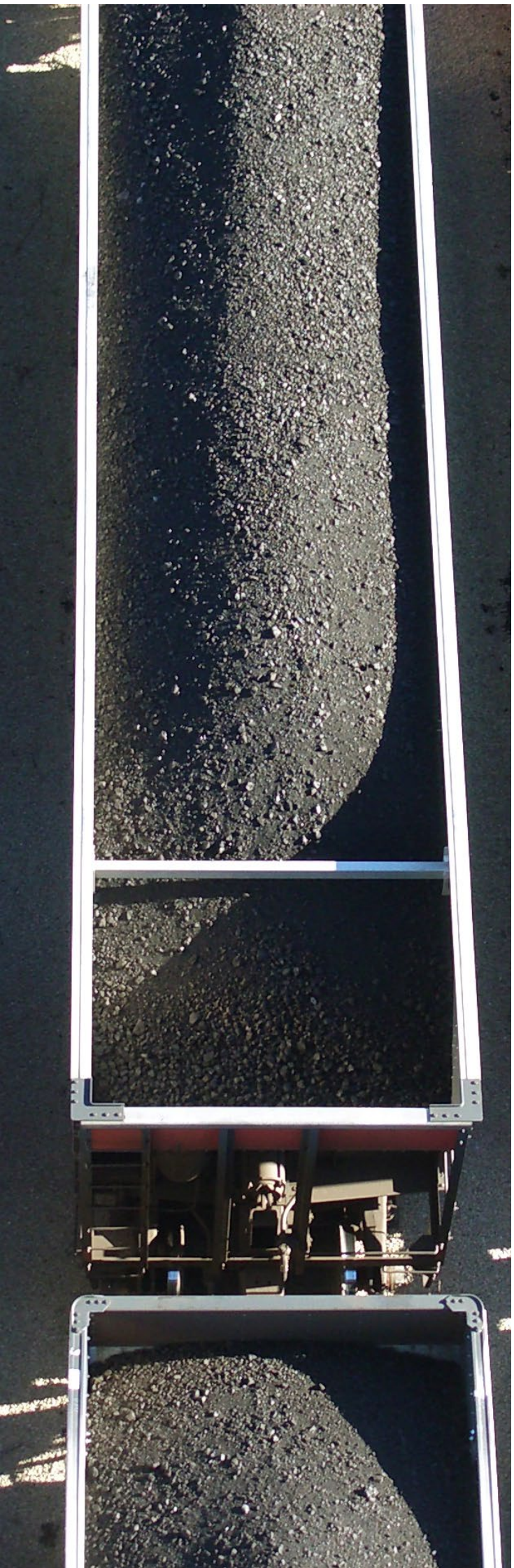

CENTRAL QLD COAL NETWORK

Initial Capacity Assessment Report

Redacted version

Date: 27 October 2021
Version: 2021 ICAR

COAL NETWORK CAPACITY CO.

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Contents

1. Abbreviations & Definitions

The following abbreviations are used throughout this document:

Abbreviation	Meaning
AN	Aurizon Network
CQCN	Central Queensland CoalNetwork
DBCT	Dalrymple Bay Coal Terminal
DNC	Deliverable Network Capacity
DSM	CQCN Dynamic Simulation Model
ECD	Existing Capacity Deficit
FSS	Full System Shut
FY	Financial Year
GAPE	Goonyella Abbott Point
HPCT	Hay Point Coal Terminal
ICAR	Initial Capacity Assessment Report
IE	Independent Expert
IL	Inloader (Rail Receival Station)
NQXT	North Queensland ExportTerminal
NRG	Gladstone Powerhouse
[redacted]	[redacted]
QCA	Queensland Competition Authority
RCS	Remote Control Signalling
RGTCT	RG Tanna Coal Terminal
SOP	System Operating Parameters
TLO	Train Load Out
TSE	Train Service Entitlement
TSR	Temporary Speed Restriction
WICET	Wiggins Island Coal Export Terminal

Definitions

Terms that are capitalised within this document are defined terms as per Part 12 of the Aurizon Network's 2017 Access Undertaking (UT5). The following additional definitions are provided:

Measure	Definition	Required per Train cycle
Train Service Entitlement (TSE)	An Access Holder's entitlement pursuant to an Access Agreement to operate or cause to be operated a specified number and type of Train Services over the Rail Infrastructure (as defined in UT5) including within a specified time period, in accordance with specified scheduling constraints and for the purpose of either carrying a specified commodity or providing a specified transport service (UT5).	2
Train Cycle	In general, Train Cycles typically proceed as follows: 1. Dispatch from yard 2. Travel empty to mine 3. Load at TLO 4. Travel loaded to rail receival station 5. Unload 6. Travel empty to yard for possible provisioning and/or maintenance 7. Wait for next dispatch Cycle Time measures items 1 to 6 Turnaround Time measures items 1 to 7	1
Train Path	Is the occupation of a specified portion of Rail Infrastructure, which may include multiple sections in sequential order, for a specified time. UT5 outlines that such Train Paths needing to be useable including in respect of return journeys. One (1) Train Path is equivalent to two (2) TSEs.	1
Train Loadouts	The upstream boundaries of the model are the Train Loadout (TLO) facilities at each mine, with their associated balloon loop. Coal enters the DSM at these facilities.	N/A

2. Preamble

2.1. Requirements of 2017 Access Undertaking (UT5)

UT5 as approved by the Queensland Competition Authority (QCA), requires Capacity Assessments of each of the Central Queensland Coal Network's Coal Systems to be performed, as detailed in **Part 7A: Capacity** of UT5.

UT5 specifies two types of Capacity Assessments, as defined in section **7A.2 Definition of Deliverable Network Capacity** and **System Capacity.**

For the IE Initial Capacity Assessment, only the Deliverable Network Capacity is required to be assessed.

2.2. Initial Capacity Assessment

UT5 outlines the requirements that the Independent Expert (IE) must consider in undertaking the IE Initial Capacity Assessment of the CQCN, which include:

- Undertake a dynamic Deliverable Network Capacity Analysis based on a dynamic model;
- Set out the System Operating Parameters (SOP) for each Coal System having regard to the way in which each Coal System operates in practice; and
- Develop an Initial Capacity Assessment Report (ICAR) that sets out Deliverable Network Capacity (DNC), assumptions, constraints and Existing Capacity Deficits (ECDs), if applicable, for the CQCN and each Coal System.

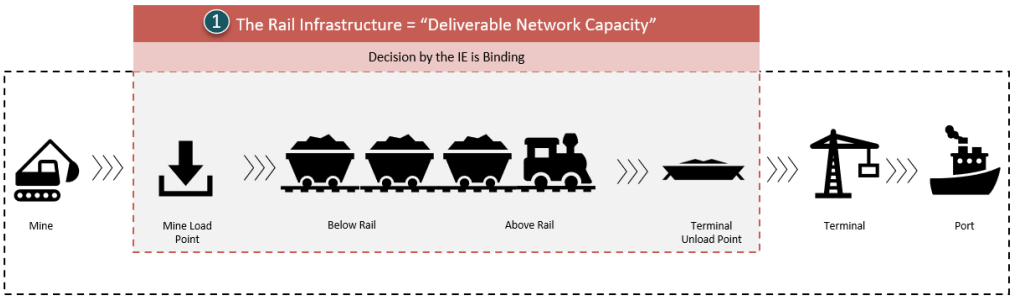
2.2.1. Dynamic Simulation Model (DSM)

A DSM has been developed using the AnyLogic modelling software to determine the DNC of the CQCN and for each Coal System. The scope of the DSM reflects the DNC definition **(section 2.3)** and is between the boundaries of:

- Coal flow into wagons at Train Loadouts (TLOs); and
- Coal flow out of wagons at Rail Receival Stations (inloaders).

and includes the components as outlined in **figure 1**.

Figure 1 – Deliverable Network Capacity Boundaries



2.2.2. System Operating Parameters (SOP)

The SOP as outlined in UT5, represent the assumptions on the operation of each element of the coal Supply Chain and the interfaces between those elements including the Supply Chain operating mode, seasonal

variations, and live run losses. These assumptions are used in the DSM for the analysis of Deliverable Network Capacity.

The IE has prepared SOP (2021 System Operating Parameters) which should be read in conjunction with this report.

The SOP are broken down into the following key areas:

- General Assumptions;
- Rail Infrastructure;
- Demand;
- Train Loadout (TLO) which represents the upstream boundary of the DSM;
- Below Rail Operations;
- Above Rail Operations;
- Terminal Inloader for both export and domestic users which represents the downstream boundary of the DSM;
- System Delays; and
- Non-Coal Traffic.

For each key area, the parameters that impact the determination of DNC have been analysed and the SOP outlines how the DSM treats each of these.

The five (5) CQCN Coal Systems and the associated branch lines and mainlines used in the DSM to assess the DNC are also outlined in the SOPs**.**

2.2.3. Consultation

Throughout the development of the DSM and SOP, consultation has occurred with industry stakeholders. A significant amount of feedback was received through this process and various subsequent stakeholder discussions were held on the operating parameters and modelling assumptions.

This feedback has been considered and where considered appropriate, has been incorporated in the finalisation of the ICAR.

2.2.4. ICAR

The ICAR prepared by the IE must report on the DNC of each Coal System over the Capacity Assessment Period. The ICAR must include information regarding:

- Assumptions that the IE has made in interpreting the definitional factors that DNC is characterised by;
- Assumptions that the IE has made in developing the SOP and other modelling related assumptions for each Coal System;
- The DNC of each Coal System's mainline and branch lines;
- Constraints that reduce, or are likely to reduce, DNC of each Coal System; and

- If the IE identifies in its assessment that there is Existing Capacity Deficits (ECDs) in respect of a Coal System, the quantum of the ECD, the Coal System and the location in the Coal System where the ECD arises, including, where identified by the IE, specific causes for the deficits and potential solutions for addressing the deficits.

The outcomes of the IE's assessment must be reported to the QCA and AN in a redacted and unredacted form and to the Chair of the Rail Industry Group (RIG) in a redacted form. QCA and AN will post the redacted versions.

2.3. Deliverable Network Capacity

2.3.1. Deliverable Network Capacity

The following extract defining Deliverable Network Capacity is taken from Part 7A.2 of UT5.

7A.2 Definition of Deliverable Network Capacity

*(a) For the purpose of this **Part 7A, Deliverable Network Capacity** means the capacity of the Rail Infrastructure, expressed as the maximum number of Train Paths (calculated on a Monthly and annual basis) that can be utilised in each Coal System (such Train Paths needing to be useable including in respect of return journeys), and the mainline and each branch line of that Coal System, taking into account the operation of that Coal System, having regard to:*

(i) the way in which the relevant Coal System operates in practice, including those matters taken into consideration in formulating the System Operating Parameters;
(ii) reasonable requirements in respect of planned maintenance and a reasonable estimate of unplanned maintenance, repair, renewal and Expansion activities on the Rail Infrastructure;
(iii) reasonably foreseeable delays or failures of Rollingstock occurring in the relevant Supply Chain, both planned delays and failures and a reasonable estimate of unplanned delays and failures;
(iv) reasonably foreseeable delays associated with any restrictions (including speed restrictions, dwell times within Train Services and between Train Services and other operating restrictions) affecting the Rail Infrastructure;
(v) the context in which the Rail Infrastructure interfaces with other facilities forming part of, or affecting, the relevant Supply Chain (including loading facilities, load out facilities and coal export terminal facilities);
(vi) the need for Aurizon Network to comply with its obligations to provide access to non-coal traffic under Access Agreements, Passenger Priority Obligation or Preserved Train Path Obligations;
(vii) the Supply Chain operating mode (including at the loading facilities, load out facilities and coal export terminal facilities);
(viii) interfaces between the different Coal Systems; and
(ix) the terms of Access Agreements (including the number of Train Service Entitlements for each origin and destination combination in that Coal System) relating to Train Services operating in Coal System.

The DNC must be reported in Train Paths. All reference to DNC will be in Train Paths. Train Service Entitlements (TSEs) and tonnes will only be provided for information purposes.

2.3.2. Capacity Assessment Period

The Capacity Assessment Period for the ICAR is for the five (5) financial years FY20 to FY24 inclusive i.e. 1st July 2019 to the 30th June 2024, noting that UT5 defines the Capacity Assessment Period as the later of five (5) years, or peak capacity under the Access Agreements and the completion and commissioning of any Expansion that AN is obliged to construct (other than as a result of a Deliverable Network Capacity Shortfall). Based on a review of the data, the ICAR has determined the Capacity Assessment Period is the five-year period outlined above as peak capacity occurs within this period.

2.4. Assumptions

2.4.1. General

The IE has had to exercise judgement on a large range of issues in arriving at developing its assumptions and conclusions in this ICAR. These relate to, among other things, the assumptions regarding the preparation of the SOP, the assessment of how the network operates in practice and the interpretation of the various factors that the IE must have regard to in deriving the DNC of each Coal System.

The IE has prepared SOP**,** which sets out, in detail, the assumptions (and associated reasoning for the assumptions) that have been employed in the DSM. The SOP should be read in conjunction with this ICAR.

Against this backdrop, the ICAR focuses on the most material assumptions that the IE has made in undertaking the Capacity Assessment. This approach allows targeting of the more significant drivers and constraints affecting the DNC assessment, enabling stakeholders to be aware of the critical capacity considerations confronting the network.

For the ICAR, Committed Capacity is used as the base demand profile against which DNC is assessed and demand is scaled up linearly (unconstrained) from there until DNC is reached.

When assessing the DNC, the capacity should not be constrained by the current number of consists operating and so the number is artificially inflated under the assumption that the Above Rail operators will provide the consists needed to realise the DNC.

The mainlines and branch lines have been shown as they are allocated (geographically) to the relevant Coal System. Some branch lines and mainlines are used to transport coal for multiple Coal Systems. The branch line and mainline DNC is noted within the Coal System section of this report where this occurs. To determine the total DNC of a branch line or mainline that is used in multiple Coal Systems, each DNC would need to be combined to calculate the total. Mainlines and branch lines that are used for multiple Coal Systems are outlined below. Coal Systems in bold are the primary Coal System that the branch line or mainline is allocated to:

Reference	Type	Mainline/branch line
1A	Branch line	Pring to Abbott Point (**Newlands** and GAPE)
1	Mainline	Collinsville to Pring (**Newlands** and GAPE)
1B	Branch line	Newlands Junction to Collinsville (**Newlands** and GAPE)
3E	Branch line	Wotonga to North Goonyella Junction (GAPE and **Goonyella**)
3F	Branch line	Blair Athol Mine to Wotonga (**Goonyella** and GAPE)
3D	Branch line	Wotonga to Coppabella (**Goonyella** and GAPE)
3C	Branch line	Oaky Creek Junction to Coppabella (**Goonyella**, GAPE and Blackwater)
4D	Branch line	Oaky Creek Junction to Burngrove (**Blackwater** and Goonyella)

Appendix A provides an aggregated view of DNC, Committed Capacity and ECD for CQCN by mainline and branch line per year.

DNC for FY20 and FY21 has been calculated using actual historical data and some forecast data however for FY22, FY23 and FY24 assumptions have been made using historical data and agreed data for some key parameters. When evaluating mitigation options for any identified ECDs the focus is primarily on the current year (FY22) and future years (FY23 and FY24).

DNC is reported in Train Paths. DNC represented in tonnes has been included in this report for information purposes only. Train Paths have been converted to tonnes using the payload assumptions in the DSM. The

DSM payload assumptions reflect how the network operates in practice and include the impacts of light loading. Readers should be aware that the DSM payload is 1-3% (varies for each Coal System) less than Nominal Payloads outlined in Access Agreements.

2.4.2. Model Variability

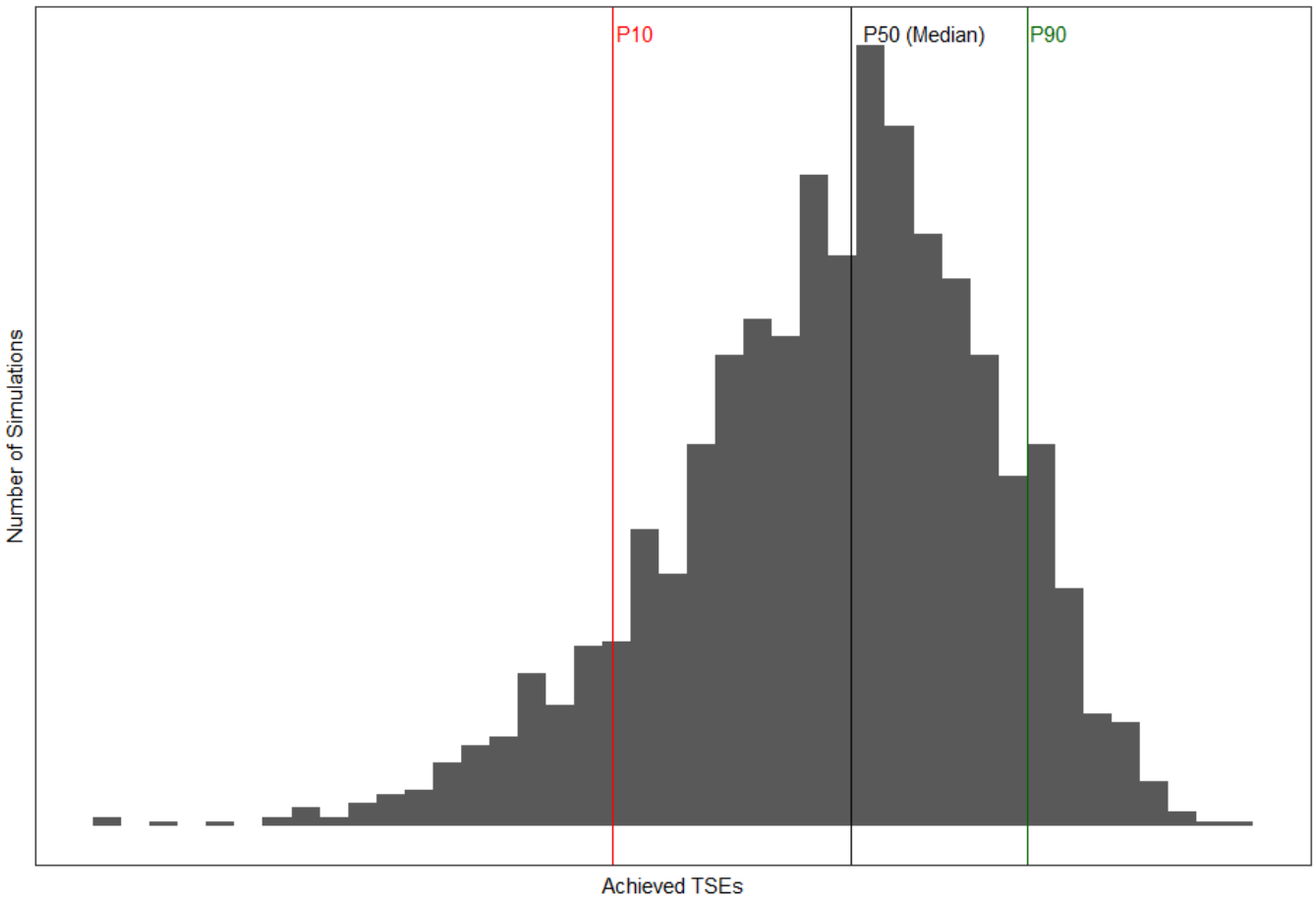
The DSM for the network is a stochastic model. Many of the inputs such as load rates, and delays are provided as a probability distribution rather than a single value.

This means that each run of the simulation will result in different outcomes as the values for these key inputs are randomly chosen throughout the course of the simulation run. Therefore, the model is run many times to obtain a range of likely outcomes. This is known as Monte Carlo simulation.

The DNC is determined to be the median result of all the simulation runs, with the 10th percentile (P10) and the 90th percentile (P90) providing an estimate of the variability. The DSM variability is minus 0.8% at P10 and positive 0.7% at P90.

The chart below **(Figure 2)** is an illustrative example of a histogram of achieved Train Paths across all the simulation runs. The P10, P50 or median, and P90 results are marked.

Figure 2 **Example of DSM Output results (illustrative only)**



2.4.3. Considerations when Evaluating DNC

When considering the determination of DNC, the focus has been to maximise DNC of the CQCN and each Coal System, minimise ECDs and achieve equitability between origin/destinations and Above Rail operators as much as possible.

This approach does not necessarily apply to the current mode of operations and the IE has determined that where ECDs occur, there is a recognition that there is a difference in the operation of different components of the supply chain and the modelling approach must be equitable wherever possible.

The DSM variability is minus 0.8% at P10 and positive 0.7% at P90 percentile levels. When ECDs have been identified, this DSM variability has been considered.

2.5. Information and Redaction

To the extent possible, this document has been prepared on an unredacted basis. Where capacity outcomes contain information that is confidential to an Access Holder, Customer or Train Operator and is unable to be disclosed, it has been redacted in this document or incorporated into Appendices to this document which will be redacted.

3. CQCN Summary

The IE has prepared the Initial Capacity Assessment Report (ICAR) regarding the Deliverable Network Capacity (DNC) of Aurizon Network's Central Queensland Coal Network (CQCN) for the Capacity Assessment Period (1 July 2019 to 30 June 2024). This summary provides an overview of the IE's:

- Capacity Assessment outcomes by Coal System, mainline and branch line by year;
- Identification of Existing Capacity Deficits; and
- Commentary and high-level recommendations on mitigation and root cause of any Existing Capacity Deficits.

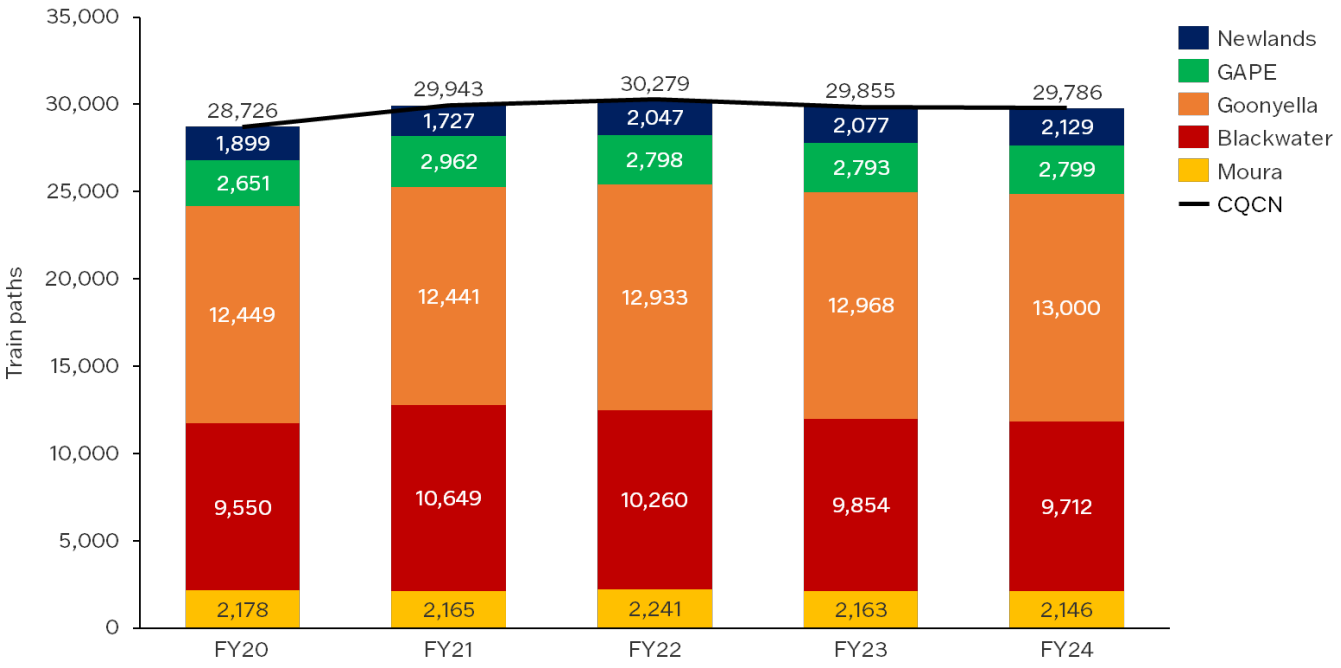
This analysis is the maximum capacity of the Rail Infrastructure by year, for the Capacity Assessment Period, and in most cases does not reflect how the network is currently performing in the current lower demand environment.

3.1. Capacity Assessment Outcomes

3.1.1. Deliverable Network Capacity

The IE has determined that the Deliverable Network Capacity in Train Paths per year for the network over the Capacity Assessment Period is as shown in **figure 3.**

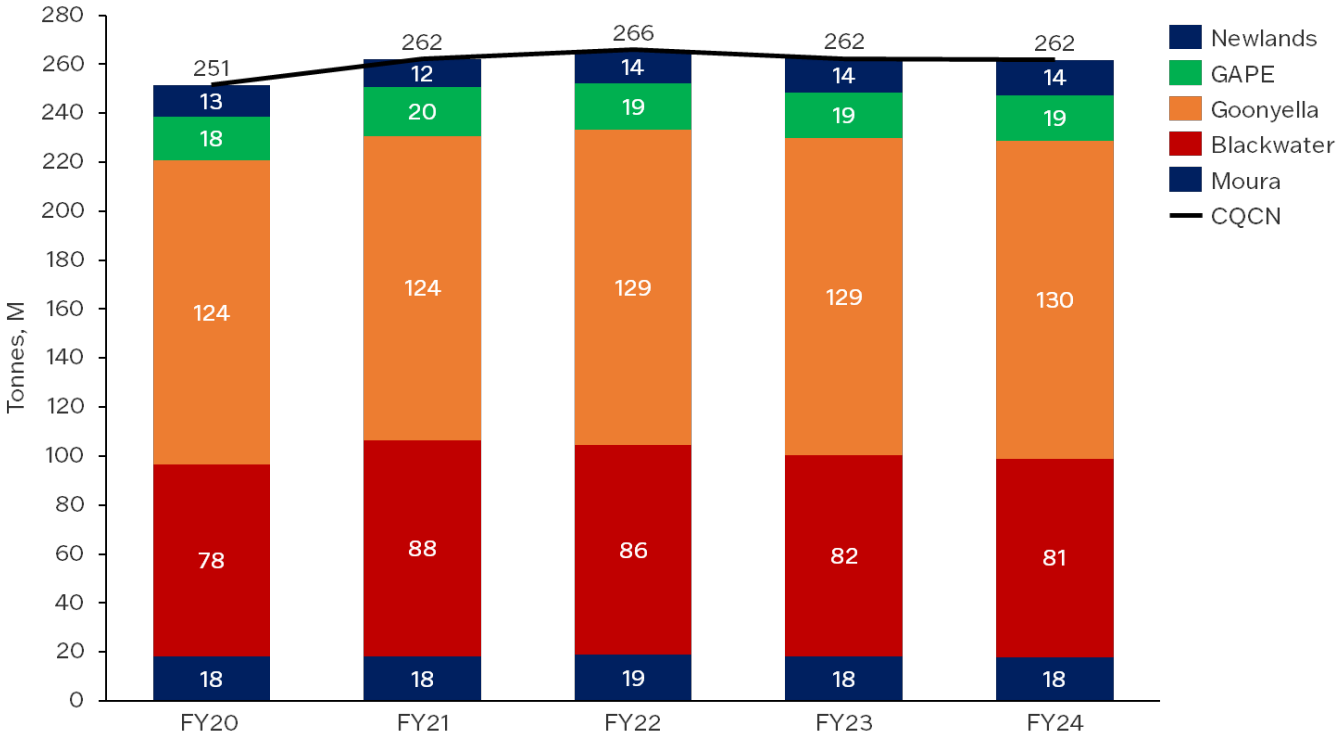
Figure 3 Deliverable Network Capacity by Coal System – Train Paths



The Deliverable Network Capacity is also shown in tonnes in **figure 4.**

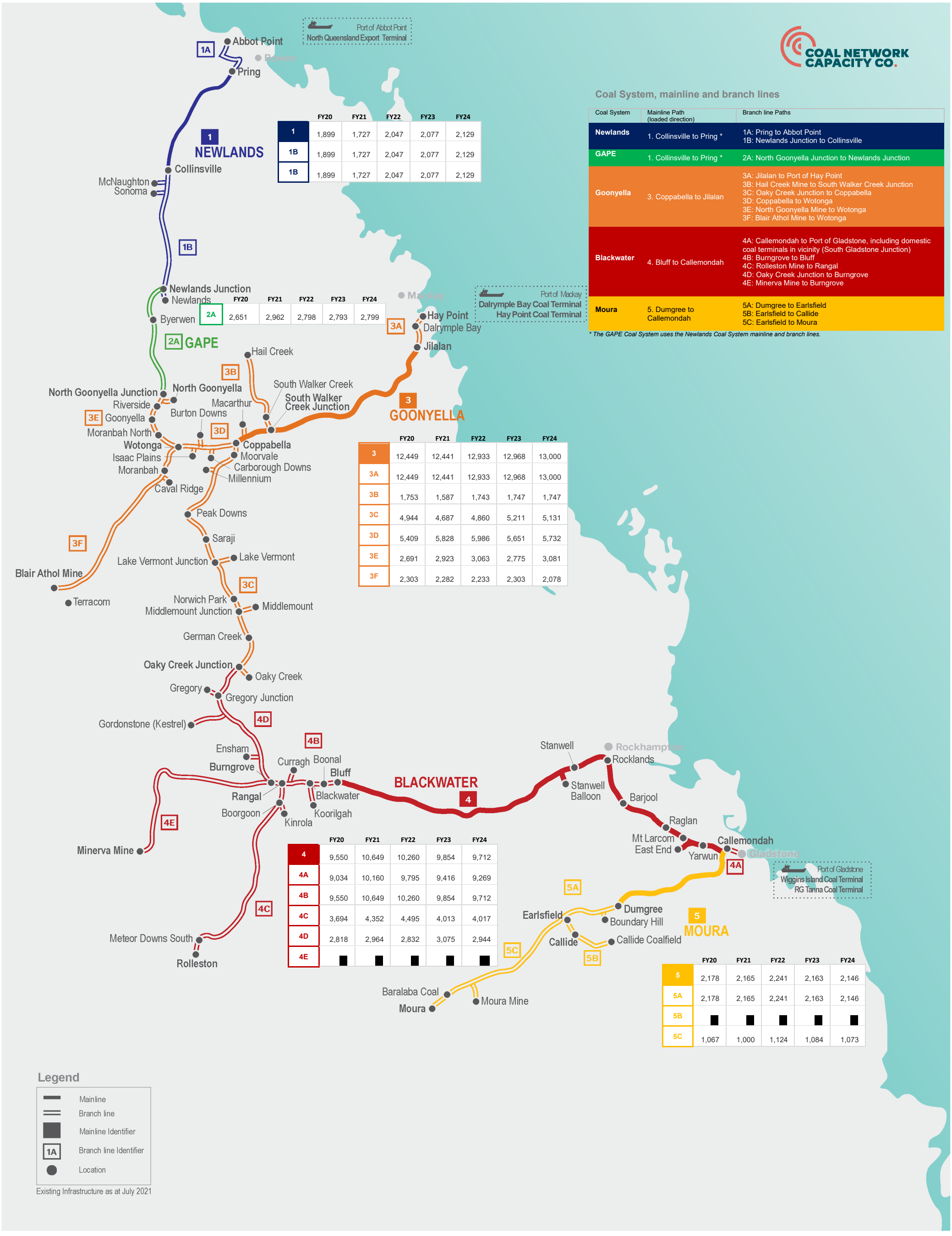
The data shows that the CQCN Rail Infrastructure has a DNC of ~266M tonnes for FY22 and ~262M tonnes for FY23 and FY24.

Figure 4 Deliverable Network Capacity by Coal System – Tonnes (M)



The Deliverable Network Capacity shown by mainline and branch line for the CQCN is shown in **figure 5** in Train Paths and in **figure 6** in tonnes for the Capacity Assessment Period.

Figure 5 CQCN Deliverable Network Capacity by mainline and branch line (Train Paths)



	FY20	FY21	FY22	FY23	FY24
1	1,899	1,727	2,047	2,077	2,129
1B	1,899	1,727	2,047	2,077	2,129
1B	1,899	1,727	2,047	2,077	2,129

	FY20	FY21	FY22	FY23	FY24
2A	2,651	2,962	2,798	2,793	2,799

	FY20	FY21	FY22	FY23	FY24
3	12,449	12,441	12,933	12,968	13,000
3A	12,449	12,441	12,933	12,968	13,000
3B	1,753	1,587	1,743	1,747	1,747
3C	4,944	4,687	4,860	5,211	5,131
3D	5,409	5,828	5,986	5,651	5,732
3E	2,691	2,923	3,063	2,775	3,081
3F	2,303	2,282	2,233	2,303	2,078

	FY20	FY21	FY22	FY23	FY24
4	9,550	10,649	10,260	9,854	9,712
4A	9,034	10,160	9,795	9,416	9,269
4B	9,550	10,649	10,260	9,854	9,712
4C	3,694	4,352	4,495	4,013	4,017
4D	2,818	2,964	2,832	3,075	2,944
4E	■	■	■	■	■

	FY20	FY21	FY22	FY23	FY24
5	2,178	2,165	2,241	2,163	2,146
5A	2,178	2,165	2,241	2,163	2,146
5B	■	■	■	■	■
5C	1,067	1,000	1,124	1,084	1,073

Coal System, mainline and branch lines

Coal System	Mainline Path (loaded direction)	Branch line Paths
Newlands	1. Collinsville to Pring *	1A: Pring to Abbot Point 1B: Newlands Junction to Collinsville
GAPE	1. Collinsville to Pring *	2A: North Goonyella Junction to Newlands Junction
Goonyella	3. Coppabella to Jilalan	3A: Jilalan to Port of Hay Point 3B: Hail Creek Mine to South Walker Creek Junction 3C: Oaky Creek Junction to Coppabella 3D: Coppabella to Wotonga 3E: North Goonyella Mine to Wotonga 3F: Blair Athol Mine to Wotonga
Blackwater	4. Bluff to Callemondah	4A: Callemondah to Port of Gladstone, including domestic coal terminals in vicinity (South Gladstone Junction) 4B: Burngrove to Bluff 4C: Rolleston Mine to Rangal 4D: Oaky Creek Junction to Burngrove 4E: Minerva Mine to Burngrove
Moura	5. Dumgree to Callemondah	5A: Dumgree to Earlsfield 5B: Earlsfield to Callide 5C: Earlsfield to Moura

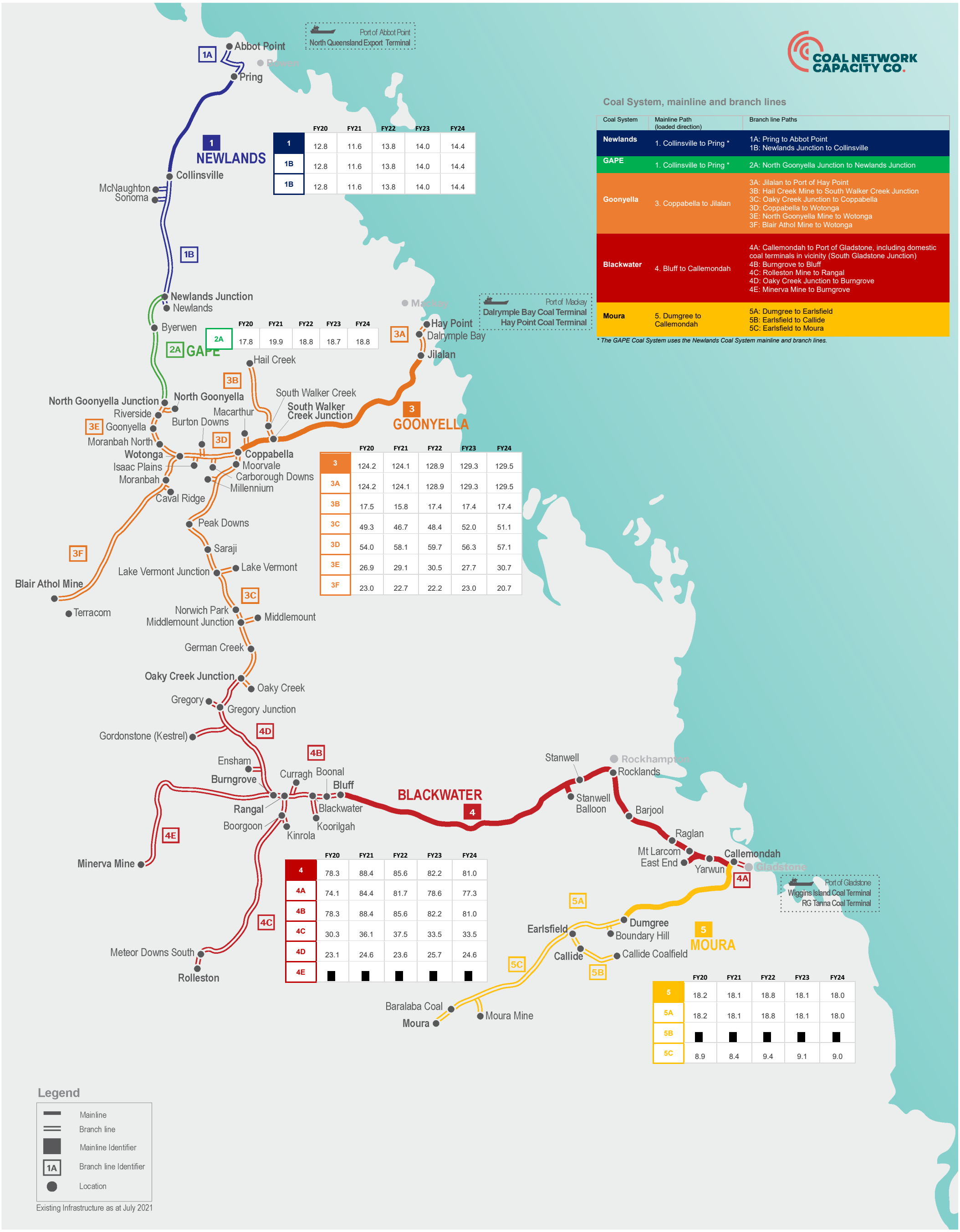
** The GAPE Coal System uses the Newlands Coal System mainline and branch lines.*

Legend

Mainline
Branch line
Mainline Identifier
1A Branch line Identifier
Location

Existing Infrastructure as at July 2021

Figure 6 CQCN Deliverable Network Capacity by mainline and branch line (tonnes)



More detailed information on the determination and results for each Coal System is provided in **sections 4 - 8** of this report.

