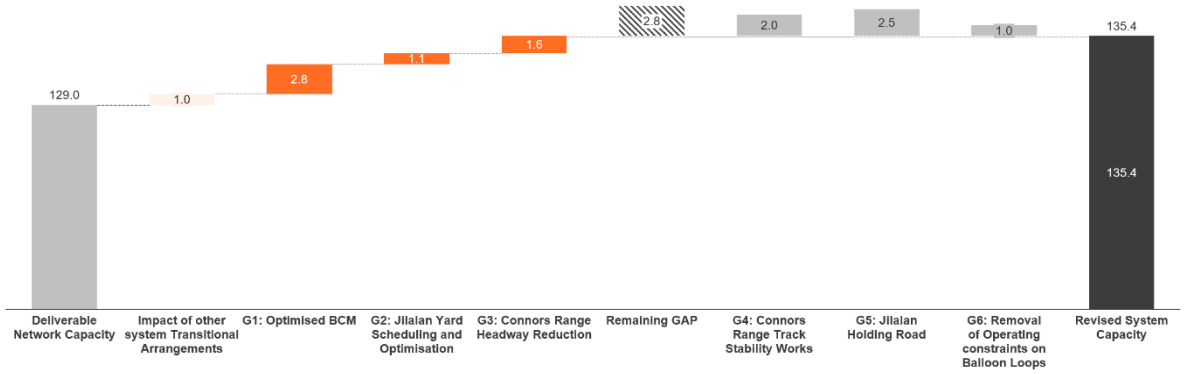
OVERVIEW

Aurizon Network is required to recommend Transitional Arrangements to resolve the Existing Capacity Deficits and meet Committed Capacity. However, to balance customer expectations, Aurizon Network is seeking to implement a pragmatic approach to ensure the best outcome can be reached.

Aurizon Network proposes to proceed with low risk, low-cost Transitional Arrangements as soon as possible. Where an Existing Capacity Deficit remains, Aurizon Network proposes to take forward several Expansion options to a Concept study, to enable Goonyella customers to better understand the scope, design, cost, and risk elements for each of the projects.

The recommended approach is summarised in the below Transitional Arrangement Bridge. Details of each of the projects can be found in Appendix 1.

Figure 9: Goonyella Transitional Arrangement Bridge



RECOMMENDED TRANSITIONAL ARRANGEMENTS

Aurizon Network is seeking to initially proceed with the following Transitional Arrangements. These Transitional Arrangements have been selected as they provide low cost, low risk capacity solutions. Each of the following has been tested and the capacity results confirmed with the Independent Expert. Additionally, customer support was broadly received.

Once implemented, these Transitional Arrangements have the ability to increase the Deliverable Network Capacity of the Goonyella system by over 5mtpa.

Table 12: Recommended Goonyella Transitional Arrangements – Goonyella System

Transitional Arrangement	Potential Capacity Created		Capital Cost Estimate	Cost vs. Capacity	Implementation Timeframe
G1 - Optimised BCM Program	279 Train Paths	2.8Mtpa	Nil	Nil	Immediate from July 2023
G2 – Yard Scheduling Improvements	106 Train Paths	1.1Mtpa	Nil	Nil	12 months
G3 – Connors Range Headway Reduction	160 Train Paths	1.6Mtpa	$163,000	$1000 per train path Nil impact on reference tariff	12 months

To rectify the remaining Existing Capacity Deficit of approximately 3Mtpa, Aurizon Network proposes a Goonyella Expansion study. The Goonyella Expansion study will determine the most efficient and effective option, or combination of which to further progress.

Aurizon Network notes that this approach is not considered in UT5, where a recommendation must be made on Transitional Arrangements, and those implemented. Aurizon Network considers a further study prudent to ensure the most efficient outcome is recommended. This will enable variables such as demand, Committed Capacity, and operational performance metrics to be considered in line with maturing modelling.

Aurizon Network will be seeking a Draft Amending Access Undertaking to ensure UT5 can accommodate this process. Further details of the proposed process and Draft Amending Access Undertaking are set out in Appendix 2.

Aurizon network also notes that due to the connectivity of the Goonyella System to both the Blackwater, and GAPE systems, Transitional Arrangements to resolve Existing Capacity Deficits in those systems may affect the Goonyella System Existing Capacity Deficit. Aurizon Network's modelling indicates that installing RCS in Newlands, and with Collinsville Passing Loop in use, they Goonyella system Deliverable Network Capacity may improve by up to 1mtpa. The proposed implementation approach will enable this to be further quantified by the Independent Expert and recognised when considering Goonyella Transitional Arrangements.

Aurizon Network recommends proceeding with a Goonyella Expansion study, focussing on the following potential Transitional Arrangements:

Table 13: Recommended Transitional Arrangements – Goonyella System

Transitional Arrangement	Potential Capacity Created	Concept Study Cost	Capital Cost Estimate	Cost vs. Capacity	Concept Study Timeframe

G4: Connors Range Track Stability Works	194 Train Paths	2Mtpa	$300,000	$41.5 – $71.5m	$200,000 per train path $0.03nt increase to reference tariff [8]	12 months
G5 – Jilalan Additional Road	242 Train Paths	2.5Mtpa	$346,000	$19.9m – 36.3m	$79,000 - $148,000 per train path $0.01 - $0.03nt increase to reference tariffs	6 months
G6 – Removal of operating restrictions on Balloon Loops	97 Train Paths	1Mtpa	$100,000	$10m - $30m	$103,000 - $300,000 per train path $0.01 – $0.02nt increase to reference tariffs	6 months

COST ALLOCATION PROPOSAL

Where Expansions are progressed to a feasibility design, Aurizon Network will make a Pricing Proposal to the QCA for cost allocation in accordance with Part 6 of UT5.

Aurizon Network considers that the Existing Capacity Deficit in the Goonyella system is common across all Access Holders, with one branch line no more impacted than another. This indicates that the constraining sections are on the mainline, and near the port, common to all Access Holders. Aurizon Network considers that in this case, where the Transitional Arrangements support system wide capacity improvements, costs should be included within the relevant Regulated Asset Base on a fully socialised basis.

Where study costs are incurred in order to assess and determine the most efficient and effective Transitional Arrangement to proceed, but studied Transitional Arrangements are not progressed, or the Expansion is no longer required, Aurizon Network will also seek to recover these costs in the Regulated Asset Base, as we consider this cost prudent in order to meet the requirements of UT5.

IMPLEMENTATION

For each of the Transitional Arrangements, Aurizon Network proposes a slightly varied implementation approach. This is intended to reflect and manage future uncertainty in demand, ensuring Expansions are only constructed as required. Details are as follows:

Table 14: Goonyella Transitional Arrangements Implementation Plan

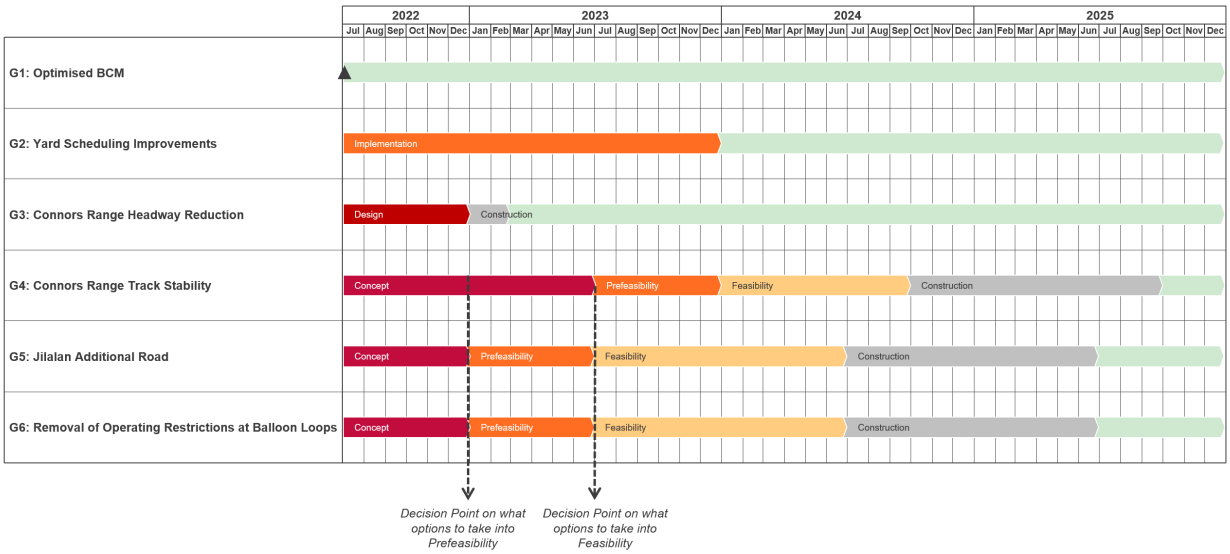
Transitional Arrangements	Implementation Approach
G1 – Optimised BCM **G2 - Yard Scheduling Improvements**	Subject to approval, Aurizon Network will commence implementation of the G1, G2, and G3 Transitional Arrangements as described in Appendix 1. In undertaking the Expansions associated with G3, Aurizon Network will ensure that the Expansion remain prudent, reviewing changes in Committed Capacity, and with reference to the Annual Capacity Assessment Report.

[8] Assuming capital costs of $40m

G3 - Connors Range Headway Reduction	Aurizon Network will provide customers with reporting to provide updates on the progress of implementation. This will include updates on cost, timing, and capacity delivered. For G1, Aurizon Network considers the benefit of this project can be immediately seen, as no works are required. Implementation is underway via the approval of the FY23 MRSB. For G2, a 12-month implementation plan is proposed. The benefits of this initiative will be measured based on key performance indicators. The details of this are included in Appendix 1. For G3, the Transitional Arrangements will be considered to be complete once the Expansions are practically complete. 6 months after practical completion, the Independent Expert will be required to review and confirm the capacity delivered.
G4 - Connors Range Track Strengthening **G5 - Jilalan Additional Road** **G6 - Removal of Balloon Loop Restrictions**	Aurizon Network recommends that Transitional Arrangements G4 to G6 are combined into a Goonyella Expansion study, and a concept study is progressed. This will ensure that design can be completed to a stage where a decision can be made between each of the Transitional Arrangements. Aurizon Network proposes that the Goonyella Expansion study will follow the proposed process detailed in Appendix 2. Aurizon Network proposes that once this concept study is complete, a recommendation is progressed to further design, and ultimately construction. This will ensure that capacity can be provided to meet Committed Capacity levels.

The following provides a high-level implementation timeframe. Please note dates indicates are indicative only, and will depend on time take for QCA Determination, and resource availability.

Figure 10: Goonyella Implementation Timeframes



TRANSITIONAL ARRANGEMENTS NOT RECOMMENDED

As detailed in Aurizon Network's Preliminary report, there were a number of other options investigated. Through consultation with customers, additional options were proposed, and have now also been assessed. The below provides an overview of these options, and why Aurizon Network has not recommended these.

Relinquishment

Aurizon Network did not receive any requests to relinquish Access Rights in the Goonyella System. Accordingly, this has not been considered.

Longer Delivery Windows at DBCT

DBCT have recently implemented longer delivery windows to build cargos at the port. The Independent Expert has however advised that this change cannot be immediately quantified in the model. The Independent Expert's model includes a cargo assembly demand profile, but Aurizon Network does not have sufficient transparency to understand whether delivery windows are considered in this demand structure.

As such, Aurizon Network is not proposing to include this as a Transitional Arrangement. We do however recognise the potential benefit and consider that any capacity improvements due to longer delivery windows will be captured in updates to the Annual Capacity Review and can be considered when assessing the prudency of the proposed Expansions.

128 Wagon Trains

In its Preliminary Report, Aurizon Network suggested an option for 128 wagons in Goonyella. This project involved extending balloon loops and passing loops to cater for larger trains. This would also require Access Agreements to be modified to rebase TSEs. Customer feedback has indicated that customers are not looking to adjust their TSEs. A fatal flaw assessment also indicates that the cost of this project is likely to increase above $30m. Therefore, at this stage, Aurizon Network is not recommending proceeding with the 128 Wagon Transitional Arrangement.

Crossovers between Jilalan and Wotonga

Aurizon Network notes the option proposed by the Integrated Logistics Company to install up to 11 additional crossovers, enabling fully connected crossovers. Aurizon Network has reviewed this option at length. The Independent Expert has also undertaken initial modelling which suggests up to a 5mtpa benefit.

Aurizon Network undertook its own modelling of this option, to which only a minor 0.2% benefit was seen. Given the discrepancies in modelling as described in the introduction to report, Aurizon Network further analysed the design and operation of the current infrastructure. On this review, Aurizon Network identified that there is the potential for minor reduction in delays with some of the crossovers, however the infrastructure as designed provides sufficient flexibility to cross trains. The utilisation of the sections proposed is well below planning threshold, enabling sufficient flexibility to manage train interactions. A summary is below:

	No. of Crosses per day	*Distance in 'wrong' direction*	*Calculated cross time @40km/h*	*Additional path consumed?*	*Path Utilisation (excluding maintenance)*
South Walker	Up to 7 times a day across all loadouts.	200m	3 minutes	Nil - similar to a SRT variance	Contracted: 53% Current: ~41%
Macarthur		4.29km	9 minutes	0.5 Path consumed	Contracted: 47% Current: 36%
Carborough Downs		4.8km	10 minutes	0.5 Paths consumed	Contracted: 30% Current: 22%
Isaac Plains		3.6km	7 minutes	0.5 Paths consumed	Contracted: 30% Current: 22%
Moorvale		300m	3 minutes	Nil - similar to a SRT variance	Contracted: 38% Current: 34%

