5 May 2017

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Copy to: Aurizon Network (Jon Windle, Tristan Barns, Donna Bowman and Nikki Molloy)

QRC submission on Aurizon Network's 2016 Baseline Capacity Assessment Report and System Operating Parameters

The Queensland Resources Council (**QRC**) provides this submission on behalf of its members in response to Aurizon Network's 2016 Baseline Capacity Assessment Report and System Operating Parameters of March 2017 under Part 7A of Aurizon Network's 2016 Access Undertaking (**UT4**).

About the QRC

The QRC is the peak representative organisation of the Queensland minerals and energy sector. The QRC's membership encompasses minerals and energy exploration, production, and processing companies and associated service companies. The QRC works on behalf of members to ensure Queensland's resources are developed profitably and competitively and in a socially and environmentally sustainable way.

All operating Queensland coal producers are members of the QRC. A number of coal mining companies in development and operating phase are also members of the QRC.

QRC's position on the Baseline Capacity Assessment Report and System Operating Parameters

Unfortunately the Baseline Capacity Assessment Report is difficult for the QRC to comment on. The report provides a high level overview of the outcomes of the Baseline Capacity Assessment and does not provide sufficient detail to allow for meaningful review and comment. For this reason, and for the reason that the Baseline Capacity Assessment is based on assumptions in the System Operating Parameters, the QRC has focused on the System Operating Parameters in this submission.

Importance of the System Operating Parameters

The System Operating Parameters describe the assumptions on which the Baseline Capacity Assessment is modelled. The System Operating Parameters occupy a significant role under UT4 (and subsequently are likely to do the same under UT5). The System Operating Parameters set a foundation for present and future capacity assessments, affect the way in which capacity is contracted and set the scene for future expansion planning. The operation of the network is also impacted by the System Operating Parameters, with UT4 requiring the System Rules to be consistent with the System Operating Parameters.

For these reasons, the System Operating Parameters are a necessary investment for all stakeholders.

Consultation with Aurizon Network

Aurizon Network consulted with the QRC prior to submitting the System Operating Parameters and Baseline Capacity Assessment to the QCA. In doing so, Aurizon Network provided a draft System Operating Parameters and draft Baseline Capacity Assessment Report to the QRC for its review. We thank Aurizon Network for that opportunity to review and comment.

During the consultation period, the QRC communicated its concerns to Aurizon Network with those drafts. In the final public versions of the System Operating Parameters and Baseline Capacity Assessment Report, Aurizon Network appears to have modified those documents to make them less open to criticism. Aurizon Network has not dealt in substance with the QRC's comments. For example, section 1.3.2 of the draft System Operating Parameters clearly depicted the narrow scope of Aurizon Network's capacity modelling by diagrammatically representing the capability factors which Aurizon Network includes and excludes from its capacity assessment. In the final public version of the System Operating Parameters, that section has been deleted, yet, as far as the QRC is aware, Aurizon Network has made no changes to its capacity modelling to warrant that deletion. A copy of the consultation draft of the System Operating Parameters is attached (Attachment 2).

The QRC's concerns in respect of the Baseline Capacity Assessment and System Operating Parameters (many of which were communicated to Aurizon Network during the consultation period) are set out in the attachment to this letter (Attachment 1).

Capitalised terms used in this submission have the meaning given to them in UT4.

Thank you for the opportunity to provide this submission.

Yours sincerely

I. Macfarlane

Ian Macfarlane
Chief Executive

Attachment 1

The QRC's concerns in respect of the Baseline Capacity Assessment and System Operating Parameters are twofold:

1 the Baseline Capacity Assessment and System Operating Parameters do not comply with UT4; and

2 in any event the Baseline Capacity Assessment does not meet the requirements of successful capacity modelling.

1 Does the Baseline Capacity Assessment and System Operating Parameters comply with UT4?

Clause 7A.4.1(b)(iii) of UT4 requires that the Baseline Capacity Assessment includes "consideration of:

(A) the terms of Access Agreements relating to Train Services operating in each Coal System; and

(B) the interfaces between the Rail Infrastructure and other facilities forming part of, or affecting, the relevant Supply Chain…"

The Baseline Capacity Assessment Report must also set out the assumptions on which Aurizon Network has relied in undertaking the assessment, including the System Operating Parameters.

The System Operating Parameters are defined in section 12 of UT4. The System Operating Parameters are required to describe "Aurizon Network's assumptions on the operation of each element of the coal Supply Chain and the interfaces between those elements including in relation to the Supply Chain operating mode, seasonal variations and live run losses, as published on its Website from time to time."

It is clear from both the definition of System Operating Parameters and clause 7A.4.1(b)(iii)(B) of UT4 that the System Operating Parameters require consideration of system impacts. The name of the document 'System Operating Parameters' emphasises that fact. This requirement also flows through to the Baseline Capacity Assessment given the Baseline Capacity Assessment is modelled on the assumptions set out in the System Operating Parameters.

The System Operating Parameters have been developed by Aurizon Network on a very narrow basis. In its covering letter to the QCA, Aurizon Network acknowledges the requirements of clause 7A.4.1(b)(iii) of UT4 but goes on to provide that it "has developed its System Operating Parameters to align with its contractual commitments to its access holders". This is said to be "consistent with the assumptions that affect the Baseline Capacity Assessment".[1] In other words, the System Operating Parameters proposed by Aurizon Network have little regard to the system and really only have regard to the below rail access agreements.

Aurizon Network's System Operating Parameters provide for a theoretical assumption of rail infrastructure capacity which fails to adequately balance the competing considerations required by UT4. These parameters make assumptions of the rail infrastructure capability and the Supply Chain which do not reflect reality. As the System Operating Parameters

[1] Aurizon Network System Operating Parameters Public Release 2016, 6.

fail to adequately have regard to their relevant supply chains, they do not comply with the definition of the System Operating Parameters, nor with clause 7A.4.1(b)(iii)(B) of UT4. Accordingly, the Baseline Capacity Assessment, which has used as its core assumption the System Operating Parameters, does not comply with UT4.

1.1 Train Service Entitlements

Aurizon Network's Baseline Capacity Assessment measures capacity in the form of TSEs. The System Operating Parameters derive the number of TSEs required to meet existing committed capacity based on contracted payloads. Those contracted payloads do not reflect planned or actual payloads (which are generally higher).

The QRC and Aurizon Network have separately been discussing the effect of payloads on the consumption of capacity as part of the UT5 approval process. In those discussions, Aurizon Network has expressed its view that an increase in payload is likely to affect the consumption of capacity in almost all circumstances. This is because of the effect of the increase in payload on either (or both of) the load and unload times (because there are more wagons to load or unload) or the Sectional Running Times (due to a reduction in the power to weight ratio). This leads the QRC to believe that modelling capacity based on actual or planned payloads is likely to lead to a different (and more accurate) capacity outcome. In particular, the Baseline Capacity Assessment will necessarily be materially inaccurate because it is based on contracted or planned payloads (and actual payloads are materially different to contracted or planned).

The definition of Capacity also suggests there is intended to be a distinction between TSEs which are contracted and the train paths used to measure Capacity. Under UT4, Absolute Capacity is defined by reference to Train Paths rather than Train Services Entitlements. Train Paths are defined as “the occupation of a specified portion of Rail Infrastructure, which may include multiple sections in sequential order, for a specified time”. No reference is made to contractual commitments. Contrast this with definition of Train Services Entitlements which are defined as “an Access Holder's entitlement pursuant to an Access Agreement to operator or cause to be operating a specified number and type of Train Services”.

1.2 Mode of operation

Aurizon Network's System Operating Parameters assume even railings even though this is inconsistent with the operating mode of some ports (for example, Dalrymple Bay Coal Terminal). Aurizon Network's justification for this is that Access Agreements are contracted based on even railings.

The purpose of the Baseline Capacity Assessment is not to <u>*align*</u> with parameters in Access Agreements but merely <u>*consider*</u> those parameters. A Baseline Capacity Assessment must also consider the interface with other elements of the supply chain, including ports and arguably the operating mode of those ports. Designing the outcome of a capacity assessment to meet contracted commitments is of little use for any stakeholder.

1.3 Sectional Run Times

Aurizon Network itself acknowledges that the Sectional Run Times adopted under the System Operating Parameters differ from those by which trains are scheduled. Those Sectional Run Times have been developed to align with the majority of Access Agreements. As above, the QRC questions the utility of a capacity assessment modelled solely based on contracted commitments.

1.4 Supply Chain capability

Aurizon Network considers the interface of the rail network with the other elements of the Supply Chain are adequately captured through load and unload times. The System Operating Parameters otherwise assume the availability of mine and port infrastructure aligns with rail network capacity (including because all port and mine maintenance and renewal activities are assumed to occur in alignment with rail network closures). The QRC would like to better understand whether this assumption is realistic. This is likely to require input from all elements of the supply chain.

During consultation on the System Operating Parameters and Baseline Capacity Assessment, the QRC suggested Aurizon Network seek further input from port and rail operators together with input from industry, including, if considered appropriate, by undertaking facilitated workshops. To the QRC's knowledge, no such workshops were undertaken. The QRC continues to believe collaborative input from all elements of the supply chain will facilitate the development of System Operating Parameters which best represent how capacity is actually consumed.

2 Successful capacity modelling

A key requirement of successful capacity modelling is to ensure the underlying assumptions and inputs which feed into that assessment reflect reality. For example, an assessment of network capacity which is based on ideal operating conditions will produce a purely theoretical capacity figure. This will lead to misrepresentations of available network capacity and the commitment of capacity well above the level that can actually be delivered. Future planning process will also be misinformed.

Aurizon Network appears to assume there is a clear distinction between "Rail Infrastructure capacity" and "supply chain capacity". The QRC disagrees with this assumption. The capacity of the Rail Infrastructure needs to be assessed in the context of which it exists, that is, as part of the supply chain. This is engrained in the Baseline Capacity Assessment process and the definition of System Operating Parameters under UT4.

Aurizon Network has modelled capacity based solely on elements of the Supply Chain of which Aurizon Network has control and even then has ignored realistic parameters to instead adopt assumptions which align with its contractual commitments. This fails to adequately balance the competing considerations required by UT4 (ie the terms of Access Agreements *and* the interface of the rail network with other elements of the supply chain). Aurizon Network's approach reflects a longing for the past. Industry and stakeholders are seeking an approach which is modern, accurate and reflects the intent of UT4. As it stands, the Baseline Capacity Assessment is of little use to any stakeholder.

Attachment 2

Aurizon Network's consultation draft of the System Operating Parameters

System Operating Parameters | 2016 Draft

Document Control

Disclaimer

While all reasonable endeavours have been exercised to ensure all information used and contained in this document was true and correct at the time of publication, no representation or warranty, express or implied, is made as to the fairness, accuracy, completeness or correctness of the information, opinions or conclusions contained in this document.

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Document Information

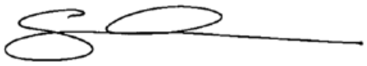
Document	System Operating Parameters
Version:	2016 Draft
Author::	Supply Chain Development Manager
	Mike Backhouse
Signature	
Endorsed by:	Manager Planning and Development
	Steve Straughan
Signature:	

Table of Contents

1 Introduction

1.1 Purpose

Aurizon Network regularly undertake Capacity Assessments (**CA**) of the CQCN to determine if there is sufficient (Network) Capacity to meet the Committed (or contracted) Capacity. These CA are triggered through either:

- an Access Seeker submitting an Access Application; or
- our obligation under Aurizon Network's Access Undertaking (**Undertaking**) to publish an annual CA.

When a CA is undertaken, it is based on the application of a defined methodology and input parameters. This document is the System Operating Parameters (**SOP**) and describes this methodology, the input parameters used and an explanation of why these have been adopted when undertaking the CA.

In accordance with clause 7A.5 of the Undertaking, Aurizon Network is required to notify all affected Access Holders, Access Seekers, Customers, Train Operators, Supply Chain Groups, Infrastructure Providers, Infrastructure service providers, Railway Operators of the relevant SOP.

This SOP covers all coal systems in the CQCN, that is:

- Newlands
- GAPE
- Goonyella
- Blackwater
- Moura

Parties are invited to make submissions in relation to the SOP on or before 9 December 2016by the provision of a written submission to NDP@aurizon.com.au. Alternatively, if you would prefer a face to face meeting to discuss the SOP please contact Steve Straughan directly. We will consider any submissions made and respond to these submissions within 15 Business Days of receipt.

1.2 Context

The SOP and Capacity Assessment Report are part of a suite of assessments that are performed by Aurizon Network. The relationship between these are provided overleaf and aim to provide context between the different assessments and outputs produced.

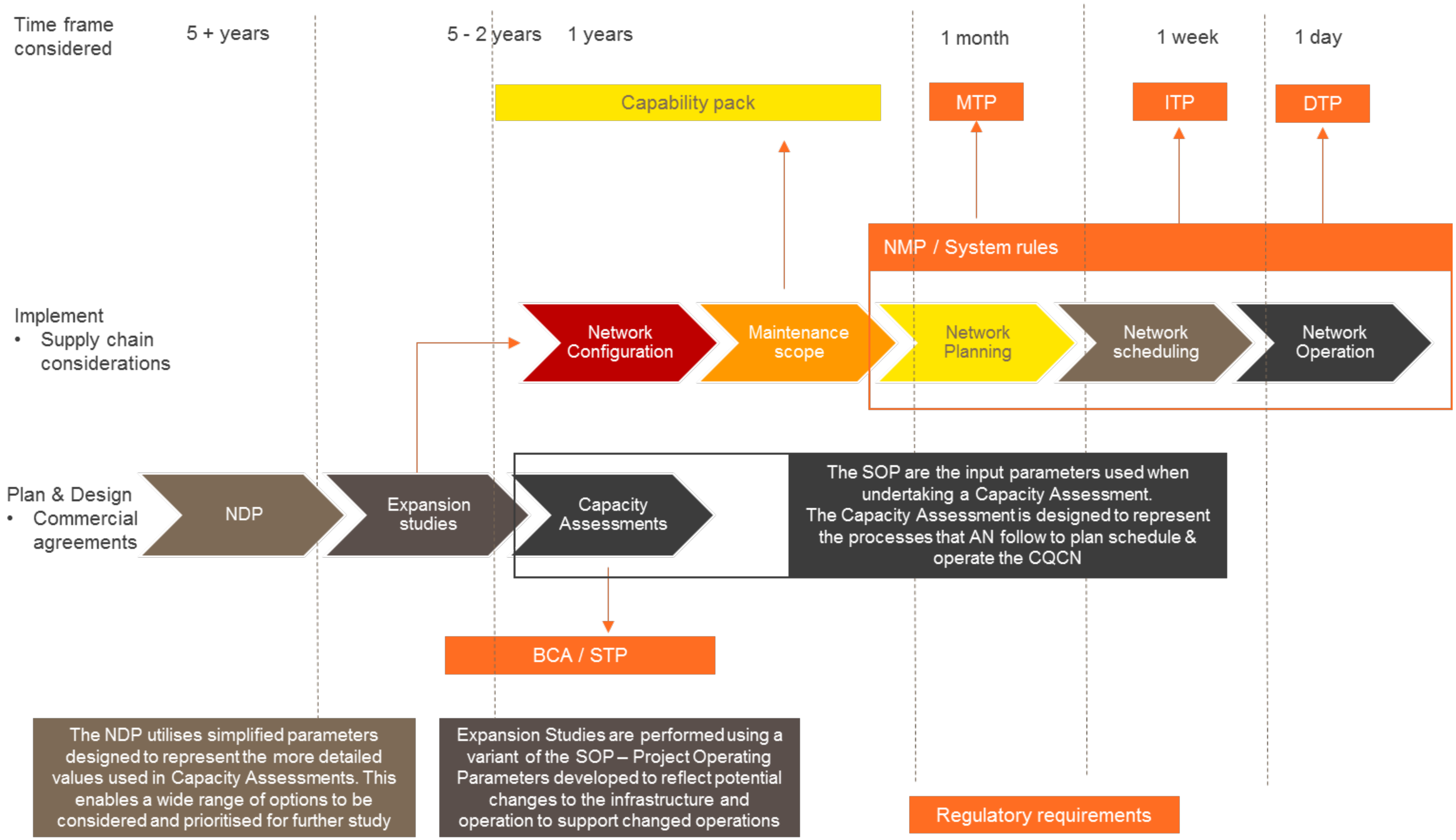


Figure 1: Capacity Assessments and reports

1.3 Capacity Assessment

UT4 requires Capacity Assessments to provide several measures of capacity, the relationship and method of calculation is summarised below in Figure 1.

