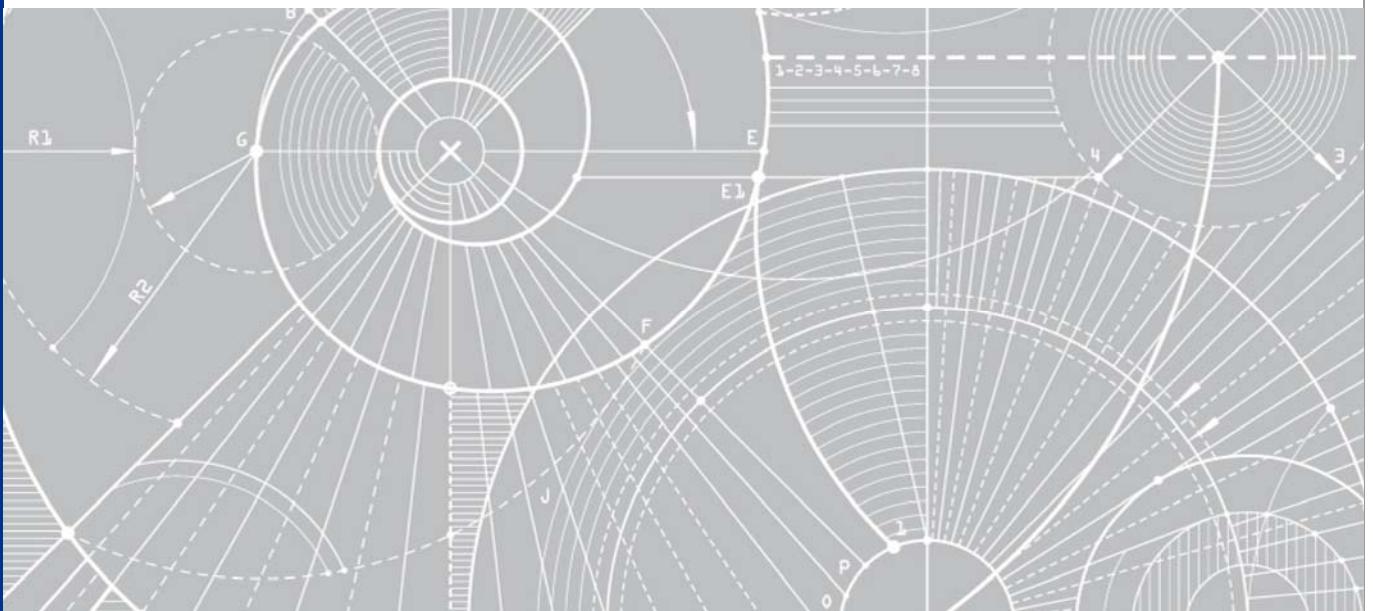


Engineering Technical Assessment of Maintenance, Operating and Capital Expenditure Forecast in Aurizon Network's Draft 2013 Access Undertaking

QUEENSLAND COMPETITION AUTHORITY

Response to Stakeholder Submissions

8 April 2014



Engineering Technical Assessment of Maintenance, Operating and Capital Expenditure Forecast in Aurizon Network's Draft 2013 Access

Document title: Response to Stakeholder Submissions
 Revision: A
 Date: 8 April 2014
 Client name: Queensland Competition Authority

Project no: QB10535
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Document history and status

Revision	Date	Description	By	Review	Approved
A	8 April 2014	First issue	HS, AH	BW	SH

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Important note about your report

The sole purpose of this report and the associated services performed by Jacobs SKM (previously known as SKM) is to provide response to comments raised in stakeholder submissions on engineering technical assessment of Aurizon Network's maintenance, operating and capital expenditure as presented in Draft 2013 Access Undertaking (UT4) in accordance with the scope of services set out in the contract between Jacobs SKM and the Queensland Competition Authority (the Authority). That scope of services, as described in this report, was developed with the Authority.

In preparing this report, Jacobs SKM has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Authority and/or from other sources. Except as otherwise stated in the report, Jacobs SKM has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs SKM derived the data in this report from information sourced from the Authority (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report.

Jacobs SKM has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs SKM for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of, Jacobs SKM's client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs SKM and the Authority.

Jacobs SKM accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

Glossary

Abbreviations and definitions used in this document (including Appendices) are listed in **Table 1**.

Table 1: Abbreviations, acronyms and terminology

Abbreviation, acronyms and terminology	Description/definition
2010 AU	2010 Access Undertaking – <i>see UT3</i>
2013 DAU	2013 Draft Access Undertaking – <i>see UT4</i>
ACCC	Australian Consumer & Competition Commission
ARTC	Australian Rail Track Corporation
AT ₁	Incremental maintenance tariff (based on 1000 gtk)
Aurizon Network	Aurizon Network Pty Ltd
CQCR	Central Queensland Coal Region
DORC	Depreciated Optimised Replacement Cost
GAPE	Goonyella to Abbot Point Expansion Project
GPR	Ground penetrating radar
gtk	Gross tonnes per kilometres
GRV	Gross Replacement Value
HVCN	Hunter Valley Coal Network
km	kilometres
MCI	Maintenance Cost Index
MEA	Modern Equivalent Asset
Mnt	Million net tonnes
MTPA	million tonnes per annum
NAMS	Network Asset Management System
NSAP	Network Strategic Asset Plan
QCA	Queensland Competition Authority
QRC	Queensland Resource Council
RAB	Regulated Asset Base
RFI	Requests for information
ROA	Return on asset
SKM	Sinclair Knight Merz
Jacobs SKM	Jacobs® and SKM have combined to form one of the world's largest and most diverse providers of technical professional and construction services across multiple markets and geographies. From 3rd March 2014 the company's branding will change from "SKM" to "Jacobs SKM". From 1 August 2014 the branding will change from "Jacobs SKM" to "Jacobs". There are no changes to the "SKM" legal entities.
STS	Specialist Track Services
the Authority	The Queensland Competition Authority
terms of reference	Terms of reference being a document that sets out the required services to be performed by Jacobs SKM under the contract between the Authority and SKM for the Engineering Technical Assessment of Maintenance, Operating and Capital Expenditure Forecast of Aurizon Network 2013 Draft Access Undertaking.
TPO	Track protection officer

Abbreviation, acronyms and terminology	Description/definition
UT3	QR Network's 2010 Access Undertaking – as approved 1 October 2010
UT4	Aurizon Network's 2013 Access Undertaking – <i>currently in draft format only</i>
UT5	2017/18 – 2020/21 Access Undertaking
WIRP	Wiggins Island Rail Project

1 Introduction

Jacobs SKM was engaged by the Queensland Competition Authority (the Authority) to provide a response to submissions on Jacobs SKM's report titled "Engineering Technical Assessment of Maintenance, Operating and Capital Expenditure Forecast", dated 21 January 2014.

The Authority has requested that Jacobs SKM provide a response to the following stakeholder submissions:

- Queensland Resources Council (QRC) "QRC UT4 Submission on Maintenance" dated 14 March 2014;
- Vale "Aurizon Network Pty Ltd – 2013 Draft Access Undertaking (UT4): Consultants' Reports – Forecast Expenditure" dated 17 February 2014;
- Asciano "Asciano Submission on QCA Cost Consultant's Reports Regarding the Aurizon Network 2013 Draft Access Undertaking" dated 6 March 2014; and
- Aurizon Network "Aurizon Network Pty Ltd – 2013 Draft Access Undertaking (2013 DAU): Response to Consultants Reports – Forecast Expenditure" dated 7 March 2014

Copies of these submissions are enclosed in this report in **Appendix B**, **Appendix C**, **Appendix D** and **Appendix E** respectively.

1.1 Background

Jacobs SKM was initially engaged by the Authority to conduct an Engineering Technical Assessment of Maintenance, Operating and Capital Expenditure Forecast for Aurizon Network's 2013 Draft Access Undertaking. A copy of the terms of reference of these services is enclosed in **Appendix A**. The findings from this review were submitted to the Authority in Jacobs SKM's report dated 21 January 2014.

Subsequent to Jacobs SKM's original engagement, the Authority requested that Jacobs SKM undertake a review of:

- Aurizon Network's proposed Maintenance Cost Index (MCI) for the UT4 period; and
- Aurizon Network's *forecast* maintenance expenditure and scope for the UT3 period compared to the *actual* maintenance expenditure and scope for the UT3 period

Additional information was made available to Jacobs SKM at the time of the subsequent engagements outlined above. This information, in particular historical scope and expenditure information for the UT3 period has therefore been used by Jacobs SKM to inform the response to stakeholder submissions. Additional information provided to Jacobs SKM for the historical maintenance scope review is outlined below:

- Attachment 4, Maintenance Cost Report 2009-10, Central Queensland Coal Region
- Maintenance Cost Report 2011/12
- Aurizon Network, Annual Maintenance Cost Report to the QCA, 2012/13

Jacobs SKM's findings for subsequent engagements are documented in the reports titled:

- Review of Aurizon Network's proposed MCI for the UT4 period
- Review of Aurizon Network's historical maintenance scope for the UT3 period

1.2 Approach

This response to stakeholder submissions draws on Jacobs SKM's review and findings documented in the report titled "Engineering Technical Assessment of Maintenance, Operating and Capital Expenditure Forecast for Aurizon Network's 2013 Draft Access Undertaking", as well as additional information provided for the subsequent engagements listed above.

