System Operating Parameters | Public Release 2016

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. To the maximum extent permitted by law, Aurizon Network and its directors, employees, affiliates or agents do not accept and expressly exclude any liability, including, without limitation, any liability arising out of negligence, for any loss arising from the use of this document or any information contained in it.

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

Table of Contents

1 Introduction 4

2 Network Configuration 11

3 Maintenance Scope 23

4 Network Planning 28

5 Network Scheduling 37

6 Network Operation 39

7 Information 42

8 Appendix 1: Sectional Run Times 51

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.

1.2 Context

The SOP and Baseline 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.

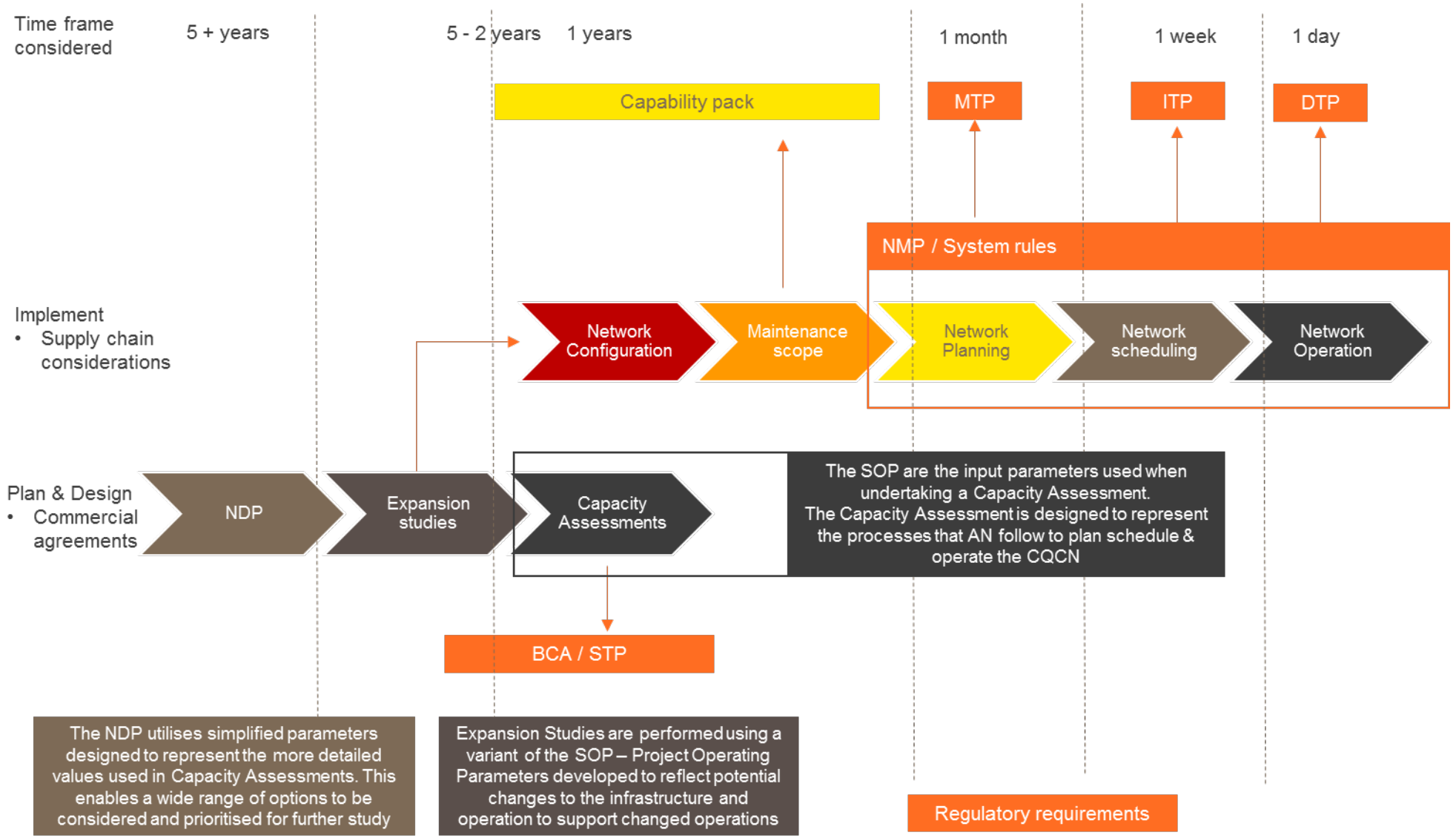


Figure 1: Capacity Assessments and reports

1.3 Regulatory context

1.3.1 Capacity Assessment

Clause 7A4.1(a)(i) of the Undertaking requires Aurizon Network to complete a capacity analysis to determine the Baseline Capacity of the Rail Infrastructure, comprised in each of the Coal Systems it manages. Coal Systems are defined within the Undertaking as each of the CQCN systems (Newlands, Goonyella, Blackwater, Moura, Goonyella to Abbot Point), each of which is defined as comprising Rail Infrastructure.

To support the BCAR, and to provide transparency to stakeholders, Aurizon Network must also develop and publish System Operating Parameters under clause 7A.5(j) of the Undertaking.

Aurizon Network has, when developing the System Operating Parameters, in line with clause 7A.5(b)(iii), sought to be consistent with the assumptions affecting the Baseline Capacity Assessment. This approach requires that in conducting its capacity analysis Aurizon Network must include:

"(iii) consideration of the following factors:

(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…"

(clause 7A.4.1(b)(iii)).

Consistent with the Undertaking Aurizon Network has developed its System Operating Parameters to align with it contractual commitments to its access holders. These contractual parameters provide an objective basis for the development of the SOPs, as each of Aurizon Network and its access holders are committed to these metrics.

The key interface metrics recorded in Access Agreements, and which are used in the generation of the System Operating Parameters include:

- number of Train Service Entitlements (TSEs) required;
- mode of operation (even railings);
- the time taken for trains to traverse sections of the network (Section Run Times or "SRTs");
- the time at interface locations (load and unload times); and
- how rail operators will operate on the network – supported by Operating Plans.

1.3.2 Stakeholder consultation

These documents have been developed following consultation with stakeholders, as required by clause 7A.4.1 (b)(i) and (ii) of the Access Undertaking. This consultation provided Aurizon Network with valuable feedback and enabled Aurizon Network to improve the quality of the BCAR through clearer explanation and presentation of the report. It has also assisted Aurizon Network to provide our stakeholders with a better understanding of Aurizon Network's capacity modelling processes.

The consultation process identified that stakeholders are keen to see an analysis which:

- provides a view of supply chain capacity, as well as Rail Infrastructure capacity; and
- is based on performance of individual supply chain elements, rather than Aurizon Network's contracted performance parameters.

1.3.3 System Capacity Assessment

Accordingly, in the context of its recently concluded collaboration with stakeholders related to the UT5 review process, Aurizon Network has volunteered to include within UT5 an obligation for Aurizon Network to provide, for information purposes, an annual System Capacity Assessment for each coal system which will focus on supply chain performance. This process will occur separately from the Baseline Capacity Assessment and the annual Capacity Assessment which focus on Rail Infrastructure capacity. More information in relation to the System Capacity Process, which has been agreed with stakeholders, can be found in Aurizon Network's submission to the QCA dated 17 March 2017 relating to collaboration with stakeholders in the UT5 process.

To achieve a robust assessment, significant data and cooperation will be required from all elements of the supply chain. Aurizon Network will shortly commence engagement with all supply chain participants with a view to ensuring it is well positioned to deliver this review. Subject to availability of suitable data, Aurizon Network's intention is to develop an initial view of system capacity as early as September 2017.

1.4 Capacity Assessment

UT4 requires Capacity Assessments to provide several measures of capacity, the relationship and method of calculation is summarised below in Figure 2.