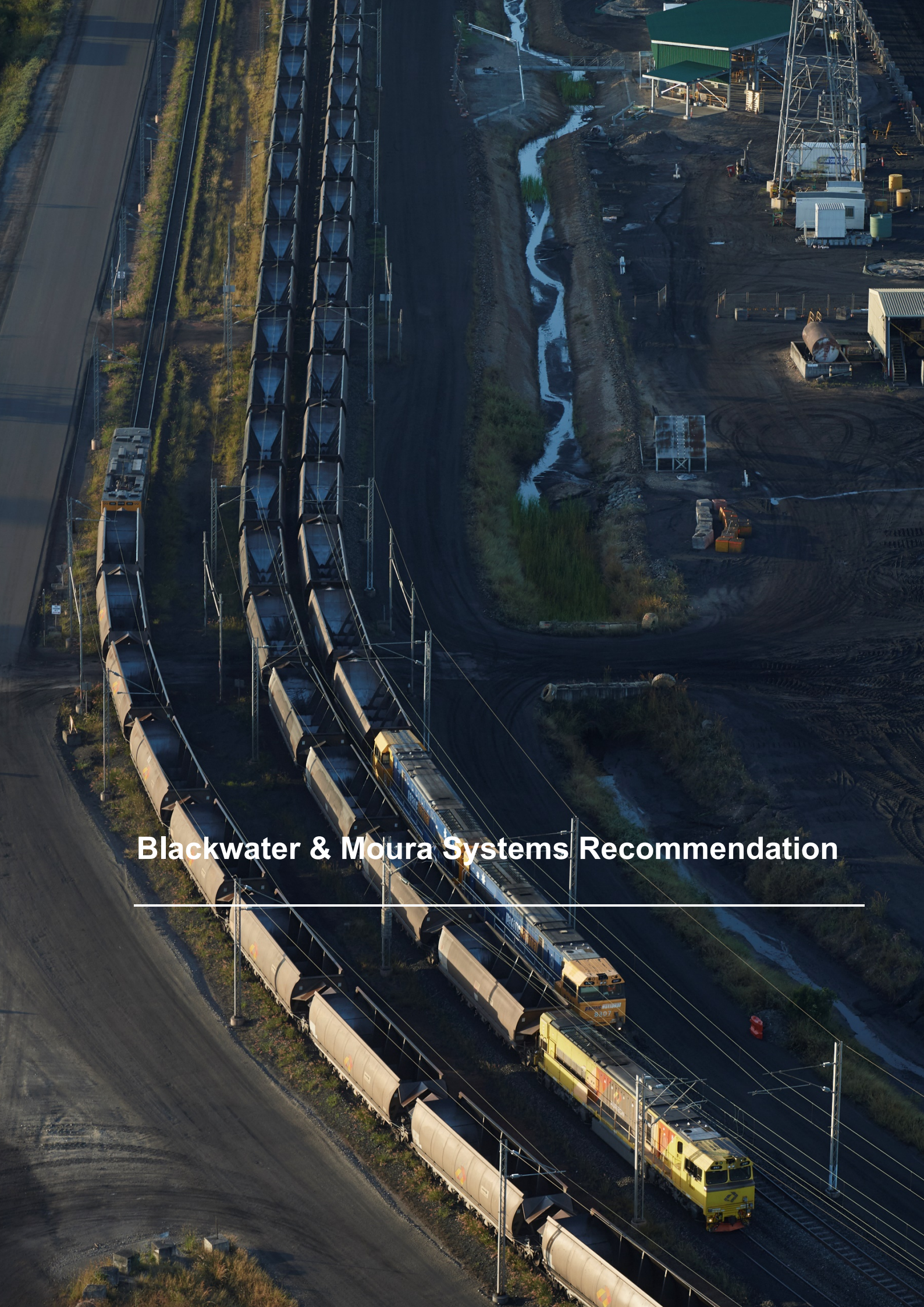
The cost of a crossover is estimated at up to $5m each, or $55m in total for the project. Aurizon Network has not identified any significant operating benefits for the crossovers. As such, Aurizon Network has not recommended this initiative at this time.

Focus on reduction in Supply Chain Delays and Cancellations

Sensitivities outlined in the ICAR indicate that capacity can be improved by reducing delays and cancellations across the supply chain. Aurizon Network is not proposing a specific initiative to lower this as a Transitional Arrangement, as a process and quantification requires further industry engagements. To the extent efficiencies can be made in this area, these results will be captured through the Annual Capacity review process and can be considered when assessing the prudency of the proposed Expansions.

Improve Network Reliability through less delays	To achieve better reliability, additional preventative maintenance would be required, as well as resourcing to respond and rectify incidents quicker. A 10% improvement has been modelled. Cycle time improvements are seen; however, this change contributes to less than 0.1% improvement in throughput. This approach is similar to the reduction in general delays as proposed in the ICAR. In the ICAR, a 1.5% capacity improvement is reported. The difference between Aurizon Network's approach is that we have focused only on below rail delays. To reach the 1.5% indicated by the Independent Expert, improvements in rollingstock, mine and port delays would be required.
Stop/Start delays	The ICAR reports a potential improvement in capacity of up to 2%, by reducing Stop/Start delays by 1 minute. Aurizon Network has reviewed the practicality of achieving this. Based on the below, Aurizon Network does not consider reductions achievable: • Starting Time is governed by the available tractive power of locomotives. In order to accelerate a loaded coal train from standstill to 80 km/h on a level gradient takes 3 minutes 15 seconds longer than to travel the same distance at a constant speed of 80 km/h. • Stopping time is governed by the layout of signalling and the requirements of safety standards[9]. This standard requires that stopping trains reduce speed to 20 km/h below boarded speed when passing the approach signal to a signal set at stop. The distance between the approach and target signal in the Goonyella system would typically be about 2000m depending on gradient and other factors. A stopping train takes at least 4.5 minutes more to travel this distance than a train travelling at line speed.
Dunsmure Passing Loop	Aurizon Network has previously identified Dunsmure Passing Loop as required for expansion volumes across the South Goonyella section. However, the change from theoretical to DNC modelling does not show a constraint in this section. Aurizon Network does not consider that this passing loop is essential to resolve an Existing Capacity Deficit. Dunsmure Passing Loop provides a 10-minute cycle time benefit, and overall TSE improvement of less than 1%.
Teviot Brook Passing Loop	Aurizon Network has previously identified Teviot Brook Passing Loop as required for expansion volumes across the North Goonyella section. However, modelling indicates that the change in assumptions from theoretical to DNC parameters does not cause added congestion on this section. Aurizon Network does not consider that this passing loop is essential to resolve an Existing Capacity Deficit. Teviot Brook Passing Loop provides a 10-minute cycle time benefit, and overall TSE improvement of less than 1%.
Connors Range Track Stability works	As highlighted above, there is a known heat risk on Connors Range, which can cause delays and cancellations to trains when the temperature of the track is too high. This heat is caused by the rail-wheel interface, and ambient heat. Additional traffic can magnify this risk. Options exist to explore track stability solutions, to remove or lower this restriction. There is the potential for a 1 - 2% capacity improvement to be seen, however works are expected to cost in excess of $30m.
ATIS	An Automatic Track Inspection system is currently being trialled in the Blackwater system. The immediate quantifiable capacity benefit is a reduction in access required for the track recording car. Aurizon Network considers this could improve capacity marginally. More frequent data collection may lead to improvements in reliability and condition-based maintenance strategies; however, the extent of these benefits has not been quantified at this stage.

[9] Safety standard HWD-00995 Version 2.1 Observance and Reaction to Signals



Blackwater & Moura Systems Recommendation

Overview of ICAR Results

The ICAR indicates that there is an Existing Capacity Deficit in both the Blackwater and Moura Systems. It indicates that the cause of the constraint is common across both systems, and as such, Aurizon Network has reviewed the potential Transitional Arrangements for these systems jointly. The ICAR findings are summarised below.

Table 15: Summary of ICAR Results for Blackwater and Moura

***ICAR Results** (Train Paths)*		FY20	FY21	FY22	FY23	FY24
Blackwater	Committed Capacity	9,259	9,918	10,473	10,404	10,155
	Deliverable Network Capacity	9,550	10,649	10,260	9,854	9,712
	Existing Capacity Deficit	0	0	214	550	443
	% of Committed Capacity Achieved	**103%**	**107%**	**98%**	**95%**	**96%**
Moura	Committed Capacity	2,294	2,282	2,338	2,338	2,345
	Deliverable Network Capacity	2,178	2,165	2,241	2,163	2,146
	Existing Capacity Deficit	116	118	97	175	199
	% of Committed Capacity Achieved	**95%**	**95%**	**96%**	**93%**	**92%**

Factors contributing to the Existing Capacity Deficit

The Independent Expert has identified that there is an Existing Capacity Deficit of up to 5% in the Blackwater system and 7% in the Moura system. The ICAR indicates that the underlying cause identified by the Independent Expert is congestion within Callemondah yard and to RG Tanna Coal Terminal.

Aurizon Network has reviewed the information provided in the ICAR and undertaken analysis to determine the cause of the Existing Capacity Deficit. Factors identified are summarised below. Full details can be found in Aurizon Network's Preliminary Report.

- **Yard Congestion**: Callemondah is a critical facility for both the Blackwater and Moura systems, as it provides the location where all services undertake provisioning, maintenance inspections, minor maintenance work and shunting activities. On average, trains are occupying the yard for 1 - 3 hours longer than planned activities. This is due to time waiting for connections, missed connections, rollingstock repairs and additional time taken for planned activities such as provisioning.
- **Scheduling and Reliability**: The Blackwater and Moura systems follow the same pattern as other systems, with a large amount of variability being contributed by mine and above rail cancellations. This level of variability often manifests in trains spending additional time in the yards while they wait for connections, which creates congestion and prevents trains from entering the yard, placing more delays on the mainline.
- **RGTCT Belt Restrictions**: Simulations have been performed to determine the impact of belt route restrictions at RGTCT on the capacity of the Rail Infrastructure. Aurizon Network's results indicate that by removing the belt restrictions, an additional 3.2% of Train Service Entitlements are achieved across both the Blackwater and Moura systems.
- Rollingstock Fleet: The results of the ICAR assume 41 consists are operating in Blackwater, and 7 consists are operating in Moura. Aurizon Network has reviewed the current fleet operating across the Blackwater and Moura systems, in line with the contracted demand. Similar to the other systems, it is acknowledged that there are discrepancies between Committed Capacity, and what each above rail operator may be contracted to deliver.

Factors influencing Deliverable Network Capacity

Aurizon Network is required to provide a recommendation on the Transitional Arrangements required to resolve the full Existing Capacity Deficit and ensure full Committed Capacity can be achieved. In calculating the Existing Capacity Deficit, the Independent Expert has used a number of information points to inform the modelling. These data points do not remain static, and changes in these data points can influence the potential outcome. Aurizon Network has sought to consider these changes in recommending its proposed Transitional Arrangements, and the proposed implementation approach.

VARIATIONS IN COMMITTED CAPACITY

Aurizon Network has reviewed the Committed Capacity of the Blackwater and Moura systems to determine whether any material changes have occurred since the ICAR was published. Only minimal change has been identified in Blackwater as outlined below. Aurizon Network anticipates this will make minimal difference to the Deliverable Network Capacity for the Blackwater System. No change has been identified in Moura.

Table 16: Committed Capacity variances between Aug 21 and Feb 22 – Blackwater and Moura

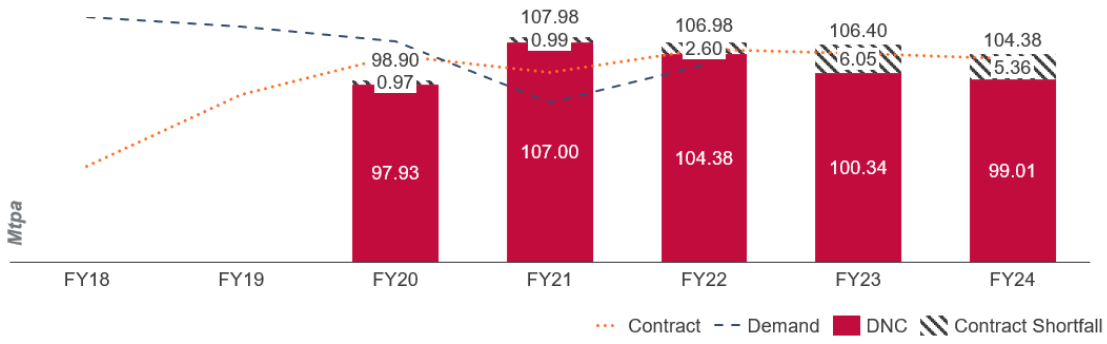
Variance from ICAR Demand (Train Paths)	FY23	FY24
M.L. - Dumgree to Callemondah	-	-
B.L. - Earlsfield to Dumgree-	-	-
B.L. - Earlsfield to Callide	-	-
B.L. - Earlsfield to Moura	-	-
M.L. - Bluff to Callemondah	-	-
B.L. - Callemondah to Port of Gladstone	-	-
B.L. - Burngrove to Bluff	-	-
B.L. - Rolleston Mine to Rangal	-	-108
B.L. - Oaky Creek Junction to Burngrove	-	+108
B.L. - Minerva Mine to Burngrove	-	-

SYSTEM DEMAND

In FY19, the Blackwater and Moura systems delivered a record 81mtpa. Over the past 2 years, demand has been impacted by the global economic climate. Improvements in demand have been seen in FY22, with current level of demand equal to the Deliverable Network Capacity across the two systems.

Should demand increase beyond the current level, there is the potential for demand not be met. Accordingly, Aurizon Network considers that Transitional Arrangements should be implemented now in order to ensure capacity can be provided.

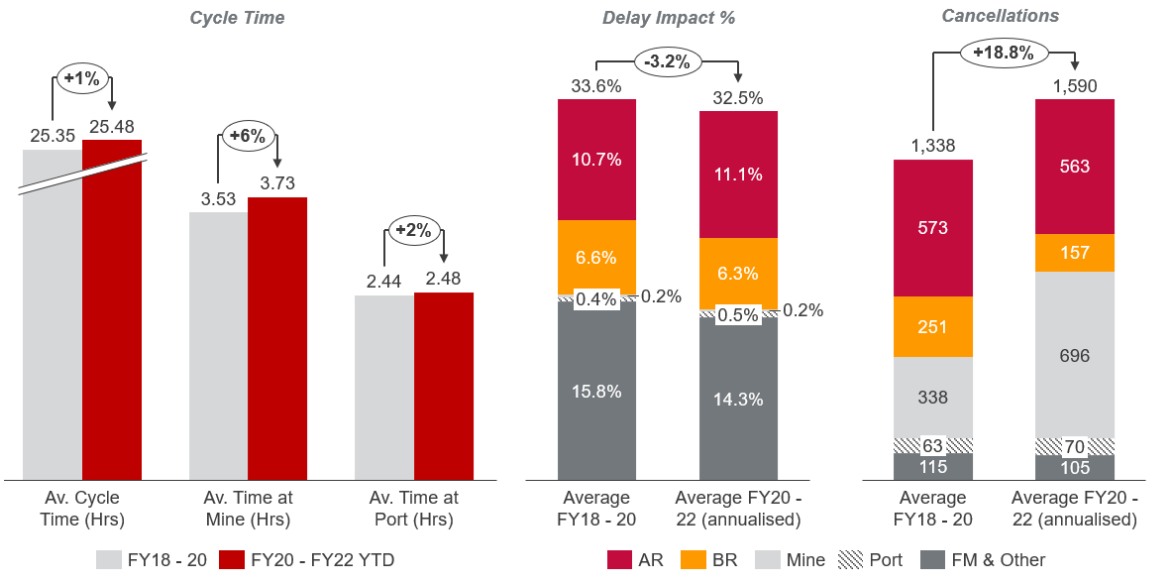
Figure 11: Blackwater system Demand



OPERATIONAL PERFORMANCE

Aurizon Network has reviewed key operational performance metrics to determine whether there have been any major changes that could impact capacity. The below provides a snapshot of variations in performance from the ICAR data period of FY18 – 20, to a revised 3-year sample between FY20, to YTD FY22.

