



ARTC

# HVAU Draft Determination 2013

Review of the WIK-Consult Report  
15 January 2015

**E3** Advisory



## Table of Contents

<b>1</b>	<b>Executive Summary</b> .....	<b>1</b>
<b>2</b>	<b>Introduction</b> .....	<b>3</b>
2.1	The Hunter Valley Rail Network.....	3
2.2	Scope of assessment .....	4
2.2.1	Assumptions.....	4
2.2.2	Limitations .....	4
2.3	About E3 Advisory .....	5
2.4	Methodology.....	6
<b>3</b>	<b>Basis of the Technical Assessment of Cost Variability</b> .....	<b>7</b>
3.1	Definition of Fixed & Variable Costs.....	7
3.2	A comment on Standalone costs.....	7
<b>4</b>	<b>Assessment for Maintenance Activities</b> .....	<b>9</b>
4.1	General .....	9
4.2	Summary Assessment of Maintenance Types .....	10
4.3	Assessment of Maintenance Types .....	15
4.3.1	Rail Defects .....	15
4.3.2	Rerailing - Minor .....	16
4.3.3	Rail Grinding.....	17
4.3.4	Turnout Grinding.....	17
4.3.5	Turnout Steel Component Replacement .....	17
4.3.6	Maintenance Resurfacing.....	17
4.3.7	Turnout Resurfacing.....	18
4.3.8	Pad Replacement .....	18
4.3.9	Ballast Cleaning .....	18
<b>5</b>	<b>Assessment for Minor CAPEX Projects</b> .....	<b>19</b>
5.1	General .....	19
5.2	Summary Assessment of Minor CAPEX Variability.....	20
5.3	Assessment of Minor CAPEX Categories.....	24
5.3.1	Rerailing .....	24
5.3.2	Point machine replacement / Point motor renewal .....	24



5.3.3	Signalling System Upgrades.....	24
5.3.4	Track Strengthening / Upgrading.....	25
5.3.5	Turnout renewal with 60kg Rail .....	25
5.3.6	Radio Upgrade (additional channels).....	25
5.3.7	Track Pads Replacement .....	25
5.3.8	Flash Butt Welding .....	25
5.3.9	Repair of Signalling Equipment (Relay Boards) .....	26
5.3.10	Installation of Rail Lubricators .....	26
5.3.11	Upgrading of Structural Deficiencies .....	26
<b>6</b>	<b>Assessment for Major CAPEX Projects .....</b>	<b>27</b>
6.1	General .....	27
6.2	ARTC's Major CAPEX Investment Context .....	28
6.2.1	Hunter Valley Coal Corridor Strategy (HVCCS) .....	28
6.2.2	Budget Investment Committee (BIC) .....	29
6.2.3	Rail Capacity Group (RCG) .....	29
6.3	Price Zones Contracted Capacity Growth.....	30
6.4	Summary Assessment of Major CAPEX Incremental Costs .....	32
6.5	Assessment of CAPEX Projects.....	36
6.5.1	Project 5255 - Maitland to Minimbah Third Road – Stage 2 – All Phases .....	37
6.5.2	Project 5811 - Nundah Third Track - All Phases .....	38
6.5.3	Project 3585 - Maitland to Minimbah Third Road – Stage 1 – Phase 6 .....	39
6.5.4	Project 3579 - Antiene to Grasstree Stage 1 duplication .....	40
6.5.5	Project 3884 - St Helliers to Muswellbrook Duplication .....	41
6.5.6	Project 3584 - Bi-Dir signalling Maitland to Branxton .....	42
6.5.7	Project 6928 - Drayton Junction Upgrade.....	43
6.5.8	Project 8665 - No.3 Departure Road at KCT.....	44
6.5.9	Project 3468 - Newdell Junction Upgrade .....	45
6.5.10	Project 6156 - Maitland Junction/CBI .....	46
6.5.11	Project 8666 - KCT Bypass Road Realignment.....	47
6.5.12	Project 3578 – Muswellbrook Loop Extension - 961.....	48
6.5.13	Project 3575 – Minimbah 80 kph Running - Stage 1.....	49
<b>7</b>	<b>Financial Outcomes .....</b>	<b>50</b>



## List of Appendices

Appendix A Reference Documents

Appendix B E3 Advisory Report Authors

## List of Tables

Table 1: Methodology to assess variable costs of ARTC maintenance and CAPEX activities.....	6
Table 2: Maintenance Activity Variability Assessment.....	10
Table 3: Rail Defect Assessment .....	15
Table 4: Minor CAPEX Variability Assessment .....	20
Table 5 Major CAPEX Variability Assessment .....	32
Table 6 E3 Advisory approach to Major CAPEX project assessments.....	36

## List of Figures

Figure 1: Total Contracted Coal Volume Growth by Price Zone

Figure 2: Share of Total Contracted Coal Volume Growth by Price Zone



# 1 Executive Summary

1. This report was prepared in early January 2015 for the Australian Rail Track Corporation (ARTC) to inform its response to the ACCC's Draft Regulatory Determination for the 2013 Calendar Year (Draft Determination) <sup>1</sup>.
2. ARTC's Hunter Valley rail network is regulated through the Hunter Valley Access Undertaking 2011 (HVAU). The HVAU financial model allows ARTC to recover revenue equivalent to its efficient costs in each calendar year for the 'Constrained Network' (*currently comprising of rail segments in Pricing Zones 1 and 2*) allowing ARTC to capitalise revenue shortfalls for Pricing Zone 3 into its regulatory value of assets for recovery in future years.
3. In determining the amount of costs to apply to Price Zone 3 customers, the ACCC's Draft Determination has, in part, relied on the WIK-Consult *Assessment of the Incremental Costs of Pricing Zone 3 Access Holders' Use of Pricing Zone 1 and 2 of the Australian Rail Track Corporation's Hunter Valley Regional Rail Network* (the WIK-Consult Report).
4. The WIK-Consult Report provides an assessment of the maintenance and capital expenditure costs that Price Zone 3 customers should incur as they represent costs 'incremental' to the operation of the network for Price Zone 1 & 2 customers.
5. WIK-Consult estimated the incremental costs of Price Zone 3 Access Holders' use of Price Zone 1 at \$14.6 million for the 2013 calendar year<sup>2</sup> compared to \$2.5 million submitted by ARTC<sup>3</sup> (based on its assessment of 'Direct Costs').
6. The basis of the WIK-Consult Report conclusions on the apportionment of incremental costs to Price Zone 3 customers is an 'Engineering Assessment of Cost Variability' performed by a subcontractor to WIK-Consult (TUVRheinland).
7. This report reviews the technical assessment in the WIK-Consult Report and provides E3 Advisory's determination of costs that can be reasonably assessed as 'incremental costs' (*or variable components of costs*) for:
  - (a) Maintenance Activities - including both Routine Corrective Maintenance (RCM) and Major Planned Maintenance (MPM)
  - (b) Minor CAPEX Works (Infrastructure renewal); and
  - (c) Major Works (Upgrades or enhancements to the network).

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<sup>1</sup> Full title: ACCC (2015) Draft Determination - Australian Rail Track Corporation's compliance with the Hunter Valley Coal Network Access Undertaking financial model for the 2013 calendar year.

<sup>2</sup> WIK-Consult, (2015) "Assessment of the incremental costs of pricing Zone 3 Access Holders' Use of Pricing Zone 1 and 2 of the Australian Rail Track Corporation's Hunter Valley Network" (2015), vi.

<sup>3</sup> ACCC (2015) Draft Determination - Australian Rail Track Corporation's compliance with the Hunter Valley Coal Network Access Undertaking financial model for the 2013 calendar year (page 6)



8. Due to time constraints, we have limited our assessment to only the maintenance and minor capital expenditure categories where the WIK-Consult Report assessment varied from the ARTC assessment provided to the ACCC in its Compliance Submission.
9. The assessments in the WIK-Consult Report appear to be based on the subjective judgement of WIK/TUV and do not reference data sources to support the recommended values for cost variability. Wherever possible we have based our assessment of maintenance and Minor CAPEX activities on current ARTC and RailCorp (TfNSW ASA) standards, manuals and guidelines.
10. Our assessment of Major CAPEX has relied on a stepped process (considering network and project specific context) to examine 13 specific projects and to identify the 'incremental' proportion of the project costs recommended to be assigned solely to Price Zone 3 producers.
11. The financial result of the recommended apportionment of incremental costs to Price Zone 3 producers is shown in the table below.

<b>Assessment</b>	<b>Costs Incremental to Price Zone 3 Producers</b> <b>\$m</b>
ARTC	\$2.49
WIK-Consult	\$14.58
E3 Advisory	\$3.64



## 2 Introduction

12. This report has been prepared for the ARTC to inform its' response to the ACCC's *Draft Determination - Australian Rail Track Corporation's compliance with the Hunter Valley Coal Network Access Undertaking* (Draft Determination).
13. The purpose of this report is to undertake a review of the WIK-Consult *Assessment of the Incremental Costs of Pricing Zone 3 Access Holders' Use of Pricing Zone 1 and 2 of the ARTC's Hunter Valley Regional Rail Network* (the WIK-Consult Report) and to provide E3 Advisory's recommendation for the allocation of these costs.

### 2.1 The Hunter Valley Rail Network<sup>4</sup>

14. ARTC operates the Hunter Valley Coal Network which forms a part of the Hunter Valley Coal Chain (HVCC) and is largely utilized by coal producers to transport coal from the mines to the Port of Newcastle.
15. ARTC's Hunter Valley Coal Network is regulated through the Hunter Valley Access Undertaking 2011 (HVAU). The HVAU financial model allows ARTC to recover revenue equivalent to its efficient costs in each calendar year for the 'Constrained Network' (currently comprising of rail segments in Pricing Zones 1 and 2 (PZ1 & PZ2)), while allowing ARTC to capitalise revenue shortfalls for Pricing Zone 3 (PZ3) into its regulatory value of assets for recovery in future years.
16. ARTC is required to submit documentation to the ACCC (annually) for an assessment of its compliance with the HVAU financial model.
17. For the 2013 Determination, the ACCC engaged an independent consultant, WIK-Consult, to review the costs of ARTC's Hunter Valley Coal Network and estimate the incremental costs of PZ3 Access Holders' use of PZ1.
18. WIK-Consult estimated the incremental costs of PZ3 Access Holders' use of PZ1 network at \$14.6 million for the 2013 calendar year<sup>5</sup> compared to \$2.5 million Direct Costs submitted by ARTC<sup>6</sup>.

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<sup>4</sup> Generic information in this section is sourced from ACCC Draft Determination and/or WIK-Consult Report

<sup>5</sup> WIK-Consult, (2015) "Assessment of the incremental costs of pricing Zone 3 Access Holders' Use of Pricing Zone 1 and 2 of the Australian Rail Track Corporation's Hunter Valley Network" (2015), vi.

<sup>6</sup> ACCC (2015) Draft Determination - Australian Rail Track Corporation's compliance with the Hunter Valley Coal Network Access Undertaking financial model for the 2013 calendar year (page 6)



## 2.2 Scope of assessment

19. Based on the WIK-Consult assessment of incremental costs, the ACCC Draft Determination considers ARTC has: “*Not complied with respect to its application of the ceiling limit test in the HVAU financial model because some Access Holders are being asked to pay more than their standalone costs*”.<sup>7</sup>
20. The WIK-Consult Report included an ‘Engineering Assessment of Cost Variability’ that was performed by TUV Rheinland (as a subcontractor to WIK-Consult) that has informed the allocation of ‘incremental costs’ to PZ3 customers.
21. This Report reviews the technical assessment included in the WIK-Consult Report, specifically by providing ARTC with E3 Advisory’s determination of costs that can be reasonably assessed as variable components of costs or the ‘incremental costs’ for the following components:
  - (d) Maintenance Activities - including both Routine Corrective Maintenance (RCM) and Major Planned Maintenance (MPM)
  - (e) Minor CAPEX Works (Infrastructure renewal); and
  - (f) Major Works (Upgrades or enhancements to the network).