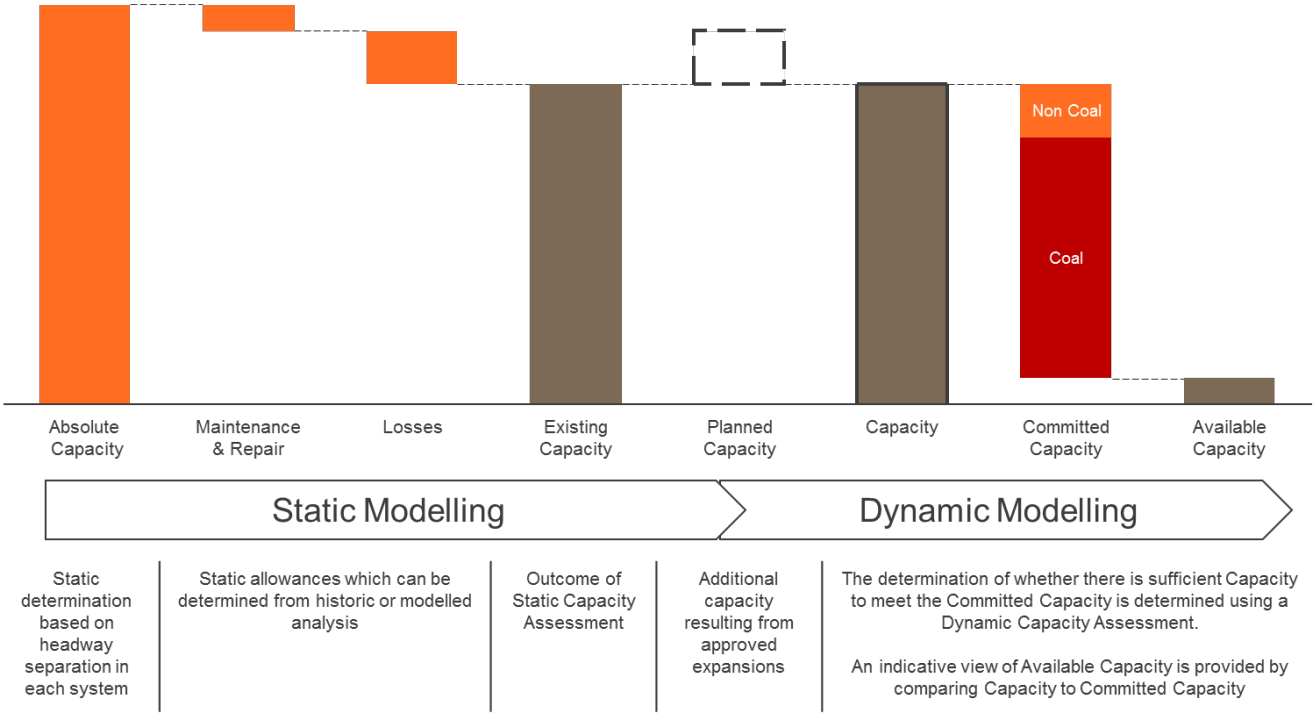


Figure 2: Waterfall schematic of the several measures of capacity and their relationships as considered in a Capacity Assessment.

The components applied to convert Absolute Capacity to Existing Capacity are

- **Maintenance & Repair**

  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;

- **Losses**

  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. For clarity this includes constraints on the ability to schedule trains between depots, mines and ports due to

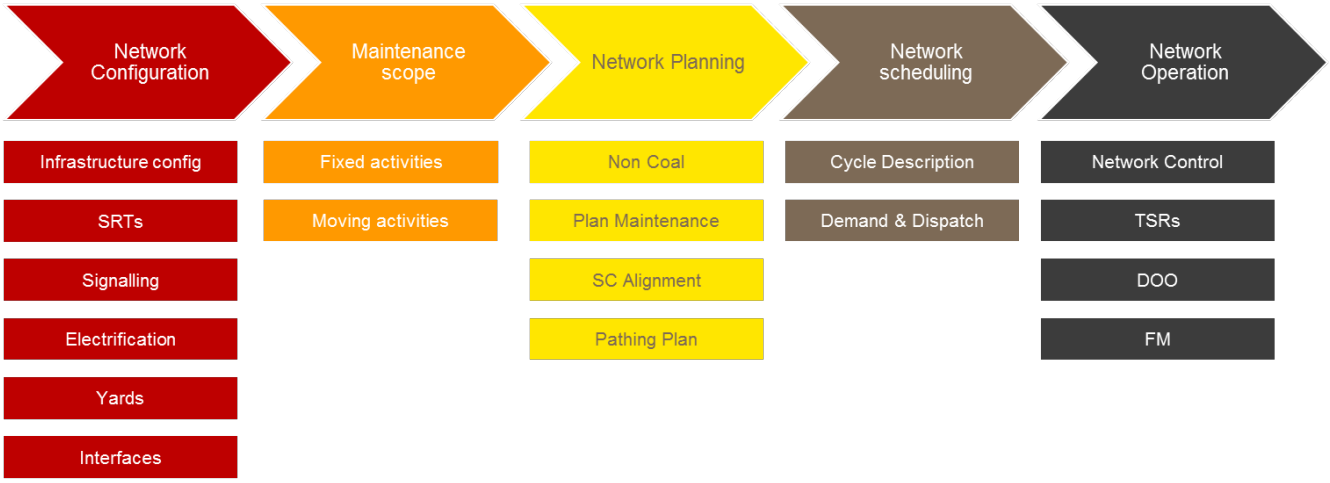
  - Other traffic at the interfaces (mines & ports)
  - Availability of rolling stock
  - Other traffic operating on the network

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.

1.4.1 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.

1.5 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.

1.5.1 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

1.5.2 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 (section 6.3) 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 GAPE 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

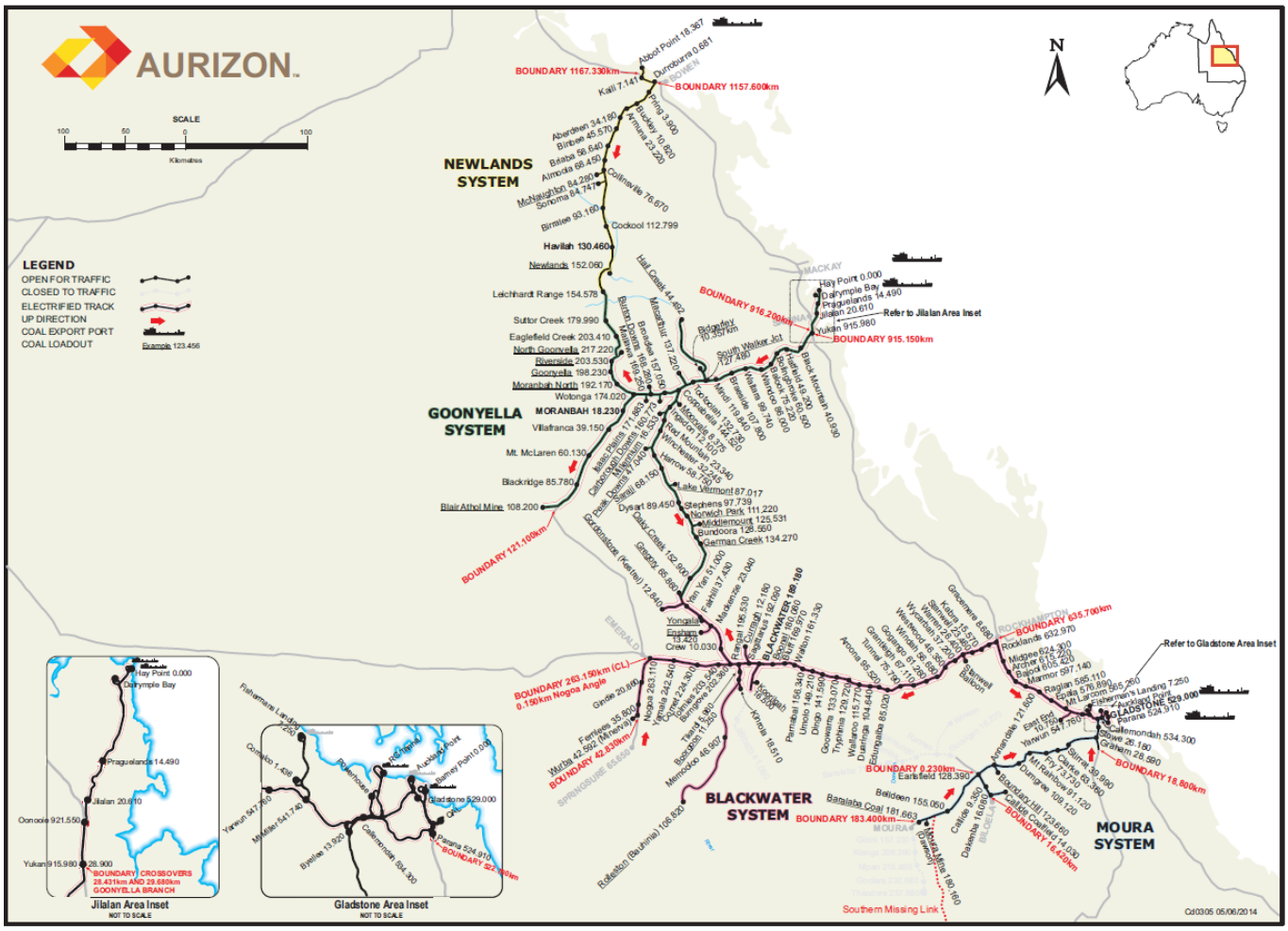


Figure 3: CQCN summary overview

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 (min)	Stop Allowance (min)
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. Full RCS installation has been deferred while system demand is lower than contract. As this infrastructure will be in place prior to full contracted capacity being reached, the assessment assumes RCS to be installed across the entire Newlands System. This provides a better measure of whether full contract can be delivered.