Jacobs SKM's review of stakeholder submissions followed the stages below:

1. The Jacobs SKM team reviewed the stakeholder submissions in the context of the terms of reference issued by the Authority for Jacobs SKM's original engagement.
2. Where an item was deemed out of scope, this is noted and a response has not been provided. However, where additional information was provided in subsequent engagements, which allows Jacobs SKM to provide an informed response, this is addressed.
3. For in-scope items, a response is provided and any changes to Jacobs SKM's original findings are outlined. Where additional information was required to address stakeholder submissions, the information has been requested from Aurizon Network and the Authority as appropriate. Additional information requested as part of response to submissions is outlined in relevant sections of this report.

1.3 Report format

This report's structure is based on the heading adopted in relevant stakeholder submissions. A summary of the stakeholder comments are presented in a grey box and Jacobs SKM's responses are detailed below these boxes.

2 QRC's submission

2.1 Comparison of UT3 and UT4 maintenance costs

2.1.1 Return on assets, internal margins and corporate overheads

The QRC queried why Jacobs SKM's review excluded:

- corporate overhead costs
- return on asset costs (ROA)

Assessment of corporate overheads and return on assets was excluded from the scope of Jacobs SKM's engagement. Jacobs SKM's engagement included a review of direct costs only.

The QRC requested that Jacobs SKM determine if Return on Assets (ROA), internal margins and corporate overheads were included in the UT3 historical cost base and remove if required.

Jacobs SKM welcomes the opportunity to provide updated cost estimates which address the issue noted by the QRC.

Jacobs SKM issued Requests for Information (RFI) to Aurizon Network seeking historical costs for the purposes of benchmarking. To the best of Jacobs SKM's knowledge at the time, these costs were comparable. However, Jacobs SKM has since received confirmation from Aurizon Network that the historical expenditure estimates which Jacobs SKM used in the analysis are inclusive of ROA, internal margins and corporate overheads, whereas the project forecast costs aren't.

Jacobs SKM requested that Aurizon Network indicate the value of ROA, internal margins and corporate overheads in the UT3 actuals. Aurizon Network provided information to Jacobs SKM on 1 April 2014 that these costs are estimated at 8 per cent of total UT3 costs each year.

Table 2 provides updated total maintenance cost estimates for the Central Queensland Coal Region (CQCR) for the UT3 and UT4 period in millions of dollars (\$m). The UT3 figures are actual costs reported to the Authority less the 8 per cent adjustment. The UT4 costs are equal to the direct costs forecast by Aurizon Network for the UT4 Maintenance Submission.

Table 2: Updated direct maintenance costs - CQCR

Financial Year	2010	2011	2012	2013	2014	2015	2016	2017
Total Maintenance Costs	\$155.6	\$154.9	\$157.3	\$165.0	\$189.5	\$204.3	\$210.3	\$213.9

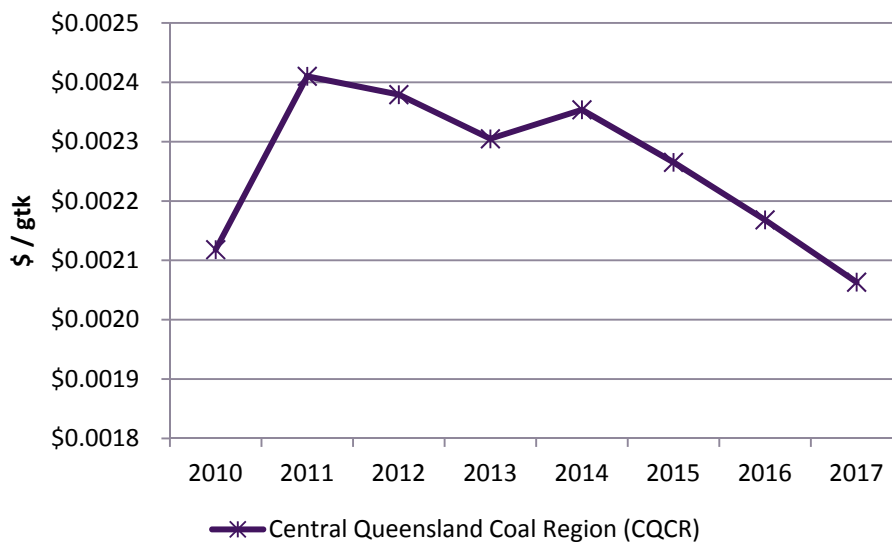
The revised unit cost of maintenance is depicted in **Figure 1**. On average, when adjusting for the issues outlined above, the unit cost for the UT4 period is still lower than the UT3 period, although the quantum of reduction over UT3 costs is far less pronounced than previously reported (the average unit cost for the UT3 period was \$0.0023 per gtk compared to \$0.0022 forecast for the UT4 period, which is 4 per cent lower on average).

There is a spike evidenced in FY14 compared to FY13. However the unit cost is only 2 per cent higher than UT3 costs for the same period and Jacobs SKM does not consider that this is of material significance to warrant further investigation of the unit costs. Notably, the unit cost for FY14 is in fact equal to the cost for FY12, since this year (FY14) was the basis of cost estimates developed by Aurizon Network. The decline in unit costs per gtk from FY15 onwards is evident of the productivity assumptions which have been factored into Aurizon

Network's forecast, These productivity assumptions may be considered as material since the scope for all maintenance activities is forecast to increase (or at least remain stable) each year of the UT4 period.

Jacobs SKM has also reviewed the unit costs for major maintenance tasks on an activity basis (for example, kilometres of rail grinding) and has found these costs reasonable. Jacobs SKM does not consider that there is any evidence from this new information to suggest that the UT4 costs are not reasonable.

Figure 1: Updated unit cost (\$ / gtk) - CQCR



Source: Jacobs SKM graph

2.1.2 Depreciation of maintenance equipment

The QRC raised concern about differing methods used to calculate depreciation expenses for the UT3 and UT4 periods. Specifically, the QRC stated the following methods in Table 1, p5:

- Reported UT3 figures - Based on book value – included in direct cost build up. No adjustment for proposed new asset purchases
- UT4 figures used by Jacobs SKM - Included in direct cost build proposed methodology based on book value with adjustments for forecast new asset replacements

The QRC requested that Jacobs SKM undertakes an audit to determine how depreciation of new equipment is built into the UT4 forecasts.

The extent to which the method of calculating depreciation for the UT4 period has changed is equivalent only to the level of detail from which depreciation was estimated. In the UT3 period, depreciation was calculated at a product group level (e.g. signalling), while a more detailed approach was taken in UT4, resulting in depreciation at the individual product level. The change in depreciation costs is therefore attributable to a more robust analysis, as well the adjustment for new asset purchases. In principle, depreciation costs have not changed since the UT3 period; however new assets which increase the maintenance equipment asset base will result in an increase in depreciation expenditure.

2.1.3 Costs funded by flood levies or insurances

QRC requested that Jacobs SKM audits the historical cost build up to determine if costs for the UT3 period include any costs funded by flood levies or insurances and exclude from UT3 figures if necessary for comparative purposes.

Jacobs SKM's scope of works does not include an accounting audit of the historical cost build up. Jacobs SKM has requested confirmation from Aurizon Network that historical and forecast costs do not include any costs associated with flood levies or insurances, and this was confirmed by Aurizon Network on the 28 March 2014. Jacobs SKM has not evidenced any information to suggest otherwise.

2.2 Maintenance cost of mechanised equipment

QRC requested that Jacobs SKM reviews UT4 maintenance costs for mechanised track equipment to determine if they are appropriately adjusted for the proposed shift to a MEA methodology

Aurizon Network's proposed shift to the MEA methodology refers to the method of calculating ROA using the Gross Replacement Value (GRV) method. A review of ROA is excluded from the scope of Jacobs SKM's review. To the best of Jacobs SKM's knowledge, the actual depreciation expense within the direct costs is based on the book value of assets.

2.3 Contingency

QRC requested that Jacobs SKM assesses how contingency has been accounted for in the cost build up and determine if the method is appropriate.

The UT4 maintenance cost forecasts are developed based on the estimated costs to complete the required activity. There are no contingencies added to those estimates. The only contingency allowances which Jacobs SKM has evidenced are with respect to:

- new plant acquisitions which had not at the time of investigation occurred; e.g. capital cost of new resurfacing consists machines; and
- new activities which at the time of submission had not yet started; e.g. the off-track ballast cleaning solution.

Jacobs SKM considers that the contingencies applied for the items listed above are reasonable given potential equipment failures and track access issues.

Jacobs SKM has undertaken a sample review of the cost build up for major maintenance tasks (ballast cleaning, resurfacing and rail grinding) and has evidenced Aurizon Network's approach to this cost build up. The maintenance cost estimate is developed on a bottom-up approach where the forecast scope of works is compared to production rates and cost per shift (machinery, labour etc.) to derive the total forecast cost for a particular maintenance task.

2.4 Accounting policy changes

QRC requested that Jacobs SKM audits accounting policies for activities such as re-railing / formation works etc. to ensure that they have had no impact on the way maintenance costs are reported.

Audit of accounting policies is not included within the scope of works of Jacobs SKM's engineering technical assessment.

2.5 Assessing the implications of economies of scale

QRC expressed concern that Jacobs SKM's analysis failed to assess whether the decrease in maintenance costs / gtk are attributable to increased throughput (economies of scale) as opposed to improved efficiency.

Table 2-14 of Jacobs SKM's reports details Aurizon Network's productivity assumptions which are measured as scope of maintenance task delivered per shift. Jacobs SKM notes it would not be appropriate to suggest that the forecast improved efficiencies occur entirely from increased throughput (gtk).