### 2.2.1 Assumptions

22. All reports and supporting analysis (e.g. spreadsheet calculations and inputs) have been assumed to be correct. There has been no attempt to review supporting information to confirm base assumptions, references or to identify input or calculation errors. This includes the financial analysis resulting from the adoption of the E3 Advisory Technical Assessment recommendations; this has been provided by ARTC based on the WIK-Consult cost model.
23. Unless denoted, all documents referenced in this report are assumed to represent the final or definitive version.

### 2.2.2 Limitations

24. Due to the limited timeframe to perform the assessment, the Major CAPEX component of the E3 Advisory assessment has focussed only on the Major CAPEX projects where the WIK-Consult allocations made a material difference to the allocation of direct/incremental costs to PZ3 customers.

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<sup>7 7</sup> ACCC (Oct 2015) Draft Determination - Australian Rail Track Corporation’s compliance with the Hunter Valley Coal Network Access Undertaking financial model for the 2013 calendar year p3





## 2.3 About E3 Advisory

25. E3 Advisory is a leading advisor providing tailored infrastructure advisory solutions and support services to clients who own, develop, deliver, manage and/or operate complex capital assets in the infrastructure and resources sectors.
26. E3 Advisory advise on many of Australia's significant transport projects by integrating our strong functional technical expertise with deep domain knowledge of the industry and a genuine understanding of the challenges of complex infrastructure projects and operations.
27. E3 Advisory is a medium sized, employee owned business with approximately 40 experienced industry professionals, operating from offices in Sydney and Brisbane.

**This report was authored by:**

Andrew Allen, Principal  
P. +61 2 8097 0790  
E. aallen@e3advisory.com

Nigel Markie, Senior Advisor  
P. +61 458 783 796  
E. nmarkie@e3advisory.com

*Refer appendix for further details of professional experience.*



## 2.4 Methodology

28. Table 1 sets out the methodology that E3 Advisory followed in performing our assessment of incremental (variable) costs.

**Table 1: Methodology to assess variable costs of ARTC maintenance and CAPEX activities**

Phase	Activity
<b>1 Familiarisation with Scope and Regulatory Arrangements</b>	<ul style="list-style-type: none"> <li>Review WIK-Consult Report and supporting analysis</li> <li>Identify key differences in ARTV versus WIK-Consult allocation methods to be addressed in the assessment</li> <li>Review ARTCs regulatory requirements for allocation of fixed/variable costs under the HVAU</li> </ul>
<b>2 Design Technical Assessment</b>	<ul style="list-style-type: none"> <li>Design targeted Technical Assessment including approach and basis for assessment</li> <li>Identify and request ARTC information required to assist in the Technical Assessment</li> </ul>
<b>3 Technical Assessment</b> <ul style="list-style-type: none"> <li><b>Maintenance</b></li> <li><b>Minor CAPEX</b></li> </ul>	<ul style="list-style-type: none"> <li>Review TUV Rheinland assessment approach</li> <li>Identify relevant standards and guidelines as a basis for assessment of fixed/variable costs</li> <li>Perform assessment of allocation basis against relevant standards and guidelines</li> </ul>
<b>4 Technical Assessment</b> <ul style="list-style-type: none"> <li><b>Major CAPEX</b></li> </ul>	<ul style="list-style-type: none"> <li>Review TUV Rheinland assessment approach</li> <li>Review relevant documents to understand the ARTC's investment framework for Major CAPEX</li> <li>Review relevant CAPEX approval documentation to identify: <ul style="list-style-type: none"> <li>Compliance with the Hunter Valley Corridor Capacity Strategy (HVCCS)</li> <li>Compliance with BIC and RCG approvals process</li> <li>Project investment driver(s), including primary and secondary benefits; and any related projects</li> </ul> </li> <li>Review contracted capacity growth by PZ</li> <li>Perform assessment of incremental costs</li> </ul>
<b>5 Document Findings</b>	<ul style="list-style-type: none"> <li>Prepare report summarising the E3 Advisory assessment of incremental cost items.</li> </ul>

29. A listing of the primary documents considered as part of this assessment are included at Appendix A.



## 3 Basis of the Technical Assessment of Cost Variability

### 3.1 Definition of Fixed & Variable Costs

30. Section 4.1 of the WIK-Consult Report *“Incremental costs are the additional costs that a firm incurs in providing a service relative to not providing a service at all.”*
31. HVAU 2011 Access Pricing Principles (Clause 4.2) requires that access revenue from every Access Holder must at least meet the Direct Cost imposed by that Access Holder.
32. HVAU 2011 defines ‘Direct Costs’ as maintenance expenditure, including major periodic maintenance that varies with usage of the Network, and may include other costs that vary with the usage of the Network but excluding Depreciation, assessed on an Efficient basis.
33. HVAU 2011 Access Pricing Principles (Clause 4.13), in determining Charges, ARTC will have regard to separate cost elements (including) *“...variable component of costs (VCC) being Direct Costs.”*
34. WIK-Consult describes the economic concept of incremental costs that has informed their assessment: *“... incremental costs are the additional costs that a firm incurs in providing a service relative to not providing that service at all.”*<sup>8</sup>
35. Section 4.1 also describes that the cost of providing services to PZ3 is incremental (alternatively called standalone) to providing services to PZ1 & PZ2.

### 3.2 A comment on Standalone costs

36. E3 Advisory make the observation that (conceptually) it can be problematic to post-facto identify the proportions of an investment that may be described as standalone (or ‘incremental’) to a single customer group in the circumstances of:
  - (a) a network characterised by increasing total capacity, and
  - (b) a shared uptake of that increased capacity across the customer groupings (i.e. by all PZ customers)
  - (c) imperfect knowledge of the timing of capacity needs of customers.
37. E3 Advisory consider that the determination of ‘incremental’ benefits and the basis for their allocation, should where possible, be identified and agreed at the time of the investment.
38. E3 Advisory’s determination of the incremental proportion of the Major CAPEX has included reference to ARTC Project Evaluation Reports that document the basis for the investment decision at that time.

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<sup>8</sup> WIK-Consult, (2015) “Assessment of the incremental costs of pricing Zone 3 Access Holders’ Use of Pricing Zone 1 and 2 of the Australian Rail Track Corporation’s Hunter Valley Network” (2015), p18.



39. The ARTC Project Evaluation Reports reviewed as part of this assessment do not generally attribute the benefits (in terms of additional capacity) to PZs on a standalone basis.



## 4 Assessment for Maintenance Activities

### 4.1 General

40. The WIK-Consult Report (section 5.3.1) undertakes an assessment of variability to determine the incremental costs for maintenance activities to the PZ3 producers over the costs of providing service to the PZ1 & PZ2 producers, where it's assessment differs from the ARTC assumptions on cost variability.<sup>9</sup>
41. For maintenance activities, the assessment of variability is an estimate of that element of the activity cost that is subject to change as a result of the additional traffic from PZ3.
42. The WIK-Consult Report does not provide any specific reasons for the selection of the items that it has proposed a different assessment on cost variability. Despite this, E3 Advisory has limited our review to the same maintenance activities as were assessed in the WIK-Consult Report.
43. The assessments in the WIK-Consult Report appear to be subjectively based on the judgement of WIK/TUV and do not reference any data or information that supports the recommended values for cost variability.
44. E3 Advisory has based its assessment on current ARTC and RailCorp (TfNSW ASA) standards, manuals and guidelines. This approach provides a reasonable basis for the assessment undertaken, and references have been provided where relevant.
45. The TfNSW ASA standards were selected as the basis for the assessment as they are widely recognised in NSW and are the basis of many of the existing ARTC standards.

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<sup>9</sup> WIK-Consult, "Assessment of the incremental costs of pricing Zone 3 Access Holders' Use of Pricing Zone 1 and 2 of the Australian Rail Track Corporation's Hunter Valley Network" (2015), section 5.3.1.



## 4.2 Summary Assessment of Maintenance Types

46. The outcomes of the E3 Advisory assessment of maintenance activity variability is summarised in Table 2 below.

**Table 2: Maintenance Activity Variability Assessment**

Assessment by ARTC			Assessment by WIK/TUV				Assessment by E3 Advisory			
Category	Cost Types	% inc.	WIK Comment (Report Section 5.3.1)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.	Cost driver (inc.)	Cost driver (fixed)
RCRM	163 – Rail Defect Removal	75	We agree with ARTC's assessment that the majority of rail defects is related to volume but that there are inherent manufacturing issues which support a small fixed element. Therefore we assessed a cost variability of 90%.	90	GTK	Time	Rail Defects have a number of causes for which a greater proportion relate to rail defects rather than utilisation of the track.  Although utilisation of the track does not cause the defects, increased utilisation will reduce the time until which the defect will need remedial work undertaken.  E3 Advisory propose a variable proportion of 50%.	50	GTK	Time
MCM	168 Rerailing – Minor	75	We agree with ARTC's assessment that the majority of defects in rail creating the need for replacement is directly related to network volumes but that a small fixed component is justified due to issues not related to volume such as manufacturing faults. Therefore we assessed a cost variability of 90%.	90	GTK	Time	Minor re-railing is a maintenance response to rail defects, and therefore the same proportion assessment of variability applies to this activity.	50	GTK	Time



Assessment by ARTC			Assessment by WIK/TUV				Assessment by E3 Advisory			
Category	Cost Types	% inc.	WIK Comment (Report Section 5.3.1)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.	Cost driver (inc.)	Cost driver (fixed)
MPM	171 - Rail Grinding	75	We agree with ARTC's general assessment that the majority of rail degradation corrected by rail grinding is linked to network volumes - damage and wear on the rails increase in line with volumes. A small component of work performed by rail grinding is the removal of surface rust and wheel burns therefore not network volume dependent - supporting a small fixed component. Therefore we assessed a cost variability of 90%.	90	GTK	Time	Rail grinding is scheduled based on the loading of the track and on a time interval basis. On this basis there is an element of variable and fixed cost. E3 Advisory consider the level of fixed cost is likely to be approximately 25% for mainline grinding.	75	GTK	Time
MPM	172 - Turnout Grinding	75	We agree with ARTC's assessment that the majority of rail degradation corrected by turnout grinding is linked to network volumes - damage and wear on the rails increase in line with volumes. A small component of work performed by rail grinding is the removal of surface rust and wheel burns therefore not network-volume dependent - supporting a small fixed component. Therefore we assessed a cost variability of 90%.	90	GTK	Time	Turnout grinding is scheduled on the same basis as rail grinding and therefore we propose the same variable proportion for this maintenance activity.	75	GTK	Time



Assessment by ARTC			Assessment by WIK/TUV				Assessment by E3 Advisory			
Category	Cost Types	% inc.	WIK Comment (Report Section 5.3.1)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.	Cost driver (inc.)	Cost driver (fixed)
MPM	187 - Turnout Steel Component Replacement	75	We agree with ARTC's assessment that most of the turnout steel component replacement is clearly linked with network volumes as the wear on these components increases proportionately with tonnage. However as per rerailing, there is an element of the turnout steels that require replacement due to issues with manufacture and therefore not network volume related. Therefore we assessed a cost variability of 90%.	90	GTK	Time	Turnout component replacement is largely undertaken due to wear caused by utilization. E3 Advisory accept the proposed variable proportion in the WIK/TUV assessment.	90	GTK	Time
MPM	203 - Maintenance Resurfacing	75	We agree with ARTC's assessment that geometry degradation is primarily based on network volume but that underlying geotechnical issues and environmental factors support a small fixed component. Therefore we assessed a cost variability of 90%.	90	GTK	Time	The requirement for maintenance resurfacing results from track geometry failure or formation failure. The cause of these failures is from a number of factors, including movement of the track resulting from the environment, construction defects and the performance of the formation. On this basis E3 Advisory consider the variable component is approximately 50%, with the cost driver GTK.	50	GTK	Time





