Hunter Valley Coal Network Access Undertaking
2017 Annual Compliance Assessment

ATTACHMENT 1: Hunter Valley Network Operating Costs

Submission To

Australian Competition & Consumer Commission

23 April 2020

PUBLIC VERSION

ARTC

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1. INTRODUCTION

This document contains additional information and analysis relating to ARTC's Network operating costs for the 2017 calendar year. It is intended to supplement the information contained in ARTC's submission to the ACCC for the assessment of compliance with ARTC's Hunter Valley Access Undertaking (**HVAU**) during 2017.

During 2017, the Hunter Valley network achieved a total coal transportation volume (including domestic) of 171.3 million tonnes (Mt), which was consistent with total tonnage volumes for 2016. With coal prices recovering from the lows experienced from 2014-2016, albeit with some fluctuation, Customers remained focused on network availability, reliability and operational efficiency, as well as value for money in costs. Customer interest in additional throughput opportunities and increased capacity remained high particularly from the single line Ulan and Gunnedah extremities of the Network.

The Gross Tonne Kilometres (GTKs) for the coal network increased 0.3% between 2016 and 2017, sustaining the significant increase in previous years. At a zonal level, Pricing Zone 1 decreased slightly by 0.3% which was offset by a 0.3% increase in Pricing Zone 2 and 2.1% increase in Pricing Zone 3, reflecting the greater proportion of volumes originating from longer hauls.

Table 1: Hunter Valley Network Coal Gross Tonne Kilometres (GTK)

Pricing Zone	CY14 GTK ,000	CY15 GTK ,000	CY16 GTK ,000	CY17 GTK ,000	% Variance 2014 - 2017	% Variance 2015 - 2017	% Variance 2016 - 2017
Pricing Zone 1	24,677,499	25,700,939	26,745,352	26,660,336	8.0%	3.7%	-0.3%
Pricing Zone 2	[redacted]				22.4%	12.4%	0.3%
Pricing Zone 3					74.6%	17.0%	2.1%
Total GTKs	**36,702,187**	**41,145,902**	**44,270,699**	**44,417,900**	**21.0%**	**8.0%**	**0.3%**

The cumulative effect of the sustained increase in GTKs over time has a material influence on cyclic maintenance requirements.

There were two serious failures of structural components on steel bridges on the Ulan line (but part of Zone 1) that disrupted network operations. This required both immediate rectification work and engineering investigations, as well as increased ongoing inspections and structural monitoring for a number of the aging structures in the Hunter Valley ahead of the planned replacement program.

There was also extreme heat throughout January and February 2017 causing disruption through heat affected track and train reliability.

ARTC had a distinct focus during 2017 on reliability work targeted to the top three causes of infrastructure losses being rail breaks, bridge defects and points failures, with the following programs formulated and implemented:[1]

- Rail Break Reduction Strategy
- Bridge Assessment and Monitoring Program
- Reliability and Condition Monitoring Program

[1] Further information relating to these programs has been provided at confidential Attachment 5.8 of ARTC's 2017 Compliance Submission

Derailments and other incidents do occur on the network from time to time. The aggregate net costs relating to incidents in 2017 was comparable with 2016.

At an organisational level, the Hunter Valley business unit structure was largely consistent with the structure implemented through ARTC's transformation program in 2015/2016, although there was some refinement of roles across teams. Revised allocators for overhead costs were implemented from 1 July 2017 in accordance with the 2017 HVAU variation.

With the progression of ARTC's Network Control Optimisation (ANCO) project through to detailed design and subsequent implementation, new operating costs were also introduced for Network Control relating to ANCO in 2017.

Teams within the Business Unit continued to build ARTC's condition monitoring and asset management improvement capability and tools to maximise network reliability and availability. This included development of a business case to move towards high speed ultrasonics (once the technology was proven) to allow for more efficient testing of rail, proposals to expand instrumented coal wagons into Pricing Zone 2 to build on the predicative intervention capability already in operation in Pricing Zones 1 and 3 and expanded coverage for points condition monitoring to allow for the detection and early intervention for point machine failures. Some of this work subsequently led to capital projects being presented to the Rail Capacity Group (RCG) for endorsement.

ARTC initiated trials to improve the coordination and synchronisation between ARTC's asset and operations teams so there was a holistic Network view when planning for work and track access authorities for the following 14-day period, before providing as input to the HVCCC for whole of Coal Chain planning. The coordination efforts were initially focused on sustaining train flow through the lower Hunter and better coordination of Network activities leading into and out of the major closedowns. Initial results suggested that the coordination facilitated more efficient use of short-term windows leading to improved completion of planned activities. The learnings from this work will also inform how best to synchronise activities to enable dynamic management of the Network under ANCO.

ARTC also continued to grow its data analysis of network operational performance, updates on events occurring on the Network and monthly performance reporting to the RCG. The improved transparency and visibility of Network status is valued by both Customers and rail operators.

Whilst some of these focus areas manifest in the cost movements for 2017, they also highlight where effort of the teams within the Business Unit was expended to improve outcomes and create value for ARTC's Customers in the Hunter Valley.

Table 2 sets out a comparison of the total operating costs in 2017 against 2016 (as lodged) for the Hunter Valley Coal Network. An explanation for the movement in costs is the following sections.