In addition, the forecast scope (example, kilometres of rail grinding) of the maintenance task is increasing, which indicates that Aurizon Network plans / forecasts to undertake a greater level of maintenance than previously but at a stable – lower unit cost per gtk. Subsequent to Jacobs SKM's initial engagement, the Authority also requested that Jacobs SKM undertakes a review of historical scope delivered compared to forecast. Based on the information available, Jacobs SKM undertook a review of:

- network ballast undercutting;
- network rail grinding (mainline and turnouts); and
- network resurfacing (mainline and turnouts).

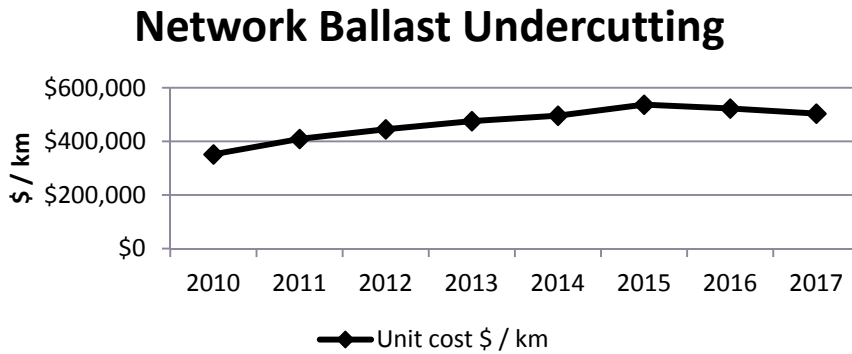
Figure 2 provides the unit costs for major maintenance activities noted above which indicates that overall the unit costs are considered to be declining. These unit costs were developed by Jacobs SKM as part of an engagement by the Authority to review UT3 expenditure and scope compared to forecast. The purpose of this engagement was to consider the impact on maintenance unit costs from deviations to planned scope. However the information can also be used to investigate the efficiency of the forecast maintenance expenditure.

The unit costs below draw on the following information:

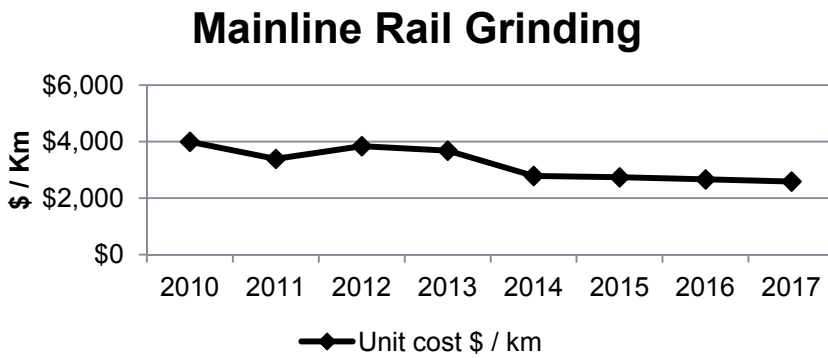
- historical maintenance expenditure compared to forecast maintenance expenditure for the financial years 2009/10, 2010/11 and 2011/12 provided by the Authority on 4 September 2013 and adjusted by Jacobs SKM to remove the impact of ROA, corporate overheads and internal margins;
- historical maintenance expenditure compared to forecast maintenance expenditure for the 2012/13 financial year provided by Aurizon Network on the 26 September 2013 and adjusted by Jacobs SKM to remove the impact of ROA, corporate overheads and internal margins;
- Jacobs SKM's estimated MCI for the UT3 period;
- forecast maintenance scope (for example, kilometres of rail grinding) for the UT4 period provided by Aurizon Network on the 17 September 2013; and
- Aurizon Network's annual maintenance reports submitted to the Authority for the financial years 2009/10, 2011/12 and 2012/13. These reports were provided by the Authority to Jacobs SKM on the 18 December 2013. The reports were provided in PDF format and Jacobs SKM has endeavoured to extract data to the greatest level of accuracy which is possible based on a review of the figures and text within the report. Therefore the actual scope (example kilometres of rail grinding) may differ to the values provided below.

The annual maintenance report for the 2010/11 financial year was not available; however, Jacobs SKM notes that the 2012/13 report provides scope data for the full UT3 period, although detailed written information is only provided for the actual reporting year.

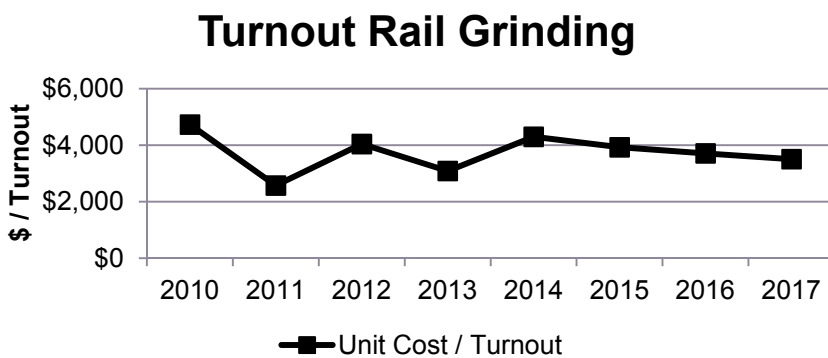
Figure 2: Unit cost of major maintenance tasks¹



More information is provided in Section 2.7.2



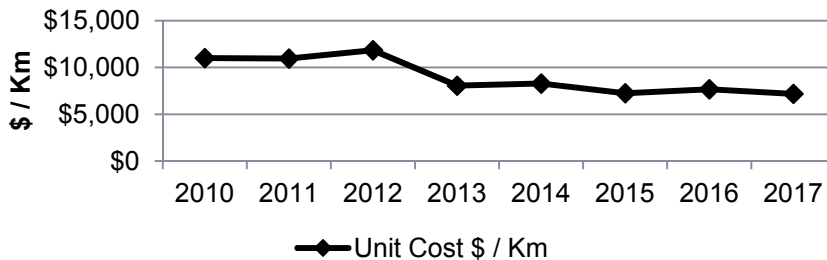
The unit cost is forecast by Aurizon Network to decline relative to the UT3 period.



The unit costs is increasing on average by \$250 per turnout and Jacobs SKM does not consider this significant to warrant further investigation, particularly since Jacobs SKM's UT3 scope assumptions are approximate only.

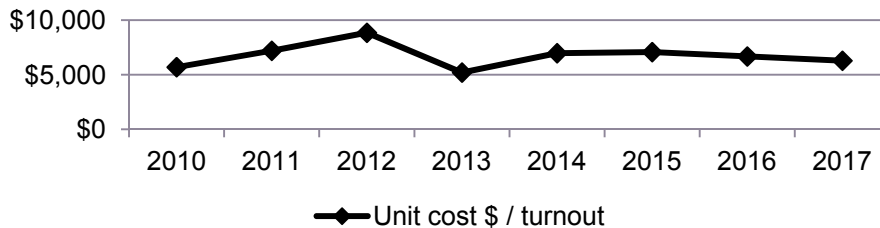
¹ Source: Jacobs SKM graph

Mainline Resurfacing



The unit cost is forecast by Aurizon Network to decline relative to the UT3 period².

Turnout Resurfacing



The unit cost is equal on average compared to the UT3 period.

Overall, Jacobs SKM considers that the decrease in maintenance costs per gtk (although not as pronounced as previously reported) is attributable to both a combination of increased throughput as well as a forecast improvement in efficiency for delivery of the maintenance task. For maintenance tasks which are understood to be increasing, the impact is marginal and the data is uncertain since Jacobs SKM has relied on data for the UT3 period which is approximate only³. In addition, the proportion of overall maintenance expenditure for these items is low. It is noted that the unit cost increase for ballast undercutting warrants further investigation, and this is provided in Section 2.7.2.

2.6 Benchmarking Aurizon Network's costs

2.6.1 Differences in methodologies

QRC raised concerns that the benchmarking exercise excluded corporate overheads and return on assets. QRC is concerned that exclusion of these costs artificially improves Aurizon Network's performance relative to the ARTC benchmark since the 'majority' of ARTC's maintenance costs are outsourced and therefore would include corporate overhead costs and other indirect costs such as return on assets.

The cost information utilised by Jacobs SKM excludes corporate overheads forecast by the ARTC. However Jacobs SKM recognises that outsourced costs would include some corporate overheads / profit margins. However, Jacobs SKM does not consider that the impact of such costs on the benchmarking analysis will be material.

Approximately 50 per cent of Aurizon Network's maintenance costs for the UT4 period will be outsourced. The proportion of costs which are outsourced for the Hunter Valley Coal Network (HVCN) is unknown.

² The historical expenditure for resurfacing was not broken down by type (for example mainline, turnout) and therefore it was necessary for Jacobs SKM to estimate the breakdown. For these purposes, the breakdown for UT4 was used as a reasonable indication.

³ Data was obtained 'by eye' from a review of graphs/figures in historical maintenance reports.

2.6.2 Comparability of benchmark costs

The QRC expressed concern that the ARTC Hunter Valley forecasts used by Jacobs SKM are not comparable to the actual cost of maintaining the Hunter Valley Network, since the forecasts have no relevance to the actual maintenance cost approved by the ACCC.

Jacobs SKM considers that the forecasts provided by ARTC represent a reasonable assumption of the costs required to maintain the HVCN and are therefore a useful comparison when appropriately normalised.