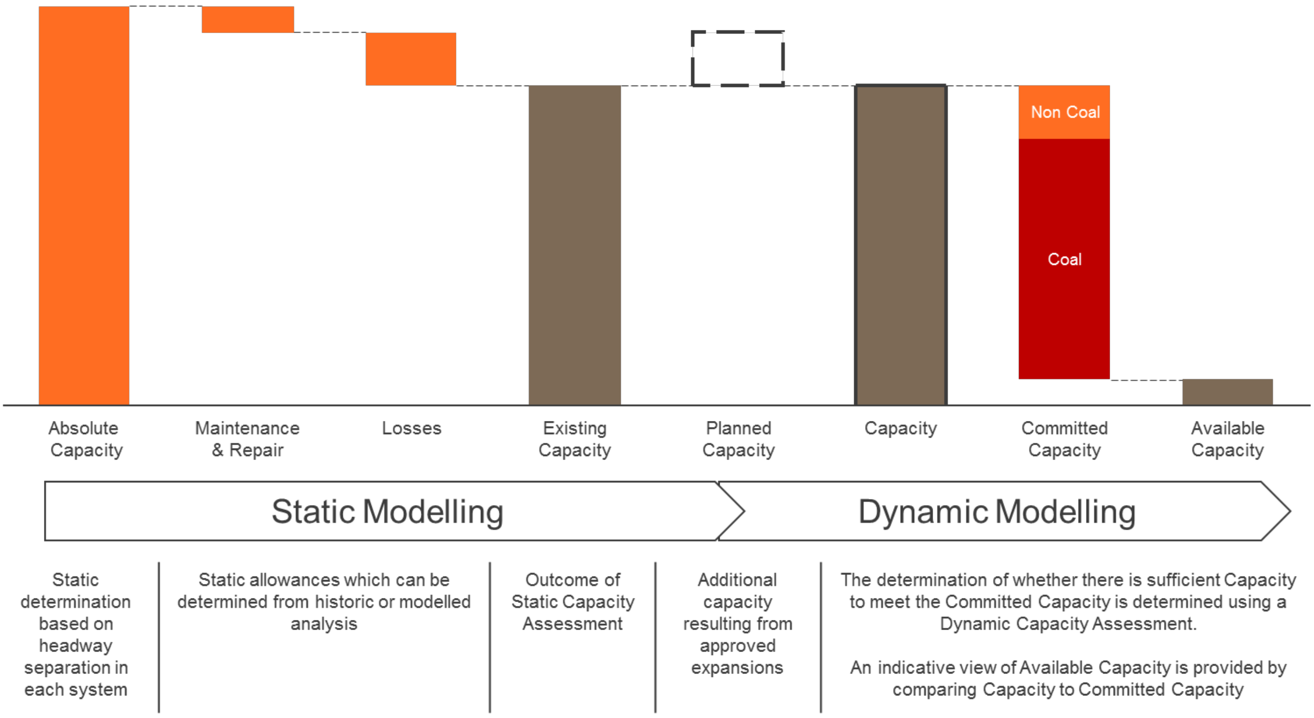


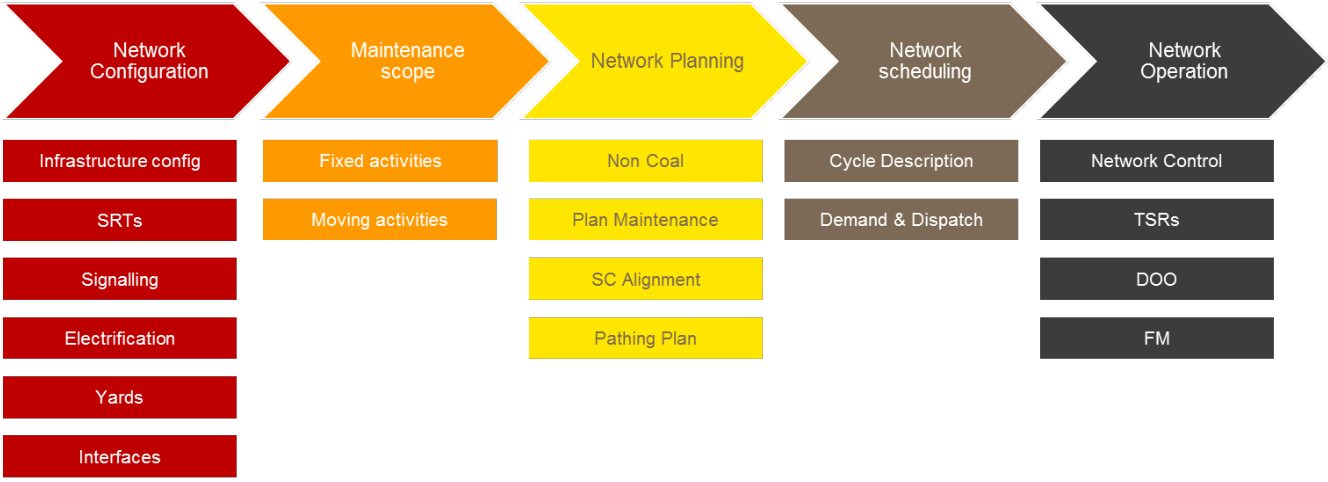
Figure 2: Waterfall schematic of the several measures of capacity and their relationships as considered in a Capacity Assessment.

The contents of this SOP describe the methodology and parameters used when undertaking dynamic assessments to determine if there is sufficient (Network) Capacity to meet the Committed (or contracted) Capacity.

For clarity, the methodology and parameters used when undertaking a Static assessment are not included in this document.

1.3.1 Planning, Scheduling & Operating the CQCN

The Capacity Assessment approach utilised by Aurizon Network recognises that the capacity of the CQCN is a function of the physical system and the planning, scheduling and operating processes that underpin it. These can be summarised as the following steps in the Capacity Assessment process which is reflected in the structure of the SOP.



- **Network Configuration**
  This relates to the layout of the CQCN, the time taken for traffic to traverse sections, the signalling that controls it and the interfaces to mines, ports and other railways.

- **Maintenance scope**
  This describes the amount of maintenance and renewal that is required to maintain the rail network in an operational state and how it is derived.

- **Network Planning**
  Describes how capacity is identified for use by coal traffic taking into account the constraints from scheduled traffic and planned activities required for asset management.

- **Network scheduling**
  Describes the cycles that coal trains operate and how these are scheduled to meet demand requirements

- **Network operation**
  Describes variations and management of trains through the network.

1.3.2 Capacity inclusions and exclusions

The Capacity Assessment of the CQCN is based on defined battery limits of what is included in the assessment and what is excluded. The components considered within a Capacity Assessment are defined as Network Capacity in Figure 2 below and the excluded components are those in Supply Chain Capability.

The items contained in Network Capacity reflect how Network manage and operate the CQCN in line with our access agreements. The items in Supply Chain Capability reflect variations outside of what is included in Access Agreements.

This SOP reflects the input parameters used for assessing Network Capacity.

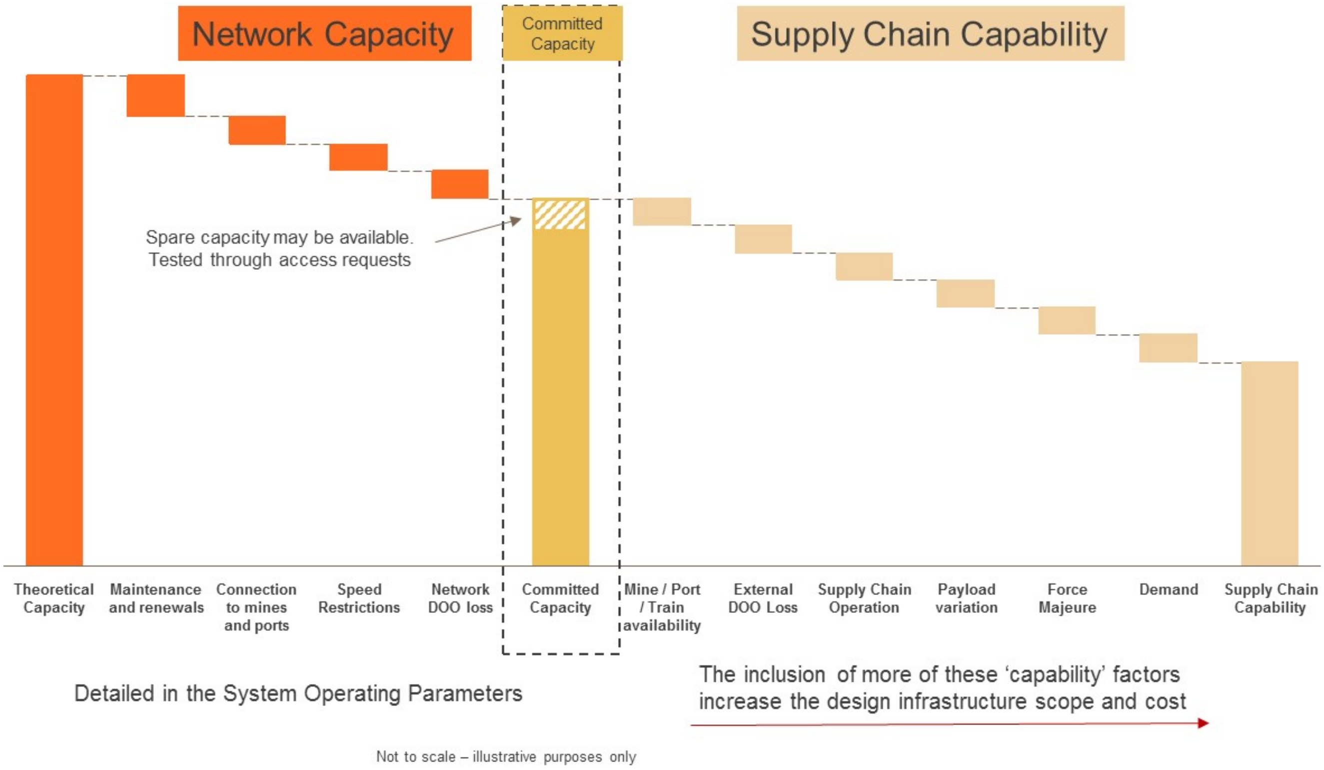


Figure 3: Capacity definition: Network Capacity and Supply Chain Capability.

Network capacity is defined as:

- **Absolute Capacity:**
  The maximum number of paths that can be provided excluding the following factors:
- **Maintenance and renewals:**
  The time required for network to manage their assets
- **Connection to mines and ports**
  The ability to schedule services between specific mines and ports with the assumed above rail resources
- **Speed Restrictions:**
  The impact of speed restrictions on the scheduling and operation of the system
- **Network DOO loss**
  Losses associated with Network delays and cancellations

There are a number of other items of supply chain operation that are not included within Access Agreements or the Undertaking and are not accounted for in Network capacity analysis. These items are activities or actions that affect the Supply Chain Capability and are outside of the control (or agreed interface parameters) of Network. These include:

- **Mine, Port or Train availability:**
  Losses associated with the (planned) time that mines / ports or rolling stock are not available for the movement of coal through the supply chain.
- **Mine, Port, Train or external DOO loss:**
  Losses associated with failures and other events outside of the control of Network. This may include items such as load and unload time variation through to rolling stock failures.
- **Supply Chain Operation:**
  The mode of operation and how trains are ordered differ from the even railings basis by which Network capacity is derived and can lead to losses.
- **Payload variation:**
  Network provides capacity in the form of Train Service Entitlements (TSEs) which are derived using a payload as part of the Access Request process. Actual payload can vary.
- **Force Majeure:**
  Losses associated with significant events that trigger force majeure events.
- **Demand:**
  The changes in demand above and below the contracted demand; leading to
- **Supply Chain Capability:**
  The capability of the supply chain – which can be observed as the actual throughput achieved.

1.4 Review and update

The SOP is updated in line with changes to the methodology or input parameters to the Capacity Assessment. It is reviewed and released on an annual basis for review by access holders and operators.

This, the draft version of the 2016 System Operating Parameters is provided to Supply Chain Participants for the purpose of reviewing the content and providing feedback to Aurizon Network to consider when developing the final version of the SOP.

1.4.1 Changes since previous version

Key areas of content change are

- Modelling methodology included
- Maintenance and renewal requirements have been updated using the PACE model
- Non coal traffic has been updated to reflect revisions to MTP and achieve preserved paths obligations
- Path availability is determined using Slider
- Speed restrictions are now based on discrete historical events rather than the monthly average previously applied

1.4.2 Planned changes to 2017 issue

Aurizon Network continue to develop the CQSCM and the input parameters to reflect enhancements in modelling tools and data availability. We anticipate the 2017 System Operating Parameters will include changes to:

- How DOO losses are modelled by removing a loss factor (x-ref) and implementing discrete events based on a review of historical data
- How yards are modelled by incorporating detailed yard models
- The application of stowage modelling enabling the removal of the stowage cancellation loss

These planned enhancements will continue to provide greater accuracy to the modelling of capacity in the CQSCM.

2 Network Configuration

This section of the SOP describes the infrastructure used in Capacity Assessments. It contains information regarding the network:

- Configuration
- Speeds
- Signalling
- Interfaces, including:
    - Yards
    - Ports
    - Mines
- Operational Constraints

2.1 Infrastructure configuration

The infrastructure configuration used in the Model reflects the committed infrastructure, which is the existing infrastructure and modifications already committed to over the life of the capacity analysis.

2.1.1 Planned changes

Capacity Assessments are based on the existing infrastructure with the following changes

- RCS implemented in the Newlands system between Collinsville and Newlands Jct (see section 2.3.1)
- Byerwen connection in the Newlands system (currently under construction)
- Drake connection in the Newlands system
- Washpool connection in the Blackwater system

A summary of the CQCN is provided in Figure 3. A more detailed representation of the network through line diagrams is provided in the Review of Rail Infrastructure and Line Diagrams for the Central Queensland Coal Region[1] published on the Aurizon website.

[1] http://www.aurizon.com.au/Network-site/Pages/Reports-and-QCA.aspx

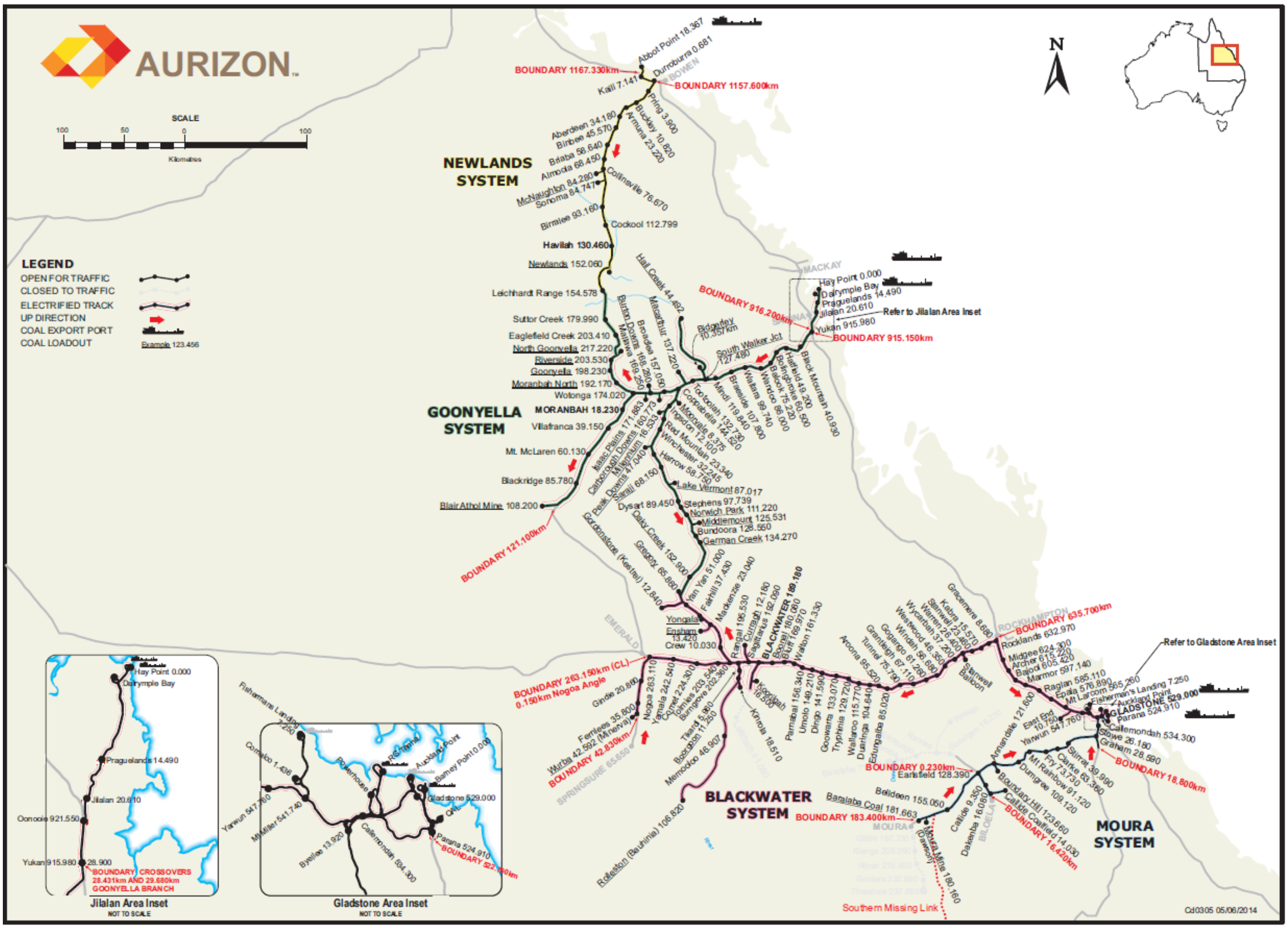


Figure 4: CQCN summary overview

2.2 SRTs

The time taken for trains to traverse sections of the CQCN is based on times derived[1] from Sectional Run Times (SRT). Nominally this is based on times provided in individual access agreements however a review of these times have indicated that there is significant discrepancy between the values

- in access agreements,
- information packs and
- those by which trains are scheduled

For that reason Capacity Assessments are conducted on the SRTs provided in Appendix 1 which are aligned to the majority of Access Agreements in place.

[1] Times are derived from SRTs to represent the greater level of detail require for capacity modelling than specified in SRTs. Typically this may involve attributing the SRT across a number of smaller sub sections to reflect the passage of trains past junctions and signals.

2.2.1 Start / Stop allowances

SRTs are produced for continuous green light running (with the exception of arriving and departing mines, ports and yards). When scheduling services in the CQCN Aurizon Network apply an increase in time to reflect the additional time to traverse the section whenever a train needs to start or stop. This additional time is used in the CA whenever a train needs to start or stop.

Table 1: Start and Stop allowances

Train /andSystem	Start Allowance	Stop Allowance
Diesel Newlands	4	2
All Goonyella	5	4
Diesel Blackwater	2	3
Electric Blackwater	2	3
Diesel Moura	3	0

2.3 Signalling Description

Aurizon Network has three signalling systems in place across the CQCN

- Remote Control Signalling (RCS)
- Direct Train Control (DTC)
- DTC with Main Line Point Indicators (DTC-MLPI)

This section of the SOP describes where each signalling system is and how it is implemented in the Capacity Assessment. The specific application of the signalling is sourced from the relevant AS plan.