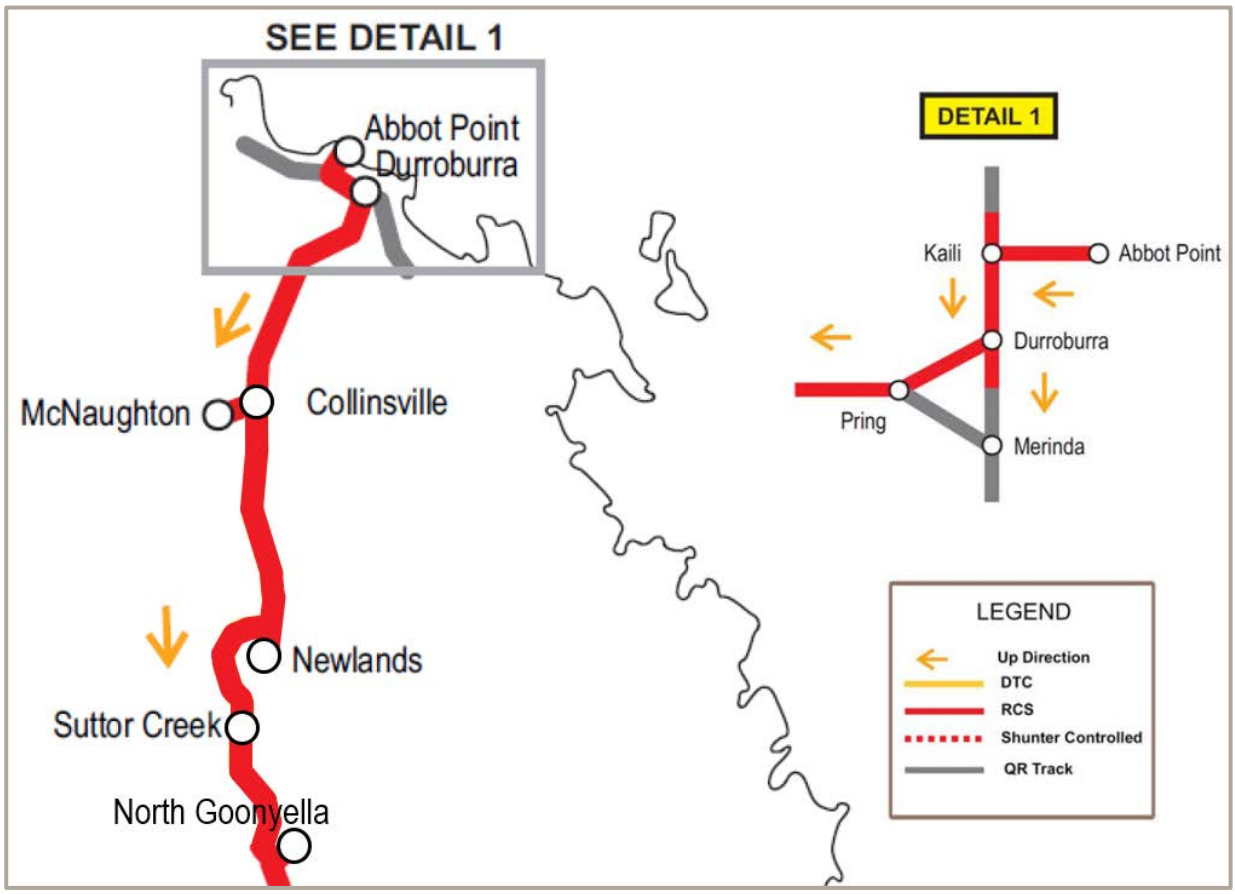


Figure 4: Newlands system and NML train control map

2.3.2 Goonyella system

The Goonyella system has RCS throughout.

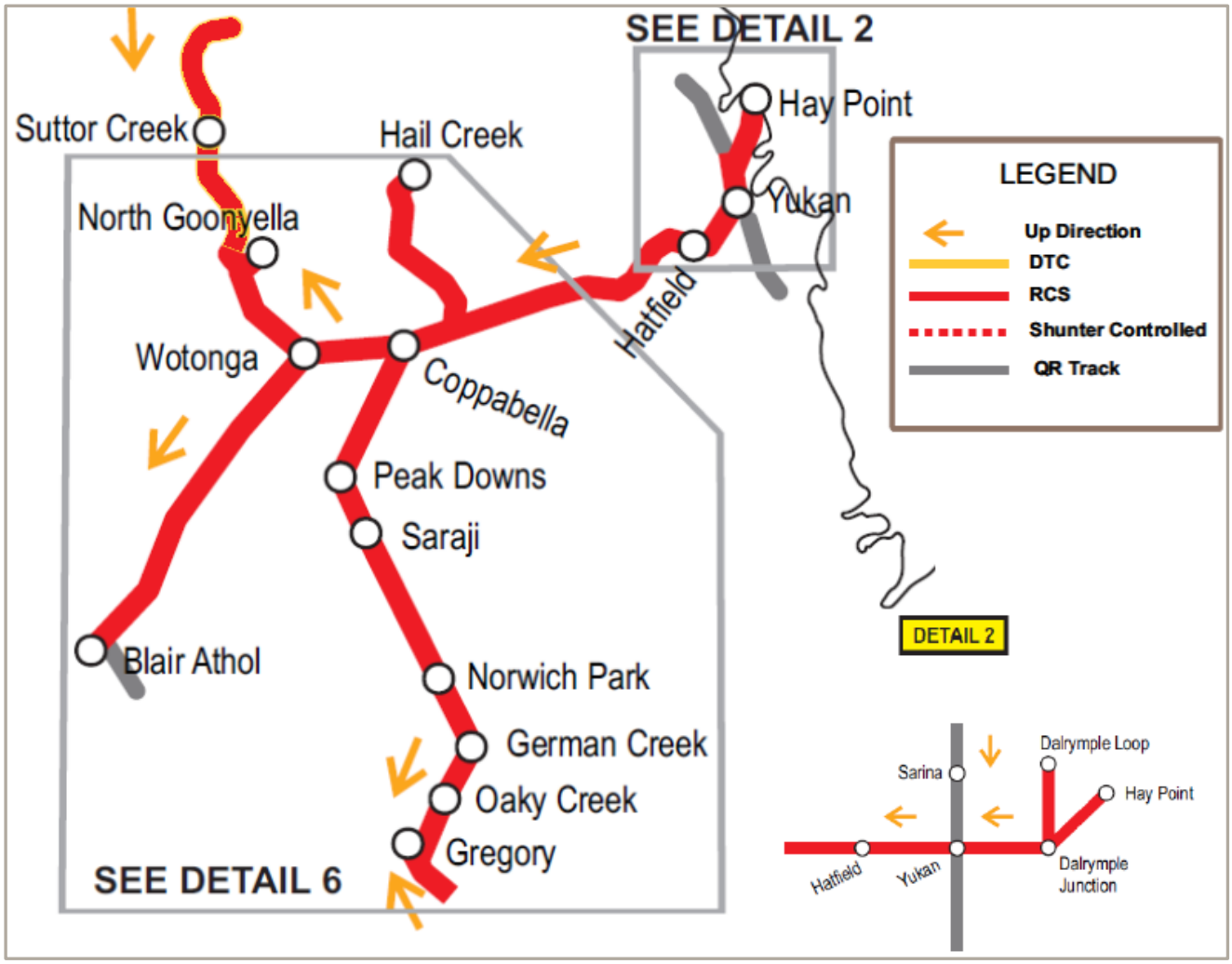


Figure 5: Goonyella system train control map.

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.

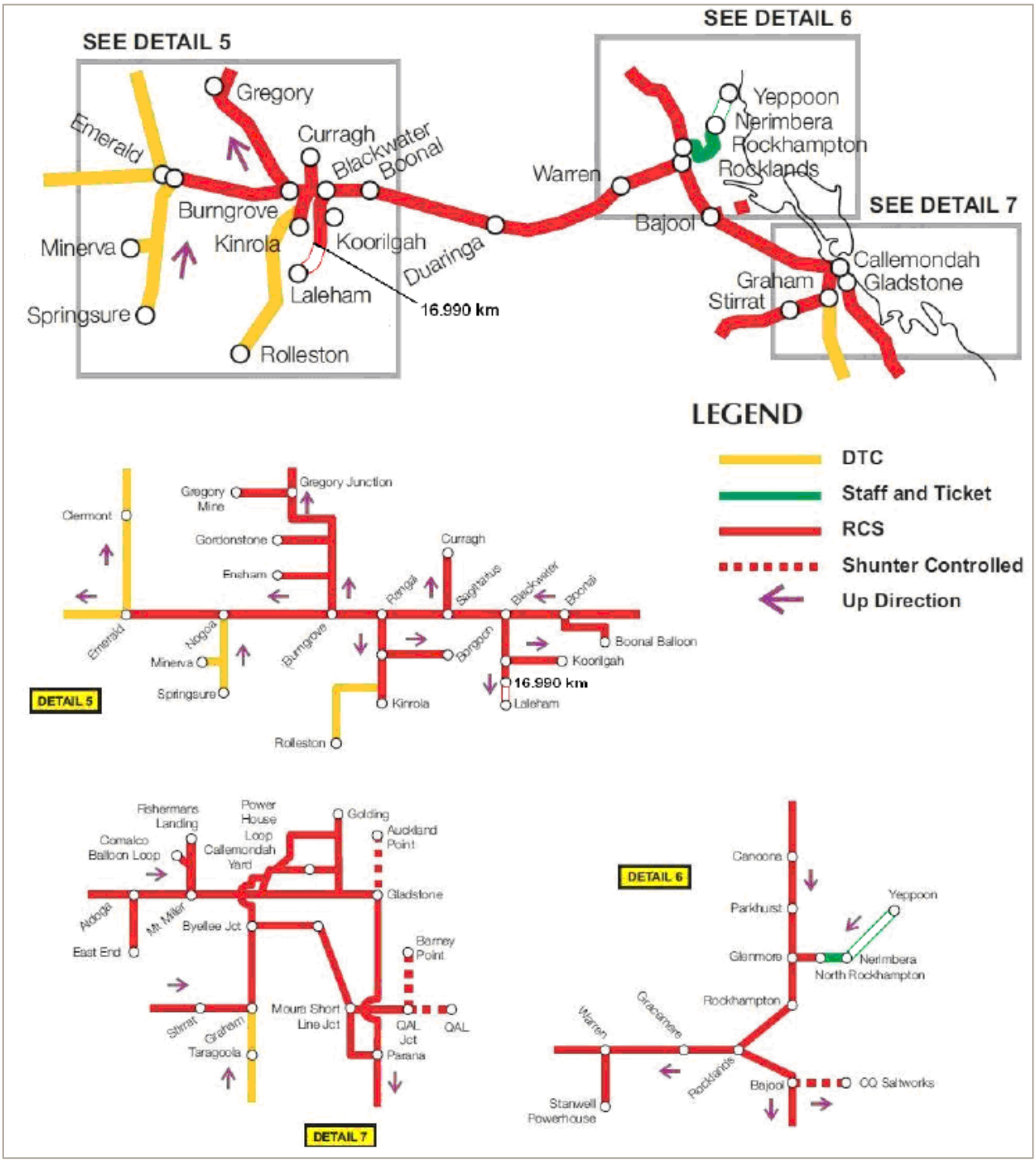


Figure 6: Blackwater system train control map

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.