2.6.3 Benchmarking conclusions

The QRC raised a number of concerns about the benchmarking process undertaken by Jacobs SKM and Jacobs SKM's conclusions which are outlined below.

- *The QRC raised concerns about the time period of benchmarking data referred to in Jacobs SKM's report.*
- *The QRC raised concern about the zones included in the Hunter Valley Network forecast costs, requesting that more detail is provided. Specifically, the QRC was concerned that maintenance costs for Zones 1 -3 were utilised while track kilometres for Zone 1 only were utilised.*
- *The QRC raised concern that Jacobs SKM inadvertently utilised costs for the entire CQCN as representative of the Blackwater system, and that costs for the Blackwater system should not be greater than the total cost for the CQCN.*
- *The QRC raised concern about Jacobs SKM's conclusions from the benchmarking exercise and suggested that more information about differences between the HVCN and the CQCN should be outlined, including the impact on costs.*

Jacobs SKM appreciates the opportunity to address the issues in data discrepancies raised by the QRC.

Jacobs SKM agrees with the QRC's statement that total track kilometres for the HVCN are difficult to obtain. Jacobs SKM has considered the following information⁴ to investigate the total coal related track length:

- Carrington coal terminal entrance to Maitland = 27.5 km
- Maitland to Stratford = 142.5 km
- Maitland to Muswellbrook = 142.5 km
- Singleton to Wambo = 10 (approx) km
- Muswellbrook to Ulan = 248.5 km
- Muswellbrook to Werris Ck = 122.0 km
- Werris Ck to Gunnedah (Narrabri) = 129.5 km

The total route kilometres for the above are 822.5 km, which excludes:

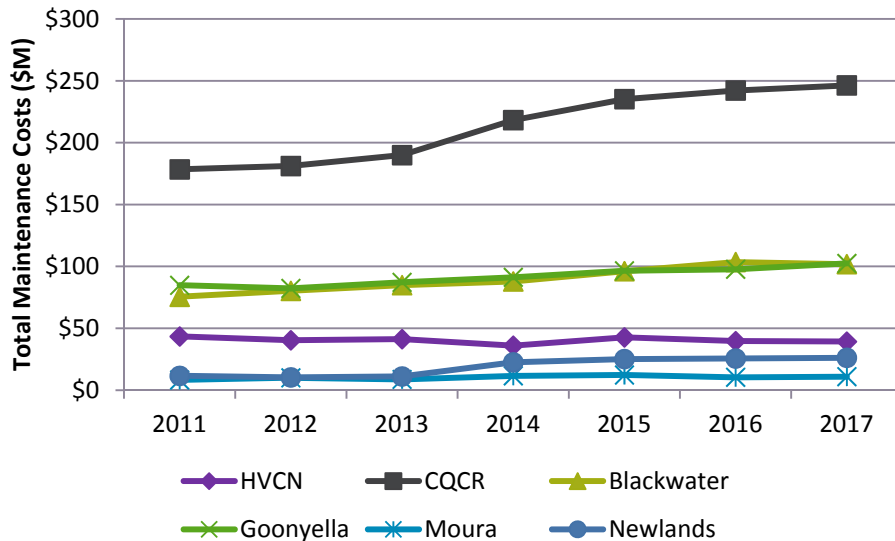
- Domestic coal lines east and south of Carrington entrance
- Private siding track including loading loops and all the track in the port terminals
- Multiple parallel tracks
- Passing loops and passing lanes

Considering the exclusions above, Jacobs SKM considers the total route length estimate of 1,336 km to be reasonable.

⁴ Source: ARTC Hunter Valley Corridor Network Diagram and Jacobs SKM industry knowledge

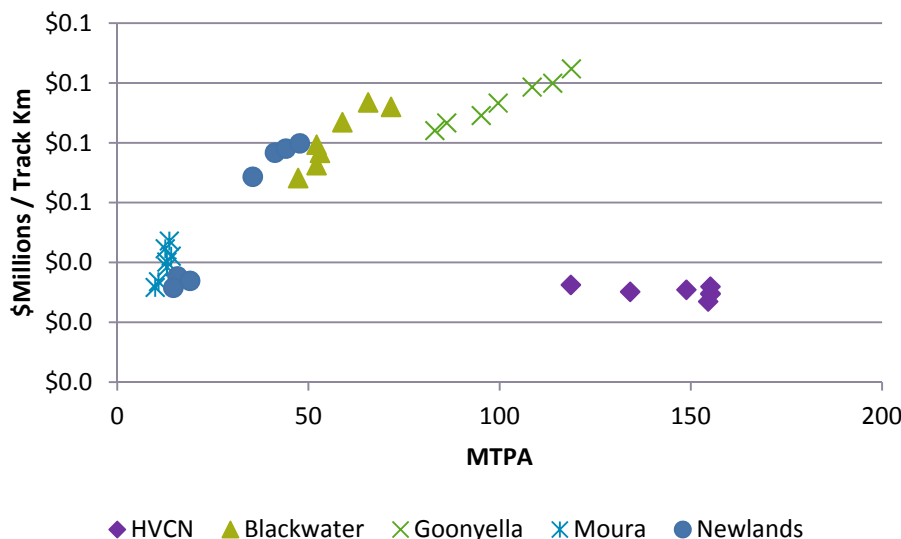
Updates to Figure 2.14 and Figure 2.16 of Attachment C in Jacobs SKM’s report are provided in **Figure 3** and **Figure 4** below. This update considers changes to track kilometres and costs for the Blackwater system. In addition, the historical UT3 costs have been adjusted to remove ROA, corporate overheads and internal margins.

Figure 3: Normalised maintenance costs – total absolute dollars



Source: Jacobs SKM graph

Figure 4: Normalised unit cost of maintenance - \$millions / track km compared to MTPA



Source: Jacobs SKM graph

Jacobs SKM utilised a quantitative normalisation approach which endeavours to account for differences in infrastructure characteristics. In addition, Jacobs SKM provided a qualitative discussion about differences between the CQCR and HVCN and their potential impact on costs. From this discussion, the following outlines the two most important factors which Jacobs SKM considers would have an impact on relative costs between the two networks:

1. regional price pressures – the HVCN is an urban network while the CQCR is dispersed across a number of regional locations. Jacobs SKM has therefore undertaken further analysis (below) which includes a regional uplift factor to allow for differences in costs between the urban HVCN and the CQCR; and
2. geographical size of the networks - the CQCR's route kilometres, although only approximately double that of the HVCN, are dispersed over a geographic location of approximately 15,000 ha compared to approximately 6,000 ha for the HVCN (i.e. the area covered by CQCR's network is approximately 3 times the size of that covered by HVCN's). Therefore as noted by Jacobs SKM in its report, there will be some cost pressures associated with (at a minimum) increased costs from travel for maintenance work, which on a costing basis, translates both to increased costs associated with reduced shift time productivity as well as accommodation and travel costs for a network dispersed over a large geographic area as opposed to a network contained in a smaller geographic area.

Jacobs SKM has therefore undertaken an additional normalisation exercise whereby the maintenance cost estimates for the HVCN are factored using a two stage approach which accounts for regional price pressures as well as the geographical footprint of the network.

The following outlines Jacobs SKM's approach to normalisation for regional price pressures.

Jacobs SKM used regional cost indices provided in the Rawlinsons Australian Construction Handbook (2011) (the Handbook) to develop the regional uplift factor for the CQCN compared to the HVCN. The Handbook provides a broad indication of cost variations within Queensland and New South Wales regions which can be applied to total project costs. For each state, the regional index is compared to a base of 100 for the relevant capital city. An example of this is provided below, which shows that the Handbook indicates that Newcastle is no more expensive than Sydney (i.e. the network can be called urban). Conversely, the regional indices indicate that Mt Isa (for example) is 45% more expensive than Brisbane

Table 3 Regional indices - Example

New South Wales	Sydney - 100 (base)	Newcastle - 100
Queensland	Brisbane - 100 (base)	Mt Isa - 145

Source: Rawlinsons (2011)

Since the regional indices are provided compared to relevant capital cities within each state, it is necessary first to convert the Sydney index to an equivalent Brisbane index. To do this, Jacobs SKM has utilised average wage rates for labourers in Sydney and Brisbane provided in Rawlinsons (2011) as a reasonable proxy for price differentials across regions⁵. **Table 4** provides the average wage rates in Brisbane compared to Sydney, which shows that prices in Sydney are slightly cheaper compared to Brisbane. Jacobs SKM has used this uplift factor (0.99) to translate Sydney prices to Brisbane prices.

Table 4 Wage rates Sydney and Brisbane

	Sydney	Brisbane
Average Labour Rate	70.63	70.00
Uplift	1.00	0.99

Source: Rawlinsons (2011), derived from pages 692 and 694

Table 5 provides regional uplift factors which Jacobs SKM has used as representative of the CQCR. Relevant regions have been selected based on a review of the location of individual systems on the CQCR compared to

⁵ A more detailed estimate could be derived utilising averages for cost inputs other than labour.

the regions provided in Rawlinsons (2011). The combined regional uplift factor is also presented, which presents the cost differential compared to Newcastle⁶.

Table 5: Regional uplift - CQCR

System	Region	Regional Uplift Factor compared to Brisbane
Moura	• Gladstone	• 115
Blackwater	• Gladstone • Emerald • Rockhampton	• 115 • 110 • 110 • Average – 111
Goonyella	• Mackay	• 105
Newlands (incl. GAPE)	• Bowen	• 110
Average regional uplift factor (CQCR compared to Brisbane)	110.25	
Combined regional uplift factor (compared to Sydney)	109.27	

Source: Jacobs SKM table based on Rawlinsons (2011)

Table 6 provides the underlying assumptions and the normalisation factor which has been applied by Jacobs SKM to account for difference in network size.