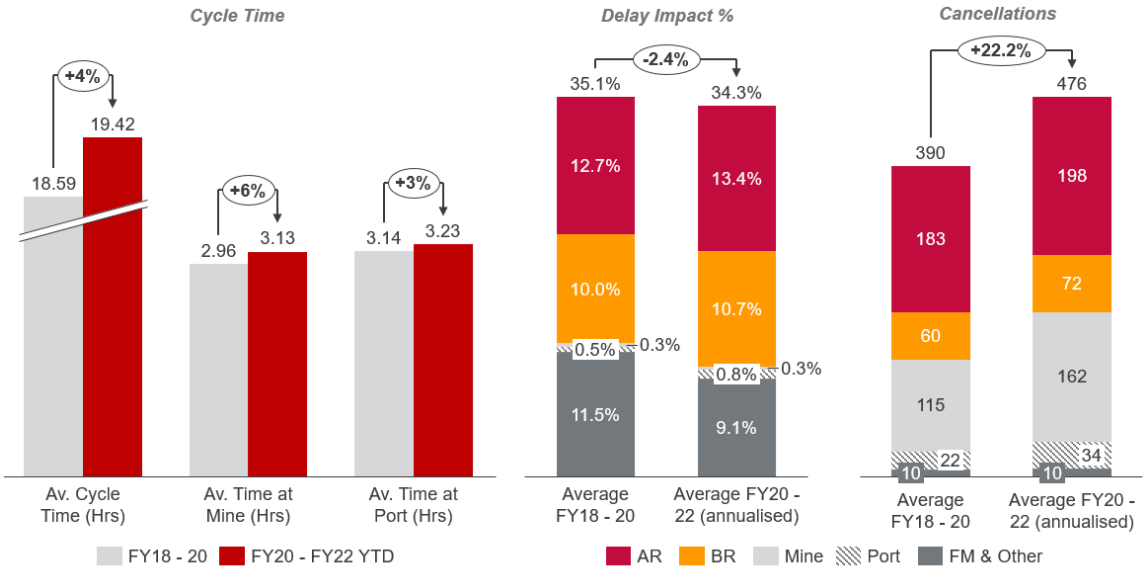
Figure 12: Blackwater system performance metrics review



From the above, there has been minimal change to cycle time, and a small improvement in delays in the Blackwater system. The average time at mine has increased by 6%, as schedules are adjusted to account for actual performance. There is however a noticeable difference in the number of cancellations. The increase is largely attributable to increased mine caused cancellations. The impact of these changes will be modelled as part of the Annual Capacity Assessment Process.

For the Moura System, there has been a minor increase in cycle time, load time, and unload time. Improvements in delays are however likely to offset this increase. As with the Blackwater system, there is a noticeable increase in cancellations, largely due to Mine cancellations. The impact of these changes will be modelled as part of the Annual Capacity Assessment Process.

Figure 13: Moura system performance metrics review



Outcome of Customer Consultation

CONSULTATION ACTIVITIES

Since November 2021, Aurizon Network has been engaging with Customers to discuss options for Transitional Arrangements to resolve the Existing Capacity Deficit. The following activities have been undertaken:

Nov 21	1:1 Customer engagement to seek feedback on Preliminary Report and Transitional Arrangements
14 Dec 21	Blackwater Customer Forum
22 Dec 21	Further information provided to customers closing out outstanding questions
Jan 22	Further 1:1 engagement and consultation as required
22 Jan 22	Customers provided formal notice of willingness to Relinquish Access Rights
2 Feb 22	Blackwater Customer Forum
14 Feb 22	Aurizon Network provides customers with detailed proposal for consideration and approval
4 Mar 22	Customers provide formal feedback and approval on proposal
14 Mar 22	Detailed Report published

Aurizon Network considers the overall engagement has been constructive. A number of alternative Transitional Arrangements were raised by the Blackwater and Moura Customers, which have been further considered. Feedback received has been incorporated into Aurizon Network's proposal and recommendation below. From this engagement, Aurizon Network understand that mixed opinions prevail. Broadly, the following principles are common:

- Certainty of access with reference to demand and market conditions
- Low-cost options for capacity growth
- Additional detail and analysis prior to making capital investment decisions.

CUSTOMER APPROVAL

On 14 February, Aurizon Network provided a proposal to affected End Users, seeking their approval for Transitional Arrangements and implementation as outlined below.

Aurizon Network has received feedback from 10 of the 13 End Users. From those End Users that responded, Aurizon Network received 100% endorsement for BM1: Optimised BCM, and BM2: Yard Scheduling improvements. However, no responses were received from two End Users, Aurizon Network will seek for the Independent Expert to review the proposed Transitional Arrangements and make a recommendation to the QCA for their determination in accordance with Part 7A.5 (d). Aurizon Network requests that the feedback from End Users be taken into consideration when making this determination.

The below provides an overview of customer support and feedback:

Table 17: Summary of End User Feedback for Blackwater

Proposed Transitional Arrangements	% of Customer Approval (11 of 13 Customers)		Approval Conditions	Feedback where approval not provided
	Blackwater	Moura		
Full Proposal (Appendix B)	60%	75%	-	-
BM1 - Optimised BCM	100%	100%	-	-
BM2 - Yard Scheduling Improvements	100%	100%	- Seeking to ensure if there is a negative impact on operations and throughput, alternatives can be considered.	-
Stage 2: Options - BM3 - Callemondah Additional Road - BM4 – Moura Provisioning at Stirrit	50%	75%	- Concept study to consider demand requirements at the time, and impact of relinquishments	- Preference is to defer to the Independent Expert for review of merits. - Further work required on risk assessment and business case

OUTSTANDING MATTERS

Based on feedback received from Customers, Aurizon Network has formed its proposal below. Aurizon Network recognises the following outstanding issues for resolution with End Users:

- **Further Details and Analysis:** A number of End Users raised that there was insufficient detail to provide approval of the full proposal. Aurizon Network considers that the detail required can only be developed through concept studies, including undertaking risk assessments, design, and developing cost and timing estimates. Our proposal seeks to address this by offering options to be further considered, and due diligence undertaken before a final recommendation is made.

- **Alignment of Industry simulation models**: Some End Users have provided feedback that further work is required to align Aurizon Network's model, and the Independent Experts model, to ensure project benefits can be confirmed. As detailed in the introduction to this report, Aurizon Network recognises some differences in the modelling approach. Aurizon Network has been working with the Independent Expert to review and assess the best approach moving forward. Ultimately, the Independent Experts model is the definitive model, and its results must be used.

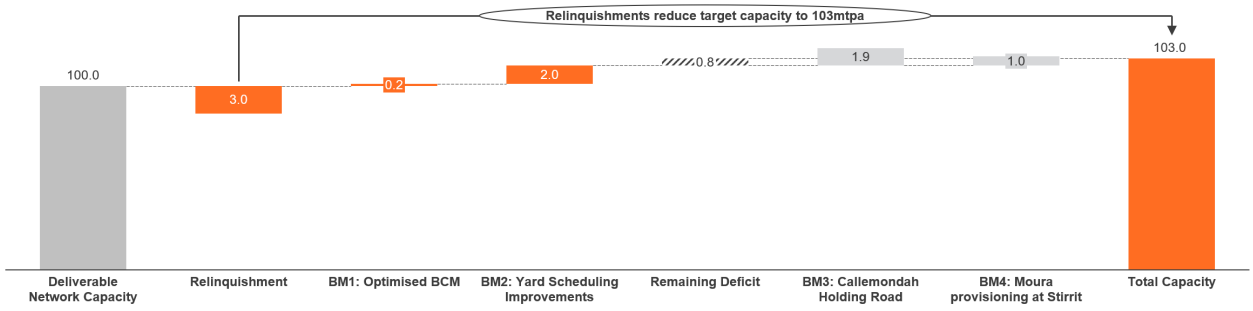
Proposed Transitional Arrangements

OVERVIEW

An approach similar to the Goonyella system is proposed for Blackwater and Moura. Aurizon Network is seeking to proceed with low risk, low-cost Transitional Arrangements as soon as possible. Where an Existing Capacity Deficit remains, Aurizon Network is seeking to take forward several Expansion options to a Concept study, to enable the industry to better understand the scope, design, cost, and risk elements for each of the projects.

The recommended approach is summarised in the below Transitional Arrangement Bridge.

Figure 14: Blackwater & Moura Transitional Arrangement Bridge



RELINQUISHMENT

Aurizon Network has received request to relinquish up to approximately 3Mtpa. To determine how these relinquishments affect the Existing Capacity Deficit, the Independent Expert has modelled the impact of the change to Committed Capacity. The Independent Expert has confirmed that the relinquishments reduce the Existing Capacity Deficit in both the Blackwater and Moura Systems.

The results indicate that the relinquishments in Blackwater resolve a large portion of the Existing Capacity Deficit. However, as the Callemondah Yard constraint is common across both systems, a portion of the benefit flows through to the Moura system. This means that the Moura Existing Capacity Deficit is removed. The Independent Experts modelling results are summarised below:

Tab;e 18: Impact of Relinquishment on Existing Capacity Deficit

		FY23	FY24	FY25 Onwards
Existing Capacity Deficit	Blackwater	550	443	443
	Moura	175	199	199
Relinquishments	Blackwater	-501	-443	-372
	Moura	-	-	-
Remaining Existing Capacity Deficit[10]	Blackwater	265	252	372
	Moura	Nil	Nil	Nil

[10] The Independent Expert's results are based on a change in the modelling assumption for consists. Consists have been reduced from 41 to 36, as the optimal number based on the most recent Committed Capacity and Relinquishments.

TRANSITIONAL ARRANGEMENTS TO BE IMPLEMENTED

To resolve the remaining Existing Capacity Deficit after relinquishments are finalised, Aurizon Network is proposing to implement the following. Details of each of the projects can be found in Appendix 1. The Transitional Arrangements detailed below have been selected based on their merits in terms of capacity benefit, ease of implementation, and costs. Both BM1 and BM2 involve changes to Below Rail operating and maintenance practices. As such, there is no capital costs involved.

Table 19: Recommended Transitional Arrangements - Blackwater & Moura

Transitional Arrangement	*Potential Capacity Created*	*Capital Cost*		*Cost vs. Capacity*	*Implementation Timeframe*
BM1: Optimised BCM Program	21 - 96 Train Paths	0.2Mtpa	nil	nil	Immediate from July 2023
BM2: Callemondah Yard Scheduling Improvements	240 Train Paths	2Mtpa	nil	nil	12 months

Aurizon Network considers that after these Transitional Arrangements are implemented, a minor deficit may remain. Pending on the time taken to implement the above, changes in Committed Capacity and other supply chain improvements, there is the potential for this deficit to be resolved naturally. As the above Transitional Arrangements involve operating changes, there is a risk that the modelled benefits may not be fully realised.

To ensure Committed Capacity can be delivered, Aurizon Network is proposing to commence Concept studies for the following further Transitional Arrangements. A Blackwater and Moura Expansion study is proposed, looking at the following alternative projects.

Table 20: Recommended Transitional Arrangements – Blackwater & Moura

Transitional Arrangement	*Potential Capacity Created*		*Concept Study Cost*	*Capital Costs*	*Cost vs Capacity*[11]	*Concept Study Timeframe*
BM3: Callemondah Additional Road	232 Train Paths	2Mtpa	$346,000	$15.7m	$67,000 per train path $0.02nt increase to BW & Moura reference tariff	6 months
BM4: Moura provisioning at Stirrit	120 Train Paths	1mpta	$100,000	$13.7m	$114,000 per train path $0.015nt increase to BW & Moura reference tariff	6 months

Progressing the concept studies for the above projects will enable Aurizon Network to develop detailed costings and scopes of work. It will also enable time to capture results of BM1 and BM2 as part of the Annual Capacity Review process. The Blackwater and Moura Expansion study will provide risk mitigation in order to ensure options are well progressed to further resolve the deficit, should it be required.

Aurizon Network notes that this approach is not considered in UT5, where a recommendation must be made on Transitional Arrangements, and those implemented. Given the changes in demand, maturing of the modelling, and

[11] Assumes 80% of cost are allocated to Blackwater, and 20% to Moura

further impact of ongoing variations to Committed Capacity and operating performance metrics, Aurizon Network considers a further study prudent to ensure the most efficient outcome is recommended. Aurizon Network will be seeking a Draft Amending Access Undertaking in order to ensure UT5 can accommodate this process. Further details of the proposed process and Draft Amending Access Undertaking are in Appendix 2.

COST ALLOCATION PROPOSAL

Where Expansions are progressed to a feasibility design, Aurizon Network will make a Pricing Proposal to the QCA for cost allocation in accordance with Part 6 of UT5.

Aurizon Network considers that the Existing Capacity Deficit in the Blackwater and Moura system is common across all Access Holders. In this case, where the Transitional Arrangements support system wide capacity improvements, costs should be included within the relevant Regulated Asset Base on a fully socialised basis, allocated proportionately across the Blackwater and Moura systems.

Aurizon Network notes however that relinquishments have been requested in the Blackwater System, that contribute to the resolution of the Existing Capacity Deficit in the Moura system. As such, Aurizon Network will further consider cost allocation in line with the economic contribution each of the systems have made to resolving the Deficit to ensure equitable distribution.

Where study costs are incurred in order to assess and determine the most efficient and effective Transitional Arrangement to proceed, but studied Transitional Arrangements are not progressed, or the Expansion is no longer required, Aurizon Network will also seek to recover these costs in the Regulated Asset Base, as we consider this cost prudent in order to meet the requirements of UT5.