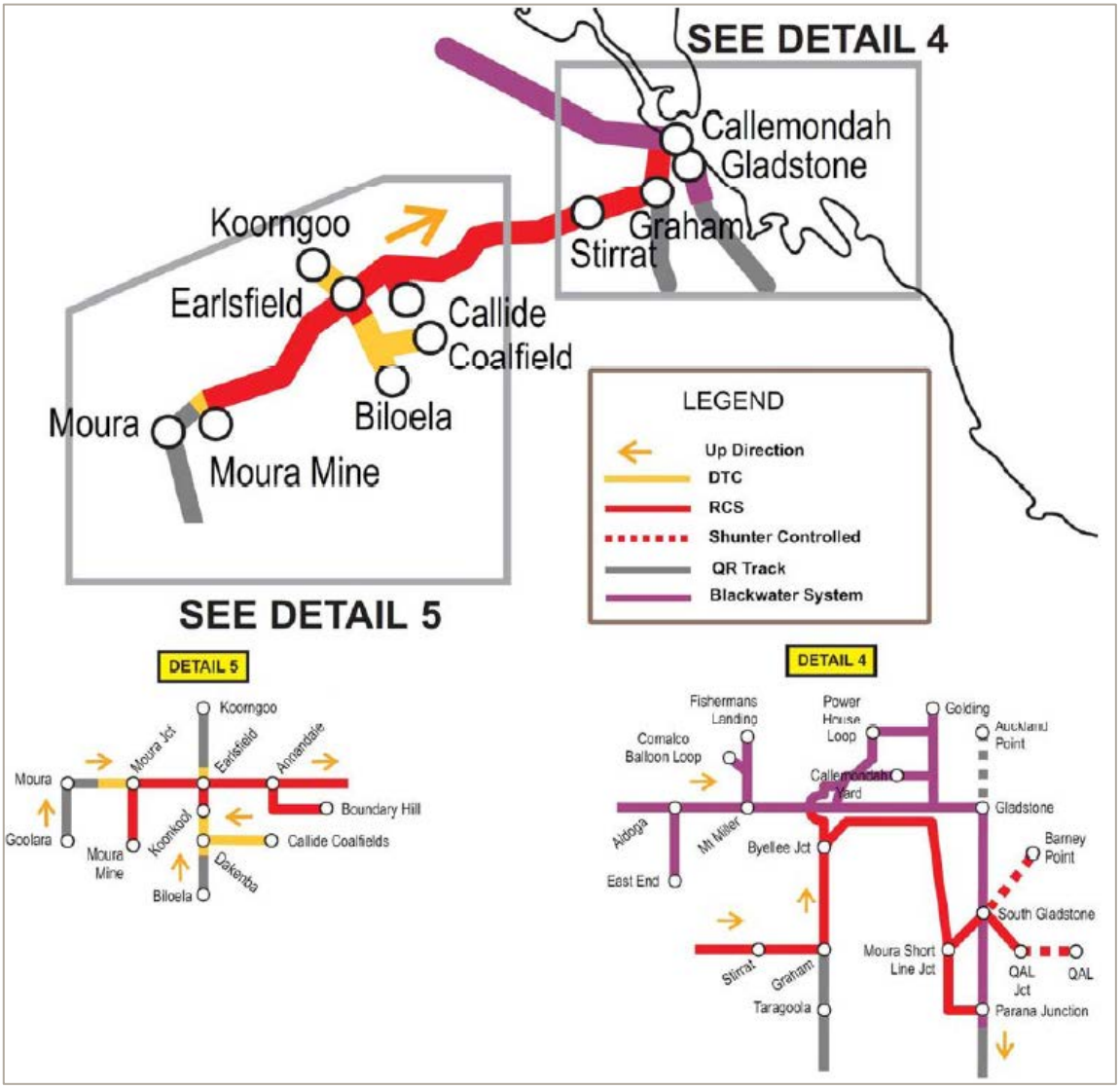


Figure 7: Moura system train control map

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)

Explanatory notes

Application of RCS in the CA incurs a total time impact of 0 minutes. The following points explain this in more detail:

- Provision of authority and movement of points occur in advance of train movements and are not required to occur in sequence of train movements
- Movement of trains do not incur additional time. These are captured in the start/stop times added to section run times
- Release of section automatically occurs and is detected via track circuits or axle counters

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 (or multiple blocks) 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.

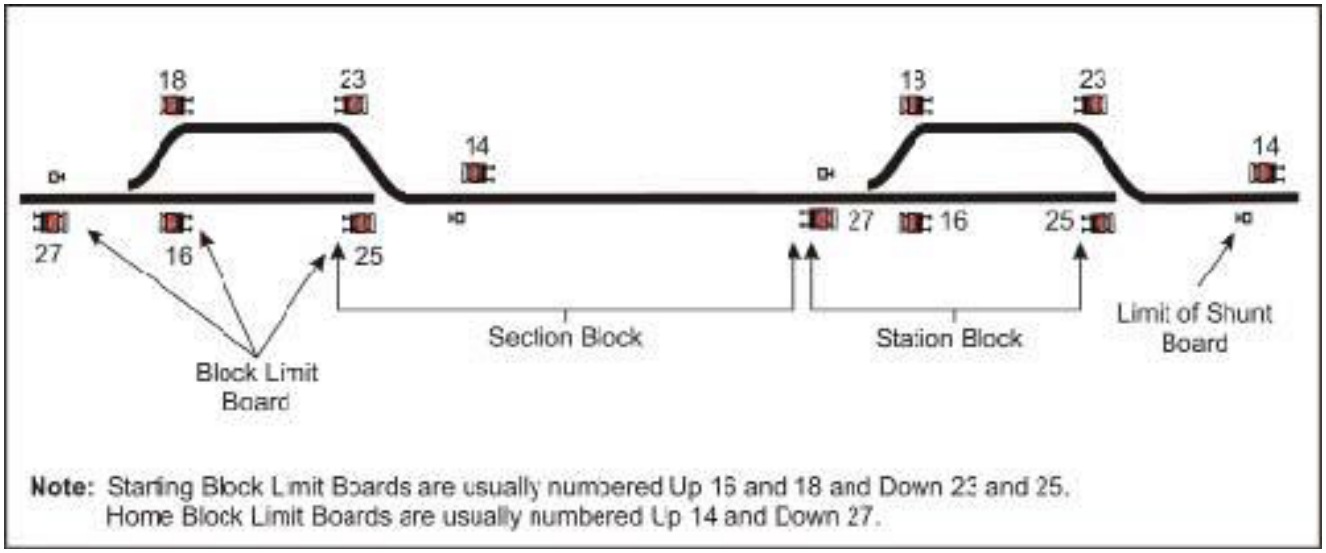


Figure 8: DTC Blocks and Position of Block Limit Boards

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

Explanatory notes:

Application of DTC in the CA incurs a total time of 6 minutes. This corresponds to the minimum margin considered between occupancies of a section of track. For example, when crossing occurs at a passing loop controlled by DTC, the time impact for release and provision of the authority is considered in the duration a train must dwell after an opposing train has cleared the section.

If the section is unoccupied then the Provision of authority applies only and may be issued in advance. This can be applied over multiple DTC blocks if the route is clear.

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

Explanatory Notes
Application of DTC-MLPI in the CA incurs a total time of 12 minutes. This applies as per the explanatory notes in section 2.3.6. However, additional time is considered for the Movement of points.