2.3.1 Newlands System

The Newlands system currently operates with a mix of RCS and DTC-MLPI signalling. Aurizon Network has reached agreement with GAPE users that the upgrade of DTC-MLPI to RCS between Collinsville and Newlands Junction will be deferred until railed tonnes trigger the upgrade. However, due to full contract requiring RCS, Capacity Assessment is undertaken on the basis that RCS is implemented

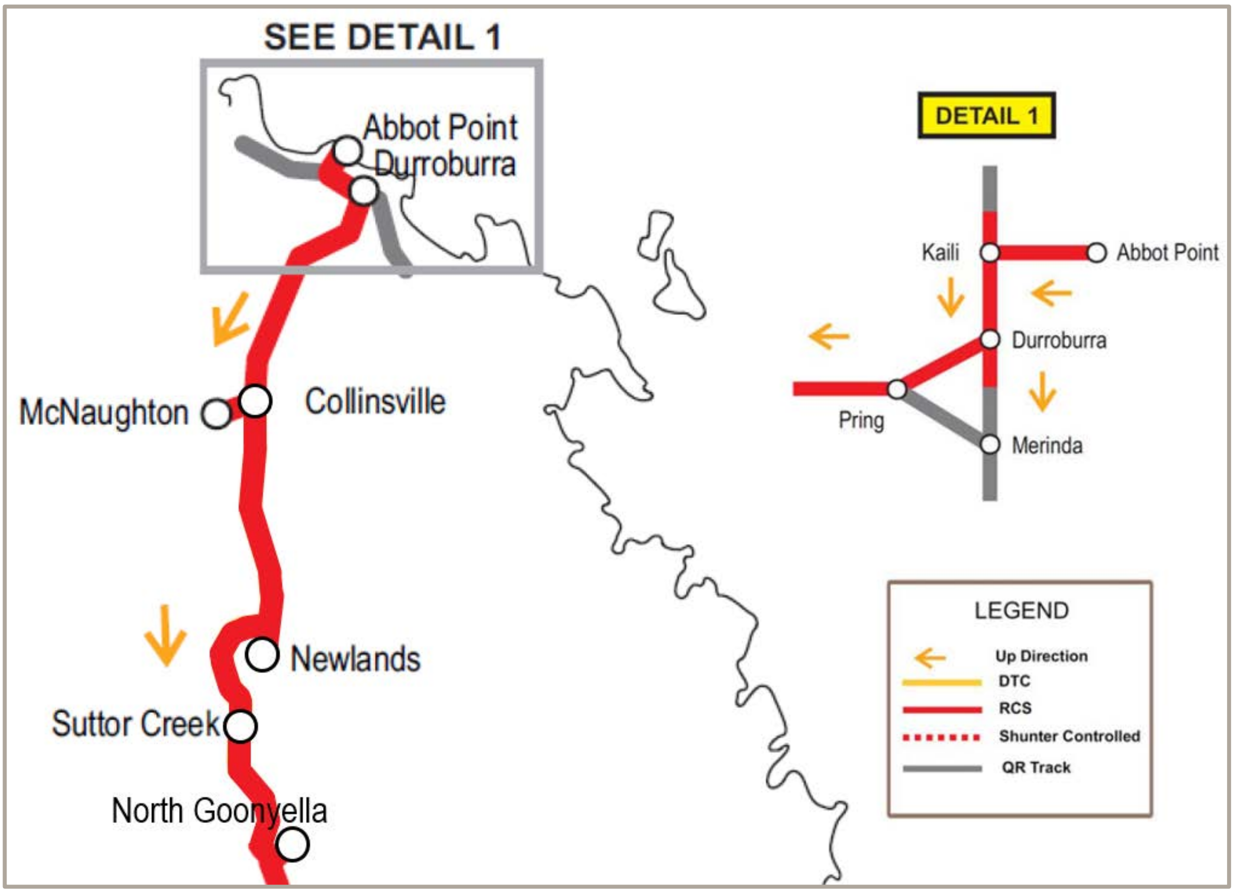


Figure 5: Newlands system and NML train control map

2.3.2 Goonyella system

The Goonyella system has RCS throughout.

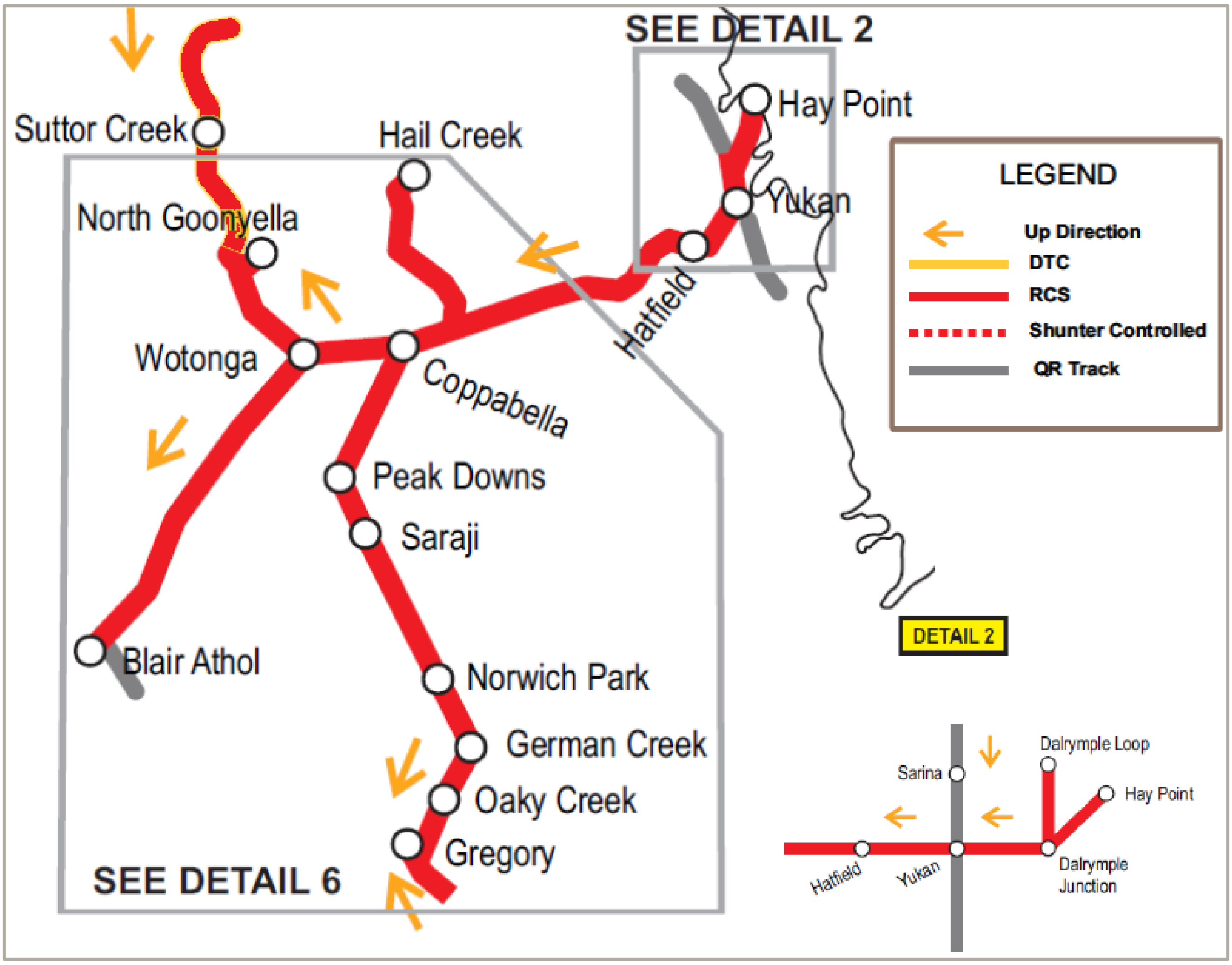


Figure 6: Goonyella system train control map.

2.3.3 Blackwater system

The Blackwater system has RCS throughout with the exception of the Rolleston and Minerva branches which have DTC installed. Memooloo (on the Rolleston branch) has DTC-MLPI installed.

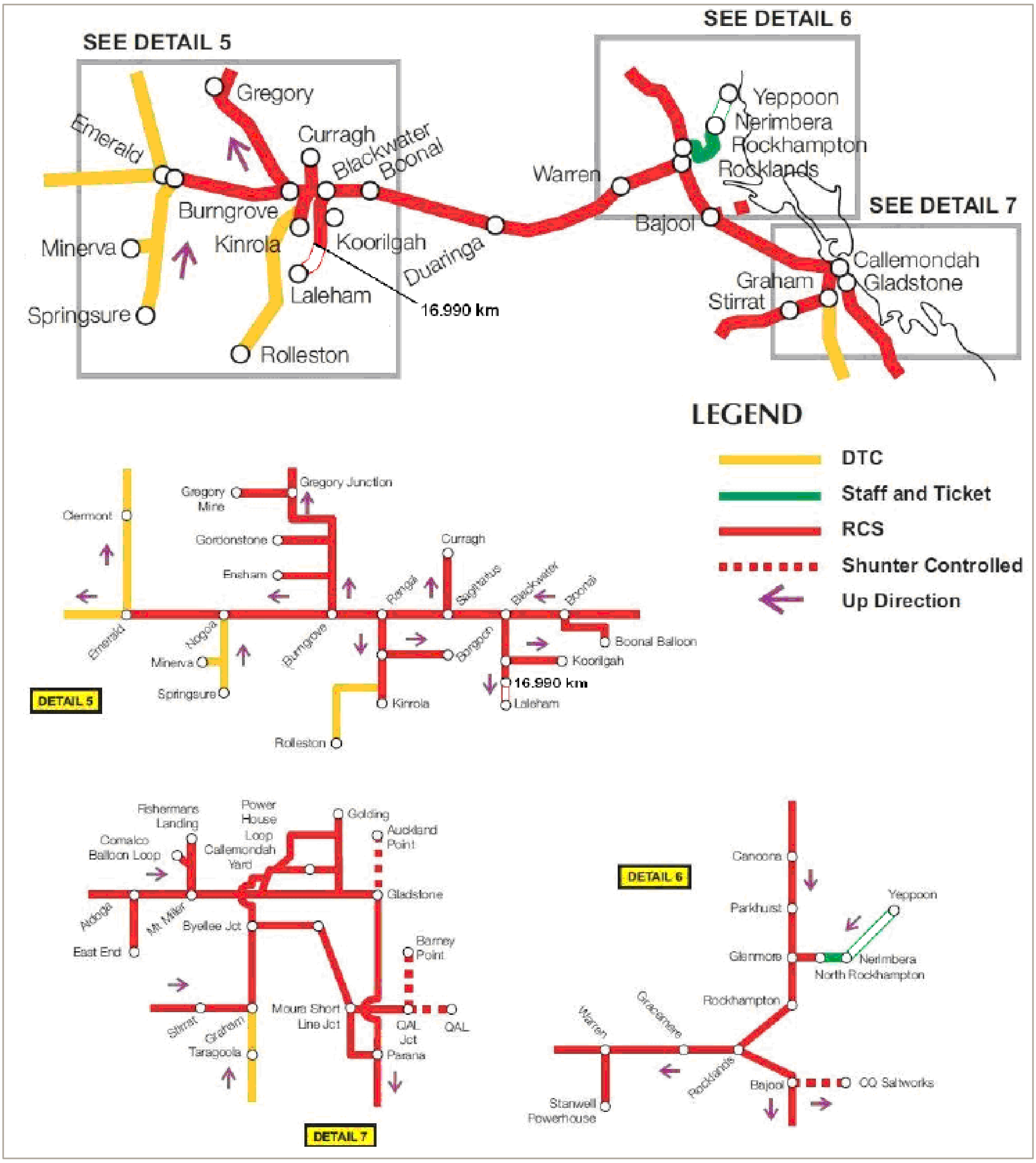


Figure 7: Blackwater system train control map

2.3.4 Moura system

The Moura system is largely RCS with the exception of DTC on the Dakenba branch (to Callide) and DTC-MLPI west of Moura mine junction to Baralaba.

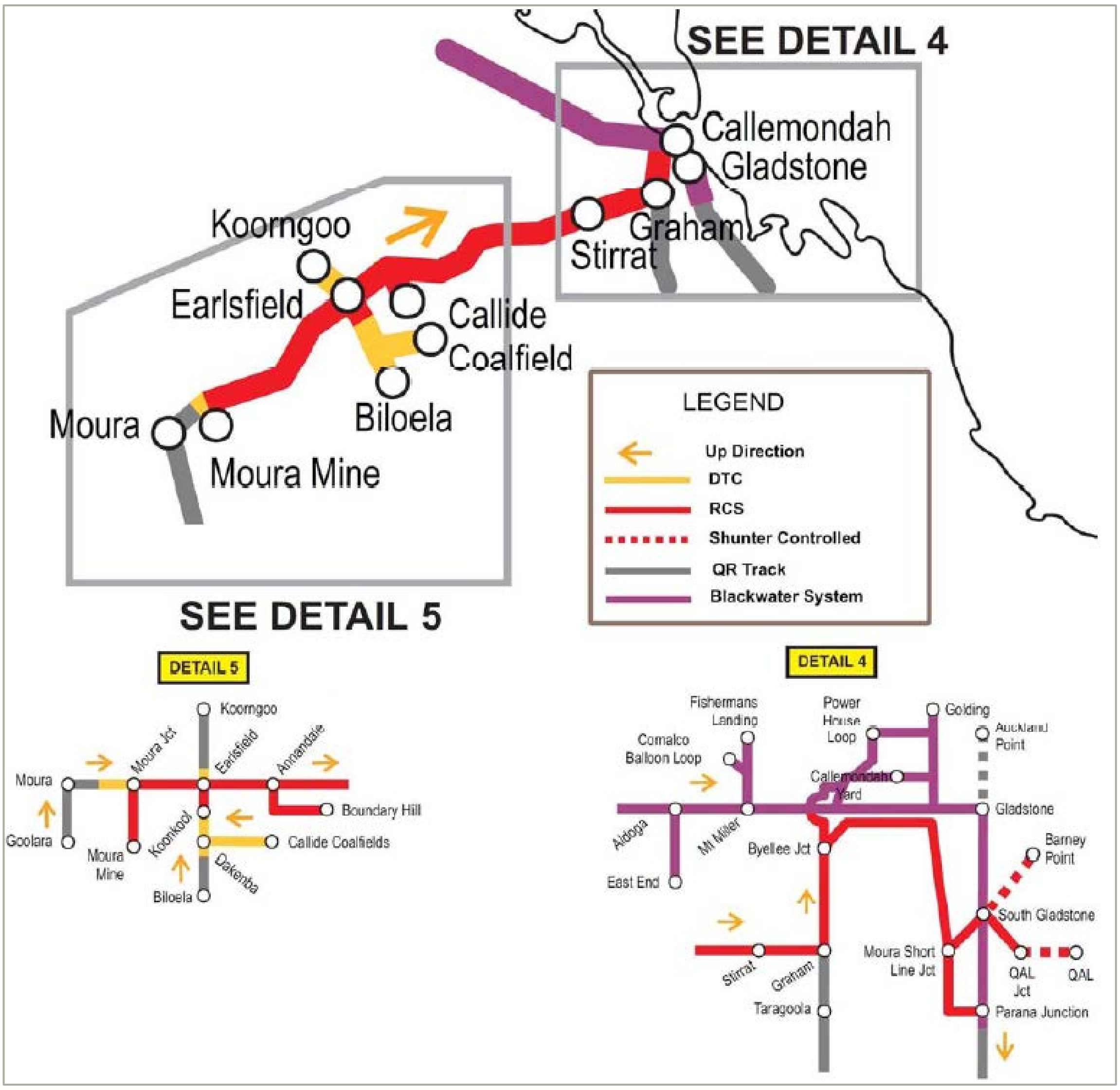


Figure 8: Moura system train control map

2.3.5 Remote Control Signalling (RCS)

RCS is a system of safe working where rail traffic movements are regulated by signals usually controlled from a remote location and/or automatically by the passage of rail traffic. The RCS system operates on the principle of only one rail traffic movement being on a signal section at one time. Key characteristics are as follows:

- Normal authority for rail traffic movements is by
    - two, three or four colour light signals for running movements
    - position light signals for non-running movements
- A signal at PROCEED is the authority to go forward
- The position of rail traffic on the track is detected by
    - track circuits, or
    - axle counters
- Points are generally controlled by points machines

The application of RCS in the CA is described below

Table 2: RCS application in CA

Activity	Description	Time impact (mins)
Provision of authority	Network controller issues authority on UTC screen which is displayed on RCS to train crew	Nominal (0)
Movement of trains	Following the provision of an authority the time taken for a train to commence moving	Nominal (0)
Movement of points	Route set in UTC requires points to move from Normal to Reverse (or vice versa)	Nominal (0)
Release of section	Train exits a train detection section which is released for the provision of authority of other trains	Nominal (0)

2.3.6 Direct Traffic Control (DTC)

The movement of rail traffic is governed by instructions contained in DTC Authorities issued by the Network Control Officer to Rail Traffic Crew.

In Direct Traffic Control (DTC) territory the route is divided into sections known as DTC blocks, which are identified by Block Limit Boards (see Figure **8**). A DTC Authority gives rail traffic possession of the block/s up to a nominated Block Limit Board. Ownership of the block/s will be passed from the Network Control Officer to the Rail Traffic Crew when the Network Control Officer issues a DTC Authority.

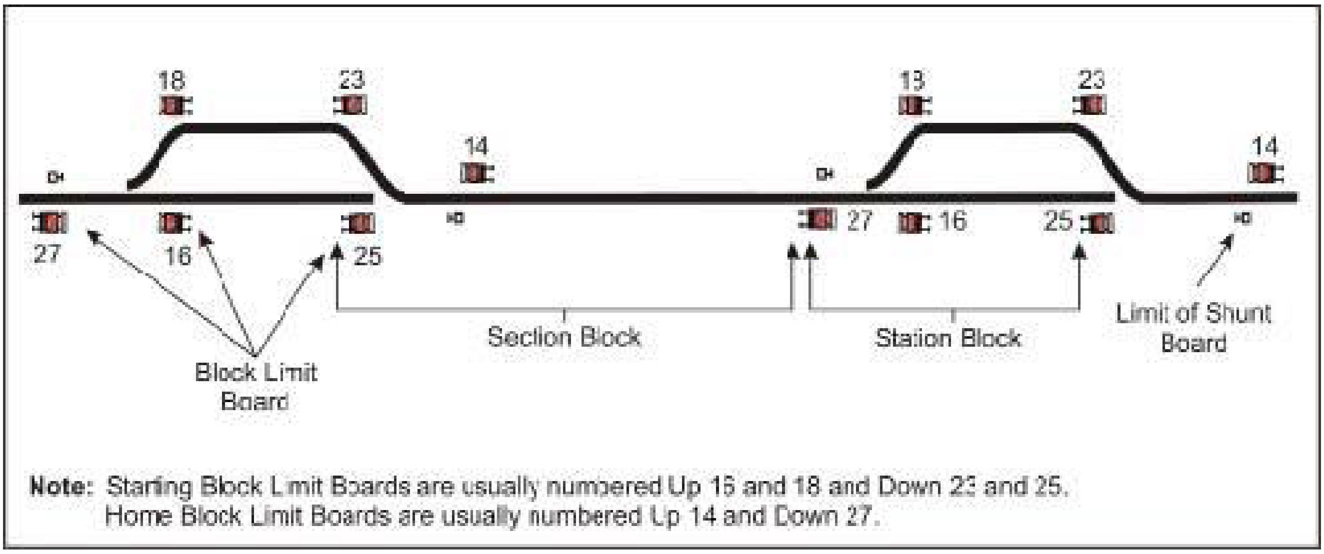


Figure 9**: DTC Blocks and Position of Block Limit Boards**

Table 3: DTC application in CA.