Assessment by ARTC			Assessment by WIK/TUV				Assessment by E3 Advisory			
Category	Cost Types	% inc.	WIK Comment (Report Section 5.3.1)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.	Cost driver (inc.)	Cost driver (fixed)
MPM	205 - Turnout Resurfacing	75	We agree with ARTC's assessment that geometry degradation is primarily based on network volume but that underlying geotechnical issues and environmental factors support a small fixed component. Therefore we assessed a cost variability of 90%.	90	GTK	Time	Turnout resurfacing is affected to a greater proportion from the dynamic loads from trains. On this basis E3 Advisory propose an assessment of 75% variable.	75	GTK	Time
MPM	226 - Pad Replacement	50	We agree with ARTC's assessment that pad replacement occurs when the pads between the rail and the sleeper are worn or no longer ineffective. Wear occurs proportionally with network volume however environmental factors and age play a role in effectiveness of the pad. It is therefore considered appropriate that this activity contains a fixed share. Therefore we assessed a cost variability of 75%.	75	GTK	Time	Pad replacement is caused by a combination of the degradation of the material under environmental conditions in combination with the loading of the track under train traffic. On this basis E3 Advisory propose that 50% of cost is variable.	50	GTK	Time



Assessment by ARTC			Assessment by WIK/TUV				Assessment by E3 Advisory			
Category	Cost Types	% inc.	WIK Comment (Report Section 5.3.1)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.	Cost driver (inc.)	Cost driver (fixed)
MPM	286 - Ballast Cleaning(MPM)	75	We agree with ARTC's assessment that ballast degradation is obviously linked to the network volume but that some degradation is also linked to other environmental issues and therefore - independent of volume - supporting a small fixed element. Therefore we assessed a cost variability of 90%	90	GTK	Time	<p>The need to undertaking ballast cleaning is the same as for maintenance resurfacing / reconditioning. Ballast cleaning is usually carried out as part of reconditioning or as preventative maintenance to prolong the life of the track formation.</p> <p>On this basis E3 Advisory's opinion is that the variable proportion of 50% based on GTK is a fair representation of the influence of train loading on the needs for ballast cleaning.</p>	50	GTK	Time



## 4.3 Assessment of Maintenance Types

### 4.3.1 Rail Defects

47. ARTC standard ETM-01-04 recognises 17 types of rail defects, which are caused by a combination of rail wear from loading, operation of trains and manufacturing defects. E3 Advisory has assumed maintenance item 163 includes all elements of rail defects referenced in this standard.
48. E3 Advisory have used TfNSW ASA Standard TMC-226 Version 1.2 in addition to the ARTC standards to provide guidance on the causes of rail defects for each of the 17 types recognised in ARTC standards. TMC-226 provides an authoritative discussion on the cause of each of the main types of rail defects and is similar to, but updated from, ARTC Engineering Practices Manual RC 2400 (RC 2400 was based on an older version of TMC 226).
49. The maintenance data provided by ARTC does not include a further breakdown into the specific causes of the 17 types of defects, and therefore a subjective assessment has been undertaken for the proportion of each type of rail defect.
50. The E3 Advisory assessment has been based on breaking down each of the rail defect types, based on cause, to identify the amount of variable and fixed cost, as detailed in Table 3 below.

**Table 3: Rail Defect Assessment**

ARTC Defect Item	Defect Type	Cause	Variable or Fixed
1.	Transverse defects in rail head	Transverse defects are caused by train loading of the rail resulting in fatigue to the metal. Transverse defects are enhanced by poor maintenance of the track resulting in increases to dynamic and impact loads at the wheel contact. This can result from tache ovale defects in the rail – as a manufacturing defect.	Variable 80% Fixed 20%
2.	Engine Burn Fracture	Engine burn fracture is caused by operation of trains resulting in continuous slipping of traction wheels. Therefore, it is likely to be proportional to the level of traffic using the track.	Variable
3.	Multiple Transverse Head Defects	Similar to Defect item 1.	Variable 80% Fixed 20%
4.	Horizontal Split Head	Commonly caused by manufacturing defects in the rail, enhanced by utilisation of the track and heavier axle loads.	Fixed
5.	Vertical Split Head	Commonly caused by manufacturing defects in the rail, enhanced by utilisation of the track and heavier axle loads.	Fixed



ARTC Defect Item	Defect Type	Cause	Variable or Fixed
6.	Head and Web separation	Commonly caused by manufacturing defects in the rail, enhanced by utilisation of the track and heavier axle loads.	Fixed
7.	Foot and Web separation	Commonly caused by manufacturing defects in the rail, enhanced by utilisation of the track and heavier axle loads.	Fixed
8.	Horizontal Split Web	Commonly caused by manufacturing defects in the rail, enhanced by utilisation of the track and heavier axle loads.	Fixed
9.	Split Web Vertical transverse	Commonly caused by manufacturing defects in the rail, enhanced by utilisation of the track and heavier axle loads.	Fixed
10.	Bolt Hole Crack (all angles)	Defective construction of track or poor maintenance practices.	Fixed
11.	Vertical Split Web longitudinal	Defective construction of track or poor maintenance practices.	Fixed
12.	Piped Rail	Caused by excessive hydrogen in steel (a manufacturing defect in the rail), enhanced by utilisation of the track and heavier axle loads.	Fixed
13.	Defective Welds	Defective construction of track.	Fixed
14.	Wire Feed Weld	Defective remedial work on track.	Fixed
15.	Broken Rail	Broken rail can result from all the defects identified under ARTC standard ETM-01-04 where appropriate remedial work is not	Not relevant.
16.	Mechanical Joint Suspect	Cause by poor construction and maintenance of the track, and enhanced under heavy axle loads.	Fixed
17.	Corroded Rail	Time of rail in the environment.	Fixed

51. As identified in the table above, the majority of causes on broken rail relate to the poor manufacture, construction and maintenance practices of the rail and track, and therefore are fixed based on time as the variable. As the causes are enhanced by the loading of the track, which reduces the length of time that the defects require rectification, we recommend 50% variable as the factor to determine the incremental cost. The variable factors are enhanced by the GTK loading over time.

#### 4.3.2 Rerailing - Minor

52. Minor re-railing is a maintenance response to rail defect, and therefore the assessment for rail defects also applies to this activity.



### 4.3.3 Rail Grinding

53. Rail grinding is a combination of preventative and reactive maintenance activity that improves the wheel rail contact. Rail grinding prevents the formation of mostly head defects and minimises the dynamic stress on the rail associated with defects and corrugations, which increases the time it takes to require remedial works.
54. Rail grinding is usually scheduled based on the loading of the track and therefore is appropriate to be considered mostly variable. However as rail grinding is also scheduled on a time interval basis, there is an element of fixed cost.
55. E3 Advisory's opinion is that the proportion proposed by ARTC (75% variable) is a fair representation of the influence of loading on the track on the grinding interval. The fixed element is subject to time as the variable.

### 4.3.4 Turnout Grinding

56. Turnout grinding is similar in cause and response to Rail Grinding and therefore E3 Advisory recommends the same proportion of variable as proposed by ARTC, and on the same principles for rail grinding.

### 4.3.5 Turnout Steel Component Replacement

57. Turnout blades and rail crossings are subject to a higher degree of quality control in manufacturing than rail. Further as these elements include moving parts they are more commonly replaced as a result of wear and maintenance (grinding).
58. On this basis E3 Advisory's opinion is that the variable proportion proposed by WIK-Consult (90% on GTK) is a fair representation of the influence of loading on the replacement of components of turnouts. The fixed component of cost would vary based on time.

### 4.3.6 Maintenance Resurfacing

59. The need to undertaking maintenance resurfacing (known also as reconditioning) is defined in the ARTC Engineering Practice Manual – Track Reconditioning Guidelines RTS 3430, which identifies the need to carry out reconditioning subject to poor track geometric performance, visible signs of formation failure and track and ballast fouled by the formation working into the ballast.
60. The causes of these conditions are generally:
  - (a) Loading of the track under traffic, resulting in applied stresses and movements to the supporting structure/formation (variable)
  - (b) Expansion and contraction of the track under temperature, applying stresses to the track restraint (primarily sleepers and ballast) (fixed)



- (c) Movements in the supporting structure and formation, caused by factors including settlement of structures and formations, movement of water, and compaction of ballast (fixed); and/or
  - (d) Poor drainage or construction of the formation, resulting in failure under loading (fixed).
61. The factors work together resulting in the need to undertake intervention through resurfacing, noting that element (a) is the most significant influence.
62. On this basis E3 Advisory's opinion is that the variable proportion of 50% by GTK is a fair representation of the influence of train loading on the need to undertake track resurfacing. The fixed component would be defined by time.

#### **4.3.7 Turnout Resurfacing**

63. Turnouts are affected by the same factors that affect the need for track requiring resurfacing. However, turnouts have increased stress resulting from the movement of trains across the turnout and the associated dynamic loadings.
64. On this basis E3 Advisory's opinion is that the variable proportion of 75% based on GTK is a fair representation of the influence of train loading on the needs for track resurfacing.

#### **4.3.8 Pad Replacement**

65. Pad replacement is generally governed by two factors, being:
- (a) The loading of the track and the dynamic loads on the pads, resulting in fatigue; and
  - (b) The degradation of the pad material (generally thermoplastic or rubber) under the environmental conditions.
66. On this basis E3 Advisory's opinion is that the variable proportion proposed by ARTC (50% based on GTK) is a fair representation of the influence of train loading on the needs for track resurfacing.

#### **4.3.9 Ballast Cleaning**

67. The need to undertaking ballast cleaning is the same as for maintenance resurfacing/reconditioning (refer above). Ballast cleaning is usually carried out as part of reconditioning or as preventative maintenance to prolong the life of the track formation.
68. On this basis E3 Advisory's opinion is that the variable proportion of 50% based on GTK is a fair representation of the influence of train loading on the needs for ballast cleaning.



## **5 Assessment for Minor CAPEX Projects**

### **5.1 General**

69. The purpose of the assessment of variability is to determine the incremental costs for providing services to the PZ3 producers over the costs of providing service to the PZ1 & PZ2 producers. For the minor CAPEX costs the assessment of variability is a specific assessment of the proportion of the costs that will apply to the additional traffic from PZ3.
70. The WIK-Consult Report (section 5.3.4) provides an assessment of the Minor CAPEX projects, summarised into 11 categories.
71. E3 Advisory performed a review of the same Minor CAPEX categories as assessed in WIK-Consult Report, to provide a recommendation on the proportion of variable and fixed costs, and the drivers for both the variable and fixed elements.
72. Similar to the maintenance activities, the assessments in the WIK-Consult Report appear to be subjectively based on the judgement of WIK/TUV and do not reference any data or information that supports the recommended values for cost variability.
73. E3 Advisory has based our assessment on our understanding of the condition of the infrastructure (based on work completed previously on the ARTC asset valuation), and the priorities for investment in the Hunter Valley.