Table 6: Normalisation for network size

	CQCR	HVCN
Ha ⁷	14,823,169	5,528,237
Track Km	2673	1336
Track Km / Ha	0.00018	0.00024
Factor	134 , derived based on the fraction below: $\left(\frac{\text{HVCN Track km / Ha}}{\text{CQCR Track km / Ha}} \right) \times 100$	

The combined uplift factor for regional price pressures and network size is 146.45⁸ and is applied to the HVCN maintenance costs. **Figure 5** provides the revised costs taking into account the above. On average, after normalisation, maintenance costs for the CQCR are approximately 30 per cent higher than the HVCN. Jacobs SKM finds that this differential is reasonable on the basis of other contributing factors such as the opportunity for cost sharing of routine maintenance tasks between coal and non-coal traffic on the HVCN. It would not be

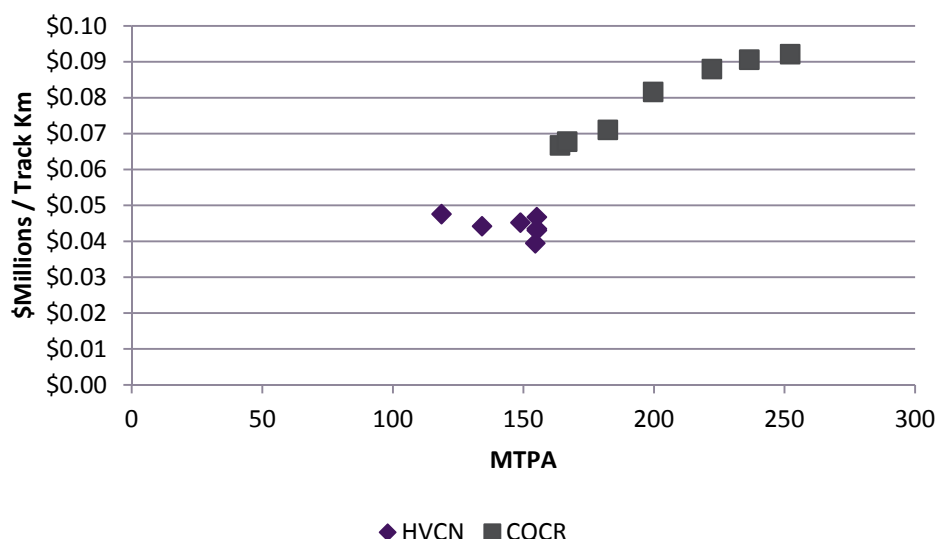
⁶ The combined regional uplift factor is derived by multiplying the wage uplift by the average regional uplift factors for the CQCR. Since the Newcastle uplift factor is equal to Sydney (base) no further adjustments are required.

⁷ Source: Jacobs SKM GIS analysts

⁸ Which represents an increase in costs of 46.45%.

reasonable to suggest that the normalisation exercise would take account of all nuances between the networks, and, as such, Jacobs SKM considers that this variation in costs between the two networks is to be expected given the overall differences between the network and therefore is reasonable.

Figure 5: Normalised unit cost of maintenance including regional uplift factor and network size uplift factor - \$millions / track km compared to MTPA



Source: Jacobs SKM graph

The QRC also raised concern about the positively correlated relationship between the cost per track kilometre and the MTPA in relation to Aurizon Network's systems which suggests that as throughput increases, so does the proportionate maintenance rate.

Jacobs SKM finds that it is reasonable that there would be a positively correlated relationship, since an increase in throughput necessitates the need for increased maintenance.

2.6.4 Reliability of benchmarking

The QRC raised concern that benchmarking may not be the most effective way of analysing Aurizon Network's maintenance costs, citing:

- a lack of appropriate benchmarks and the appropriateness of using benchmarking as a measure of efficiency; and
- the danger of self-fulfilment of maintenance tasks since both organisations would undertake benchmarking against each other.

The Authority's brief included benchmarking within the scope of works. Jacobs SKM notes that there are a number of limitations associated with benchmarking.

It is recommended that the Authority reviews the appropriateness of benchmarking as a method for informing reasonableness of costs when undertaking future reviews. It is Jacobs SKM's opinion that benchmarking, even with appropriate normalisation of benchmark costs, can only give an indication of the likelihood of inefficiencies of one regulated entity over another and therefore should inform areas for further investigation rather than be used as a tool to inform of inefficiencies per se. That said, Jacobs SKM's conclusions are not heavily weighted by the outcome of the benchmarking exercise, but rather the unit cost and scope information reviewed by Jacobs SKM.

2.7 Ballast contamination

The QRC raised the following concerns with the forecast expenditure for ballast undercutting for the UT4 period.

2.7.1 Cost structure

The QRC queried why historical ballast undercutting costs were not broken down by the four activities for benchmarking purposes.

The QRC requested an outline of what the 'off track cleaning solutions' are, how they are costed and the rationale for implementation.

Changes to the proportion of total costs by activity type between UT3 and UT4 are mostly driven by the inclusion of 'off track solutions' in the ballast undercutting task. The 'off-track cleaning solutions' include excavators, track jacks, front end loaders, a grader, tippers and a resurfacing consist (tamper and regulator). Although the unit cost of the 'off-track solution' is higher than for the RM900, it is used on aspects of the work activities where using the RM900 would not be feasible (smaller, harder to reach areas).

Ballast is trucked to site and placed in track with the front end loader and mini excavators. Pending access and conditions this operation can ballast undercut up to 15-25 metres per hour. On larger sites additional excavators with cutter bars & supporting fleet are mobilised to increase production rates.

At the time preparing the UT4 Maintenance Submission, Aurizon Network had not yet confirmed the specific off-track equipment and procurement approach. Therefore a "wet hire" allowance of \$14.9m for 165 shifts (\$90k per shift), was included in the cost build up each year, which includes ballast, fuel, plant hire, plant maintenance, TPOs and off-track logistics. Jacobs SKM considers this approach and assumption to be reasonable.

The QRC raised concerns that Jacobs SKM has not detailed how the mechanised and non-mechanised components of the ballast undercutting budget is to be planned, spent and monitored.

Further detail on Aurizon Network's assumptions for the ballast undercutting task is provided below.

- The vast majority of the mainline scope will be performed by the RM900, with an annual 4.7 km of the minor works being performed by Asset Maintenance, where the works are not suitable for the large machine; e.g. near turnouts;
- Turnout undercutting (C03) was performed by Asset Maintenance in FY12, but UT4 costing is based on this work being completed by STS (\$63k per turnout); and
- The C01 scope can be achieved by combining:
 - the existing RM900 plant capability;
 - with the acquisition of additional 18 spoil and the upgrade of 60 ballast wagons from Q1 2014/15; and
 - The acquisition of an off-track solution from Q1 2013/14⁹.
- The work itself will be performed in closures specifically assigned to the ballast cleaning function.

Apart from the above, Aurizon Network does not have plans for any other changes in undercutting consist during UT4 period.

Aurizon Network's production assumptions for the ballast undercutting task are provided in **Figure 6** below. Production assumptions were not provided for the CO2 (ballast undercutting other) scope. Jacobs SKM has reviewed the production assumptions and considers that they are reasonable.

⁹ NB: Jacobs SKM proposed an adjustment to allowable maintenance costs by reducing the scope until such time that the above acquisitions are realised.

Figure 6: Aurizon Network production assumptions – ballast undercutting

Assumptions		FY14	FY15	FY16	FY17
RM 900					
Shifts		200	177	170	180
Accommodation nights - 32 staff		200	177	170	180
Track Protection Officers - 6 staff		200	177	170	180
Ballast replacement/return mix		60% replaced; 40% returned to track			
Ballast depth	2,500 and 4,167 M ³ / km	70% standard 300mm depth; 30% of ballast @ 500mm depth			
Freight - undercutter		0	0	0	0
Freight - rail	Mix based on FY13 plan, uplifted	168	185	195	207
Freight - truck	for scope	56	62	66	69
Earthworks	Pre and post	200	177	170	180
Off Track Operation					
Shifts		165	165	165	165
Accommodation nights		Included in \$14k wet hire rate			
Track Protection Officers					
Ballast replacement/return mix		100% of material replaced			
Ballast depth	2,500 M ³ / km	100% standard 300mm depth			
Freight - rail	inc in \$14k	165	165	165	165
Turnouts (C03)					
Scope		60	80	86	88
(Implied) Shifts	\$43k vs \$63k	41	54	58	60
Accommodation nights - 9 staff		41	54	58	60