Table 2: Hunter Valley Coal Network Operating Expenditure $'000

	2016 (a)	2017 (b)	% Variance (b)/(a)-1
Infrastructure Maintenance	109,763	111,790	1.8%
Loss on Disposals	8,590	7,606	-11.5%
Expensed Project Costs	-	-	0.0%
Network Control	12,490	14,149	13.3%
Business Unit Management	25,830	29,781	15.3%
Corporate Overheads	18,012	18,291	1.5%
Less Non-Coal Allocation	(3,921)	(5,238)	33.6%
Total Operating Expenditure	**170,764**	**176,378**	**3.3%**

2. INFRASTRUCTURE MAINTENANCE

Infrastructure Maintenance includes Major Periodic Maintenance (MPM) and Routine Corrective and Reactive Maintenance (RCRM) work programs.

MPM are typically major cyclical or planned activities that maintain the operating performance and asset life of operational infrastructure and aim to reduce the level of defects and corrective maintenance. These activities are largely delivered within the network closedowns and are predominantly outsourced.

RCRM are typically minor scheduled activities used to inspect or service asset condition on a routine basis. RCRM extends to include reactive and corrective activities that are required as a result of inspections or defect identification that, because of their nature, are dealt with on the spot or as soon as is reasonably practical thereafter.

ARTC has provided details of the top 10 maintenance activities by value in 2017 at a Network level in Table 3A. A zonal break down of these top 10 maintenance activities is provided in Table 3B to Table 3D below. The required maintenance activities can vary year to year, particularly where there are discrete projects, and cost variations are to be expected. Commentary has been provided on the key drivers for the movement in costs for the top 10 maintenance activities.

The amounts reflect the underlying maintenance costs for each activity before allocating a share of incremental maintenance to the non-coal traffics.

Table 3A: Top 10 Hunter Valley Maintenance Activities $'000

Activity	MPM/RCRM	2016 (a)	2017 (b)	% Variance (b)/(a)-1
Ballast Cleaning	MPM			-35.3%
Rail Grinding	MPM			19.3%
Mudholes Full Track Reconditioning	MPM	10,290	10,211	-0.8%
Maintenance Resurfacing	MPM	9,257	8,513	-8.0%
Turnout Steel Component Replacement	MPM	4,892	5,897	20.5%
Turnout Resurfacing	MPM	3,370	4,701	39.5%
Ballast Undercutting	MPM	3,471	4,366	25.8%
Rail Defect Removal	RCRM	3,165	4,294	35.7%
Steel Bridge Maintenance	MPM	743	3,117	319.4%
Turnout Grinding	MPM	2,482	3,081	24.1%
Top 10 Total		**66,865**	**67,878**	**1.5%**
Top 10%		**60.9%**	**60.7%**	
Other Activities	MPM/RCRM	42,898	43,912	0.7%
Total Maintenance		**109,763**	**111,790**	**1.8%**

Infrastructure Maintenance Summary $'000

Activity	2016 (a)	2017 (b)	% Variance (b)/(a)-1
Major Periodic Maintenance	87,204	85,582	-1.9%
Routine Corrective and Reactive Maintenance	22,559	26,208	16.2%
Total Maintenance	**109,763**	**111,790**	**1.8%**

Table 3B: Top 10 Hunter Valley Maintenance Activities Pricing Zone 1 $'000

Activity	MPM/RCRM	2016 (a)	2017 (b)	% Variance (b)/(a)-1
Ballast Cleaning	MPM	[redacted]	[redacted]	-100.0%
Rail Grinding	MPM			9.4%
Mudholes Full Track Reconditioning	MPM	2,262	5,234	131.3%
Maintenance Resurfacing	MPM	3,167	3,313	4.6%
Turnout Steel Component Replacement	MPM	4,163	3,793	-8.9%
Turnout Resurfacing	MPM	2,426	3,382	39.4%
Ballast Undercutting	MPM	2,290	3,492	52.5%
Rail Defect Removal	RCRM	1,750	3,117	78.1%
Steel Bridge Maintenance	MPM	605	794	31.2%
Turnout Grinding	MPM	1,947	2,408	23.7%
Top 10 Total		**29,643**	**30,524**	**3.0%**
Top 10%		**56.1%**	**58.1%**	
Other Activities	MPM/RCRM	23,152	22,013	-7.7%
Total Maintenance		**52,794**	**52,537**	**-0.5%**

Infrastructure Maintenance Pricing Zone 1 $'000

Activity	2016 (a)	2017 (b)	% Variance (b)/(a)-1
Major Periodic Maintenance	40,405	37,869	-6.3%
Routine Corrective and Reactive Maintenance	12,390	14,668	18.4%
Total Maintenance	**52,794**	**52,537**	**-0.5%**

Table 3C: Top 10 Hunter Valley Maintenance Activities Pricing Zone 2 $'000

Activity	MPM/RCRM	2016 (a)	2017 (b)	% Variance (b)/(a)-1
Ballast Cleaning	MPM	[redacted]	[redacted]	-100.0%
Rail Grinding	MPM			-10.0%
Mudholes Full Track Reconditioning	MPM	2,840	1,113	-60.8%
Maintenance Resurfacing	MPM	1,626	1,865	14.7%
Turnout Steel Component Replacement	MPM	120	177	46.6%
Turnout Resurfacing	MPM	290	468	61.5%
Ballast Undercutting	MPM	213	291	36.8%
Rail Defect Removal	RCRM	314	412	31.3%
Steel Bridge Maintenance	MPM	50	116	133.6%
Turnout Grinding	MPM	246	190	-22.8%
Top 10 Total		**10,575**	**7,627**	**-27.9%**
Top 10%		**62.7%**	**53.6%**	
Other Activities	MPM/RCRM	6,283	6,595	4.8%
Total Maintenance		**16,858**	**14,222**	**-15.6%**