## 5.2 Summary Assessment of Minor CAPEX Variability

74. The assessment undertaken by E3 Advisory for Minor CAPEX variability is summarised in Table 4 below.

**Table 4: Minor CAPEX Variability Assessment**

Assessment by ARTC		Assessment by WIK/TUV				Assessment by E3 Advisory			
Cost Types	% inc.	WIK Comment (Report Section 5.3.4)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.	Cost driver (inc.)	Cost driver (fixed)
Rerailing	0	Our assessment is that the majority of rail wear is related to volume but that there is still a small fixed time related element. Therefore we assessed a cost variability of 90%.	90	GTK	Time	Re-railing in the Hunter Valley has been undertaken as a combination of strengthening of the track and renewal due to rail wear. The renewal component due to rail wear is primarily variable on a GTK basis, while the strengthening component offers safety and reliability benefits. Given that in 2013 PZ3 users were limited to 25TAL, the strengthening benefits would not apply. On this basis E3 Advisory recommend a 50% variable for GTK with the fixed driver of safety.	50	GTK	Safety
Point machine replacement / Point motor renewal	0	Our assessment is that the need for point machine replacement resp. point motor renewal is caused by both, time and volume likewise. Therefore we assessed a cost variability of 50%.	50	Tkm	Time	Point machines deteriorate as a result of a combination of train traffic and time in the environment. E3 Advisory agree with the variability assessment of WIK-Consult.	50	Trains	Time





Assessment by ARTC		Assessment by WIK/TUV				Assessment by E3 Advisory			
Cost Types	% inc.	WIK Comment (Report Section 5.3.4)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.	Cost driver (inc.)	Cost driver (fixed)
Signalling System investments/upgrades	0	Our assessment is that the need for signalling system investments / upgrades is caused by both, time and volume likewise. Therefore we assessed a cost variability of 50%.	50	Tkm	Time	Signalling system upgrades in the freight environment are required primarily due to the obsolescence of components and signalling equipment. On this basis E3 Advisory has assessed a 0% variability factor.	0	NA	Time
Track strengthening / upgrading	0	Our assessment is that the need for track strengthening and upgrading is more caused by volume rather than time. Therefore we assessed a cost variability of 75%.	75	GTK	Time	Track strengthening is required for increased traffic loads or improved resilience to geometric defects. In 2013 PZ3 producers were limited to 25T axle load, resulting in limited benefit (if at all). On this basis, E3 Advisory has assessed the variability as 0% with the fixed driver of safety.	0	NA	Safety
Turnout renewal with 60kg rail	0	Our assessment is that the need for turnout renewals with an upgrade to 60kg rails is more related to volume than to time. Therefore we assessed a cost variability of 75%.	75	GTK	Time	Turnout renewal has been undertaken as a combination of track strengthening and renewal due to wear. The wear component is primarily variable on Tkm basis, while the strengthening of component offers safety and reliability benefits. As in 2013 Pz3 users were limited to 25TAL, then the strengthening benefits would not apply. On this basis E3 Advisory recommend a 50% variable for GTK with the fixed driver of safety.	50	Tkm	Safety



Assessment by ARTC		Assessment by WIK/TUV				Assessment by E3 Advisory			
Cost Types	% inc.	WIK Comment (Report Section 5.3.4)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.	Cost driver (inc.)	Cost driver (fixed)
Radio Upgrade, additional channels	0	Our assessment is that the need for a radio upgrade and also for additional channels is related to both, safety and traffic but more safety than traffic. Therefore we assessed a cost variability of 25%.	25	Tkm	safety	Radio upgrades provides for both improved safety and increased traffic on the network. On this basis E3 Advisory agrees with the WIK-Consult assessment of 25% variability on a Tkm basis.	25	Trains	Safety
Track Pad Replacement	0	Our assessment is that the need for a replacement of the track pads is more related to volume than time. Therefore we assessed a cost variability of 75%.	75	GTK	Time	Pad replacement is caused by a combination the degradation of the material under environmental conditions in combination with the loading of the track under train traffic. On this basis E3 Advisory propose that 50% is fixed.	50	GTK	Time
Flash Butt Welding	0	Our assessment is that the need for flash butt welding is more related to volume than time. Therefore we assessed a cost variability of 75%.	75	GTK	Time	Flash butt welding is an input activity required for re-railing. On this basis E3 Advisory has assessed the variability as the same as the re-railing.	50	GTK	Safety



Assessment by ARTC		Assessment by WIK/TUV				Assessment by E3 Advisory			
Cost Types	% inc.	WIK Comment (Report Section 5.3.4)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.	Cost driver (inc.)	Cost driver (fixed)
Repair of signaling equipment (relay boards)	0	Our assessment is that the need for a upgrade of the signalling equipment is related to both, safety and traffic but more safety than traffic. Therefore we assessed a cost variability of 25%.	25	Tkm	Time	Signalling equipment has a relatively short design life and deteriorates primarily based on time. On this basis, E3 Advisory has assessed 0% variability.	0	NA	Time
Installation of rail lubricators	0	Our assessment is that the need to install rail lubricators is driven by both volume and the need to reduce maintenance costs. Therefore we assessed a cost variability of 50%.	50	GTK	Time	Installation of rail lubricators is largely defined based on the track geometry once a threshold traffic is reached, and is to prevent excessive head wear on the rails. E3 Advisory has therefore assessed as 0% variability, with the fixed factor based on the track geometry.	0	NA	Other
Upgrading of structural deficiencies	0	Our assessment is that the need for upgrading the structural deficiencies under 30 tonne axle loads is more related to volume than to time. Therefore we assessed a cost variability of 75%.	75	GTK	Time	Upgrading of structural deficiencies should be assessed on the same basis as track strengthening.	0	NA	Safety



## 5.3 Assessment of Minor CAPEX Categories

### 5.3.1 Rerailing

75. Re-railing is usually undertaken for one or more of the following reasons:
  - (a) to allow higher axle loads on the track
  - (b) as a result of a high number of defects forming in the section of rail, or
  - (c) rail head wear from track usage and/or grinding has reduced the rail head depth.
76. Both elements (b) and (c) are variable based on the GTK, noting that the cause of many rail defects is ultimately related to manufacturing defects in the rail. (see section 4.3.1).
77. Most of the re-railing undertaken in the Hunter Valley during 2013 has been to replace older rail profiles. This work benefits both the PZ1/2 and PZ3 producers as it allows for higher axle loads without the corresponding number of defects; and for improved safety.
78. It is further noted that in 2013 the producers from PZ3 were only operating on 25T axle loads due to the limitations with the PZ3 infrastructure. This lower axle load from the PZ3 producers would result in a smaller proportional contribution to the rail wear and number of defects in the rail than the PZ1 & PZ2 producers.
79. On that basis E3 Advisory consider the assessment of variability should be undertaken as on a reduced proportion as 50% variability on a GTK basis.
80. We also note, within the assessment undertaken in Appendix A, that WIK-Consult have allowed for variable elements on re-railing of specific colliery access loops which would not be used by PZ3 producers.

### 5.3.2 Point machine replacement / Point motor renewal

81. Point machines wear out as a result of a combination of the number of trains using the points and time as components deteriorate.
82. E3 Advisory agree with the WIK-Consult assessment of a 50% variability factor, but consider this based on the number of trains.

### 5.3.3 Signalling System Upgrades

83. Signalling equipment has a relatively short design life compared to railway civil infrastructure and therefore requires relatively regular replacement.
84. In the freight environment, where the frequency of service is limited (*compared to high frequency urban passenger systems*) minor signalling upgrades will generally relate to the replacement of obsolete or faulty signalling components, and therefore, will have no variable component.



85. Upgrades to facilitate an increase in traffic have generally been included as a Major CAPEX project.
86. On this basis E3 Advisory has assessed a 0% variability factor with the fixed component on a time basis.

#### **5.3.4 Track Strengthening / Upgrading**

87. Track strengthening and upgrading is required to allow increased axle loads on the track, or to improve resilience to geometry defects; and to improve safety.
88. In 2013 PZ3 producers were limited to 25T axle loads, due to limitations of the PZ3 network infrastructure. As a result, upgrades that allow for higher axle loads only resulted in benefits for the PZ1/PZ2 users and the variability of the track strengthening and upgrading is 0% in relation to the PZ3 users. The fixed component of benefits would be on the basis of safety for the PZ3 users.

#### **5.3.5 Turnout renewal with 60kg Rail**

89. Turnout renewal will be undertaken for the same reason as re-railing. Renewals that include higher grade of track (i.e. 60kg rail) include an element of strengthening within the renewal.
90. Based on this combination of re-railing and strengthening, E3 Advisory consider the variability factor to be 50% on a Tkm basis, with the fixed cost driver being safety.

#### **5.3.6 Radio Upgrade (additional channels)**

91. The radio upgrade provides both for safety and additional traffic on the network. On this basis E3 Advisory agree with the WIK-Consult assessment of 25% variability on a number of trains basis, with the fixed cost driver as safety.

#### **5.3.7 Track Pads Replacement**

92. Track pad replacement is a combination of deterioration of the material and the track loading, as detailed in section 4.3.8 above. On this basis E3 Advisory assesses variability as 50% on a GTK basis, consistent with the assessment above.

#### **5.3.8 Flash Butt Welding**

93. Flash butt welding is an activity related to the re-railing and therefore is assessed at the same proportion of variability as the re-railing activity in section 5.3 above.



### **5.3.9 Repair of Signalling Equipment (Relay Boards)**

94. Signalling equipment deteriorates over time, with a relatively short design life for railway infrastructure. On this basis E3 Advisory assess variability of 0%, with time as the fixed cost driver.

### **5.3.10 Installation of Rail Lubricators**

95. Rail lubricators prevent significant wear on curves and also are used to prevent noise.
96. Guidelines on the requirements for lubrication are included in ARTC Engineering Practices Manual RC2411, which recommends rail lubricators be installed for curves under the 600-800m threshold.
97. The requirement to install rail lubricators is mostly related to geometry and does not significantly changed based on the number of trains or GTK (once a reasonable threshold is reached). On this basis E3 Advisory recommend variability of 0%, with the fixed element based on noise.

### **5.3.11 Upgrading of Structural Deficiencies**

98. Upgrading of structural deficiencies would be assessed in the same manner as track strengthening and will not provide benefits to the PZ3 producers for 2013. On this basis, E3 Advisory recommend variability of 0%.



## 6 Assessment for Major CAPEX Projects

### 6.1 General

99. The purpose of the assessment of variability is to determine the incremental costs for providing services to the PZ3 producers over the costs of providing service to the PZ1 & PZ2 producers.
100. For the major CAPEX costs, the assessment of variability is a specific assessment of the proportion of the costs that should apply to the additional traffic originating from PZ3.
101. WIK-Consult Report, section 5.3.5, provided a high level or summary assessment of the Major CAPEX projects. The WIK-Consult Report took the view that<sup>10</sup>:
  - (a) All Major CAPEX projects could be categorised into 6 'rough types'; the 6 'rough types' of CAPEX projects are *'not required in case of no increase of traffic volumes'*; and therefore
  - (b) All Major CAPEX was *"...deemed to be 100% volume related, hence incremental."*
102. E3 Advisory performed a review of the Major CAPEX projects that had a material impact, in terms of re-allocation of costs from PZ1/PZ2 producers to PZ3 producers, as a result of the WIK-Consult Report approach.
103. Similar to the maintenance activities, the assessments in the WIK-Consult Report appear to be subjectively based on the judgement of WIK/TUV Rheinland.
104. The assessment by WIK/TUV Rheinland does not appear to have considered:
  - (a) The network wide capacity planning objectives set out in the HVCCS
  - (b) Primary and secondary project benefits of the specific investments
  - (c) Actual contracted capacity growth in the various PZs.
105. E3 Advisory has based our assessment on a stepped process of examining:
  - (a) ARTC's investment framework for Major CAPEX including the role of the HVCCS, RCG and the BIC in approving the works
  - (b) Project endorsement by the RIG/RCG (and PZ customer representation)
  - (c) Primary and secondary benefits of specific CAPEX projects investments identified for PZ3
  - (d) Actual and forecast growth in contracted capacity volumes per PZ
  - (e) Related Projects (if any).
106. E3 Advisory's assessment of the 'incremental' proportion of the major CAPEX is our recommendation of the proportion of the total project costs to be assigned solely to PZ3 producers. The recommended cost driver is Contracted Capacity (GTK).<sup>11</sup>

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<sup>10</sup> WIK-Consult, (2015) "Assessment of the incremental costs of pricing Zone 3 Access Holders' Use of Pricing Zone 1 and 2 of the Australian Rail Track Corporation's Hunter Valley Network" (2015), p32

<sup>11</sup> This approach is in contrast to the maintenance and minor CAPEX assessments which assessed the proportion of the expenditure to be apportioned across all PZs based on the nominated cost driver.