Activity	Description	Time impact (mins)
Provision of authority	Network controller issues authority via DTC to train crew. This involves a series of activities and communications between the Network Controller and the train crew.	3 mins
Movement of trains	Following the provision of an authority the time taken for a train to commence moving	Nominal (0)
Movement of points	Points in manual DTC territory are typically trailable which removes the need for the points to move when traffic is operating in normal conditions. Speed through the points are however limited in specific directions due to the geometry. The impact of the speed restrictions is incorporated into SRTs.	Nominal (0)
Release of section	Train exits section or a station which is released for the provision of authority of other trains. This involves a series of activities and communications between the Network Controller and the train crew.	3 mins

2.3.7 DTC with Main Line Points Indicators (DTC-MLPI)

Main Line Points Indicators (MLPIs) operate on the approach side of power operated points in DTC territory and provide an indication to rail traffic crew as to the lie of all points for the route that rail traffic is approaching.

The implementation of power operated points in DTC territory:

- Removes the need for manual movement of points by train crew
- Removes the need for speed restrictions due to the geometry of the points

Table 4: DTC-MLPI application in CA

Activity	Description	Time impact (mins)
Provision of authority	Network controller issues authority via DTC to train crew. This involves a series of activities and communications between the Network Controller and the train crew.	3 mins
Movement of trains	Following the provision of an authority the time taken for a train to commence moving	Nominal (0)
Movement of points	Route set in DTC-MLPI requires points to move from Normal to Reverse (or vice versa).	6 mins
Release of section	Train exits section or a station which is released for the provision of authority of other trains. This involves a series of activities and communications between the Network Controller and the train crew.	3 mins

2.4 Electrification

Electric trains can operate throughout the CQCN with the exception of the following areas

- Newlands and GAPE systems north of North Goonyella
- Blackwater system west of Burngrove
- Moura system
- Mt Miller branch

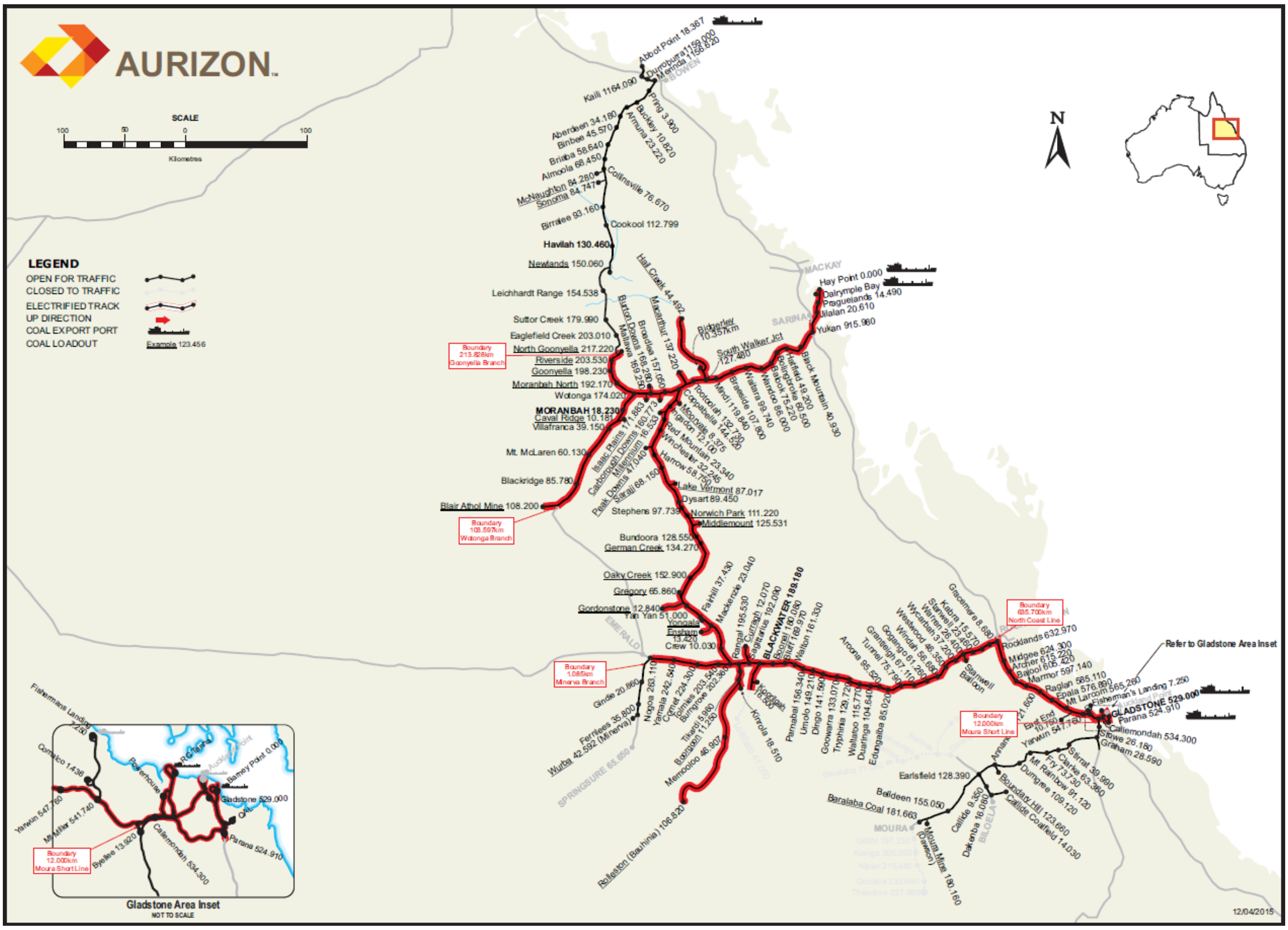


Figure 10: Electrification of CQCN.

2.5 Yards

This section of the SOP describes the infrastructure configuration of yards in the Capacity Assessment. The use of each yard by the Above Rail Operators is described in the appropriate operator appendix.

2.5.1 Newlands system

Pring is represented as a simplified node with capacity to perform the following activities: Detail of each operator's activities is provided in the relevant appendix.

Table 5: Pring Yard capability

Activity	Capacity	Notes
RE	2	Only 1 RE per operator
Crew change	6	No operator restrictions
Shunt	1	No operator restrictions
Provision	2	No operator restrictions
Cab Clean	2	No operator restrictions
Total	6	

2.5.2 Goonyella system

Jilalan contains Aurizon Network infrastructure (red roads) and infrastructure owned by Aurizon Operations (blue roads). It is modelled as a simplified node with capacity to perform the following activities. Detail of each operator's activities is provided in the relevant appendix.

Table 6: Jilalan Yard capability

Activity	Capacity	Notes
RE	1	No operator restrictions
Crew change	12	No operator restrictions
Provision	4	No operator restrictions
Cab Clean	1	No operator restrictions
Shunt		Not Modelled
Total	12	Including bypass roads

Nebo is a Pacific National owned and operated yard. Nebo is modelled as simplified node with a capacity of 5 trains. Train services exit the Goonyella system to Nebo at Waitara, re-joining at Braeside. Detail of each operator's activities is provided in the relevant appendix.

Table 7: Nebo Yard capability

Activity	Capacity	Notes
Cab Clean	2	No operator restrictions
Provision	2	No operator restrictions
Refuel	2	No operator restrictions
Total	5	

2.5.3 Blackwater and Moura systems

Callemondah contains Aurizon Network infrastructure (red roads) and infrastructure owned by Aurizon Operations (blue roads). Aurizon Network only assesses capacity of red roads. Callemondah is modelled as a detailed representation with the activities performed on the infrastructure described in each operators operating plan. Detail of each operator’s activities is provided in the relevant operator appendix.

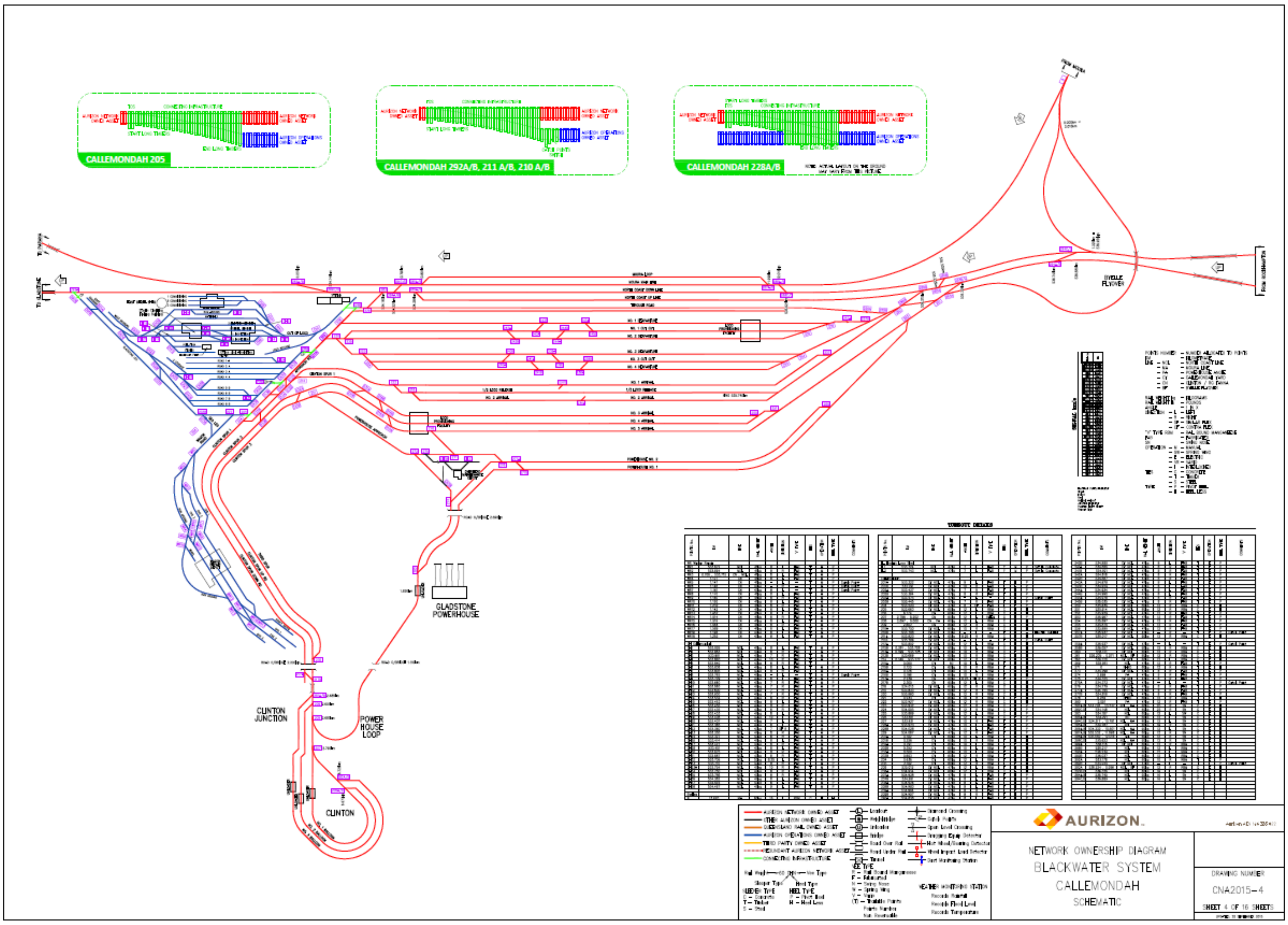


Figure 11: Callemondah Line diagram

2.6 Interfaces

The primary interfaces between the CQCN and the rest of the supply chain is at mines and ports and are defined as the time taken to load and unload trains. Capacity Assessments do not take into account constraints to the operation outside of the CQCN interface point. For instance, constraints due to belt routes in ports are not included when assessing network capacity.

These values are specified in Access Agreements and are included in the appropriate operator appendix.

3 Maintenance Scope

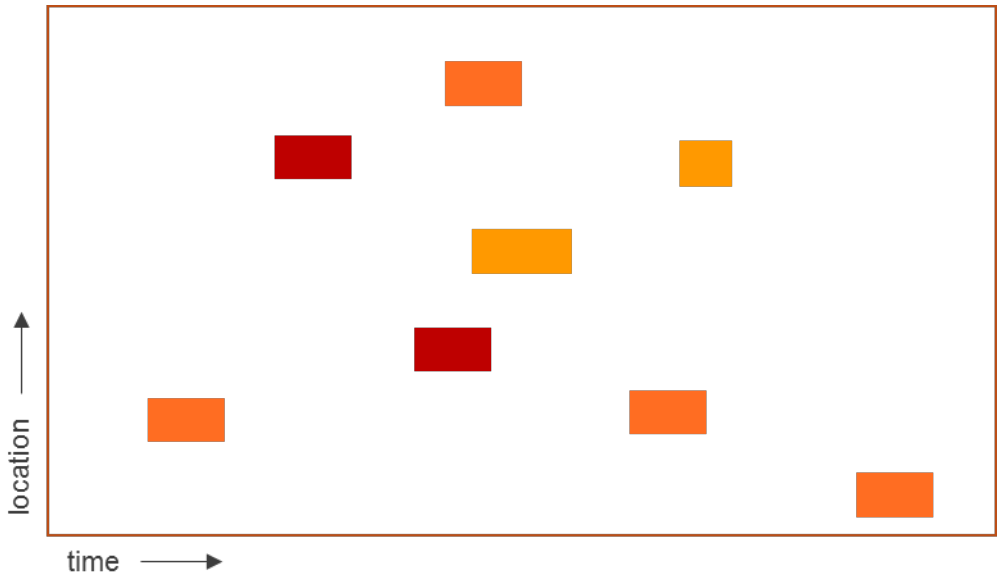
This section of the SOP describes how the scope for maintenance and renewal activities is generated.

3.1 Fixed activities: Maintenance, Renewals and Construction

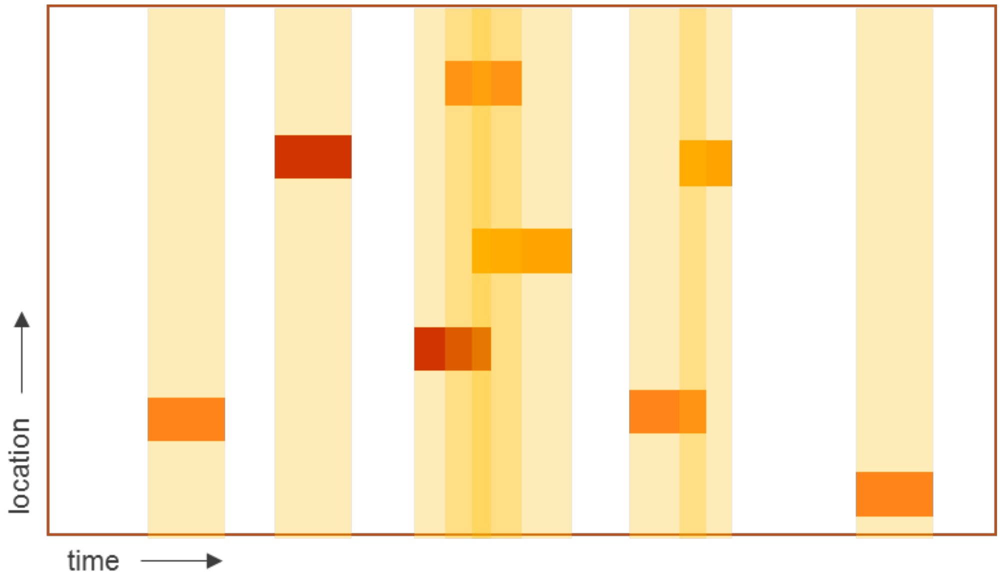
3.1.1 PACE approach

Aurizon Network have implemented a new maintenance planning tool PACE. The objective of PACE is to generate Maintenance Access Windows which have been assessed to demonstrate that Aurizon Networks capacity requirements can be met. This provides certainty to maintenance service providers that they can have the access required to maintain the network and reduce the need for unplanned and opportunistic maintenance, which delivers a more robust network plan for the supply chain.

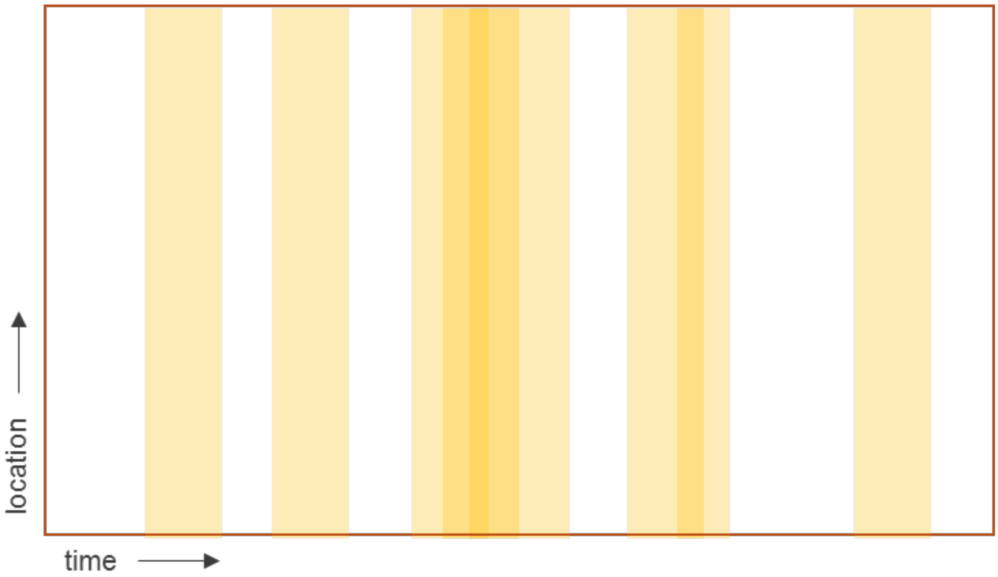
The PACE tool develops a maintenance scope of work using a nominated demand scenario and known planned work programs.



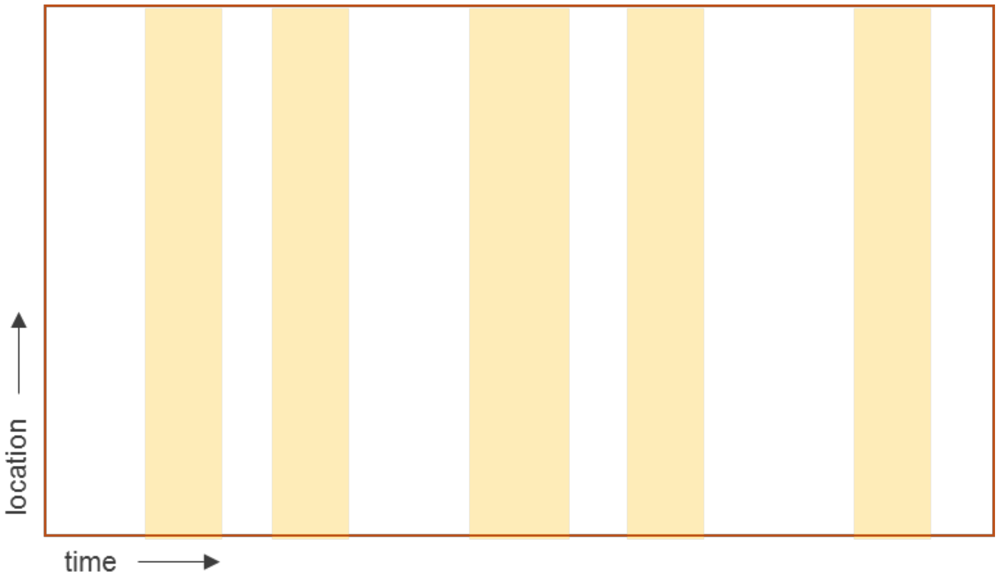
Based on these inputs Maintenance Access Windows (MAWs) are developed which offer sufficient access to the network to perform the required maintenance tasks.