3.2. Existing Capacity Deficits

An ECD exists in a Coal System if the DNC (within the Capacity Assessment Period) is less than the number of Train Paths required to meet committed Train Service Entitlements (TSEs) or Committed Capacity. Committed Capacity includes all export and domestic coal users and any non-coal traffic.

DNC is calculated at a network level, a Coal System and mainline and branch line level. Where an ECD is identified at an origin/destination (e.g. mine/terminal) level the DSM applies an ECD to the origin/destination and to the mainline and branch lines relating to the Train Path of that origin/destination. The DSM does not identify ECDs for each section of the Rail Infrastructure. Mitigation and sensitivity analysis has been used (where possible) to fine tune how any ECD may be mitigated.

3.2.1. CQCN

The DNC, Committed Capacity and ECD for the network is shown in **figure 7** for the Capacity Assessment Period. The DNC does not achieve Committed Capacity at an annual level for any of the five (5) years. For FY22 the percent DNC achieved of Committed Capacity is ~89%.

Figure 7 **Train Paths per annum – DNC, Committed Capacity and ECD**

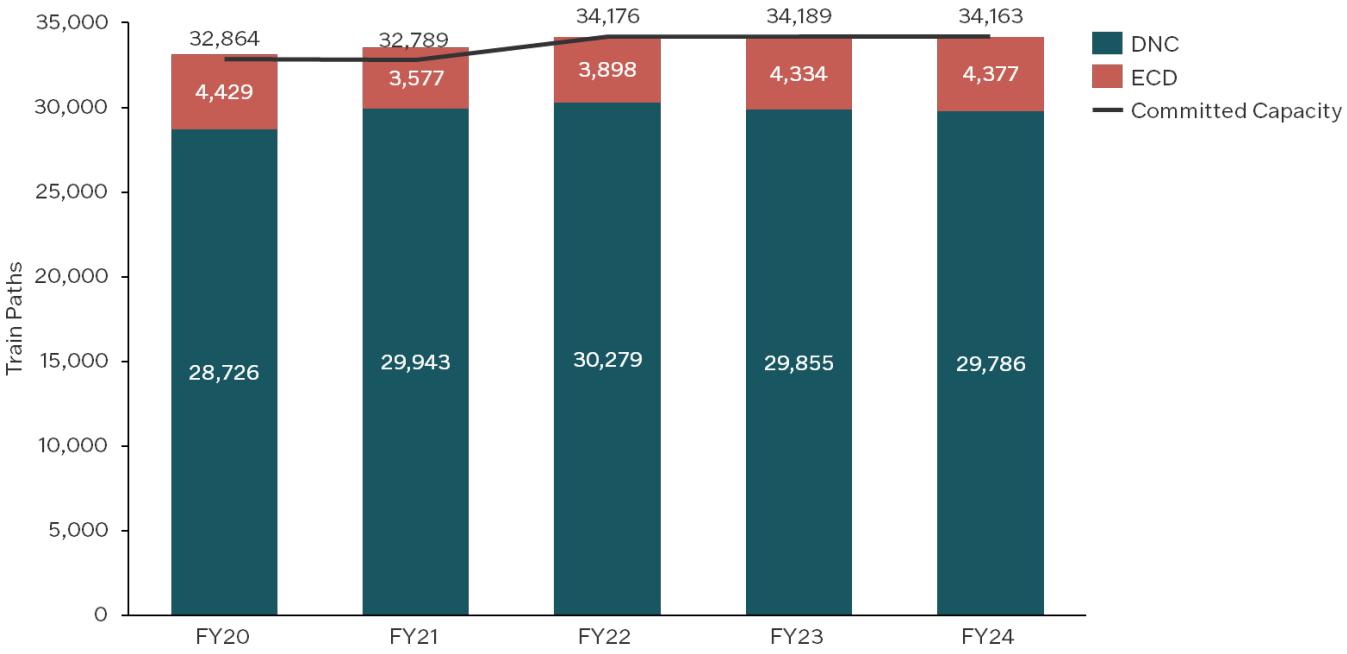
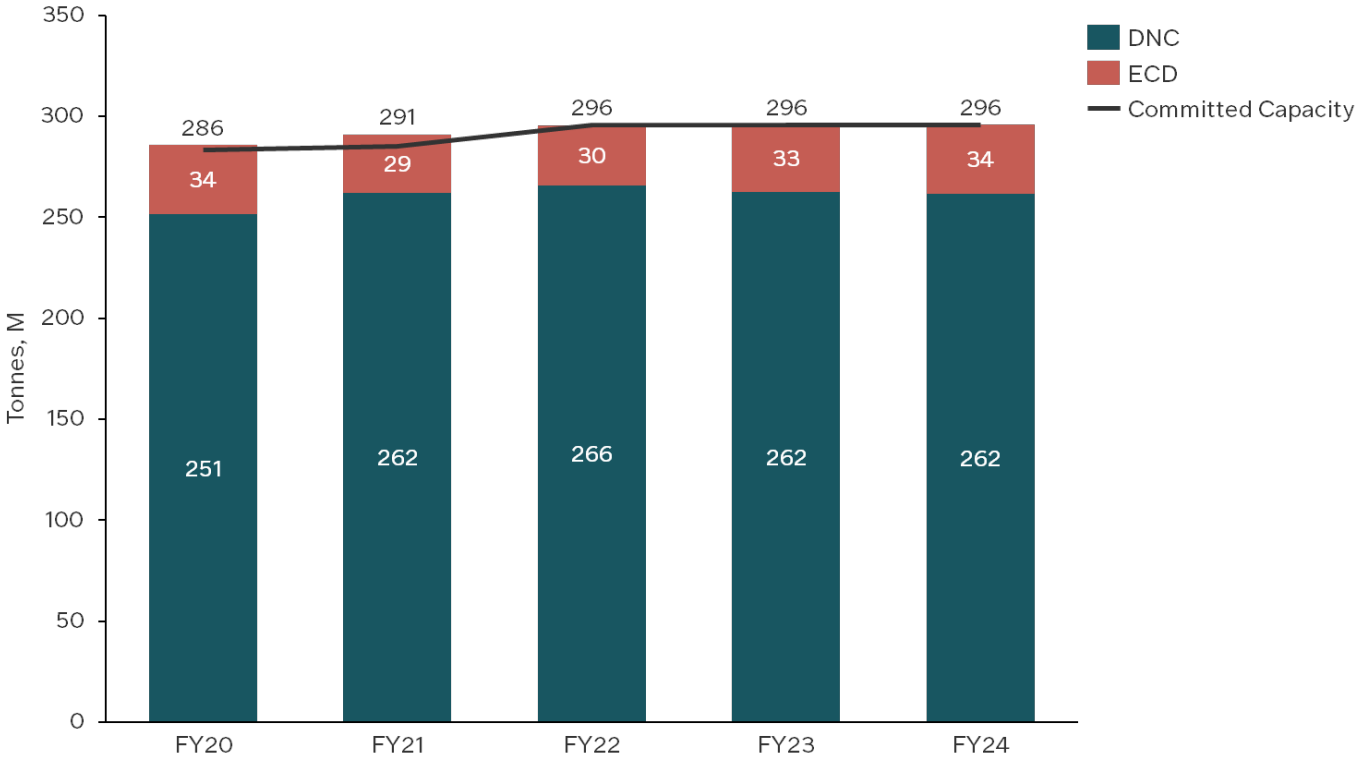


Figure 8 shows the same information in tonnes, where tonnes are calculated using DSM calculated payloads (includes light loading).

Figure 8 **Tonnes per annum (M) – DNC, Committed Capacity and ECD**



The CQCN Rail Infrastructure has ~ 34,150 Train Paths (~ 296M tonnes) of Committed Capacity for FY22 through to FY24. This includes all contracts for export coal, domestic coal, and non-coal freight (current as of July 2021).

The DNC has been calculated as ~ 266M tonnes (~ 30,279 Train Paths) for FY22. The ECD shortfall at a network level for FY22 is ~ 30M tonnes. This increases to 33-34M tonnes in FY23 and FY24.

3.2.2. Coal System

Figures 9 - 13 show the DNC in Train Paths, Committed Capacity and ECD at a Coal System level.

- Newlands Coal System has an ECD for each year of the five-year assessment period. The average annual DNC as a percentage of Committed Capacity for the period was 66%.
- GAPE Coal System has an ECD for each year of the five-year assessment period. The average annual DNC as a percentage of Committed Capacity for the period was 64%.
- Goonyella Coal System has an ECD for each year of the five-year assessment period. The average annual DNC as a percentage of Committed Capacity for the period was 92%.
- Blackwater Coal System has no ECDs in FY20 and FY21 however has ECDs in FY22, FY23 and FY24. The average annual DNC as a percentage of Committed Capacity for the period was 100%.
- Moura Coal System has an ECD for each year of the five-year assessment period. The average annual DNC as a percentage of Committed Capacity for the period was 94%.

Figure 9 **Newlands Coal System – Train Paths per annum - DNC, Committed Capacity and ECD**

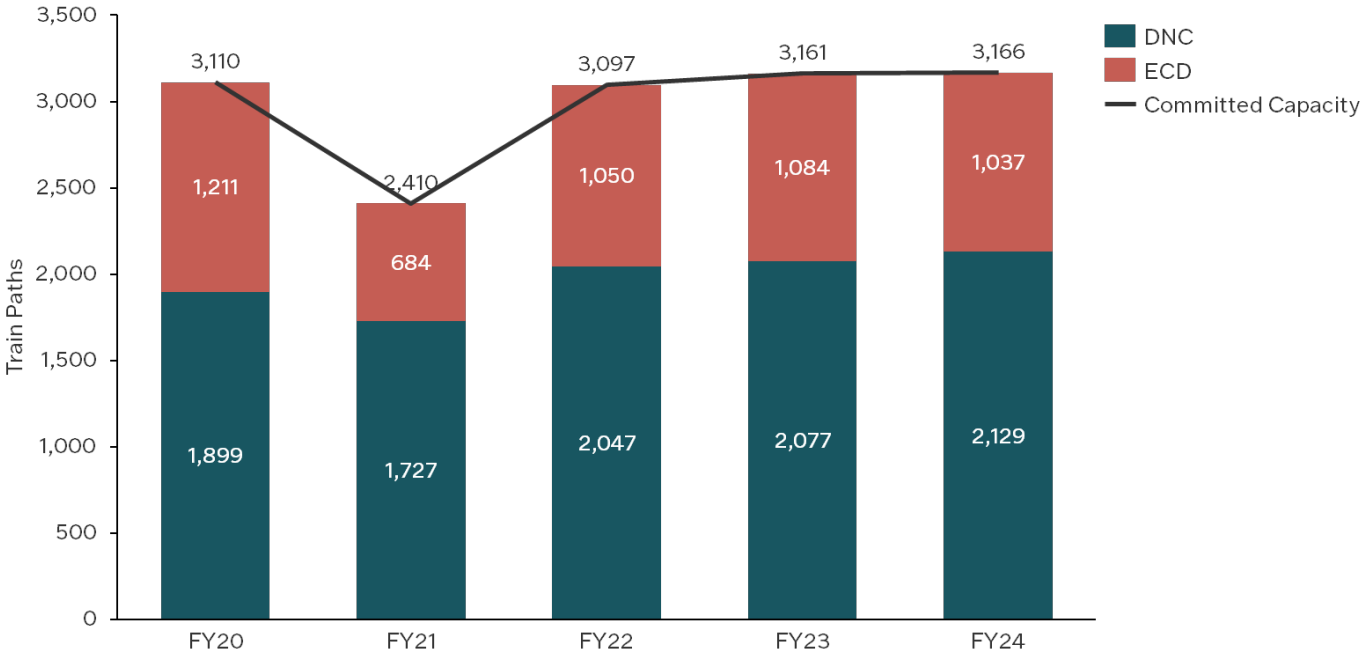


Figure 10 **GAPE Coal System – Train Paths per annum - DNC, Committed Capacity and ECD**

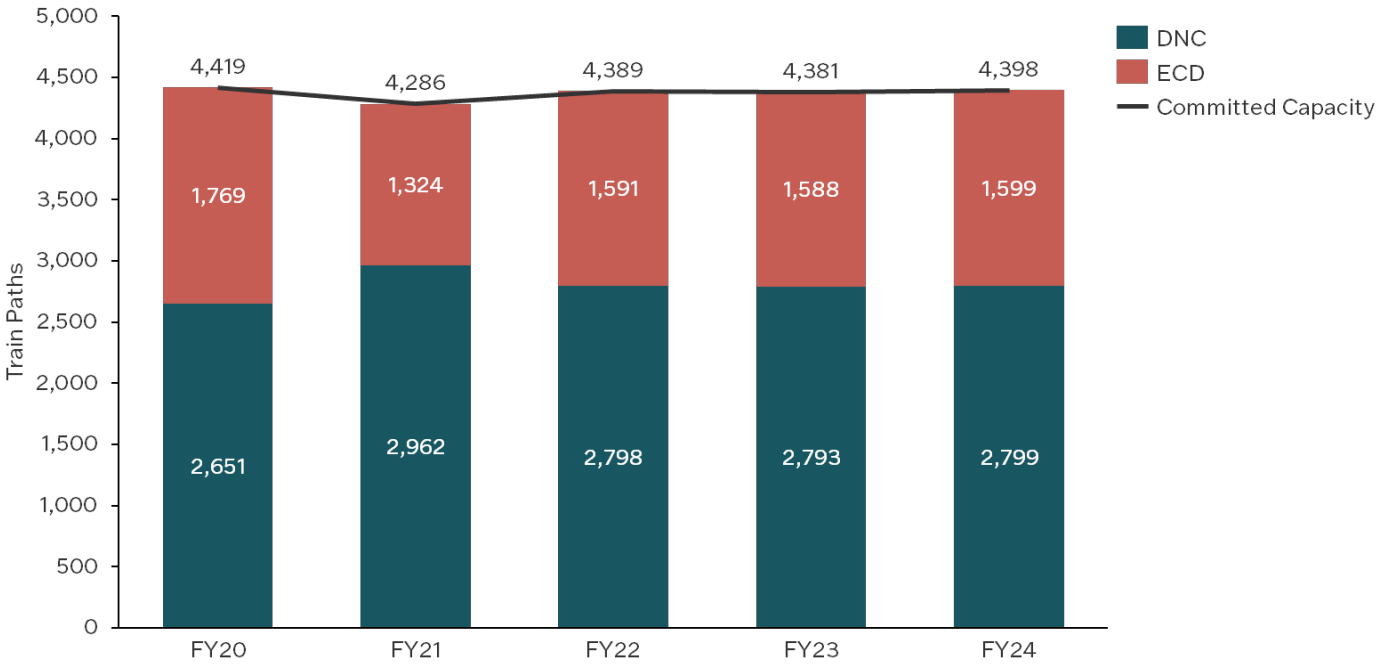


Figure 11 **Goonyella Coal System – Train Paths per annum - DNC, Committed Capacity and ECD**

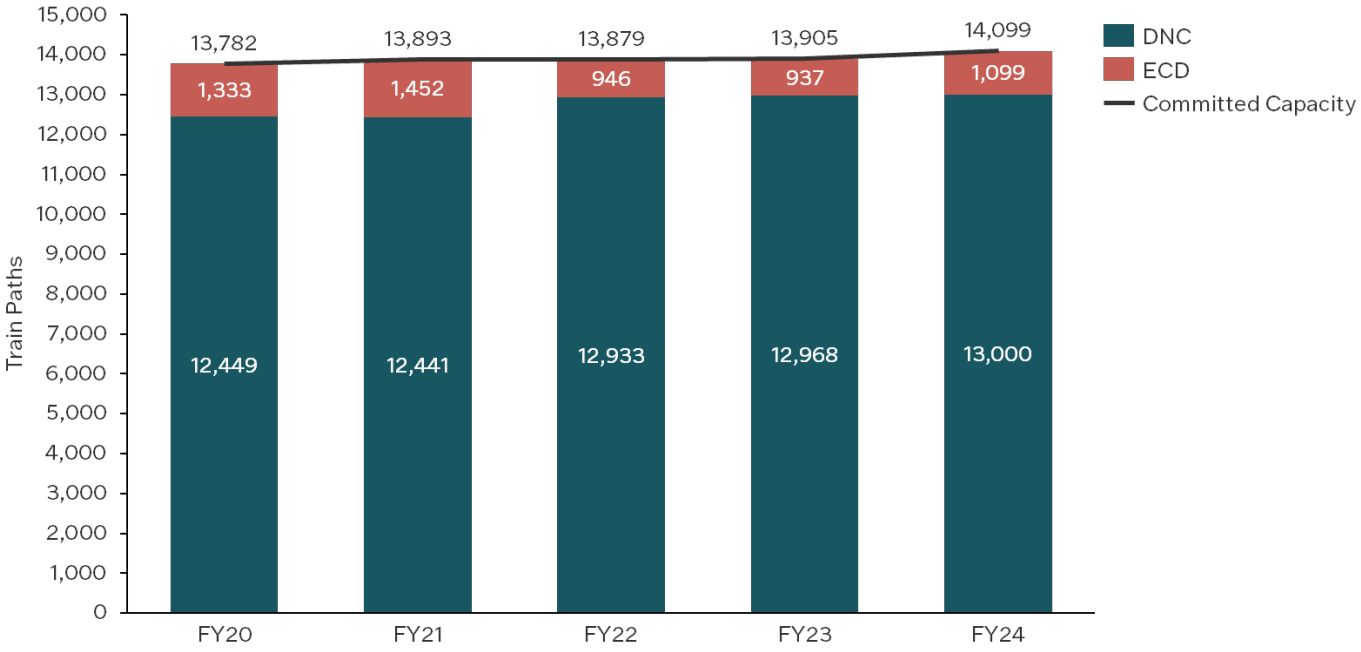


Figure 12 **Blackwater Coal System – Train Paths per annum - DNC, Committed Capacity and ECD**

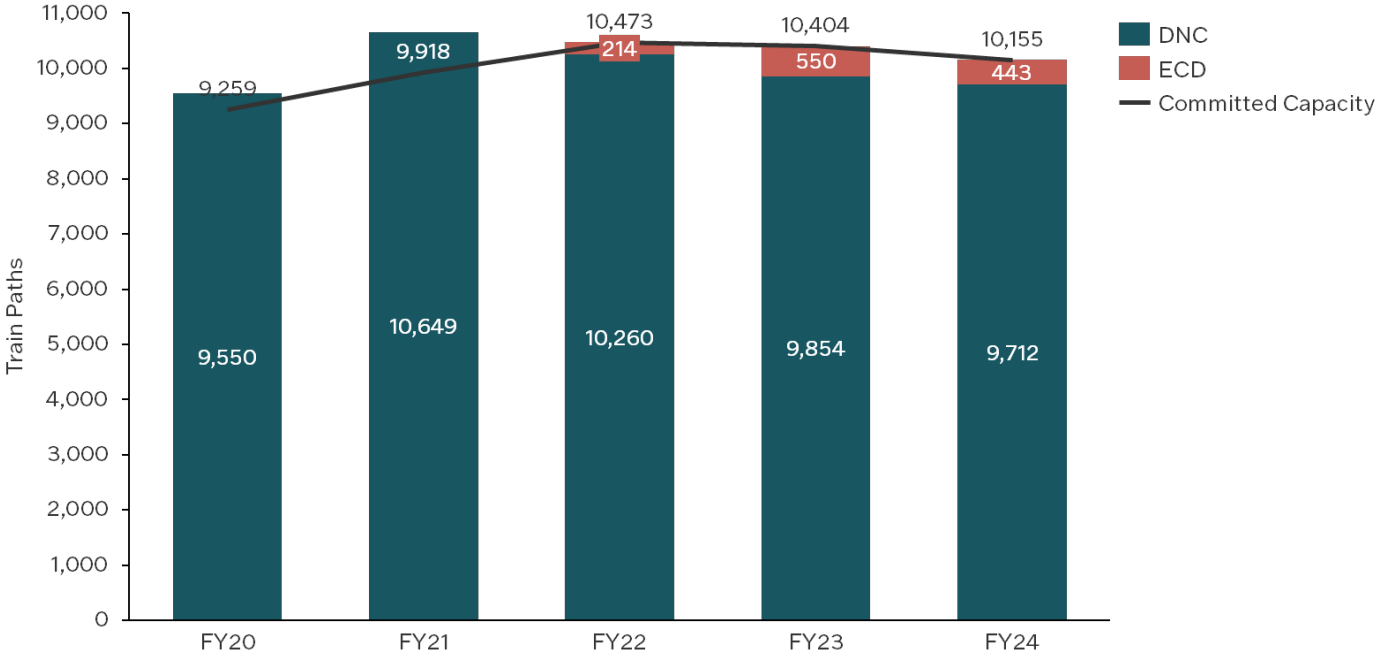
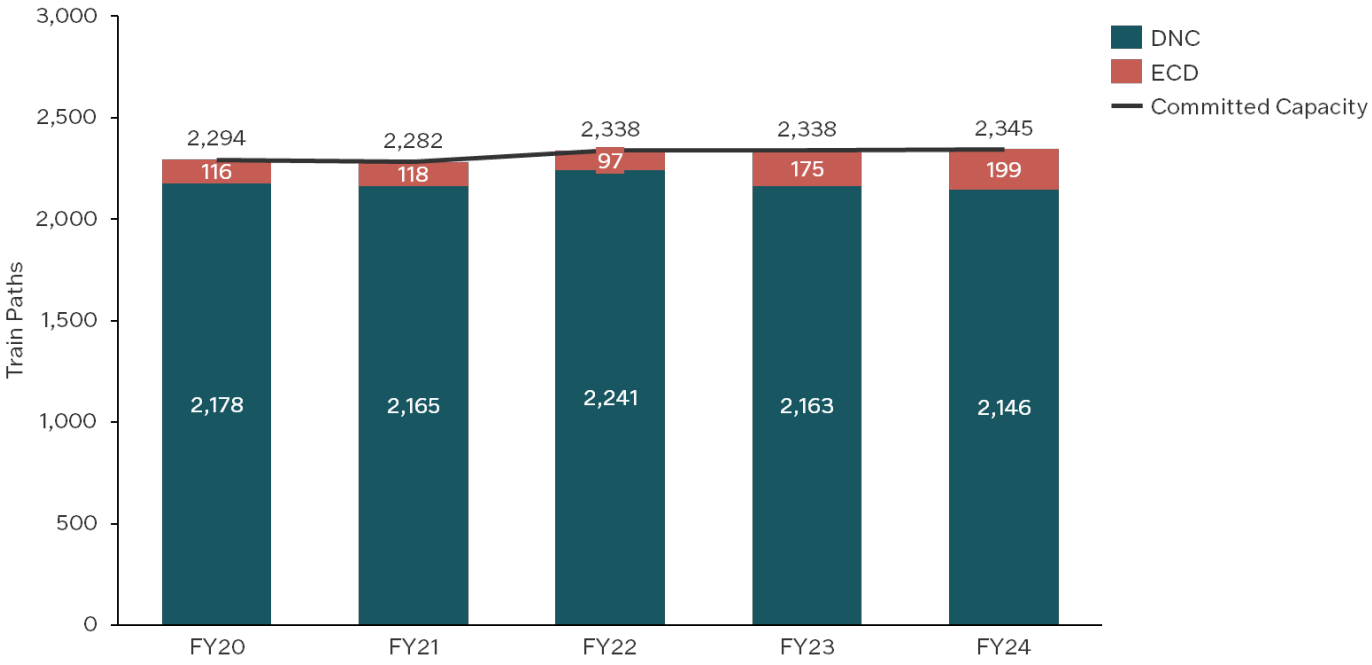


Figure 13 **Moura Coal System – Train Paths per annum - DNC, Committed Capacity and ECD**



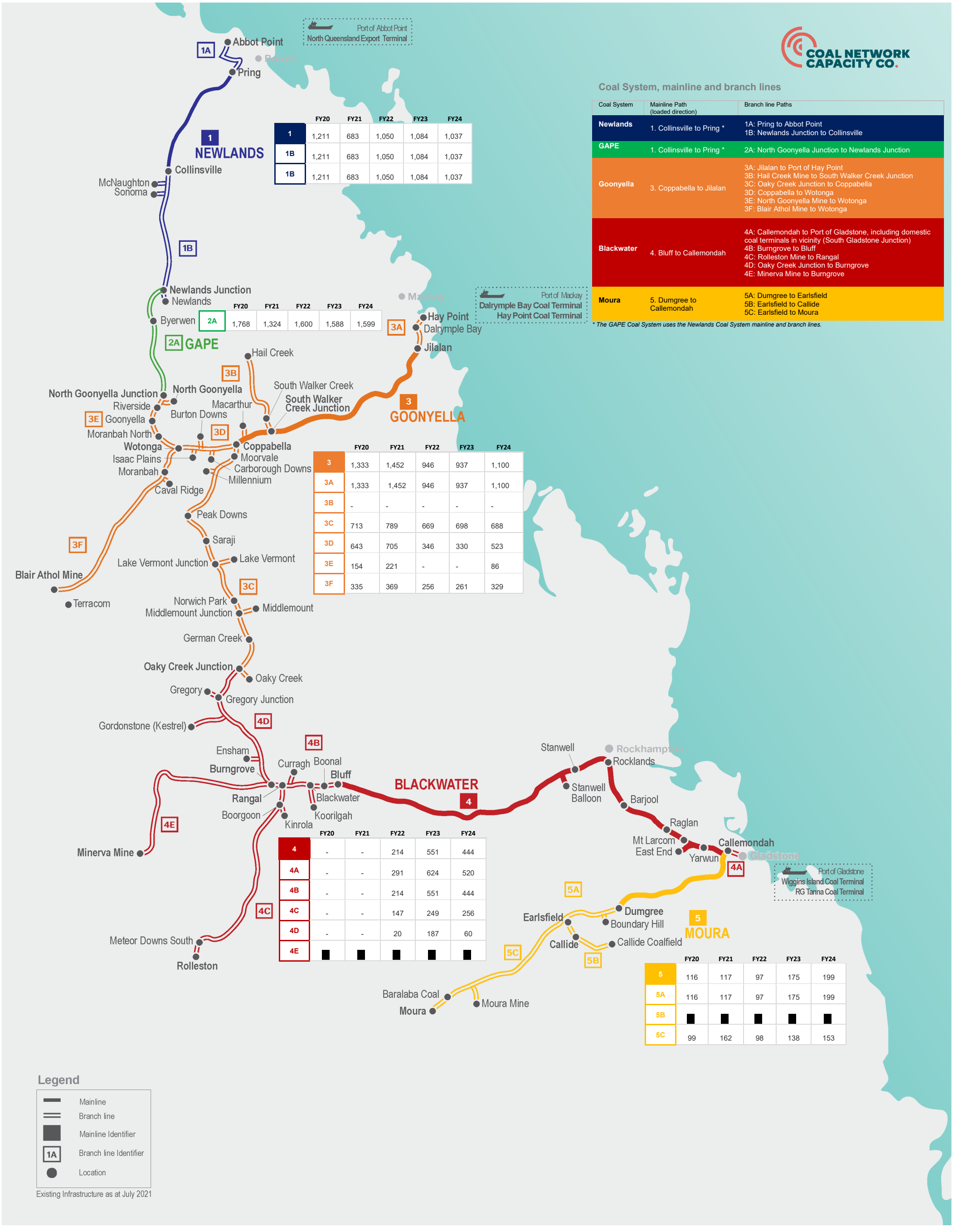
3.2.3. Mainline and Branch Line

Figure 14 shows ECDs by mainline and branch line for each year. A zero means there is no ECD.

There are a number of branch lines that have no ECDs from FY22 to FY24, however all main lines and most branch lines have some level of ECDs.

More detail on DNC by month and per origin/destination pairs can be found in **sections 4 - 8** of this report.

Figure 14 ECDs by mainline and branch line for each year (Train Paths)



3.3. Root Cause and Mitigation of Existing Capacity Deficits

Where ECDs have been identified, analysis of root cause and potential mitigation options have been undertaken where possible. For some impacted Coal Systems this analysis and commentary is at a high level based on the materiality of the ECD and the number of affected parties. More detail on each Coal System ECDs can be found in **sections 4 - 8** of this report.

3.3.1. DNC Materiality Analysis

The IE has made assumptions on a range of matters in determining the Capacity Assessment outcomes. The assumptions that have had the most material impact on the outcomes relate to:

- SOP that reflect components of the network operations and infrastructure and how they impact the determination of DNC. Using this information, the IE has identified the most material constraints that impact DNC estimates;
- The interpretation of DNC, when balancing the nine factors that the IE must have regard to in deriving the DNC; and
- The boundaries of the DNC and the impact of coal terminal and other supply chain operations on the Rail Infrastructure.

System Operating Parameters

The SOP were grouped into constraints that affect the following parts of the supply chain: Below Rail; Above Rail, the boundaries of mines (TLOs) and inloaders and other constraints including non-coal traffic.

As part of the ICAR process, analysis was undertaken to establish the materiality impact on DNC of key parameters used in the DSM. Key parameters that were reviewed include:

Constraint Area	Constraint
Below Rail	• Below Rail planned maintenance • TSRs • Delays
Above Rail	• Consist levels and composition (Above Rail operators) • Stop/start delays • Crew change time • Provisioning time
Boundaries	• Campaign railing vs even railing (Goonyella Coal System only) • TLO load rates • Inloader rates
Other	• General delays (applicable to all areas) • Non-coal traffic delays

This information is provided as general knowledge for the industry and to assist with the understanding of materiality of key factors in determining the DNC. As DNC is aimed at achieving the maximum number of Train Paths, the sensitivity analysis has focused on improvements to key parameters and the impact to DNC. DNC is calculated at maximum Committed Capacity of the network and the sensitivity analysis provided is only relevant at modelled assumptions.

This information is at network level with more specific commentary provided within each Coal System in **sections 4 – 8** of this report.

Materiality Impact of Key Parameters on DNC

Figure 15 shows the materiality variations for each Coal System for some of the key operational parameters. It clearly shows that each Coal System reacts differently to improvements in operational and maintenance parameters.

Figure 15 **Coal System Materiality impact on DNC per constraint area - % of DNC**

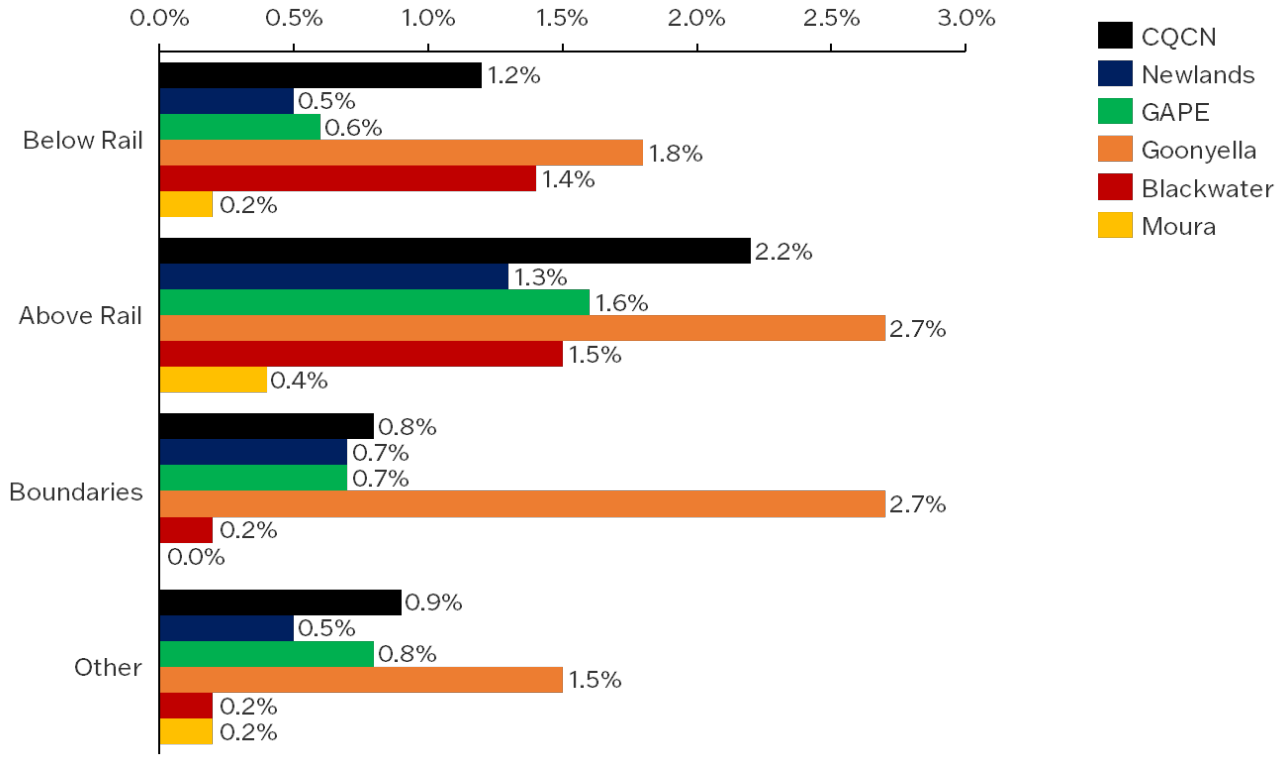
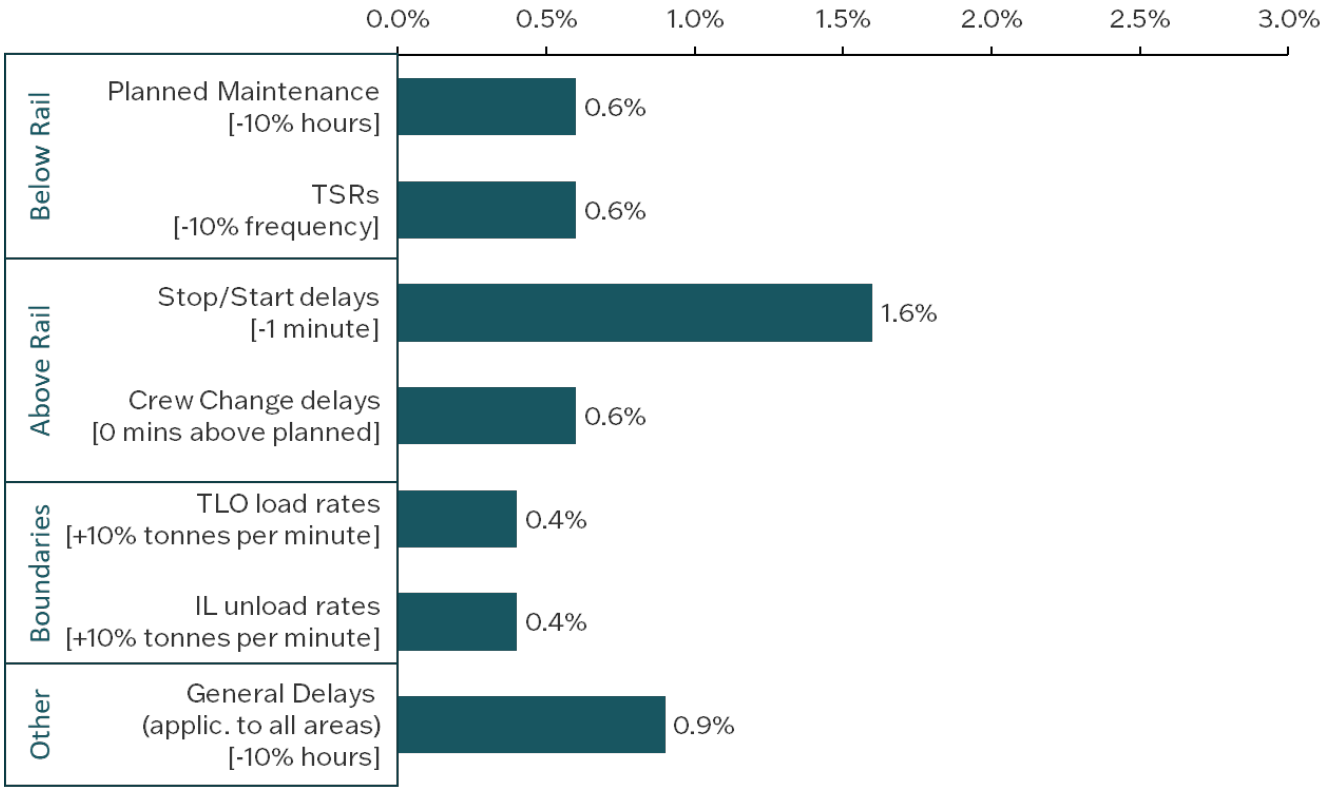


Figure 16 shows the individual key SOP parameters materiality impact on DNC for the network.

Figure 16 **SOP Parameter Materilality on CQCN - % of DNC**



At a network level, reducing start/stop delays by 1 minute and a reduction of general delays of 10% have the greatest sensitivity impact on DNC when operating at Committed Capacity.

A 1% improvement in DNC at a network level is equivalent to ~ 300 Train Paths and ~ 2.6M tonnes annually.