107. The following sections provide the context for the stepped assessment process performed by E3 Advisory for Major CAPEX.

## 6.2 ARTC's Major CAPEX Investment Context

108. HVAU 2011 sets out ARTC's requirements for prudent capital investment, including for Project Initiation (Section 8) and Industry Consultation (Section 9).
109. Projects can be initiated via a number of pathways including:
- (a) ARTC's annual Hunter Valley Corridor Capacity Strategy<sup>12</sup> (HVCCS) that is to:
    - (i) be based on contracted volumes sought by existing and prospective access holders;
    - (ii) be aligned with Newcastle port terminal capacity forecasts; and
    - (iii) identify maximum future capacity requirements.
  - (b) Additional Capacity endorsed by the Rail Capacity Group (RCG) for concept assessment
  - (c) Additional Capacity recommended by the Hunter Valley Coal Chain Coordinator (HVCCC)
  - (d) Additional Capacity requested by the Applicant
  - (e) Additional Capacity identified by ARTC.
110. Following Project Initiation, projects to provide Additional Capacity proceed to concept assessment and are subject to industry consultation to, among other things, *provide industry endorsement for Capital Expenditure incurred by ARTC*.<sup>13</sup>
111. All Major CAPEX projects subject of this assessment were included in the HVCCS or network operational strategy documents prior to implementation approval.

### 6.2.1 Hunter Valley Coal Corridor Strategy (HVCCS)

112. The HVCCS is an annual strategy (currently in its ninth edition) setting out the Hunter Valley infrastructure enhancement strategies and how ARTC plans to ensure that rail corridor capacity in the Hunter Valley stays ahead of coal demand.
113. The HVCC identifies the future constraints on the coal network's capacity, the options to resolve these constraints, and a proposed course of action to achieve increased coal throughput.
114. The 2006-2011 HVCCS states that *"The fundamental approach of the ARTC in developing this Strategy has been to increase capacity (with a reserve surge capability) to levels sufficient to meet anticipated demands for export and domestic coal transport, while at the same time*

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<sup>12</sup> 1. The HVCCS is an annual strategy (currently in its ninth edition) setting out the Hunter Valley infrastructure enhancement strategies and how ARTC plans to ensure that rail corridor capacity in the Hunter Valley stays ahead of coal demand.

<sup>13</sup> HVAU 2011 Section 9 Industry Consultation p62





*achieving greater operational harmony between the various sections of the Hunter Valley network.”<sup>14</sup>*

115. The HVCCS makes clear that: *“The capacity and performance of the system is entirely interlinked and the capacity of the rail network needs to be considered in that context.”<sup>15</sup>*
116. ARTC capacity planning in place at the time (2006 HVCCS) of the project approvals, identifies that the capacity strategy included, amongst other things, *investment to stay ahead of existing contracted volumes as well as having in place ‘surge capacity’.<sup>16</sup>*

### **6.2.2 Budget Investment Committee (BIC)**

117. The BIC is the ARTC’s internal approval body for Capital Expenditure (prior to gaining RCG endorsement).
118. The BIC review Project Evaluation Reports for specific projects as they go through a stage-gate approval process from Initiation to Implementation. Via this process all capital expenditure projects are subject to approval by the BIC and endorsement by the RCG.
119. Project Evaluation Reports provide, amongst other things, information on the project specific objectives, benefits and linkages to the HVCCS and other related projects.

### **6.2.3 Rail Capacity Group (RCG)**

120. The RCG Group is a group operating primarily for the purposes of carrying out the requirements of the ARTC HVAU2011 sections 8 & 9 related to capital enhancement and is the official approval body representing access holders under the HVAU.<sup>17</sup>
121. The RCG select the prospective volume assumptions required to be used as the basis for the development of the HVCCS.<sup>18</sup>
122. The RCG was formed in 2012, replacing the former Rail Infrastructure Group (RIG). The transitional arrangements (section 7) of the RCG included the *‘deemed endorsement of projects previously endorsed by the RIG.’<sup>19</sup>*
123. The capital expenditure endorsement process under the NSW Rail Access Undertaking (NSWRAU) that applied prior to the HVAU was similar to that which applies under the HVAU. However, there were several important differences including that contracts for coal haulage were with the train operators. The effect of the endorsement process by coal producers was as an indication of support for an investment and an acknowledgement that appropriate

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<sup>14</sup> 2006–2011 Hunter Valley Coal Network Capacity Improvement Strategy, Executive Summary

<sup>15</sup> ARTC (2015) 2015-2024 Hunter Valley Corridor Capacity Strategy p3

<sup>16</sup> 2006–2011 Hunter Valley Coal Network Capacity Improvement Strategy Consultation Draft

<sup>17</sup> ARTC (2015) 2015-2024 Hunter Valley Corridor Capacity Strategy p6

<sup>18</sup> *ibid*

<sup>19</sup> “Rail Infrastructure Group” and “RIG” both refer to the group formed by ARTC for the purpose of carrying out a capital project consultation process and the endorsement of projects for the inclusion of the cost in the regulatory asset base under the NSW Rail Access Undertaking.



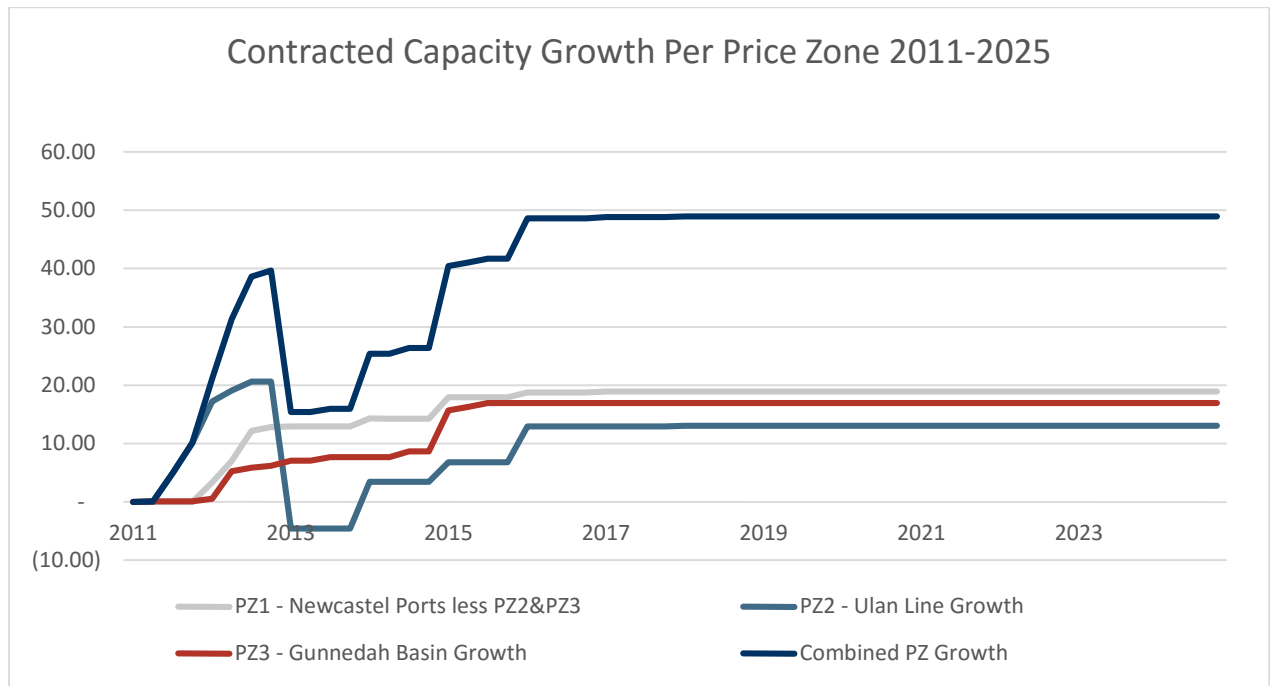
consultation with end users of rail services had been carried out. Endorsement of a project was not weighted as it is under the HVAU.

124. The RCG reviews and votes to approve rail investment recommended by ARTC.
125. The RCG includes representation by producers of each PZ. The voting arrangements include voting by PZ producers for capital expenditure investments within their own PZ.
126. Eligibility and voting rights of RCG members is determined by Contracted Coal GTK.<sup>20</sup>
127. All capital expenditure projects subject to this assessment were approved inclusive of RIG/RCG endorsement.
128. RCG endorsement of a project does not necessarily trigger the timing of the works, which is ultimately an ARTC planning decision, including consideration of secured contracted volumes with their customers.

### 6.3 Price Zones Contracted Capacity Growth

129. Contracted capacity has grown across each of the three PZs since 2011.<sup>21</sup> This is shown diagrammatically in Figure 1 below.

**Figure 1: Total Contracted Coal Volume Growth by Price Zone**



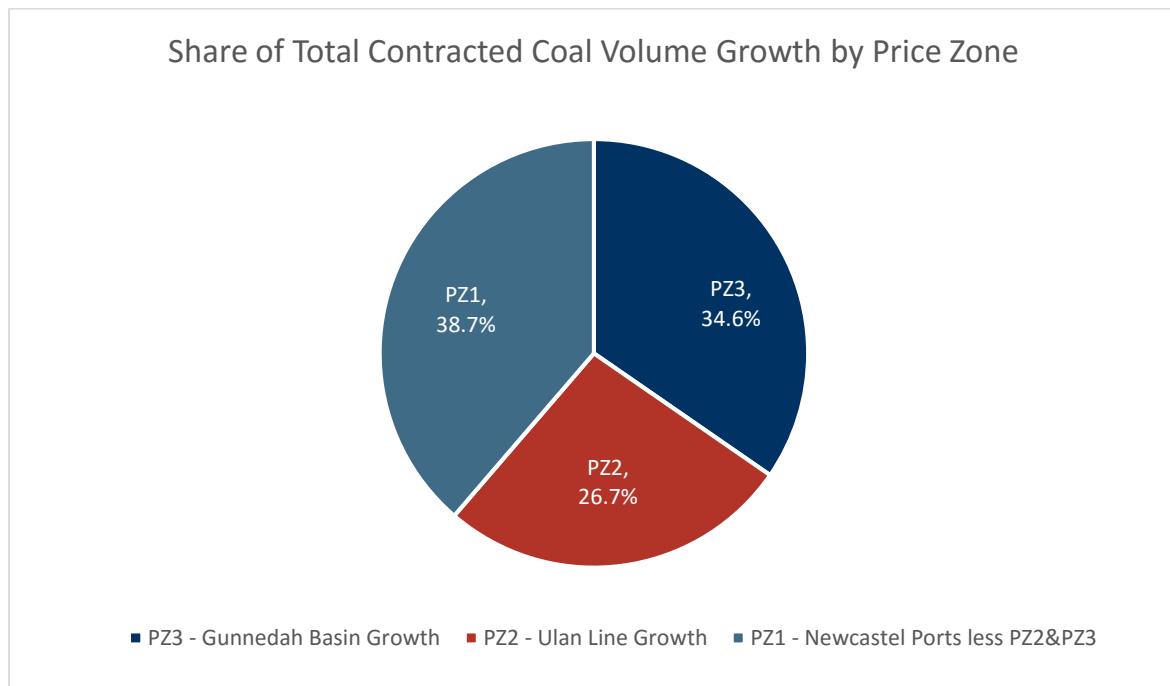
<sup>20</sup> ARTC (2012) Rail Capacity Group Charter, Section 3

<sup>21</sup> Sourced from Hunter Valley Volume Model – 2014.xls actuals 2011-2015 and forecast to 2025 (note Commercial in Confidence)



130. PZ1 & PZ2 contracted capacity growth represents approximately two thirds of the total network increase for the period 2011-2025 (i.e. actuals and forecast). The contracted capacity growth by PZ is shown diagrammatically in Figure 2 below.