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

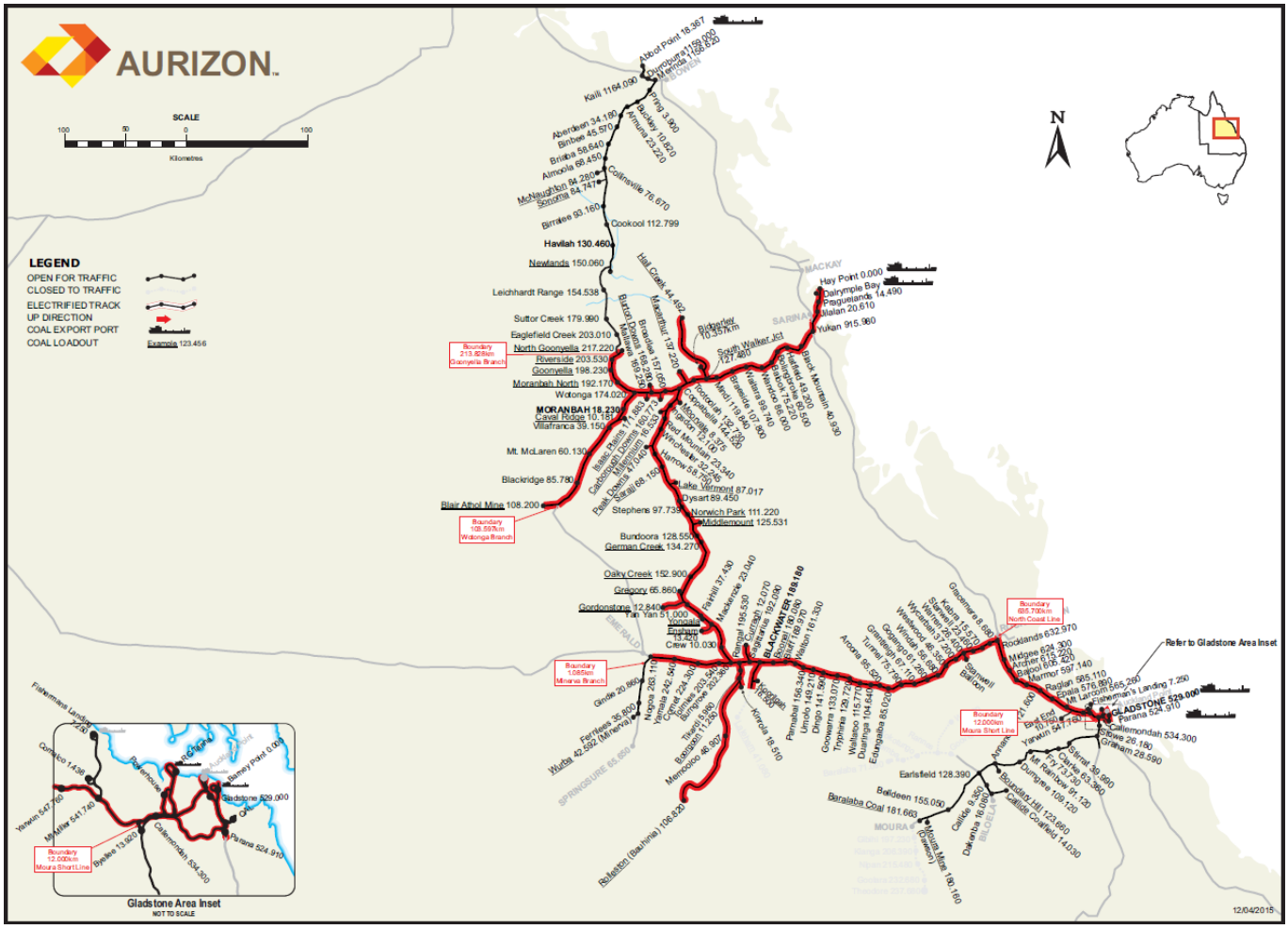


Figure 9: Electrification of CQCN.

2.5 Yards

Yard activities that occur on Network infrastructure by Above Rail Operators are performed in accordance with their operating plans. These activities as applied to the Capacity Assessment are described in the appropriate operator appendix.

Non Network yards are included in the capacity model and assumed to provide sufficient capacity for the Above Rail operators activities and not impact Network capacity.

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

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.
- Availability of mine or port infrastructure is assumed to align with rail network capacity

3 Maintenance Scope

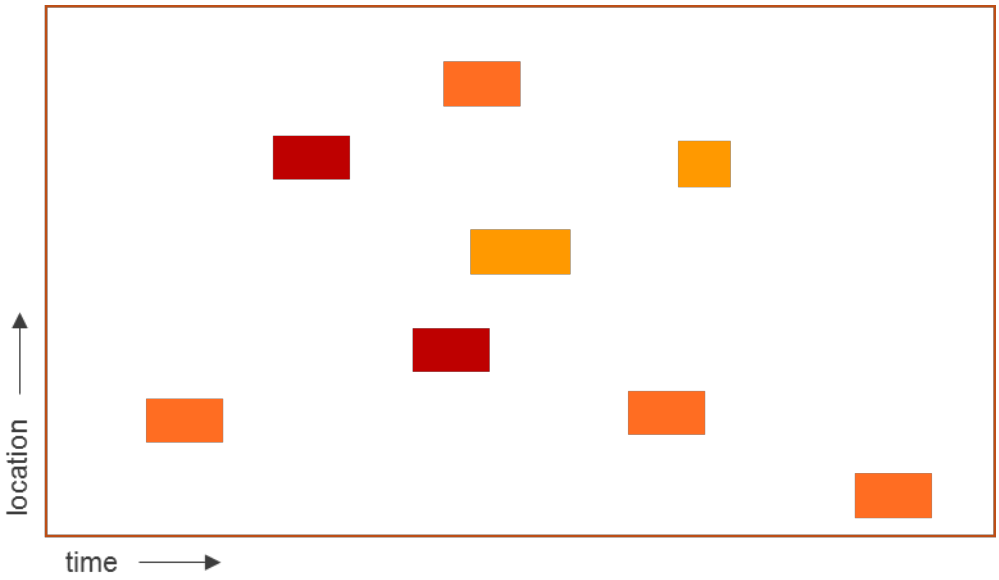
This section of the SOP describes how the scope for maintenance and renewal activities is generated.

3.1 Fixed activities: Maintenance, Renewals and Construction

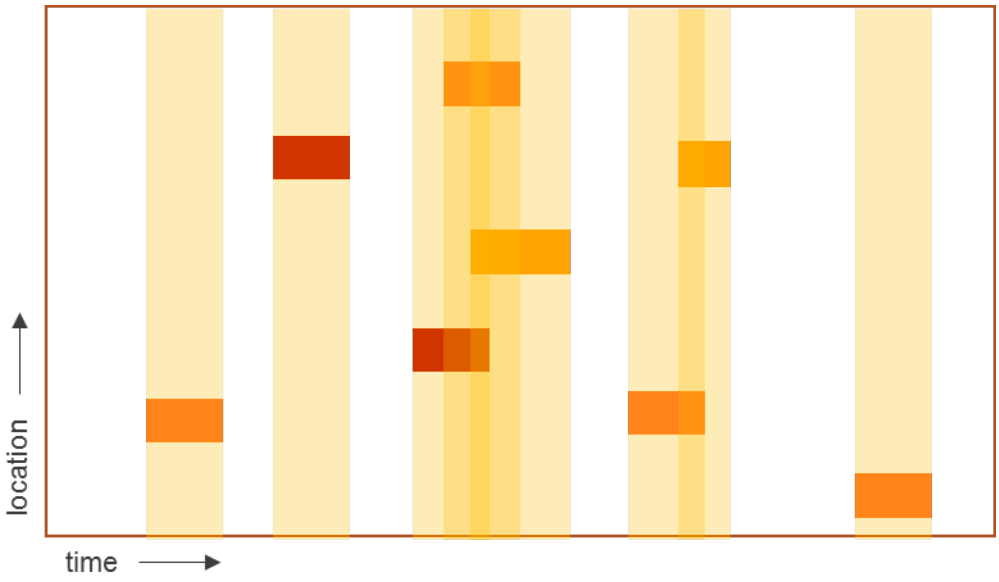
3.1.1 PACE approach

Aurizon Network have implemented a new maintenance planning tool PACE. The objective of PACE is to generate Maintenance Access Windows which are then populated with a Virtual Possession Plan (VPP). The VPP is then assessed to demonstrate that Aurizon Networks capacity requirements can be met whilst undertaking the scope of works to maintain and renew the rail infrastructure.

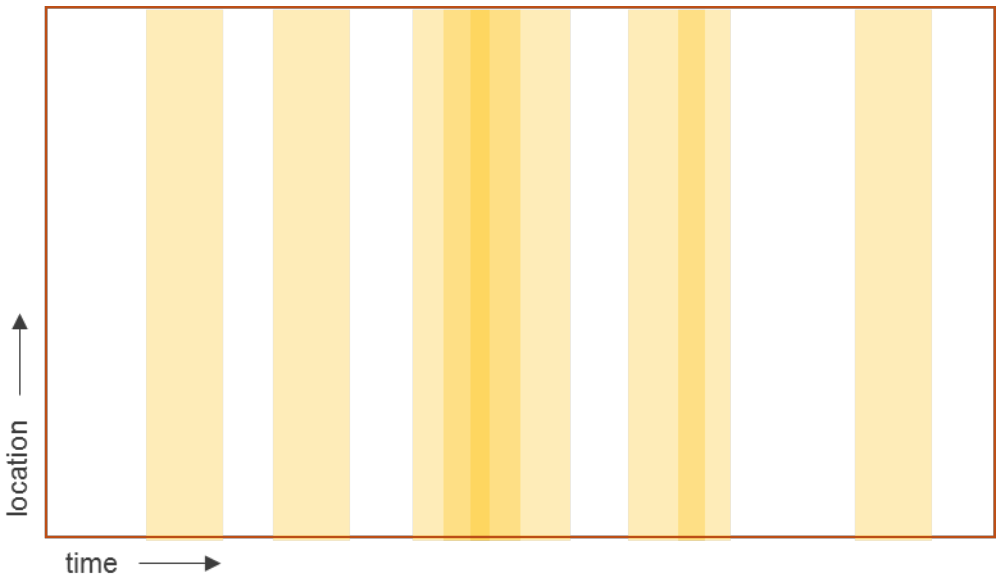
The PACE tool develops a maintenance scope of work using a nominated demand scenario and known planned work programs.