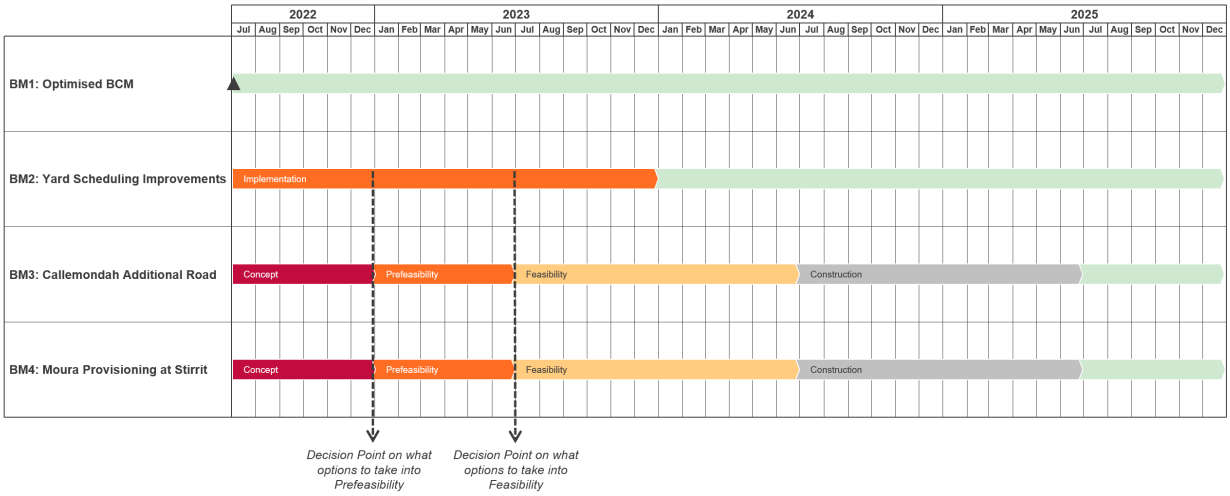
IMPLEMENTATION

For each of the Transitional Arrangements, Aurizon Network proposes a slightly varied implementation approach. This is intended to reflect and manage future uncertainty in demand, ensuring Expansions are only constructed as required. Details are as follows:

BM1: Optimised BCM **BM2: Yard Scheduling Improvements**	Subject to approval, Aurizon Network will commence implementation of the BM1 and BM2 Transitional Arrangements as described in Appendix 1. Aurizon Network will develop reporting based on the metrics identified to ensure capacity benefits can be adequately quantified. For BM1, Aurizon Network considers the benefit of this project can be immediately seen, as no works are required. Implementation is underway via the approval of the FY23 MRSB. For BM2, a 12-month implementation plan is proposed. The benefits of this initiative will be measured based on key performance indicators. The details of this are included in Appendix 1.
BM3 – Callemondah Additional Road **BM4 – Moura provisioning at Stirrit**	Aurizon Network recommends that Transitional Arrangements BM3 and BM4 are combined into a Blackwater and Moura Expansion study, and a concept study is progressed. This will ensure that design can be completed to a stage where a decision can be made between each of the Transitional Arrangements. Aurizon Network proposes that the Blackwater and Moura Expansion study will follow the proposed process detailed in Appendix 2. Aurizon Network proposes that once this concept study is complete, a recommendation is progressed to further design, and ultimately construction. This will ensure that capacity can be provided to meet Committed Capacity levels.

The following provides a high-level implementation timeframe. Please note dates indicates are indicative only, and will depend on time take for QCA Determination, and resource availability.

Figure 18: Blackwater Implementation Timeframes



TRANSITIONAL ARRANGEMENTS NOT RECOMMENDED

As detailed in Aurizon Network's Preliminary report, there were a number of other options investigated. Through consultation with customers, additional options were proposed, and have now also been assessed. The below provides an overview of these options, and why Aurizon Network has not recommended these.

Standardising fleet size to 100 wagons in Moura	Aurizon Network investigated an option for extension of Callide Balloon Loop. Through this extension consist sizes can be standardised, and the number of paths reduced. Aurizon Network has conducted a fatal flaw review of this option, which indicates that project costs are likely to be ~$30m. This includes provision for moving of a road overpass. Given the increased cost estimate Aurizon Network does not recommend proceeding with this option.
Mobile Provisioning at WICET	An option was raised to provision services at WICET. This option has been assessed and has the potential to improve capacity by up to 1mtpa. The benefit is relatively small, as provisioning activities largely take place in Callemondah at the same time as trains staging to the port. Operators also cycle fleet between WICET and RGTCT services, so a provision often would still be required in Callemondah. In consultation with WICET, there are concerns around fuel trucks travelling in the vicinity of the loop, so provisioning would be further limited to electric services only. This will reduce the benefit further.
Improve Network Availability by lowering time on track	The Independent Expert has modelled a 10% reduction across the board for all planned maintenance activities and achieves a 0.5% improvement in capacity for Blackwater, and 0.2% improvement in Moura. Aurizon Network has also reviewed options to increase availability through changes to planned maintenance. Aurizon Network's approach to modelling this sensitivity is remove a 36hr system closure in Blackwater, to simulate an achievable outcome. Results indicate a similar outcome, with a minimal increase of 0.3% in throughput seen. This option involves prioritising access for coal carrying services over maintenance requirements. To ensure the track conditions remain to standard, this will likely impact the approach to maintenance, requiring more resources to undertake more maintenance in less time. This will lead to increased maintenance costs. Based on the minor capacity

	benefit, at this stage, Aurizon Network considers that the impact to maintenance cost may outweigh the benefit.
Improve Network Reliability through less delays	To achieve better reliability, additional preventative maintenance would be required, as well as resourcing to respond and rectify incidents quicker. A 10% improvement has been modelled. Cycle time improvements are seen; however, this change contributes to less than 0.1% improvement in throughput. This approach is similar to the reduction in general delays as proposed in the ICAR. In the ICAR, a 0.2% capacity improvement is reported for both Blackwater and Moura. The difference between Aurizon Network's approach is that we have focused only on below rail delays. To reach the 0.2% indicated by the Independent Expert, improvements in rollingstock, mine and port delays would be required.
RCS on the Bauhinia Branch	The ICAR indicates that RCS on the Bauhinia branch line may assist in improving capacity for services on that branch line. Aurizon Network has assessed the potential improvements from installing RCS. RCS assists in lowering cycle times for customers on that branch by 23 minutes and has a marginal (<0.3%) improvement in capacity. While there is some benefit from installing RCS, given the constraint identified is in and around Callemondah yard, and the ICAR does not specifically identify a constraint on the Bauhinia branch, Aurizon Network considers that the Existing Capacity Deficit can be better resolved through Transitional Arrangements that address the direct constraint.
ATIS	An Automatic Track Inspection system is being trialled in the Blackwater system. The immediate quantifiable capacity benefit is a reduction in access required for the track recording car. Aurizon Network considers this could improve capacity marginally. More frequent data collection may lead to improvements in reliability and condition-based maintenance strategies; however, the extent of these benefits has not been quantified at this stage.
Port operations and unloading time improvements	It is estimated that by reducing restrictions around belt routes, throughput improvements of 3.2% can be seen. While it is acknowledged that this presents challenges and investment requirements, any minimisation of these restrictions will assist in supply chain performance. Additionally, Aurizon Network has modelled a reduction in port unload time of 10%. This provides an overall increase in Train Service Entitlements achieved of 0.9%. This result is larger than the sensitivity presented in the ICAR and is likely due to differences in the modelling approach around yards.
Mine Cancellation Improvements	In FY21, 44% of cancellations across Blackwater and Moura systems were due to mine cancellations, contributing to a 7.1% reduction in performance to plan. When a train is cancelled, the train will likely store in the yard until a new job is found, or schedules are adjusted. This creates missed connections, and yard congestion. When the yard is congested, further delays are seen on the mainline, as other trains stage for a yard slot. Decreasing this variability will assist in minimising time in yards.
Above Rail Cancellation Improvements	In FY21, 34% of cancellations across Blackwater and Moura systems were due to Rail Operator cancellations, contributing to a 5.6% reduction in performance to plan. Improvements in the reliability of Rollingstock may improve overall system throughput. Further discussion will take place with Rail Operators to determine whether improvement initiatives underway can assist in resolving the Existing Capacity Deficit.

Approvals Next Steps

Approval and Next Steps

As outlined above for each system, Aurizon Network has sought to jointly agree the recommended Transitional Arrangements with affected End Users. While strong support has been received, a unanimous agreement has not been reached.

Accordingly, Aurizon Network now seeks the Independent Expert to review the recommended Transitional Arrangements and make a recommendation to the QCA for their determination. The following provides a summary of the process detailed in Part 7A.5(a)(d) of UT5:

- Aurizon Network has now published this Detailed Report.
- The Independent Expert will now review the report and make a recommendation to the QCA with respect of which Transitional Arrangements it considers will most effectively and efficiently resolve the Existing Capacity Deficit.
- Within 15 Days of this recommendation (or such longer period as may be required), the QCA will make a determination as to which of the Transitional Arrangement will most efficiently and effectively resolve the Existing Capacity Deficit.
- Aurizon Network will then implement the Transitional Arrangements as soon as reasonably practicable, where these are within our control.

Aurizon Network notes that the recommendations included in this Detailed Report seeks to:

- implement certain Transitional Arrangements; and
- progress further studies for remaining options in order to better inform decision making.

UT5 does not contemplate an approach where multiple options are taken forward. UT5 requires the Independent Expert to recommend specific Transitional Arrangements, and following the QCA determination, for Aurizon Network to implement the selected Transitional Arrangements.

Given the changing dynamics across each of the systems, Aurizon Network considers a further study prudent to ensure the most efficient outcome is recommended. Aurizon Network will be seeking a Draft Amending Access Undertaking in order to ensure UT5 can accommodate this process, where recommended by the Independent Expert. Further details of the proposed process and Draft Amending Access Undertaking are included in Appendix 2.

Appendix 1: Transitional Arrangement Briefs

Appendix 1

NG1: RCS IN NEWLANDS

Project Scope

Aurizon Network has identified that the existing DTC signalling remaining between McNaughton and Newlands is a capacity constraint due to the time it takes to cross trains. Upgrading the DTC signalling to RCS has been identified as the best way to improve these crossing times.

Analysis indicates that installing RCS has the potential to reduce the turnaround time of the system by up to 4 hrs per cycle. This increase in velocity means that trains can cycle quicker and achieve more throughput. There are also additional safety benefits with RCS, with a simplification in safe working systems.

The following signals have been identified for upgrades:

Location from	Meterage	Location to	Meterage
Collinsville CE20	78.282 km	Sonoma Junction SA14	84.600 km
Sonoma Spur and Balloon SA14	84.600	SA26	3.500km
Sonoma Junction SA14	84.600 km	Birralee BI16/18	93.894km
Birralee BI16/18	93.894km	Cockool CL16/18	113.517km
Cockool CL16/18	113.517km	Havilah HH16/18	131.216km
Havilah HH16/18	131.216km	Newlands NS21	146.055km

The scope of signalling upgrade includes all related works for

- Level crossing protection,
- Operational systems upgrades
- Telecommunications requirements.

Potential Capacity Benefit

773 Train Paths 5.25Mtpa Independent Expert Modelled benefit? ✓

- The primary benefit of RCS signalling is the reduction in crossing times between McNaughton Junction and Newlands Junction.
- Analysis indicates that installing RCS has the potential to reduce the turnaround time of the system by up to 4 hrs per cycle. This increase in velocity means that trains can cycle quicker and achieve more throughput.
- With this project, pathing in the Newlands System can be reduced from a 60-minute dispatch to 36-minute dispatch.
- There are also additional safety benefits with RCS, with a simplification in safe working systems.

Cost Estimate

Concept Design	$25,000
Prefeasibility Design	$135,000
Feasibility Design	$1,200,000
Construction Cost Estimate	**$16,219,500 (+/-50%)**
Operational Systems	*$230,000*
Signalling Construction	*$13,600,000*
Telecommunications	*$915,000*
Project Management & Indirect costs	*$1,474,500*

Delivery Timeframe

Concept Study	2 months
Prefeasibility Study	3 months
Feasibility Study	12 months (Subject to resource availability)

	Construction	12 – 24 months (Subject to long lead item procurement)
Project Risks and opportunities	• There are 24 level crossings in this area, 5 of which are active. All impacted crossings will require an ALCAM assessment, and some crossings may require renewal or upgrade as appropriate. This is not included in the cost estimates above. • Resourcing availability for signalling design and construction is likely to lead to longer timeframes for both design and construction. This has been highlighted above, with risk that the longer ends of the time ranges manifests.	
Project Funding and RAB allocation	• Aurizon Network is proposing to allocate the costs of the RCS project to the GAPE RAB.	
Measurement of success	• 6 months after project completion, the Independent Expert will be required to undertake a capacity assessment in accordance with the Expansion provisions within the Access Undertaking. Their assessment will confirm the capacity created from this project.	

NG2, G1, BM1: OPTIMISED BCM PROGRAM

Project Scope	This project involves changes to the way Aurizon Network manages the BCM program. The Optimised single BCM program uses the RM902, auxiliary equipment and organisational structure. The current operating methodology is to have the ballast cleaning operation locate in the North for five months and then the south for five months. The proposed change in this option is to instead move the machine between closures to reduce the reliance on single line closures. In the Newlands System, this involves removal of 13hrs of closures each year.			
Potential Capacity Benefit	**Newlands:** 16 - 30 Train Paths	0.1 Mtpa - 0.2Mtpa	Independent Expert Modelled benefit?	✓ [12]
	Goonyella: 279 Train Paths	1.8 – 2.7Mtpa	Independent Expert Modelled benefit?	✓ [13]
	Blackwater: 21 – 96 Train Paths	0.2 – 1.2Mtpa	Independent Expert Modelled benefit?	✓ [14]
	• This project does not involve any capital investment and can generate increased throughput by making more paths available for coal services. • It also provides for better utilisation of the Ballast Cleaning Machine and staff. No additional supporting plant or assets are required. • This project does involve some changes to the maintenance plan to enable sufficient time between system closures for BCM travel. These changes are being incorporated in the FY23 MRSB. • To ensure the benefits from this change are seen, compliance to plan is required. There will be limited ability to move the program or to accommodate additional scope in future years, without additional access impacts.			
Cost Estimate	**Maintenance Cost Increase**	Goonyella	$400,000 pa.	
		Blackwater	$300,000 pa.	
Delivery Timeframe	The optimised BCM program will be implemented in Q1 FY23 as part of the approved Maintenance and Renewals Strategy and Budget.			
Project Risks and opportunities	• Discrepancies remain between the Independent Expert's modelling results and Aurizon Network's modelled outcomes. This may be due to modelling variations and assumptions. Further analysis will be undertaken with the Independent Expert to validate the capacity benefit created.			
Project Funding and RAB allocation	• Project costs associated with the Optimised BCM program are included within the FY23 Maintenance and Renewals Strategy and Budget. Ongoing costs will be included in this process each year.			

[12] Aurizon Network's modelling indicates a benefit of up to 30 Train Paths. The IE's assessment is more conservative, at 16 Train Paths

[13] Aurizon Network's modelling indicates a benefit of up to 1.8Mtpa. The IE's assessment indicates more benefit, of up to 2.7Mtpa

[14] Aurizon Network's modelling indicates benefits of up to 1.2Mtpa. The IE's assessment ranges from 0.2Mtpa to 0.8Mtpa pending on the assumption used around consists.

Measurement of success	• The benefits of this project are contingent on demand existing to take advantage of the paths released for train services. Given this, it is proposed that following implementation of this initiative in FY23, the project benefits are considered to be created, and the SOP updated to reflect the new maintenance approach.