**Figure 2: Share of Total Contracted Coal Volume Growth by Price Zone**



131. As noted at 6.2.1 and 6.2.3 above regards the HVCCS, *“The capacity and performance of the system is entirely interlinked and the capacity of the rail network needs to be considered in that context”*.
132. The increase in contracted coal volumes by ARTC coal customers across the PZs has been included to demonstrate that the benefits of increased capacity have, to an extent, accrued to all PZ producers and not to PZ3 alone.
133. PZ3 contracted volume increases (at 38.7% of the total)<sup>22</sup> following the delivery of the PZ1 Major CAPEX investments, are not significantly different to the uptake of the total additional volumes of other PZ customers. The counter case (higher or lower) would be a useful indicator of the standalone or incremental nature of the investment to PZ3 customers.

<sup>22</sup> Based on ARTC Contracted Coal Volumes data for period 2011-2025 (i.e. actuals and forecast)



## 6.4 Summary Assessment of Major CAPEX Incremental Costs<sup>23</sup>

134. The assessment undertaken by E3 Advisory for Major CAPEX variability is summarised in Table 5 below.

**Table 5 Major CAPEX Variability Assessment**

Assessment by ARTC		Assessment by WIK/TUV				Assessment by E3 Advisory		
Project	% inc.	WIK Comment (Report Section 5.3.4)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.#	Cost driver (inc.)
5255 - Maitland to Minimbah Third Road – Stage 2 – All Phases	0	Project expenditures assesses incremental due to their relation to the capacity enhancements by providing a We assume that track extensions, 3rd road, is mainly driven by asset enhancement for higher network capacity resp. reduction of maintenance impacts through increasing operational flexibility.	100	GTK	Time	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary and secondary benefits not explicit to PZ3; subsequent contract capacity growth in PZ1/PZ2.	0	Contracted GTK

- <sup>23</sup> Note# the % incremental (% inc.) of Major CAPEX assessed by E3 Advisory represents the percentage of project capital expenditure recommended to be assigned solely to PZ3 producers (cost driver - contracted capacity (GTK)). This is in contrast to the maintenance and minor CAPEX assessments which assessed the proportion of activity to be apportioned across all PZs based on the nominated cost driver.



Assessment by ARTC		Assessment by WIK/TUV				Assessment by E3 Advisory		
Project	% inc.	WIK Comment (Report Section 5.3.4)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.#	Cost driver (inc.)
5811 - Nundah Third Track - All Phases	0	Project expenditures assesses incremental due to their relation to the capacity enhancements. We assume that track extensions, 3rd road, is mainly driven by asset enhancement for higher network capacity resp. reduction of maintenance impacts through increasing operational flexibility.	100	GTK	Time	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary and secondary benefits not explicit to PZ3; subsequent contract capacity growth in PZ1/PZ2.	0	Contracted GTK
3585 - Maitland to Minimbah Third Road – Stage 1 – Phase 6	0	We assume that junction upgrade is mainly driven by asset enhancement for higher network capacity.	100	GTK	Time	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary and secondary benefits not explicit to PZ3; subsequent contract capacity growth in PZ1/PZ2.	0	Contracted GTK
3579 - Antiene to Grasstree Stage 1 duplication	0	We assume that the need track duplication is mainly driven by asset enhancement for higher network capacity.	100	GTK	Time	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary benefits explicit PZ3 (and PZ2); secondary benefits explicit to PZ3 (and PZ2); subsequent contract capacity growth in PZ1/PZ2.	25	Contracted GTK



Assessment by ARTC		Assessment by WIK/TUV				Assessment by E3 Advisory		
Project	% inc.	WIK Comment (Report Section 5.3.4)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.#	Cost driver (inc.)
3884 - St Helliers to Muswellbrook Duplication	0	Project expenditures assesses incremental due to their relation to the capacity enhancements. We assume that track extensions, 3rd road, is mainly driven by asset enhancement for higher network capacity resp. reduction of maintenance impacts through increasing operational flexibility.	100	GTK	Time	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary benefits explicit PZ3 (and PZ2); secondary benefits not explicit to PZ3; subsequent contract capacity growth in PZ1/PZ2.	10	Contracted GTK
3584 - Bi-Dir signalling Maitland to Branxton	0	We assume that investments provisioning facilities are mainly driven by asset enhancement for higher network capacity.	100	GTK	safety	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary and secondary benefits not explicit to PZ3; subsequent contract capacity growth in PZ1/PZ2.	0	Contracted GTK
6928 - Drayton Junction Upgrade (Capital)	0	We assume that junction upgrade is mainly driven by asset enhancement for higher network capacity.	100	GTK	Time	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary and secondary benefits not explicit to PZ3; subsequent contract capacity growth in PZ1/PZ2.	0	Contracted GTK
8665 - No.3 Departure Road at KCT	0	We assume that the investment into a departure road is mainly driven by asset enhancement for higher network capacity but some share is also to provide higher buffering capacities at port.	50	GTK	Time	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary and secondary benefits not explicit to PZ3; subsequent contract capacity growth in PZ1/PZ2.	0	Contracted GTK



Assessment by ARTC		Assessment by WIK/TUV				Assessment by E3 Advisory		
Project	% inc.	WIK Comment (Report Section 5.3.4)	% inc.	Cost driver (inc.)	Cost driver (fixed)	E3 Advisory Comment	% inc.#	Cost driver (inc.)
3468 - Newdell Junction Upgrade	0	We assume that junction upgrade is mainly driven by asset enhancement for higher network capacity.	100	GTK	Time	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary and secondary benefits not explicit to PZ3; subsequent contract capacity growth in PZ1/PZ2.	0	Contracted GTK
6156 - Maitland Junction/CBI	0	We assume that junction upgrade is mainly driven by asset enhancement for higher network capacity.	100	GTK	Time	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary and secondary benefits not explicit to PZ3; subsequent contract capacity growth in PZ1/PZ2.	0	Contracted GTK
8666 - KCT Bypass Road Realignment	0	We assume that junction upgrade is mainly driven by asset enhancement for higher network capacity.	100	GTK	Time	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary and secondary benefits not explicit to PZ3; subsequent contract capacity growth in PZ1/PZ2.	0	Contracted GTK
3578 - Muswellbrook Loop extension	0	We assume that the need for loop extension is mainly driven by asset enhancement for higher network capacity.	100	GTK	Time	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary benefits explicit PZ3 (and PZ2); secondary benefits not explicit to PZ3; subsequent contract capacity growth in PZ1/PZ2.	10	Contracted GTK
3575 - Minimbah 80 kph running stage 1	0	We assume that investments into a higher running stage of 80 kph are mainly driven by asset enhancement for higher network capacity	100	GTK	Time	Investment consistent with HVCCS; RCG/RIG approval independent of PZ3 benefits; primary and secondary benefits not explicit to PZ3; subsequent contract capacity growth in PZ1/PZ2.	0	Contracted GTK



## 6.5 Assessment of CAPEX Projects

135. The following sections provide the detailed assessment of each Major CAPEX project.

136. The steps and logic behind the assessment are set out in the table below:

**Table 6 E3 Advisory approach to Major CAPEX project assessments**

Step	Basis for this Assessment	Logic
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	The HVCCS is the strategic network planning document for the HVCN. The HVCCS considers capacity and congestion on a whole of network basis as well as capturing projects required for individual customers and PZs.	HVCCS provides an indication of any system-wide objectives supported by specific projects.  Particularly for projects approved by PZ1 and PZ customers for the PZ1 and PZ2 network this would indicate that system-wide capacity planning has identified the project need independent of standalone PZ3 customer requirements.
Step 2 - Confirm RIG/RCG Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	All projects (are) were endorsed by relevant industry stakeholders with an interest in the investment. customer groups based on their eligibility within a PZ and their share of contracted capacity.	Customer endorsement of projects by PZ1 and PZ2 customers may indicate the need for the project independent of standalone PZ3 customer requirements.  Operator endorsed projects (i.e. not endorsed by PZ customers) are considered to reflect operational efficiency projects that have shared benefits across customers, rather than standalone to a PZ.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents identify project objectives and the primary benefits of the investment.	If the project is to be considered a standalone (benefit) of PZ3 customers, the primary objectives and benefits should be (largely) independent of the PZ1/PZ2 customer benefits.
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	ARTC contracted coal capacity information can be used to identify take-up of available capacity by PZ customer.	If the project is to be considered a standalone (benefit) of PZ3 customers (and HVCCS strategic objectives for operation and surge capacity remain largely unchanged) the network growth should be concentrated with PZ3 customers.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	The BIC approval documents (generally) identify secondary project objectives and benefits of the investment.	If the project is to be considered a standalone (benefit) of PZ3 customers, the secondary objectives and benefits should be (to an extent) largely independent of the PZ1/PZ2 customer benefits.





### 6.5.1 Project 5255 - Maitland to Minimbah Third Road – Stage 2 – All Phases

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	The project was identified in the HVCCS prior to customer group endorsement and was consistent with the strategy to provide capacity ahead of demand as well as allowance for surge capacity.	Indicates network wide capacity planning identified the project need (potentially) independent of standalone PZ3 customer requirements.
Step 2 - Confirm RIG/RCG Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement largely driven by PZ1 & PZ2 customer representatives (based on a proxy assessment using 2012 voting shares).	Indicates (potentially) PZ1 and PZ2 customers considered the project need independent of standalone PZ3 customer requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents do not link the investment specifically to the PZ3 customer group. The primary objective is to: <i>'Reduce the effects of non-aligned railway maintenance between Maitland and Minimbah and other parts of the network to offset non-aligned maintenance'</i>	Not incremental.
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	The BIC approval documents do not link the secondary objectives or benefits specifically to the PZ3 customer group. The secondary objective is the <i>'Ability to re-sequence trains between Maitland to Minimbah'</i> . Other benefits include: <ul style="list-style-type: none"> <li>• Increase rail capacity/reliability between the mines and port</li> <li>• Improve operational performance</li> <li>• Mitigate impacts of surge demand</li> <li>• Recover breakdowns with minimum disruption to coal traffic</li> <li>• Non-aligned railway maintenance reduced in consideration of commercial efficacy</li> <li>• Network capacity remains ahead of demand</li> <li>• 8 minute headways between Maitland and Whittingham</li> </ul>	Not incremental.
<b>Assessment of Incremental Percentage - Project 5255</b>		<b>0%</b>