4. Newlands Coal System

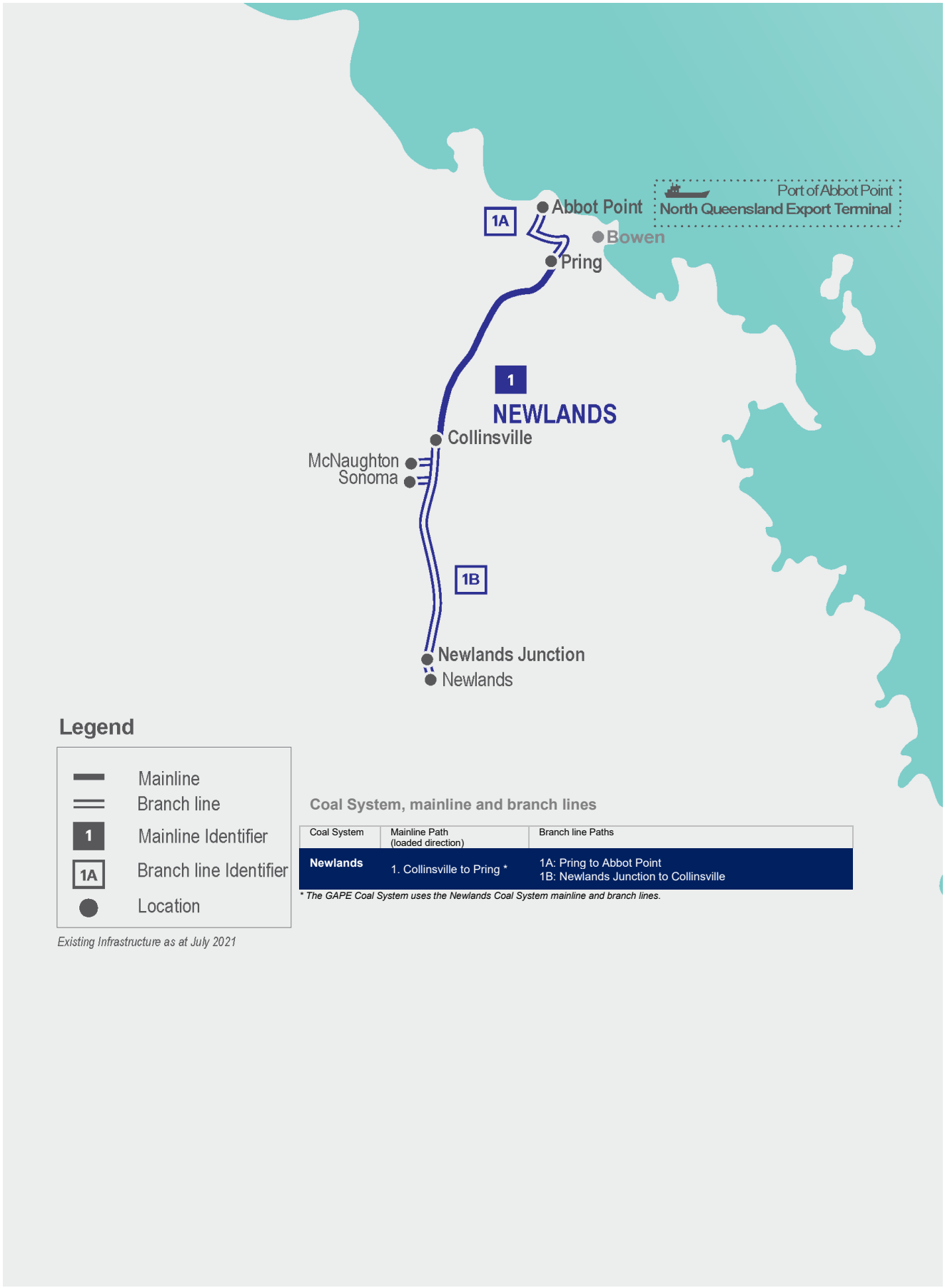
4.1. Overview of Coal System

A map of the Newlands Coal System is provided in f**igure 17**. It shows the Coal System and each mainline and branch line that makes up the Newlands Coal System.

The Newlands Coal System refers to the Rail Infrastructure comprising the rail corridor from the terminal at NQXT to Newlands Mine.

The Newlands Coal System Rail Infrastructure is also used by GAPE Coal System traffic.

Figure 17 Newlands Coal System



Coal System, mainline and branch lines

Coal System	Mainline Path (loaded direction)	Branch line Paths
Newlands	1. Collinsville to Pring *	1A: Pring to Abbot Point 1B: Newlands Junction to Collinsville

** The GAPE Coal System uses the Newlands Coal System mainline and branch lines.*

The Newlands Coal System has [redacted] origin/destination contracts that enter directly within the Newlands Coal System. [redacted]

There are a further [redacted] origin/destination contracts that enter the Newlands Coal System via the GAPE Coal System that either originate within the GAPE Coal System or from the Goonyella Coal System. [redacted]

4.2. Deliverable Network Capacity

4.2.1. Coal System Level (monthly)

Section 3 has provided the DNC, Committed Capacity and ECD for the network and each Coal System by year for the period FY20 to FY24. This section provides more detailed analysis and data at a monthly and mainline and branch line level for the Newlands Coal System.

The DNC calculated for the Newlands Coal System by month for the five-year assessment period is shown in **figure 18** below.

- The DNC in Train Paths ranges from 1,727 to 2,129 per annum over the period. This equates to a DNC tonnage capacity range of 11.6M – 14.3M tonnes.
- FY22 DNC is 2,047 Train paths (~14M tonnes).
- Peak Committed Capacity occurs in FY24 at 3,166 Train Paths (~21.4M tonnes). The maximum DNC occurs in FY24.
- There is considerable variability in Newlands Coal System month by month compared to other systems and the GAPE Coal System traffic impacts this. Key impacts on the variability include, demand profile, maintenance, delays and TSRs. Where there are large differences in a month between years it relates generally to FSS timing or significant increase/decrease in maintenance.

Figure 18 **Newlands Coal System DNC by year and month**

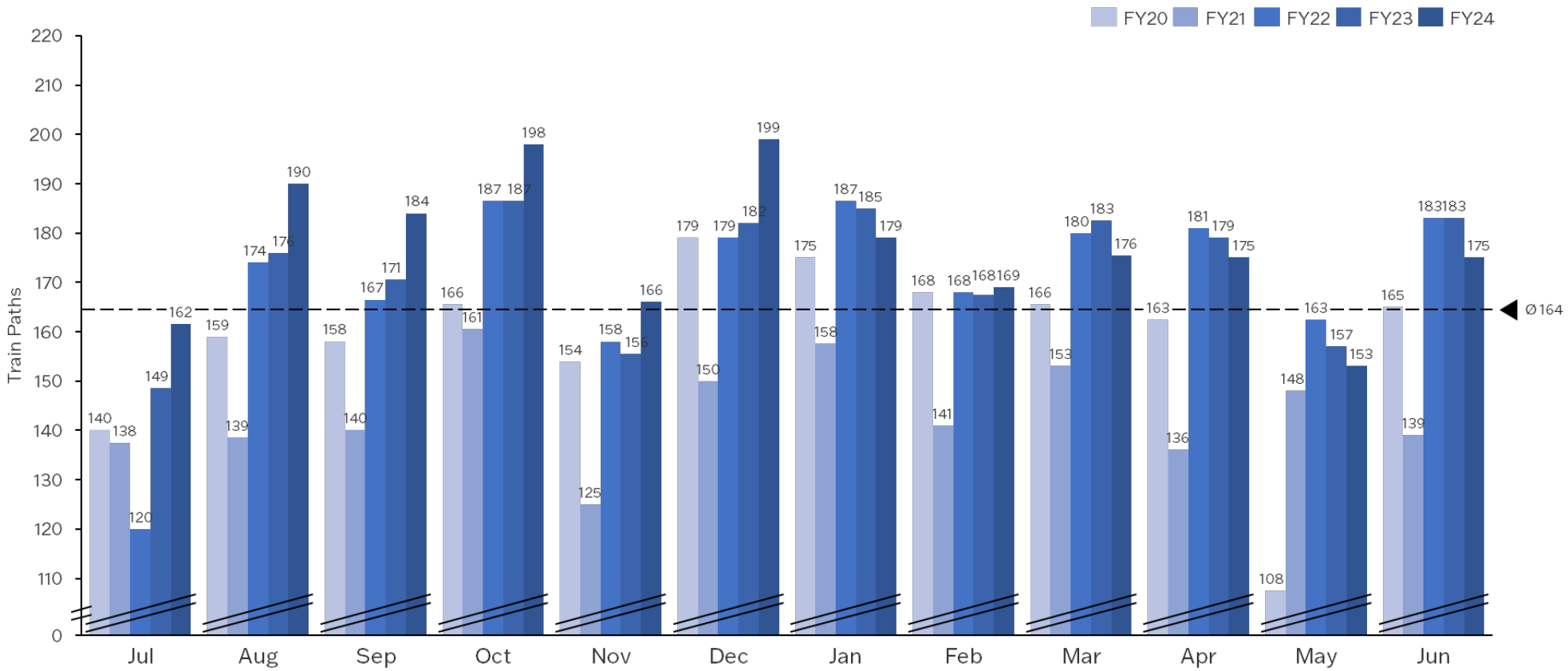
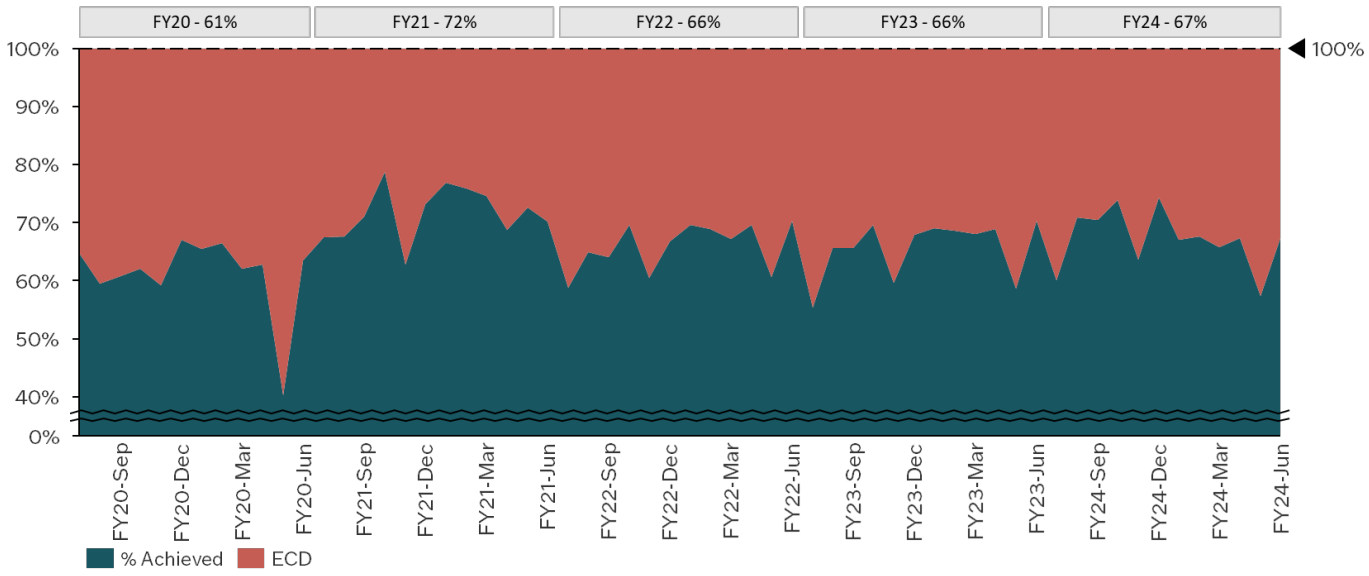


Figure 19 shows the same data as a percentage achieved DNC of Committed Capacity. Where this value is less than 100%, the DNC representing the capacity of the Rail Infrastructure is not able to meet the Committed Capacity.

- On an annual basis the Newlands Coal System DNC is meeting 61% – 72% of Committed Capacity. For FY22 is it 66%.
- The maximum DNC, as a percent of Committed Capacity, that has been achieved in the period is ~ 79%. At no time does DNC meet Committed Capacity.

Figure 19 **Newlands Coal System DNC % achieved of Committed Capacity**



4.2.2. Mainline/Branch Line Level (monthly)

The DNC calculated for Newlands Coal System by mainline and branch line by month and year for the five-year assessment period is shown in t**able 1** below. The percentage is the percent DNC of committed Train Paths. Where this value is less than 100%, the DNC representing the capacity of the Rail Infrastructure is not able to meet the Committed Capacity at a Coal System level.

While Newlands Coal System is shown separately, the DSM models Newlands Coal System and GAPE Coal Systems together, as there is some Rail Infrastructure that is common to both Coal Systems.

If an individual branch line or mainline is showing a DNC less than 100% for the year, this does not necessarily indicate that line of the Rail Infrastructure is unable to meet Committed Capacity. The DNC is calculated using the origin (mine) to destination (terminal) Train Path and if anywhere on that Train Path the Committed Capacity cannot be met it will influence the allocation of DNC to the branch line or mainline level. Mitigation analysis can then focus on where specifically in the system any shortfall can be best managed.

Table 1 **Newlands Coal System monthly DNC % achieved of Committed Capacity by mainline and branch line**

FY20 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Newlands Coal System		**65%**	**60%**	**61%**	**62%**	**59%**	**67%**	**66%**	**66%**	**62%**	**63%**	**40%**	**63%**	**61%**
1	M.L. - Collinsville to Pring	65%	60%	61%	62%	59%	67%	66%	66%	62%	63%	40%	63%	61%
1A	B.L. - Pring to Abbot Point	65%	60%	61%	62%	59%	67%	66%	66%	62%	63%	40%	63%	61%
1B	B.L. - Newlands Mine to Collinsville	65%	60%	61%	62%	59%	67%	66%	66%	62%	63%	40%	63%	61%

FY21 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Newlands Coal System		**67%**	**68%**	**71%**	**79%**	**63%**	**73%**	**77%**	**76%**	**75%**	**69%**	**73%**	**70%**	**72%**
1	M.L. - Collinsville to Pring	67%	68%	71%	79%	63%	73%	77%	76%	75%	69%	73%	70%	72%
1A	B.L. - Pring to Abbot Point	67%	68%	71%	79%	63%	73%	77%	76%	75%	69%	73%	70%	72%
1B	B.L. - Newlands Mine to Collinsville	67%	68%	71%	79%	63%	73%	77%	76%	75%	69%	73%	70%	72%

FY22 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Newlands Coal System		**59%**	**65%**	**64%**	**70%**	**61%**	**67%**	**70%**	**69%**	**67%**	**70%**	**61%**	**70%**	**66%**
1	M.L. - Collinsville to Pring	59%	65%	64%	70%	61%	67%	70%	69%	67%	70%	61%	70%	66%
1A	B.L. - Pring to Abbot Point	59%	65%	64%	70%	61%	67%	70%	69%	67%	70%	61%	70%	66%
1B	B.L. - Newlands Mine to Collinsville	59%	65%	64%	70%	61%	67%	70%	69%	67%	70%	61%	70%	66%

FY23 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Newlands Coal System		**55%**	**66%**	**66%**	**70%**	**60%**	**68%**	**69%**	**69%**	**68%**	**69%**	**59%**	**70%**	**66%**
1	M.L. - Collinsville to Pring	55%	66%	66%	70%	60%	68%	69%	69%	68%	69%	59%	70%	66%
1A	B.L. - Pring to Abbot Point	55%	66%	66%	70%	60%	68%	69%	69%	68%	69%	59%	70%	66%
1B	B.L. - Newlands Mine to Collinsville	55%	66%	66%	70%	60%	68%	69%	69%	68%	69%	59%	70%	66%

FY24 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Newlands Coal System		**60%**	**71%**	**70%**	**74%**	**64%**	**74%**	**67%**	**68%**	**66%**	**67%**	**57%**	**67%**	**67%**
1	M.L. - Collinsville to Pring	60%	71%	70%	74%	64%	74%	67%	68%	66%	67%	57%	67%	67%
1A	B.L. - Pring to Abbot Point	60%	71%	70%	74%	64%	74%	67%	68%	66%	67%	57%	67%	67%
1B	B.L. - Newlands Mine to Collinsville	60%	71%	70%	74%	64%	74%	67%	68%	66%	67%	57%	67%	67%

4.2.3. Origin/Destination Level (monthly)

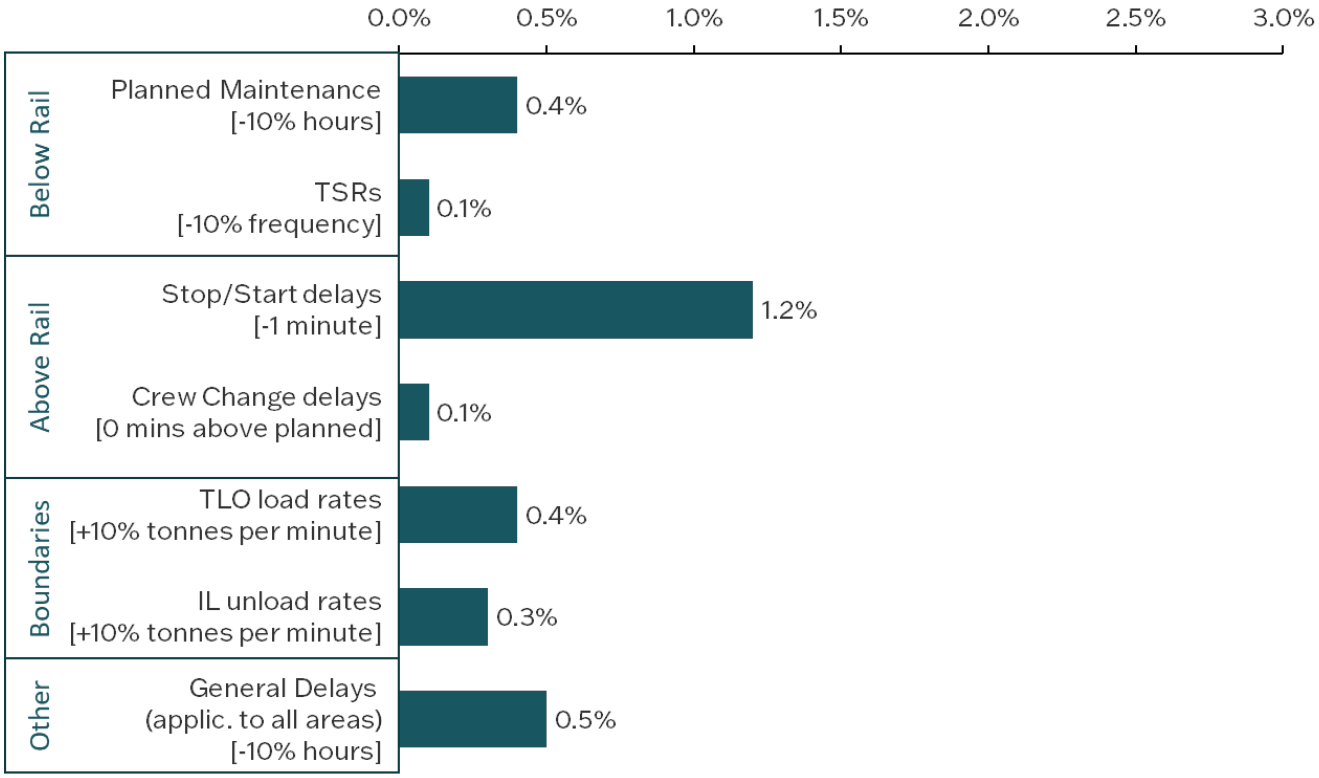
The IE is required to report the DNC by Coal System and mainline and branch line. However, given Below Rail contracts are at an origin/destination level and the affected parties of any ECDs must be identified, the DNC has been calculated for each origin/destination pair by month for the five-year assessment period. This is shown in **Appendix B.**

While a mainline or branch line DNC may have a shortfall or exceed Committed Capacity the origin/destination pairs may vary dependent on varying factors and assumptions. For Newlands Coal System all [redacted] contracted parties have ECDs. Given the variability of the DSM, any DNC that is within 1% of meeting Committed Capacity is considered to be achieving.

4.3. DNC Materiality Analysis

Section 3.3 provides high-level sensitivity data for the network. **Figure 20** shows the materiality impact on DNC specifically for the Newlands Coal System. The focus is on operating and maintenance improvement impacts with capital options mentioned further in **section 4.4.1** of the report.

Figure 20 **SOP Parameter materiality on Newlands Coal System - % of DNC**



Start/Stop delay improvement and a reduction in general delays have the greatest impact on DNC uplift for the Newlands Coal System when operating at Committed Capacity (~ 51M tonnes combined GAPE and Newlands Coal Systems). A 1% improvement in DNC equates to an increase in annual Train Paths of ~20 (~ 0.14M tonnes) for the Newlands Coal System.

- Changes to Above Rail input parameters have a more significant impact on result sensitivity;
    - Reducing the time impact of stopping and starting minutes by 1 minute has a 1.2% impact on DNC;
    - The DNC output is less sensitive to the removal of crew change delays (above planned time).
- Changes to boundary assumptions also have a minimal impact on DNC.
    - Increasing TLO load rates by 10% provides a 0.4% increase in DNC;
    - Increasing unload rates at the inloaders by 10% has an impact on DNC of 0.3%.
- Reducing General delay hours by 10% has a 0.5% impact on throughput.

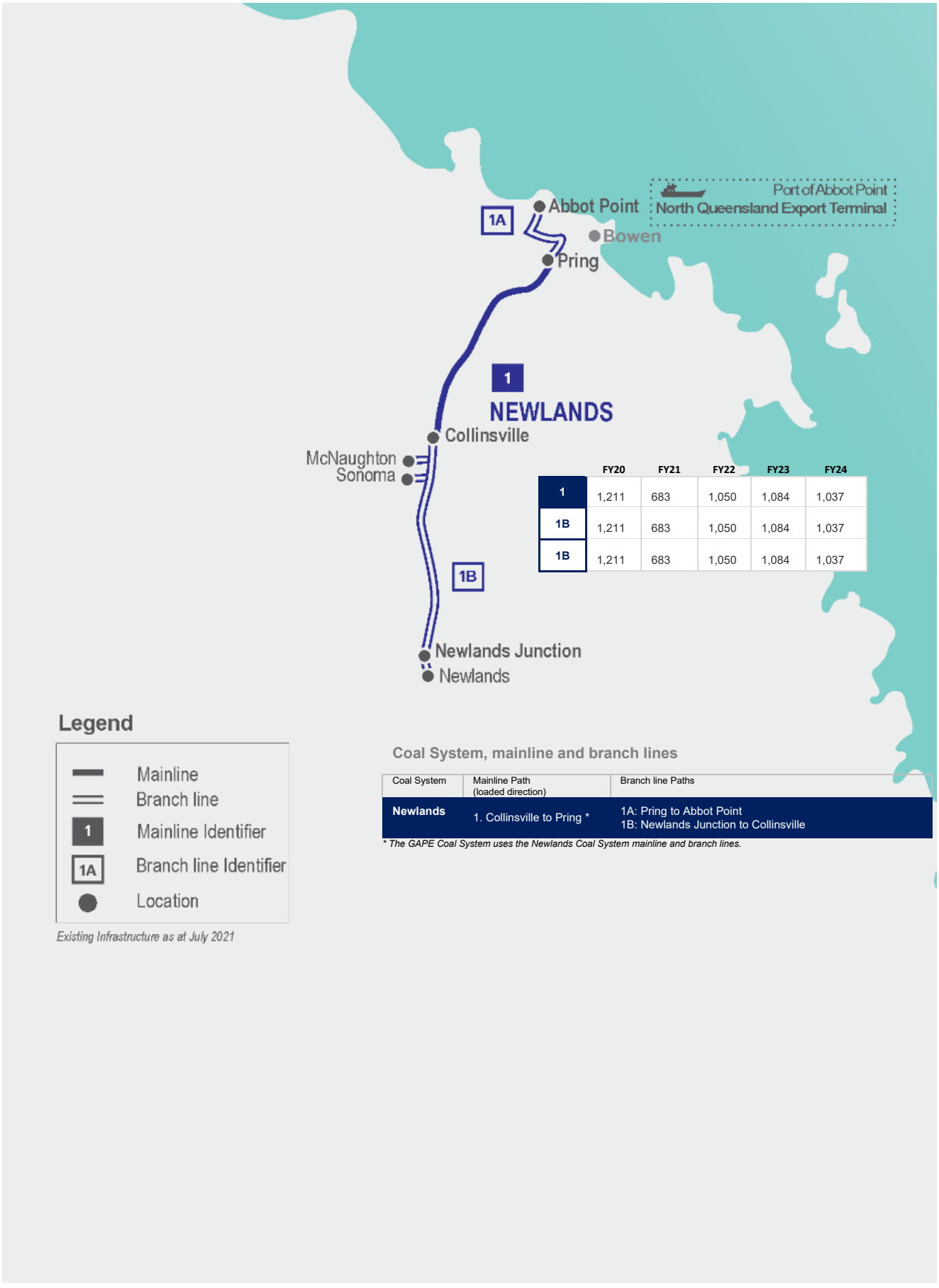
4.4. Existing Capacity Deficits

An ECD exists in a Coal System if the DNC (within the Capacity Assessment Period) is lower than the number of Train Paths required to meet Train Service Entitlements (TSEs).

If an ECD has been identified, the ECD is apportioned to each affected party equivalent to the percentage of Committed Capacity for that Coal System.

Figure 21 shows ECDs by mainline and branch line for the Newlands Coal System, per year, for the five-year assessment period year. A zero means there is no ECD.

Figure 21 **Newlands Coal System ECDs (Train Paths)**



	FY20	FY21	FY22	FY23	FY24
1	1,211	683	1,050	1,084	1,037
1B	1,211	683	1,050	1,084	1,037
1B	1,211	683	1,050	1,084	1,037

Coal System, mainline and branch lines

Coal System	Mainline Path (loaded direction)	Branch line Paths
Newlands	1. Collinsville to Pring *	1A: Pring to Abbot Point 1B: Newlands Junction to Collinsville

** The GAPE Coal System uses the Newlands Coal System mainline and branch lines.*

There are ECDs for all branch lines and the main line. **Appendix B** provides individual origin/destination data and the affected parties of ECDs identified for the Newlands Coal System.

4.4.1. Root Cause and Mitigation of Existing Capacity Deficits

Results

The IE has determined that:

- The DNC of the Newlands Coal System Rail Infrastructure is ~2,100 Train Paths or ~ 14M tonnes for FY22 to FY24.
- The Newlands Coal System has an identified ECD of 1,050 Train Paths for FY22.
- This is equivalent to between 7M – 7.3M tonnes annual shortfall. This equates to the Rail Infrastructure being capable of meeting approximately 66% of Committed Capacity on average for the five (5) year Assessment Period.
- [redacted]
- [redacted]
- The GAPE Coal System Committed Capacity utilises the entire Newlands Coal System Rail Infrastructure. For both Coal Systems this equates to ~ 7,500 Train Paths (~51M tonnes).
- Committed Capacity (Newlands Coal System contracts only) for FY22 is ~ 3,097 Train Paths or ~ 20.9M tonnes. The Committed Capacity increases by ~2% from FY22 to FY24.
- This DNC is calculated taking into consideration that the GAPE Coal System Committed Capacity is using the mainline and branch lines of the Newlands Coal System.
- All [redacted] of the contracted origin/destination parties are impacted and have ECDs as a result.
- All branch lines and mainlines in the Newlands Coal System are impacted. Not one month in the five-year assessment period showed the DNC of the Rail Infrastructure is capable of meeting the Committed Capacity.
- While operational and maintenance improvements will provide some positive capacity uplift, the quantum of the ECD is significant and capital is likely to be required to achieve Committed Capacity.

Root Cause factors

The quantum of the ECD for the Newlands Coal System is significant.

The major restrictions to achieving the Committed Capacity occurs on branch line 1B Newlands Junction to Collinsville and the mainline 1. Collinsville to Pring. As all Newlands Coal System and GAPE Coal System users traverse at least one of these sections, the ECD allocation is consistent with the proportion of Committed Capacity.

Any mitigation for the Newlands Coal System (and the GAPE Coal System) must consider the large contracted, but generally unused, capacity that traverses from the GAPE Coal System through the Newlands Coal System to NQXT that will impact critical operational and capital decisions for capacity.

Mitigation Options

The DNC materiality analysis on key operational and maintenance factors in **section 4.3** provide indicative areas of opportunity for an improvement in DNC in the Newlands Coal System. Other areas that would likely improve DNC are:

- Headway in the Newlands Coal System and GAPE Coal System is currently at 60 minutes. To achieve the Committed Capacity this needs to be reduced to below 40 minutes to achieve a considerable increase in Train Paths.
- Installation of RCS on all points (3 in total) between McNaughton Junction and Newlands Junction on branch line 1B Newlands Junction to Collinsville. This will significantly reduce the headway time by at least 33%.
- It is recommended that if RCS was to be installed, that this occur in parallel to the Collinsville passing loop being reinstated or with the Coral Creek passing loop being installed. The combination of RCS and one of these passing loops will increase DNC by ~25% for all traffic using the Newlands Coal System. This equates to between 8-9M tonnes annual capacity uplift across both Newlands Coal System and GAPE Coal System.
- As the demand increases in the Newlands Coal System, the yard capacity and operations at Pring is also likely to be a constraint.

5. GAPE Coal System

5.1. Overview of Coal System

A map of the GAPE Coal System is provided in **figure 22**. It shows the only branch line that makes up the GAPE Coal System. It also shows the branch lines that feed any Committed Capacity to the GAPE Coal System from the Goonyella Coal System and to the Newlands Coal System.

The GAPE Coal System refers to the Rail Infrastructure comprising the rail corridor from North Goonyella Junction to Newlands Junction. There are a number of contracts however that originate from the Goonyella Coal System that also traverse through the GAPE Coal System. These are via branch lines 3F Blair Athol Mine to Wotonga, 3E North Goonyella Mine to Wotonga, 3C Oaky Creek Junction to Coppabella and 3D Coppabella to Wotonga.

The Newlands Coal System Rail Infrastructure is also used by GAPE Coal System traffic.

Figure 22 GAPE Coal system

The GAPE Coal System has [redacted] origin/destination contracts that enter directly into the GAPE Coal System or from the Goonyella Coal System. [redacted] The impact of this contract on the DNC and the GAPE Coal System and Newlands Coal System is significant in terms of DNC and mitigation options to alleviate ECDs.

5.2. Deliverable Network Capacity

5.2.1. Coal System Level (monthly)

The DNC calculated for the GAPE Coal System by month for the five-year assessment period is shown in **figure 23** below.

- The DNC in Train Paths ranges from 2,651 to 2,962 over the period.
- Peak Committed Capacity occurs in FY24 at 4,398 Train Paths or ~ 29.5M tonnes. The maximum DNC occurs in FY21 at 2,962 Train Paths (~ 20M tonnes).
- FY22 DNC is 2,798 Train Paths (~19M tonnes).
- There is considerable variability in the GAPE Coal System DNC month by month compared to other systems. The GAPE Coal System must traverse through the Newlands Coal System and this also impacts the DNC. Key impacts on the variability include, demand profile, maintenance, delays and TSRs. Where there are large differences in a month between years it relates generally to FSS timing or significant increase/decrease in maintenance.
- For all months the DNC does not meet the Committed Capacity.

Figure 23 **GAPE Coal System DNC by year and month – Train Paths**

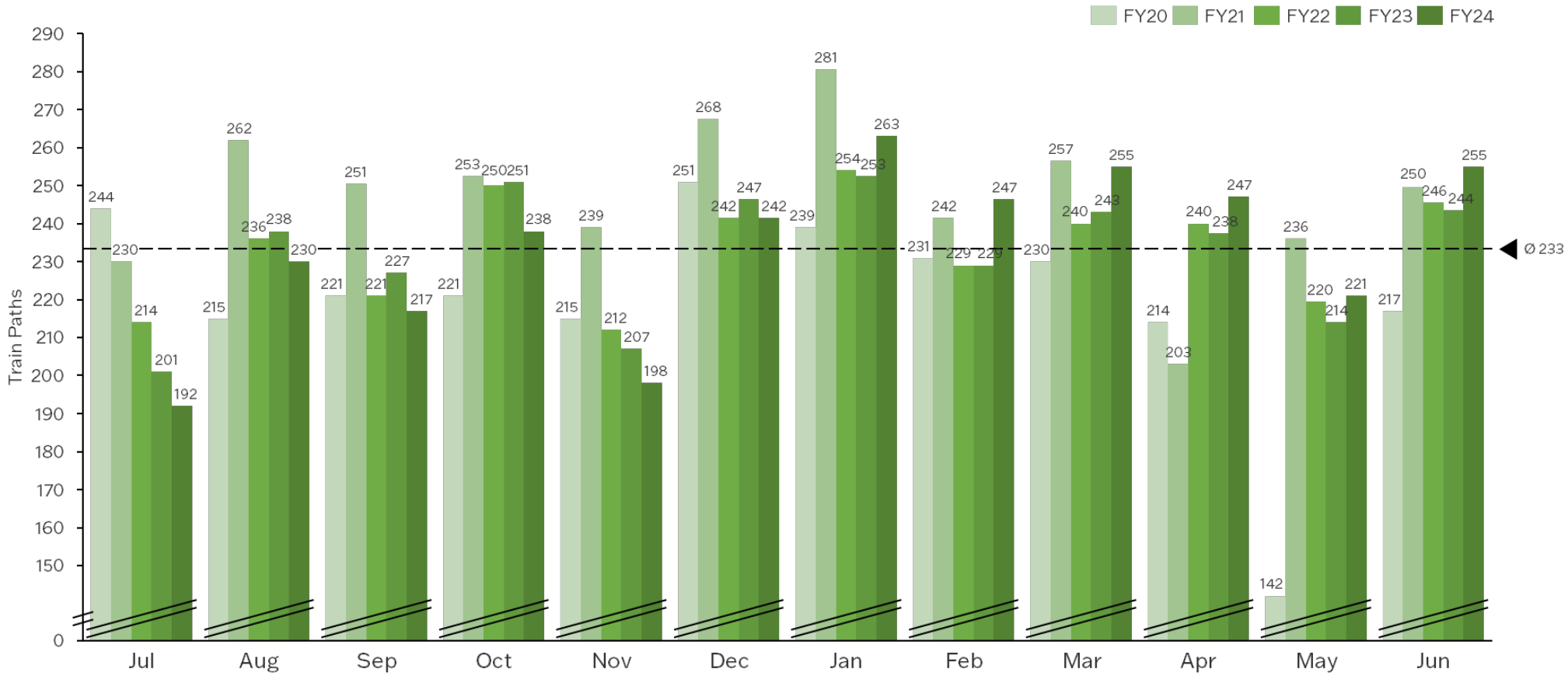
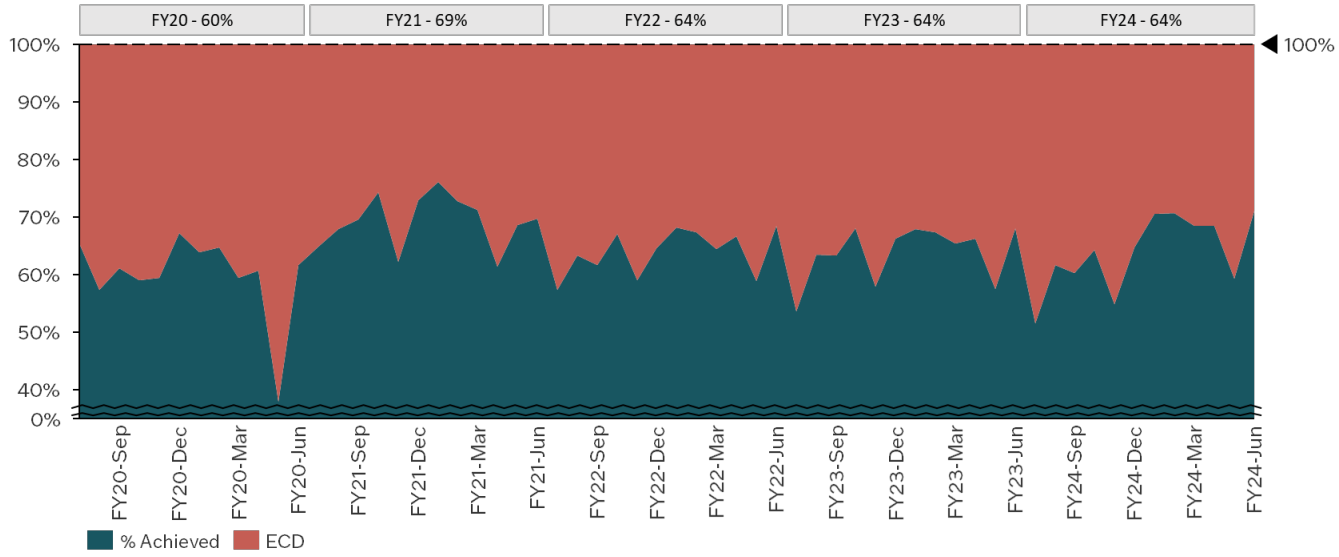


Figure 24 shows the same data as a percentage achieved DNC of Committed Capacity. Where this value is less than 100%, the DNC representing the capacity of the Rail Infrastructure is not able to meet the Committed Capacity.

- On an annual basis the GAPE Coal System's DNC is meeting 60% – 69% of Committed Capacity. For FY22 it is 64%.
- The maximum DNC as a percent of Committed Capacity that has been achieved in the period is ~ 76%. At no time does DNC meet Committed Capacity.

Figure 24 **GAPE Coal System DNC % achieved of Committed Capacity**



5.2.2. Mainline/Branch Line Level (monthly)

The DNC calculated for the GAPE Coal System by mainline and branch line by month for the five-year assessment period is shown in **table 2** below. Note – all branch lines that have an origin entering the GAPE Coal System is shown and only branch line 2A North Goonyella Junction to Newlands Junction is considered GAPE Coal System infrastructure. The percentage is the percent DNC of contracted Train Paths. Where this value is less than 100%, the DNC representing the capacity of the Rail Infrastructure is not able to meet the Committed Capacity at a Coal System level.