Infrastructure Maintenance Pricing Zone 2 $'000

Activity	2016 (a)	2017 (b)	% Variance (b)/(a)-1
Major Periodic Maintenance	14,204	11,033	-22.3%
Routine Corrective and Reactive Maintenance	2,654	3,189	20.2%
Total Maintenance	**16,858**	**14,222**	**-15.6%**

Table 3D: Top 10 Hunter Valley Maintenance Activities Pricing Zone 3 $'000

Activity	MPM/RCRM	2016 (a)	2017 (b)	% Variance (b)/(a)-1
Ballast Cleaning	MPM	[redacted]	[redacted]	6.7%
Rail Grinding	MPM			175.4%
Mudholes Full Track Reconditioning	MPM	5,187	3,864	-25.5%
Maintenance Resurfacing	MPM	4,464	3,334	-25.3%
Turnout Steel Component Replacement	MPM	608	1,927	216.7%
Turnout Resurfacing	MPM	654	851	30.2%
Ballast Undercutting	MPM	968	583	-39.8%
Rail Defect Removal	RCRM	1,101	766	-30.5%
Steel Bridge Maintenance	MPM	88	2,207	2404.0%
Turnout Grinding	MPM	288	482	67.3%
Top 10 Total		**26,648**	**29,727**	**11.6%**
Top 10%		**66.4%**	**66.0%**	
Other Activities	MPM/RCRM	13,463	15,303	13.1%
Total Maintenance		**40,111**	**45,031**	**12.3%**

Infrastructure Maintenance Pricing Zone 3 $'000

Activity	2016 (a)	2017 (b)	% Variance (b)/(a)-1
Major Periodic Maintenance	32,595	36,680	12.5%
Routine Corrective and Reactive Maintenance	7,516	8,351	11.1%
Total Maintenance	**40,111**	**45,031**	**12.3%**

The following sections provide an explanation for the key drivers for the movements in maintenance activities across the network.

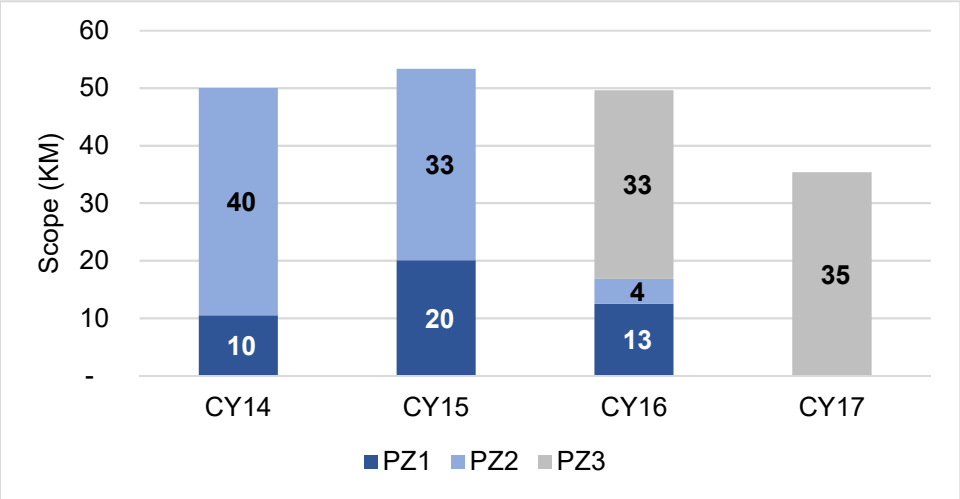
2.1 Ballast Cleaning

Ballast cleaning is the mechanical excavation of deteriorated track ballast up to 500mm below the bottom of the sleeper across the entire track cross-section. The activity's purpose is to reinstate the function of the ballast as a free-draining medium, holding the track to its correct geometry under the passage of trains. Ballast cleaning is a cyclical maintenance activity across the network, with timing driven by the cumulative tonnages over specific segments of track. It is a large component of the recurrent operating costs at an aggregate level, recognising that the activity will move through the zones across a number of years. The ballast cleaning activity is outsourced.

Compared to 2016, aggregate costs decreased by [redacted] in 2017 as the ballast cleaner moved out of Pricing Zone 1 (including complex multi-track areas) and Pricing Zone 2. The initial ballast cleaning cycle within Pricing Zone 3 continued with one ballast cleaning machine in use.

Unit cost in 2017 was [redacted] per metre as 35km in scope was achieved throughout the year, with the majority of works being delivered from Murulla to Dartbrook Jct. Poor ballast reclamation levels were encountered during these works which is anticipated to persist throughout Pricing Zone 3 due to it being the initial clean. Unit rates fluctuate year on year dependent on contract rates, ballast reclamation levels, ballast age and maintenance possession scheduling.