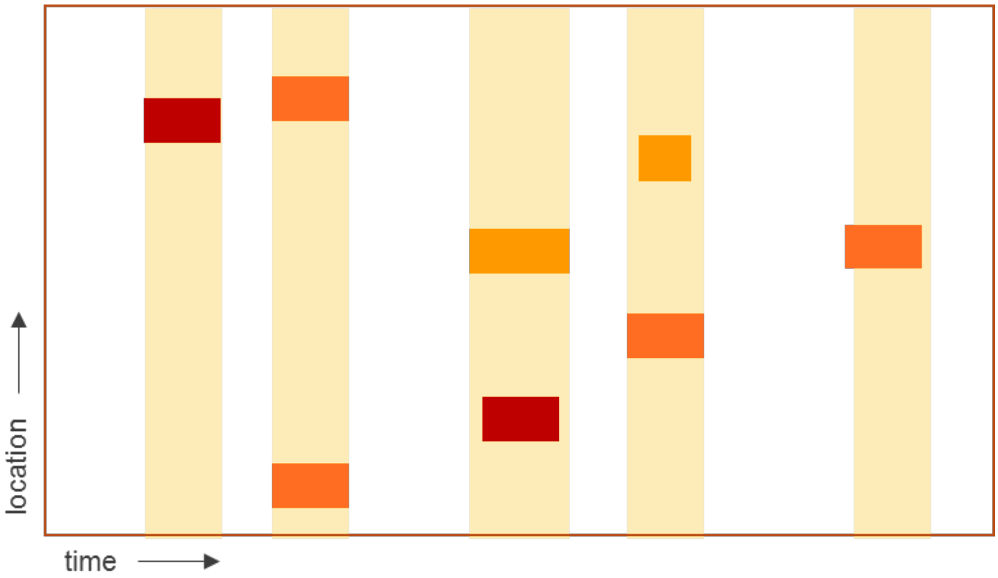
The planned work programmes are removed



The MAWs are aligned to minimise the capacity impact



PACE generates a series of possessions to replicate the scope of work taking into account resource constraints and production rates.



This is reviewed through a Capacity Assessment to demonstrate that scope delivery, contracted capacity and supply chain performance requirements are achieved and revised where appropriate.

The Maintenance Access Window plan provides frequent planning opportunities throughout the year for all types of maintenance. These maintenance access windows are pre-assessed which provides certainty that maintenance scope and contractual network pathing for all traffic types can be delivered within the available network capacity.

3.1.2 PACE Scope

The PACE tool has developed a scope of works and maintenance access window plan for FY17 that will deliver the planned maintenance and network capacity requirements for the CQCN based on the current capacity requirements. This is being used as the basis for the FY18 / FY19 BCA.

The key inputs that were used to develop the FY 17 plan were sourced from service providers and included:

- RM900 mainline program
- Excavator mainline and turnout undercutting program
- Rerailing and restressing mainline program
- Points maintenance program
- Track upgrade program
- Resurfacing and general maintenance scope PACE-generated to align with historical actuals for this tonnage profile
- All other major products are delivered in System Shutdowns

The scope of works for each product is summarised in Table 8

Table 8: PACE summary work scope[1]

Work Type	Newlands (km)	Goonyella (km)	Blackwater (km)	Moura (km)
Rail Renewal	6.6	23.76	20.4	3.025
Rail Restressing	6.6	23.76	20.4	3.025
Mainline Ballast Undercutting	13.2	62.75	39.62	0
Mainline Excavator Undercutting	1.74	13.3	6.25	0.75
Turnout Undercutting	2	26	27	3
Track Resurfacing	302	878	1016	180
Turnout Resurfacing	29	179	200	11
Track Upgrade	0	4.235	17.105	0
General Maintenance	11.88	56.85	57.7	12.7

[1] Source: 2016 – 2017 Strategic Asset Access Plan Report

3.2 Moving activities: Inspection, work and material trains

In addition to the fixed activities that require possessions for the work to be undertaken there are moving activities that are undertaken to:

- Inspect the infrastructure
- Transport material or work trains to / from site
- Perform maintenance on the move (i.e. grinding)

The scope of work for moving activities is assumed to be the same as for FY16. To establish the amount of moving activities to incorporate within the Capacity Assessment a review was performed of 2016 records. Historical maintenance train data from Vizirail was sourced from the Vizirail datawarehouse. The schedule data was sourced for a period of 1 financial year – 01/07/2015-30/06/2016. The train services are maintenance trains moving or working between locations and does not include on track machinery movements within maintenance possessions.

To illustrate the type of services in a year, six months of data was sourced from the Vizirail reporting database. The reporting database contains service detail required to categorise the maintenance services. This data isn't present in the datawarehouse.

A summary of the services identified through the analysis is provided in Table 9.

Table 9: Maintenance moving activities

Maintenance Service Category	Number of services per year
Resurfacing and Lining (MMA070/MMA500/MMA501)	1502
Ballast Train	308
Mainline Grinder (MMY031)	226
Rail Inspection Vehicle (RTI Test Car)	156
Ballast Clean and Drainage (RM900)	152
Weed Spray Truck	144
Turnout Grinder (MMY030)	108
Rail Train	72
Others (Sleeper, track laying, Track Geometry, Tuition, Scissor & unidentified)	200

In addition, there are Track Inspection trains that operate through the network on a fortnightly cycle. These Hi-rail vehicles are not detected through the signalling system and therefore are not recorded in the vizirail system. The scheduled track inspection trains are summarised below. For the purposes of capacity modelling only trains operating in the first week are included as the difference between the capacity impact of trains operating in week one and week two is minimal.

Table 10: Newlands System fortnightly inspection schedule

Departure	Destination	Departure Time	Week	Day
Abbot Point	Briaba Dn	0900	One	Wednesday
McNaughton Jct	Nth Gyella Jct	0800	One	Thursday
Sonoma Jct	Sonoma Balloon	1100	Two	Wednesday
Collinsville	Abbot Point	0730	Two	Thursday

Table 11: Goonyella System fortnightly inspection schedule

Departure	Destination	Departure Time	Week	Day
Coppabella Angle	Dysart	0815	One	Wednesday
Dal Bay Entry	Yukan West End (Dn)	0730	One	Wednesday
South Walker Jct (Dn)	North Goonyella Balloon	0730	One	Wednesday
Dysart	Oaky Creek Jct	0700	One	Thursday
Yukan West End (Dn)	Hail Creek (Inc. Balloon)	0730	One	Thursday
Isaac Plains Jct	Blair Athol	0800	One	Thursday
Dysart	Coppabella Angle	0700	Two	Wednesday
Yukan West End (Up)	Hay Pt Entry	0730	Two	Wednesday
North Goonyella Jct	Macarthur Balloon	0730	Two	Wednesday
Oaky Creek Jct	Dysart	0830	Two	Thursday
Hail Creek (Inc. Balloon)	Yukan (Up)	0930	Two	Thursday
Blair Athol	Isaac Plains Balloon	0830	Two	Thursday
Moranbah	Caval Ridge Balloon Jct	1135	Both	Tuesday & Friday

Table 12: Blackwater System fortnightly inspection schedule

Departure	Destination	Departure Time	Week	Day
Dingo (Dn)	Curragh Balloon	0815	One	Tuesday
Kinrola Spur Jct	Rolleston Mine Balloon	0730	One	Wednesday
Burngrove	Oaky Creek Jct	0800	One	Wednesday
Curragh	Dingo (Up)	0805	Two	Tuesday
Rolleston Mine	Kinrola Branch Jct	0900	Two	Wednesday
Oaky Creek Jct	Burngrove	0830	Two	Wednesday
Blackwater	Burngrove	0730	Both	Monday
Parana	Power House Balloon	0800	Both	Monday
Burngrove	Wurba Jct	0805	Both	Thursday
Aldoga (Up)	Gladstone	1210	Both	Thursday

Table 13: Moura System Fortnightly Inspection Schedule

Departure	Destination	Departure Time	Week	Day
Barney Point	Mt Rainbow	0910		Wednesday
Dakenba	Callide Balloon			Thursday
Mt Rainbow	Barney Point Balloon	0815		Wednesday
Cockatoo Jct	Earsfield	1405		Thursday

4 Network Planning

This section of the System Operating Parameters refer to the activities undertaken to:

- Plan non-coal (MaTP) traffic
- Plan maintenance and renewals
- Provide available capacity information for the scheduling of services

4.1 Non Coal (MaTP Services)

The provision of capacity for Non-Coal trains on the CQCN is a legislative requirement of the Transport Infrastructure Act (TIA) 1994. The TIA specifies the minimum number of train paths to be made available to Non-coal services. Non-coal trains are typically included in the Master Train Plan (MaTP) developed in conjunction with Queensland rail for services operating on the NCL.

The MaTP contains the following types of traffic:

- Livestock
- Passenger:
    - Tilt Train
    - Sprit of Outback
    - Spirit of Queensland
- Freight
- Light Engine[1]

To ensure that the Capacity Assessment is based on an adequate representation of Non-coal traffic the MaTP has been compared to the TIA requirements. Where it was found that the MTP had less trains operating than in the TIA additional trains were added to the simulated MaTP. A total of 16 trains were added to the MaTP (8 up/Northbound and 8 down/southbound)

4.1.1 Seasonal traffic

Seasonal traffic such as grain or sugar is not included in the MaTP.

4.1.2 Limestone traffic

Limestone traffic is included in the MaTP, however it is modelled as a cyclic service between East End and Fisherman landing to represent the actual operation of the service across the network.

[1] Paths to facilitate Light Engine movements are not preserved under the TIA

4.2 Planning of maintenance and renewals

4.2.1 PACE scope application

The FY17 scope of work for PACE (described in section 3.1) is applied to MAWs or System Shutdowns according to the access strategy matrix (illustrated below). This illustrates the different work products and how they have been applied in each of the CQCN systems. This strategy seeks to deliver a 10% reduction of System Shutdown hours from 1000 to 900 for the FY17 year

Maintenance Access Window Only

System Shutdowns & Maintenance Access Window

System Shutdowns Only

Program/Work Product	Goonyella	Newlands	Blackwater	Moura
Track-Track Resurfacing- High Production Resurfacing Machine	Maintenance Access Window Only	Maintenance Access Window Only	Maintenance Access Window Only	Maintenance Access Window Only
Turnouts-Resurfacing- Turnout Tamper	Maintenance Access Window Only	Maintenance Access Window Only	Maintenance Access Window Only	Maintenance Access Window Only
Points-8.66 Week Inspection- Signal Electricians	Maintenance Access Window Only	Maintenance Access Window Only	Maintenance Access Window Only	Maintenance Access Window Only
Points-52 Week Inspection- Signal Electricians	Maintenance Access Window Only	Maintenance Access Window Only	Maintenance Access Window Only	Maintenance Access Window Only
Track-General Track Maintenance Activities- Track Maintenance Gang	Maintenance Access Window Only	Maintenance Access Window Only	Maintenance Access Window Only	Maintenance Access Window Only
Turnouts-Ballast Undercutting- Excavator	System Shutdowns & Maintenance Access Window	System Shutdowns & Maintenance Access Window	System Shutdowns & Maintenance Access Window	System Shutdowns & Maintenance Access Window
Rail-Renewal- Track Construction Gang	System Shutdowns & Maintenance Access Window	System Shutdowns Only	System Shutdowns & Maintenance Access Window	System Shutdowns Only
Rail-Restressing- Track Construction Gang	System Shutdowns & Maintenance Access Window	System Shutdowns Only	System Shutdowns & Maintenance Access Window	System Shutdowns Only
Track-Ballast Undercutting- RM900	System Shutdowns & Maintenance Access Window	System Shutdowns Only	System Shutdowns & Maintenance Access Window	System Shutdowns Only
Track-Ballast Undercutting-Excavator	System Shutdowns & Maintenance Access Window	System Shutdowns Only	System Shutdowns & Maintenance Access Window	System Shutdowns Only
Track Upgrade	System Shutdowns & Maintenance Access Window	System Shutdowns Only	System Shutdowns & Maintenance Access Window	System Shutdowns Only
Sleeper Replacement	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only
Turnouts-Renewal- Track Construction Gang	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only
Points-Renewal- Signals Construction Gang	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only
Culvert barrels-Renewal- Concrete Construction Contractors	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only
Overhead Maintenance	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only
Bridge Renewals	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only
Level Crossings	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only	System Shutdowns Only

4.2.2 System shuts

The following system shuts are included in the Capacity Assessment. These are based on the FY17 CAAC as of April 2016 and are repeated for the BCA assessment period.

Table 14: Summary of shutdowns in the CQCN by system and duration

Shutdown Duration (hours)	Goonyella	Newlands/GAPE	Blackwater	Moura
10		4		4
12	11[1]	6	8	6
20			2[2]	
24	1			
36	4		2	1
40			1[3]	
42				1
60			1	
108		1[4]		

4.2.3 Possessions

The following is a summary of the possessions included in the Capacity Assessment outside of system shutdowns.

Table 15: Summary of total possession time for each system in the CQCN included in the Capacity Assessment

Possession Activities	Goonyella (hours)	Newlands/GAPE (hours)	Blackwater (hours)	Moura (hours)
Ballast undercutter	929	224	558	
Ballast undercutter (excavator)	536		243	9
Culvert renewals			4	
General track maintenance	945	501[5]	1567	343
Points maintenance	339		486	
Rail renewals	206		218	
Rail restressing	187		168	
Track laying	29		101	
Track resurfacing	971	213[6]	803	191
Turnout resurfacing	276	66[7]	349	13

4.3 Alignment with supply chain interfaces

All port and mine maintenance and renewal activities are assumed to occur in alignment with network closures and other network activities. I.e. – there is no capacity loss assumed with these activities when undertaking Capacity Assessments.

[1] Goonyella: 5 of the 12 hour shutdowns are in line with the 24 and 36 hour system shutdowns

[2] Blackwater: 20 hour shutdowns include the North Coast Line and are in line with the 36 hour shutdowns

[3] Blackwater: 40 hour shutdown includes the North Coast Line and is in line with the 60 hour shutdown

[4] Newlands: Extended shutdown for planned bridge works

[5] Newlands general track maintenance: 216 hours for GAPE works

[6] Newlands track resurfacing: 80 hours for GAPE works

[7] Newlands turnout resurfacing: 3 hours for GAPE works

4.4 Pathing Plan

The AN Tactical Planning team develop pathing plans to advertise the paths that are available for Access Holders to operate trains on. These are based on the constraints from MaTP services, possessions and moving products. This approach is replicated in the Capacity Assessment as described below.

4.4.1 Network Pathing

A base template for train paths is developed for each system based on the achievable headway through each component as described in Table 16 below.

Table 16: Model Pathing.

Generally Empty coal traffic travels in the Up direction and Loaded in the Down, apart from sections: Callemondah – Kabra and Callemondah – Dumgree.

Section	Up Separation	Down Separation
Newlands		
Abbot Point – Pring	Headway separation	Demand basis for port availability
Pring – Birralee	36 minutes – fixed times	36 minutes – headway separation
Birralee – North Goonyella Jct	60 minutes – headway separation	60 minutes – headway separation
Goonyella		
Hay Point – Jilalan	Headway separation	Demand basis for port availability
Jilalan – Coppabella	20 minutes – fixed times	20 minutes – fixed times
Coppabella – Gregory Jct	36 minutes – headway separation	36 minutes – headway separation
Coppabella - Wotonga	30 minutes – headway separation	30 minutes – headway separation
Wotonga – Blair Athol	60 minutes – headway separation	60 minutes – headway separation
Wotonga – North Goonyella Jct	60 minutes – headway separation	60 minutes – headway separation
Blackwater		
Callemondah – Kabra[1]	15 minutes – fixed times	15 minutes – fixed times
Kabra – Bluff	20 minutes – fixed times	20 minutes – fixed times
Moura		
Callemondah – Dumgree[2]	90 minutes – headway separation	90 minutes – fixed times

This differs from the pathing templates used by the tactical planning team in the following respects:

- **Newlands System**
  Capacity Assessments assume that RCS has been implemented through the Newlands system resulting in a lower path separation than currently planned.