The mainline and branch lines in the GAPE Coal System are impacted by the Newlands Coal System capacity. The system is capable of achieving ~ 64% of the Committed Capacity from FY22.

If an individual branch line or mainline is showing a DNC less than 100% for the year, this does not necessarily indicate that the line of the Rail Infrastructure is unable to meet Committed Capacity. The DNC is calculated using the origin (mine) to destination (terminal) Train Path and if anywhere on that Train Path the Committed Capacity cannot be met, it will influence the allocation of DNC to the branch line or mainline level. Mitigation analysis can then focus on where specifically in the system any shortfall can be best managed.

Table 2 GAPE Coal System monthly DNC % achieved of Committed Capacity by mainline and branch line

FY20 - % Achieved			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
GAPE Coal System			**65%**	**57%**	**61%**	**59%**	**59%**	**67%**	**64%**	**65%**	**59%**	**61%**	**38%**	**62%**	**60%**
1	M.L. - Collinsville to Pring		65%	57%	61%	59%	59%	67%	64%	65%	59%	61%	38%	62%	60%
1A	B.L. - Pring to Abbot Point		65%	57%	61%	59%	59%	67%	64%	65%	59%	61%	38%	62%	60%
1B	B.L. - Newlands Mine to Collinsville		65%	57%	61%	59%	59%	67%	64%	65%	59%	61%	38%	62%	60%
2A	**B.L. - North Goonyella Junction to Newlands Junction**	*	**65%**	**57%**	**61%**	**59%**	**59%**	**67%**	**64%**	**65%**	**59%**	**61%**	**38%**	**62%**	**60%**
3C	B.L. - Oaky Creek Junction to Coppabella		66%	57%	60%	58%	59%	66%	65%	66%	59%	61%	36%	61%	60%
3D	B.L. - Coppabella to Wotonga		66%	57%	60%	58%	59%	66%	65%	66%	59%	61%	36%	61%	60%
3E	B.L. - Wotonga to North Goonyella		66%	57%	61%	59%	60%	67%	65%	65%	60%	61%	38%	62%	60%
3F	B.L. - Blair Athol Mine to Wotonga		63%	57%	61%	62%	60%	68%	61%	62%	57%	58%	38%	60%	58%

FY21 - % Achieved			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
GAPE Coal System			**65%**	**68%**	**70%**	**74%**	**62%**	**73%**	**76%**	**73%**	**71%**	**61%**	**69%**	**70%**	**69%**
1	M.L. - Collinsville to Pring		65%	68%	70%	74%	62%	73%	76%	73%	71%	61%	69%	70%	69%
1A	B.L. - Pring to Abbot Point		65%	68%	70%	74%	62%	73%	76%	73%	71%	61%	69%	70%	69%
1B	B.L. - Newlands Mine to Collinsville		65%	68%	70%	74%	62%	73%	76%	73%	71%	61%	69%	70%	69%
2A	**B.L. - North Goonyella Junction to Newlands Junction**	*	**65%**	**68%**	**70%**	**74%**	**62%**	**73%**	**76%**	**73%**	**71%**	**61%**	**69%**	**70%**	**69%**
3C	B.L. - Oaky Creek Junction to Coppabella		65%	68%	69%	75%	62%	72%	76%	74%	71%	58%	70%	69%	69%
3D	B.L. - Coppabella to Wotonga		65%	68%	69%	75%	62%	72%	76%	74%	71%	58%	70%	69%	69%
3E	B.L. - Wotonga to North Goonyella		65%	68%	70%	75%	62%	73%	76%	73%	71%	60%	69%	70%	69%
3F	B.L. - Blair Athol Mine to Wotonga		64%	68%	69%	72%	63%	73%	76%	71%	70%	60%	67%	70%	69%

FY22 - % Achieved			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
GAPE Coal System			**57%**	**63%**	**62%**	**67%**	**59%**	**65%**	**68%**	**67%**	**64%**	**67%**	**59%**	**68%**	**64%**
1	M.L. - Collinsville to Pring		57%	63%	62%	67%	59%	65%	68%	67%	64%	67%	59%	68%	64%
1A	B.L. - Pring to Abbot Point		57%	63%	62%	67%	59%	65%	68%	67%	64%	67%	59%	68%	64%
1B	B.L. - Newlands Mine to Collinsville		57%	63%	62%	67%	59%	65%	68%	67%	64%	67%	59%	68%	64%
2A	**B.L. - North Goonyella Junction to Newlands Junction**	*	**57%**	**63%**	**62%**	**67%**	**59%**	**65%**	**68%**	**67%**	**64%**	**67%**	**59%**	**68%**	**64%**
3C	B.L. - Oaky Creek Junction to Coppabella		57%	64%	62%	67%	59%	65%	68%	69%	65%	65%	59%	68%	64%
3D	B.L. - Coppabella to Wotonga		57%	64%	62%	67%	59%	65%	68%	69%	65%	65%	59%	68%	64%
3E	B.L. - Wotonga to North Goonyella		57%	64%	62%	67%	59%	65%	68%	68%	65%	66%	59%	69%	64%
3F	B.L. - Blair Athol Mine to Wotonga		58%	63%	61%	67%	59%	64%	68%	67%	64%	67%	58%	68%	64%

FY23 - % Achieved			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
GAPE Coal System			**54%**	**63%**	**63%**	**68%**	**58%**	**66%**	**68%**	**67%**	**65%**	**66%**	**58%**	**68%**	**64%**
1	M.L. - Collinsville to Pring		54%	63%	63%	68%	58%	66%	68%	67%	65%	66%	58%	68%	64%
1A	B.L. - Pring to Abbot Point		54%	63%	63%	68%	58%	66%	68%	67%	65%	66%	58%	68%	64%
1B	B.L. - Newlands Mine to Collinsville		54%	63%	63%	68%	58%	66%	68%	67%	65%	66%	58%	68%	64%
2A	**B.L. - North Goonyella Junction to Newlands Junction**	*	**54%**	**63%**	**63%**	**68%**	**58%**	**66%**	**68%**	**67%**	**65%**	**66%**	**58%**	**68%**	**64%**
3C	B.L. - Oaky Creek Junction to Coppabella		53%	64%	63%	67%	56%	67%	68%	68%	66%	64%	58%	68%	63%
3D	B.L. - Coppabella to Wotonga		53%	64%	63%	67%	56%	67%	68%	68%	66%	64%	58%	68%	63%
3E	B.L. - Wotonga to North Goonyella		54%	64%	63%	68%	58%	66%	68%	68%	65%	66%	58%	68%	64%
3F	B.L. - Blair Athol Mine to Wotonga		54%	63%	63%	68%	58%	66%	67%	67%	65%	67%	58%	67%	64%

FY24 - % Achieved			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
GAPE Coal System			**51%**	**62%**	**60%**	**64%**	**55%**	**65%**	**71%**	**71%**	**68%**	**68%**	**59%**	**71%**	**64%**
1	M.L. - Collinsville to Pring		51%	62%	60%	64%	55%	65%	71%	71%	68%	68%	59%	71%	64%
1A	B.L. - Pring to Abbot Point		51%	62%	60%	64%	55%	65%	71%	71%	68%	68%	59%	71%	64%
1B	B.L. - Newlands Mine to Collinsville		51%	62%	60%	64%	55%	65%	71%	71%	68%	68%	59%	71%	64%
2A	**B.L. - North Goonyella Junction to Newlands Junction**	*	**51%**	**62%**	**60%**	**64%**	**55%**	**65%**	**71%**	**71%**	**68%**	**68%**	**59%**	**71%**	**64%**
3C	B.L. - Oaky Creek Junction to Coppabella		52%	61%	60%	65%	53%	65%	71%	68%	68%	63%	59%	70%	63%
3D	B.L. - Coppabella to Wotonga		52%	61%	60%	65%	53%	65%	71%	68%	68%	63%	59%	70%	63%
3E	B.L. - Wotonga to North Goonyella		52%	62%	60%	64%	55%	65%	70%	70%	68%	68%	59%	71%	64%
3F	B.L. - Blair Athol Mine to Wotonga		51%	62%	60%	64%	56%	65%	70%	72%	68%	71%	59%	71%	64%

***** The mainlines and branch lines have been shown as they are allocated (geographically) to the relevant Coal System. Some branch lines and mainlines are used to transport coal for multiple Coal Systems. To determine the total DNC of a branch line or mainline that is used in multiple Coal Systems, each DNC would need to be combined to calculate the total. See **Appendix A**.

5.2.3. Origin/Destination Level (monthly)

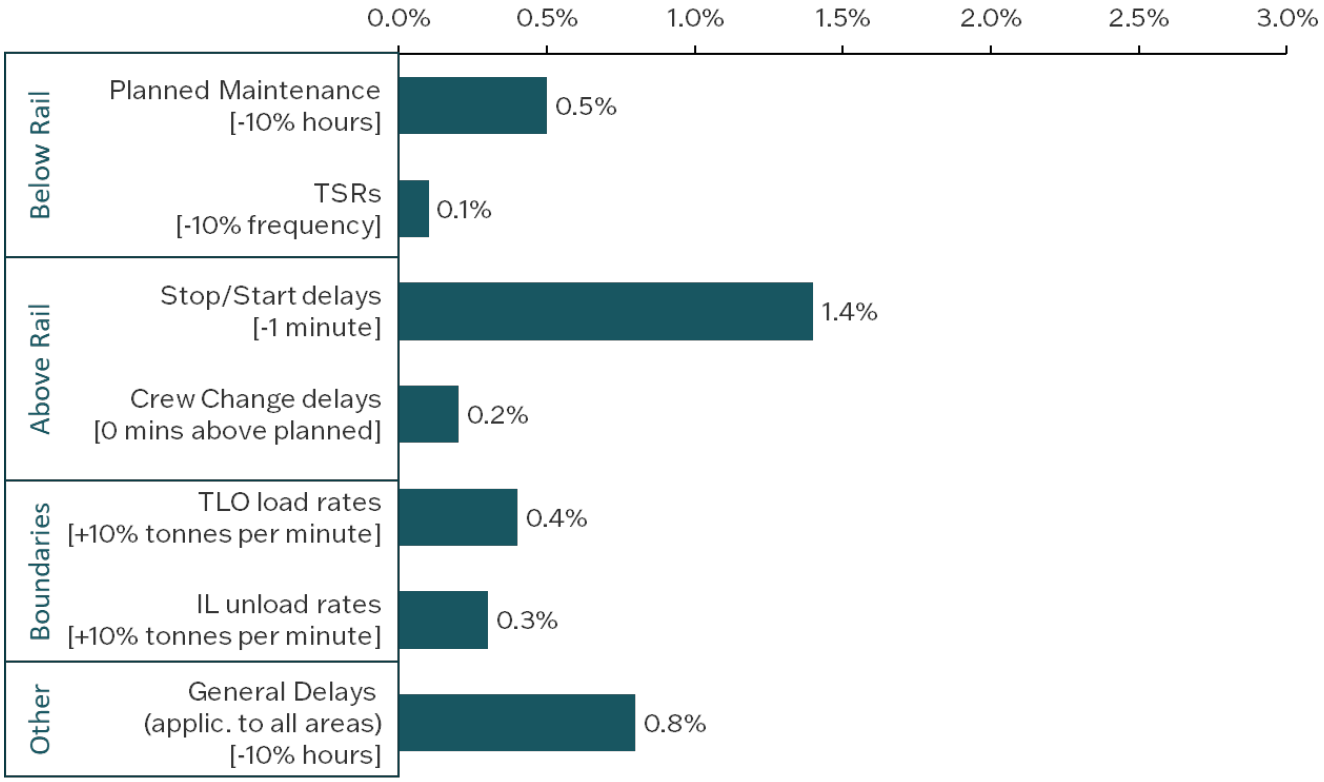
The IE is required to report the DNC by Coal System and mainline and branch line. However, given Below Rail contracts are at origin/destination level and the affected parties of any ECDs must be identified, the DNC has been calculated for each origin/destination pair by month for the five-year assessment period. This is shown in **Appendix C.**

While a mainline or branch line DNC may have a shortfall or exceed Committed Capacity the origin/destination pair may vary dependent on varying factors and assumptions. For the GAPE Coal System all origin/destinations do not meet Committed Capacity for any of the five years. Given the variability of the DSM any DNC that is within 1% of meeting Committed Capacity is considered to be achieving.

5.3. DNC Materiality Analysis

Section 3.3 provides high-level sensitivity data for the network. **Figure 25** shows the materiality impact on DNC specifically for the GAPE Coal System. The focus is on operating and maintenance improvement impacts with capital options mentioned further in **section 5.4.1** of the report.

Figure 25 **SOP parameter materiality on GAPE Coal System - % of DNC**



Start/Stop delay improvement and an improvement in general delays have the greatest impact on DNC uplift for the GAPE Coal System when operating at Committed Capacity. A 1% improvement in DNC equates to an increase in annual Train Paths of ~30 (~ 0.2M tonnes).

- Changes to Below Rail input parameters (planned maintenance and TSRs) have minimal impact on DNC;
- Changes to Above Rail input parameters have a more significant impact on result sensitivity;
    - Reducing the time impact of stopping and starting minutes by 1 minute has a 1.4% impact on DNC;
    - The DNC is less sensitive to the removal of crew change delays (above planned time).

- Changes to boundary assumptions also have a minimal impact on DNC.
    - Increasing TLO load rates by 10% provides a 0.4% increase in DNC;
    - Increasing unload rates at the inloaders by 10% has minimal impact of 0.3% on DNC.
- Reducing General delays by 10% has a 0.8% impact on throughput.

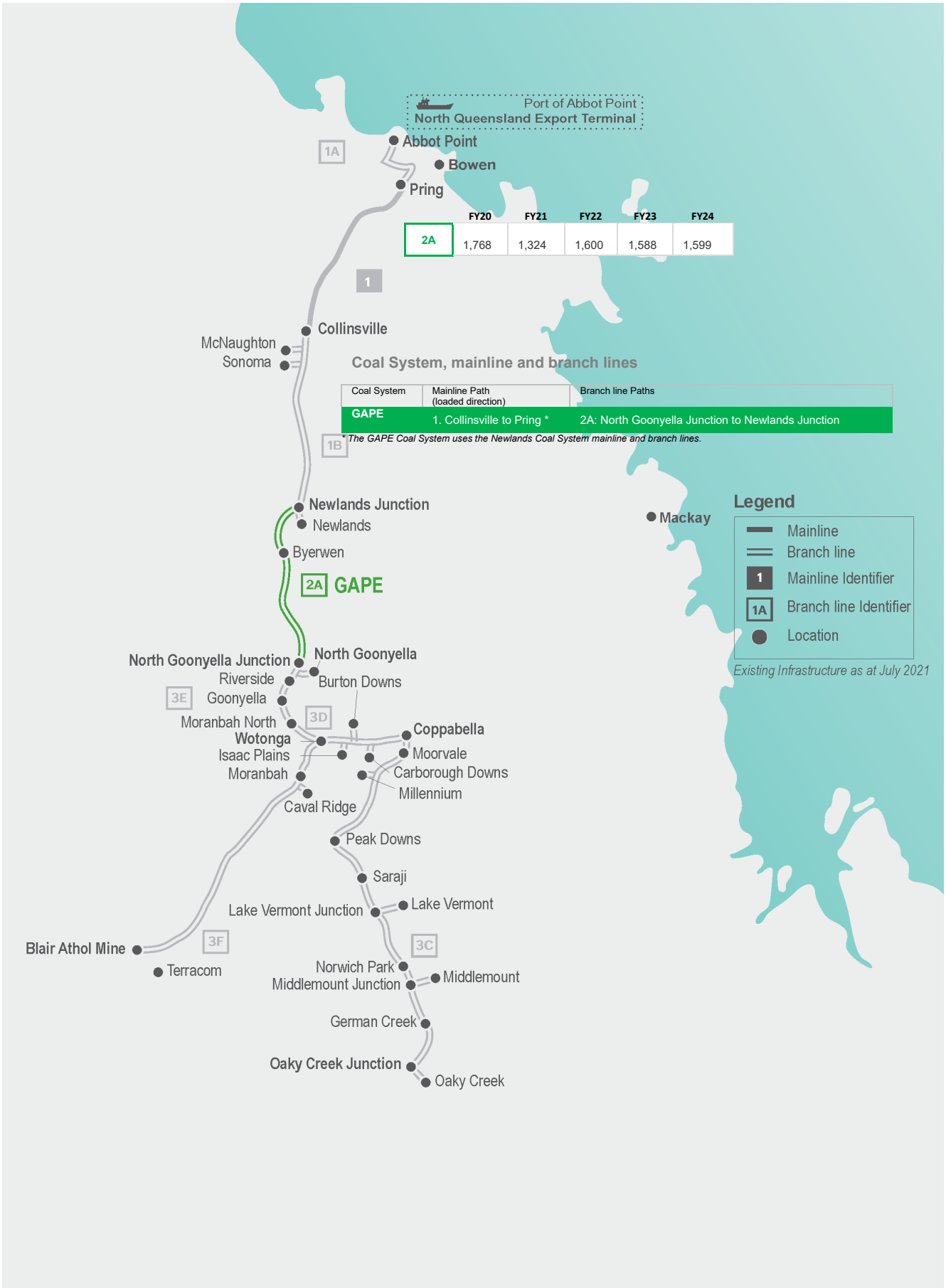
5.4. Existing Capacity Deficits

An ECD exists in a Coal System if the DNC (within the Capacity Assessment Period) is lower than the number of Train Paths required to meet Train Service Entitlements (TSEs).

If an ECD has been identified, the ECD is apportioned to each affected party equivalent to the percentage of Committed Capacity for that system.

Figure 26 shows ECDs by mainline and branch line for the GAPE Coal System, per year, for the five-year assessment period year. A zero means there is no ECD.

Figure 26 **GAPE Coal System ECDs (Train Paths)**



There are ECDs for all branch lines and the main line. **Appendix C** provides individual origin/destination data and the affected parties of ECDs for the GAPE Coal System.

5.4.1. Root Cause and Mitigation of Existing Capacity Deficits

Results

The IE has determined that:

- The DNC of the GAPE Coal System Rail Infrastructure is ~ 2,800 Train Paths or ~ 19M tonnes for FY22 to FY24.
- The GAPE Coal System has an identified ECD of 1,591 Train Paths for FY22.
- This is equivalent to between 10M - 11M tonnes annual shortfall. This equates to the Rail Infrastructure being capable of meeting ~ 64% of the Committed Capacity for the five (5) year Assessment Period.
- [redacted]
- [redacted]
- All GAPE Coal System users utilise the Newlands Coal System mainline and branch lines to reach NQXT. The GAPE Coal System includes branch line 2A North Goonyella Junction to Newlands Junction. Other branch lines that feed into the GAPE Coal System with Committed Capacity include: 3C Oaky Creek Junction to Coppabella, 3D Coppabella to Wotonga, 3E Wotonga to North Goonyella junction and 3F Blair Athol Mine to Wotonga.
- The main line 1 Collinsville to Pring has a total Committed Capacity (Newlands and GAPE Coal Systems combined) of 7,486 Train Paths for FY22 (see **Appendix A**) and a DNC of 4,845 Train Paths for same period.
- Committed Capacity (GAPE Coal System contracts only) from FY22 is ~ 4390 Train Paths or ~ 29M tonnes. The Committed Capacity remains static between FY22 and FY24.
- All origin/destination contracts are impacted and have ECDs as a result.
- The combined ECD for the Newlands Coal System and the GAPE Coal System is ~ 18M tonnes at Committed Capacity.
- Not one month in the five-year assessment period showed the DNC of the Rail Infrastructure capable of meeting the Committed Capacity.

Root Cause factors

The quantum of the ECD for the GAPE Coal System is significant. Branch line 1B in the Newlands Coal System from Newlands Junction to Collinsville and then the mainline in the Newlands Coal System (1. Collinsville to Pring) has been shown to be key areas for any initial mitigation focus for both the Newlands Coal System and the GAPE Coal System.

Any mitigation for the GAPE Coal System must consider the large contracted, but generally unused, capacity that traverses from the Goonyella Coal System through the Newlands Coal System to NQXT that will impact critical operational and capital decisions for capacity.

Mitigation Options

The DNC materiality analysis on key operational and maintenance factors in **section 5.3** provide indicative areas of opportunity for an improvement in DNC.

Options that should be considered for bridging the ECD for the GAPE Coal System rely heavily on mitigation of the Newlands Coal System to increase capacity. The mitigation options outlined for Newlands Coal System apply to GAPE Coal System ECDs. They are repeated below.

- Headway in the Newlands Coal System and GAPE Coal System is currently at 60 minutes. To achieve Committed Capacity this needs to be reduced to below 40 minutes to achieve a considerable (>35%) increase in Train Paths per day.
- Installation of RCS on all points (3 in total) between McNaughton Junction and Newlands junction on branch line 1B Newlands Junction to Collinsville. This will significantly reduce the headway time by at least 33%.
- It is recommended that if RCS was to be installed, that this occur in parallel to the Collinsville passing loop being reinstated or with the Coral Creek passing loop being installed. The combination of RCS and one of these passing loops will increase DNC by ~25% for all traffic using the Newlands Coal System. This equates to between 8M-9M tonnes annual uplift for Newlands Coal System and GAPE Coal System.
- As the demand increases in the Newlands Coal System, the yard capacity and operations at Pring is also likely to be a constraint.

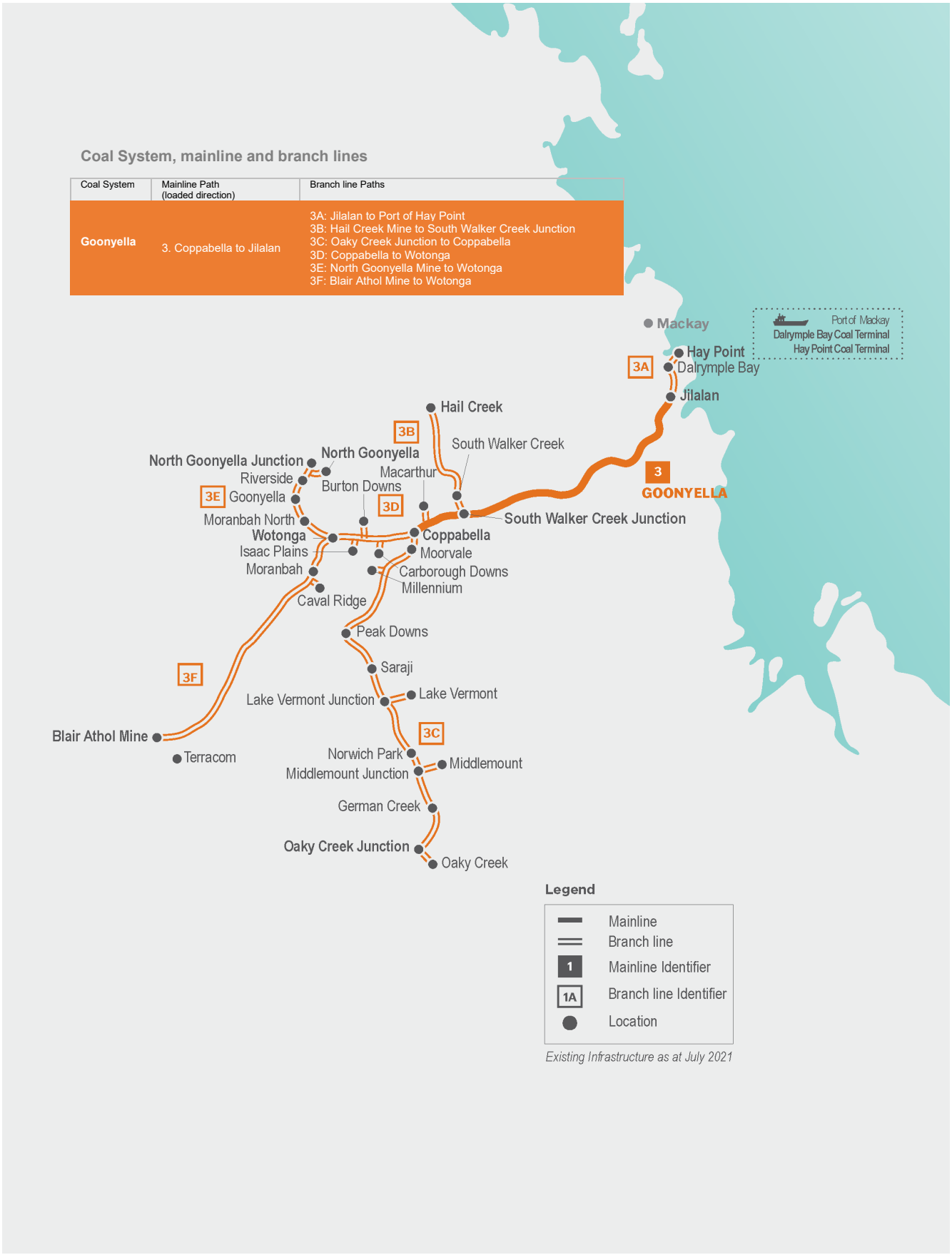
6. Goonyella Coal System

6.1. Overview of Coal System

A map of the Goonyella Coal System is provided in **figure 27**. It shows the system and each mainline and branch line that makes up the Goonyella Coal System.

The Goonyella Coal System refers to the Rail Infrastructure comprising the rail corridor from the terminals at the Port of Hay Point (i.e., Hay Point Services Coal Terminal and Dalrymple Bay Coal Terminal) to Hail Creek mine, Blair Athol mine, North Goonyella mine and the junction with the Oaky Creek branch line and all branch lines directly connecting coal mine loading facilities to those corridors.

Figure 27 **Goonyella Coal System**



There are [redacted] origin/destination contracts (FY22 onwards) that enter directly into the Goonyella Coal System. [redacted]

6.2. Deliverable Network Capacity

Section 3 has provided the DNC, Committed Capacity and ECD for the network and each Coal System by year for the period FY20 to FY24. This section provides more detailed analysis and data at a monthly and mainline and branch line level for the Goonyella Coal System.

6.2.1. Coal System Level (monthly)

The DNC calculated for the Goonyella Coal System by month for the five-year assessment period is shown in **figure 28** below.

- The DNC in Train Paths ranges from 12,441 to 13,000 over the period. This equates to a DNC tonnage capacity range of 124M – 130M tonnes on an annual basis. FY22 DNC is 12,933 Train Paths (~129M tonnes).
- Peak Committed Capacity occurs in FY24 at 14,099 Train Paths (~141M tonnes). The maximum DNC occurs in FY24.
- There is considerable variability between months and between years in some instances. From FY22 to FY24 similar data is used in the DSM. Key impacts on the variability include, demand profile, maintenance, delays and TSRs. Where there are large differences in a month between years it relates generally to FSS timing or significant increase/decrease in maintenance.

Figure 28 **Goonyella Coal System DNC Train Paths by year and month – Train Paths**

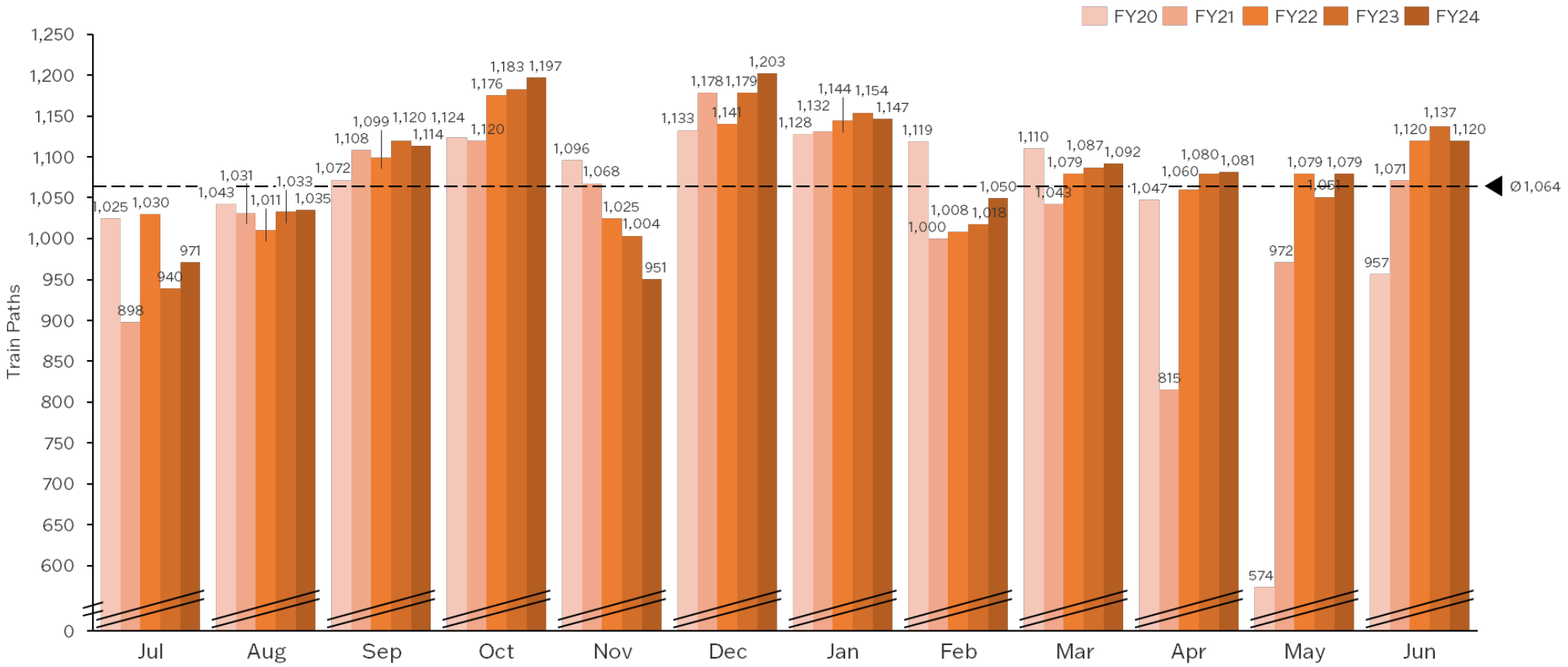
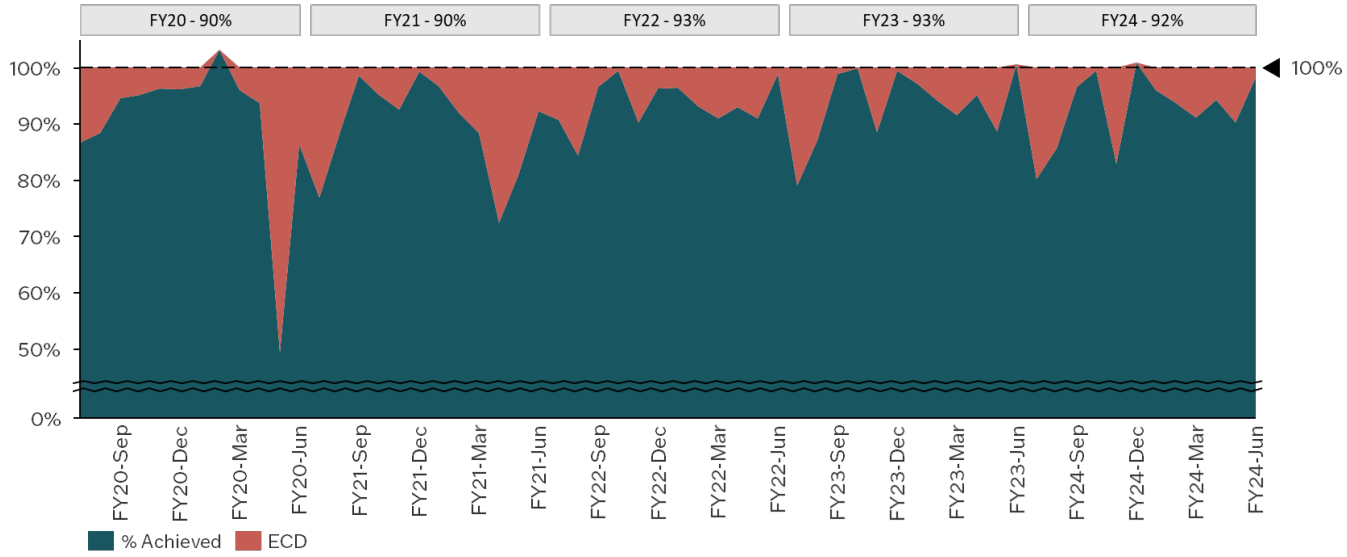


Figure 29 shows the same data as a percentage achieved DNC of Committed Capacity. Where this value is less than 100%, the DNC representing the capacity of the Rail Infrastructure is not able to meet the Committed Capacity.

- On an annual basis the Goonyella Coal System's DNC is meeting ~93% of Committed Capacity for FY22.
- There are, however, several months that the Committed Capacity can be achieved. This indicates that the Rail Infrastructure can meet the Committed Capacity for some periods however it cannot be sustained over a full year with the assumptions used to determine DNC.
- A DNC of ~ 95% can be achieved over several months which equates to ~ 131M-133M tonnes.

Figure 29 **Goonyella Coal System DNC % achieved of Committed Capacity**



6.2.2. Mainline/Branch Line Level (monthly)

The DNC calculated for the Goonyella Coal System by mainline and branch line by month and year for the five-year assessment period is shown in **table 3** below. The percentage is the percent DNC of committed Train Paths. Where this value is less than 100%, the DNC representing the capacity of the Rail Infrastructure is not able to meet the Committed Capacity at a Coal System level.

If an individual branch line or mainline is showing a DNC less than 100% for the year, this does not necessarily indicate that line of the Rail Infrastructure is unable to meet Committed Capacity. The DNC is calculated using the origin (mine) to destination (terminal) Train path and if anywhere on that Train Path the Committed Capacity cannot be met it will influence the allocation of DNC to the branch line or mainline level. Mitigation analysis can then focus on where specifically in the system any shortfall can be best managed.