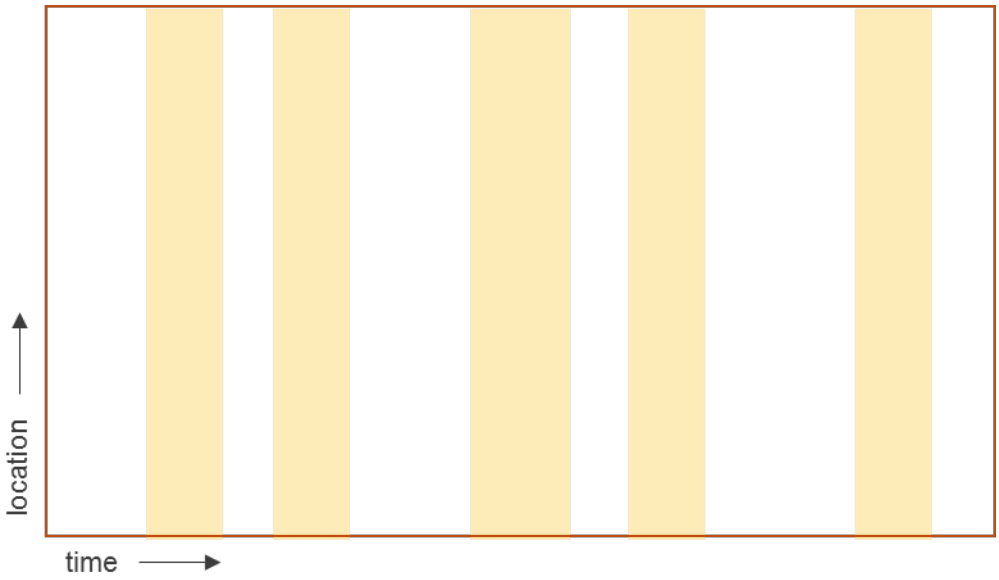
Based on these inputs Maintenance Access Windows (MAWs) are developed which offer sufficient access to the network to perform the required maintenance tasks.



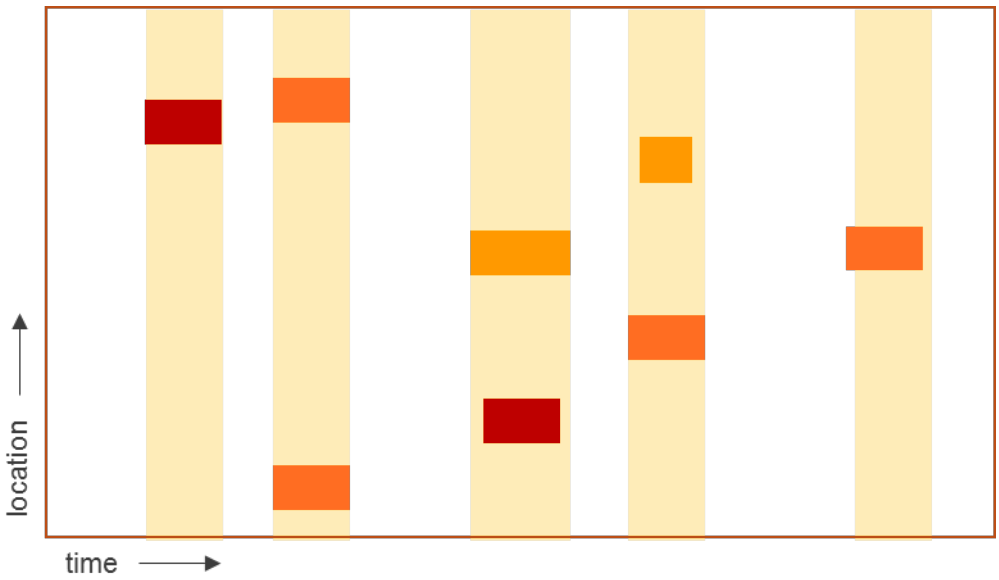
The planned work programmes are removed



The MAWs are aligned to minimise the capacity impact



PACE generates a series of possessions (VPP) 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.

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 5

Table 5: 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 6.

Table 6: 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 7: 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 8: 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 9: 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 10: 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

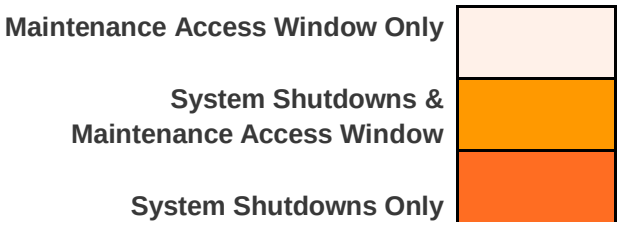
Seasonal traffic such as grain or sugar is not included in the MaTP.

[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



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

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 11: 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 12: 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 and coal is assumed to be available at the mine.

[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 13 below.

Table 13: 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
West of Bluff	Headway separation	Headway separation
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**

[1] Empty coal traffic travels in the Down direction

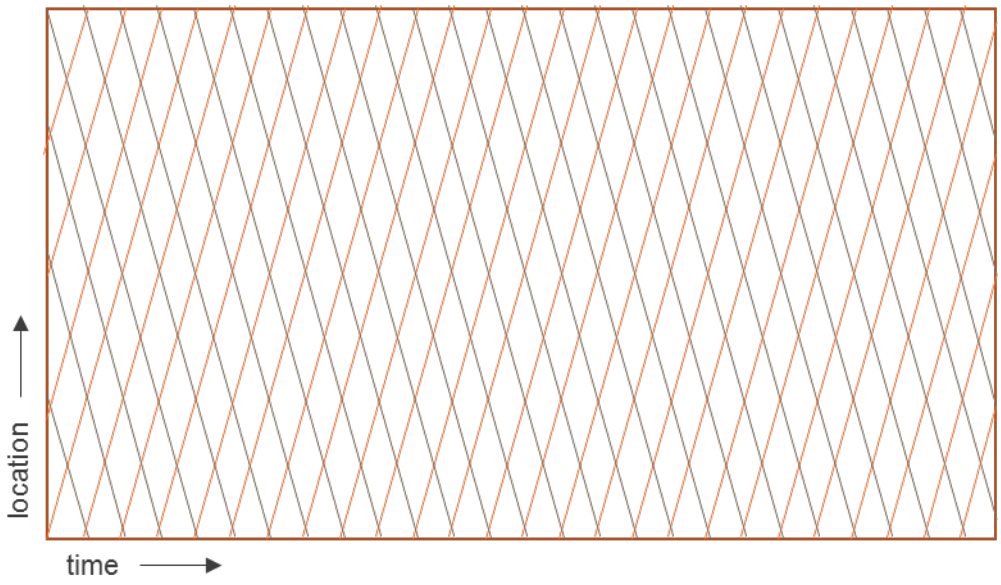
[2] Empty coal traffic travels in the Down direction

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)

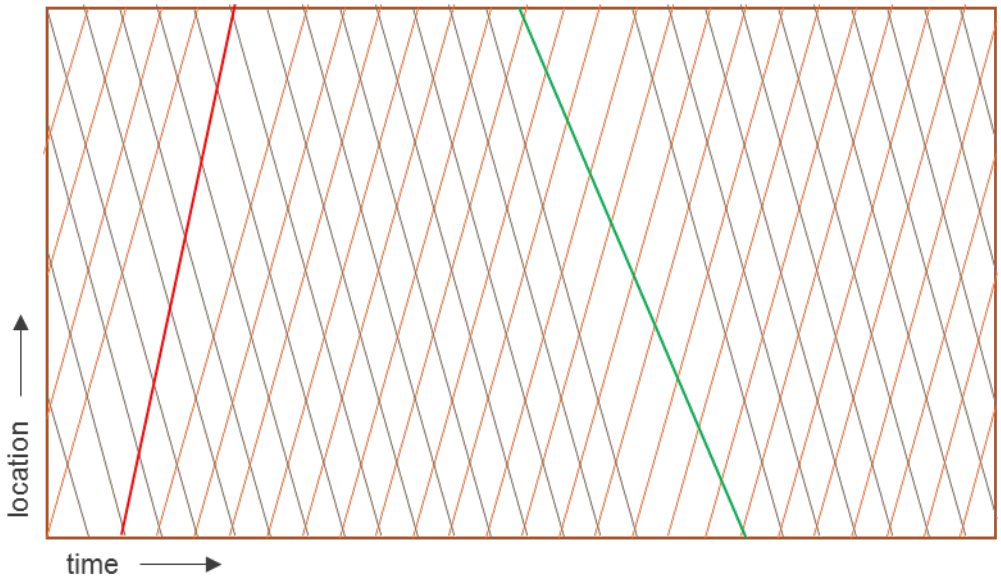
4.4.2 Pathing Plan

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)