Figure 1: Ballast Cleaning Work Scope – CAL 14-17 in KM[1]



[1] *Note: An error was identified with the 37km scope reported in the 2016 Submission for Pricing Zone 3. Actual scope achieved was 33km. This has been corrected in the chart above. The corrected overall unit rate for ballast cleaning for 2016 was [redacted] per metre.*

2.2 Rail Grinding

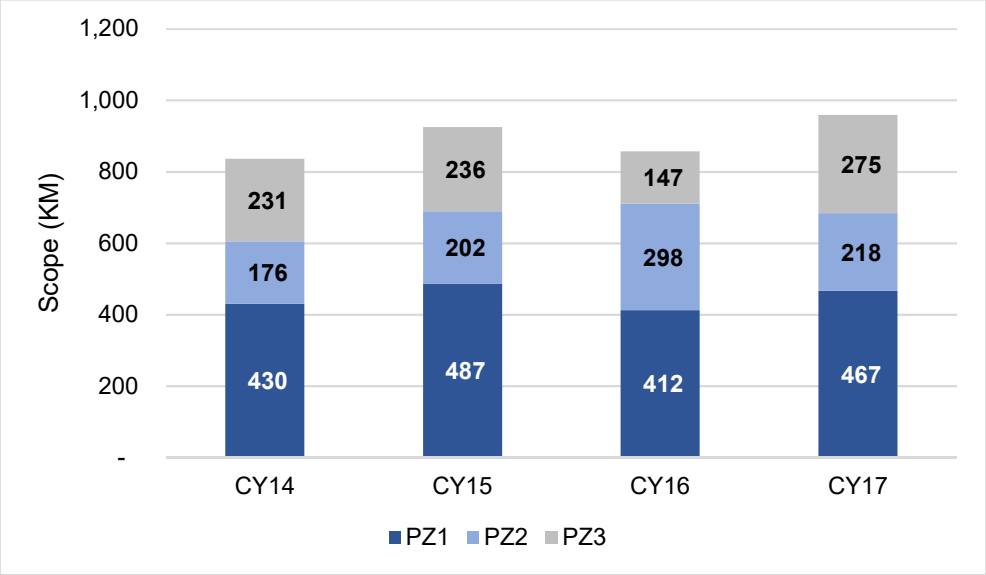
Rail grinding is the periodic grinding of rail to manage its profile and stress-related defect growth. Grinding improves wheel and rail interface to reduce rail and wheel wear and propagation of rail defects. The frequency of rail grinding is dependent upon rail and traffic type, tonnages (in Million Gross Tonnes (MGT)) and track curvature. In determining the optimal rail grinding frequency a detailed analysis of rail performance is undertaken to maximise rail life and minimise the development of rail defects.

Rail grinding costs increased [redacted] in 2017 compared with 2016, due to an increase in the scope of rail grinding delivered. Due to the cyclic nature of the activity, rail grinding may not be comparable year on year but will be driven by sustained increases in tonnage over time. During 2017, cost in Pricing Zone 1 increased by [redacted] and Pricing Zone 2 decreased by [redacted]. Pricing Zone 3 increased by [redacted].

For Pricing Zone 3, the 30TAL rerailing program has influenced the annual rail grinding maintenance requirements, with the initial grind for new rail being part of the capital cost of the project. The increase in 2017 reflects a return to a more routine level of activity for 30TAL rail replaced in previous years.

This activity was entirely outsourced during the calendar year.

Figure 2: Rail Grinding Work Scope – CAL 14-17 in KM



2.3 Mudholes Full Track Reconditioning

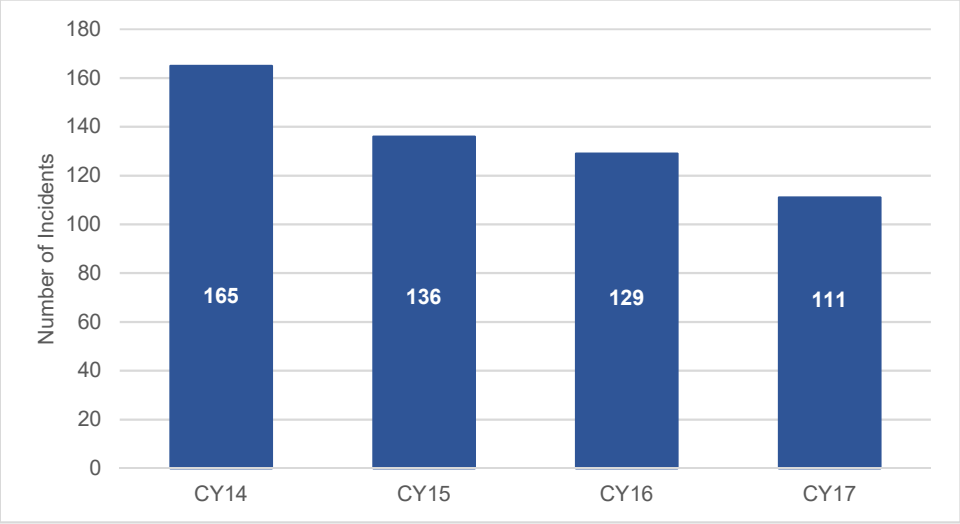
Track reconditioning is the reconstruction of the track formation (track bed) arising from a failure related to long term water ingress. Track reconditioning includes subgrade treatment, the installation of structural earthworks, a capping layer and new ballast, followed by track and drainage restoration. The purpose being to effectively manage the risk to rail operations from track geometry deterioration. Key drivers of reconditioning include track failure rates and type of failure; track performance; maintenance effectiveness intervals; and formation and subgrade configuration. This consists of formation

reconstruction work on short track sections, which are in response to immediate/localised problem areas. It should be noted that sites that are 200m or more in length are treated as capital track upgrades.