Table 3 Goonyella Coal System monthly DNC % achieved of Committed Capacity by mainline and branch line

FY20 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Goonyella Coal System		**87%**	**88%**	**95%**	**95%**	**96%**	**96%**	**97%**	**103%**	**96%**	**94%**	**49%**	**86%**	**90%**
3	M.L. - Coppabella to Jilalan	87%	88%	95%	95%	96%	96%	97%	103%	96%	94%	49%	86%	90%
3A	B.L. - Jilalan to Port of Hay Point	87%	88%	95%	95%	96%	96%	97%	103%	96%	94%	49%	86%	90%
3B	B.L. - Hail Creek Mine to South Walker Creek Junction	99%	100%	107%	108%	109%	109%	110%	115%	108%	106%	58%	102%	102%
3C	B.L. - Oaky Creek Junction to Coppabella	84%	86%	92%	92%	94%	93%	94%	102%	92%	90%	47%	89%	88%
3D	B.L. - Coppabella to Wotonga	86%	88%	93%	95%	95%	96%	95%	100%	96%	93%	48%	79%	89%
3E	B.L. - Wotonga to North Goonyella	90%	95%	100%	101%	99%	101%	101%	101%	100%	99%	52%	75%	93%
3F	B.L. - Blair Athol Mine to Wotonga	84%	86%	91%	92%	95%	94%	93%	103%	94%	90%	45%	85%	87%

FY21 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Goonyella Coal System		**77%**	**88%**	**99%**	**95%**	**93%**	**99%**	**97%**	**92%**	**88%**	**72%**	**81%**	**92%**	**90%**
3	M.L. - Coppabella to Jilalan	77%	88%	99%	95%	93%	99%	97%	92%	88%	72%	81%	92%	89%
3A	B.L. - Jilalan to Port of Hay Point	77%	88%	99%	95%	93%	99%	97%	92%	88%	72%	81%	92%	89%
3B	B.L. - Hail Creek Mine to South Walker Creek Junction	94%	102%	113%	108%	107%	111%	108%	105%	106%	87%	91%	106%	103%
3C	B.L. - Oaky Creek Junction to Coppabella	75%	85%	97%	92%	89%	96%	92%	88%	83%	68%	78%	87%	86%
3D	B.L. - Coppabella to Wotonga	74%	87%	97%	94%	92%	99%	97%	92%	88%	73%	81%	92%	89%
3E	B.L. - Wotonga to North Goonyella	78%	91%	99%	97%	96%	101%	102%	98%	94%	76%	83%	97%	93%
3F	B.L. - Blair Athol Mine to Wotonga	70%	84%	96%	93%	89%	97%	94%	87%	84%	70%	80%	89%	86%

FY22 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Goonyella Coal System		**91%**	**84%**	**97%**	**99%**	**90%**	**96%**	**96%**	**93%**	**91%**	**93%**	**91%**	**99%**	**93%**
3	M.L. - Coppabella to Jilalan	91%	84%	97%	99%	90%	96%	96%	93%	91%	93%	91%	99%	93%
3A	B.L. - Jilalan to Port of Hay Point	91%	84%	97%	99%	90%	96%	96%	93%	91%	93%	91%	99%	93%
3B	B.L. - Hail Creek Mine to South Walker Creek Junction	106%	97%	108%	109%	100%	105%	106%	104%	101%	106%	101%	109%	104%
3C	B.L. - Oaky Creek Junction to Coppabella	83%	77%	90%	95%	86%	92%	92%	90%	86%	87%	86%	94%	88%
3D	B.L. - Coppabella to Wotonga	93%	87%	99%	100%	91%	97%	98%	93%	92%	94%	92%	100%	95%
3E	B.L. - Wotonga to North Goonyella	98%	93%	104%	106%	96%	103%	103%	100%	99%	100%	98%	105%	100%
3F	B.L. - Blair Athol Mine to Wotonga	88%	81%	94%	96%	86%	92%	92%	88%	87%	89%	88%	96%	90%

FY23 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Goonyella Coal System		**79%**	**87%**	**99%**	**100%**	**89%**	**100%**	**97%**	**94%**	**92%**	**95%**	**89%**	**101%**	**93%**
3	M.L. - Coppabella to Jilalan	79%	87%	99%	100%	89%	100%	97%	94%	92%	95%	89%	101%	93%
3A	B.L. - Jilalan to Port of Hay Point	79%	87%	99%	100%	89%	100%	97%	94%	92%	95%	89%	101%	93%
3B	B.L. - Hail Creek Mine to South Walker Creek Junction	93%	99%	109%	109%	101%	109%	107%	106%	103%	107%	100%	111%	105%
3C	B.L. - Oaky Creek Junction to Coppabella	74%	80%	94%	95%	85%	95%	92%	90%	86%	89%	83%	96%	88%
3D	B.L. - Coppabella to Wotonga	79%	90%	100%	101%	89%	101%	99%	95%	93%	97%	91%	102%	95%
3E	B.L. - Wotonga to North Goonyella	86%	98%	107%	106%	96%	107%	105%	102%	100%	104%	98%	107%	101%
3F	B.L. - Blair Athol Mine to Wotonga	75%	85%	95%	98%	84%	97%	94%	89%	88%	92%	86%	98%	90%

FY24 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Goonyella Coal System		**80%**	**86%**	**97%**	**100%**	**83%**	**101%**	**96%**	**94%**	**91%**	**94%**	**90%**	**98%**	**92%**
3	M.L. - Coppabella to Jilalan	80%	86%	97%	100%	83%	101%	96%	94%	91%	94%	90%	98%	92%
3A	B.L. - Jilalan to Port of Hay Point	80%	86%	97%	100%	83%	101%	96%	94%	91%	94%	90%	98%	92%
3B	B.L. - Hail Creek Mine to South Walker Creek Junction	97%	99%	109%	106%	97%	111%	106%	105%	102%	106%	103%	110%	104%
3C	B.L. - Oaky Creek Junction to Coppabella	76%	80%	92%	97%	79%	98%	92%	91%	88%	89%	86%	94%	88%
3D	B.L. - Coppabella to Wotonga	79%	87%	96%	99%	82%	100%	96%	92%	90%	95%	90%	98%	92%
3E	B.L. - Wotonga to North Goonyella	86%	94%	101%	104%	88%	105%	102%	98%	97%	100%	97%	103%	98%
3F	B.L. - Blair Athol Mine to Wotonga	75%	82%	91%	95%	77%	95%	90%	86%	84%	89%	82%	93%	87%

6.2.3. Origin/Destination Level (monthly)

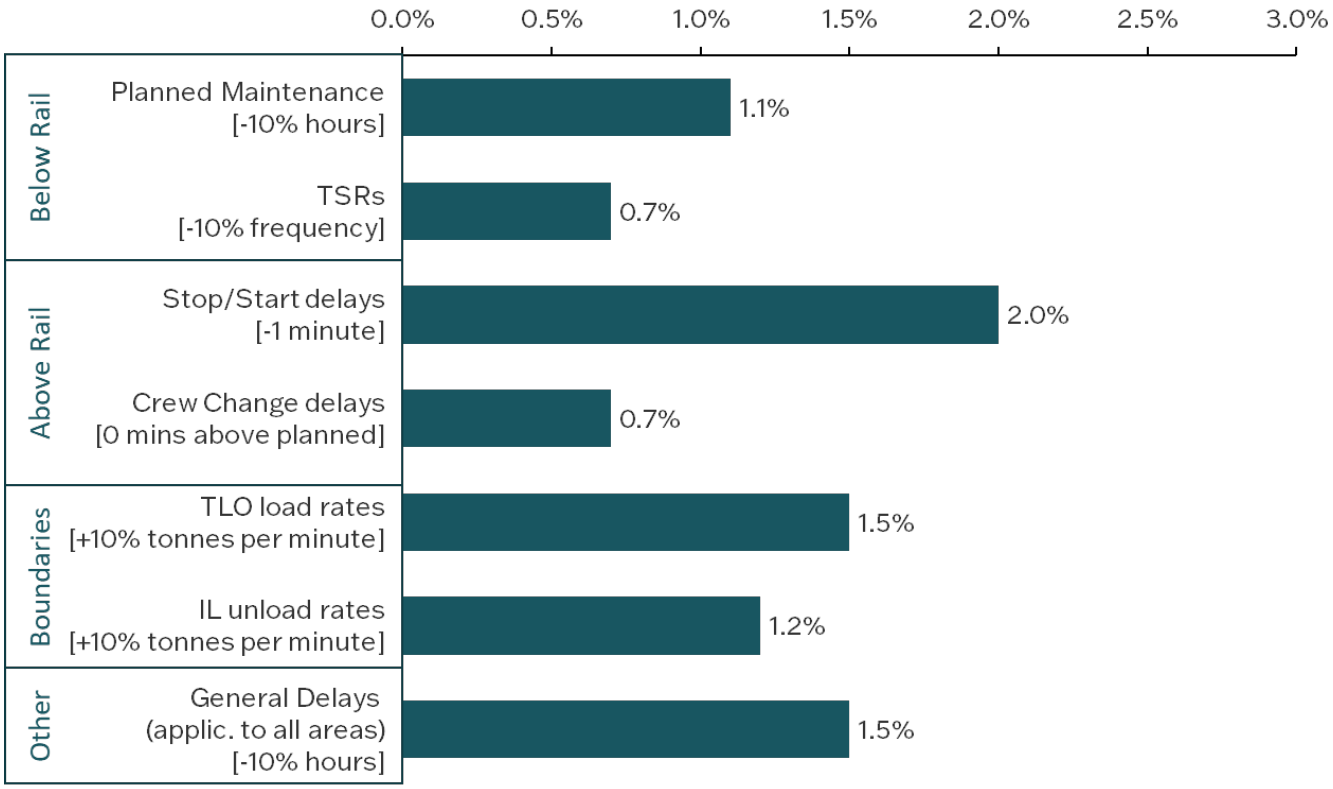
The IE is required to report the DNC by Coal System and mainline and branch line. However, given Below Rail contracts are at origin/destination level and the affected parties of any ECDs must be identified, the DNC has been calculated for each origin/destination pair by month for the five-year assessment period. This is shown in **Appendix D.**

While a mainline or branch line DNC may have a shortfall or exceed Committed Capacity the origin/destination pairs may vary dependent on varying factors and assumptions. There are a number of (FY22, FY23 and FY24) origin/destination contracts where DNC is meeting or exceeding the Committed Capacity. These therefore do not have any ECDs. Of the remaining there are a number that are within 1-2% of meeting Committed Capacity. Given the variability of the DSM any DNC that is within 1% of meeting Committed Capacity is considered to be achieving.

6.3. DNC Materiality Analysis

Section 3.4 provides high-level sensitivity data for the network. **Figure 30** shows the materiality impact on DNC specifically for the Goonyella Coal System. The analysis was undertaken for FY22 to FY24. The focus is on operating and maintenance improvement impacts with capital options mentioned further in **section 6.4.1** of the report.

Figure 30 **SOP parameter materiality on Goonyella Coal System - % of DNC**



An improvement of one (1) minute for stop/start delays and a 10% increase in TLO rates and reduction of 10% in general delays provide the greatest favourable impact on DNC for the Goonyella Coal System when operating at Committed Capacity. A 1% improvement in DNC equates to an annual increase in Train Paths of ~130 and ~ 1.3M tonnes.

- Changes to Below Rail input parameters (planned maintenance and TSRs) indicate that the model outputs is sensitive to:
  - A reduction in planned maintenance by 10% improves the DNC by 1.1% indicating the maintenance has a reasonable impact on capacity;
  - Reducing the number of TSRs applied in the Goonyella Coal System has a 0.7% impact on DNC.
- Changes to Above Rail input parameters have a similar impact on result sensitivity:
  - Reducing the time impact of stopping and starting minutes by 1 minute has a 2% impact on DNC;

    - The DNC output is less sensitive to the removal of crew change delays (above planned time).
- Changes to boundary assumptions also have a considerable impact on DNC.
- Reducing General delays by 10% has a 1.5% impact on throughput.

6.4. Existing Capacity Deficits

An ECD exists in a Coal System if the DNC (within the Capacity Assessment Period) is lower than the number of Train Paths required to meet committed Train Service Entitlements (TSEs).

If an ECD has been identified, the ECD is apportioned to each affected party equivalent to the percentage of Committed Capacity for that Coal System.

Figure 31 shows ECDs by mainline and branch line for the Goonyella Coal System, per year, for the five-year assessment period year. A zero means there is no ECD.

Figure 31 Goonyella Coal System ECDs (Train Paths)

The 3B Hail Creek Mine to South Walker Creek Junction branch line and 3E North Goonyella Mine to Wotonga branch line have no ECDs in FY22. The main line 3 Coppabella to Jilalan has an ECD of 946 Train Paths in FY22.

Appendix D provides individual origin/destination data and the affected parties of ECDs for the Goonyella Coal System.

6.4.1. Root Cause and Mitigation of Existing Capacity Deficits

Results

The IE has determined that:

- The DNC of the Goonyella Coal System Rail Infrastructure is 12,933 to 13,000 Train Paths or 129M – 130M tonnes for FY22 to FY24.
- The Goonyella Coal system has an identified ECD of 946 Train Paths for FY22.
- This is equivalent to ~ 9.4M tonnes annual shortfall. This equates to the Rail Infrastructure being capable of meeting approximately 93% of Committed Capacity for FY22.
- The Goonyella Coal System DNC is impacted by Newlands and GAPE Coal System traffic and cross system traffic to the Blackwater Coal System.
- There are [redacted] contracted parties (FY22 onwards) that enter directly into the Goonyella Coal System.
    - [redacted]
    - [redacted]
- [redacted]
- There are a few months that the Goonyella Coal System can achieve an annualised full Committed Capacity.
- ~ 20% of Goonyella Coal System origin/destination contracts do not have identified ECDs.
- There are several branch lines that do not have ECDs identified on an annual basis.

Root Cause factors

The Goonyella Coal System is complex and the root cause of any ECDs are reliant on a number of factors and assumptions. The ICAR process has determined that DBCT shall be modelled as campaign railing (cargo assembly operations) given that is how the terminal operates in practice. The contracts for the Goonyella Coal System have been agreed on the basis of even railings for both DBCT and HPCT.

The impact on the capacity of the Rail Infrastructure for this change to campaign railing for DBCT, represents a 5% reduction in DNC (this equates to 5-6M tonnes) as compared to DBCT being modelled as even railings. This impacts all users of the Goonyella Coal System in some way and explains the majority of the ECDs identified.

Mitigation Options

The DNC materiality analysis on key operational and maintenance factors in **section 6.3** provide indicative areas of opportunity for an improvement in DNC. Other areas that would likely improve DNC are:

- The Goonyella Coal System is very sensitive to consist numbers given there are multiple Above Rail operators. Yard capacity at Jilalan and stowage and provisioning practices may be an opportunity to increase DNC.
- The signalling and operations on Connors Range (on the mainline) offers an opportunity to reduce headway to increase capacity dependent on safety matters being adequately considered.
- Goonyella Coal System capacity is also sensitive to cross system traffic and GAPE Coal System traffic. Any mitigation undertaken in the Newlands Coal System and GAPE Coal System will impact (most likely favourably) on Goonyella Coal System capacity.
- A potential new passing loop at Teviot Brook (located halfway between Wotonga and Riverside on branch line 3E) impacts both the GAPE Coal System and the Goonyella Coal System positively. This will provide a marginal improvement in DNC for the Goonyella Coal System.
- A potential new passing loop at Dunsmure (located halfway between Saraji and Dysart passing loops on branch line 3C) will also provide marginal improvement for mines using this section of the Coal System.

7. Blackwater Coal System

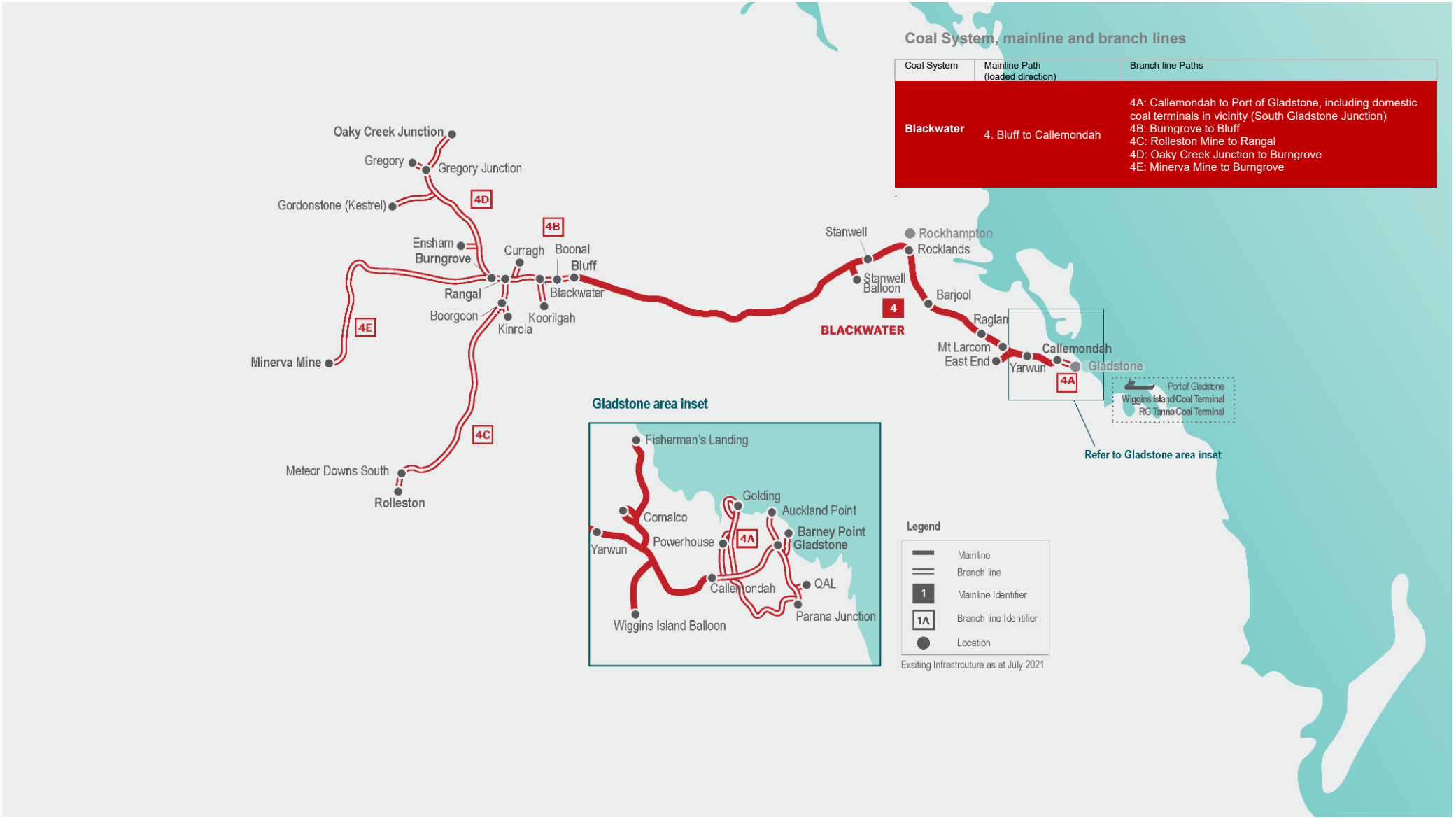
7.1. Overview of Coal System

A map of the Blackwater Coal System is provided in **figure 32**. It shows the Coal System and each mainline and branch line that makes up the Blackwater Coal System.

The Blackwater Coal System refers to the Rail Infrastructure comprising the rail corridor from terminals at Wiggins Island Coal Export Terminal and RG Tanna Coal Terminal to Rolleston mine, Burngrove and Oaky Creek Junction and all branch lines directly connecting coal mine loading facilities to those corridors. Blackwater Coal System also has a number of domestic coal users that are considered.

Some of the Moura Coal System traffic utilises Blackwater Coal System from Callemondah to Port of Gladstone and to the two (2) export coal terminals.

Figure 32 **Blackwater Coal System**



The Blackwater Coal System has [redacted] origin/destination contracts which includes some cross system traffic from the Goonyella Coal System. This system is impacted by non-coal traffic volumes. [redacted]

7.2. Deliverable Network Capacity

7.2.1. Coal System Level (monthly)

The DNC calculated for the Blackwater Coal System by month for the five-year assessment period is shown in **figure 33** below.

The Blackwater Coal System has a number of domestic coal users and is also impacted by non-coal traffic at a greater level than other coal systems.

- The DNC in Train Paths ranges from 9,550 to 10,649 over the period. This equates to a tonnage capacity between 78 – 88M tonnes.
- Peak Committed Capacity occurs in FY22 at 10,473 Train Paths or approximately 87M tonnes. The maximum DNC occurs in FY21 at 10,649 Train Paths or approximately 88M tonnes.
- Committed Capacity increases by ~ 5% between FY21 and FY22 it then reduces by ~3% between FY22 to FY24.
- The DNC variability between months is primarily linked to planned and unplanned maintenance, TSRs and delays.

Figure 33 **Blackwater Coal System DNC by year and month – Train Paths**

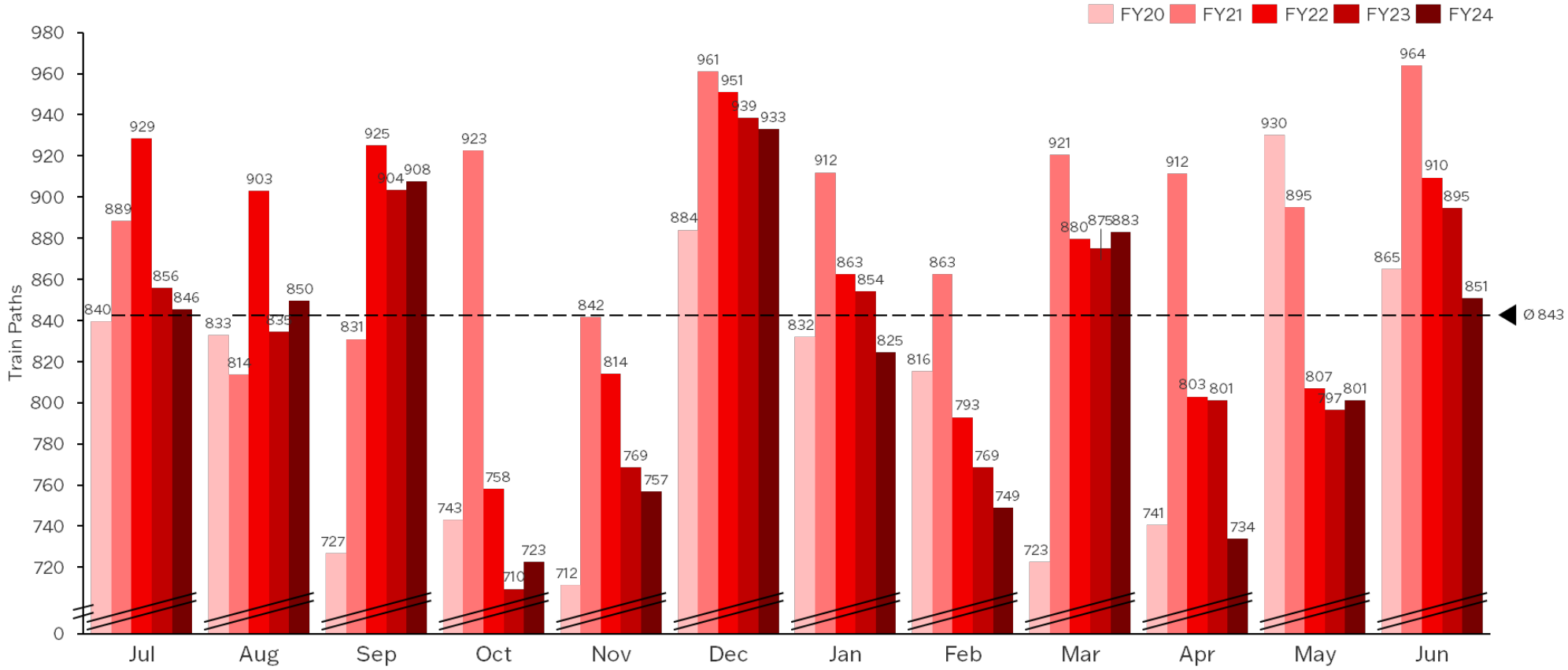
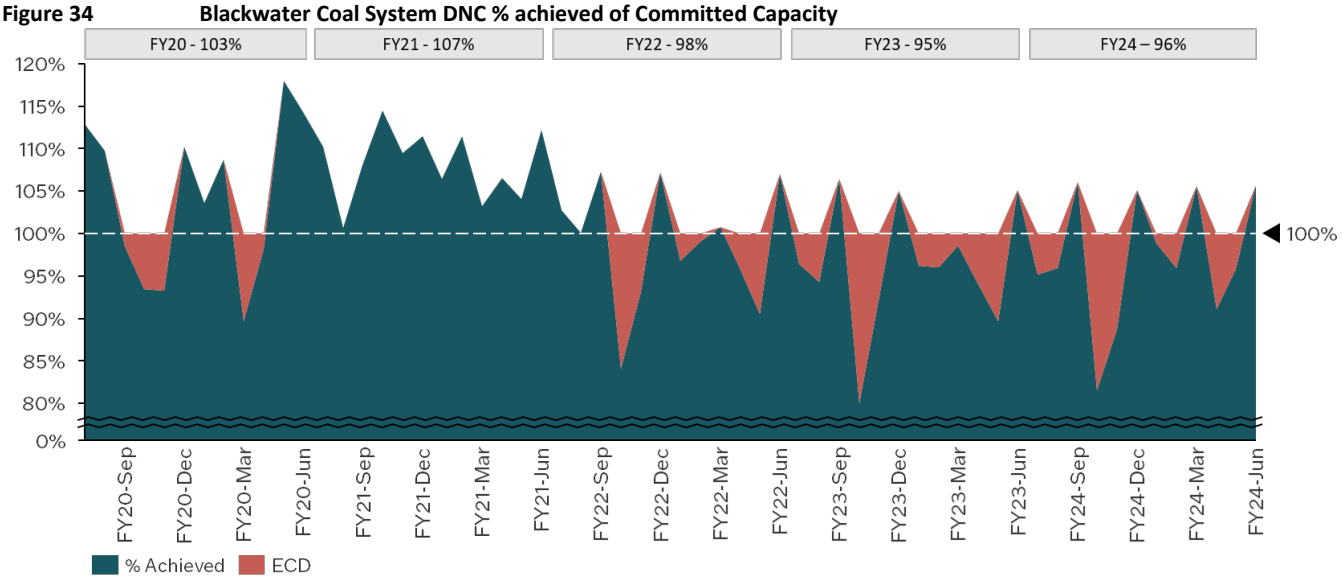


Figure 34 shows the same data as a percent achieved DNC of Committed Capacity. Where this value is less than 100%, the DNC representing the capacity of the Rail Infrastructure is not able to meet the Committed Capacity.

- On an annual basis the Blackwater Coal System's DNC is meeting or exceeding Committed Capacity in FY20 and FY21 however the DNC is not meeting Committed Capacity in FY22, FY23 and FY24.
- For FY22 the DNC is within 214 Train Paths (~1.8M tonnes) of the Committed Capacity.
- For FY22 to FY24 there are many months when the DNC meets or exceeds Committed Capacity however on average the DNC is only capable of reaching ~ 95% of Committed Capacity for FY23 and FY24.

Figure 34 **Blackwater Coal System DNC % achieved of Committed Capacity**



7.2.2. Mainline/Branch Line Level (monthly)

The DNC calculated for the Blackwater Coal System by mainline and branch line by month for the five-year assessment period is shown in **table 4** below. Branch line 3C Oaky Creek Junction to Coppabella has been included for the origin/destination contracts from the Goonyella Coal System to the Blackwater Coal System coal terminals. The percentage is the percent DNC of contracted Train Paths. Where this value is less than 100%, the DNC representing the capacity of the Rail Infrastructure is not able to meet the Committed Capacity at a Coal System level.

If an individual branch line or mainline is showing a DNC less than 100% for the year, this does not necessarily indicate that the line of the Rail Infrastructure is unable to meet Committed Capacity. The DNC is calculated using the origin (mine) to destination (terminal) Train path and if anywhere on that Train Path the Committed Capacity cannot be met, it will influence the allocation of DNC to the branch line or mainline level. Mitigation analysis can then focus on where specifically in the system any shortfall can be best managed.

Table 4 Blackwater Coal System monthly DNC % achieved of Committed Capacity by mainline and branch line

FY20 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Blackwater Coal System		**113%**	**110%**	**99%**	**93%**	**93%**	**110%**	**104%**	**109%**	**90%**	**98%**	**118%**	**114%**	**103%**
4	M.L. - Bluff to Callemondah	113%	110%	99%	93%	93%	110%	104%	109%	90%	98%	118%	114%	104%
4A	B.L. - Callemondah to Port of Gladstone	113%	110%	98%	93%	92%	110%	103%	108%	88%	97%	118%	114%	103%
4B	B.L. - Burngrove to Bluff	113%	110%	99%	93%	93%	110%	104%	109%	90%	98%	118%	114%	104%
4C	B.L. - Rolleston Mine to Rangal	114%	111%	97%	92%	94%	111%	104%	108%	93%	99%	121%	117%	105%
4D	B.L. - Oaky Creek Junction to Burngrove	116%	114%	108%	100%	98%	114%	106%	112%	89%	100%	117%	116%	107%
4E	B.L. - Minerva Mine to Burngrove	116%	111%	95%	89%	89%	111%	105%	108%	92%	95%	118%	116%	103%
3C	B.L. - Oaky Creek Junction to Coppabella	115%	111%	102%	92%	95%	110%	103%	112%	89%	97%	119%	118%	105%

FY21 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Blackwater Coal System		**110%**	**101%**	**108%**	**114%**	**109%**	**111%**	**106%**	**111%**	**103%**	**106%**	**104%**	**112%**	**107%**
4	M.L. - Bluff to Callemondah	110%	101%	108%	114%	109%	111%	106%	111%	103%	106%	104%	112%	108%
4A	B.L. - Callemondah to Port of Gladstone	110%	100%	108%	114%	109%	111%	106%	111%	103%	106%	103%	112%	108%
4B	B.L. - Burngrove to Bluff	110%	101%	108%	114%	109%	111%	106%	111%	103%	106%	104%	112%	108%
4C	B.L. - Rolleston Mine to Rangal	115%	102%	109%	121%	113%	111%	113%	112%	104%	110%	103%	113%	110%
4D	B.L. - Oaky Creek Junction to Burngrove	106%	99%	107%	110%	107%	112%	105%	113%	106%	108%	104%	116%	108%
4E	B.L. - Minerva Mine to Burngrove	100%	86%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%
3C	B.L. - Oaky Creek Junction to Coppabella	105%	98%	107%	110%	106%	114%	105%	107%	101%	107%	102%	117%	106%

FY22 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Blackwater Coal System		**103%**	**100%**	**107%**	**84%**	**93%**	**107%**	**97%**	**99%**	**101%**	**96%**	**91%**	**107%**	**98%**
4	M.L. - Bluff to Callemondah	103%	100%	107%	84%	93%	107%	97%	99%	101%	96%	91%	107%	99%
4A	B.L. - Callemondah to Port of Gladstone	102%	99%	107%	83%	92%	107%	96%	98%	100%	95%	90%	107%	98%
4B	B.L. - Burngrove to Bluff	103%	100%	107%	84%	93%	107%	97%	99%	101%	96%	91%	107%	99%
4C	B.L. - Rolleston Mine to Rangal	102%	98%	106%	84%	92%	106%	96%	98%	101%	95%	90%	106%	98%
4D	B.L. - Oaky Creek Junction to Burngrove	103%	103%	109%	82%	94%	110%	99%	101%	101%	97%	92%	110%	100%
4E	B.L. - Minerva Mine to Burngrove	100%	100%	100%										100%
3C	B.L. - Oaky Creek Junction to Coppabella	101%	100%	106%	82%	90%	105%	95%	97%	97%	93%	89%	106%	97%

FY23 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Blackwater Coal System		**96%**	**94%**	**106%**	**80%**	**92%**	**105%**	**96%**	**96%**	**99%**	**94%**	**90%**	**105%**	**95%**
4	M.L. - Bluff to Callemondah	96%	94%	106%	80%	92%	105%	96%	96%	99%	94%	90%	105%	96%
4A	B.L. - Callemondah to Port of Gladstone	96%	93%	106%	79%	91%	104%	95%	95%	98%	93%	89%	105%	95%
4B	B.L. - Burngrove to Bluff	96%	94%	106%	80%	92%	105%	96%	96%	99%	94%	90%	105%	96%
4C	B.L. - Rolleston Mine to Rangal	96%	94%	106%	79%	92%	104%	96%	96%	99%	94%	90%	105%	96%
4D	B.L. - Oaky Creek Junction to Burngrove	96%	94%	108%	78%	91%	106%	95%	96%	98%	94%	89%	106%	96%
4E	B.L. - Minerva Mine to Burngrove													
3C	B.L. - Oaky Creek Junction to Coppabella	93%	90%	105%	78%	86%	103%	93%	93%	94%	91%	87%	103%	93%

FY24 - % Achieved		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Blackwater Coal System		**95%**	**96%**	**106%**	**82%**	**89%**	**105%**	**99%**	**96%**	**106%**	**91%**	**96%**	**106%**	**96%**
4	M.L. - Bluff to Callemondah	95%	96%	106%	82%	89%	105%	99%	96%	106%	91%	96%	106%	97%
4A	B.L. - Callemondah to Port of Gladstone	94%	95%	106%	80%	88%	105%	98%	95%	105%	90%	95%	105%	96%
4B	B.L. - Burngrove to Bluff	95%	96%	106%	82%	89%	105%	99%	96%	106%	91%	96%	106%	97%
4C	B.L. - Rolleston Mine to Rangal	95%	96%	106%	81%	88%	104%	96%	92%	104%	87%	93%	104%	96%
4D	B.L. - Oaky Creek Junction to Burngrove	95%	96%	107%	79%	87%	106%	105%	104%	108%	99%	103%	109%	99%
4E	B.L. - Minerva Mine to Burngrove													
3C	B.L. - Oaky Creek Junction to Coppabella	93%	92%	104%	78%	81%	101%	98%	98%	102%	91%	95%	105%	95%

7.2.3. Origin/Destination Level (monthly)

The IE is required to report the DNC by Coal System and mainline and branch line. However, given Below Rail contracts are at origin/destination level and the affected parties of any ECDs must be identified, the DNC has been calculated for each origin/destination pair by month for the five-year assessment period. This is shown in **Appendix E.**

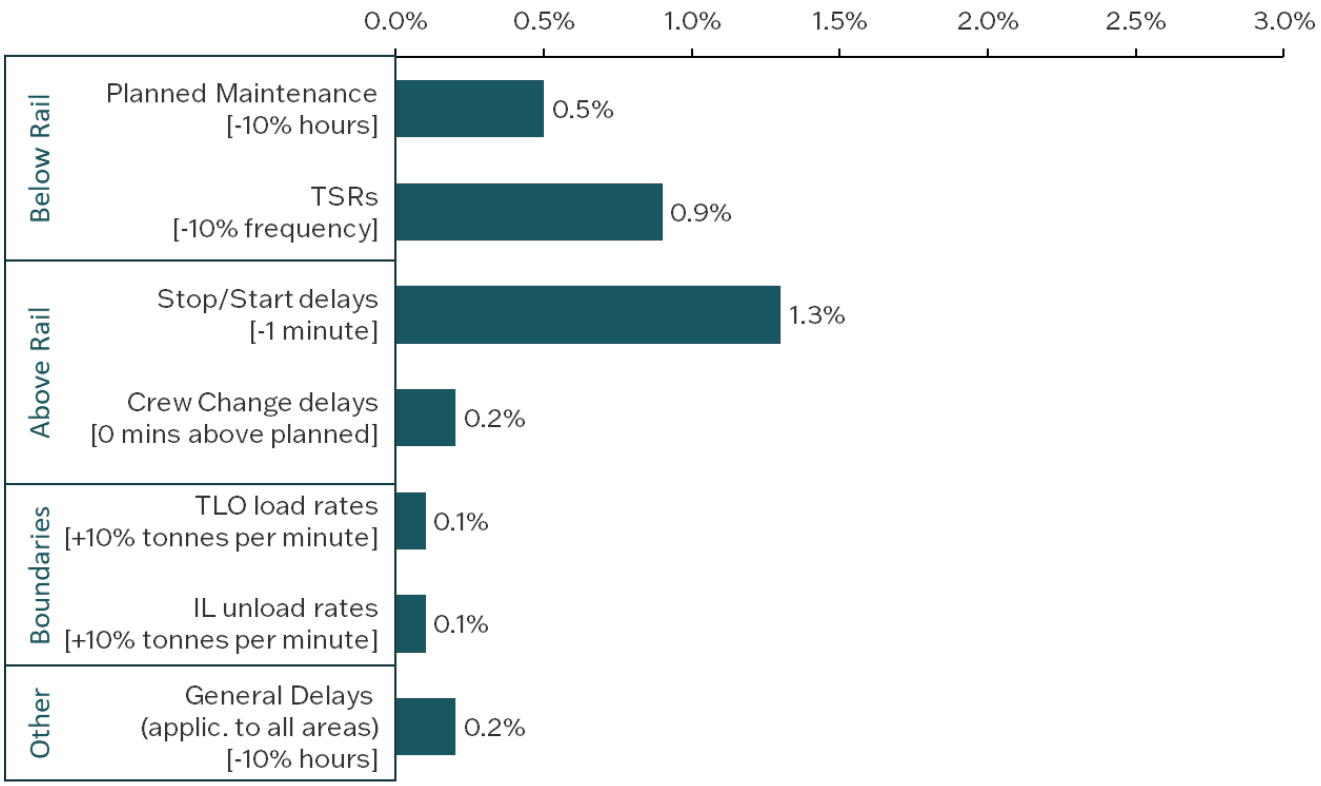
While a mainline or branch line DNC may have a shortfall or exceed Committed Capacity the origin/destination pairs may vary dependent on varying factors and assumptions.

Given the variability of the DSM any DNC that is within 1% of meeting the Committed Capacity is considered to be achieving.

7.3. DNC Materiality Analysis

Section 3.3 provides high-level sensitivity data for the network. **Figure 35** shows the materiality impact on DNC specifically for the Blackwater Coal System. The focus is on operating and maintenance improvement impacts.

Figure 35 **SOP Parameter materiality on Blackwater Coal System - % of DNC**



A reduction in start/stop delays by one (1) minute and a 10% reduction in TSR frequency has the greatest impact on DNC uplift for the Blackwater Coal System when operating at Committed Capacity. A 1% improvement in DNC equates to an increase in annual Train Paths of ~100 and ~ 0.83M tonnes.

- Changes to Below Rail input parameters (planned maintenance and TSRs) indicate that the model outputs is sensitive to:
    - A reduction in planned maintenance by 10% improves the DNC by over 0.5% indicating the maintenance has a reasonable impact on capacity;

  - Reducing the number of TSRs applied in the Goonyella Coal System has a 0.9% impact on DNC.
- Changes to Above Rail input parameters also have an impact on result sensitivity:
  - Reducing the time impact of stopping and starting minutes by 1 minute has a 1.3% impact on DNC;
  - The DNC output to the removal of crew change delays (above planned time) provides a very minor impact on DNC.
- Changes to boundary assumptions have a minimal impact on DNC
- Reducing General delays by 10% has a 0.2% impact on throughput., demonstrating the sensitivity of throughout on delays in the DSM.

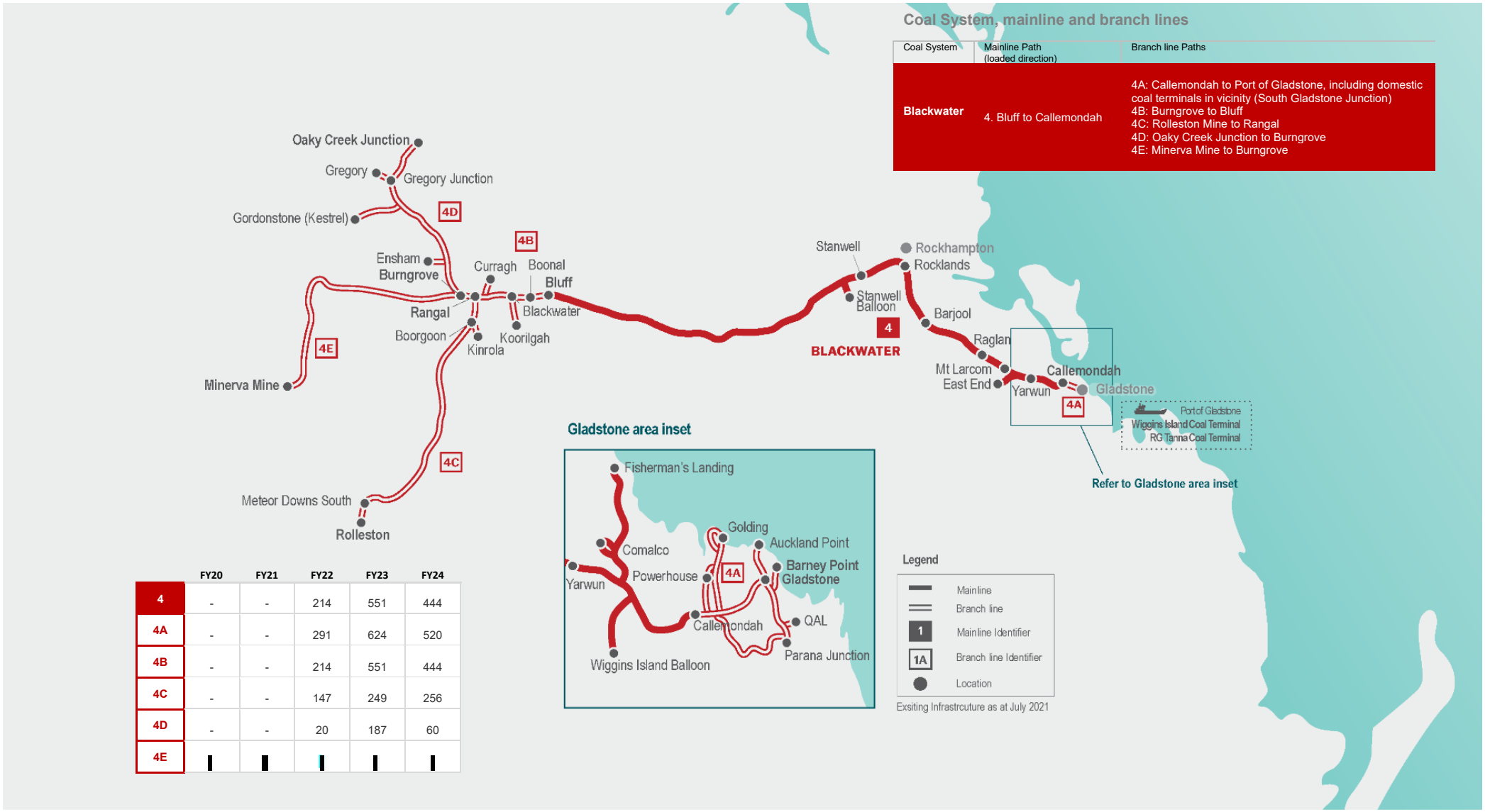
7.4. Existing Capacity Deficits

An ECD exists in a Coal System if the DNC (within the Capacity Assessment Period) is lower than the number of Train Paths required to meet Train Service Entitlements (TSEs).