Source: Jacobs SKM graph

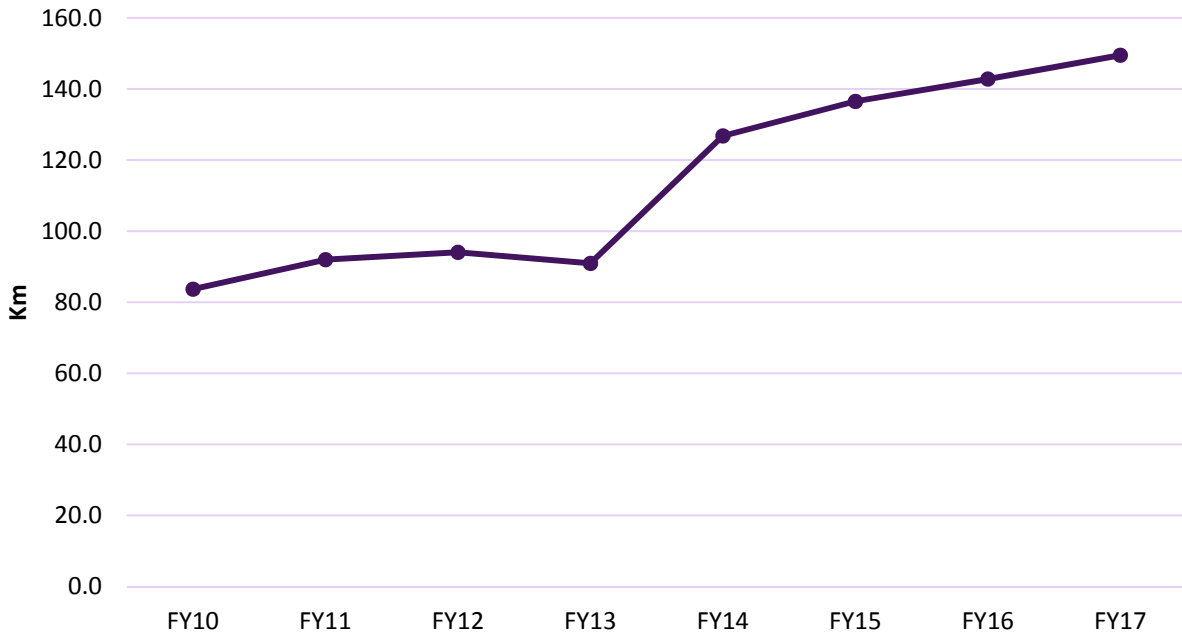
While it is not part of Jacobs SKM's scope to comment on the Authority's process for monitoring annual expenditure compared to scope, Jacobs SKM supports the general consensus in stakeholder submissions that Aurizon Network should be required to deliver the forecast ballast undercutting scope set out in UT4 and that the forecast expenditure for this activity should not be re-allocated to other uses.

2.7.2 Cost increases

The QRC queried what additional costs are being forecast in 2013/14 to drive the 34% (excluding corporate overheads and ROA) increase in costs from 2012/13.

The increase in costs for FY14 is largely attributable to an increased scope of ballast undercutting compared to FY13. **Figure 7** provides the network ballast undercutting for the UT4 period compared to the actuals for the UT3 period.

Figure 7: Network ballast undercutting - UT3 actual scope compared to UT4 forecast scope

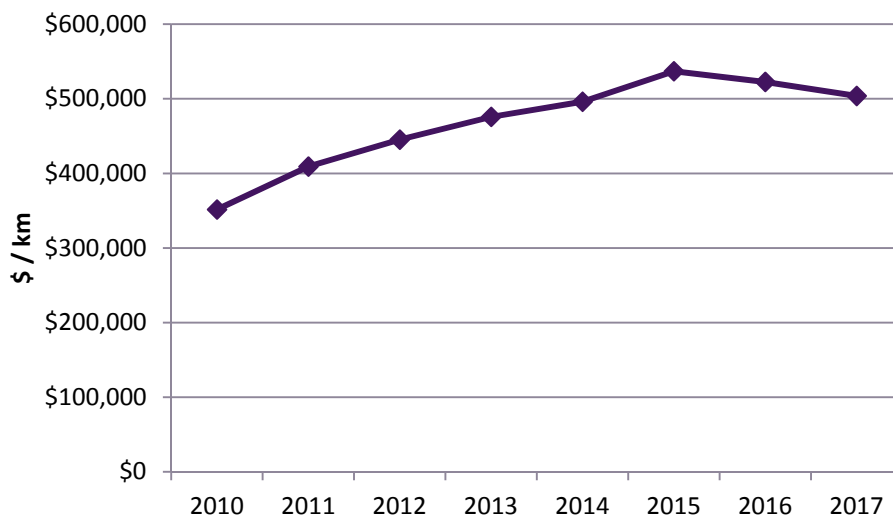


Source: Jacobs SKM graph

Figure 8 shows the unit cost of the network ballast undercutting task in \$2012, which was developed by Jacobs SKM from information provided by the Authority for the historical scope review. A revised unit cost was provided by Aurizon Network on the 28 March 2014 in \$2011 which shows the same trends.

Figure 8 shows that although the cost increase for ballast undercutting is largely due to scope increases, some of the cost increase is also attributable to an increase in the unit cost for the UT4 period.

Figure 8: Mainline ballast undercutting unit cost - Actual (UT3) compared to forecast (UT4)



Source: Jacobs SKM graph

Jacobs SKM requested additional information from Aurizon Network to justify this increase in unit cost, which was provided on the 28 March 2014. The following summarises Aurizon Network’s response, and Jacobs SKM

considers that they provide a reasonable justification for unit cost increases. However, Jacobs SKM considers that this trend should not continue, particularly since the scope should not increase significantly in the next regulatory period¹⁰:

- the increase in unit costs between FY13 and FY14 is attributable to:
 - a significant increase in scope which necessitates a step change in resourcing required, including introduction of the off-track cleaning solution (which has a higher unit cost than the RM900) for areas which are not suited to the RM900;
 - limited opportunity to dispose of spoiled ballast on the side of the track which means that additional earthworks and transport costs are incurred for disposal (over that incurred previously);
 - a reduction in the proportion of ballast that can be cleaned and returned to the track, from 49% return rate in FY12 to a forecast of 40% in UT4 due to continued ballast fouling; and
 - increasing maintenance costs for the RM900 which is now 14 years old.
- in FY15, the increasing unit cost is largely attributable to the increase in depreciation and plant maintenance costs for the new assets (24 new spoil wagons and 56 upgraded ballast wagons). In addition, the forecast assumes that it will take time to get the new expanded operation to full operating capacity.
- post FY15, the new operation is fully imbedded and the productivity improvements outweigh the additional costs, resulting in a decline in unit costs in FY16 and FY17.

Jacobs SKM notes that overall, although there is a declining unit cost in FY16 and FY17, costs are still higher than the UT3 average, which results from the reasons noted previously for FY14, specifically introduction of the off-track solution, limited opportunities to dispose of ballast, a reduction in the proportion of ballast which can be returned to track and increasing maintenance costs for the RM900.

Aurizon Network also provided supporting information showing the breakdown of unit costs by activity type which shows that:

- the unit cost for the RM900 will increase on average;
- the unit cost for ballast cleaning (minor) will decrease on average; and
- the unit cost for ballast cleaning (turnouts) will decrease on average.

This indicates that the increase in the unit cost results from the issues associated with the RM900 listed above and the introduction of the off-track cleaning solutions. This supports the information provided by Aurizon Network.

The QRC also questioned if there is any evidence that these additional costs are actually being incurred.

Jacobs SKM's review does not include the monitoring of Aurizon Network's expenditure. Actual compared to forecast expenditure is monitored by the Authority.

¹⁰ In fact it would be reasonable to consider that the unit cost for the next regulatory period would decline since the level of ballast undercutting should decline and disposal of some plant and machinery could occur or solutions such as the off-track consist could decline.

2.7.3 Under-delivery during the UT3 period

The QRC queried why there was no investigation / comment on the fact that ballast undercutting allocation was transferred to other uses in the UT3 period.

The QRC raised concern that re-allocation of budget away from the ballast undercutting cannot be justified on the basis of responsiveness because “while other activities are concerned with keeping the network operating on a day to day basis, ballast cleaning addresses a long term maintenance deficit that, if not addressed, will have significant negative impacts sometime in the future”. (QRC, 2014, p12).

Jacobs SKM's scope of works did not include investigation of under-delivery by Aurizon Network during the UT3 period, although reference has been made to this issue within its report. Jacobs SKM agrees with the QRC's statement that forecast expenditure for the ballast undercutting task should not be re-allocated to other uses. Jacobs SKM sees limited opportunity to undertake 'comparable' maintenance activities and therefore any deviations from forecast scope during the UT4 period are likely to result in cost inefficiencies.

2.7.4 Scope increases

The QRC raised concern that Jacobs SKM has not provided an assessment of the appropriateness of the proposed scope increase in the context of the technical information available in relation to the extent of the ballast fouling.

Addressing contaminated ballast is the most significant maintenance task and hence the greatest cost allowance in the UT4 maintenance cost forecast. Achievement of the ballast undercutting scope is an important objective. Jacobs SKM has indicated the ballast undercutting task is required to be high in the UT4 period due to an under-delivery of scope in the UT3 period. Jacobs SKM has highlighted that historically the debt of ballast undercutting has continued due to failure of Aurizon Network to achieve the scope that was set when the undertaking was approved.

The ballast undercutting scope is homogenous - it is output based with a consistent unit of measure; e.g. kilometres of undercutting. The cost for these products has been developed based on cost inputs for the unit of measure (whether they be labour hours, plant shifts or a combination of both), and productivity rates, including assumptions with respect to work locations, the need for travel and time on track.

At the moment ballast undercutting is in a reactive mode – Aurizon Network states that they are hoping to clear all deficit ballast fouling scope by the UT5 period. This would be achieved by the procurement of new enhanced machines, and by the results gained from veneering improvements along with the introduction of Ground Penetrating Radar (GPR). Over a short period of time, such as the undertaking period, it is reasonable to expect that ballast treatment work will not be in step with tonnages because ballast treatment has longer term impacts. Ballast treatment should be manifesting after the tonnage).