NG3: COLLINSVILLE PASSING LOOP EXTENSION

Project scope	This initiative involves lengthening Collinsville Passing Loop to make it fit for use as a crossing location by the currently operating fleet. Movement of the signals at the southern end of Collinsville Passing Loop to increase the passing loop length by 16 metres will enable this.			
Potential Capacity Benefit	253 Train Paths	1.75Mtpa	Independent Expert Modelled benefit?	✓ [15]
	• Increasing the length of Collinsville Passing Loop will allow the current fleet operating in the network to cross and will result in reduction in cycle time. • With RCS installed, reinstating Collinsville Passing Loop has the potential to reduce the average cycle time in GAPE and Newlands further, by 1.5 - 2.5 hours.			
Cost Estimate	**Concept Design**			$33,000
	Prefeasibility Design			$88,000
	Feasibility Design			$130,000
	Construction Cost Estimate			**$304,000 (+/-50%)**
	Operational Systems			*$17,000*
	Signalling Construction			*$170,000*
	Telecommunications			*$90,000*
	Project Management & Indirect costs			*$27,000*
Delivery Timeframe	***Concept Study***	2 weeks		
	Prefeasibility Study	1 month		
	Feasibility Study	2 months		
	Construction	3 – 6 months (pending closure availability and long lead procurement		
Project Risks and opportunities	• This option involves a reduced handling allowance of 4 metres. A risk assessment with Above Rail operators is required to confirmed this is acceptable. Should this not be acceptable, a further option exists to lengthen the loop further. This involves civil works and is estimated at $4.5m. Some efficiencies may be possible with the integration of RCS signalling at the same time.			
Project Funding and RAB allocation	• The primary reason why Collinsville Passing loop is not currently utilised is due to 84 wagon consists being too large for the loop. Low demand has allowed for 84 wagons to operate without the need for this loop to be operational. • As such, Aurizon Network intends to distribute the costs of this project proportionately between the GAPE and Newlands systems, based on the Existing Capacity Deficits in each of these systems. It is therefore intended that the cost of this project be socialised within the GAPE and Newlands RABs to reflect the operational productivity improvements to all users operating 84 wagons.			
Measurement of success	• 6 months after project completion, the Independent Expert will be required to undertake a capacity assessment in accordance with the Expansion provisions within the Access Undertaking. Their assessment will confirm the capacity created from this project.			

[15] IE modelling has been undertaken on 24hr use. In Stage 1, Aurizon Network is proposing to use the Collinsville Passing loop from 6am through to 8pm. Therefore, the IE's results have been reduced by a factor of 40% to reflect the hours not in operation.

NG4 – STUDY INTO USING COLLINSVILLE PASSING LOOP 24HRS A DAY

Project Scope	The Collinsville Passing Loop project identified above in NG3 will see the Passing loop being capable of accommodating an 84-wagon train. In 2012, Aurizon made a commitment to the Collinsville community to only cross trains in this loop between the hours of 0600 and 2000. ***Project NG3*** recognises this restriction. This limitation means that the loop is not being used to its full potential, and there is an opportunity loss of up to 1.4Mtpa. This Project NG4 involves the study and works required to mitigate any noise issues to enable the use of the Collinsville Passing Loop 24hrs a day. The scope includes: • Community engagement to recommence use of the loop 24hrs a day • Investigations into noise abatement requirements as required • Design and construction of noise abatements as required			
Potential Capacity Benefit	180 Train Paths	1.25Mtpa	Independent Expert Modelled benefit?	✓ [16]
	• The benefit of this project is driven by using the Collinsville Passing loop 24hrs a day.			
Cost Estimate	**Study Allowance**			$100,000
	Construction Cost Estimate			**$10,000,000**
Delivery Timeframe	***Phase 1: Study and community Consultation***	9 months		
	Phase 2: Construction	*12 months*		
Project Risks and opportunities	• Stage 1 of the Newlands and GAPE Transitional Arrangement should create enough capacity for up to 38Mtpa. Further throughput improvement on Stage 1 can be achieved where additional consists above 18 consists are operating in the system. • The requirement for this project, and stage 2 is therefore dependant on actual demand over 38Mtpa. Once this demand is reached, or as otherwise agreed with our Customers, Aurizon Network will commence this project as part of Stage 2. • This project is also largely dependent on community concerns. Should these concerns no longer be voiced, then this project will not be required. If concerns remain, and no agreement can be reached, it is likely that phase 2 of Project NG5 will be required.			
Project Funding and RAB allocation	• The primary reason why Collinsville Passing loop is not currently utilised is due to 84 wagon consists being too large for the loop. Low demand has allowed for 84 wagons to operate without the need for this loop to be operational. • Aurizon Network considers that the noise issues preventing use of the crossing 24hrs a day are common across both the Newlands and GAPE users. Given changing demand in both of those systems, Aurizon Network does not consider that a single system can be identified as the cause. • As such, Aurizon Network intends to distribute the costs of this project proportionately between the GAPE and Newlands systems, based on the			

[16] IE modelling has been undertaken on 24hr use. In Stage 1, Aurizon Network is proposing to use the Collinsville Passing loop from 6am through to 8pm. Therefore, the IE's results have been reduced by a factor of 40% to reflect the hours not in operation.

	Existing Capacity Deficits in each of these systems. It is therefore intended that the cost of this project be socialised within the GAPE and Newlands RABs.
Measurement of success	• Phase 1 will not require any measurement of success • Phase 2 can be considered as an Expansion. 6 months after project completion, the Independent Expert will be required to undertake a capacity assessment in accordance with the Expansion provisions within the Access Undertaking. Their assessment will confirm the capacity created from this project.

NG5: CORAL CREEK PASSING LOOP

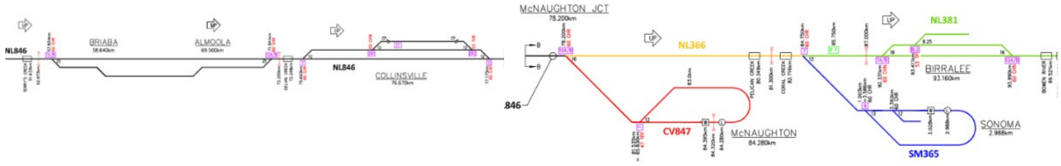
Project Scope

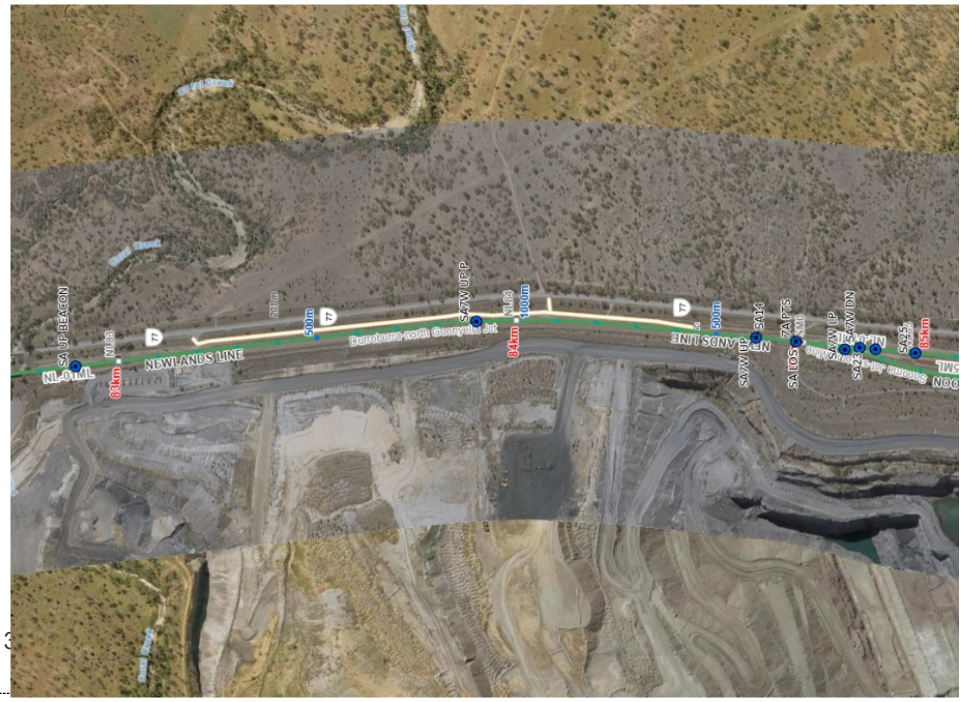
Newlands system capacity is constrained by the headway between Almoola and Birralee and the fact that Collinsville passing loop is too short to cross current 84 wagon trains.

An option to resolve this issue and reduce the headway of this section is to construct a new passing loop that divides the section between Almoola and Birralee in half thus halving the constraining headway. This is an alternative to extending Collinsville Passing Loop which may not be desirable to the local community.

Construction of a new passing loop between 83km and 84.5km. This lies to the south of Coral Creek and north of Sonoma Junction. The general specification of the passing loop is as follows:

Purpose	To facilitate the crossing or passing of 2 Newlands bulk coal trains
Holding length between signals	1450m
Axle load	26.5t
Signalling system	RCS
Turnout speed	Minimum 50km/h
Bad order siding	Not required
RMAR	Per standard requirements





Potential Capacity Benefit	• Coral Creek passing loop has similar benefits to the Collinsville Passing Loop, in that it breaks up the section from Almoola to Birralee • This provides for the headway on the Newlands mainline to be reduced from 60 minutes to 40 minutes, providing increased pathing for coal services.	
Cost Estimate	**Concept Design**	Completed as part of Newlands Expansion Study
	Prefeasibility Design	$300,000
	Feasibility Design	$500,000
	Construction Cost Estimate	**$19,888,000 (+/-50%)**
	Track & Civils	*$15,000,000*
	Signalling Construction	*$2,900,000*
	Telecommunications	*$180,000*
	Project Management & Indirect costs	*$1,808,000*
Delivery Timeframe	***Concept Study***	NA
	Prefeasibility Study	3 months
	Feasibility Study	6 months
	Construction	6 – 12 months
Project Risks and opportunities	- Stage 1 of the Newlands and GAPE Transitional Arrangement should create enough capacity for up to 39Mtpa. Further throughput improvement on Stage 1 can be achieved where additional consists above 18 consists are operating in the system. - The requirement for this project, and stage 2 is therefore dependant on actual demand over 39Mtpa. Once this demand is reached, or as otherwise agreed with our Customers, Aurizon Network will commence this project as part of Stage 2.	
Project Funding and RAB allocation	- Aurizon Network intends to distribute the costs of this project proportionately between the GAPE and Newlands systems, based on the Existing Capacity Deficits in each of these systems. This is on the basis that Coral Creek is required as Collinsville Passing Loop cannot be used 24hrs a day. It is therefore intended that the cost of this project be socialised within the GAPE and Newlands RABs. - Please note this project has also been identified in the Newlands Expansion Concept Study, Should the requirement for this loop be triggered by Expansion volumes, then Aurizon Network will seek to allocate the costs accordingly, recognising the use.	
Measurement of success	- 6 months after project completion, the Independent Expert will be required to undertake a capacity assessment in accordance with the Expansion provisions within the Access Undertaking. Their assessment will confirm the capacity created from this project.	

NG6: PRING YARD ADDITIONAL ROAD

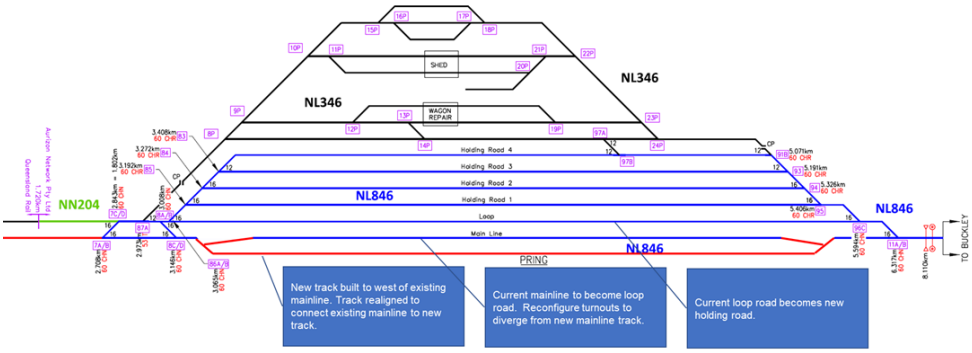
Project Scope

Capacity simulation and analysis has indicated that the Newlands system capacity is likely to be constrained by the capacity of Pring yard when consist numbers reach that required for full system contracted capacity of 50 Mtpa particularly with the use of holding roads 3 and 4 for above rail activities.

Simulation has indicated that the addition of one additional holding road in Pring Yard will significantly improve system throughput.

Purpose	To provide an additional road in Pring yard for either staging or dispatch of empty trains. Include crew change platforms and road access both ends.
Holding length between signals	1450m minimum
Axle load	26.5t
Signalling system	RCS incl shunt.
Turnout speed	Minimum 50km/h
RMAR	Per standard requirements

Diagram below provides a proposed arrangement of tracks to provide the additional holding road.



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Potential Capacity Benefit

88 Train Paths | 0.5 – 2Mtpa | Independent Expert Modelled benefit? ✓ [17]

- An additional holding road in Pring has been identified as a potential option to improve capacity when an increase from the peak assumed fleet of 18 is seen.
- Where delays or possessions occur, trains that have been generally scheduled evenly, tend to lose this even distribution. Combined with the dwell times in Pring for provisioning, maintenance and connection time, this variation results in periods of high yard congestion when the system is modelled at Committed Capacity.
- Yard congestion reduces the velocity of train movements through the yard to the port and return empty (the yard port mini cycle), increasing cycle time and reducing throughput.

[17] The IE assessment indicates an approximate benefit of 88 Train Paths, or 0.5Mtpa. Aurizon Network's assessment indicates a higher benefit of up to 2Mtpa. This is due to differences in the modelling approach for the yard, and assumptions used.

	• Installing an additional road in the yard provides additional capacity to store and stage consists, reducing congestion, improving cycle time, and increasing throughput. A similar outcome can be achieved to an extent by improving yard performance. This is discussed in the section below.	
Cost Estimate	**Concept Design Allowance**	$150,000
	Prefeasibility Design Allowance	$396,800
	Feasibility Design Allowance	$647,100
	Construction Cost Estimate	**$15,850,000 (+/-50%)**
	Track & Civils	*$13,230,000*
	Signalling Construction	*$1,180,000*
	Project Management & Indirect costs	*$1,440,000*
Delivery Timeframe	***Concept Study***	6 weeks
	Prefeasibility Study	3 months
	Feasibility Study	12 months
	Construction	6 – 12 months
Project Risks and opportunities	• This project is largely dependent on an increase from 18 to 22 and above consists, and demand at full committed capacity of 50Mtpa. • The requirement for this project is also largely based on the operator mix at the time. As demand changes, and operators servicing that demand changes, the use of the yard will also likely change. Further assessment will be required in Stage 3 to confirm the benefit of this project.	
Project Funding and RAB allocation	• Aurizon Network intends to distribute the costs of this project proportionately between the GAPE and Newlands systems, based on the Committed Capacity, and Existing Capacity Deficits for each system. It is therefore intended that the cost of this project be socialised within the GAPE and Newlands RABs.	
Measurement of success	• 6 months after project completion, the Independent Expert will be required to undertake a capacity assessment in accordance with the Expansion provisions within the Access Undertaking. Their assessment will confirm the capacity created from this project.	