Expenditure on track reconditioning for 2017 decreased by $0.1m overall compared to 2016, with variation at a zonal level due to asset condition and the size and scope of the required work to rectify the underlying issues identified. Pricing Zone 1 increased by $3m as significant works continued throughout the zone to address poor track performance resulting from poor ballast, significant flooding events in previous two years and failed formation. Key projects included reconditioning at Kooragang $1.9m, Glennies Creek $0.8m and Maitland to Branxton $1.2m. Pricing Zones 2 and 3 decreased by $3.1m combined as performance benefited from planned reconditioning projects undertaken in 2016.

The benefit of the track reconditioning works is evidenced in the overall decreasing trend in incidence of Temporary Speed Restrictions (TSR).

Figure 3: Track Geometry Related TSRs – All Pricing Zones[1]



[1] *Coal Up Direction Only with TSR PZ1 <80km; PZ2 <60km; PZ3 <60km*

2.4 Maintenance Resurfacing

Track resurfacing (tamping) restores the track geometric parameters of top, line, superelevation and curvature by mechanised on-track machinery. Similar to ballast cleaning, the accumulated gross tonnage over the line segment determines the initial resurfacing scope. Frequency is also influenced by the environment, track structure and condition, train axle loads and speeds.

Tamping in 2017 was reasonably consistent on prior year with a decrease in cost of $0.7m overall. Pricing Zone 3 decreased by $1.1m reflecting a reduced tamping frequency required following the implementation of 30TAL, offset by a combined increase in Pricing Zones 1 and 2 of $0.4m.

2.5 Turnout Steel Component Replacement

Replacement of worn and defective turnout rail components reduces the risk of turnout rail component failure and therefore potential derailment. Sites are identified through inspection by field staff based on a condition assessment. Data for the upcoming year is submitted showing individual turnout component requirements. Individual component performance varies due to track formation, design issues, drainage and tonnage. The scope of this activity is not steady from year to year and correlates to various rates of asset wear and the complexity of the particular location. Unit costs of turnout components also vary considerably creating unit rate anomalies in the delivery of this activity.

Pricing Zone 1 costs decreased $0.4m compared to 2016 reflecting the significant projects carried out in the prior year through complex areas. Pricing Zone 2 costs remained comparable to 2016. Pricing Zone 3 costs increased by $1.3m as turnouts upgraded in the early part of the 30TAL project were approaching 5 years of age and required certain components replaced as part of the ongoing maintenance cycle to support 30TAL traffic. The works during 2017 were concentrated between Werris Creek to Dartbrook Junction.

2.6 Turnout Resurfacing

Turnout resurfacing (tamping) restores the geometric parameters of top, line and superelevation by mechanised on-track machinery. Turnouts are generally tamped on a cycle which are derived from tonnage and turnout performance, with factors such as ineffective drainage and turnout geometric design also having an impact. Some turnouts have a high tamping requirement, for example three times a year for high traffic areas around Hexham, while other turnouts may only require a tamp every two years.

Increased scope was performed during 2017 leading to a $1.3m increase in cost compared to 2016. This increase was primarily attributable to Pricing Zone 1 where 313 tamps where performed compared to 241 tamps in 2016, with an increase in cost of $1m for this zone.

2.7 Ballast Undercutting

Ballast undercutting addresses localised ballast defects on track sections (typically less than 100m in length), and involves a small crew using an excavator and cutter bar to remove a mud-hole and/or area of highly fouled ballast which impedes drainage. Ballast undercutting provides a short-term solution to mud hole removal where the track condition does not require a full track reconditioning.

Pricing Zone 1 costs increased $1.2m as significant works were undertaken throughout the year, including rectification of track geometry issues causing temporary speed restrictions at Port Waratah, Kooragang, Sandgate and Maitland. This increase was offset by a $0.4m decrease in Pricing Zone 3, while Pricing Zone 2 remained consistent.

2.8 Rail Defect Removal

Rail defect removal is the removal of surface or internal defects through replacing and welding in a new length of rail, generally 6-8 metres in length. Defects are identified through visual or ultrasonic inspections. Increased tonnage, which the HV Network has experienced over the past few years, has an adverse impact on track formation and consequently results in additional track defects requiring attention to maintain track reliability.

Rail defect removal costs in 2017 increased $1.1m compared with 2016 across the network. This was due to the extent of works undertaken in Pricing Zone 1 in high traffic areas around Sandgate to Kooragang Island ($0.9m). Pricing Zone 2 remained consistent and Pricing Zone 3 saw a decrease of $0.3m compared to 2016.

2.9 Steel Bridge Maintenance

Steel bridge maintenance relates to a range of repair and maintenance activities designed to maintain the operation and safety of steel bridge structures. Steel bridge maintenance does not have a steady year on year spend rate as it is dependent on condition and scope specific to the site requiring work. These works can range from minor to significant projects depending on the componentry being repaired.

The 2017 cost increase of $2.4m in steel bridge maintenance related primarily to works undertaken on three bridges in Pricing Zone 3. The Gap Bridge required significant repairs, with a total cost of $1.4m incurred to fix the bridge's excessive superelevation. The Quirindi Bridge and Jacob & Joseph Bridge required bridge end formation work and the installation of transition slabs on either side of bridge ends totalling $0.6m. These bridges are due for replacement in 2020. The timing of the works were critical to maintain the safety of the structures.

2.10 Turnout Grinding

Turnout grinding is the periodic grinding of turnouts to manage the wheel/rail interface and minimise whole of life costs. Turnout components interface closely with signalling assets and can impact the network reliability if left in poor condition. In determining the optimal grinding frequency, a detailed assessment and review of turnout performance is undertaken annually for all turnouts. Frequency is determined by consideration of factors including tonnage, location and condition.