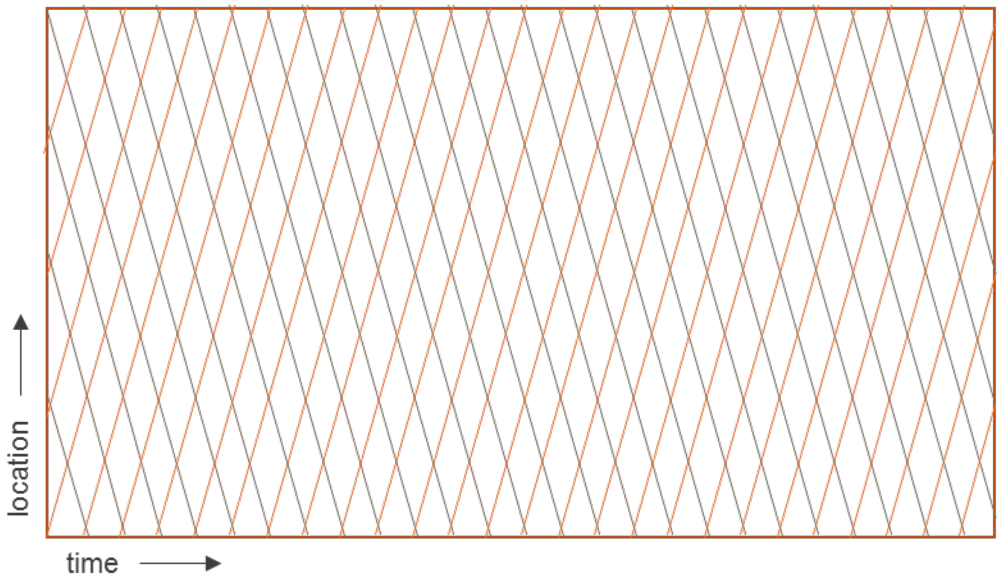
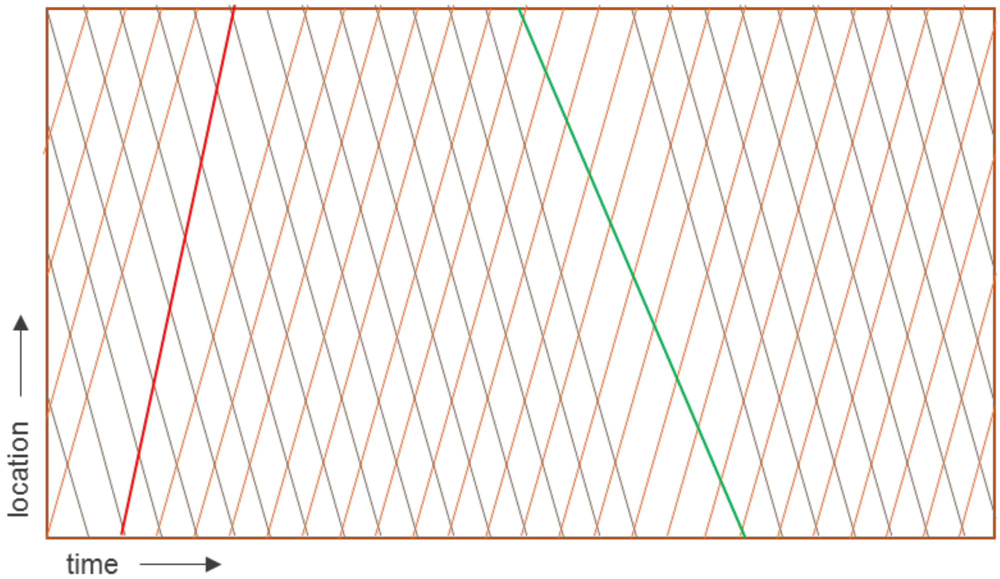
- **Blackwater system**
  The infrastructure design for WIRP was predicated on the basis of a 15/20 template which would be facilitated by the implementation of APEX. Due to the lower demand in the system the current template used in tactical planning is based on 15 minute paths from Callemondah (empty) and 20 minute paths from Bluff (loaded)

[1] Empty coal traffic travels in the Down direction

[2] Empty coal traffic travels in the Down direction

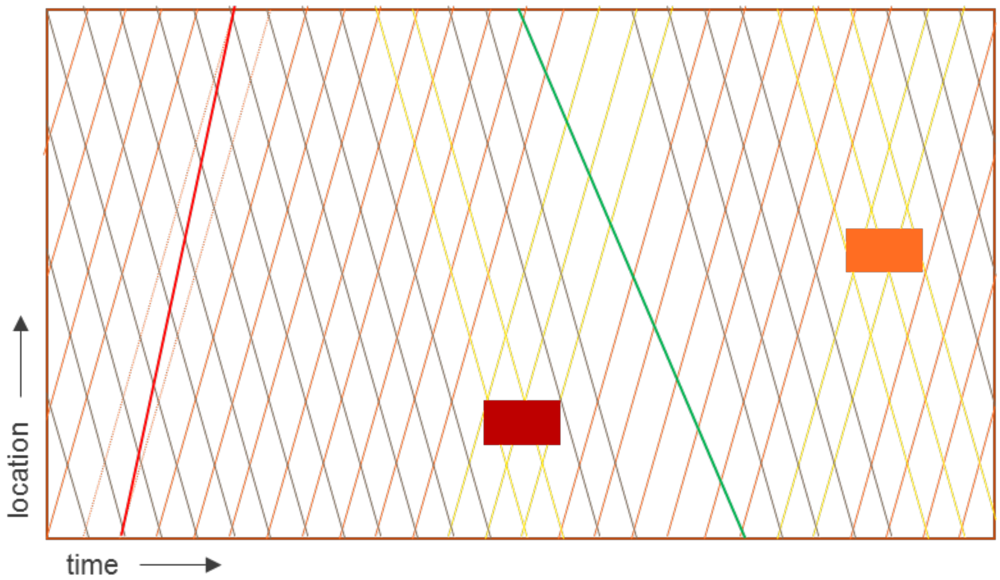
4.4.2 Pathing Plan

SLIDER is used to identify which paths are unavailable for scheduling coal trains based on the requirements for MaTP and other traffic.

SLIDER has a base template of paths operating through each system (depicted in orange and grey)	
Planned trains, either MaTP or maintenance / inspection trains (depicted in red and green) are overlaid and conflicting paths are removed	

Maintenance possessions are then overlaid (as solid boxes). This identifies potential conflicts between up and down traffic (depicted as yellow paths).

The available paths and potential conflicts are inputted into the Network Schedule generation.



4.5 Availability

The availability of paths in each system is summarised below. This assessment considers only trunk paths in each system, and does not take mine or port capability into account (these are included in the Network Scheduling step).

4.5.1 Newlands

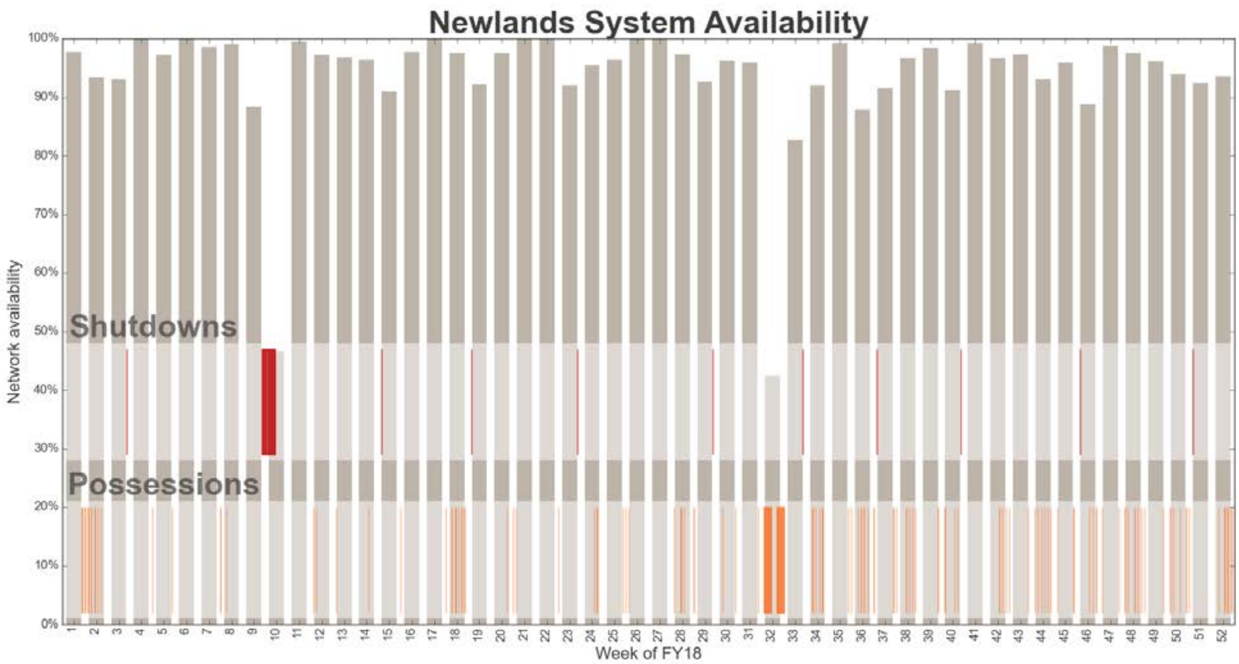


Figure 11: Newlands system weekly modelled availability

4.5.2 Goonyella

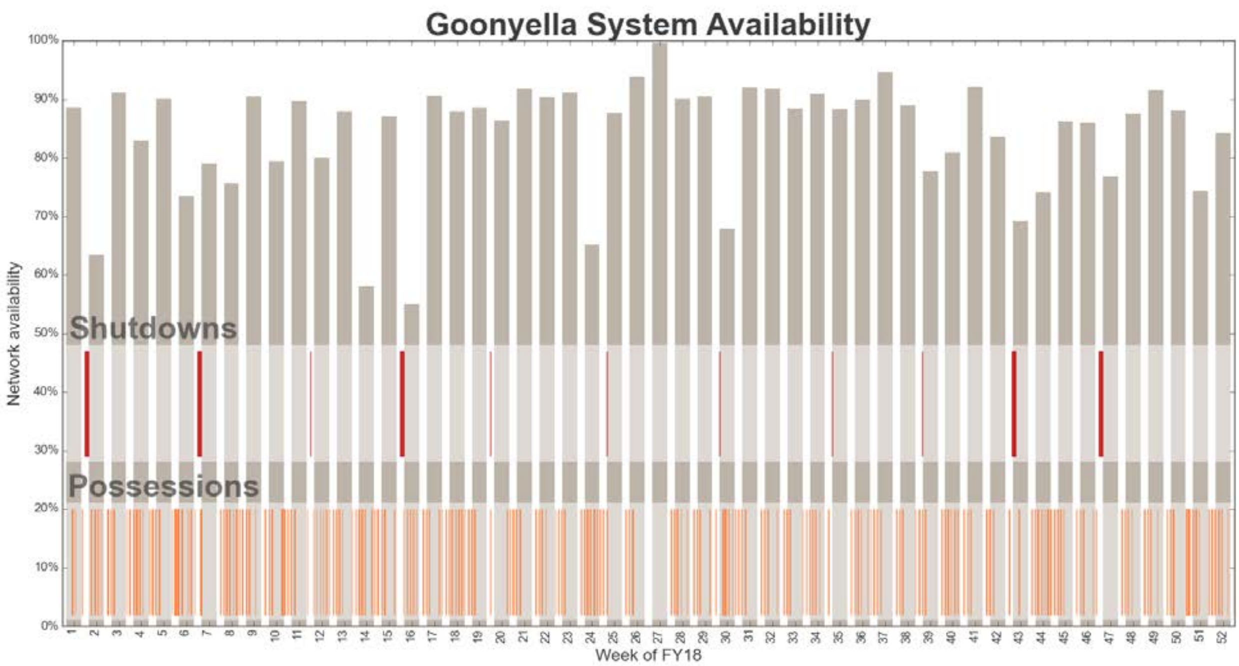


Figure 12: Goonyella system weekly modelled availability

4.5.4 Blackwater

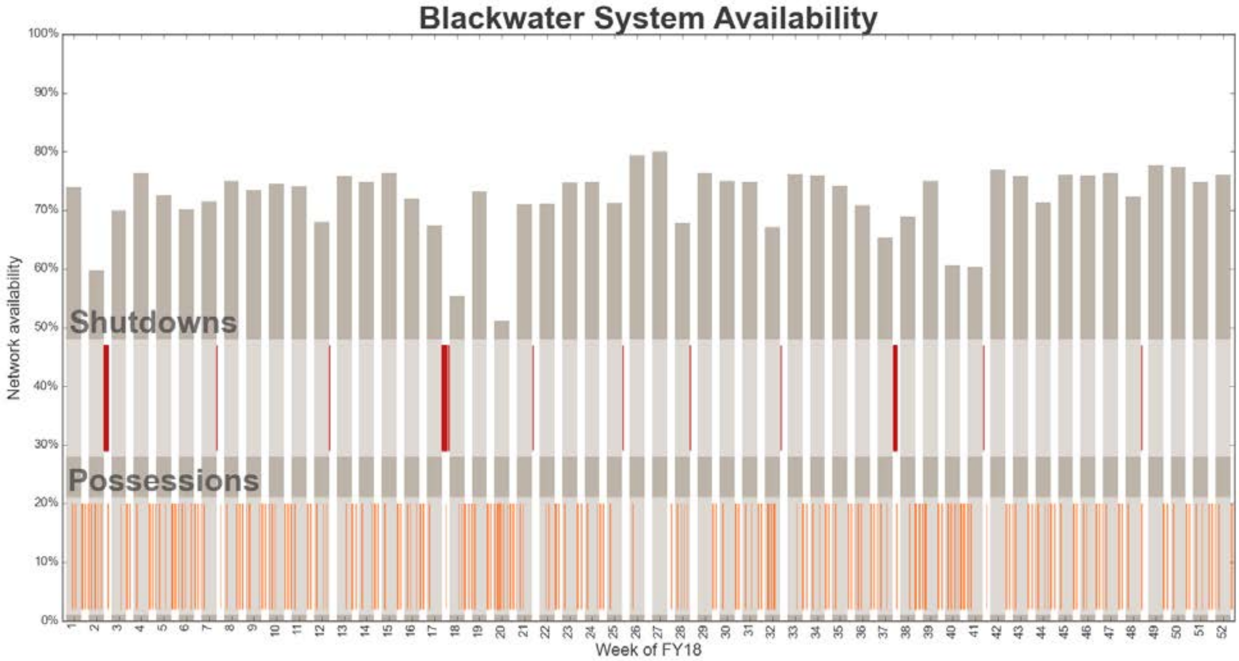


Figure 13: Blackwater system weekly modelled availability

4.5.5 Moura

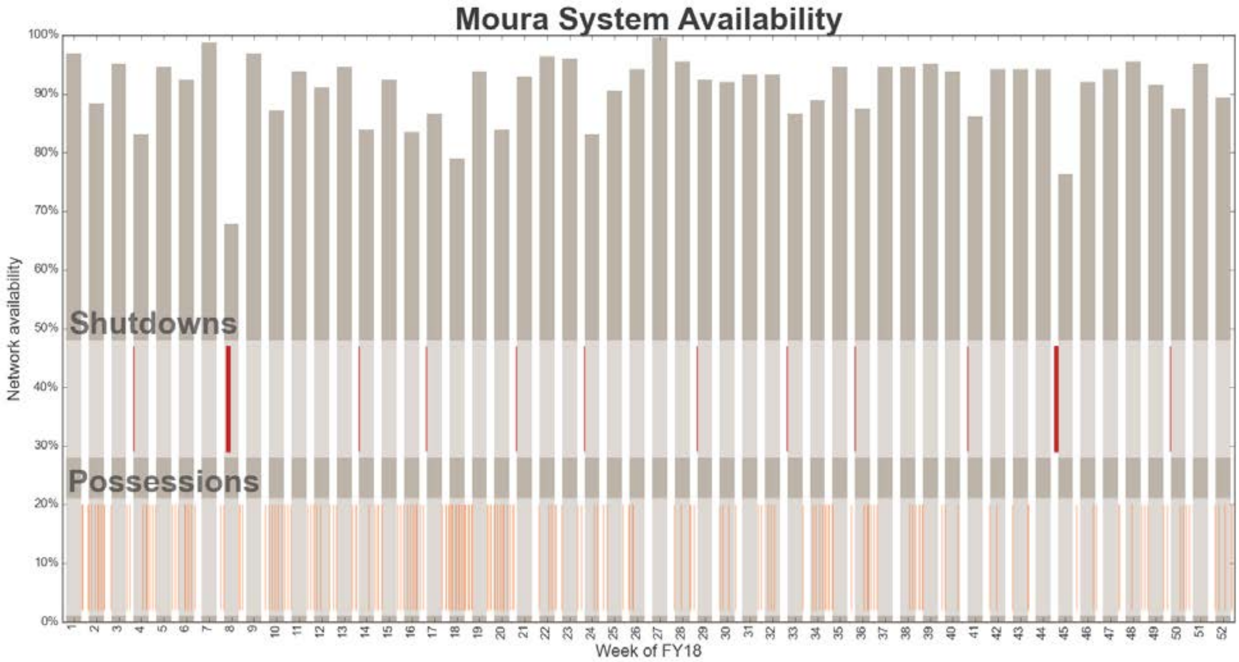


Figure 14: Moura system weekly modelled availability

4.6 Possession Protocols

The Possession Protocols set out the basis on which Aurizon Network will communicate and engage with all Operators about the planning of Possessions on the CQCN. The purpose of the Possession Protocols is to establish a communication and engagement process that is:

- straightforward,
- transparent,
- clear, and
- consistent for all operators

The possession protocols does not detail the internal management processes by which Aurizon Network determines the quantum, duration and timing of Possessions, after taking into account safety, operational, asset management, contractual, coal supply chain, risk and other matters.

5 Network Scheduling

This section of the SOP describes how Coal train services that operate within the CQCN are scheduled within the Capacity Assessment. This includes:

- The description of a cycle
- How rolling stock is assigned to meet demand

5.1 Cycle description

Coal traffic is modelled in alignment with Access Agreements and Operating Plans and described in individual appendices for train operators.

Each appendix includes:

- **Cycle Description**
  Description of the train cycle including crew changes, operations in yards and other activities en-route
- **Demand**
  For each mine / port / access agreement information relating to the number of TSEs for the assessment period, the Loading time and the unloading time. Where contracts end prior to the end of the simulation period (in this case June 2019) they have been assumed to continue in line with their previous contracts.

5.2 Demand and Dispatching

The CQSCM is a discrete event simulation model used to generate schedules using business rules based on the demand entered. This demand, entered as TSEs is

- Converted into a number of train orders required
- Scaled by the number of days in the month.
- Evenly space the train orders across the simulation period to align with ‘Even Railings’ mode of operation

During the simulation the train orders are injected into the CQSCM Dispatcher. The Dispatcher is a queue based management system that registers the orders and allocates them to available trains. In the event train orders are unsatisfied, a queue is formed to ensure the orders are processed whilst maintaining priority.

Within the CQSCM’s Dispatcher, several sub-processes are executed to determine if a train accepts the order and commences its service. To enable a successful allocation of an order to a train to form an active service, all sub-processes must successfully complete. These are:

- **Availability of Network Paths**
  This process controls the Network Path allocated to a train. When a Network Path is available, the Dispatcher reserves the Network Path for the train and continues to evaluate the other sub-processes. In the event a network path is not available, train orders are not processed and are queued.
- **Train Configuration applicability**
  This process checks to ensure the train configuration is suitable for the available order. In some cases, there are restrictions on the train configurations such as Electric trains operating to non-electrified origins.
- **Train Loadout management**
  This processes predicts the trains arrival time at the mine to ensure the loadout is available to accept the train. The availability of the loadout is evaluated to minimise train delays at the loadout.
- **Route availability**

This process evaluates the availability of the track network to ensure the train can reach its origin mine. In the event an outage on the network is encountered, the Dispatcher will prevent the service from being created and seek to find a suitable time that aligns track network and mine availability.

Once all sub-processes are completed successfully, a service is allocated its route and commences the journey to the origin mine. The Dispatcher evaluates the sub-processes for all the orders in the queue. If the bottom of the queue is reached, the Dispatcher periodically rechecks the situation to ensure orders are dispatched as evenly as possible throughout the simulated period.