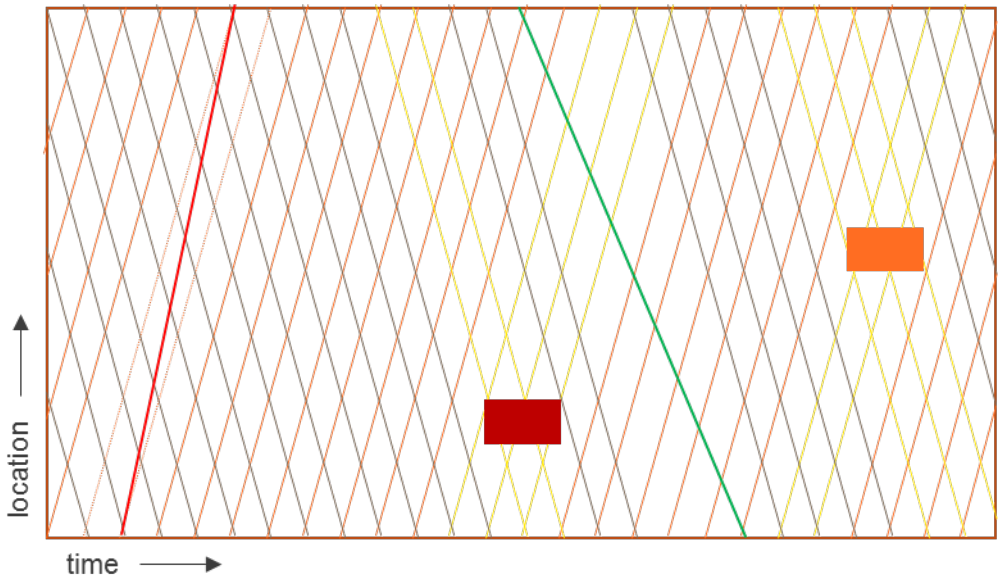


Planned trains, either MaTP or maintenance / inspection trains (depicted in red and green) are overlaid and conflicting paths are removed



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 as a % of the theoretical capacity. 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). Information relating to shutdowns and possessions provide an illustrative representation of the duration of the activity