Turnout grinding cost in 2017 increased by $0.6m, primarily due to works in Pricing Zone 1 which accounts for $0.5m of the increase. Within the zone, significant works were undertaken through Sandgate to Thornton ($0.5m) and Draytons Junction ($0.4m) regions.

3. LOSS ON DISPOSALS

Section 6 of the 2017 Compliance Submission sets out the process for determining the loss on disposal for assets being removed from the regulated asset base (RAB). Table 4 below summarises the loss on disposal amounts by zone relating to Major Project works and Corridor Capital projects.

Table 4: 2017 Disposals $

Major Projects	Written Down RAB Value	Net Disposal Proceeds	Net Loss on Disposal
Pricing Zone 1	-	-	-
Pricing Zone 2	-	-	-
Pricing Zone 3	-	-	-
Total	**-**	**-**	**-**

Corridor Capital	Written Down RAB Value	Net Disposal Proceeds	Net Loss on Disposal
Pricing Zone 1	4,636,314	383,441	4,252,873
Pricing Zone 2	729,704	107,174	622,530
Pricing Zone 3	2,772,413	42,264	2,730,149
Total	**8,138,432**	**532,879**	**7,605,552**

All Disposals	Written Down RAB Value	Net Disposal Proceeds	Net Loss on Disposal
Pricing Zone 1	4,636,314	383,441	4,252,873
Pricing Zone 2	729,704	107,174	622,530
Pricing Zone 3	2,772,413	42,264	2,730,149
Total	**8,138,432**	**532,879**	**7,605,552**

Disposal proceeds and asset recovery rates vary across years and Pricing Zones due to several factors including:

- The location and nature of the RAB asset being disposed and the RAB written down value attached to the applicable Segment;
- The nature of the capital projects/activities and scope being undertaken in each year;
- The nature of the asset or material being disposed of (e.g. rerailing and turnout projects have scrap rail, whilst concrete culverts have unsaleable and non-reusable scrap materials); and
- The market value for the scrap material.

For the 2017 calendar year, the overall asset recovery rate decreased by 2.2% on prior year. This was largely due to the nature of the capital projects and activities undertaken during the year, with corridor capital expenditure on rerailing activities decreasing by $20m against 2016. While arm's length market scrap steel price per tonne increased from an average of $156.94 in 2016 to $249.58 in 2017, the quantity of scrap steel disposed decreased from approximately 5,267 tonnes in 2016 to 3,058 tonnes in 2017. During 2017 there were also instances where assets were removed from the network but not replaced with like for like assets, for example removal of a turnout replaced with rail only. The cost of removing these redundant assets is reflected in the loss on disposal.

4. EXPENSED PROJECT COSTS

Expensed projects reflect the development cost of projects (as approved by the RCG) that have since been determined will no longer be required. There were no projects expensed during 2017.

5. NON-MAINTENANCE OPERATING ACTIVITIES

Non-maintenance operating activities are categorised as Network Control, Business Unit Management or Corporate Overheads.

In late 2017, the corporate Property function was transferred to the respective business units to allow for direct accountability for local property management within the business units. From 1 December 2017, the costs for Hunter Valley property are reported within Business Unit Management. Aside from this change, the organisational structure for the Hunter Valley business unit was largely consistent with the structure implemented through ARTC's transformation program in 2015/2016.

During 2017, the cost allocation method for Non-Segment Specific costs changed with the introduction of Schedule I. Accordingly, the allocation method for these costs fall into two periods:

- 1 January 2017 to 30 June 2017 (2017 H1) applied according to the cost allocation method set out in section 4.6 of the HVAU as varied 23 November 2016; and
- 1 July 2017 to 31 December 2017 (2017 H2) applied according to the cost allocation methodology prescribed in section 4.6 and Schedule I of the 2017 HVAU Variation.

The movements in non-maintenance operating costs between 2016 and 2017 are driven by a combination of:

- The change in the relative values for each allocator between Hunter Valley and Interstate;
- Increases or decreases in the underlying costs associated with Network Control, Business Unit Management or Corporate Overhead activities; and
- The change in allocation methodology under Schedule I.

Table 5 sets out a comparison of the costs for each of the non-maintenance operating cost categories. To allow for a like for like comparison with prior year information, ARTC has restated 2016 non-maintenance cost figures with the Schedule I allocators applied for the half year period from 1 July 2016 to 31 December 2016.

Table 5: Non-Maintenance Operating Costs $'000

	2016 as lodged (a)	2016 restated (b)	2017 (c)	Variance % (c)/(b)-1
Network Control	12,490	12,532	14,149	12.9%
Business Unit Management	25,830	26,226	29,781	13.6%
Corporate Overheads	18,012	20,957	18,291	-12.7%
Total	**56,332**	**59,716**	**62,221**	**4.2%**

The drivers for the cost movements are considered further in the following sections.

6. NETWORK CONTROL

Network control includes costs associated with ARTC's Network Control Centre North (located at Broadmeadow). The control centre controls the train movements for the entire Hunter Valley business unit including the coal network and non-coal segments that adjoin the coal network. The network is controlled by a series of 'Network Control Boards' (NC Boards) which manage defined areas. Twelve of the thirteen NC Boards are required to be operationally staffed 24 hours per day, 365 days a year.

Network control expenses include labour and materials associated with the delivery of the following functions:

- train control and signalling both on the main line and within the coal terminals;
- train planning and programming;
- operations and operational customer interface;
- incident management; and
- communication costs.