## 6.5.2 Project 5811 - Nundah Third Track - All Phases

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	The project was identified in the HVCCS prior to customer group endorsement and was consistent with the strategy to provide capacity ahead of demand as well as allowance for surge capacity.	Indicates network wide capacity planning identified the project need (potentially) independent of standalone PZ3 customer requirements.
Step 2 - Confirm RIG/RCG Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement largely driven by PZ1 & PZ2 customer representatives (based on a proxy assessment using 2012 voting shares).	Indicates (potentially) PZ1 and PZ2 customers considered the project need independent of standalone PZ3 customer requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents do not link the investment specifically to the PZ3 customer group. The primary objective and benefits include: <i>'the project ... is designed to remove the constraint to meet contracted coal volumes. The main benefit of this Project is providing the railway capacity ahead of demand on the Nundah Bank.</i>  <i>The Nundah Bank Third Track Project will ensure the rail network is not the constraint on the coal chain once Stage 2 is completed.'</i>	<i>(Likely)</i> Not incremental – noting Strategy is linked to meeting port capacity.  <i>(Consider take up of contracted volumes to confirm)</i>
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	The BIC approval documents do not link the secondary objectives or benefits specifically to the PZ3 customer group. The secondary objectives are related to network operational efficiencies and include: <ul style="list-style-type: none"> <li>• Ten-minute signalling headways on the Nundah Bank;</li> <li>• Improve operational performance; and</li> <li>• Improve the recovery of rolling stock on Nundah Bank</li> </ul>	Not incremental.
<b>Assessment of Incremental Percentage - Project 5811</b>		<b>0%</b>



### 6.5.3 Project 3585 - Maitland to Minimbah Third Road – Stage 1 – Phase 6

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	The project was identified in the HVCCS prior to customer group endorsement and was consistent with the strategy to provide capacity ahead of demand as well as allowance for surge capacity.	Indicates network wide capacity planning identified the project need (potentially) independent of standalone PZ3 customer requirements.
Step 2 - Confirm RIG/RCG Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement by rail operators Pacific National and QR.	Indicates benefits are tied to operational efficiencies and independent of standalone PZ3 customer capacity requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents do not link the investment specifically to the PZ3 customer group. The primary objective and benefits include: <i>'ensure that network capacity remains ahead of coal industry demand and provides increased reliability ...the section of track known as Minimbah Bank is expected to be constrained due to the existing grade of 1:80 and current signalling configuration.'</i> <i>'The primary objective of the Minimbah Bank Third Road Project is to ensure that network capacity remains ahead of coal industry demand and provides increased reliability.'</i>	(Possibly) Not incremental.  <i>(Need to consider take up of contracted volumes)</i>
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	The BIC approval documents do not link the secondary objectives or benefits specifically to the PZ3 customer group. The secondary benefits are generally related to network operational efficiencies, for example: <ul style="list-style-type: none"> <li>• Reduced train headways</li> <li>• Allows two trains to be on the grade without one stopping</li> <li>• Provides greater recovery flexibility</li> <li>• Reduces the impact of the capacity “shadow” caused by passenger trains.</li> </ul>	Not incremental.
<b>Assessment of Incremental Percentage - Project 3585</b>		<b>0%</b>



### 6.5.4 Project 3579 - Antiene to Grasstree Stage 1 duplication

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	The project was identified in the HVCCS prior to customer group endorsement and was consistent with the strategy to provide capacity ahead of demand as well as allowance for surge capacity. However, the project does also address specific additional volumes out of PZ2 and PZ3.	Indicates network wide capacity planning identified the project consistent with network strategy however, indicates a significant element is for PZ2/PZ3 benefit.
Step 2 - Confirm RIG/RCG Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement by rail operators Pacific National and QR.	Indicates (some) benefits are tied to operational efficiencies and independent of standalone PZ2/PZ3 customer capacity requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents link the investment specifically to the PZ2 and sPZ3 customer groups. The primary objective is capacity focussed and: <i>will result in an increase in available paths from 21 to 96 (associated with the Ulan and Gunnedah)</i>	Partially incremental – <i>with PZ2 customers also sharing benefits.</i> <i>(Need to consider take up of contracted volumes)</i>
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	The BIC approval documents link the secondary objectives or benefits specifically to the PZ3 customer group as well as PZ2 customers (although they also include and third party beneficiaries), for example: <ul style="list-style-type: none"> <li>Operational simulation software indicates saving of 15 minutes for Gunnedah trains and 19 minutes for Ulan trains resulting in 125 minutes and 82 minutes of round trip delay per train respectively.</li> <li>Includes install the 1 in 18.5 SNT Antiene crossover to primarily benefit Macquarie Generation.</li> </ul>	Partially incremental.
<b>Assessment of Incremental Percentage - Project 3579</b>		<b>25%</b>



### 6.5.5 Project 3884 - St Helliers to Muswellbrook Duplication

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	The project was identified in the HVCCS prior to customer group endorsement and was consistent with the strategy to provide capacity ahead of demand as well as allowance for surge capacity. However, the project does also address specific additional volumes out of PZ2 and PZ3 to the extent it is related to project 3579.	Indicates network wide capacity planning identified the project consistent with network strategy however, indicates potentially a shared PZ2/PZ3 benefit.
Step 2 - Confirm RIG/RCG Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement by rail operators Pacific National and QR.	Indicates (some) benefits are tied to operational efficiencies and independent of standalone PZ2/PZ3 customer capacity requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents do not link the investment specifically to the PZ3 customer group. However, it is considered to be related to the project 3579 capacity improvement that benefits PZ2 and PZ3 customers. The primary benefits include: <i>' providing forecast capacity; reducing cycle times, minimising reactive maintenance losses, improving ARTC operational flexibility.'</i>	Partially incremental – <i>with PZ2 customers also sharing benefits.</i> <i>(Need to consider take up of contracted volumes)</i>
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	The BIC approval documents do not link the secondary objectives or benefits specifically to the PZ3 customers and are focussed on operational efficiencies that would benefit customers across PZs.	Not incremental.
<b>Assessment of Incremental Percentage - Project 3884</b>		<b>10%</b>



## 6.5.6 Project 3584 - Bi-Dir signalling Maitland to Branxton

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	The project was identified in the HVCCS prior to customer group endorsement and was consistent with the strategy to provide operational efficiencies (specifically, 2006–2011 Hunter Valley Coal Network Capacity Improvement Strategy 2007 – project identified to focus on ' <i>reducing maintenance impacts and increasing operational flexibility</i> ').	Indicates network wide capacity planning identified the project need independent of standalone PZ3 customer requirements.
Step 2 - Confirm RIG/RCG Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement by rail operators Pacific National and QR.	Indicates benefits are tied to operational efficiencies and independent of standalone PZ3 customer capacity requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents do not link the investment specifically to the PZ3 customer group. The primary objective and benefits are related to network operational efficiency.	Not incremental.
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	<p>The BIC approval documents do not link the secondary objectives or benefits specifically to the PZ3 customer group. The secondary benefits are related to network operational efficiencies, for example:</p> <ul style="list-style-type: none"> <li>• Allow increasing speed</li> <li>• Continue running during 18x6 hour possession during the year</li> <li>• Reducing transit time</li> <li>• More even headway reducing need for excessive breaking</li> <li>• Reduce provision of unplanned system downtime.</li> </ul>	Not incremental.
<b>Assessment of Incremental Percentage - Project 3584</b>		<b>0%</b>



## 6.5.7 Project 6928 - Drayton Junction Upgrade

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	The project was identified in the HVCCS prior to customer group endorsement and was consistent with the strategy to provide operational efficiencies (2006–2011 Hunter Valley Coal Network Capacity Improvement Strategy 2007 – project identified to focus on ‘ <i>reducing junction conflicts</i> ’).  Drayton Junction was associated with “high maintenance turnouts, necessitating excessive track maintenance and producing additional train delays.”	Indicates network wide capacity planning identified the project need independent of standalone PZ3 customer requirements.
Step 2 - Confirm RIG/RCG Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement by rail operators Pacific National and QR.	Indicates benefits are tied to operational efficiencies and independent of standalone PZ3 customer capacity requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents do not link the investment specifically to the PZ3 customer group. The project does provide increased branch line capacity, however, primary objective is network efficiencies, including: <ul style="list-style-type: none"> <li>• Replace life-expired, maintenance-intensive assets</li> <li>• Reduced junction conflicts and impact on mainline tonnages</li> <li>• Cater for increased branch line capacity</li> <li>• Minimise capital expenditure.</li> </ul>	(Likely) Not incremental.  <i>(Need to consider take up of contracted volumes)</i>
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	The BIC approval documents do not link the secondary objectives or benefits specifically to the PZ3 customer group. The secondary benefits are related to network operational efficiencies, for example minimising: <ul style="list-style-type: none"> <li>• Construction and maintenance impacts on existing operations</li> <li>• Maintenance cycles and costs</li> <li>• Signalling and communications complexity.</li> </ul>	Not incremental.
<b>Assessment of Incremental Percentage - Project 6928</b>		<b>0%</b>



### 6.5.8 Project 8665 - No.3 Departure Road at KCT

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	The project was identified by the HVCCC for ARTC to plan and develop. The 2009-2018 Hunter Valley Corridor Capacity Strategy - Consultation Document identified the project as a congestion project at the terminal aimed at easing congestion (unlocking existing capacity)	Indicates wider industry benefits than standalone PZ3 customer requirements.
Step 2 - Confirm RIG/RCG Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement largely driven by PZ1 & PZ2 customer representatives (based on a proxy assessment using 2012 voting shares). E3 Advisory note that a planning phase approval document was used for this assessment.	Indicates (potentially) PZ1 and PZ2 customers considered the project need independent of standalone PZ3 customer requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents do not link the investment specifically to the PZ3 customer group. The primary objective is to: <i>'Provide infrastructure in accordance with the HVCCC's system assumptions by providing a minimum of two Departure Roads for each Dump Station at the Kooragang Coal Terminal.'</i>	Not incremental.
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	The BIC approval documents do not link the secondary objectives or benefits specifically to the PZ3 customer group. The secondary objectives include: <ul style="list-style-type: none"> <li>• Minimise life cycle maintenance costs</li> <li>• Minimise signalling and communications complexity.</li> </ul>	Not incremental.
<b>Assessment of Incremental Percentage - Project 8665</b>		<b>0%</b>





## 6.5.9 Project 3468 - Newdell Junction Upgrade

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	The project was identified in the HVCCS prior to customer group endorsement and was consistent with the strategy to provide operational efficiencies (2006–2011 Hunter Valley Coal Network Capacity Improvement Strategy 2007 – project identified to focus on ‘ <i>reducing junction conflicts</i> ’). Newdell Junction was associated with “high maintenance turnouts, necessitating excessive track maintenance and producing additional train delays.”	Indicates network wide capacity planning identified the project need independent of standalone PZ3 customer requirements.
Step 2 - Confirm RIG/RCC Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement by rail operators Pacific National and QR.	Indicates benefits are tied to operational efficiencies and independent of standalone PZ3 customer capacity requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents do not link the investment specifically to the PZ3 customer group. The project does provide increased capacity (at the junction by increasing speeds). Primary objectives include: <ul style="list-style-type: none"> <li>• Improve/increase capacity through the junction by increasing turnout speeds</li> <li>• Reduce maintenance costs</li> <li>• Improve reliability of signalling system</li> <li>• Minimise capital expenditure.</li> </ul>	(Likely) Not incremental.  <i>(Need to consider take up of contracted volumes)</i>
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	The BIC approval documents do not link the secondary objectives or benefits specifically to the PZ3 customer group. The secondary benefits are related to network operational efficiencies, for example minimising: <ul style="list-style-type: none"> <li>• Construction and maintenance impacts on existing operations</li> <li>• Maintenance life cycle costs</li> <li>• Signalling and communications complexity.</li> </ul>	Not incremental.
<b>Assessment of Incremental Percentage - Project 3468</b>		<b>0%</b>