If an ECD has been identified, the ECD is apportioned to each affected party equivalent to the percentage of Committed Capacity for that system.

Figure 36 shows ECDs by mainline and branch line for the Blackwater Coal System, per year, for the five-year assessment period year. A zero means there is no ECD.

Figure 36 Blackwater Coal System ECDs (Train Paths)



	FY20	FY21	FY22	FY23	FY24
4	-	-	214	551	444
4A	-	-	291	624	520
4B	-	-	214	551	444
4C	-	-	147	249	256
4D	-	-	20	187	60
4E					

There are ECDs for most of the branch lines and the mainline for all years other than FY20 and FY21.

For FY22, 4D Oaky Creek Junction to Burngrove and [redacted] branch lines meet Committed Capacity (are within 1% of Committed Capacity) and there are no ECDs. The main line 4 Bluff to Callemondah and branch line 4B Burngrove to Bluff are achieving 99% of Committed Capacity. Other branch lines in FY22 do not meet Committed Capacity by 2-3%.

For FY23 and FY24 the ECDs increase for all branch lines and the mainline to within 95-97% of Committed Capacity.

Appendix E provides individual origin/destination data and the affected parties of ECDs for the Blackwater Coal System. For FY22 ~ 50% of origin/destinations meet or exceed Committed Capacity. In FY23 and FY24 this decreases to ~ 25% meeting Committed Capacity.

7.4.1. Root Cause and Mitigation of Existing Capacity Deficits

Results

The ICAR has determined that:

- The DNC of the Blackwater Coal System Rail Infrastructure is 9,712 to 10,260 Train Paths or 81M – 86M tonnes for FY22 to FY24.
- The Blackwater Coal system has an identified ECD of 214 Train Paths for FY22.
- This is equivalent to ~ 1.8M tonnes annual shortfall. This equates to the Rail Infrastructure being capable of meeting approximately 98% of Committed Capacity for FY22 to FY24.
- The Blackwater Coal System has [redacted] origin/destination contracts which includes some cross system traffic from the Goonyella Coal System. This system is impacted by non-coal traffic volumes. Given the domestic traffic volume through the Blackwater Coal System there are multiple mines that service multiple destinations in this system. [redacted] of these contracts is currently not operational.
- A small number of the [redacted] contracted parties have multiple destination terminals (RGTCT and WICET).
- There are a several months that the Blackwater Coal System can achieve an annualised full Committed Capacity of >10,400 Train Paths or > 86M tonnes.
- ~ 40% of Blackwater Coal System origin/destination contracts do not have identified ECDs for FY22.

Root Cause factors

The ECD for FY22 is within 2% of the Committed Capacity. Operational improvements are likely to alleviate this ECD. The branch line 4A Callemondah to Port of Gladstone is also utilised by some Moura Coal System traffic. For FY23 and FY24 capital maybe required.

The area of the Blackwater Coal System which is the most congested at maximum Committed Capacity is between Callemondah and the Port of Gladstone.

Mitigation Options

The DNC materiality analysis on key operational and maintenance factors in **section 7.3** provide indicative areas of opportunity for an improvement in DNC. Other areas that would likely improve DNC are:

- The Blackwater Coal System can become congested around Callemondah and as demand increases the yard capacity, stowage and operations at Callemondah is likely to be a constraint.
- RCS on Bauhinia Branch would also potentially improve capacity for that associated branch line.

8. Moura Coal System

8.1. Overview of Coal System

A map of the Moura Coal System is provided in **figure 37**. It shows the system and each mainline and branch line that makes up the Moura Coal System.

The Moura Coal System refers to the Rail Infrastructure comprising the rail corridor from the RG Tanna Coal Terminal and Domestic users sites to Moura mine, Callide and Earsfield and all branch lines directly connecting coal mine loading facilities to those corridors. The Moura Coal System has a number of domestic coal users that are considered.

The Blackwater Coal System branch line 4A Callemondah to Port of Gladstone is also utilised by Moura Coal System traffic.

Figure 37 Moura Coal System

The Moura Coal System has [redacted] origin/destination contracts. [redacted]

8.2. Deliverable Network Capacity

8.2.1. Coal System Level (monthly)

The DNC calculated for the Moura Coal System by month for the five-year assessment period is shown in **figure 38** below.

- The DNC in Train Paths ranges from 2,146 to 2,241 over the period. This equates to a DNC annual tonnage capacity range of 18 – 19M tonnes.
- Peak Committed Capacity occurs in FY24 at 2,345 Train Paths (~ 20M tonnes). The maximum DNC occurs in FY22 at 2,241 Train Paths (~ 19M tonnes).

Figure 38 **Moura Coal System DNC by year and month – Train Paths**

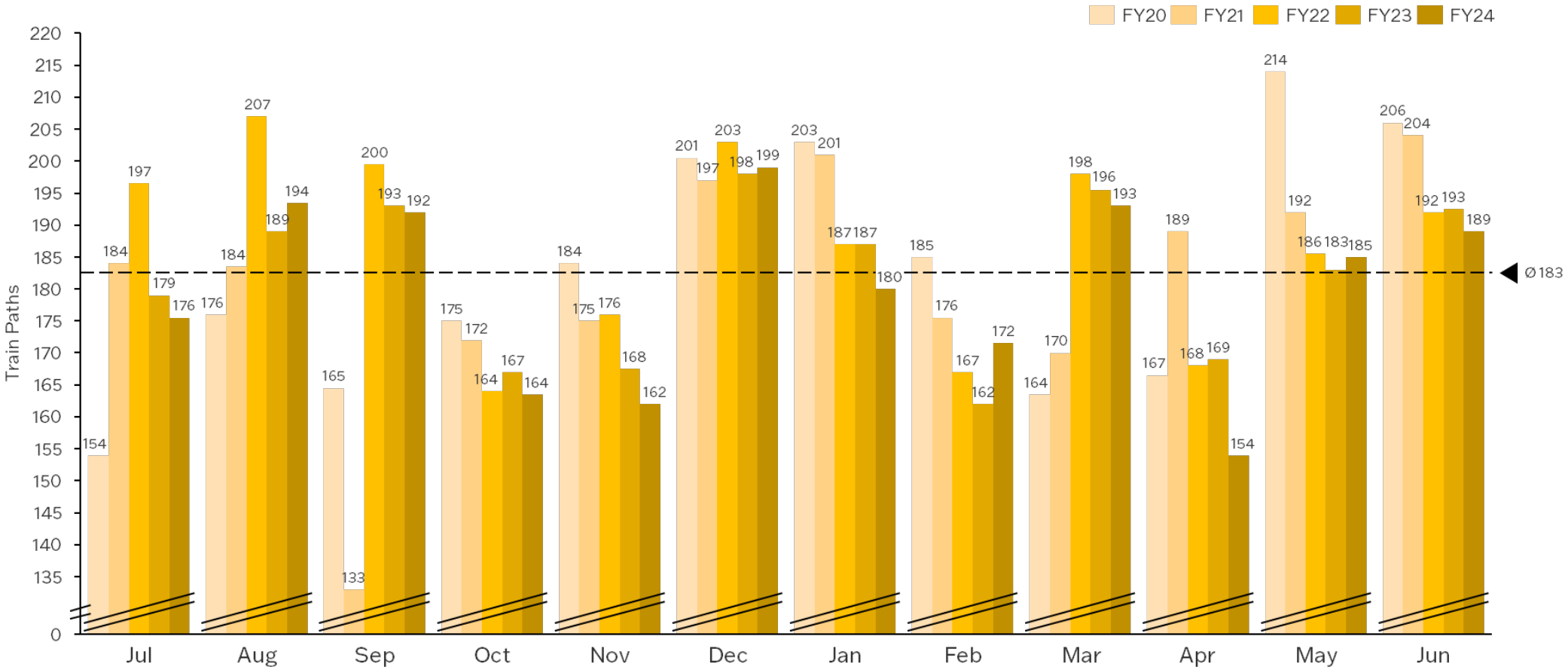
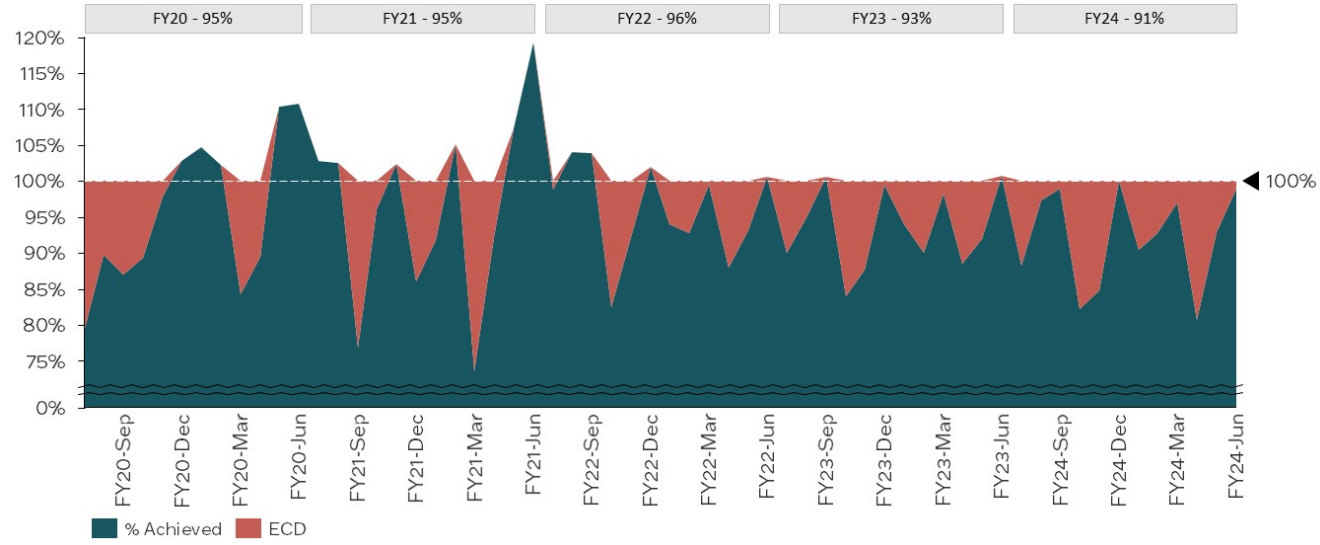


Figure 39 shows the same data as a percent achieved DNC of Committed Capacity. Where this value is less than 100%, the DNC representing the capacity of the Rail Infrastructure is not able to meet the Committed Capacity.

- On an annual basis the Moura Coal System's DNC is not meeting Committed Capacity for any of the five years.
- In FY22 the DNC is 2,241 Train Paths which is 96% of Committed Capacity of 2,338 Train Paths.
- There are some months when the DNC meets or exceeds Committed Capacity however on average the DNC is only capable of reaching ~ 96% of Committed Capacity in FY22.
- The DNC results are heavily impacted where the coal traffic from the Moura Coal System enters the Blackwater Coal System at branch line 4A Callemondah to Port of Gladstone.

Figure 39 **Moura Coal System DNC % achieved of Committed Capacity**



8.2.2. Mainline/Branch Line Level (monthly)

The DNC calculated for the Moura Coal System by mainline and branch line by month and year for the five-year assessment period is shown in **table 5** below. The percentage is the percent DNC of contracted Train Paths. Where this value is less than 100%, the DNC representing the capacity of the Rail Infrastructure is not able to meet the Committed Capacity at a Coal System level.

For FY22 the mainline 5 Dumgree to Callemondah is achieving 96% of Committed Capacity with most of the branch lines achieving similar levels. The Moura Coal System infrastructure is considered generally capable of meeting the Committed Capacity however when trains reach Callemondah (noting the DNC is determined for the entire origin/destination Train Path) and then must reach the coal terminal destination, the congestion in this area causes some restrictions to flow similar to that experienced for Blackwater Coal System users in this area.

Table 5 Moura Coal System Monthly DNC % achieved of Committed Capacity by Mainline and branch line

FY20 - % Achieved of Contract		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Moura Coal System		**79%**	**90%**	**87%**	**89%**	**98%**	**103%**	**105%**	**102%**	**84%**	**90%**	**110%**	**111%**	**95%**
5	M.L. - Dumgree to Callemondah	79%	90%	87%	89%	98%	103%	105%	102%	84%	90%	110%	111%	96%
5A	B.L. - Earlsfield to Dumgree	79%	90%	87%	89%	98%	103%	105%	102%	84%	90%	110%	111%	96%
5B	B.L. - Earlsfield to Callide	[redacted]												
5C	B.L. - Earlsfield to Moura	71%	82%	75%	83%	98%	103%	103%	102%	82%	90%	110%	111%	92%
4A	B.L. - Callemondah to Port of Gladstone	79%	90%	87%	89%	98%	103%	105%	102%	84%	90%	110%	111%	96%

FY21 - % Achieved of Contract		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Moura Coal System		**103%**	**103%**	**77%**	**96%**	**102%**	**86%**	**92%**	**105%**	**74%**	**92%**	**107%**	**119%**	**95%**
5	M.L. - Dumgree to Callemondah	103%	103%	77%	96%	102%	86%	92%	105%	74%	92%	107%	119%	95%
5A	B.L. - Earlsfield to Dumgree	103%	103%	77%	96%	102%	86%	92%	105%	74%	92%	107%	119%	95%
5B	B.L. - Earlsfield to Callide	[redacted]												
5C	B.L. - Earlsfield to Moura	92%	92%	67%	88%	92%	73%	80%	98%	59%	80%	100%	118%	86%
4A	B.L. - Callemondah to Port of Gladstone	103%	103%	77%	96%	102%	86%	92%	105%	74%	92%	107%	119%	95%

FY22 - % Achieved of Contract		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Moura Coal System		**99%**	**104%**	**104%**	**82%**	**92%**	**102%**	**94%**	**93%**	**99%**	**88%**	**93%**	**101%**	**96%**
5	M.L. - Dumgree to Callemondah	99%	104%	104%	82%	92%	102%	94%	93%	99%	88%	93%	101%	96%
5A	B.L. - Earlsfield to Dumgree	99%	104%	104%	82%	92%	102%	94%	93%	99%	88%	93%	101%	96%
5B	B.L. - Earlsfield to Callide	[redacted]												
5C	B.L. - Earlsfield to Moura	95%	101%	102%	78%	88%	98%	89%	88%	97%	86%	89%	95%	92%
4A	B.L. - Callemondah to Port of Gladstone	99%	104%	104%	82%	92%	102%	94%	93%	99%	88%	93%	101%	96%

FY23 - % Achieved of Contract		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Moura Coal System		**90%**	**95%**	**101%**	**84%**	**88%**	**99%**	**94%**	**90%**	**98%**	**88%**	**92%**	**101%**	**93%**
5	M.L. - Dumgree to Callemondah	90%	95%	101%	84%	88%	99%	94%	90%	98%	88%	92%	101%	93%
5A	B.L. - Earlsfield to Dumgree	90%	95%	101%	84%	88%	99%	94%	90%	98%	88%	92%	101%	93%
5B	B.L. - Earlsfield to Callide	[redacted]												
5C	B.L. - Earlsfield to Moura	86%	90%	97%	81%	85%	95%	89%	86%	95%	86%	88%	97%	90%
4A	B.L. - Callemondah to Port of Gladstone	90%	95%	101%	84%	88%	99%	94%	90%	98%	88%	92%	101%	93%

FY24 - % Achieved of Contract		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Moura Coal System		**88%**	**97%**	**99%**	**82%**	**85%**	**100%**	**90%**	**93%**	**97%**	**81%**	**93%**	**99%**	**91%**
5	M.L. - Dumgree to Callemondah	88%	97%	99%	82%	85%	100%	90%	93%	97%	81%	93%	99%	92%
5A	B.L. - Earlsfield to Dumgree	88%	97%	99%	82%	85%	100%	90%	93%	97%	81%	93%	99%	92%
5B	B.L. - Earlsfield to Callide	[redacted]												
5C	B.L. - Earlsfield to Moura	84%	94%	95%	77%	82%	95%	87%	89%	94%	79%	88%	95%	88%
4A	B.L. - Callemondah to Port of Gladstone	88%	97%	99%	82%	85%	100%	90%	93%	97%	81%	93%	99%	92%

8.2.3. Origin/Destination Level (monthly)

The IE is required to report the DNC by network, Coal System and mainline and branch line. However, given Below Rail contracts are at origin/destination level and the affected parties of any ECDs must be identified, the DNC has been calculated for each origin/destination pair by month for the five-year assessment period. This is shown in **Appendix F.**

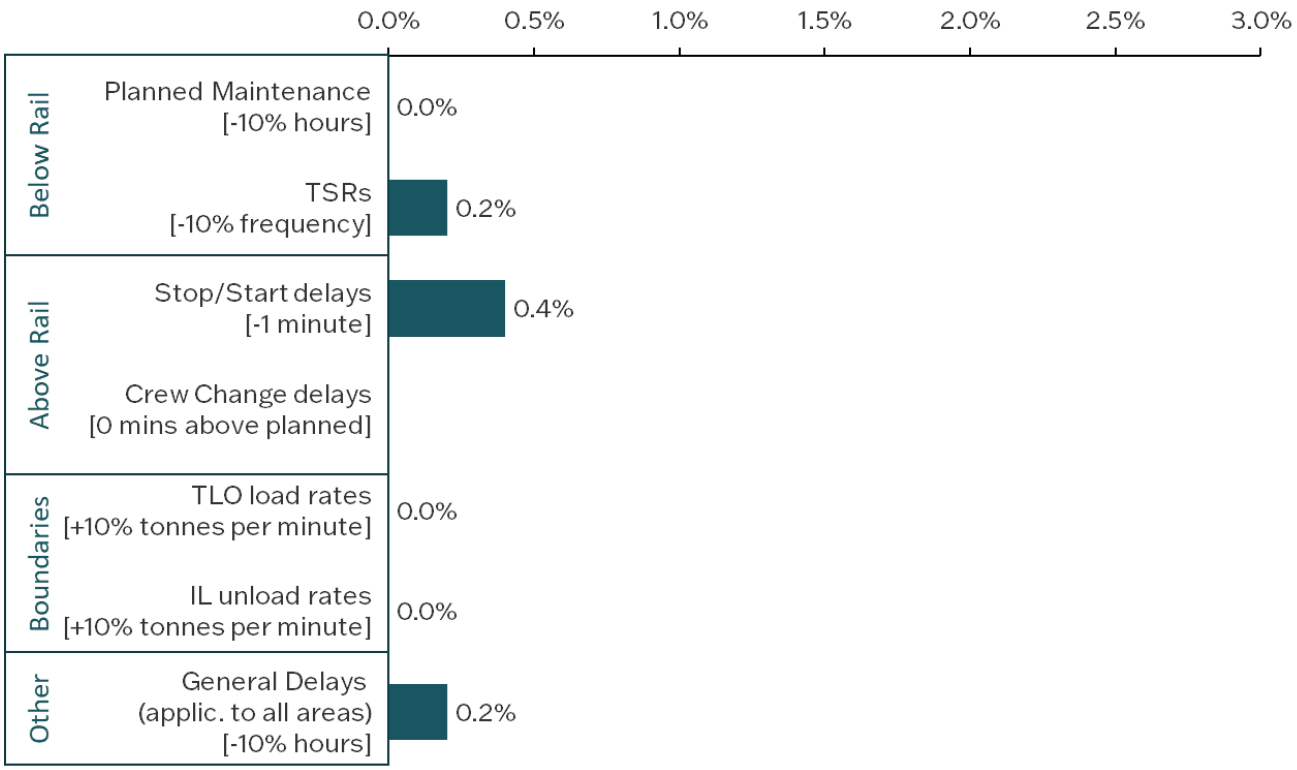
Given the variability of the DSM any DNC that is within 1% of meeting the Committed Capacity is considered to be achieving.

Not all origin/destinations have an ECD in the Moura Coal System.

8.3. DNC Materiality Analysis

Section 3.3 provides high-level sensitivity data for the network. **Figure 40** shows the materiality impact on DNC specifically for the Moura Coal System. The focus is on operating and maintenance improvement impacts.

Figure 40 **SOP parameter materiality on Moura Coal System - % of DNC**



There are minor improvements achieved with gains in key SOP operations and maintenance factors for the Moura Coal System with any improvements linked to the management of trains at and between Callemondah and the Port of Gladstone likely to have the greatest positive impact on DNC. A 1% improvement in DNC equates to an annual increase in Train Paths of ~22 and ~ 0.18M tonnes.

8.4. Existing Capacity Deficits

An ECD exists in a Coal System if the DNC (within the Capacity Assessment Period) is lower than the number of Train Paths required to meet Train Service Entitlements (TSEs).

If an ECD has been identified, the ECD is apportioned to each affected party equivalent to the percentage of Committed Capacity for that coal system.

Figure 41 shows ECDs by mainline and branch line for the Moura Coal System, per year, for the five-year assessment period year. A zero means there is no ECD.

Figure 41 **Moura Coal System ECDs (Train Paths)**

There are ECDs for all of the branch lines and the mainline after FY21.

For FY22 the mainline and most branch lines are achieving ~ 96% of Committed Capacity. Note the Rail Infrastructure for the Moura Coal System is considered capable of meeting Committed Capacity for some of the origin/destination journey however when relevant Moura Coal System traffic enters the Blackwater Coal System into branch line 4A Callemondah to Port of Gladstone and to the two (2) export coal terminals the DNC is adversely impacted at times.

Appendix F provides individual origin/destination data and the affected parties of ECDs for the Moura Coal System.

8.4.1. Root Cause and Mitigation of Existing Capacity Deficits

Results

The ICAR has determined that:

- The DNC of the Moura Coal System Rail Infrastructure is 2,146 to 2,241 Train Paths or 18M – 19M tonnes for FY22 to FY24.
- The Moura Coal system has an identified ECD of 97 Train Paths for FY22.
- This is equivalent to ~ 0.8M tonnes annual shortfall. This equates to the Rail Infrastructure being capable of meeting approximately ~98% of Committed Capacity annually.
- The Moura Coal System has [redacted] origin/destination contracts.
- There are a number of months that the Moura Coal System can achieve Committed Capacity.
- Some of the Moura Coal System origin/destination contracts do not have identified ECDs for FY22.

Root Cause factors

The Moura Coal system has sufficient capacity at most times to meet Committed Capacity however when trains reach around Callemondah they are impacted by the Blackwater Coal System traffic. Any mitigation that is undertaken in that area will benefit the Moura Coal System DNC.

Mitigation Options

The DNC materiality analysis on key operational and maintenance factors in **section 8.3** provide indicative areas of opportunity for an improvement in DNC. Other areas that would likely improve DNC are:

- The Moura Coal System can become congested between Callemondah and the Port of Gladstone and as demand increases the yard capacity and operations at Callemondah and within this branch line is likely to be a constraint.

9. Improvement Recommendations

The IE has exercised judgement on a large range of issues in arriving at developing its assumptions and conclusions in this ICAR. These relate to, among other things, the assumptions regarding the preparation of the SOP, the assessment of how the CQCN operates in practice and the interpretation of the various factors that the IE must have regard to in deriving the DNC of each Coal System.

The IE has determined that the DSM in its current form is suitable to determine the DNC as outlined in UT5 and finalise the ICAR.

This ICAR report is the first time that the determination of the Deliverable Network Capacity for the CQCN has been undertaken. During the development of the initial draft DSM by Integrated Logistics Company and subsequent model verification and validation by the IE, there have been a number of issues that have arisen that require further attention for improving the DNC accuracy as part of the Annual Capacity Assessment process moving forward.

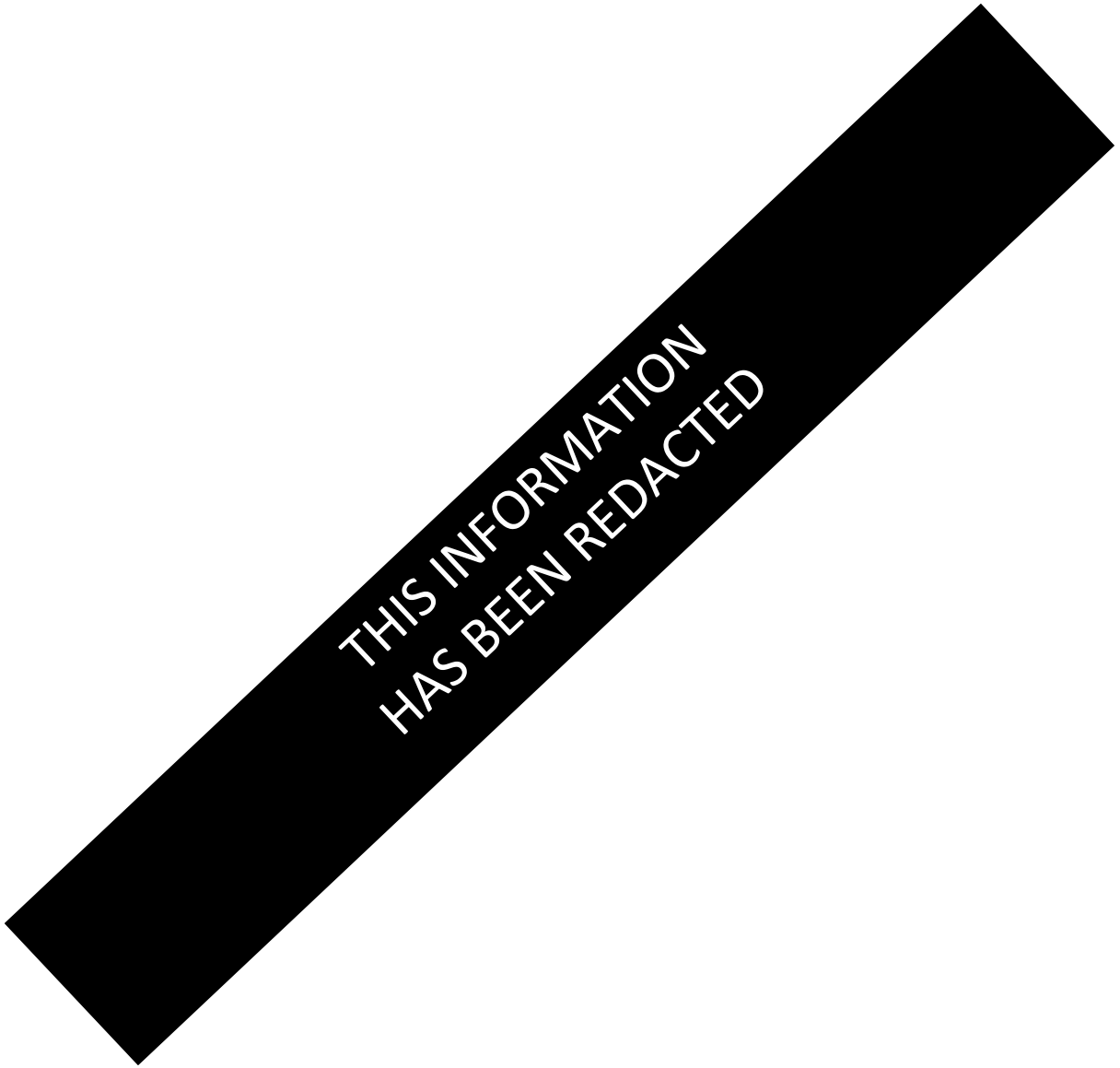
Some of these issues and opportunities are listed below and the IE plans to work through each of these prior to the first Annual Capacity Assessment due by 30 June 2022 to enhance the DSM and granularity of the DNC determination.

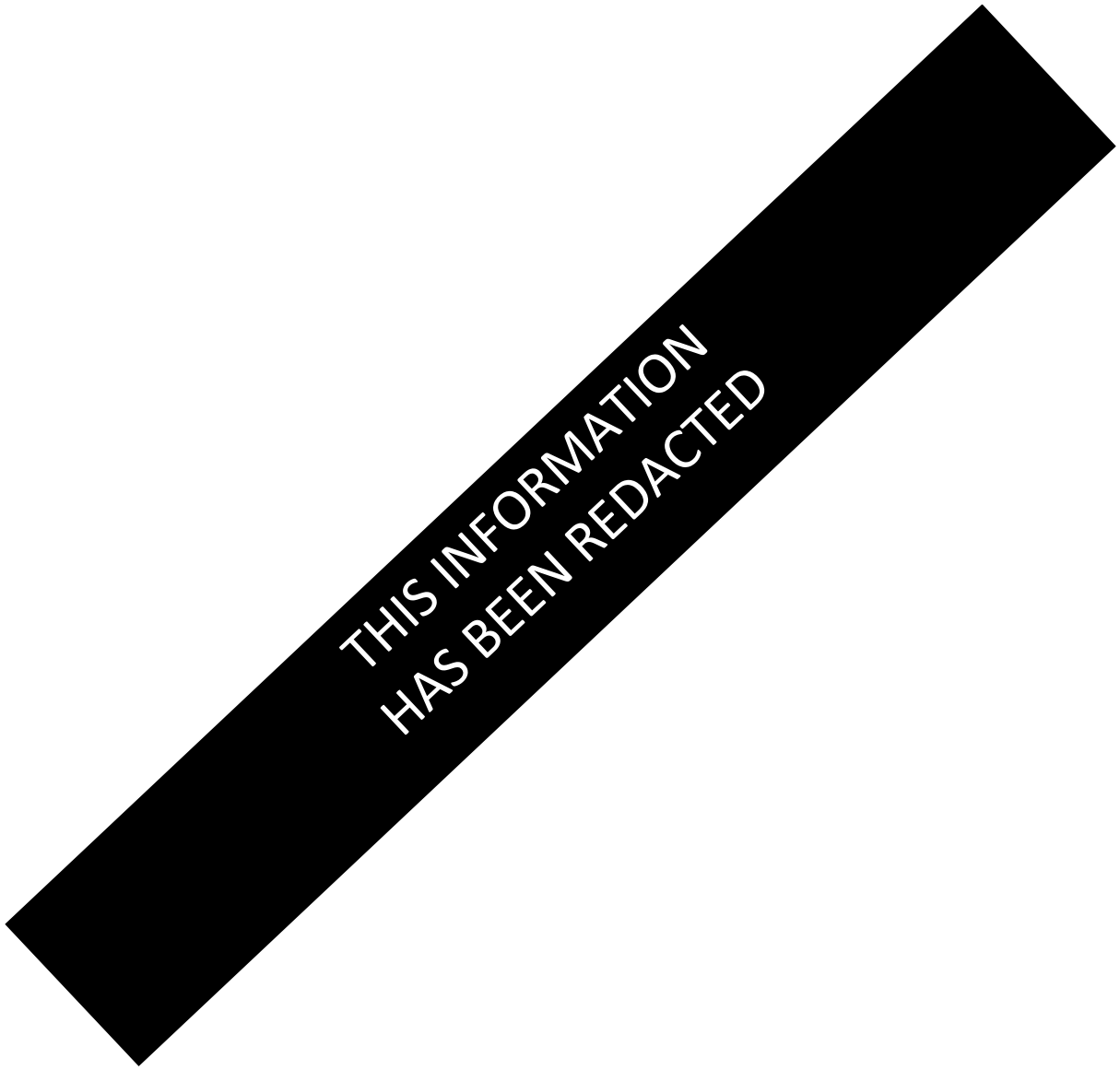
- Improvements in the quality, suitability and accuracy of raw data to ensure key model input data is presented consistent with the DSM requirements;
- Work with AN and the Rail Industry Group on a more detailed planned maintenance data for future years (i.e., more than 12 months) to make future year DNC estimates more accurate;
- Work with AN on capturing more detailed data on “moving maintenance” eg hi rail, moving equipment to site and rail grinding operations in terms of utilisation of committed paths/or scheduling between;
- Undertake further analysis of yard operations and stowage impact on DNC and consider if these inclusions could potentially enhance the DSM;
- Undertake further analysis of terminal operations (separate to Supply Chain model development) to determine if there are any terminals where there is a hybrid operation that impacts even railing assumptions; and
- Work with AN, Above Rail operators and supply chain participants on a more detailed level of data for general delays, unplanned maintenance and emergency possessions to ensure data is captured by the primary cause.