Network Control costs increased $1.7m compared to 2016 (as lodged) and by $1.6m against 2016 restated.

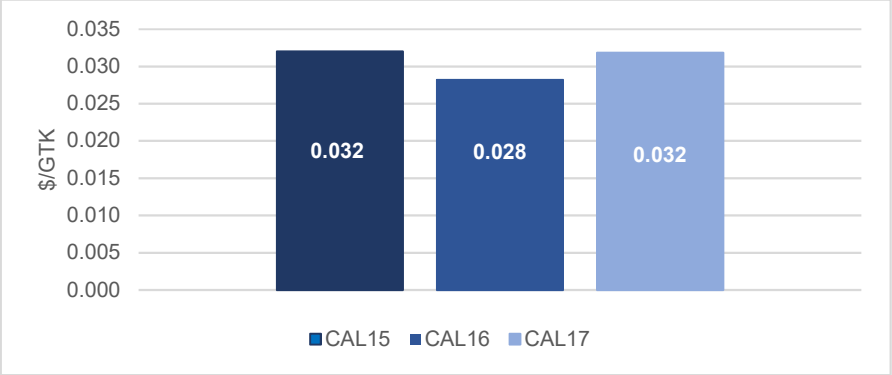
The movement in Network Control costs are primarily driven by:

- New operating costs of $1.1m were incurred in 2017 relating to ARTC's Network Control Optimisation (ANCO) project. The operating costs relate to software licence costs associated with the transition to digital tools and increased dynamic capability for the coal network. ARTC has previously highlighted that new operating cost elements would be introduced on an ongoing basis as a result of the ANCO project.
- Labour costs increased by $0.5m. This is due to the combination of annual salary increases under ARTC's Enterprise Agreement and costs associated with new trainee Train Controllers and roster changes for live run and supervisory roles. Network Control is a specialised critical business function and the trainees and roster changes will support business continuity and operational assurance for Customers during periods of unplanned absences or role vacancies within the Network Control team.

As Network Control costs are directly attributed to the Network based on the control boards, there has been no impact from the application of Schedule I other than to report office depreciation of $0.04m relating to Network Control items directly against Network Control costs for the half year period (rather than as Corporate Overheads).

As part of the review of ARTC's Operating Costs for 2015, Deloitte benchmarked ARTC's Network Control costs per GTK and found ARTC's allocation of network control costs to be comparable at $0.032/GTK to other rail networks' costs of $0.029/GTK. ARTC's Network Control costs for 2017, which included a new cost element, remain comparable.

Figure 4: Comparison of Network Control costs per GTK



7. BUSINESS UNIT MANAGEMENT

Business unit management costs comprise Hunter Valley direct costs and encompasses four functions:

- Hunter Valley Customer Service and Operations;
- Hunter Valley Asset Delivery, including the Provisioning Centres;
- Hunter Valley Asset Development; and
- Hunter Valley Management and Support.

Business Unit Management costs increased $3.9m compared to 2016 (as lodged) and $3.6m against 2016 restated.

The major drivers of the cost movements are:

- $1.4m of costs were incurred in 2017 for the development of an operating cost efficiency mechanism. This was a key element for both the ACCC and Customers for the renewal of the 2017 HVAU at the time. ARTC worked closely with a working group of Customers in developing the proposed mechanism and shared considerable information with those Customers on ARTC's cost base and drivers.
- $0.6m for the Asset Management Improvement Project which has the objective to transform the way asset related work is planned and executed. The work includes streamlined data and workflows to identify and manage known conditions and defects on the Network and improved ability to plan, schedule, monitor and record the repairs. This project will roll out across multiple years and contribute to improved reliability outcomes over time.
- $0.5m for the continued investment in improved reliability data tools and the capture and analysis of reliability data to understand potential areas at risk of a failure. During 2017 the focus was on track formation failures, rail breaks and tamping effectiveness. Work will continue to expand the Hunter Valley reliability data analytics capability and tools in subsequent years to allow for more predictive maintenance interventions and move from away reliance on spreadsheets and separate data streams.

- $0.4m increase in costs to support ARTC's continued focus on improving safety and environmental performance in the Hunter Valley. During 2017, the business unit launched the fatal and severe risk program to target behaviours to mitigate the highest risk activities, embedded a systemic incident investigation process, established a 24/7 Enviroline community enquiry service and improved the community notification guidelines and tools for Hunter Valley closedown works. These activities go to ARTC's no harm value and our licence to operate in the Hunter Valley, and by extension, our Customers.
- $0.2m increase in costs to enhance contractual and tender management and the packaging of scope for asset related works to secure resources and achieve value for money for Customers.
- $0.3m decrease due to the impact of higher Hunter Valley non-coal GTK and Train Km allocators which had the effect of decreasing the share of costs being allocated to the Network. This was predominantly related to the 2017 H1 period.

The corporate Property function was transferred to the Hunter Valley from 1 December 2017. Given this timing, there was not a material impact on costs for 2017. The full year effect will be observed in 2018.

The indicative impact of the revised overhead allocators is a $0.4m increase in costs to the Network (based on the restated 2016 values), with this mainly due to the inclusion of office depreciation for Business Unit Management related items for the half year period (rather than in Corporate Overhead).

The balance of the cost movements is attributed to minor cost movements and annual salary increases across various business unit activities.

8. CORPORATE OVERHEADS

Corporate overheads include costs associated with the following ARTC wide functions:

- Executive;
- Finance;
- People;
- Corporate Services and Safety; and
- Strategy.