G2, BM2: YARD SCHEDULING IMPROVEMENTS

Project Scope

The ICAR results have indicated that Pring, Jilalan, and Callemondah yards are a source of congestion on the network and may be limiting capacity. This project involves a series of improvement initiatives focused on improving planning and scheduling in the yard. These includes:

- Embedding the IRP process
- Availability Optimisation – Improved pathing distribution and & Clump Management
- Schedule Optimisation – Investigations into rolling plans and optimisation to reflect day of operations.
- Implementation of Roadie for yard scheduling

In addition, Above Rail performance in the yards has been a point of focus over the past 24 months. As Rail Operators make step changes in how they are using the yards, this too will improve overall capacity. The goal of this project is to reduce congestion and time in the yard, leading to reduction in turnaround time, and facilitating more movements through the yard, and on the network.

The below provides more details on each of the initiatives:

Embed the IRP Process	
Scope Statement	- Integrated Rail Planning (IRP) involves a process whereby Operators submit demand and operating assumptions to Aurizon Network to globally optimise. The key benefit to this process is improving the schedule through optimising for throughput. Where previously each Operator were developing their own schedule, and Aurizon Network would resolve for clashes. With IRP, Aurizon Network can develop a schedule inclusive of all demand and minimise these clashes. - IRP has the ability to improve operations in the yard, through scheduling of connection times. Where connection times can be reduced, or minimised, trains will stage in the yard for a shorter amount of time.
Solutions Benefit	- Increased planned throughput - Decrease planned to schedule cycle time variance - Weekly baseline against which to monitor performance - Ability to perform what-if analysis to quantify impact on system constraints
Actions	- Stabilisation of process, including increasing licences and optimisation hours, refine TSE tiering approach, and improvement of planning inputs and assumptions - Formalise the changes required to adopt the process as business as usual.
Availability Optimisation	
Scope Statement	- This initiative involves elimination of pathing constraints by adjusting the criteria used to assess access requests and to cancel paths. This project seeks to optimise available path distribution and improve planning of asset activities. In spreading pathing, this means that yard activities can also be more evenly distributed.
Solutions Benefit	- Increased planned throughput - Decreased Turnaround Time
Actions	- Determine improved criteria for assessing access request and for cancelling paths - Implement improved criteria to assess access requests and to cancel paths

	- Identify the root cause for cancelled paths - Determine method to address root cause - Implement methods.
Schedule Optimisation	
Scope Statement	- This project seeks to investigate optimisation inside the ITP timeframe. - This will improve daily train schedules considering the location of consists to reduce cancellations due to broken connections and maintain planned turnaround times and allows optimised planning for changes in customer demand or supply chain availability. - Cancellations of connections in yards result in the stowing of trains on roads until another connection can be made. This consumes yard capacity and causes congestion. By minimising these cancellations, improvements in yard capacity will be seen.
Solutions Benefit	- Increased planned throughput - Decreased Turnaround Time - Reduction in time taken to develop schedules - Preparation for moving to a more frequent planning process.
Actions	- Determine requirements of using a global optimisation tool inside the ITP week to generate optimised rolling schedules - Make required adjustments to systems and processes - Establish required data feeds - Pilot process - Evaluate Pilot & Implement
Roadie Implementation	
Scope Statement	- Currently, yards are unscheduled. The DOO schedule designates departure and arrival times only, actual train movements within the yard are locally controlled. Local operations and control decisions can impact on above rail activities, and lead to train cancellations. The Roadie tool is a custom-built yard scheduling tool that seeks to incorporate all yard activity into one schedule.
Solutions Benefit	- Improved compliance to yard plan activity type - Reduction in connection changes required.
Actions	- For each yard, the actions include: o Roadie Server Upgrade o Beta Version Development o Production Version Development o Handover to Coordinator Network Control o Implementation and review

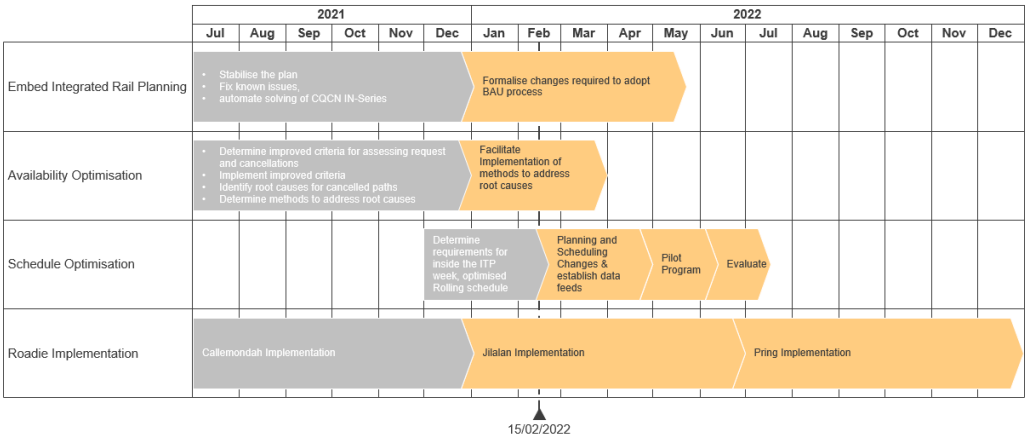
Potential Capacity Benefit	**Goonyella:** 106 Train Paths	1.1Mtpa	Independent Expert Modelled benefit?	✓ [18]
	Blackwater: 240 Train Paths	2Mtpa	Independent Expert Modelled benefit?	✓

- A series of yard operational improvements have been tested to determine potential capacity benefits. This initiative aims to reduce cancellations due to missed connections through better planning and reduce the overall time trains spend in the yard by a target of one hour. Modelling indicates that a reduction of depot time by one hour has a significant impact on overall cycle time and system throughput.
- Depot dwell time consists of time for provisioning and examination, train maintenance activities, shunting and waiting for next dispatch connection. Unplanned rollingstock maintenance and connection wait times are the largest elements of modelled depot dwell time. Consideration should be given to the possibility of achieving depot dwell time savings by measures such as minimisation of shunting activities and better performance to plan.
- Integrated Rail Planning will help to facilitate this by improving schedule reliability, ensuring plans are deconflicted and can be reliably achieved and accommodate variation, which will assist in reducing the effect of yard congestion associated with missed connections.
- Better yard scheduling and management can be achieved through operational rules, and enhanced technology. Aurizon Network has modelled whether providing a dedicated 'no touch' road will assist in congestion management. Through simulations, TSEs achieved increased by 0.5%. While this may be minor, tools such as Roadie for better road management can also assist in combatting the impact of cargo assembly operations.

Cost Estimate	**Operating Cost Increase**	Up to $1m in Operating Costs for system and process changes

Delivery Timeframe

The suite of projects contributing to yard reductions have commenced. The program of work is scheduled to run until 2022.



Project Risks and opportunities	- The benefits of this project are yet to be tested in periods of peak demand. Benefits are also largely influenced by the number of consists operating, and other factors contributing to congestion on the network. There are other non-controllable issues such as customer cancellations and demand that impact system performance and dwell time.
Measurement of success	The ICAR provides the simulated Deliverable Network Capacity of each Coal System, based on a set of assumptions detailed in the SOP. These assumptions were based on actual data provided for FY18 – FY20. Relevant factors in the System Operating Parameters are as follows:

[18] Aurizon Network's modelling indicates a benefit of up to 3Mtpa. The IE's assessment indicates less benefit at 1.1Mtpa due to differences in the modelling approach to yards.

- Reliability Examination Frequency and minutes
- Unit Train Maintenance Frequency and minutes
- Provisioning frequency and duration
- Assumptions for shunting and unplanned activities

With fluctuations in demand, yard activity and congestion vary. Additionally, actual yard activity is impacted by activities not included in the SOP, including:

- Shunting and unplanned activities
- Impacts of scheduled connections (in contrast to run when ready simulations)
- Delays[19] that occur only in yards

It is therefore proposed that a two-staged approach is taken to measure the effectiveness of these initiatives as a whole:

- **Trend Monitoring**

To determine the improvements made from scheduling improvements, it is proposed to track trends in this data. The following metrics will be monitored to determine overall improvements across the yards:

- Turnaround Time & time in yard
- Compliance to mini-cycle plan
- Compliance to planned activity time
- ITP to 24hr Schedule variance
- Connection changes and cancellations
- Delays within the yard
- In-Series v IRP comparison

Trend data will be used to see improvements from the average data points of the ICAR data horizon of FY18 to FY20.

- **Simulation**

Over the period of 12 months, trend data will be captured. Updated data will be provided to the Independent Expert for inclusion in their model. A side-by-side comparison can then be run at committed capacity levels to determine the modelled benefit from the initiatives. This simulation will confirm the capacity benefit that is created.

At that point in time when the simulation is complete, the Transitional Arrangement will be considered implemented, and the capacity benefit recognised.

[19] Delays in the ICAR are applied on a per 100km basis. They are not specifically represented in the yards, however contribute to the overall loss in the simulation.

G3: CONNORS RANGE HEADWAY REDUCTION

Project Scope

The capacity of the Goonyella system is constrained by the limiting headway. This is between Hatfield and Yukan – The Connors Range. All loaded coal trains must descend this steep (1:50) grade. Headway times (the minimum time that passes before a train can enter a section after a previous train) are a minimum of 21 minutes and average 24 minutes. If the tonnage signal constraint can be safely removed, this section could be operated at reduced headway of around 16 minutes as shown.

This has the potential to produce significant benefits in terms of network capacity and potential benefits to train cycle times.

The track between these two locations is divided into two track sections:

- Hatfield to Black Mountain
- Black Mountain to Yukan.

These two sections cannot be occupied by two loaded coal trains due to the tonnage signal BM27/28. This signal cannot be passed by a loaded coal train unless it shows a green aspect. This will not occur until the train in front has passed signal YN20/21.

The signalling arrangement however results in the headway between loaded coal trains being governed by the time taken to travel from signal BM 27/28 to tail of the train clear of signal YN20/21 plus overlap.

Proposed Changes:

It is proposed that if the tonnage signal constraint can be safely removed, this section could be operated as two sections reducing headway to around 16 minutes. To achieve this, the following changes are proposed:

1. Section Timings

A detailed analysis of historical train running on these sections of track has been carried out using train steps data (track circuit occupy and release times for all relevant track circuits) over a one-month period to determine:

- The distribution of run times across each track circuit.
- The effect of trains running at close separations on run times.
- The achievable arrival separation at Yukan currently.
- The achievable and probable arrival separation at Yukan with the proposed change.
- The probability of following trains encountering restricted aspects on approach to Black Mountain under the proposed change.

The results of the train steps analysis as described above is presented below. The table indicates the probability distribution of train separations for the current operating scenario. Note this is a representation of the best achievable times based on current performance and the distribution of transit times not the achieved arrival separations as these are influenced by other factors such as demand and supply chain availabilities.

Arrival Separation at Yukan in Minutes		Current Operating Scenario	Proposed Operating Scenario
Minimum time based on current speed boards	Min	17.1 minutes	13.3 minutes
25% of trains will achieve an arrival separation of this time or better	P25	18.8 minutes	15.1 minutes
25% of trains will achieve an arrival separation between these times	P50	18.8 – 19.7 minutes	15.1 – 16.9 minutes
25% of trains will achieve an arrival separation between these times	P75	19.7 – 21.5 minutes	16.9 – 22.8 minutes**
15% of trains will achieve an arrival separation between these times	P90	21.5 – 24.6 minutes	22.8 – 30.6 minutes**

2. Signal Aspects on approach

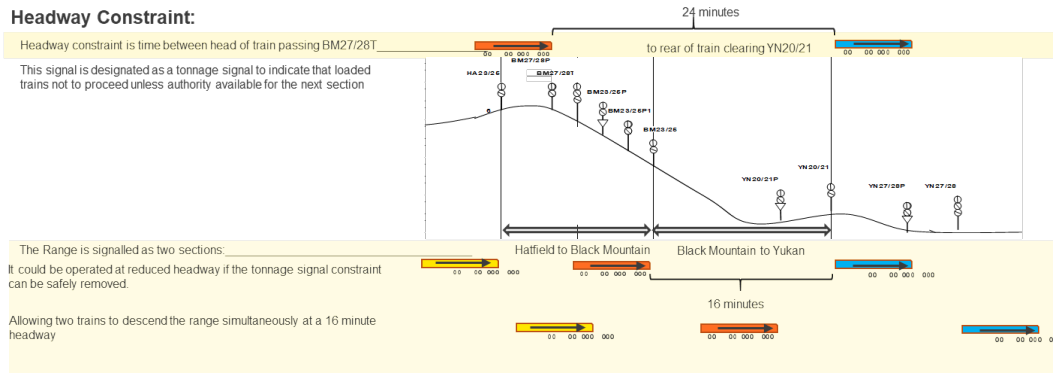
A key factor in the success of the proposal is the coordination between trains traversing the two sections. If trains traversing the Hatfield to Black Mountain section sight the BM23/25P approach signal before the train traversing Black Mountain to Yukan clears the overlap at YN20/21 the approach signal will be at yellow leaving the train crew no option but to apply a full brake application to stop at Black Mountain.

A desktop analysis of the required stopping distance for a standard air brake train on this gradient indicates a stopping distance of between 850 and 1250 m. Information received regarding ECP braked trains indicates a stopping distance of 550m. This project will require a revised approach signal location at 1000m from BM23/25.

3. Signal Aspect Sequencing

Current signal aspect sequencing clears Hatfield signal HD23/25 to green when the preceding train has cleared the overlap at signal BM27/28. This currently allows trains to proceed from Hatfield prior to the preceding train clearing the BM23/25 overlap (see point 3 above). The analysis shows that this will lead to trains sighting a yellow aspect at revised BM23/25 P approach signal under the proposed operation.

A signalling design solution is required for this problem. It is proposed that signal HD23/25 should not clear until the preceding train has cleared BM23/25 overlap.



Potential Capacity Benefit	160 Train Paths	1.6Mtpa	Independent Expert Modelled benefit? ✓

- Improving the headway on this section will allow for additional services to travel down Connors Range each day.

	• By implementing the change, static calculations indicate that an additional 30 trains per day could travel through that section. Consideration must however be given to constraints both downstream and upstream. • There is a risk that reducing train separation may lead to an increase in track stability problems due to track heat input from train braking. This is an existing risk that materialises in delays currently due to excessive heat on the track. Further studies are proposed to quantify the increased risk from additional services, and to develop concept studies for the solution as part of G4.	
Cost Estimate	**Design**	$75,000
	Construction Cost Estimate	**$87,880**
	Signalling Construction	*$73.080*
	Project Management & Indirect costs	*$14,800*
Delivery Timeframe	***Design***	6 months
	Construction	1 month, depending on closure program
Project Risks and opportunities	• A minimum of a 5-day closure will be required for circuit changes and testing. A construction plan will be developed as part of the design stage. • This project does not include any changes to management of heat restrictions on Connors range. As more traffic becomes more frequent travelling down the range, there is the potential that delays will increase.	
Project Funding and RAB allocation	• Aurizon Network intends for the cost of this project to be included in the Goonyella RAB on a fully socialised basis.	
Measurement of success	• 6 months after project completion, the Independent Expert will be required to undertake a capacity assessment in accordance with the Expansion provisions within the Access Undertaking. Their assessment will confirm the capacity created from this project.	