The modelling process seeks to ensure that all demand is met, therefore the quantum of rolling stock modelled may differ from that operated in each system. When undertaking a Capacity Assessment Aurizon Network adjusts the quantum of rolling stock to meet the demand requirements.

6 Network Operation

This section of the System Operating Parameters describe how the Capacity Assessment replicates the operation of trains across the CQCN through:

- Network Control
- Speed of trains (speed restrictions)
- Day of Operations loss
- Force Majeure

6.1 Network Control

The management of a trains journey in the CQSCM is handled through a Track Control process. The purpose of this process is continuously monitor the situation of trains on the track network and determine the next possible moves similar to that of a Network Controller operating trains, including.

- Manage conflicts at a nodal level to pass trains at crossing locations
- Manage the route set ahead to avoid deadlocks
- Manage the routing of trains around maintenance being undertaken on the track network
- Manage the trains entire journey to ensure its cycle is completed
- Manage activities in yards and allocation of roads in a yard
- Manage safe-working and headway constraints of the track network

6.1.1 System Closure management

The management of trains in the dynamic model during system closures is described below:

- **System closures and possessions application**
  System closures for maintenance are applied in the dynamic model by closing selected sections of track to prevent trains traversing a particular section or corridor of track.

- **Empty direction**
  Prior to dispatching a train service from the above rail facility the model looks forward in time. This determines if the train service is able to traverse the track to the destination load out without being blocked by a closure or track possession. If the model detects that one of these two events will block the train from reaching its destination, the train service will not dispatch from the above rail facility.

  The model continuously re-evaluates to dispatch a train service. This method will see that trains depart their respective above rail facility to arrive at the section under closure or possession at a point in time when the track becomes available.

  The look ahead function in the model utilises reference train SRTs and considers scheduled dwells such as crew changes. Variation to SRTs and contracted dwells is not considered in this method. Based on this approach the model may dispatch a train service in the empty direction that will be blocked by a closure or possession, dependant on the variation levels entered.

  Network paths are also considered and managed in the Dispatcher for the mainline corridor.

- **Loaded direction**
  Train services departing the mine assess the availability of the track up to the next point of capacity (i.e. signal or passing loop). Using this method in the model, train services will proceed along their route to the identified separation location where trains dwell for network paths.

Once a train arrives at the separation point, a network path is allocated to a train. Trains will dwell at the separation location until the network path time is reached and will then continue the journey to the destination port.

During the trains journey, the train continues to assess the track sections being traversed to ensure the network is available. In the event congestions or an outage is reached, trains will proceed once the following sections and/or queued trains have cleared.

- **Data reporting**
  Model output parameters are filtered to exclude train delays that occur due to system closures in both the loaded and empty directions.

The modelled representation of a system shut is optimistic compared to the actual throughput achieved, therefore 2.25% of trains are cancelled at origin.

6.2 Temporary Speed Restrictions (TSRs)

To replicate the impact of TSRs on the rail network, historical data for the CQCN from July 2012 to May 2015 was analysed. This information was used to generate a set of representative speed restrictions through the following process:

- **Collate historical speed restrictions**
  Records of the location, duration and speed limit imposed across the CQCN were collated for a 3 year period

- **Determine time impact**
  The impact of the TSR was determined by calculating the additional time taken to traverse the speed restriction length (including decelerating and accelerating) compared to the time taken to cover the section without speed restrictions applied.

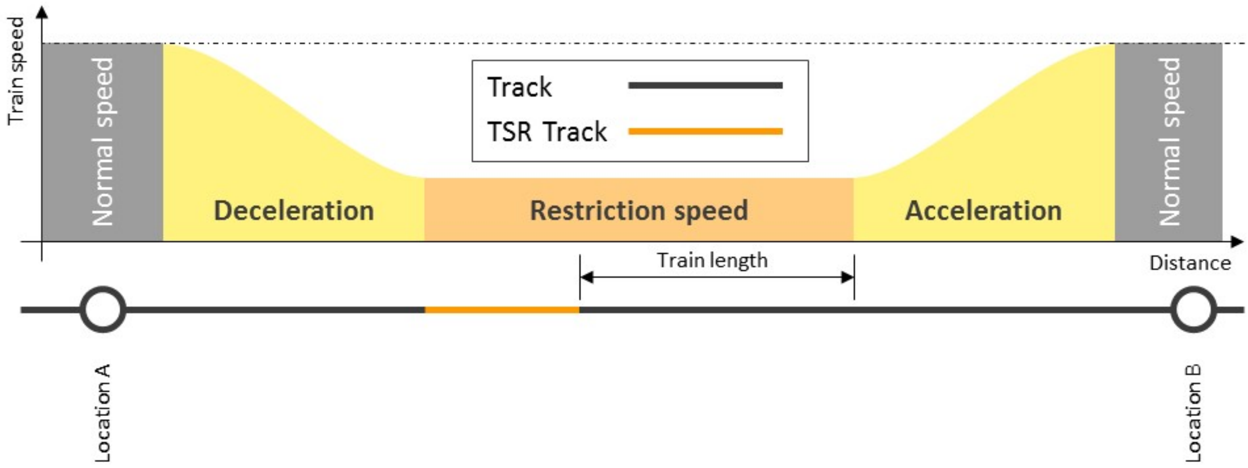


Figure 15: Assumed impact to train speed used to calculate TSR impact to SRT

- **Determine representative period**
  To determine a representative 12 month period of TSRs the time impact calculated was weighted by the quantity of traffic traversing the section (based on the contracted demand).

  From this review a period of 1st Feb 2014 – 31st January 2015 was selected as a representative period for inclusion in the Capacity Assessment.

- **Inclusion in the Capacity Assessment**
  A table was generated that identified for each TSR the:

- Location
- Track
- Start Date / End Date
- Time impact

Table 17 illustrates the number of speed restrictions applied in a given month over the FY17 period. The total impact depends on the volume of traffic traversing each restriction. The time impacts are typically between 3 and 4 minutes, but can be as high as 24 minutes.

Table 17: Number of speed restrictions applied over the FY17 period

Month	Goonyella	Newlands/GAPE	Blackwater	Moura
July 2016	15	7	31	1
August 2016	27	4	21	2
September 2016	23	2	26	4
October 2016	18	6	29	2
November 2016	25	2	23	1
December 2016	34	9	13	4
January 2017	21	2	18	7
February 2017	36	5	53	3
March 2017	28	3	33	4
April 2017	27	2	36	2
May 2017	23	6	43	2
June 2017	13	2	14	

6.3 Day of Operations Losses

Day of operations losses result from a number of varying influences, which include (but are not limited to):

- Adverse weather conditions
- Infrastructure faults and failures
- Incidents at interfaces (e.g. level crossing incidents, trespassing)

These can manifest in the DOO as delays and failures. To represent this, the operating logic in the dynamic model randomly applies cancellations to 10% of empty train services scheduled to depart origin.

6.4 Force Majeure

Force Majeure Events are not included in the Capacity Assessment, which is in accordance with all Access Agreements whereby obligations are suspended during a Force Majeure Event.

7 Information

7.1 Train Service Entitlements

Aurizon Network provides capacity in the form of TSEs i.e. the provision of the ability for an Access Holder to operate a specified number and type of train services between a mine and a port. Aurizon Network determines the number of TSEs that are required to be contracted based on throughput and payload assumptions provided by the Access Seeker in the COP. Two TSEs are required for cyclic traffic, one for the empty leg and one for the loaded leg.

The derivation of TSEs from a tonnage is described below:

Table 18: Train Service Entitlements calculation Table.

Value	Source / Calculation
million tonnes per annum (MTPA)	Access Holder / Seeker
Train payload (tonnes)	Access Holder / Seeker
Annual TSEs	= 2 * (MTPA / Payload)
Monthly[1] TSEs	= Annual TSE / 12

7.2 Measurement of capacity

Network capacity is provided in the form of Train Service Entitlements (TSEs). To ensure there is sufficient network capacity to service existing and future contracts TSEs are tested in the dynamic Capacity Model based on a 30 day month with adjustments made for non 30 day months. Once scaled for the non 30 day months adjustments are made as per the following:

- if the remainder of TSEs are less than or equal to 0.29, then round down
- if the remainder of TSEs are greater than 0.29, then round up

Capacity is assessed for the contracted period with an output of the assessment being the number of consists required to operate in the system to service each contract for each operator.

This process confirms that there is sufficient capacity to meet the contracted TSE obligations, the proposed demand scenario being assessed and planned maintenance works whilst also accounting for day of operation losses. From this a Network train schedule can be generated.

The process does not determine how much available capacity remains in the network, as available capacity is dependent on scenario variable factors such as; the origin and destination of a service. Specific scenarios can be initiated by access seekers through the Access Request process.

[1] Rounding of fractional part of TSE calculation based on method described in section 7.2

7.2.1 Below Rail Transit Time (BRTT)

BRTT is a measure of the additional time to the nominated cycle time for a service (excluding any above rail planned dwells or delays or Force Majeure Events) which accounts for the dynamic interactions of cyclic traffic such as crossing activities, Network caused delays (including speed restrictions) and queueing of trains.

BRTT is calculated on an annual average basis across all system services.

For information purposes, the Target BRTT Threshold for each system is provided in the table below.

Table 19: Target BRTT Thresholds.

System	Target BRTT Threshold
Newlands / GAPE	160%
Goonyella	123%
Blackwater	127%
Moura	130%

7.3 Definitions and Abbreviations

Definition	Meaning
Above Rail Delay	A delay to a Train Service from its scheduled Train Path in the DTP, where that delay can be attributed directly to an Access Holder (including, if applicable, its Nominated Railway Operator) in operating its Train Services, but excludes: (a) cancellations; (b) delays resulting from compliance with a Passenger Priority Obligation; and (c) delays resulting from a Force Majeure Event.
Absolute Capacity	The maximum number of Train Paths (calculated on a Monthly and annual basis) that can be provided: (a) in each Coal System; and (b) for the mainline and each branch line of each Coal System, using the following assumptions: (c) the Rail Infrastructure is not affected by maintenance, renewal or Expansion activities; (d) there are no speed restrictions affecting the Rail Infrastructure; (e) there are sufficient origins and destinations, and sufficient infrastructure at those origins and destinations, to enable all Train Paths to be utilised; (f) there are no delays or failures occurring in the relevant Supply Chain; (g) there is sufficient rollingstock and other above rail assets to enable all Train Paths to be utilised; and (h) the minimum headway of the relevant Coal System.
Access Holder	Unless expressed to the contrary, a person that has been granted Access Rights to operate Train Services on all or part of the Rail Infrastructure.
Access Seeker	Subject to clause 4.9(a) and unless expressed to the contrary, the entity that provides Aurizon Network with a properly completed Access Application, but does not include a request to enter into a Train Operations Deed.
Available Capacity	Capacity, excluding all Committed Capacity.
Below Rail Delay	A delay to a Train Service from its scheduled Train Path in the DTP, where that delay can be attributed directly to Aurizon Network, but excludes: (a) cancellations; (b) delays resulting from compliance with a Passenger Priority Obligation; and (c) delays resulting from a Force Majeure Event.
Below Rail Transit Time	For a Train Service travelling between its origin and destination, the sum of: (a) the relevant nominated section running times (in the direction of travel) as specified in the Train Service Entitlement; (b) identified Below Rail Delays for that Train Service; (c) the time taken in crossing other Trains to the extent that such time is not contributed to by Above Rail causes or Force Majeure Events or otherwise included in paragraph (a) of this definition; and (d) delays due to Operational Constraints directly caused by the activities of Aurizon Network in maintaining the Rail Infrastructure, provided such delays are not contributed to by Above Rail causes or Force Majeure Events or otherwise included in paragraphs (b) and (c) of this definition.
Below Rail Transit Time Percentage	For a type of Train Service specified in a Train Service Entitlement, the proportion (expressed as a percentage) calculated by dividing the Below Rail Transit Time by the

Definition	Meaning
	maximum sectional running times (as set out in the relevant Access Agreement) for all relevant sections (as set out in the relevant Access Agreement).
BRTT	Below Rail Transit Time
Capacity	The aggregate of Existing Capacity and Planned Capacity.
Capacity Analysis	A simulation modelling assessment of the Available Capacity of the Rail Infrastructure, based on the Network Management Principles, System Operating Parameters, System Rules, Train Operator's Operating Plans and any requested Access Seeker's Access Rights, to determine, as the context requires: (a) Available Capacity; (b) whether there is sufficient Capacity to accommodate Committed Capacity; (c) whether there is sufficient Available Capacity to accommodate the requested Access Rights not yet considered to be Committed Capacity; (d) if there is insufficient Capacity to accommodate Committed Capacity, the Expansions required to provide the Shortfall Capacity to accommodate Committed Capacity (and an indicative estimate of the cost of such works and timing for completion); (e) if there is insufficient Available Capacity to accommodate requested Access Rights not yet considered to be Committed Capacity, whether Expansions are required to provide the additional Capacity to accommodate the requested Access Rights (and an indicative estimate of the cost of such works and timing for completion); and (f) the operational impacts of the requested Access Rights including the impact of the requested Access Rights on the, Network Management Principles, System Operating Parameters, System Rules and Train Operator's Operating Plans, and which: (g) provides a sufficient basis to enable Aurizon Network to finalise the relevant Train Service Entitlement, initial timetable, applicable Access Charges and associated funding arrangements (subject to other variations identified in the negotiation process); and (h) for information purposes only: (i) includes the Monthly available tonnes based on Nominal Train Payloads outlined in Schedule F; and (ii) identifies the assumed split of traffic to different destinations serviced by the relevant Coal System.
Committed Capacity	That portion of the Capacity that is required: (i) to meet Train Service Entitlements; (j) to satisfy Aurizon Network's obligations under clause 7.3(d) in respect of a Renewing Access Seeker; (k) to comply with any Passenger Priority Obligation or Preserved Train Path Obligation; (l) to provide Access Rights where Aurizon Network has, in relation to those Access Rights, contractually committed to construct an Expansion; and (m) to provide Access Rights where Aurizon Network has, in relation to those Access Rights, contractually committed to construct a Customer Specific Branch Line.
CQSCM	Central Queensland Supply Chain Model
Customer	A person in respect of which an Access Holder or an Access Seeker is or is intending to use Access Rights to provide Train Services for that person (in that Access Seeker's or Access Holder's capacity as a Railway Operator).
Cyclic Traffic	A traffic, the Train Service Entitlements in respect of which are defined in terms of a number of Train Services within a particular period of time, for example, a year, Month, week or day. Coal traffic is an example of such traffic.
DTC	Direct Traffic Control

Definition	Meaning
Dwell	Where a Train stops for a short period on Rail Infrastructure at locations specified by Aurizon Network as required for crew changes, meal breaks and maintenance, examination and provisioning of that Train.
Existing Capacity	Absolute Capacity, net of: (a) Aurizon Network's reasonable requirements for the exclusive or partial utilisation of the Rail Infrastructure for the purposes of performing activities associated with the maintenance and repair of the Rail Infrastructure, including the operation of work Trains; and (b) Aurizon Network's allowances for "day of operations" losses, speed restrictions and other operational losses or restrictions applicable to the Rail Infrastructure as set out in the System Operating Parameters.
Infrastructure Service Providers	Those parties who provide maintenance, construction and other related services in respect of the Rail Infrastructure.
Loading Time	The time between a Train Service arriving at a Nominated Loading Facility and that same Train departing the Nominated Loading Facility, and for the purpose of clarity, this time runs from when a Train Service arrives at the entry signal to the Nominated Loading Facility until it has completed loading, presented at the exit signal, is ready to depart the Nominated Loading Facility and has advised the relevant Network Controller accordingly.
Maintenance Work	Any work involving maintenance or repairs to, or renewal, replacement and associated alterations or removal of, the whole or any part of the Rail Infrastructure (other than Infrastructure Enhancements) and includes any inspections or investigations of the Rail Infrastructure.
Major Periodic Maintenance	Activities that renovate the Rail Infrastructure to retain it in a functional condition completed on Track sections at intervals of more than one year, and includes activities such as re-railing, rail grinding, resurfacing, re-signalling, communications upgrades, renovating structures, ballast cleaning and re-sleepering.
MaTP	Master Train Plan containing the planned time of scheduled traffic
Operational Constraint	Any restriction on the use of any part of the Rail Infrastructure that impacts adversely on Train Services, including speed restrictions, load restrictions, Possessions or signalling or overhead restrictions
PACE	Possession Aligner and Capacity Evaluator
Planned Capacity	The additional Train Paths (calculated on a Monthly and annual basis) that is expected to result from an Expansion that Aurizon Network is contractually committed to construct, taking into account: (a) Aurizon Network's reasonable requirements for the exclusive or partial utilisation of the Rail Infrastructure resulting from that Expansion for the purposes of performing activities associated with the maintenance and repair of the Rail Infrastructure resulting from that Expansion, including the operation of work Trains; and (b) Aurizon Network's allowances for "day of operations" losses, speed restrictions and other operational losses or restrictions applicable to the Rail Infrastructure resulting from that Expansion as set out in the System Operating Parameters.
Railway Operator	The meaning given to that term in the TIA and, for clarity, includes an Access Holder's nominated Train Operator.
Railway Operator (TIA definition)	(a) means a person who operates rolling stock on a railway; but (b) does not include the Authority.
RCS	Remote Control Signalling
Supply Chain Group	(a) A group that has been established as a supply chain coordination group for the purpose of coordinating some or all aspects of the planning or operation of a Supply Chain; or

Definition	Meaning
	(b) a group which has the support of sufficient participants in the Supply Chain to effectively perform that coordination purpose, but in each case the group includes consideration of the service taken to be declared under section 250(1)(a) of the Act.
TIA	Transport Infrastrcuture cte 1994 (QLD)
Train Operator	A person nominated by an Access Seeker or an Access Holder to operate Train Services for that Access Seeker or Access Holder under the terms of a Train Operations Deed.
Unloading Time	The time between a Train Service arriving at a Nominated Unloading Facility and that same Train departing the Nominated Unloading Facility, and for the purpose of clarity, this time runs from when a Train Service arrives at the entry signal to the Nominated Unloading Facility until it has completed unloading, presented at the exit signal, is ready to depart the Nominated Unloading Facility and has advised the relevant Network Controller accordingly.