Aurizon Network proposed forecast of approximately 136 km of ballast undercutting scope in a given year is deemed reasonable in enabling it to complete all UT3 deficit ballast undercutting scope, complete the recently authorised Ballast Upgrade Programme, and ensure both statutory and contracted obligations for rail safety, current asset condition, and current asset performance requirements are met. Jacobs SKM is of the opinion that the Ballast Cleaning scope could lessen if less tonnages was proposed due to the less coal dust falling on the track.

Jacobs SKM also noted that Aurizon Network has committed to a suite of logistical support enhancements and processes to its current ballast undercutting programme which will enable the delivery of the full maintenance scope for UT4 (e.g. Network Asset Management System (NAMS), Coal Loss Management Plan, Ballast Veneering, GPR, etc.) The introduction of the changes now will only be of value to stakeholders when their impact flows through to a lower cost and more efficient maintenance task. These processes are currently being rolled out across the CQCR network. Jacobs SKM suggests a reasonable timeframe should be allowed for benefits to be realised from these processes will be the first quarter of UT5 period.

The Maintenance effort has been determined by analysing current ballast fouling rates. These fouling rates have been determined in terms of % PVC per 100 Mnt of coal carried. These rates range between 1% and 15% with an overall average of about 4.5%. This average equates to a Ballast Undercutting Machine Product frequency for Network Strategic Asset Plan (NSAP) of 600 Mnt. This compares to a Ballast Undercutting Machine Product frequency of 950 Mnt (=1600 Mgt) if coal fouling was not an issue, that is the natural degradation of the aggregate.

The method for determining the long term forecast for Ballast Undercutting Machine work relies on ballast fouling rates for each km of the track and applying these to the forecast coal tonnages for UT4. Beyond this period a 5% pa tonnage increase is applied. Where rates of fouling are not able to be determined because of insufficient historical information or other reason a default average of 5% PVC per 100 Mnt is applied.

To better manage the problem of ballast fouling with regards to ballast undercut planning, Aurizon Network has analysed 1170 km of GPR data, to ascertain the principal contributors to ballast fouling, on the CQCR which represents the most highly trafficked tracks on the four systems including the North Coast Line, Central Line, Rocklands to Burngrove, Hay Point to Goonyella and the Oaky Creek Branch. This represents about 80% of the ballast cleaning requirements of the network. This additional GPR technical information will assist in the planning of future ballast undercutting requirements.

Jacobs SKM also notes a significant difference in the way Aurizon Network undertakes ballast treatment works to that of the ARTC. Aurizon Network undertakes ballast undercutting to formation level (as per the US class 1 railroads), whereas ARTC does not. ARTC undertake ballast undercutting to a site specific pre-determined depth following data analysis and pot-hole investigations. Aurizon Network also has a requirement to remove all contaminated ballast from site whereas ARTC is able to spoil to the bank. Despite these differentials and additional effort required for Aurizon Network its cleaning effort should last between 8 and 10 years compared to ARTC's 4 year cycle.

It is also anticipated that the newly created Coal Loss Management Plan will result in a reduction of the rate of ballast contamination. The anticipated net effect of these controls is predicted to be in the order of a -10% reduction in ballast fouling. However, given the increased tonnage forecast for the UT4 period and the existing deficit Jacobs SKM finds that coal fouling will continue to be an issue requiring to be addressed by the methods employed by Aurizon Network for the foreseeable future but at a lower rate.

2.7.5 Requests for the Authority

The QRC requested that the Authority:

- *reviews the actual spend on ballast undercutting in 2013/14 to determine if it is consistent with the forecast spend;*
- *details the resources that are forecast to be devoted to the ballast cleaning task in each year of UT4, the cost of these resources and the expected output of these resources; and*
- *asks Aurizon Network to report on the actual cost of these resources and the scope they deliver on a monthly basis. Any unspent budget should be netted off their allowance in future years*

The above points were requested by the QRC to be addressed by the Authority. For informational purposes, Jacobs SKM has outlined production assumptions in **Figure 6** which were provided by Aurizon Network.

2.7.6 Monitoring of operations

The QRC raised concerns that Jacobs SKM has not detailed how the efficiency of operations should be monitored over time given the lack of available benchmarks.

Jacobs SKM's engagement does not include development of a process for monitoring efficiency of operations. In the simplest terms, Aurizon Network should be assessed against forecast scope compared to actual scope

delivered, since inefficiencies in historical operations have been largely a result of under-delivery of scope while expenditure was close to forecast.

2.8 Other issues

2.8.1 Ongoing monitoring of Aurizon Network's maintenance spend and performance

The QRC made a series of recommendations for the Authority's consideration as to the level of reporting which Aurizon Network should be subject to throughout the regulatory period, as well as the level of industry involvement.

Jacobs SKM agrees in principle with the QRC's proposals, but believes this is a matter which should be decided by the Authority following a separate investigation which considers:

- available evidence (including Jacobs SKM's historical scope review);
- the value of the benefits proposed by QRC from increased reporting; and
- the increased regulatory burden, for which costs are borne by users. This includes direct costs incurred by the Authority as well as regulation costs incurred by Aurizon Network which are eventually passed on to users.

Jacobs SKM's report titled "Review of Aurizon Network's Historical Maintenance Scope for the UT3 period" provides the Authority with useful information about the implications of diverting maintenance budget on maintenance task efficiency.

2.8.2 Non coal traffic

The QRC raised concerns that Jacobs SKM's report does not adequately address the impact of non-coal volumes on the network, considering:

- *the forecast non-coal volumes;*
- *the proposed pricing structure for non-coal traffic; and*
- *how revenue from non-coal traffic will be accounted for.*

Jacobs SKM's review provides an assessment of the reasonableness of maintenance costs for the UT4 period and the Authority's brief indicates that in assessing the reasonableness of costs the consultant should only consider costs as they relate to coal volumes.

The scope of works does not include consideration for pricing mechanisms and monitoring of revenue for any users.

2.8.3 Pricing of internally procured services

The QRC supports Jacobs SKM's recommendation that internally procured services should be subject to a cost-benefit analysis to determine if cost inefficiencies exist from internal procurement practices. The QRC makes a series of recommendations for the Authority's consideration to identify the scale of the issue.

For informational purposes, the proportion of internally procured resources forecast for the UT4 period is provided in **Table 7** below.

Should the Authority wish to undertake further investigations, Jacobs SKM recommends that both financial impacts as well as network reliability impacts are assessed, since it is likely that use of internally procured resources enable a greater degree of certainty of resources.

Table 7: Percentage breakdown of key costs

	FY14	FY15	FY16	FY17
Internal labour and associated on-costs	42%	39%	38%	38%
Externally procured resources	51%	52%	52%	52%
Depreciation	7%	9%	10%	10%
Total	100%	100%	100%	100%

Source: UT4 Maintenance Submission, p114, Table 23

2.8.4 Change to gross replacement value approach to determining asset charges

The QRC expressed concern that the following statement in Jacobs SKM's report is confusing for readers:

"SKM found that adjustments to the RAB in the context of a DORC evaluation may be required since the proposed maintenance strategy (in particular, the level of ballast undercutting and the transition to a planned preventative maintenance regime) would reasonably be expected to leave the CQCR in a better state than during the UT3 period".

The QRC also highlighted a series of review points for Jacobs SKM's consideration relating to the proposed shift to the GRV approach to asset charges.

As noted by the QRC, the proposed shift to the GRV pricing approach is applicable to asset charges only, which are excluded from Jacobs SKM's review. Jacobs SKM notes that there was some level of confusion associated with reference to the GRV approach within its report. Given asset charges are not within the scope of Jacobs SKM's review, no further comment has been provided on the proposed review points, although it is recommended that the Authority seeks further advice on this matter.

In reference to the quote from Jacobs SKM's report which the QRC requested more clarity on, the Authority's scope of works included commentary on whether adjustments to the value of the RAB may be required in the context of a DORC valuation. Jacobs SKM considers that the transition to a preventative maintenance strategy may prolong the useful life of assets which in turn has implications for asset valuation. Jacobs SKM scope of works did not include providing a quantitative assessment of adjustments to asset valuation.

2.8.5 Double counting of costs

The QRC raised concerns that Jacobs SKM's review of Aurizon Network's approach to avoid double counting of costs was not sufficient. The QRC indicated that Jacobs SKM should consider:

- how the costs which are to be claimed through Aurizon Network's proposed corporate overhead allowance were excluded from the cost build up;
- how the maintenance costs of the mechanised maintenance fleet were adjusted for the MEA/GRV asset valuation approach; and
- how revenues accruing to, for example, the rail grinding operation from work carried out outside the CQCN (i.e. for Queensland Rail) were accounted for in the forecasts.

The information provided to Jacobs SKM was for coal volumes only as per the Authority's brief. Jacobs SKM has not undertaken a review of non-coal forecasts. However Jacobs SKM has reviewed samples of the process by which the maintenance cost forecast for the UT4 Maintenance Submission was derived and is satisfied that the bottom up pricing approach minimises the risk of double counting.

Aurizon Network's total maintenance cost forecast is derived based on a planned scope (for example, kilometres of rail grinding) for which production assumptions are assigned (example, kilometres of scope achieved per shift) and relevant cost are assigned, including labour, fuel, transport etc. Since the maintenance scope is developed for coal volumes, Jacobs SKM is satisfied that the forecast does not include works carried out outside the CQCR.

Jacobs SKM is also satisfied that this process means that corporate overheads are excluded from the direct cost build-up. In the event that a maintenance item / task is outsourced, this would inherently include a corporate overhead component however this is normal across operators and Jacobs SKM is satisfied that there are no additional overheads accounted for the in the cost build up.