G4: CONNORS RANGE TRACK STABILITY WORKS

Project Scope

There is an existing track stability risk on the Connors Range, primarily track buckling due to high rail temperatures. Rail temperature is driven by both high ambient temperature conditions and heat transfer from rolling stock wheels which are at high temperature because of friction braking to control speed on the steep grade. Reducing the interval between trains will result in greater thermal input from rolling stock wheels increasing the rail temperature problem.

Current techniques for managing track buckling risk are to monitor rail temperatures and interrupt rail traffic when temperature limits are exceeded. This is effective for managing risk but does not facilitate higher traffic volumes. The long-term solution requires a track structure capable of remaining stable with the higher thermal input resulting from trains running at 15-minute headways. The scope of this project is to upgrade the track structure over approximately 10km of the Connors Range.

By minimising the delays caused by these heat restrictions, capacity benefits can be seen.

Design Requirements

The design is required to achieve the following:

- Deliver the performance specification with a high level of reliability and availability.
- Use proven technology and components.
- Be constructable and maintainable with current methods and equipment. Minor modifications to equipment and processes are acceptable.
- Determine what portions of the existing track should be upgraded or replaced.

Study Scope

Concept Study	- Viable design concept. - Validation and verification processes such as lab and field testing - Construction cost estimate. - Prefeasibility study scope and cost estimate
Prefeasibility Study	- Preliminary design and value engineering. - Cost and construction planning. - Determine method of expansion funding.
Feasibility Study	- Final design for construction - Processes to finalise cost elements – materials and construction tendering processes.

Potential Capacity Benefit

194 Train Paths 2Mtpa Independent Expert Modelled benefit? ✘[20]

- Minimising the heat restrictions has the potential to reduce delays on the network.
- The benefits above have been calculated based on the opportunity loss identified through actual delays. Results have then been simulated by removing the delay, to determine the potential benefit.

Cost Estimate

Concept Design	$300,000
Prefeasibility Design	$2,000,000
Feasibility Design	$6,000,000
Construction Cost Estimate	**$41.5m – $71.5m**
Track & Civils	*$40m - $70m*
Electrification and Track Distribution	*$500,000*

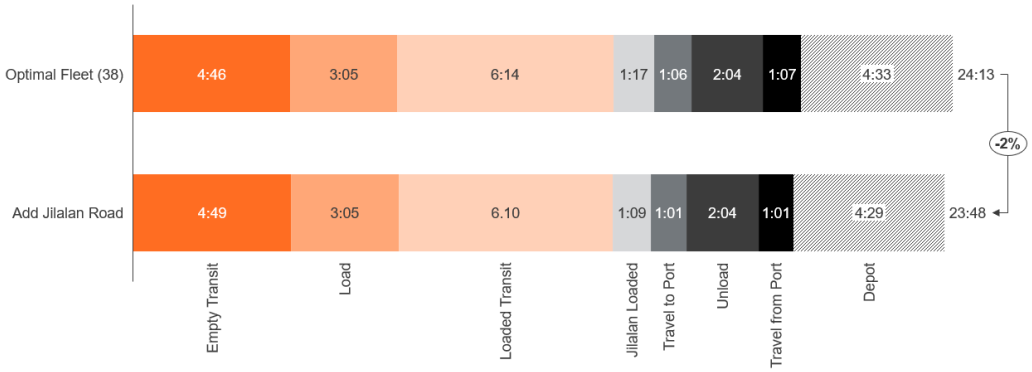
[20] Aurizon Network has modelled the benefit based on a reduction in the delays caused by heat restrictions. The IE has not modelled this benefit at this stage.

	Project Management & Indirect costs	*$1,000,000*
Delivery Timeframe	***Concept Study***	12 months
	Prefeasibility Study	6 months
	Feasibility Study	9 months
	Construction	6 – 12 months
Project Risks and opportunities	• No assumption has been made in the cost estimates for widening of existing embankment and associated extension of culvert structures. Improvement on access has not been considered at this point.	
Project Funding and RAB allocation	• Aurizon Network intends for the cost of this project to be included in the Goonyella RAB on a fully socialised basis.	
Measurement of success	• This project will be delivered in stages, with the first stage being concept design. At the end of each design phase, the effectiveness and efficiency of the project will be re-evaluated based on other options available. • Should this project move into construction, 6 months after project completion, the Independent Expert will be required to undertake a capacity assessment in accordance with the Expansion provisions within the Access Undertaking. Their assessment will confirm the capacity created from this project.	

G5: JILALAN HOLDING ROAD

Project Scope

- This project involves design and construction of an additional holding road within the Jilalan complex. The road can be used for staging of services to the port, provisioning, and maintenance examinations, or to provide a 'no touch' pathway through the yard for trains that do not require provisioning.
- A key bottleneck identified at Committed Capacity is the amount of time trains spend in Jilalan. This time is well above design parameters for the yard and occurs across multiple operators.
- With the yard at capacity, a new holding road will help support cargo assembly operations by creating an additional staging location for trains to wait or sequence to the port.
- Early works have already been undertaken on this when Jilalan Bypass Road was constructed, including formation, structures and drainage which will provide for simple and cost-effective implementation.
- Modelling indicates that an additional road in Jilalan provides cycle time reduction as shown in the chart below. Further study will be required to refine the yard operations to best use.



Study Scope

Two options are to be investigated. The scope will be refined as study phases progress.

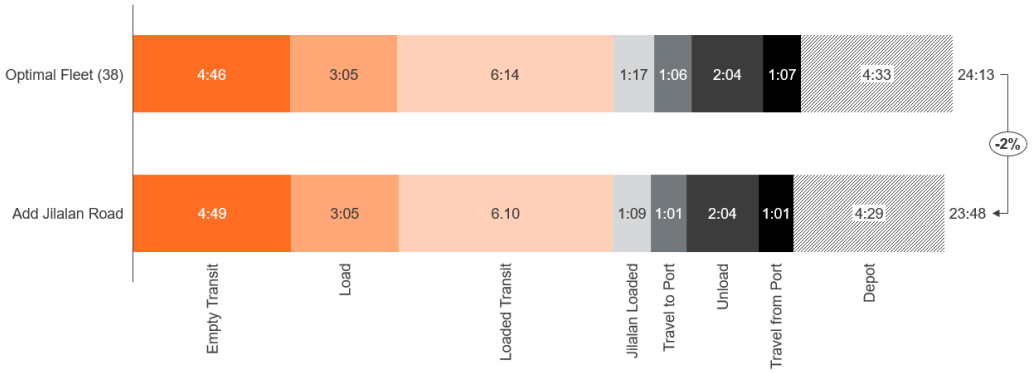
- OPTION 1: At a minimum the additional road will provide sufficient length to hold a Goonyella train. Holding distance between signals of 2150m.
- OPTION 2: An option to be assessed and costed to provide sufficient track for two holding locations connected with crossovers to the adjacent Jilalan Bypass Road.

Concept Study	- DD10 design (including rail alignment) - Bill of Materials (BOM) - Risk Assessment
Prefeasibility Study	- DD30 design (including rail alignment) - Preliminary geotechnical investigation/ hydro study - Bill of Materials (BOM) - Risk Assessment
Feasibility Study	- Field Survey/ Geotech investigation/ Detail Hydro study - IFC Design package - Bill of Materials (BOM) and tender documentations - Safety in Design (SID) and Risk Assessment - Desktop ALCAM assessments with changes taken into consideration if no site assessments are required.

Potential Capacity Benefit	242 Train Paths	2.5Mtpa	Independent Expert Modelled benefit?	[21]

- A key bottleneck identified at Committed Capacity is the amount of time trains spend in Jilalan. This time is well above design parameters for the yard and occurs across multiple operators.
- With the yard at capacity, a new holding road will help support cargo assembly operations by creating an additional staging location for trains to wait or sequence to the port.
- Early works have already been undertaken on this when Jilalan Bypass Road was constructed, including formation, structures and drainage which will provide for simple and cost-effective implementation.
- Modelling indicates that an additional road in Jilalan provides cycle time reduction as shown in the chart below. Further study will be required to refine the yard operations to best use.

Figure 13 – Impact of additional holding road on turnaround time (h:mm)



Cost Estimate	**Concept Design**	$346,000
	Prefeasibility Design	$1,020,000
	Feasibility Design	$2,900,000
	Construction Cost Estimate	**$19.3m - $36.3m**
	Civil & Track	*$14m - $28m*
	Electrification & Traction Distribution	*$3,600,000*
	Signalling and Telecoms	*$4,020,000*
	Project Management & Indirect costs	*$1,000,000*
Delivery Timeframe	***Concept Study***	6 months
	Prefeasibility Study	6 months
	Feasibility Study	12 months
	Construction	12 – 18 months

Project Risks and opportunities

- This project has only been scoped at a fatal flaws level. Further study is required to confirm location, and specific scope.
- Due to differences between AN and the Independent Expert's model, currently the Independent Expert does not consider any capacity benefit through the construction of an additional road in Jilalan yard. Further modelling will be required to confirm and quantify the capacity benefit

[21] AN modelling indicates a benefit of 2.5 – 3.5Mtpa. The IE has undertaken modelling, however does not see any benefit. This is largely due to differences in modelling approaches and assumptions. Further work is required to quantify the benefit.

Project Funding and RAB allocation	• Aurizon Network intends for the cost of this project to be included in the Goonyella RAB on a fully socialised basis.
Measurement of success	• This project will be delivered in stages, with the first stage being concept design. At the end of each design phase, the effectiveness and efficiency of the project will be re-evaluated based on other options available. • Should this project move into construction, 6 months after project completion, the Independent Expert will be required to undertake a capacity assessment in accordance with the Expansion provisions within the Access Undertaking. Their assessment will confirm the capacity created from this project.

G6: REMOVAL OF OPERATING RESTRICTIONS ON BALLOON LOOPS

Project Scope

Operating limitations of certain balloon loops can impact all traffic in the vicinity through adding congestion on the mainline. This is particularly prevalent with Cargo Assembly operations, whereby balloon loops are required to peak at a set time, to achieve cargo builds within allocated delivery windows.

The following limitations exist in the Goonyella System:

Saraji Balloon Loop

- Saraji Balloon Loop is signalled as a 2-train balloon loop, however is operating as 1.
- All the signal sections allow the trains to fit in clear however with the placement of the loadout and weighbridges, trains need to be fully finished and asked to clear the loadout, receive a weighbridge report and head towards the departure signal, before the next train is given lights into the balloon up to the intermediate signal.
- The signal section at Saraji up the intermediate only allows the train to be in clear by 9 metres, which invites SPAD/rollback SPAD risk, or mainline capacity restrictions as trains take a long time to pull in clear.
- At Saraji the train is very close to the departure signal if not past it before clearing loadout and weigh bridge tape being sent through. If a train is the already behind at intermediate it makes it very hard to adhere to the standard regarding managing overloads.
- A study is required to determine what infrastructure is required to be relocated to enable the balloon loop to operate as a 2-train balloon loop.

Peak Downs Balloon Loop

- Peak Downs Balloon Loop is signalled as a 2-train balloon loop, however is operating as 1.
- Traincrew have identified risks due to the gradient in the loop, which has the potential to cause issues with setbacks and train handling.
- A study is required to determine what changes are required to reduce the train handling risks.

Alternative Angles

- An option has been raised to install northern angles for Goonyella mines railing to Abbot Point. This will provide improvements in capacity due to the removal of the need to turn the train at another location on the network.
- A study is required to determine the number of locations, and whether their operation is currently limiting capacity.

Potential Capacity Benefit

97 Train Paths 1Mtpa — Independent Expert Modelled benefit? ✓[22]

- The removal of restrictions on balloon loops has the potential to improve capacity by allowing back-to-back trains to be staged at mines.
- This can become important with cargo assembly operations, where peaking capacity is required to build parcels in a dedicated time.

Cost Estimate

Concept Design	$100,000
Prefeasibility Design	$200,000
Feasibility Design	$600,000
Construction Cost Estimate	**$10 - $30m**

[22] AN modelling indicates a benefit of 0.5Mtpa for Saraji and Peak Downs operations. The IE modelling indicates a further benefit of 0.5Mtpa for northern angles.

Delivery Timeframe	***Concept Study***	6 months
	Prefeasibility Study	6 months
	Feasibility Study	12 months
	Construction	12 – 18 months
Project Risks and opportunities	• The time and costs of this project will be largely dependent on how many options are investigated, and whether operational changes can be made.	
Project Funding and RAB allocation	• Aurizon Network intends for the cost of this project to be included in the Goonyella RAB on a fully socialised basis.	
Measurement of success	• This project will be delivered in stages, with the first stage being concept design. At the end of each design phase, the effectiveness and efficiency of the project will be re-evaluated based on other options available. • Should this project move into construction, 6 months after project completion, the Independent Expert will be required to undertake a capacity assessment in accordance with the Expansion provisions within the Access Undertaking. Their assessment will confirm the capacity created from this project.	

BM3: CALLEMONDAH HOLDING ROAD

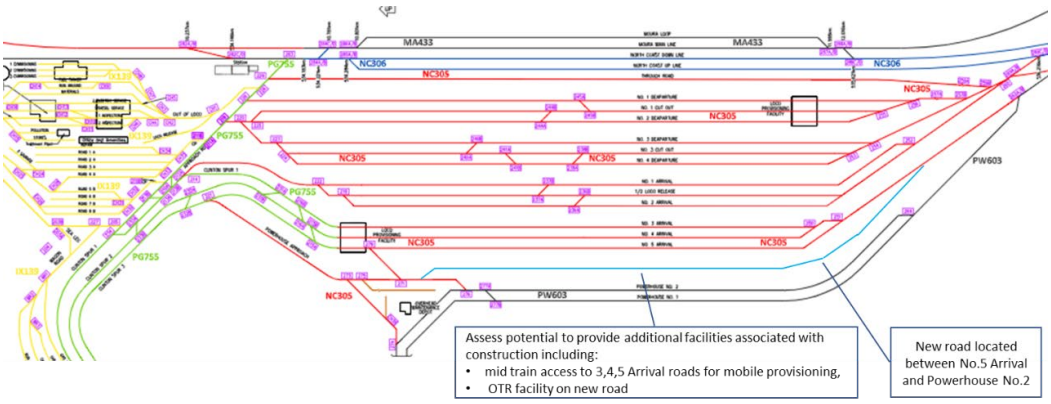
Project Scope

- This project involves design and conduction of an additional holding road within the Callemondah complex. The road can be used for staging of services to the port, provisioning, and maintenance examinations, or to provide a 'no touch' pathway through the yard for trains that do not require provisioning.
- A key bottleneck identified is the amount of time trains spend in Callemondah. This time is well above design parameters for the yard and occurs across multiple operators.
- There is the potential to make provisions for better use of Road 5 in Callemondah yard through upgrades to the access road. Upgrades could facilitate mobile provisioning of lead and remote locomotives, or access for other on-train activities.