APPENDIX A: Aggregated Train Paths for CQCN per Mainline / Branch line per year

Coal System	Mainline / Branch Line		DNC (Train Paths)					Committed Capacity (Train Paths)					ECD (Train Paths)				
			FY20	FY21	FY22	FY23	FY24	FY20	FY21	FY22	FY23	FY24	FY20	FY21	FY22	FY23	FY24
Newlands	1	M.L. - Collinsville to Pring	4,550	4,689	4,845	4,870	4,928	7,529	6,696	7,486	7,542	7,564	2,979	2,007	2,641	2,672	2,636
Newlands	1A	B.L. - Pring to Abbot Point	4,550	4,689	4,845	4,870	4,928	7,529	6,696	7,486	7,542	7,564	2,979	2,007	2,641	2,672	2,636
Newlands	1B	B.L. - Newlands Mine to Collinsville	4,550	4,689	4,845	4,870	4,928	7,529	6,696	7,486	7,542	7,564	2,979	2,007	2,641	2,672	2,636
GAPE	2A	B.L. - North Goonyella Junction to Newlands Junction	2,651	2,962	2,798	2,793	2,799	4,419	4,286	4,389	4,381	4,398	1,768	1,324	1,591	1,588	1,599
Goonyella	3	M.L. - Coppabella to Jilalan	12,449	12,441	12,933	12,968	13,000	13,782	13,893	13,879	13,905	14,099	1,333	1,452	946	937	1,100
Goonyella	3A	B.L. - Jilalan to Port of Hay Point	12,449	12,441	12,933	12,968	13,000	13,782	13,893	13,879	13,905	14,099	1,333	1,452	946	937	1,100
Goonyella	3B	B.L. - Hail Creek Mine to South Walker Creek Junction	1,753	1,587	1,743	1,747	1,747	1,719	1,541	1,674	1,674	1,683					
Goonyella	3C	B.L. - Oaky Creek Junction to Coppabella	6,522	6,475	6,548	7,232	7,122	7,749	7,636	7,742	8,536	8,396	1,228	1,161	1,195	1,304	1,275
Goonyella	3D	B.L. - Coppabella to Wotonga	6,226	6,770	6,854	6,514	6,592	7,416	7,894	7,692	7,341	7,620	1,190	1,124	839	828	1,028
Goonyella	3E	B.L. - North Goonyella Mine to Wotonga	4,899	5,256	5,287	4,946	5,256	6,508	6,525	6,537	6,143	6,586	1,609	1,270	1,250	1,197	1,330
Goonyella	3F	B.L. - Blair Athol Mine to Wotonga	3,198	3,286	3,380	3,400	3,185	4,164	4,122	4,290	4,289	4,141	967	837	911	890	956
Blackwater	4	M.L. - Bluff to Callemondah	9,550	10,649	10,260	9,854	9,712	9,259	9,918	10,473	10,404	10,155			214	551	444
Blackwater	4A	B.L. - Callemondah to Port of Gladstone	11,212	12,325	12,036	11,579	11,415	11,124	11,792	12,423	12,377	12,134			388	799	719
Blackwater	4B	B.L. - Burngrove to Bluff	9,550	10,649	10,260	9,854	9,712	9,259	9,918	10,473	10,404	10,155			214	551	444
Blackwater	4C	B.L. - Rolleston Mine to Rangal	3,694	4,352	4,495	4,013	4,017	3,545	3,976	4,641	4,261	4,272			147	249	256
Blackwater	4D	B.L. - Oaky Creek Junction to Burngrove	2,894	3,046	2,923	3,185	2,982	2,785	2,905	2,978	3,388	3,047			56	204	65
Blackwater	4E	B.L. - Minerva Mine to Burngrove	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Moura	5	M.L. - Dumgree to Callemondah	2,178	2,165	2,241	2,163	2,146	2,294	2,282	2,338	2,338	2,345	116	117	97	175	199
Moura	5A	B.L. - Earlsfield to Dumgree	2,178	2,165	2,241	2,163	2,146	2,294	2,282	2,338	2,338	2,345	116	117	97	175	199
Moura	5B	B.L. - Earlsfield to Callide	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Moura	5C	B.L. - Earlsfield to Moura	1,067	1,000	1,124	1,084	1,073	1,166	1,162	1,222	1,222	1,226	99	162	98	138	153

APPENDIX B: Newlands Coal System Origin/Destination Information

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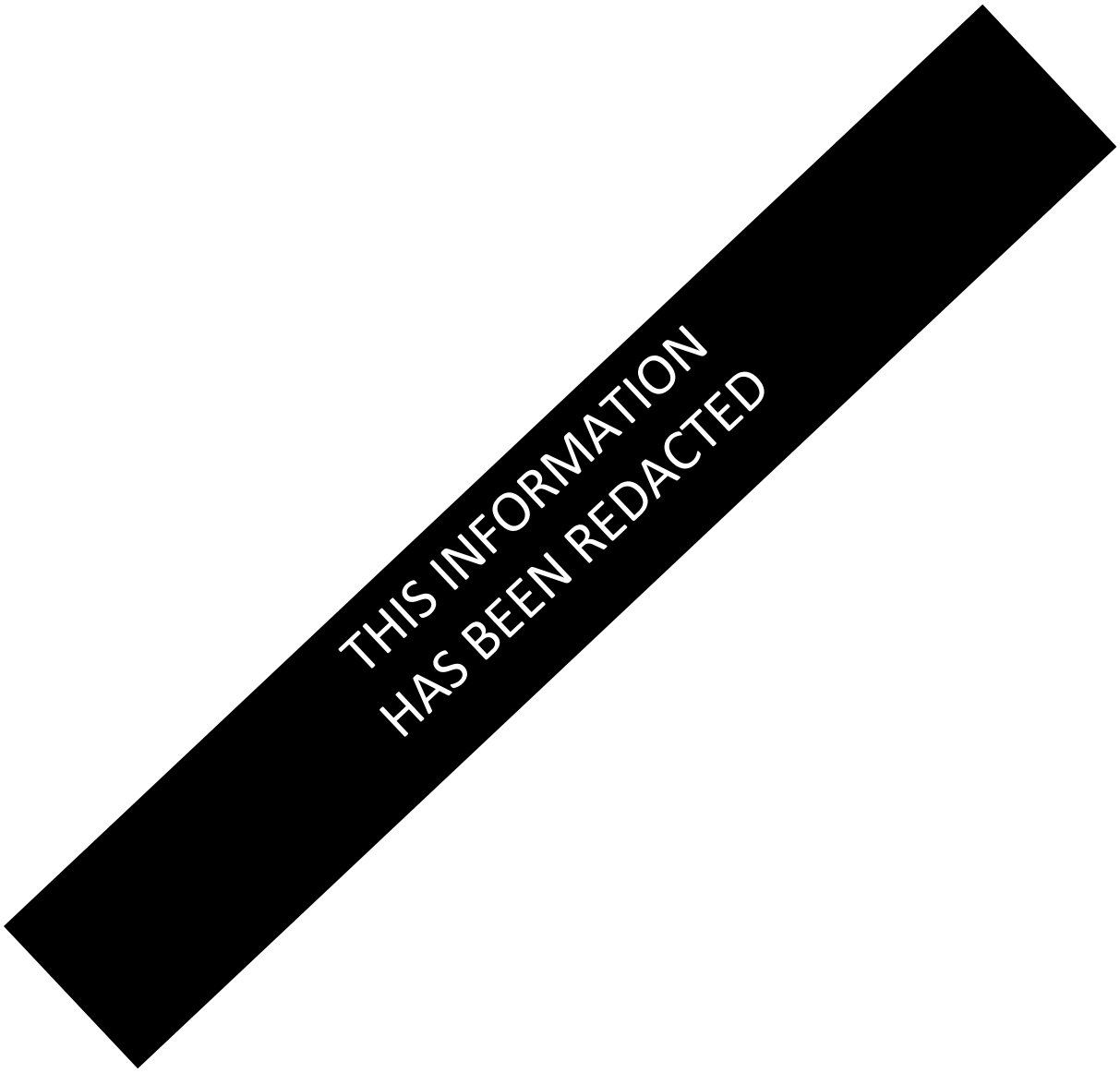
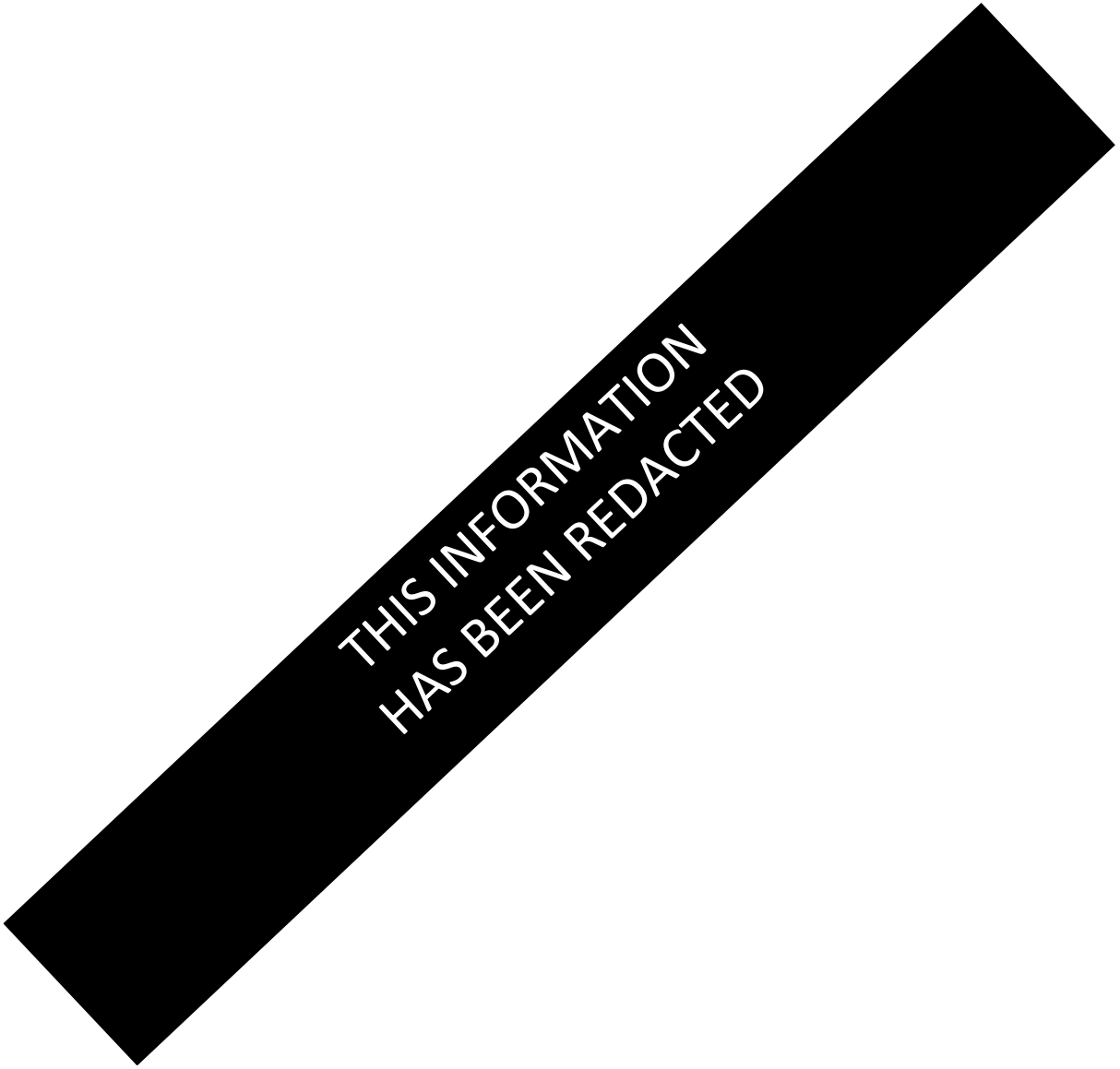
APPENDIX C: GAPE Coal System Origin/Destination Information

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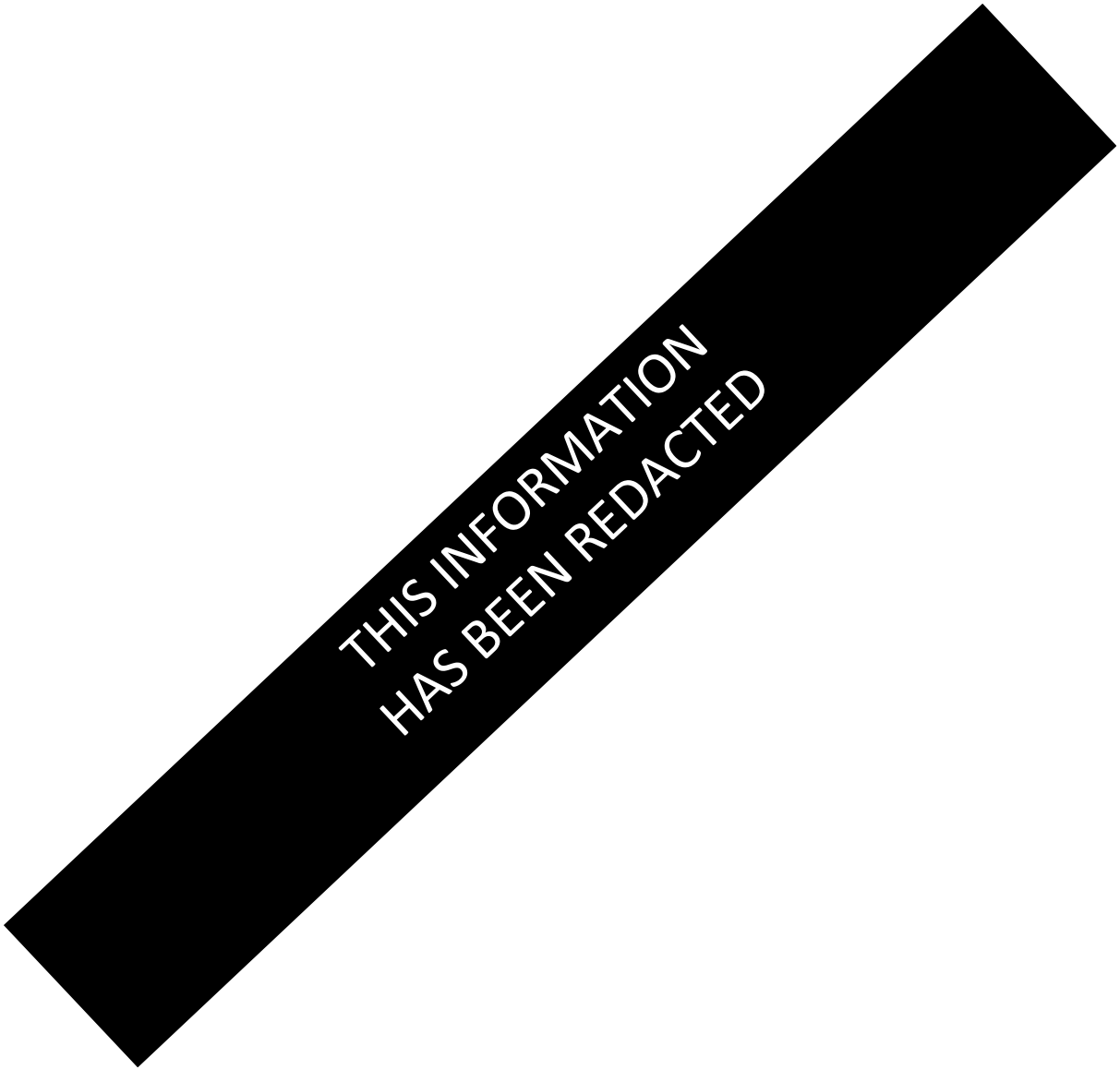
APPENDIX D: Goonyella Coal System Origin/Destination Information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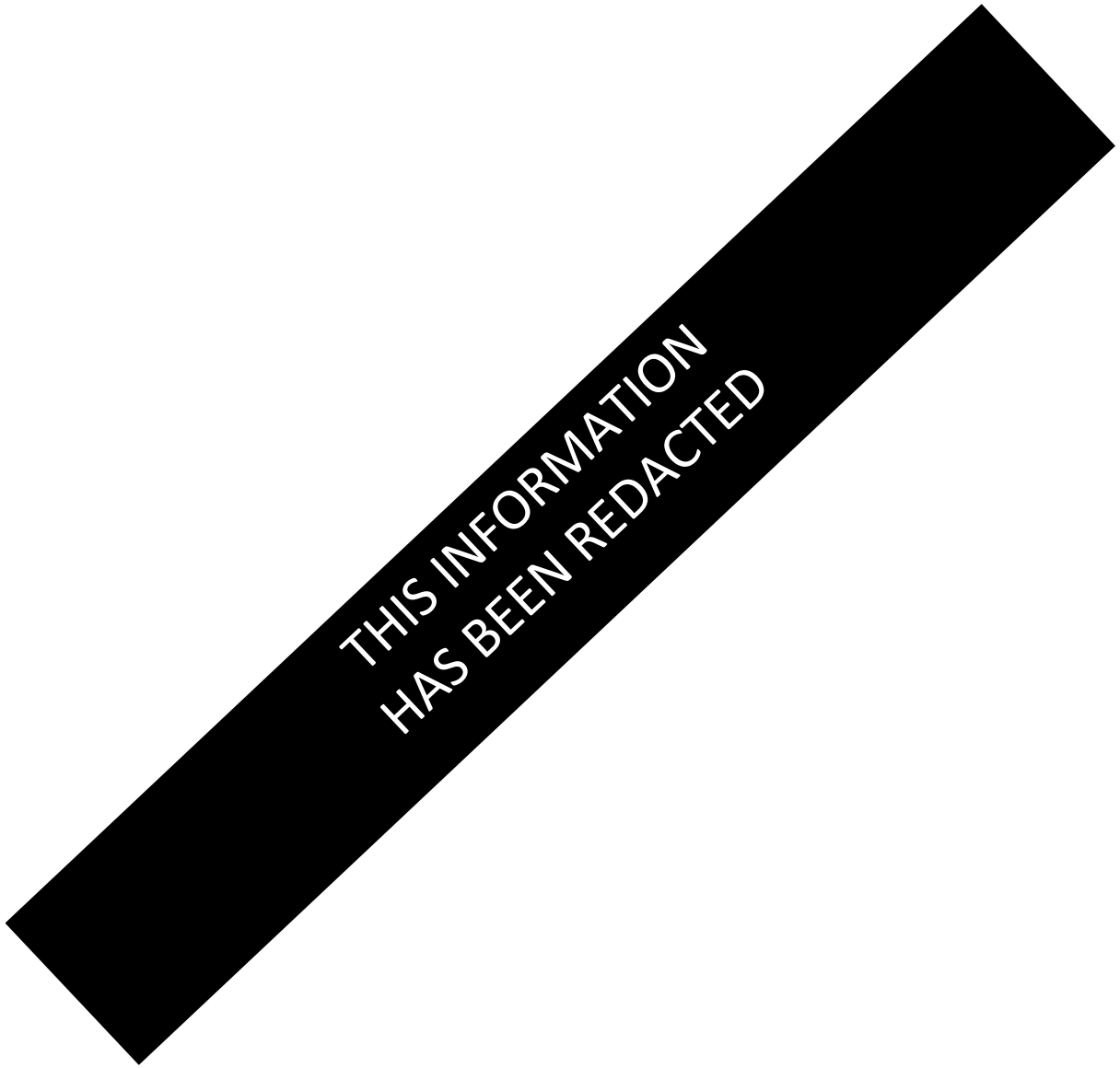
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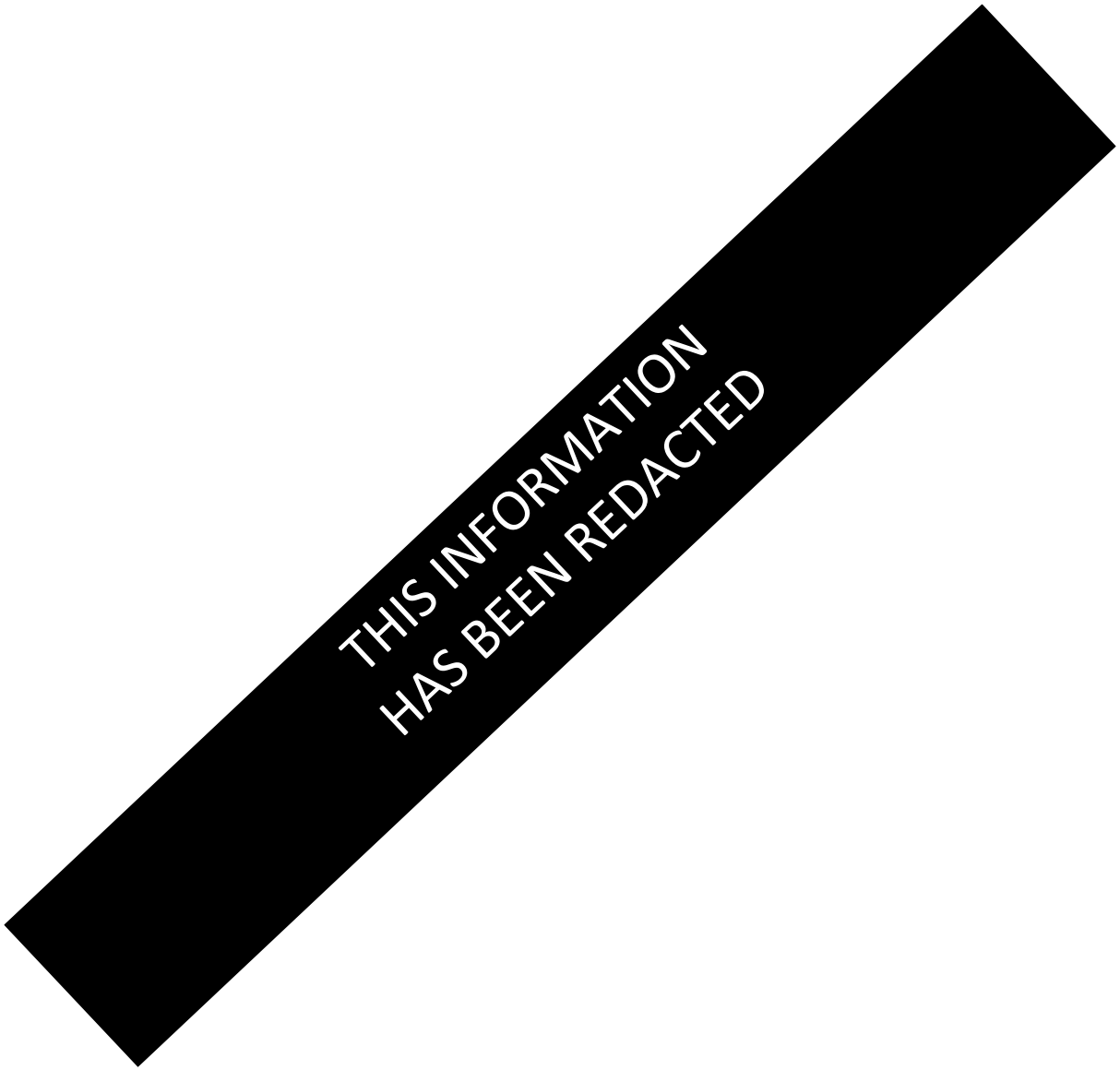
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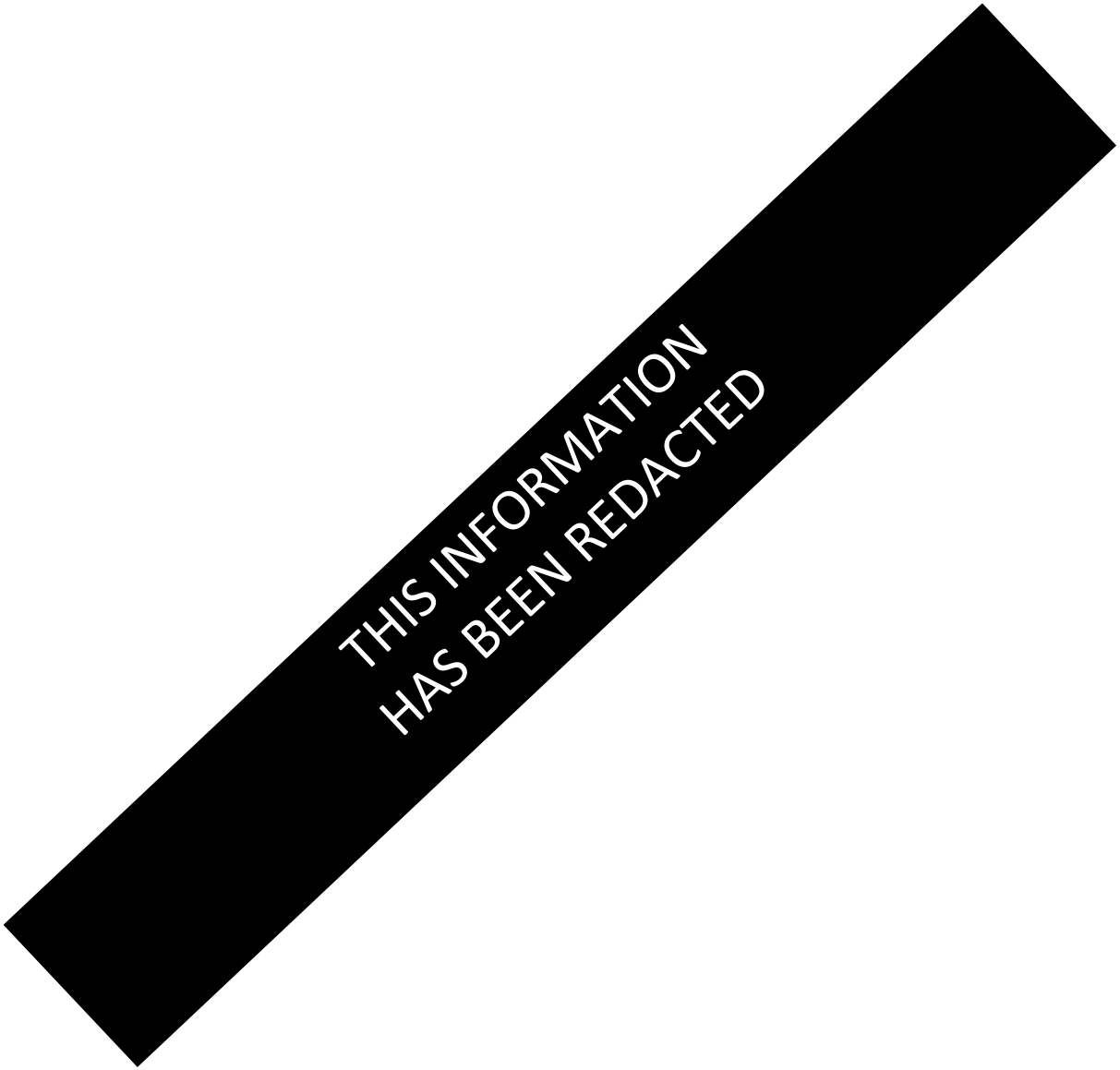
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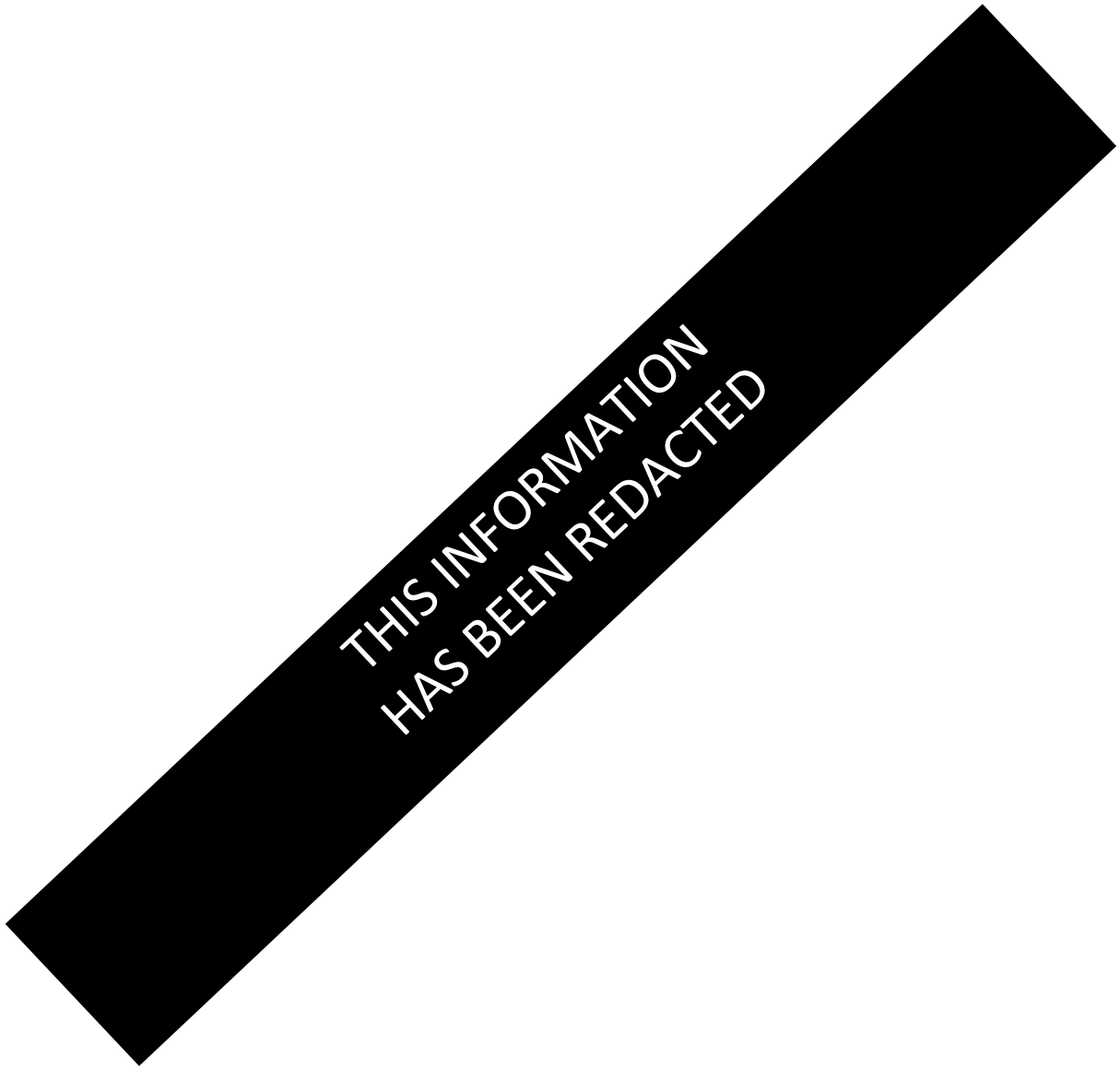
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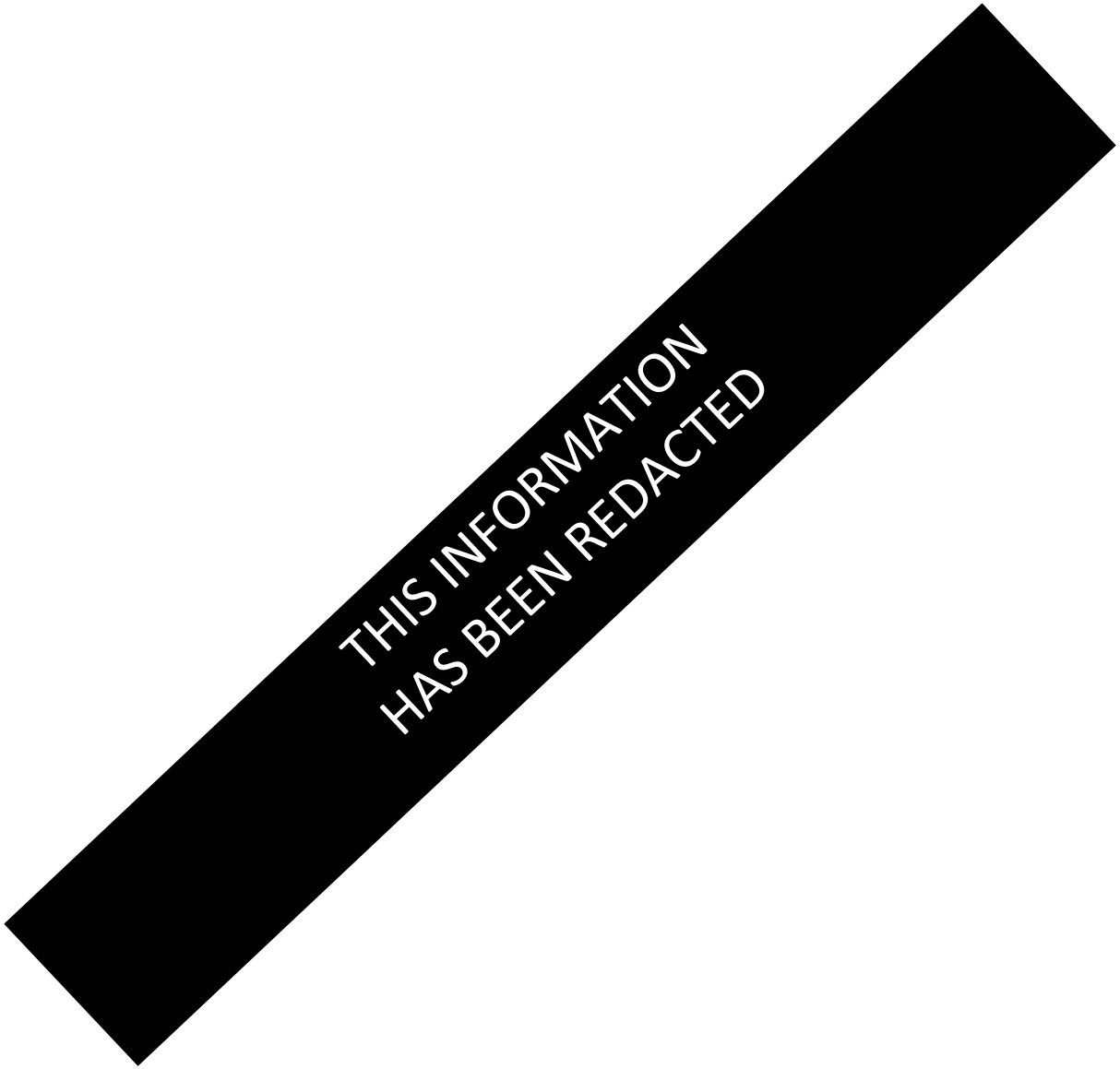
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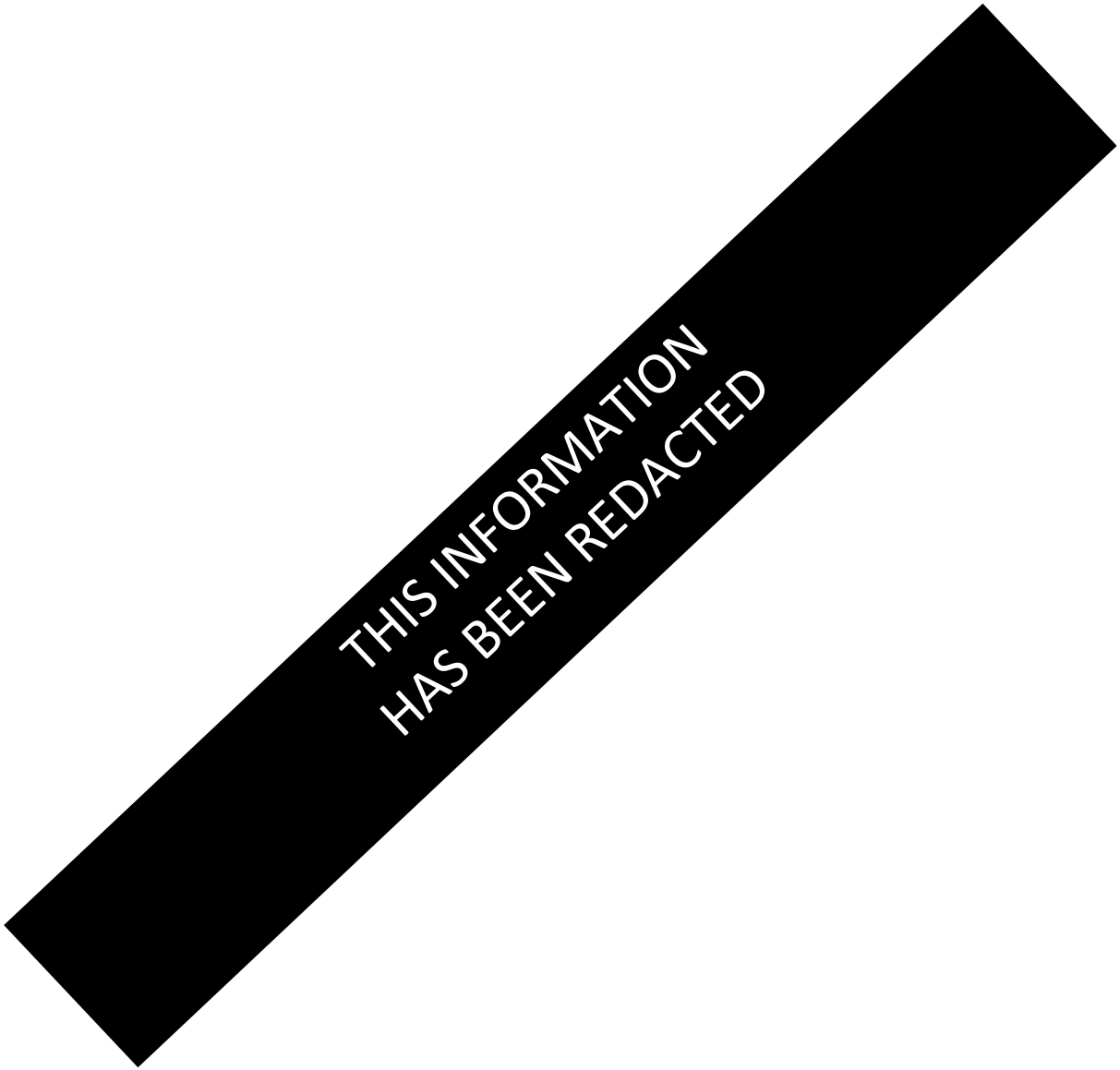
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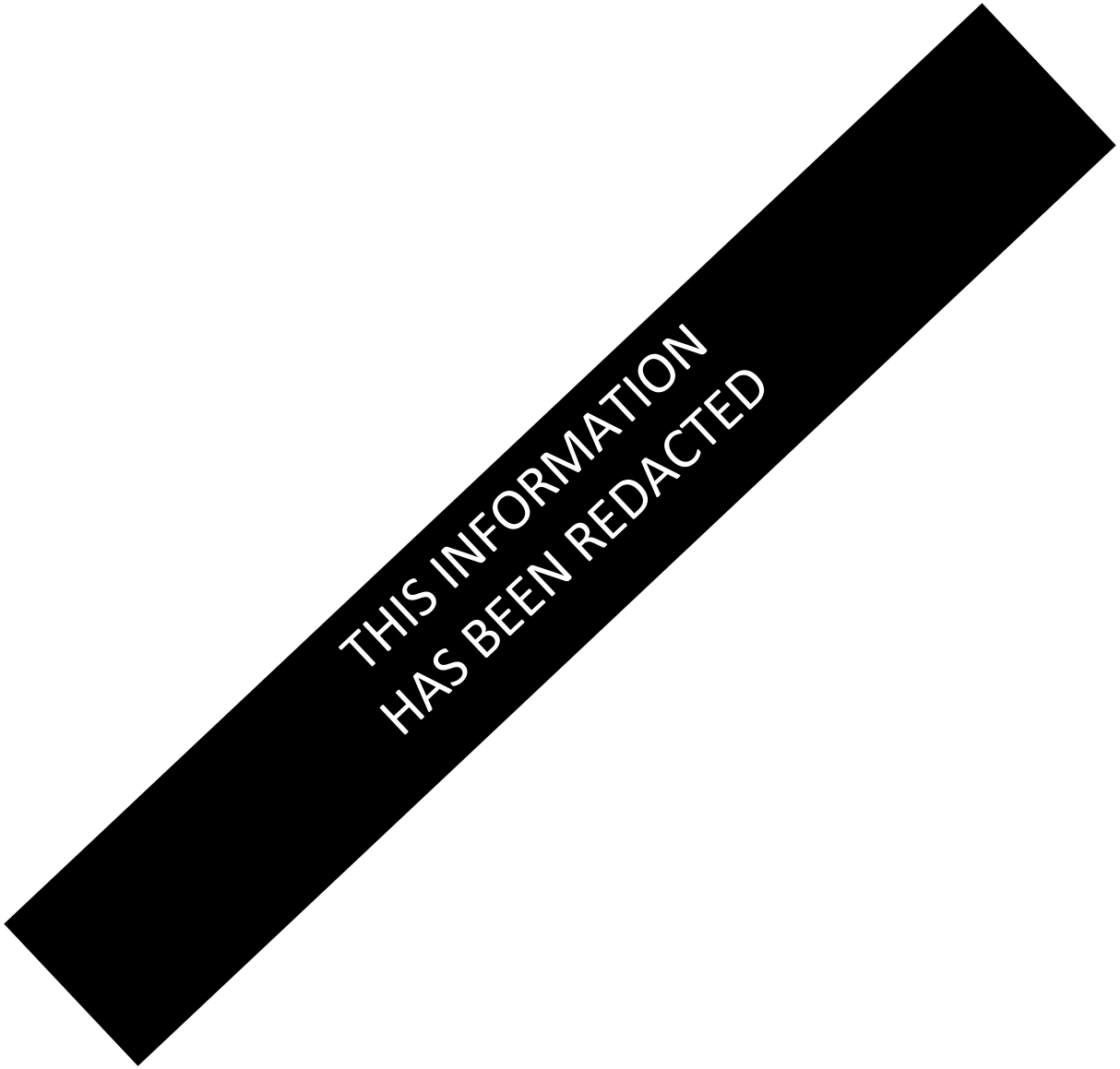
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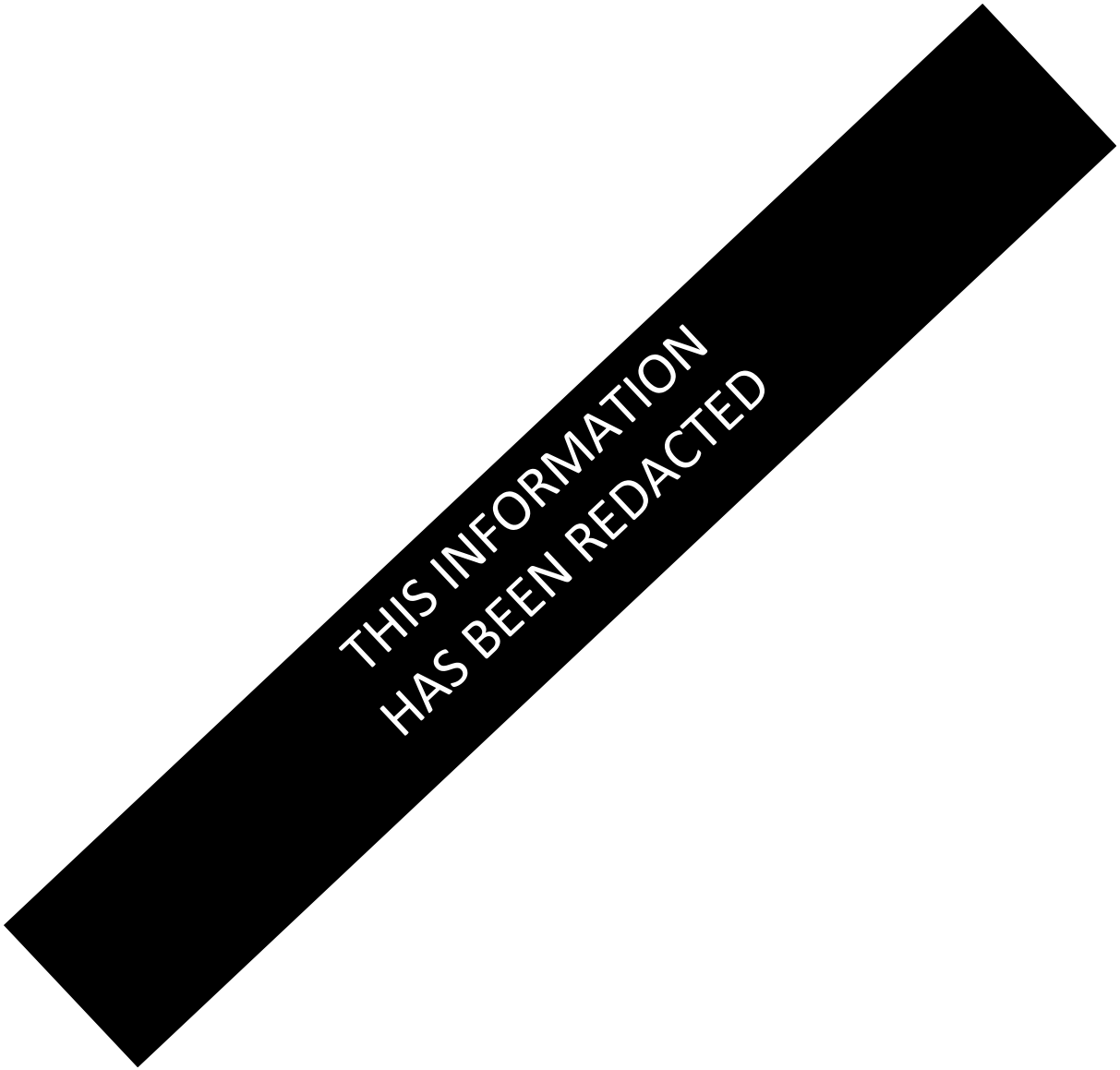
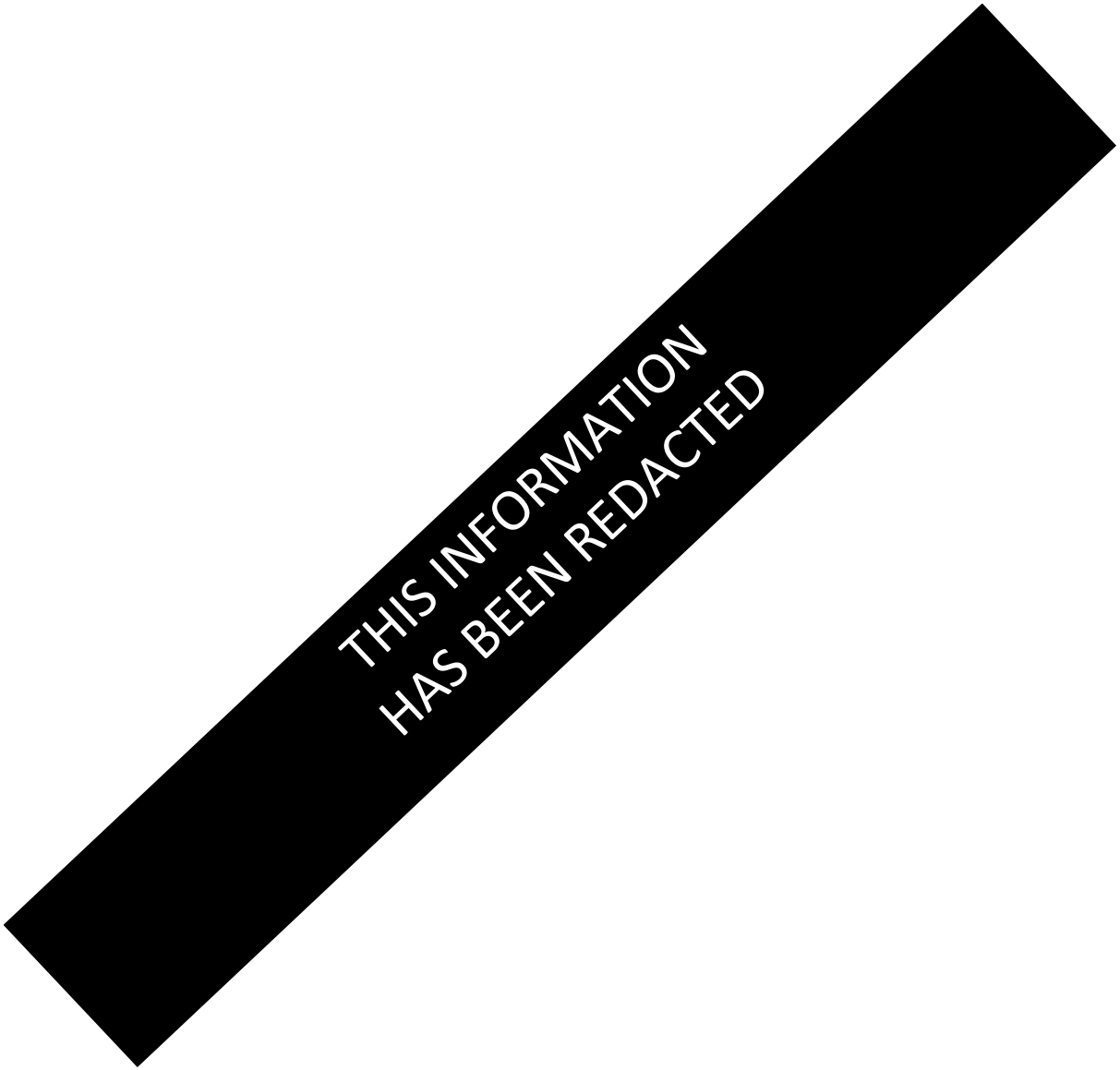
APPENDIX E: Blackwater Coal System Origin/Destination Information