7.4 UT4 regulatory compliance

The SOP satisfies the following requirements within UT4

Section	Clause	Notes
BCA (7A.4.1 (b) (iv))	a Baseline Capacity Assessment must include (A) sets out Aurizon Network's assumptions affecting Capacity and relied upon for the Baseline Capacity Assessment, including: (1) operational, maintenance, construction and planning assumptions in each Coal System; (2) Possession Protocols; (3) Aurizon Network's methodology for calculating Train Service Entitlements in each Coal System; (4) Network Management Principles, System Operating Parameters and System Rules, if applicable, for each Coal System; and (5) all capacity, operational and planning definitions relied on for the development of the Baseline Capacity Assessment; and	The SOP contains this information The body of the document contains this information Section 4.6 Section 7.1 Used in the generation of the CA methodology and parameters Section 7.3
Schedule G (Strategic Train Plan Principles)	(b) In preparing an STP, Aurizon Network will consider: (i) only the Train Paths that are System Paths; (ii) the known and reasonably anticipated: (A) track maintenance requirements; and (B) impacts of the construction of Expansions, for the period of the STP; (iii) the relevant System Operating Parameters; and (iv) any other factors that may materially impact on the Existing Capacity necessary for Aurizon Network to meet its obligations in relation to Train Service Entitlements for the period of the STP. (c) The STP must specify the material assumptions that Aurizon Network has made during its preparation.	As the STP contains trains from mine to port then the train paths are system paths Section 4 Achieved by referencing the SOP

7.5 Source Information

Section	Content	Document References
General	System Rules	Aurizon Network System Rules Capricornia Coal Chain April 2014
Appendix 2- 4	Cycle description, loading time, unloading time.	Executed Access Agreements between Aurizon Network and Access Holders
Appendix 1	SRTs	Newlands System information Pack Issue 6_3 (which includes GAPE) Goonyella System information Pack Issue 6_3 2016 Blackwater System information Pack Issue 5_8 2016 Moura System information Pack Issue 6_2

8 Appendix 1: Sectional Run Times

Table 20: Newlands and GAPE SRTs

Location from	Location to	Empty	Loaded
Newlands system			
APCT	KAILI	9	11
KAILI	DURROBURRA	7	8
DURROBURRA	PRING	4	3
PRING	BUCKLEY	5	5
BUCKLEY	ARMUNA	11	11
ARMUNA	ABERDEEN	9	9
ABERDEEN	BINBEE	9	8
BINBEE	BRIABA	11	12
BRIABA	ALMOOLA	10	27
ALMOOLA	COLLINSVILLE	5	7
COLLINSVILLE	BIRRALEE	16	20
BIRRALEE	COCKOOL	15	16
COCKOOL	HAVILAH	14	14
HAVILAH	NEWLANDS JUNCTION	13	12
Northern Missing Link			
NEWLANDS JUNCTION	LEICHARDT RANGE	6	7
LEICHARDT RANGE	SUTTOR CREEK	20	21
SUTTOR CREEK	EAGLEFIELD CREEK	18	20
EAGLEFIELD CREEK	NORTH GOONYELLA JUNCTION	9	11
South Goonyella			
COPPABELLA	MOORVALE JUNCTION	8	14
MOORVALE JUNCTION	INGSDON	2	2
INGSDON	MILLENNIUM JUNCTION	3	5
MILLENNIUM JUNCTION	RED MOUNTAIN	6	5
RED MOUNTAIN	WINCHESTER	7	7
WINCHESTER	PEAK DOWNS	10	11
PEAK DOWNS	HARROW	11	12
HARROW	SARAJI	6	6
SARAJI	DUNSMURE	4	5
DUNSMURE	LAKE VERMONT	4	5
LAKE VERMONT	DYSART	4	4
DYSART	STEPHENS	7	7
STEPHENS	NORWICH PARK	9	11
NORWICH PARK	BUNDOORA	15	18
Coppabella to Wotonga			
COPPABELLA	BROADLEA	8	14
BROADLEA	CARBOROUGH DOWNS JUNCTION	3	4
CARBOROUGH DOWNS JUNCTION	MALLAWA	7	8

Location from	Location to	Empty	Loaded
MALLAWA	ISAAC PLAINS JUNCTION	2	3
ISAAC PLAINS JUNCTION	WOTONGA	3	2
Blair Athol Branch			
WOTONGA	MORANBAH	13	14
MORANBAH	VILLAFRANCA	17	20
VILLAFRANCA	MOUNT MCLAREN	17	18
MOUNT MCLAREN	BLACKRIDGE	20	21
BLACKRIDGE	BLAIR ATHOL JUNCTION	15	18
BLAIR ATHOL JUNCTION	BLAIR ATHOL MINE	5	2
North Goonyella			
WOTONGA	TEVIOT BROOK	7	8
TEVIOT BROOK	MORANBAH NORTH JUNCTION	7	8
MORANBAH NORTH JUNCTION	GOONYELLA	3	3
GOONYELLA	RIVERSIDE	6.78	4.78
RIVERSIDE	NORTH GOONYELLA JUNCTION	17	17

Table 21: Goonyella SRTs

Location from	Location to	Empty	Loaded
Goonyella Trunk			
DALRYMPLE BAY	DALRYMPLE CROSSOVER POINTS	10	15
HAY POINT	DALRYMPLE CROSSOVER POINTS	12	11
DALRYMPLE CROSSOVER POINTS	PRAGUELANDS	8	8
PRAGUELANDS	JILALAN	9	7
JILALAN	YUKAN	9	8
YUKAN	BLACK MOUNTAIN	13	18
BLACK MOUNTAIN	HATFIELD	10	10
HATFIELD	BOLINGBROKE	9	11
BOLINGBROKE	BALOOK	13	14
BALOOK	WANDOO	9	10
WANDOO	WAITARA	12	12
WAITARA	BRAESIDE	6	8
BRAESIDE	MINDI	11	11
MINDI	SOUTH WALKER JUNCTION	7	7
SOUTH WALKER JUNCTION	TOOTOOLAH	4	4
TOOTOOLAH	MACARTHUR JUNCTION	4	4
MACARTHUR JUNCTION	COPPABELLA	9	8
South Goonyella branch			
COPPABELLA	MOORVALE JUNCTION	8	14
MOORVALE JUNCTION	INGSDON	2	2
INGSDON	MILLENNIUM JUNCTION	3	5
MILLENNIUM JUNCTION	RED MOUNTAIN	6	5
RED MOUNTAIN	WINCHESTER	7	7

Location from	Location to	Empty	Loaded
WINCHESTER	PEAK DOWNS	10	11
PEAK DOWNS	HARROW	9	10
HARROW	SARAJI	9	9
SARAJI	DYSART	18	20
DYSART	NORWICH PARK	15	16
NORWICH PARK	BUNDOORA	15	18
UNDOORA	GERMAN CREEK	2	2
GERMAN CREEK	OAKY CREEK	14	21
OAKY CREEK	LILYVALE	13	12
LILYVALE	GREGORY JUNCTION	1	2
Blair Athol branch			
COPPABELLA	BROADLEA	14	19
BROADLEA	CARBOROUGH DOWNS JUNCTION	3	4
CARBOROUGH DOWNS JUNCTION	MALLAWA	7	8
MALLAWA	ISAAC PLAINS JUNCTION	2	3
ISAAC PLAINS JUNCTION	WOTONGA	3	2
WOTONGA	MORANBAH	13	14
MORANBAH	VILLAFRANCA	16	17
VILLAFRANCA	MOUNT MCLAREN	16	19
MOUNT MCLAREN	BLACKRIDGE	20	21
BLACKRIDGE	BLAIR ATHOL JUNCTION	15	18
BLAIR ATHOL JUNCTION	BLAIR ATHOL MINE	5	2
North Goonyella			
WOTONGA	MORANBAH NORTH JUNCTION	13	15
MORANBAH NORTH JUNCTION	GOONYELLA	3	3
GOONYELLA	RIVERSIDE	7	5
RIVERSIDE	NORTH GOONYELLA BALLOON	18	18
Mine spurs			
SOUTH WALKER JUNCTION	BIDGERLEY JUNCTION	3	5
BIDGERLEY JUNCTION	BIDGERLEY BALLOON	9	1
BIDGERLEY JUNCTION	HAIL CREEK BALLOON	38	36
MACARTHUR JUNCTION	MACARTHUR BALLOON	10	1
MOORVALE JUNCTION	MOORVALE BALLOON	12	2
MILLENNIUM JUNCTION	MILLENNIUM BALLOON	13	1
PEAK DOWNS	PEAK DOWNS BALLOON	7	1
SARAJI	SARAJI BALLOON	5	3
NORWICH PARK	NORWICH PARK BALLOON	7	4
GERMAN CREEK	GERMAN CREEK BALLOON	6	6
OAKY CREEK	OAKY CREEK BALLOON	7	3
GREGORY JUNCTION	GREGORY MINE	7	7
MALLAWA	BURTON MINE BALLOON	7	1
CARBOROUGH DOWNS JUNCTION	CARBOROUGH DOWNS MINE	9	1
ISAAC PLAINS JUNCTION	ISAAC PLAINS MINE	9	1

Location from	Location to	Empty	Loaded
MORANBAH NORTH JUNCTION	MORANBAH NORTH MINE	6	3
RIVERSIDE	RIVERSIDE BALLOON	6	6
GOONYELLA	GOONYELLA BALLOON	5	1
INGSDON	MILLENNIUM JUNCTION	3	5
MILLENNIUM JUNCTION	RED MOUNTAIN	6	5
SARAJI	LAKE VERMONT JUNCTION	16	19
LAKE VERMONT JUNCTION	LAKE VERMONT BALLOON	14	15
LAKE VERMONT JUNCTION	DYSART	8.4	10.4
DYSART	STEPHENS	7.5	8
STEPHENS	NORWICH PARK	7.5	8

Table 22: Blackwater Electric SRTs

Location From	Location to (and including)	Empty	Loaded
NCL			
CALLEMONDAH	MOUNT MILLER	12	10
MOUNT MILLER	YARWUN	4	5
YARWUN	ALDOGA	6	6
ALDOGA	MOUNT LARCOM	7	9
MOUNT LARCOM	AMBROSE	3	4
AMBROSE	EPALA	5	5
EPALA	RAGLAN	6	6
RAGLAN	MARMOR	10	9
MARMOR	BAJOOL	5	8
BAJOOL	ARCHER	8	8
ARCHER	MIDGEE	5	4
MIDGEE	ROCKLANDS	7	7
Blackwater trunk			
ROCKLANDS	GRACEMERE	8	6
GRACEMERE	KABRA	6	6
KABRA	STANWELL	9	9
STANWELL	WARREN	2	2
STANWELL POWERHOUSE	WARREN	4	4
WARREN	WYCARBAH	11	10
WYCARBAH	WESTWOOD	8	10
WESTWOOD	WINDAH	9	13
WINDAH	GRANTLEIGH	10	10
GRANTLEIGH	TUNNEL	9	9
TUNNEL	EDUNGALBA	12	16
EDUNGALBA	AROONA	8	9
AROONA	DUARINGA	7	7
DUARINGA	WALLAROO	10	14
WALLAROO	TRYPHINIA	11	12
TRYPHINIA	DINGO	11	11

DINGO	UMOLO	6	6
UMOLO	PARNABAL	6	6
PARNABAL	WALTON	4	4
WALTON	BLUFF	10	10
BLUFF	BOONAL BALLOON POINTS	8	11
BOONAL BALLOON POINTS	BOONAL BALLOON	2	3
BOONAL	BLACKWATER	8	8
BLACKWATER	SAGITTARIUS	3	4
SAGITTARIUS	RANGAL	3	4
RANGAL	BURNGROVE	7	7
South Goonyella branch			
BURNGROVE	CREW	7	8
CREW	MACKENZIE	10	12
MACKENZIE	FAIRHILL	11	11
FAIRHILL	YAN YAN	11	14
YAN YAN	GREGORY JUNCTION	8	8
Koorilgah branch			
BLACKWATER	KOORILGAH	17	23
KOORILGAH	KOORILGAH BALLOON	10	1
Curragh branch			
SAGITTARIUS	WASHPOOL JUNCTION	9	7
WASHPOOL JUNCTION	WASHPOOL	5	5
WASHPOOL JUNCTION	CURRAGH	5	5
Rolleston branch			
RANGAL	TIKARDI	6	6
TIKARDI	BOORGOON	5	6
BOORGOON	BOORGOON BALLOON	4	2
BOORGOON	KINROLA JUNCTION	4	7
KINROLA JUNCTION	KINROLA BALLOON	6	4
KINROLA JUNCTION	SPRINGSURE CREEK JCT**	14	18
SPRINGSURE CREEK JCT	SPRINGSURE CREEK MINE**	10	10
SPRINGSURE CREEK JCT	KENMARE**	6	7
KENMARE	MEMOOLOO**	20	25
MEMOOLOO	ROLLESTON**	56	56
Mine spurs			
MACKENZIE	ENSHAM BALLOON	13	10
YAN YAN	GORDONSTONE BALLOON	13	11
GREGORY JUNCTION	GREGORY MINE	6	6
OAKY CREEK	GREGORY JUNCTION	14	13
OAKY CREEK	OAKY CREEK BALLOON	6	6

Table 23: Blackwater Diesel SRTs

Location From	Location to (and including)	Empty	Loaded
NCL			
CALLEMONDAH	MOUNT MILLER	11	11
MOUNT MILLER	YARWUN	4	5
YARWUN	ALDOGA	6	6
ALDOGA	MOUNT LARCOM	7	9
MOUNT LARCOM	AMBROSE	3	4
AMBROSE	EPALA	5	5
EPALA	RAGLAN	6	6
RAGLAN	MARMOR	10	9
MARMOR	BAJOOL	5	8
BAJOOL	ARCHER	8	8
ARCHER	MIDGEE	5	4
MIDGEE	ROCKLANDS	7	10
Blackwater trunk			
ROCKLANDS	GRACEMERE	8	6
GRACEMERE	KABRA	6	6
KABRA	STANWELL	9	9
STANWELL	WARREN	2	2
STANWELL POWERHOUSE	WARREN	5	3
WARREN	WYCARBAH	11	10
WYCARBAH	WESTWOOD	9	10
WESTWOOD	WINDAH	9	**19**[15]
WINDAH	GRANTLEIGH	10	9
GRANTLEIGH	TUNNEL	9	9
TUNNEL	EDUNGALBA	12	**20**[16]
EDUNGALBA	AROONA	8	11
AROONA	DUARINGA	7	7
DUARINGA	WALLAROO	11	12
WALLAROO	TRYPHINIA	11	12
TRYPHINIA	DINGO	11	11
DINGO	UMOLO	6	6
UMOLO	PARNABAL	6	6
PARNABAL	WALTON	4	4
WALTON	BLUFF	10	10
BLUFF	BOONAL BALLOON POINTS	8	11
BOONAL BALLOON POINTS	BOONAL BALLOON	2	4
BOONAL	BLACKWATER	8	12

[15] SRTs are taken from simulation data and are different to contracted SRTs.

[16] SRTs are taken from simulation data and are different to contracted SRTs.

Location From	Location to (and including)	Empty	Loaded
BLACKWATER	SAGITTARIUS	3	4
SAGITTARIUS	RANGAL	3	4
RANGAL	BURNGROVE	7	7
South Goonyella branch			
BURNGROVE	CREW	7	8
CREW	MACKENZIE	10	12
MACKENZIE	FAIRHILL	12	11
FAIRHILL	YAN YAN	11	14
YAN YAN	GREGORY JUNCTION	8	8
Koorilgah branch			
BLACKWATER	KOORILGAH	17	23
KOORILGAH	KOORILGAH BALLOON	10	1
Curragh branch			
SAGITTARIUS	WASHPOOL JUNCTION	9	7
WASHPOOL JUNCTION	WASHPOOL	4	3
WASHPOOL JUNCTION	CURRAGH	5	5
Rolleston branch			
RANGAL	TIKARDI	6	6
TIKARDI	BOORGOON	5	5
BOORGOON	BOORGOON BALLOON	4	1
BOORGOON	KINROLA JUNCTION	4	7
KINROLA JUNCTION	KINROLA BALLOON	6	4
KINROLA JUNCTION	SPRINGSURE CREEK JCT**	14	18
SPRINGSURE CREEK JCT	SPRINGSURE CREEK MINE**	10	10
SPRINGSURE CREEK JCT	KENMARE**	6	7
KENMARE	MEMOOLOO**	20	25
MEMOOLOO	ROLLESTON**	56	56
Mine spurs			
MACKENZIE	ENSHAM BALLOON	12	10
YAN YAN	GORDONSTONE BALLOON	13	12
GREGORY JUNCTION	GREGORY MINE	6	6
OAKY CREEK	GREGORY JUNCTION	14	14
OAKY CREEK	OAKY CREEK BALLOON	6	6

Table 24: Moura SRTs

Location From	Location To	Empty	Loaded
Moura trunk			
CALLEMONDAH	BYELLEE	6	5
BYELLEE	STOWE	13	12
STOWE	GRAHAM	4	7
GRAHAM	STIRRAT	8	7
STIRRAT	CLARKE	20	22

Location From	Location To	Empty	Loaded
CLARKE	FRY	9	10
FRY	MT. RAINBOW	17	22
MT. RAINBOW	DUMGREE	17	26
DUMGREE	BOUNDARY HILL JUNCTION	10	13
BOUNDARY HILL JUNCTION	ANNANDALE	2	1
ANNANDALE	EARLSFIELD	6	14
EARLSFIELD	BELLDEEN	21	22
BELLDEEN	MOURA MINE JUNCTION	21	40
EARLSFIELD	KOONKOOL	5	5
KOONKOOL	DAKENBA	23	20
BOUNDARY HILL JUNCTION	BOUNDARY HILL	5	3
DAKENBA	CALLIDE COALFIELDS	20	20
MOURA MINE JUNCTION	MOURA MINE	5	1
MOURA MINE JUNCTION	BARALABA COAL PAD	5	5
Gladstone surrounds			
COMALCO BALLOON LOOP	COMALCO BALLOON JUNCTION	4	4
COMALCO BALLOON JUNCTION	MT. MILLER	5	3
MT. MILLER	CALLEMONDAH	3	7
PARANA	SOUTH GLADSTONE	8	2
SOUTH GLADSTONE	PARANA	6	2
PARANA	CALLEMONDAH	9	10
BARNEY POINT	SOUTH GLADSTONE	6	8
GLADSTONE QAL SDG	SOUTH GLADSTONE	10	10
GOLDING	GLADSTONE POWERHOUSE JUNCTION	4	8
GLADSTONE POWERHOUSE JCT	CALLEMONDAH	10	6

9 Appendix 2: Aurizon Operations Coal Train Operating Parameters

9.1 Cycle descriptions

9.2 Haul Details

10 Appendix 3: BMA Rail Coal Train Operating Parameters

10.1 Cycle descriptions

10.2 Haul Details

11 Appendix 4: Pacific National Coal Train Operating Parameters

11.1 Cycle descriptions

11.2 Haul Details

12 Appendix 5: Independent Operating Parameters

12.1 Cycle descriptions

The cycle operated for each haul is based on the predominant cycle of each operator in the system.

12.2 Demand