Corporate Overhead costs increased by $0.3m compared to 2016 (as lodged) and decreased by $2.7M against 2016 restated.

Major drivers for the cost movement included:

- $1.0m decrease in Hunter Valley insurance costs due to favourable insurance market conditions at the time of reassessment and renegotiation of insurance.
- $0.4m decrease in Plant Charges due to a timing different between financial and calendar year plant recoveries. This offsets part of the increase in Plant Charges reported in the 2016 Compliance Assessment that arose due to timing.

- $1.0m decrease due to the impact of higher non-Hunter Valley allocator values which has the effect of decreasing the share of costs being allocated to the Network.

The change in allocation methodology has resulted in an increase to the proportion of Corporate Overhead costs being allocated to the Hunter Valley Network, which is indicatively $2.9m (based on the restated 2016 values). The revised allocators for the Corporate activities approved in Schedule I provide a closer alignment to the drivers for the underlying costs and therefore a more accurate reflection of the true share of costs for the Network.

The balance of the cost movements is attributed to minor cost movements and annual salary increases across various business unit activities.

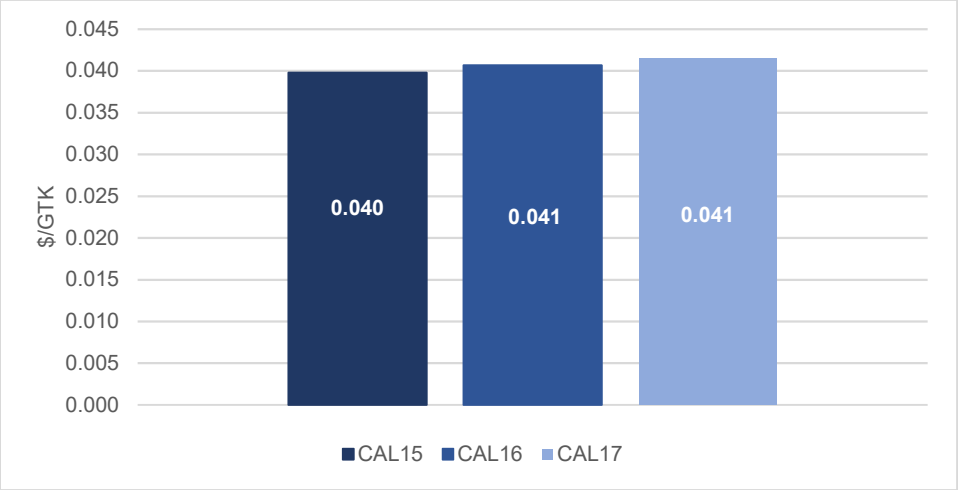
To assist with understanding the movement in office depreciation, Table 6 provides a summary of the reporting changes.

Table 6: Office Depreciation $'000

	2016 as lodged (a)	2016 restated (b)	2017 (c)	Variance % (c)/(b)-1
Network Control	-	42	107	154.8%
Business Unit Management	-	429	522	21.7%
Corporate Overheads	1,752	1,794	1,612	-10.1%
Total	**1,752**	**2,266**	**2,241**	**-1.1%**

As part of the review of ARTC's Operating Costs for 2015, Deloitte benchmarked ARTC's allocation of corporate overheads and found it to be lower at $0.04/GTK compared to other rail networks' costs of $0.06/GTK. This measure has remained consistent for ARTC from 2015 to 2017.

Figure 5: Comparison of Corporate Overhead costs per GTK



9. INCREMENTAL COSTS

Incremental costs have been calculated on the basis set out by WIK Consult[2] as approved by the ACCC in its 2013 Final Determinations and subsequent Compliance Assessment decisions. Table 7 sets out the incremental charges attracted by various groups of traffic within the Hunter Valley network.

Table 7: 2017 Incremental Costs $'000

	Maintenance and Loss on Disposal	Capital Charges	Total
Constrained Group of Mines	32,908	68,366	101,274
Pricing Zone 3 Traffics	32,477	18,233	50,710
Other Unconstrained Coal	647	-	647
Non-Coal Traffics	5,238	-	5,238
Total	**71,269**	**86,599**	**157,869**

9.1 Pricing Zone 3 Incremental Costs in Pricing Zone 1

In the interests of transparency, Table 8 sets out the Pricing Zone 3 incremental costs in Pricing Zones 1 and 3. Note that under the ACCC approved methodology, incremental capital charges are not applied in Pricing Zones 2 or 3.

Table 8: Pricing Zone 3 Incremental Costs $'000

	Maintenance and Loss on Disposal	Capital Charges	Total
Pricing Zone 1	6,248	18,233	**24,481**
Pricing Zone 3	26,229	-	**26,229**
Total	**32,477**	**18,233**	**50,710**

10. NON-COAL ALLOCATION

Under the HVAU, all traffic including non-coal traffics are required to contribute revenue sufficient to meet the Floor Limit. The Floor Limit as applies to non-coal traffics is the incremental maintenance cost attributable to them based on GTK or Train Km, as applicable to each maintenance activity.

For 2017 the non-coal incremental maintenance cost attributed to non-coal traffics was $5.2m. This amount is deducted from the costs that are allocated between coal traffics in the Hunter Valley Network, as shown in Table 2.

[2] Report available as a download from the ACCC website at https://www.accc.gov.au/system/files/WIK-Consult%20T%C3%9CV%20-%20Consultant%20report%20for%202015%20Annual%20Compliance%20%28PUBLIC%29.pdf