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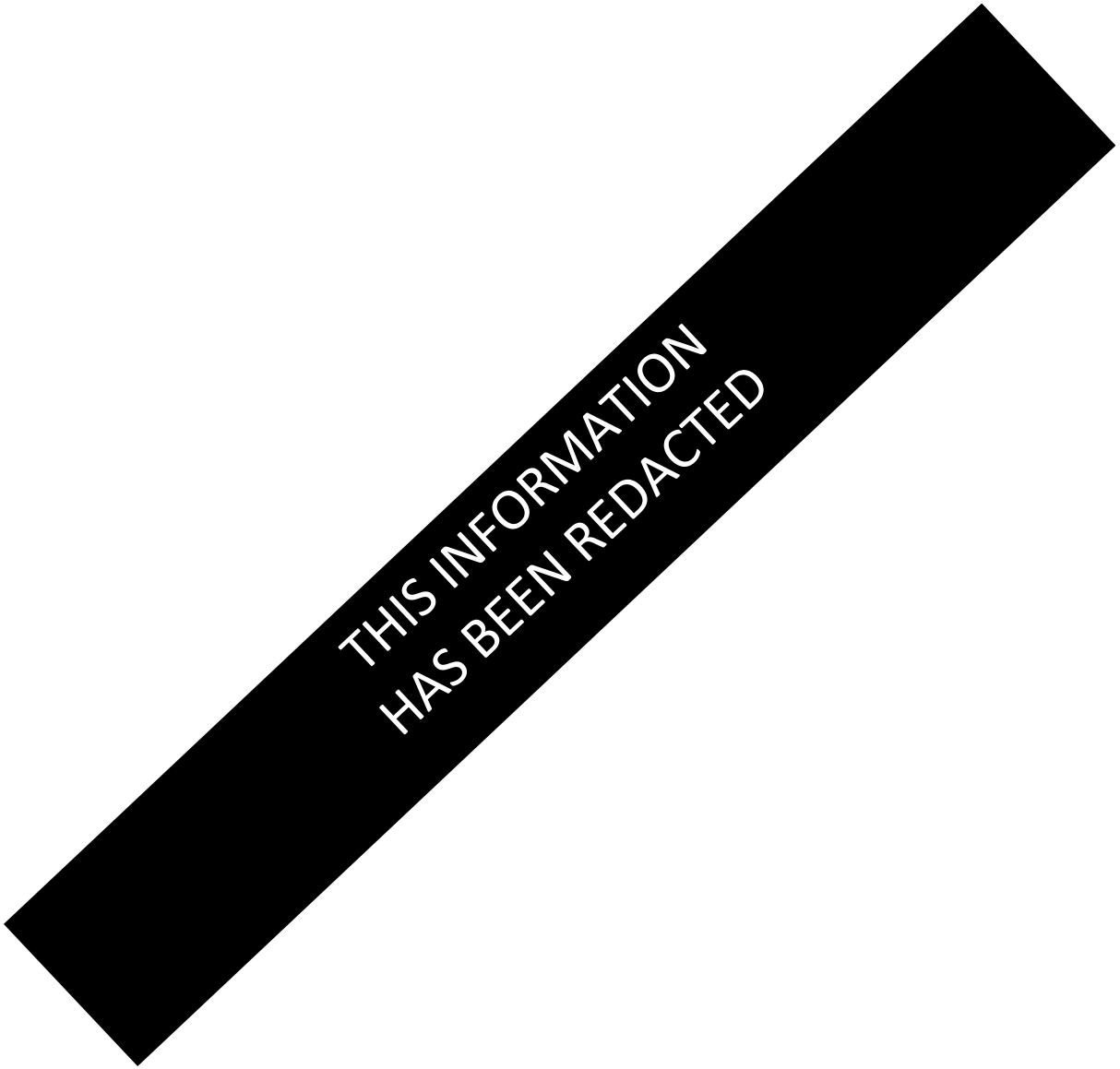
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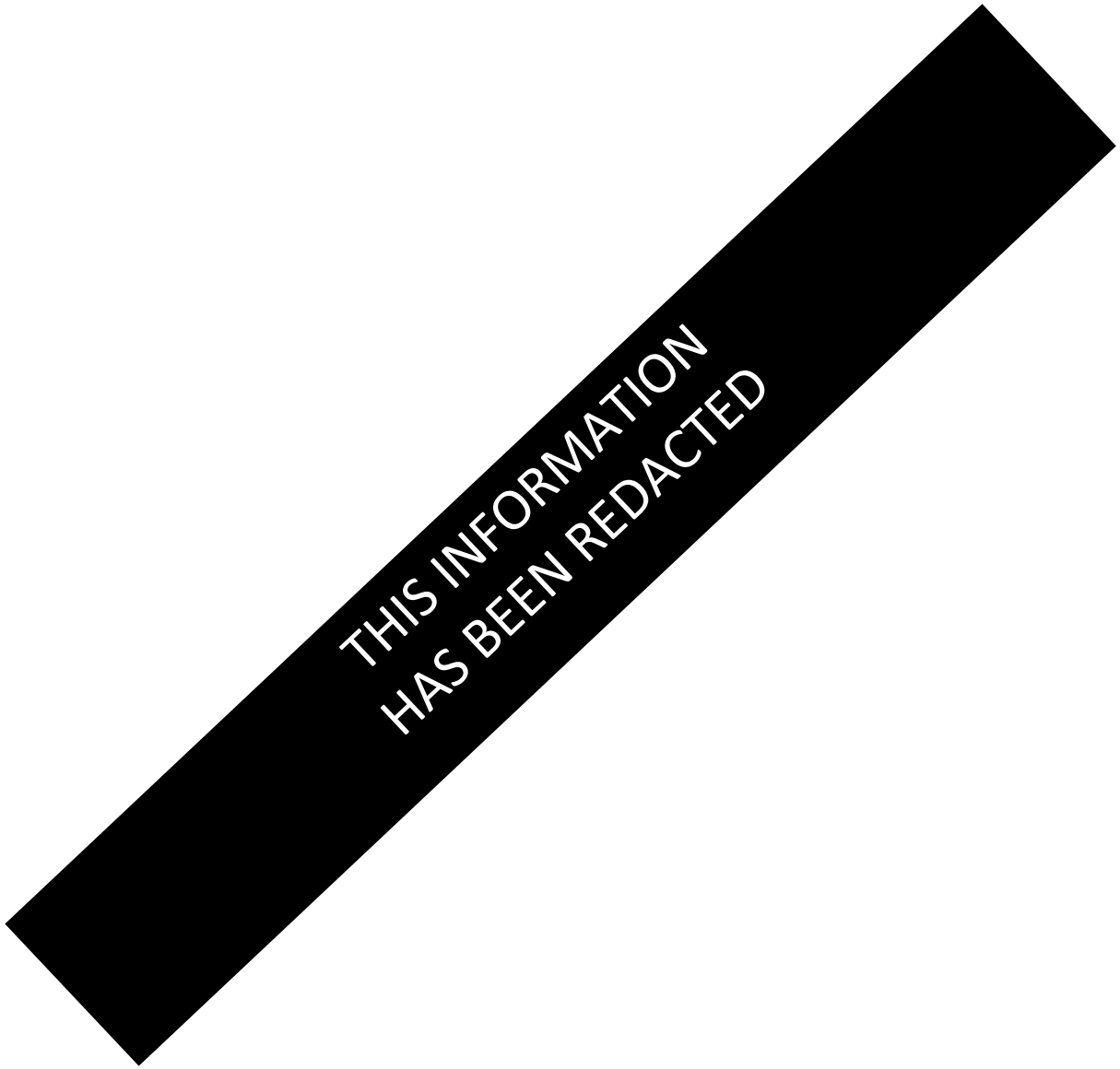
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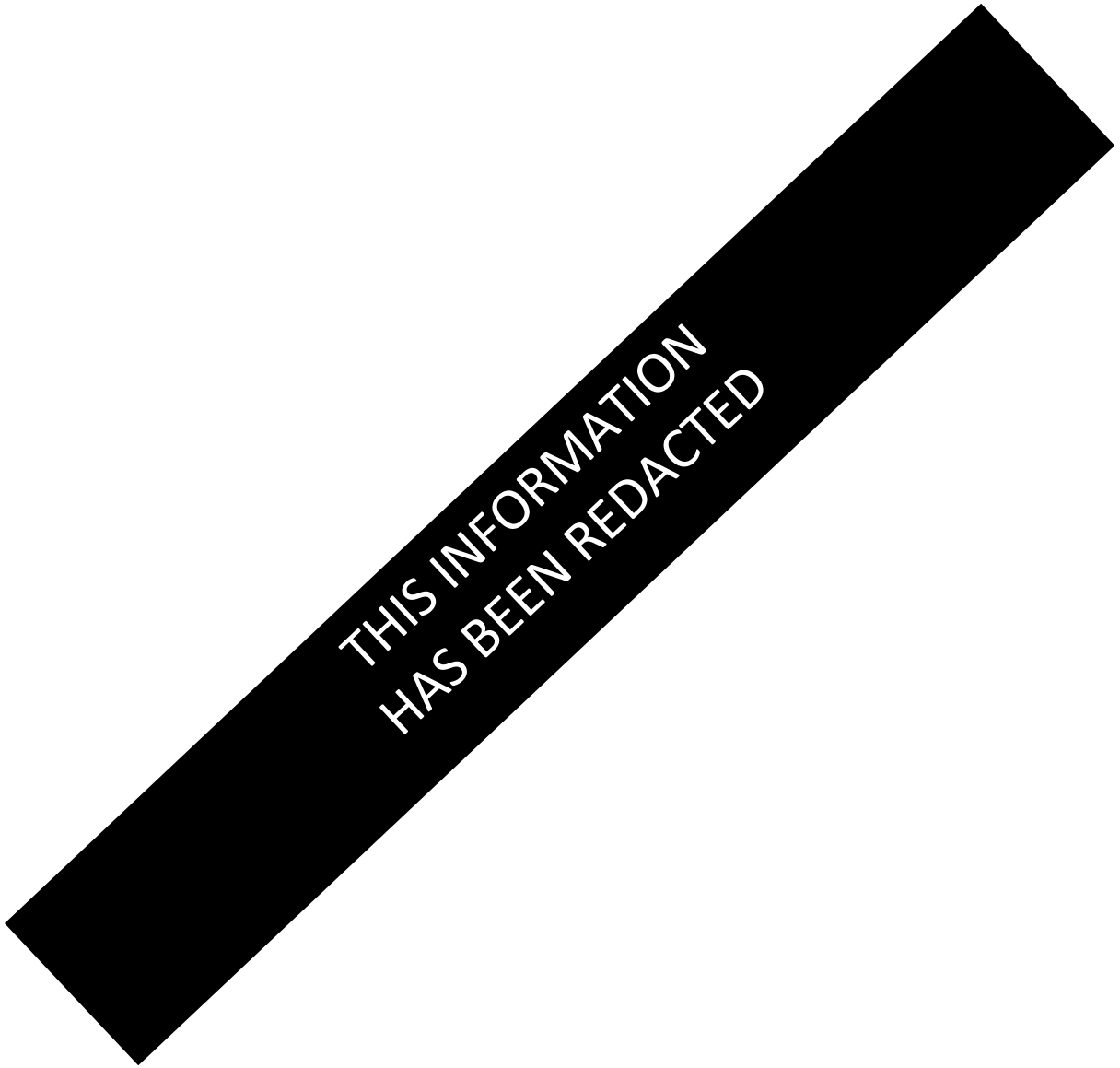
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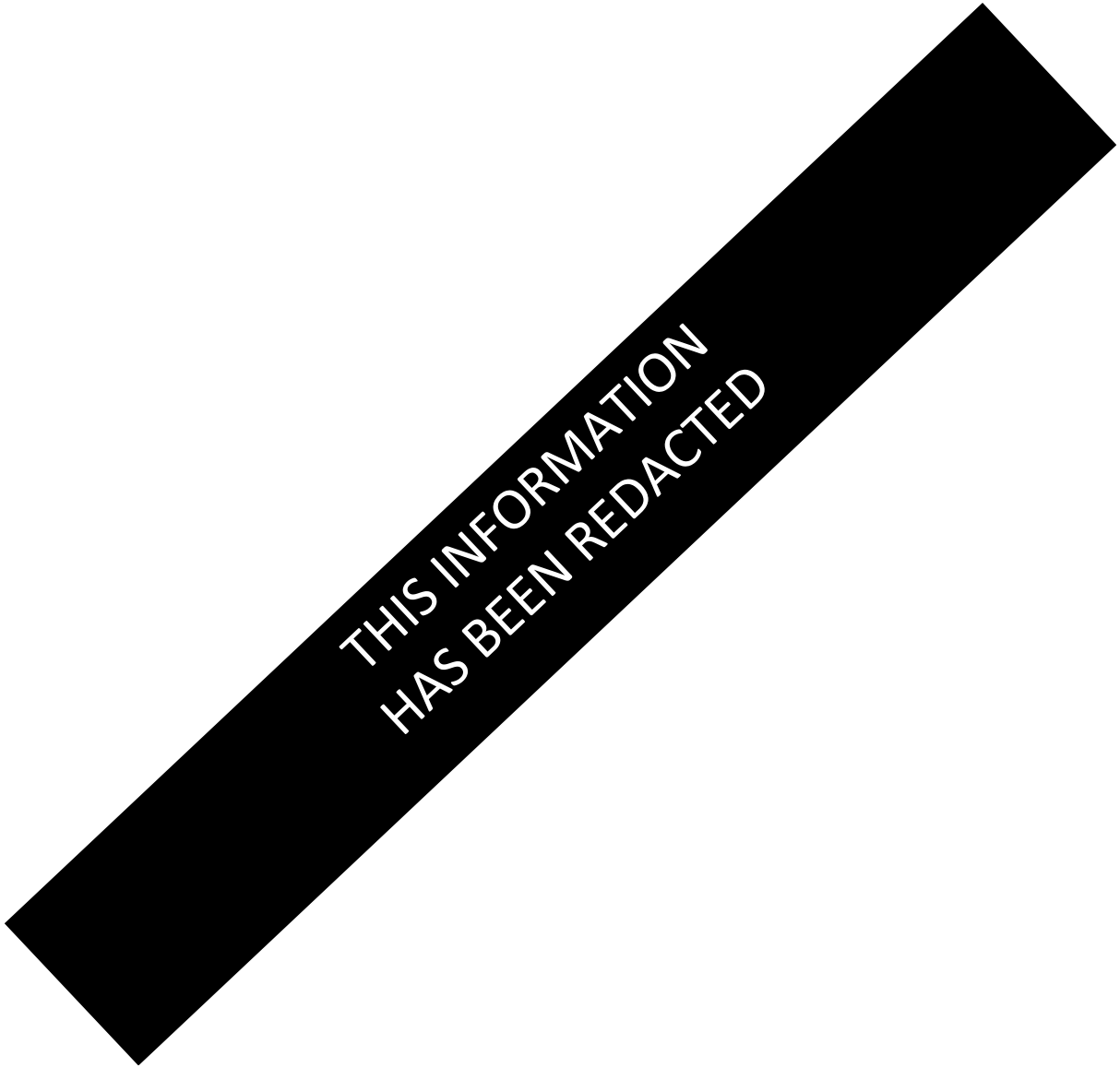
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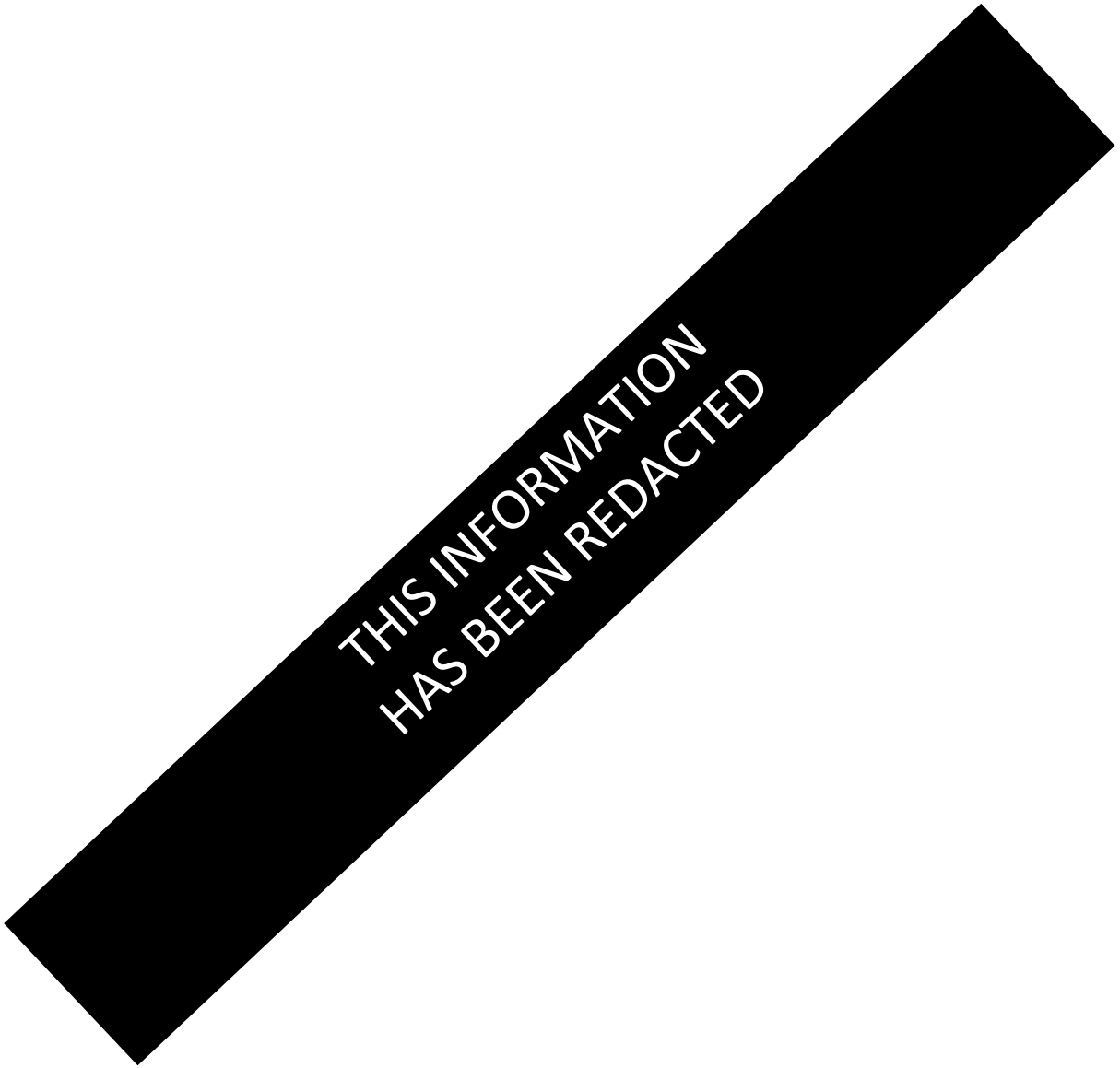
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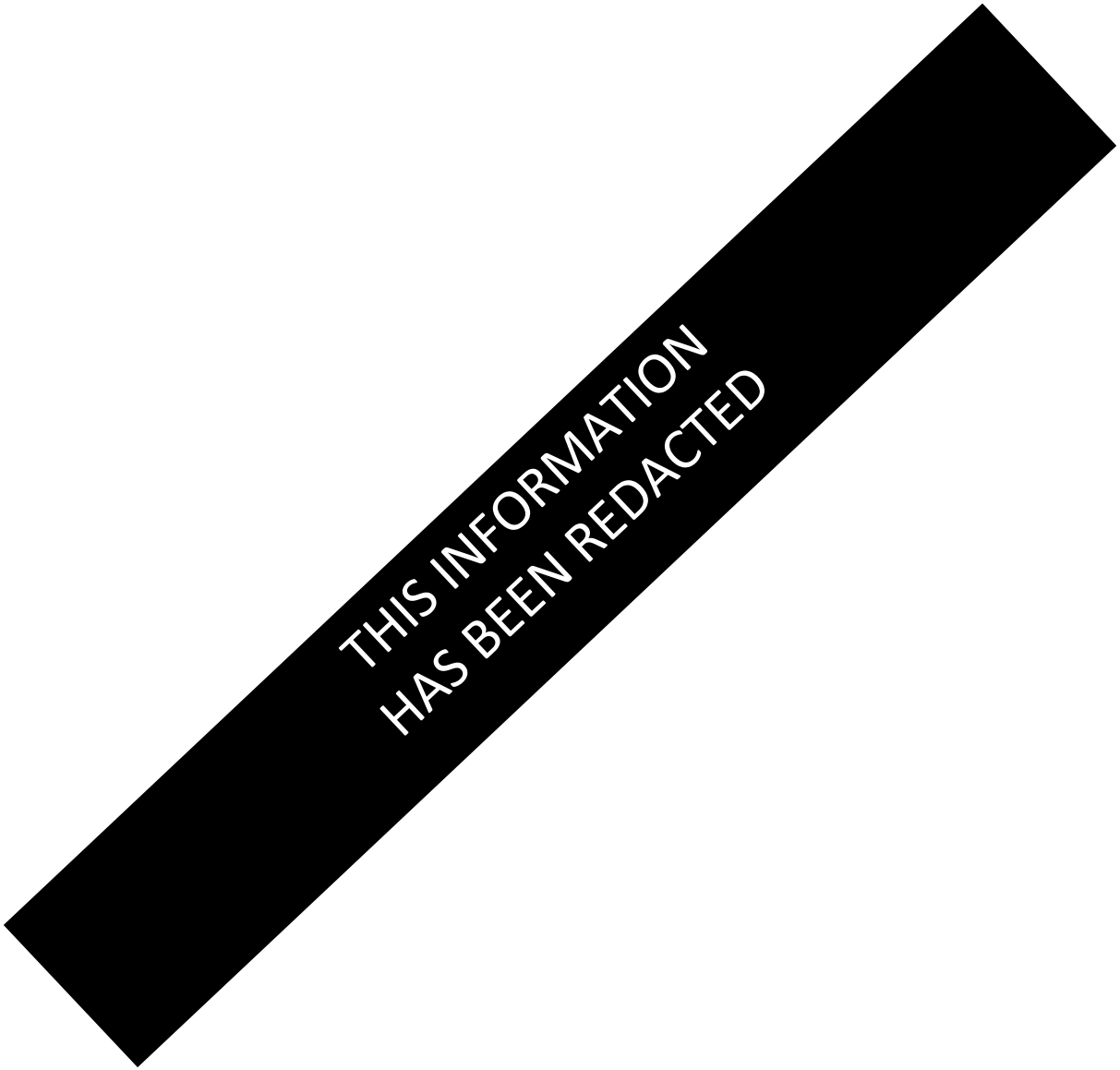
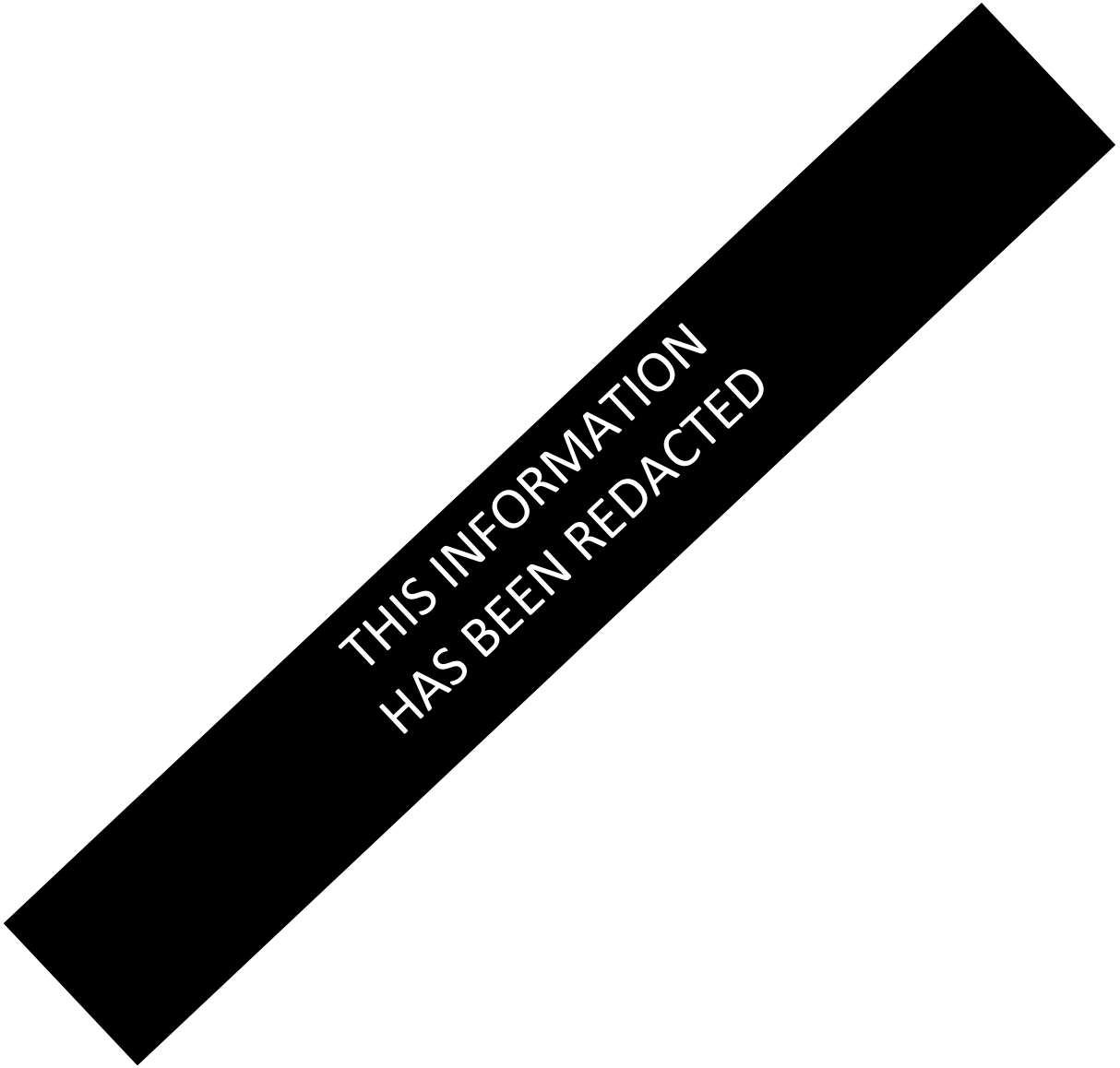
HAS BEEN REDACTED

APPENDIX F: Moura Coal System Origin/Destination Information

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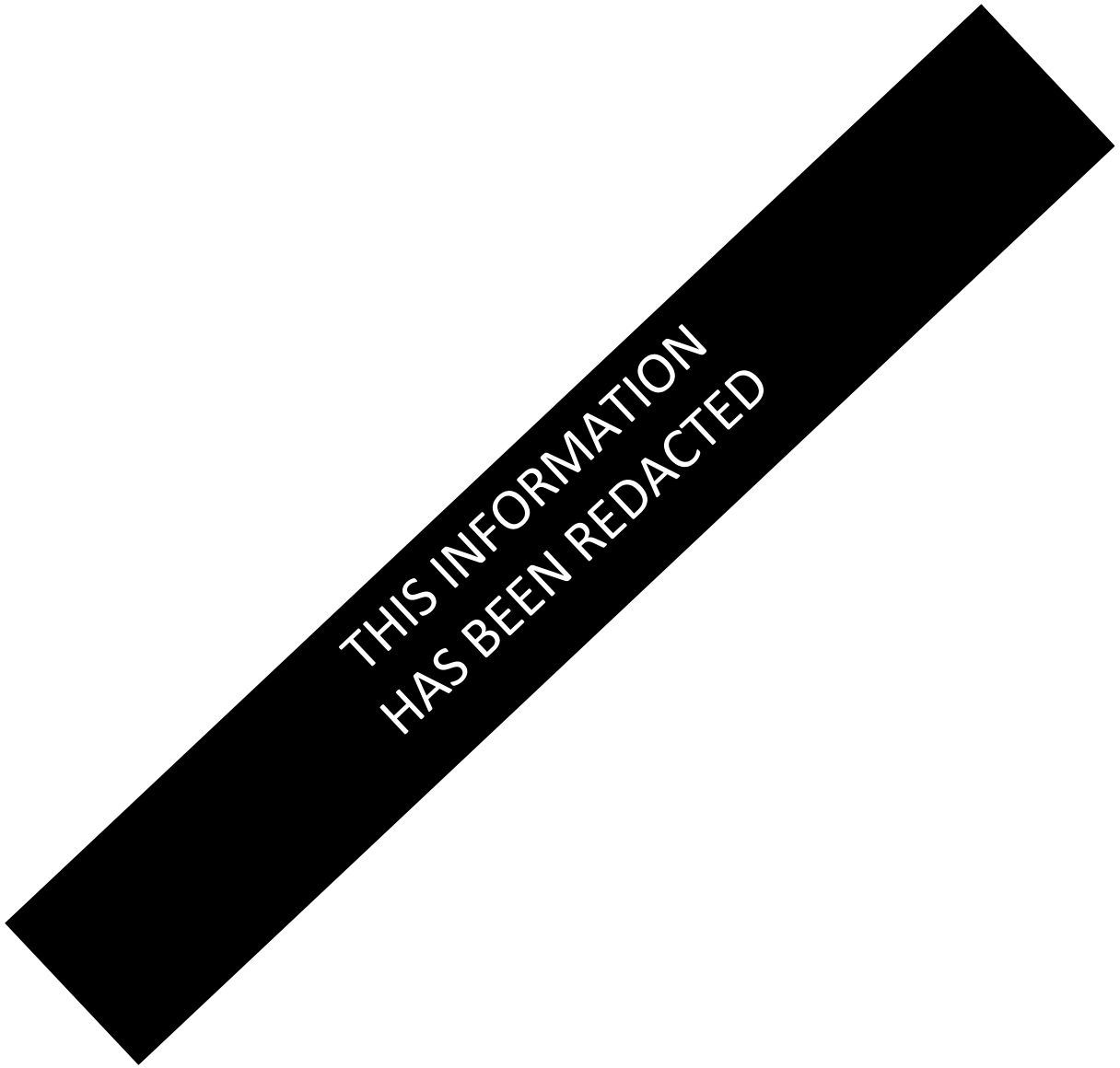
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