### 6.5.10 Project 6156 - Maitland Junction/CBI

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	The 2011-2020 Hunter Valley Corridor Capacity Strategy - Consultation Document considered: <i>the primary issues at Maitland are related to the maintenance of the old slow-speed turnouts and accordingly the primary focus of the review is the most effective way to replace these turnouts with low-maintenance high-speed units. The secondary objective is to leverage this renewal to increase capacity by improving train speeds and reducing crossing conflicts.</i>	Indicates wider industry benefits than standalone PZ3 customer requirements.
Step 2 - Confirm RIG/RCG Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement largely driven by PZ1 & PZ2 customer representatives (based on a proxy assessment using 2012 voting shares).	Indicates (likely) PZ1 and PZ2 customers considered the project need independent of standalone PZ3 customer requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents do not link the investment specifically to the PZ3 customer group. The primary objectives are: <ul style="list-style-type: none"> <li>• Operational and Maintenance flexibility for future capacity improvement projects, maintenance upgrades and Maitland junction rationalisation</li> <li>• Program certainty (de-risking future commissioning's).</li> </ul>	Not incremental.
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	The BIC approval documents do not link the secondary objectives or benefits specifically to the PZ3 customer group. The secondary objectives were not included in the evaluation report material reviewed by E3 Advisory.	Not incremental.
<b>Assessment of Incremental Percentage - Project 6156</b>		<b>0%</b>



### 6.5.11 Project 8666 - KCT Bypass Road Realignment

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	Aligns with similar congestion reducing initiatives at ports. Specific HVCCS reference not located in this assessment.	Indicates wider industry benefits than standalone PZ3 customer requirements.
Step 2 - Confirm RIG/RCG Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement largely driven by PZ1 & PZ2 customer representatives (based on a proxy assessment using 2012 voting shares).	Indicates (likely) PZ1 and PZ2 customers considered the project need independent of standalone PZ3 customer requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents do not link the investment specifically to the PZ3 customer group. The primary objective was to facilitate efficient operations of coal trains through Kooragang Coal Terminal. This is considered to be a congestion improving project that unlocks capacity, however this is not standalone to any PZ.	Not incremental. <i>(Unlocked capacity and operational improvements benefit all customers)</i>
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	The BIC approval documents do not link the secondary objectives or benefits specifically to the PZ3 customer group. The secondary objectives include to minimise: <ul style="list-style-type: none"> <li>• life cycle maintenance costs</li> <li>• signalling and communications complexity.</li> </ul>	Not incremental.
<b>Assessment of Incremental Percentage - Project 8666</b>		<b>0%</b>



### 6.5.12 Project 3578 – Muswellbrook Loop Extension - 961

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	Aligns with 2006-2011 Network Improvement Strategy.	Indicates wider industry benefits than standalone PZ3 customer requirements.
Step 2 - Confirm RIG/RCG Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement by rail operators Pacific National and QR.	Indicates benefits are tied to operational efficiencies and independent of standalone PZ3 customer capacity requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	<p>The BIC approval documents do link the investment specifically to the PZ3 customer group. The primary objective and benefits include:</p> <ul style="list-style-type: none"> <li>• provide capacity for Ulan and Main North</li> <li>• reduce running times on longest single track</li> <li>• provide down loop for standing coal trains in yard</li> <li>• allow Macquarie Generation trains to cross from up to down.</li> </ul>	<p>(Partially) incremental to PZ2 and PZ3.</p> <p><i>(Need to consider take up of contracted volumes)</i></p>
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	<p>The BIC approval documents do not link the secondary objectives or benefits specifically to the PZ3 customer group. The secondary objectives include to:</p> <ul style="list-style-type: none"> <li>• increase through speed</li> <li>• provide operational flexibility</li> <li>• provide a reliable signalling system.</li> </ul>	Not incremental.
<b>Assessment of Incremental Percentage - Project 3578</b>		<b>10%</b>



### 6.5.13 Project 3575 – Minimbah 80 kph Running - Stage 1

Step	Basis of Assessment	Assessment
Step 1 - Confirm Alignment with HVCCS and identify system wide considerations	Included in Hunter Valley Coal Network Capacity Improvement Strategy. Operational efficiency focus.	Indicates wider industry benefits than standalone PZ3 customer requirements.
Step 2 - Confirm RIG/RCC Endorsement and identify endorsement stakeholders (base on 2012 voting rights)	The project was endorsed by the RIG prior to 2012 with industry endorsement by rail operators Pacific National and QR.	Indicates benefits are tied to operational efficiencies and independent of standalone PZ3 customer capacity requirements.
Step 3 - Identify primary project objectives/ benefits to identify standalone benefits of PZ3 customers.	The BIC approval documents do not link the investment specifically to the PZ3 customer group. The primary objectives include: <ul style="list-style-type: none"> <li>• Allowing G-Class trains to approach Minimbah/Nundah Banks at 80kph</li> <li>• Reduce train headways</li> <li>• Reduce the overall transit time of loaded coal trains between Muswellbrook and Maitland</li> <li>• Increase the number of available paths through these sections of track by 21 paths creating 95 paths daily.</li> </ul>	(Likely) Not incremental. <i>(Need to consider take up of contracted volumes)</i>
Step 4 - Identify growth (if any) in contracted capacity on a PZ basis.	Contracted capacity growth (actual and forecast) from 2011-2015 is shared across all PZs. PZ1 and PZ2 account for approximately two thirds of the contracted capacity growth.	Not incremental.
Step 5 - Identify secondary project objectives/ benefits to identify if focussed on PZ3 customer benefits.	The BIC approval documents do not link the secondary objectives or benefits specifically to the PZ3 customer group as they are focussed on operational efficiency outcomes from increased speeds.	Not incremental.
<b>Assessment of Incremental Percentage - Project 3575</b>		<b>0%</b>



## 7 Financial Outcomes

137. The financial outcome resulting from the adoption of E3 Advisory Technical Assessment recommendations is summarised in the table below.
138. The financial outcome has been provided by ARTC based on their operation of the WIK-Consult cost model.

**Table 7 Financial outcomes of Technical Assessment (Source: ARTC WIK-Consult Cost Model)**

<b>Assessment</b>	<b>Costs Incremental to Price Zone 3 Producers \$m</b>
ARTC	\$2.49
WIK-Consult	\$14.58
E3 Advisory	\$3.64



# Appendix A

## Reference Documents



## Referenced Documents List

Owner	Date	Title	Source
WIK-Consult	Sept 2015	WIK-Consult TÜV - Consultant report for 2013 Annual Compliance (Public)	Publicly available: <a href="https://www.accc.gov.au/regulated-infrastructure/rail/annual-compliance-assessment-2013/draft-determination">https://www.accc.gov.au/regulated-infrastructure/rail/annual-compliance-assessment-2013/draft-determination</a>
ACCC	30 October 2015	Draft Determination - Australian Rail Track Corporation's compliance with the Hunter Valley Coal Network Access Undertaking financial model for the 2013 calendar year	Publicly available: <a href="https://www.accc.gov.au/regulated-infrastructure/rail/annual-compliance-assessment-2013/draft-determination">https://www.accc.gov.au/regulated-infrastructure/rail/annual-compliance-assessment-2013/draft-determination</a>
ACCC	29 June 2011	Australian Competition and Consumer Commission - Decision - In relation to Australian Rail Track Corporation's Hunter Valley Rail Network Undertaking	Publicly available: <a href="https://www.accc.gov.au/regulated-infrastructure/rail/hunter-valley-access-undertaking-2011/final-decision">https://www.accc.gov.au/regulated-infrastructure/rail/hunter-valley-access-undertaking-2011/final-decision</a>
ARTC/RCG	June 2012	Rail Capacity Group Charter	ARTC response to information request – Commercial in Confidence
ARTC	July 04, 2012	HVAU Rail Capacity Group GTK Voting Rights	ARTC response to information request – Commercial in Confidence
ARTC	Not dated	Pricing Zone Map	ARTC response to information request – Commercial in Confidence
ARTC	Not dated (Created April 2015)	HV Contracted Volumes 2015	ARTC response to information request – Commercial in Confidence
ARTC	July 2015	2015-2024 Hunter Valley Corridor Capacity Strategy	Publicly available: <a href="https://www.artc.com.au/projects/hv-strategy/library/2015-24%20Hunter%20Valley%20Corridor%20Capacity%20Strategy%20-%20Final.pdf">https://www.artc.com.au/projects/hv-strategy/library/2015-24%20Hunter%20Valley%20Corridor%20Capacity%20Strategy%20-%20Final.pdf</a>
ARTC	6 April 2006	2006–2011 Hunter Valley Coal Network Capacity Improvement Strategy Consultation Draft	Publicly available: <a href="https://www.artc.com.au/projects/hv-strategy/library/news_060406_2.pdf">https://www.artc.com.au/projects/hv-strategy/library/news_060406_2.pdf</a>





Owner	Date	Title	Source
ARTC	Various	BIC Approval Documents and RSG Approval Documents all assessed Major CAPEX Projects.	ARTC response to information request – Commercial in Confidence
ARTC	Various	ETM-01-04 Rail Defect Standards RC2400 Rail Defects Handbook RC2411 Guidelines for Trackside Lubrication RTS3430 Track Reconditioning Guidelines Engineering (Track & Civil) Code of Practice - Section 5 Track Geometry	
Railcorp	Various	TMC 202 Track Fundamentals TMC 203 Track Inspection TMC 226 Rail Defects Handbook TMC 251 Turnouts	



# Appendix B

E3 Advisory Report Authors



## **Andrew Allen, Principal**

Andrew has extensive experience in the construction industry with expertise in project definition and assurance, procurement, project management, design management, contract documentation, contract administration, claims management and commercial dispute resolution. This experience has been gained by working for major contractors in the United Kingdom, and more recently, in advisory consultancy in Australia.

Andrew's experience covers both major road and rail projects and programs. Rail experience covers projects in both heavy rail, light rail and rail systems. Projects have included North West Rail Link, Sydney Metro Stage 1, CBD and Southeast Light Rail, Rail Clearways and Docklands Light Rail Extension (UK). Programs have included TfNSW's Long Term Transport Master Plan, CBD Rail Capacity Program and Western Express Program.

Andrew's recent focus has included the preparation of project business cases on Sydney's Rail Future, traction power and advanced train control system.

Andrew understands the breadth of issues that must be managed in a major transport project to ensure the project is not only successful from a budget and time perspective, but also to deliver the expected outcomes for users of the infrastructure.



## **Nigel Markie, Senior Advisor**

Nigel has almost 20 years' experience in asset intensive industries in both public and private sectors (including Government Owned Corporations). By training he is an economist with degrees in economics & finance and journalism & history.

In his career he has worked closely with senior public and private sector executives assisting them with investment analysis and options, strategy development, business wide improvement processes and engaging with competition regulators.

Nigel was responsible for the joint authorship of the LinkWater (now merged with Seqwater) Regulatory Submissions in 2011-12 & 2012-13 with specific responsibility for development of the Capital Expenditure related material in the submission. The Regulatory Submission is effectively the business case for the pricing and expenditure programs for the regulated business.

Nigel has performed numerous roles working with senior executives in the public and private sector developing management frameworks, designing process improvements and developing project options and then implementing the solutions.



## Contact Details

### Sydney

Suite 3, Level 24, 45 Clarence Street  
Sydney NSW 2000  
+61 2 8097 0790

### Brisbane

Level 6, 167 Eagle Street  
Brisbane QLD 4000  
+61 7 3160 3150

### Email

[info@e3advisory.com](mailto:info@e3advisory.com)

### Website

[www.e3advisory.com](http://www.e3advisory.com)