Further study is required to determine feasibility, and to maximise the potential benefits.

Construction of an additional holding road in Callemondah yard. The general specification of the passing loop is as follows:

Purpose	To provide an additional road in Callemondah yard for either staging of loaded trains to RGTCT or dispatch of empty trains. Include crew change platforms and road access both ends.
Holding length between signals	1720m minimum
Axle load	26.5t
Signalling system	RCS
Turnout speed	Minimum 50km/h
	See additional comments in **Error! Reference source not found.** below.



Study Scope

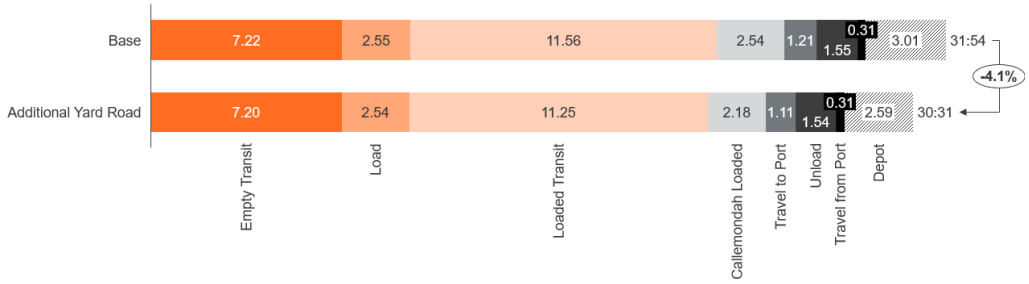
Two options are to be investigated. The scope will be refined as study phases progress.

- OPTION 1: At a minimum the additional road will provide sufficient length to hold a Goonyella train. Holding distance between signals of 2150m.
- OPTION 2: An option to be assessed and costed to provide sufficient track for two holding locations connected with crossovers to the adjacent Jilalan Bypass Road.

	Concept Study	- DD10 design (including rail alignment) - Bill of Materials (BOM) - Risk Assessment
	Prefeasibility Study	- DD30 design (including rail alignment) - Preliminary geotechnical investigation/ hydro study - Bill of Materials (BOM) - Risk Assessment
	Feasibility Study	- Field Survey/ Geotech investigation/ Detail Hydro study - IFC Design package - Bill of Materials (BOM) and tender documentations - Safety in Design (SID) and Risk Assessment - Desktop ALCAM assessments with changes taken into consideration if no site assessments are required.

Potential Capacity Benefit	232 Train Paths 2Mtpa	Independent Expert Modelled benefit?	✓

- Construction of a new road between the existing yard and Powerhouse loop will assist in providing a location for trains to stage to the port. Simulations indicate that cycle time improvements are seen on the loaded journey and loaded wait time in the port.



Cost Estimate	***Concept Design***	*$346,000*
	Prefeasibility Design	*$1,020,000*
	Feasibility Design	*$2,900,000*
	Construction Cost Estimate	***$15,757,500***
	Civil & Track	*$10,240,000*
	Electrification & Traction Distribution	*$1,800,000*
	Signalling and Telecoms	*$2,285,000*
	Project Management & Indirect costs	*$1,432,500*
Delivery Timeframe	***Concept Study***	6 months
	Prefeasibility Study	6 months
	Feasibility Study	12 months
	Construction	12 – 18 months

Project Risks and opportunities

- Currently, the location proposed will not provide sufficient holding length. Further study is required to confirm the desired length can be achieved.

Project Funding and RAB allocation

- This project provides benefits to both the Blackwater and Moura systems.
- Aurizon Network intends for the cost of this project to be included in the Blackwater and Moura RABs on a fully socialised basis. The cost will be proportionately allocated with reference to the Existing Capacity Deficit and Committed Capacity.

Measurement of success

- This project will be delivered in stages, with the first stage being concept design. At the end of each design phase, the effectiveness and efficiency of the project will be re-evaluated based on other options available.

- Should this project move into construction, 6 months after project completion, the Independent Expert will be required to undertake a capacity assessment in accordance with the Expansion provisions within the Access Undertaking. Their assessment will confirm the capacity created from this project.

BM3: PROVISIONING OF MOURA SERVICES AT STIRRIT

Project Scope

An option to reduce time in Callemondah Yard is to move provisioning of Moura services, to a location on the Moura system, such as Stirrit.

Aurizon Network has undertaken capacity modelling has been undertaken to determine the potential benefit of this change. The results are below:

		Change
Blackwater	% TSE achieved	+ 0.9%
	Cycle Time	- 19 mins
Moura	% TSE achieved	- 0.02%
	Cycle Time	+ 9 mins

Study Scope

This project involves working with Rail Operators to determine a suitable location, and infrastructure requirements to move provisioning out of Callemondah.

Modelling has been undertaken with existing infrastructure and shows a slight decrease in performance for Moura trains. There is the potential that a new road may be required as not to disadvantage Moura services. The following study will be undertaken:

Concept Study	- Scope identification and optioneering - DD10 design (including rail alignment) - Bill of Materials (BOM) - Risk Assessment
Prefeasibility Study	- DD30 design (including rail alignment) - Preliminary geotechnical investigation/ hydro study - Bill of Materials (BOM) - Risk Assessment
Feasibility Study	- Field Survey/ Geotech investigation/ Detail Hydro study - IFC Design package - Bill of Materials (BOM) and tender documentations - Safety in Design (SID) and Risk Assessment - Desktop ALCAM assessments with changes taken into consideration if no site assessments are required.

Potential Capacity Benefit

120 Train Paths 1Mtpa Independent Expert Modelled benefit? ✖

- This option has the potential to provide benefit to both the Blackwater and Moura systems, by freeing up space at Callemondah yard.
- Modelling has been undertaken, removing Moura provisioning from Callemondah. Initial results indicate that this activity could be accommodated at Stirrit with existing infrastructure, however cycle time for Moura services increases.
- The study will therefore investigate options for a new road, to ensure cycle time can remain consistent.

Cost Estimate

Concept Design	$100,000
Prefeasibility Design	$200,000

	Feasibility Design	$600,000
	Construction Cost Estimate	**$13,777,500**
	Civil & Track	*$10,240,000*
	Signalling and Telecoms	*$2,285,000*
	Project Management & Indirect costs	*$1,252,500*
Delivery Timeframe	***Concept Study***	6 months
	Prefeasibility Study	6 months
	Feasibility Study	12 months
	Construction	12 – 18 months
Project Risks and opportunities	• Currently, the location proposed will not provide sufficient holding length. Further study is required to confirm the desired length can be achieved.	
Project Funding and RAB allocation	• This project provides benefits to both the Blackwater and Moura systems. • Aurizon Network intends for the cost of this project to be included in the Blackwater and Moura RABs on a fully socialised basis. The cost will be proportionately allocated with reference to the Existing Capacity Deficit and Committed Capacity.	
Measurement of success	• This project will be delivered in stages, with the first stage being concept design. At the end of each design phase, the effectiveness and efficiency of the project will be re-evaluated based on other options available. • Should this project move into construction, 6 months after project completion, the Independent Expert will be required to undertake a capacity assessment in accordance with the Expansion provisions within the Access Undertaking. Their assessment will confirm the capacity created from this project.	

Appendix 2: Proposed Expansion process

Appendix 2

Proposed Expansion Process

UT5 PRINCIPLES

Based on the proposal outlined above for each of the systems, Aurizon Network recognises that UT5 does not consider further study and/or a staged approach to implementation. Part 7A.5 provides the following principles for management and execution of Expansions relating to an Existing Capacity Deficit:

- If Aurizon Network and the affected End Users jointly agree that an Expansion is the most efficient and effective option to address the Existing Capacity Deficit, and on the terms of the Expansion proposal to be submitted to the Independent Expert, then the QCA will not be required to make a determination on which Transitional Arrangements must be implemented.

- Where Aurizon Network and the affected End Users jointly agree that an Expansion is the most efficient and effective, option, but the terms of the Expansion proposal have not been agreed, Aurizon Network can recommend these terms, and similar to the above, the QCA will not be required to make a determination on which Transitional Arrangement must be implemented.

- Where an agreement on Transitional Arrangements has not been reached, the Independent Expert must review, and make a recommendation to the QCA, who will make a determination on which Transitional Arrangements must be implemented.

- Aurizon Network must submit an Expansion proposal to the Independent Expert. The Independent Expert must review and approve the efficiency and prudency of the proposed Expansion prior to Aurizon Network incurring any construction expense in relation to the proposed Expansion.

- The value of the Expansion will be included in the Regulatory Asset Base.

- The pricing principles to apply to an Expansion are set out in Part 6 and Schedule F.

Part 8 of UT5 provides the process for managing network developments and Expansions. Specifically, Expansions relating to an Existing Capacity Deficit are excluded from the process detailed in Part 8.3, 8.4, and 8.7, which provide the process for undertaking concept, pre-feasibility and feasibility studies, as well as funding of those studies. Aurizon Network considers that the following principles in Part 8 are relevant for an Expansion relating to an Existing Capacity Deficit:

- Notwithstanding any other provision of Part 7A or Part 8, Aurizon Network is obliged to construct or permit an Expansion only to the extent that Aurizon Network is satisfied (acting reasonably) that the Expansion is technically and economically feasible and consistent with the safe and reliable operation of the Rail Infrastructure.

- The proposed Expansion is deemed technically and economically feasible, and consistent with the safe and reliable operation of the Rail Infrastructure unless there is a material change so that the proposed Expansion no longer satisfies those requirements

- Aurizon Network must not unnecessarily or unreasonably delay any Expansion that it is obliged to construct

- Aurizon Network is responsible for the design and scope of work to deliver the Capacity for an Expansion.

- The Independent Expert is responsible for confirming the design will deliver the Capacity required by any Expansion.

PROPOSED PROCESS

Aurizon Network and its Customers have largely reached an agreement that to implement any of the Expansions identified in this Detailed Report, a process is required that addresses the principles outlined above but provides sufficient flexibility to enable the prudency of Expansions to be further explored, and the best outcome pursued. In consideration of the above principles, Aurizon Network proposes that the following process will be followed for Expansions detailed in this report.

Stage 1: Concept Study

The concept study will focus on reviewing each of the alternatives identified in this Detailed Report, to determine which individual or combination of Transitional Arrangements, are the most efficient and effective way of resolving the Existing Capacity Deficit. This study will provide a preliminary assessment of the potential costs, benefits and risks involved in providing the capacity required and will include the following:

- Identification of technical solutions
- Include an indicative assessment of the broad cost estimate of the potential solution with a +/- 50% accuracy. A financial analysis in terms of the total cost of ownership will also be undertaken
- A preliminary risk assessment
- Indicative timeframes for the development and delivery of the project
- Review of the most up to date capacity information, including the Annual Capacity Assessment Report, updated System Operating Parameters, and Committed Capacity to ascertain whether an Expansion remains prudent.
- Results of a Capacity Assessment for each of the Transitional Arrangements proposed to be undertaken by the Independent Expert
- A proposal on which options are recommended for further design stages, including a proposed scope of work, budget, time schedule and deliverables

The deliverable of the Concept Study will be a Concept Study Report. This report will be provided to affected End Users, and Rail Operators, and the Independent Expert for information purposes.

Stage 2: Consultation and Independent Expert recommendation

After the concept study is complete, Aurizon Network will engage with affected End Users to seek feedback on the proposal. This feedback will be used to inform the timing for the next stage of design, and the prudency of the Expansion.

In consideration of Aurizon Network's obligation to resolve the Existing Capacity Deficit, Aurizon Network will then determine whether it considers the Expansion to be prudent, and where so, seek the Independent Expert to review the outcome of the Concept Study, and make a recommendation to the QCA, for their further determination on which Transitional Arrangements they consider will most efficiently and effectively address the Existing Capacity Deficit.

Stage 3: Design

Stage 3 involves progressing the design of the Expansion for each system in accordance with the concept study recommendation, or the QCA's determination. This may include a Pre-feasibility stage, or progression straight to Detailed Design. In this study, Aurizon Network will be focused on undertaking a detailed assessment of technical and operating requirements of the proposed Expansion.

At the completion of the relevant design stage, Aurizon Network will provide affected End Users, and the Independent Expert with a report. This report will include the technical, and operational findings of the study. It will include the

relevant cost estimates, a risk assessment, and outcome of a Capacity Analysis to be undertaken by the Independent Expert.

Additionally, Aurizon Network will also review the most up to date capacity information, to ensure prudency of the project remains. This includes review of the Annual Capacity Assessment Report, Committed Capacity, and System Operating Parameters. Aurizon Network may also seek a demand forecast from customers, which may assist in determining timing of delivery of the projects.

As part of the final stage of design, Aurizon Network will prepare a pricing proposal, to be submitted to the QCA, in accordance with Part 6.4.4 of UT5.

Stage 4: Independent Expert Approval

Once Aurizon Network has completed the feasibility design for the relevant Expansion, the Independent Expert will be required to review and approve the Expansion in accordance with Part 7A.5 (i) of UT5.

Stage 5: Construction

Aurizon Network will construct the Expansion in accordance with the timeframes as identified through detailed design.

Stage 6: Post Implementation Review

Six months after the practical completion of the Expansion, Aurizon Network will seek for the Independent Expert to undertake an Expansion Capacity Assessment in accordance with Part 8.9.2 of UT5. This assessment will determine whether sufficient capacity has been created to resolve the Existing Capacity Deficit. If a Capacity Deficit remains after an Expansion has been undertaken, Aurizon Network will follow the process outlined in Part 8.9.4 of UT5.

DRAFT AMENDING ACCESS UNDERTAKING

The obligation remains for the Independent Expert to promptly make a recommendation to the QCA with respect to which of the Transitional Arrangements it considers will most efficiently and effectively resolve the residual Existing Capacity Deficit in respect of any Transitional Arrangements which have not been agreed with our customers.

Aurizon Network will propose a DAAU that seeks to enable the process detailed above. The objective of the DAAU is to address the following:

- Provide the ability for the Independent Expert to request additional information or Concept Studies to be undertaken by Aurizon Network, prior to it making a recommendation to the QCA on the most efficient and effective Transitional Arrangements to resolve an Existing Capacity Deficit;
- Ensure the Independent Expert has regard to the most up to date Annual Capacity Assessment when making its recommendation to the QCA on the most efficient and effective Transitional Arrangements; and
- Provide appropriate and effective regulatory certainty that any costs reasonably incurred by Aurizon Network in undertaking Concept Studies to determine the required Transitional Arrangements will be recoverable by Aurizon Network.

Aurizon Network will promptly seek to submit this DAAU and will be further seeking support from Customers to streamline the process, for the QCA's consideration.