4.5.1 Newlands

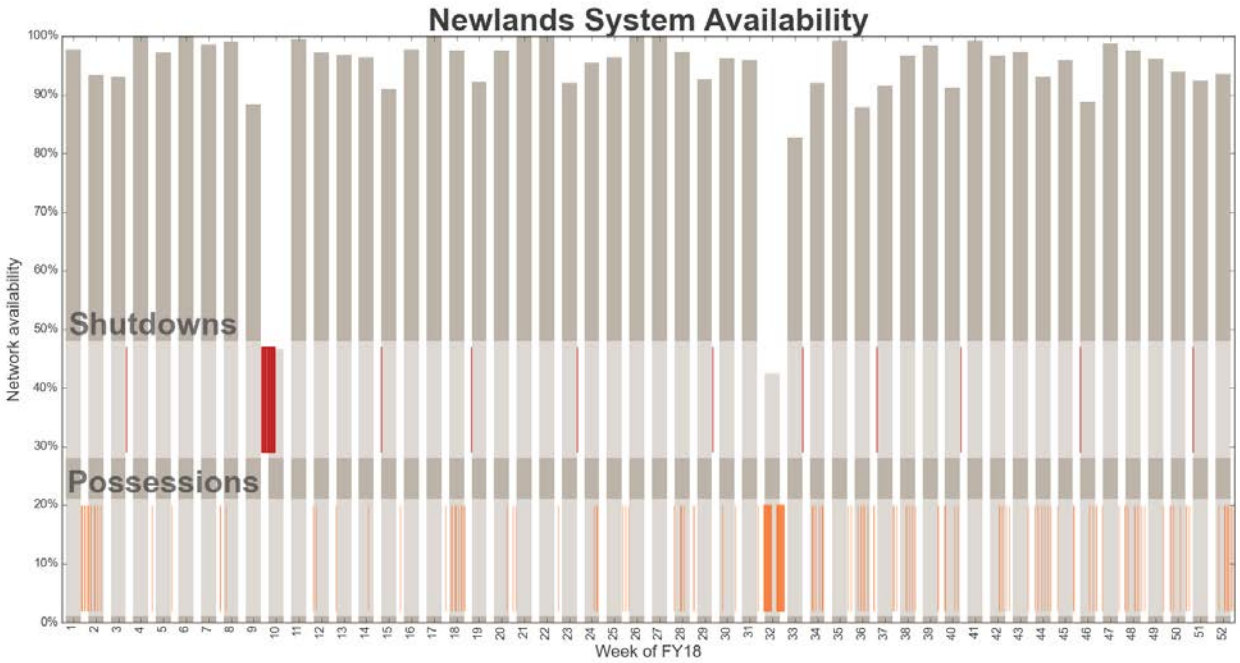


Figure 10: Newlands system weekly modelled availability

4.5.2 Goonyella

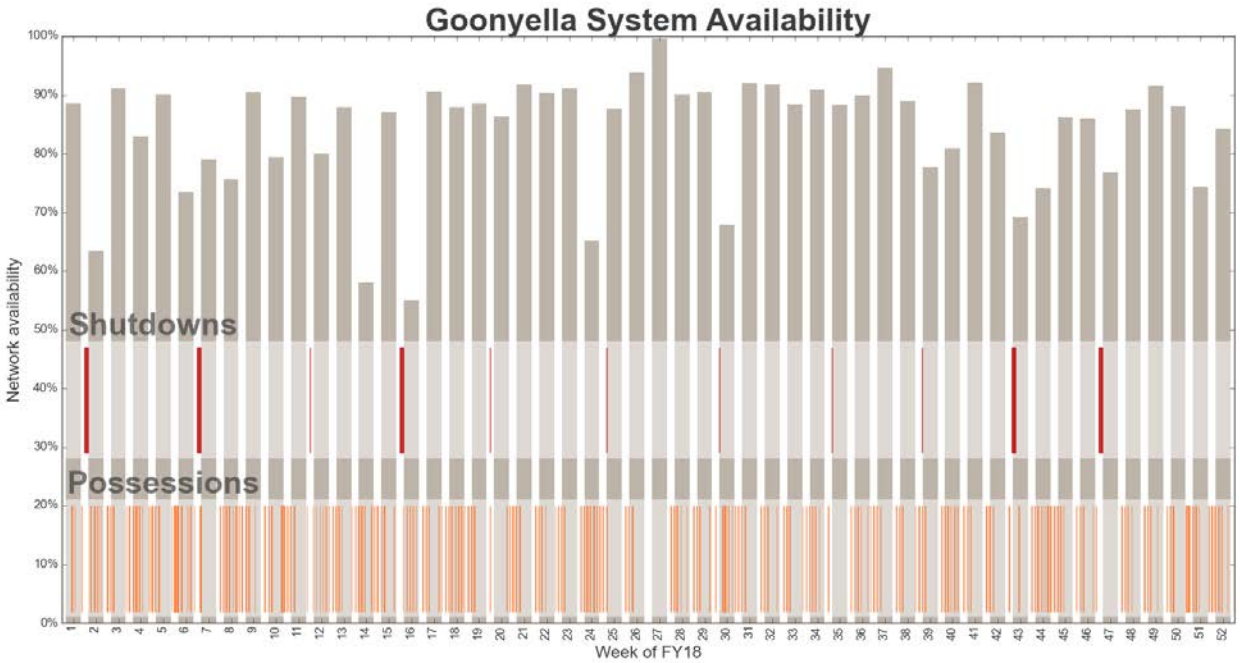


Figure 11: Goonyella system weekly modelled availability

4.5.3 Blackwater

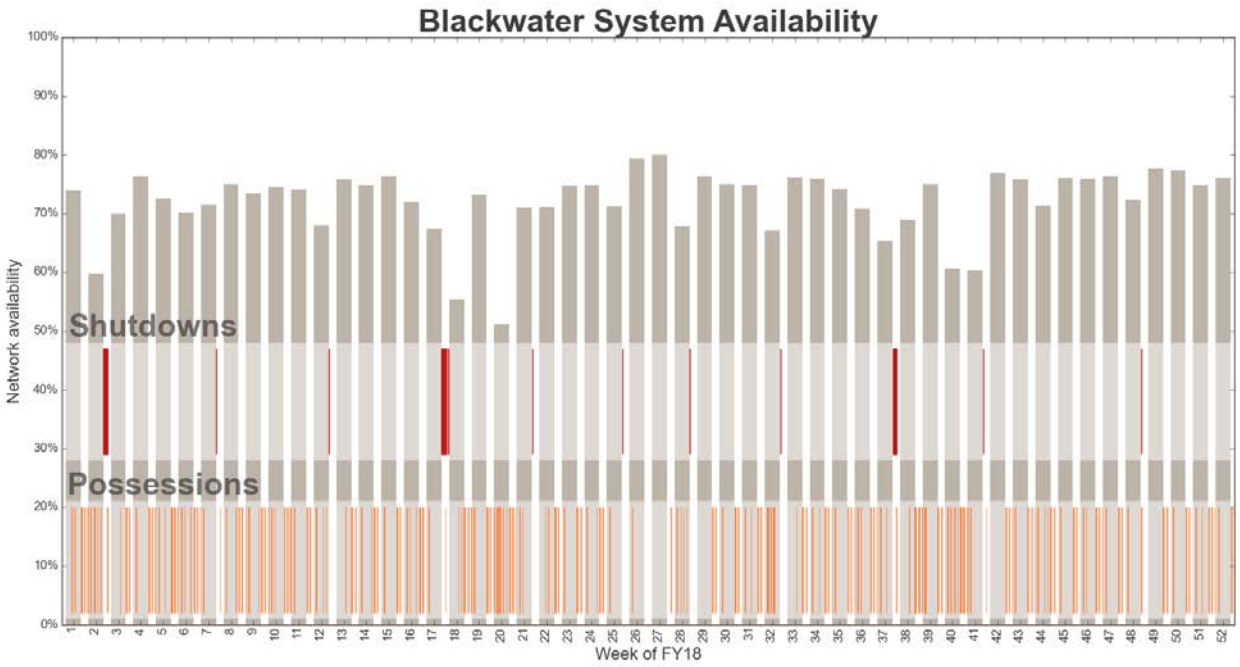


Figure 12: Blackwater system weekly modelled availability

4.5.4 Moura

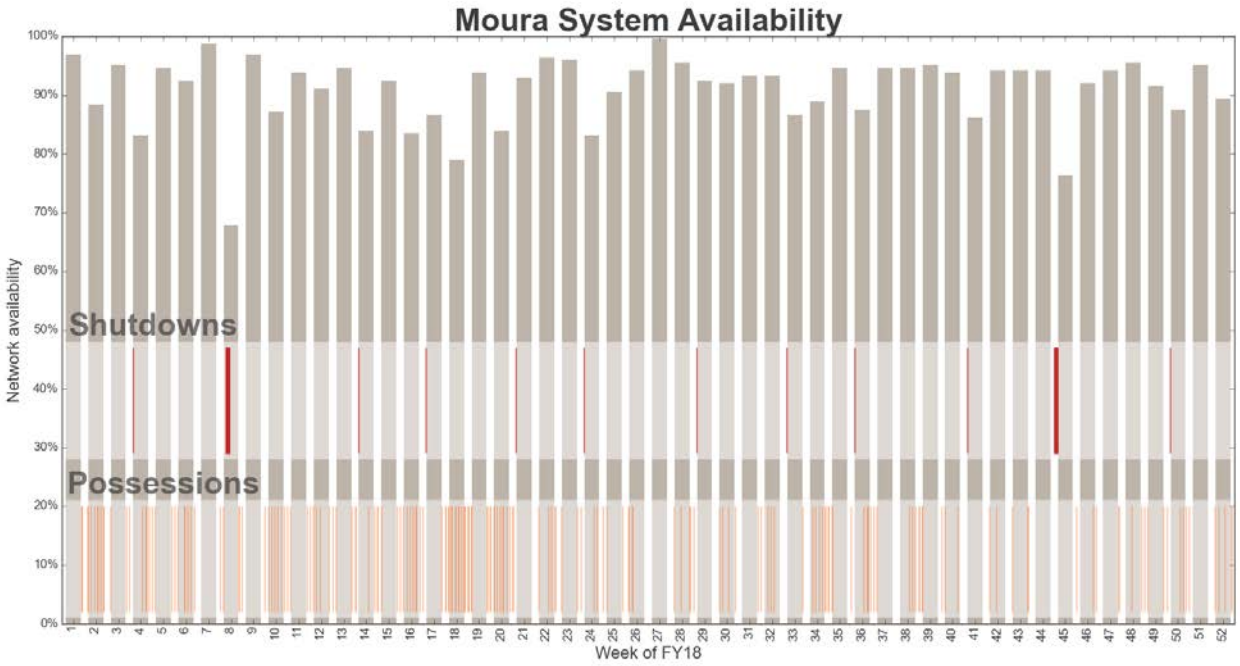


Figure 13: Moura system weekly modelled availability

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.

5.3 Train Operation

5.3.1 Fleet Size

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. This is primarily because the fleet sizes each operator may have in each system may not match that required to meet the demand scenario considered in the Capacity Assessment

5.3.2 Payloads

Because Aurizon Network provides capacity in terms of TSEs (rather than tonnes), any increase in payload beyond contract assumptions, will not have any impact on network capacity, unless that increase in payload results in consumption of an additional path or changes the interface parameters. The Capacity Assessment is therefore performed to understand if the number of Train Service Entitlements (TSEs) can be achieved.

While contract payloads assumptions are used to convert TSEs to a nominal tonne figure for the purposes of the Baseline Capacity Assessment, this information is provided within the Baseline Capacity Assessment for illustrative purposes only as the real assessment is completed on a TSE basis.

Aurizon Network notes that differences between contract payload assumptions and actual payloads delivered per TSE has arisen partly due to the fact that adjusting TSEs to reflect higher payloads may trigger relinquishments fees under the current regulatory framework. Aurizon Network, stakeholders and the QCA are currently working through this issue separately as part of the UT5 process.

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 origin, 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.

  The model continuously re-evaluates to dispatch a train service. This method will see that trains depart their respective service origin 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.

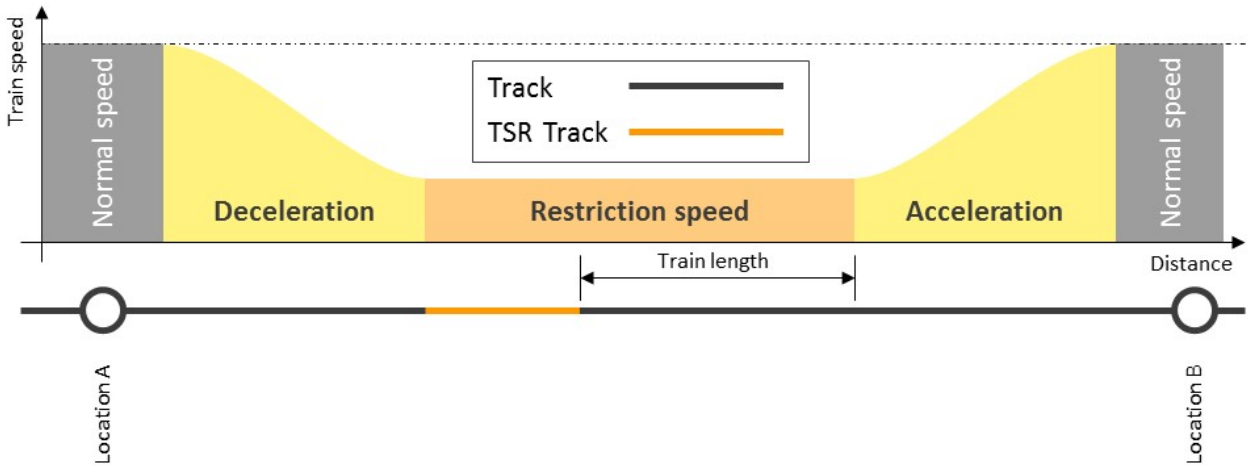


Figure 14: Assumed impact to train speed used to calculate TSR impact to SRT

- **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 14 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 14: Number of speed restrictions applied over the FY18 period

Month	Goonyella	Newlands/GAPE	Blackwater	Moura
July 2017	15	7	31	1
August 2017	27	4	21	2
September 2017	23	2	26	4
October 2017	18	6	29	2
November 2017	25	2	23	1
December 2017	34	9	13	4
January 2018	21	2	18	7
February 2018	36	5	53	3
March 2018	28	3	33	4
April 2018	27	2	36	2
May 2018	23	6	43	2
June 2018	13	2	14	

As part of Aurizons ongoing development of the Capacity Assessment a more detailed representation of DOO losses is being developed. As this will incorporate part of the impact of speed restrictions we have not updated the historical data from the Jul7 2012 to May 2015 period.

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 (excludes those declared as Force Majeure)
- 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 the origin.

The 2017 SOP will supersede this approach by implementing discrete events based on a review of historical data.

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 15: 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

The agreed TSEs are included in the Access Agreement.

7.2 Measurement of capacity

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 0

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 16: 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	The SOP contains this information
	(A) sets out Aurizon Network's assumptions affecting Capacity and relied upon for the Baseline Capacity Assessment, including:	The body of the document contains this information
	(1) operational, maintenance, construction and planning assumptions in each Coal System;	Section 4.6
	(2) Possession Protocols;	Section 7.1
	(3) Aurizon Network's methodology for calculating Train Service Entitlements in each Coal System;	Used in the generation of the CA methodology and parameters
	(4) Network Management Principles, System Operating Parameters and System Rules, if applicable, for each Coal System; and	Section 7.3
	(5) all capacity, operational and planning definitions relied on for the development of the Baseline Capacity Assessment; and	
Schedule G (Strategic Train Plan Principles)	(b) In preparing an STP, Aurizon Network will consider:	
	(i) only the Train Paths that are System Paths;	As the STP contains trains from mine to port then the train paths are system paths
	(ii) the known and reasonably anticipated:	
	(A) track maintenance requirements; and	Section 4
	(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.	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 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 17: 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 18: 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 19: 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 20: 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 21: 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