Jacobs SKM has not undertaken a review of the MEA/GRV valuation approach since this approach applies only to return on assets and not direct maintenance cost estimates. The method of calculating depreciation costs has remained unchanged since the UT3 period.

The QRC also expressed concern that Aurizon Network's attempt to present maintenance costs as a standalone rail provider could result in incremental earnings from additional work for a variety of potential clients including private sidings, Queensland Rail capital works or unplanned flood or derailment works that are to be funded by insurance payments.

The QRC raised concern that "to the extent that the pricing of these additional services includes an asset charge, Aurizon Network is effectively 'double dipping'. On the other hand, if the pricing of these services does not include a full asset charge, Aurizon Network is in effect cross subsidising these activities." (QRC, 2014, p18).

Jacobs SKM agrees with the QRC's concerns about incremental earnings which could occur through forecasting costs which would apply for a standalone rail provider, although it is noted that this is the method which is required by the Authority. Jacobs SKM recommends that the Authority further investigates this issue.

Jacobs SKM also considers that there is potential for cross subsidisation or 'double dipping' of asset charges, however Jacobs SKM's review does not include asset charges and therefore no comment has been made on this issue, although it is recommended that the Authority further investigate the issue.

Jacobs SKM does not consider that the maintenance cost forecasts are impacted by unplanned flood or derailment works, which are funded through insurance payments. Jacobs SKM has not evidenced any information which would suggest that the maintenance costs include works funded by insurance payments.

2.8.6 Resurfacing

The QRC recommended that costs associated acquisition with increased resurfacing scope which is only achievable with new resurfacing machines is removed from the cost forecast to facilitate an adjustment of costs at the time the equipment is actually purchased.

Should the Authority wish to consider an adjustment to mainline resurfacing costs, it will be necessary to adjust both the actual scope forecast as well as the production assumptions.

Figure 9 provides Aurizon Network's assumptions on capability of existing mainline tampers for FY14, which shows the capability prior to the acquisition of any new tampers. The track time per shift was based on the average from FY12.

Figure 9: Capability of existing mainline tampers

Existing Mainline Tampers	FY14
Total Shifts (year)	200
Track Time (hrs / shift)	3.71
Production per hr	0.550
Production per machine	408
Number of machines	5
Total Capability	2,041

Source: Aurizon Network, provided to Jacobs SKM for the UT4 Maintenance Submission review

Aurizon Network's forecast mainline resurfacing scope during the UT4 period is provided in **Table 8** below. Analysis of the data contained in **Table 8** reveals that the existing mainline tampers have the capability to deliver the forecast scope for FY14 and FY15, but at a lower production rate than the new mainline tampers. From FY16 onwards, the existing mainline tampers cannot deliver the forecast scope.

Table 8: Forecast mainline resurfacing scope

FY14	FY15	FY16	FY17
1,731	1,943	2,077	2,226

Therefore, if it is assumed that there is no acquisition of new machines, and that the existing mainline tampers are allowed to reach maximum capability throughout the UT4 period, the scope shown in **Table 9** would apply.

Table 9: Adjusted mainline resurfacing scope for existing mainline tampers

FY14	FY15	FY16	FY17
1,731	1,943	2,041	2,041

Figure 10 details Aurizon Network's assumptions on machine capability for both the existing and new mainline tampers, and the corresponding year, which can be utilised to consider the change in costs which would apply if the scope is delivered with existing mainline tampers.

Figure 10: Capability of existing and new mainline tampers

New Mainline Tampers	FY14	FY15	FY16	FY17
Number of machines	-	2.25	5	5
Total Capability	-	2,003	4,452	4,452

Existing Mainline Tampers	FY14	FY15	FY16	FY17
Number of machines	5	2.75	-	-
Total Capability	2,041	1,122	-	-

Source: Aurizon Network, provided to Jacobs SKM for the UT4 Maintenance Submission review

For FY14, no change in costs would be expected since it is evident that Aurizon Network has not factored new mainline tampers into the FY14 production assumptions. The unit cost for FY14 is \$8,282, which is the unit cost which would apply assuming a reduced scope and no acquisition of new mainline tampers. The total revised costs for mainline resurfacing would therefore be as below. Due to the worsening production rate, the total cost would exceed the forecast cost provided by Aurizon Network (approximately \$60 million over the UT4 period).

Therefore it is recommended that no adjustments are applied to resurfacing expenditure on the basis that acquisition of new machinery has not yet occurred.

Table 10 Revised mainline resurfacing scope and cost

	Scope	Total Cost	Unit Cost
FY14	1,731	\$14,336,821	\$8,282
FY15	1,943	\$16,092,688	\$8,282
FY16	2,041	\$16,904,363	\$8,282
FY17	2,041	\$16,904,363	\$8,282
Total	7,756	\$64,238,234	

2.8.7 Imposition of a X-factor

The QRC rejects Jacobs SKM's findings that the imposition of an X-factor is no longer appropriate on the basis that:

- the productivity improvements for resurfacing, ballast undercutting and rail grinding are presented in terms of unit rates without detailing the cost; and*
- the mining industry has implemented a number of cost cutting measures which reflect a slowing of demand for coal which should be reflected in a declining cost base for the UT4 period. Examples provided include accommodation, hire equipment, specialist labour services and skilled labour.*

Jacobs SKM maintains the position that imposition of an X-factor is not appropriate. The unit rates provided in Table 2-14 of Jacobs SKM's report detail the assumptions made by Aurizon Network about the scope of maintenance which can be undertaken per shift. Where the unit rate improves, this translates to a direct forecast cost saving for the maintenance task. In this regard, it is important to note that efficiency of operations over time should be measured on a unit cost basis, not a total cost basis, since it would not be reasonable to assume that scope could increase but that the total cost should decrease. Likewise, a decline in total cost does not necessarily indicate improved efficiency if the scope of maintenance activities also declines.

Jacobs SKM does not consider that imposition of an X-factor necessarily mimics efficiency gains which would occur in a competitive market, and that imposition of an ongoing multiplier could be unsustainable and could result in further under-delivery of scope. Pricing pressures faced by competitive markets should be addressed within the MCI while productivity improvements are evidenced in assumed increase in production rates. However, it is important to note that resources have a fixed potential which can only be increased through acquisition of new/improved machinery and or additional labour, which will have associated costs. Therefore Jacobs SKM does not consider that it is appropriate to assume that an X-factor could be applied over a prolonged period of time.

Jacobs SKM has evidenced Aurizon Network's spreadsheet cost build-up which shows how improved productivity assumptions are factored into the cost forecast. In this regard, it becomes important to consider whether forecast production rates are achievable, since, if not, the actual costs incurred will be higher than forecast or the scope delivered will be lower than forecast.

Jacobs SKM considers that the forecast productivity improvements are achievable, and that Aurizon Network should be held accountable for delivering the forecast scope of works during the UT4 period (aside from circumstances which are clearly out of their control such as extreme weather events). In this regard, should such events occur, Jacobs SKM recommends that the Authority review the extent to which the events could

reasonably be expected to affect delivery of the planned maintenance task, and whether adjustments to the allowable revenue would be warranted for significant under-delivery.

Jacobs SKM also notes the QRC's position about deflation in mining and mining related industries, however any deflationary impacts would be captured within the MCI and therefore the cost base from which the unit rates are forecast is not a relevant factor.

2.8.8 Review of incremental maintenance tariff component

The QRC requested that more clarity is provided about Jacobs SKM's conclusions surrounding the AT₁ reference tariff.

Jacobs SKM's conclusions are outlined below:

1. Jacobs SKM provided a series of AT₁ reference tariffs for the Authority's consideration, for a number of maintenance cost scenarios. This approach was adopted since it would be inappropriate for Jacobs SKM to assume the Authority's position on maintenance without the Authority's determination. Jacobs SKM presented AT₁ reference tariffs for three scenarios, from which the Authority may select an AT₁ reference tariff. These scenarios are outlined below:
 - a. AT₁ reference tariffs for Aurizon Network's proposed maintenance cost and proposed volumes
 - b. AT₁ reference tariffs for Aurizon Network's proposed volumes but with a reduced scope of ballast undercutting as per Jacobs SKM's recommendation
 - c. AT₁ reference tariffs for reduced volumes (as forecast by Energy Economics) and Jacobs SKM's resulting recommendations for reductions in maintenance costs.
2. Jacobs SKM recommends that under all scenarios, the AT₁ reference tariffs are indexed with the Authority's approved MCI. Subsequent to Jacobs SKM's initial engagement, Jacobs SKM provided updated AT₁ reference tariffs to the Authority in FY12 dollars, since the MCI had not yet been established. In addition, Jacobs SKM's updated reference tariffs included a combined maintenance scenario where total maintenance costs had been reduced in line with the Energy Economics' forecast and the ballast undercutting scope has been reduced as per Jacobs SKM's recommendation.
3. Jacobs SKM recommends that if the Authority does not pursue further investigations as to the appropriateness of the AT₁ reference tariff, that one of the scenarios above are adopted.

Jacobs SKM is not aware of what the Authority's position is on the recommendations above and which maintenance cost scenarios will be adopted.

The QRC raised concerns that Jacobs SKM's analysis relies heavily on Aurizon Network's maintenance cost forecasts which the QRC considers are likely to be revised following review.

Jacobs SKM has provided an estimate of AT₁ reference tariffs for a number of scenarios which include adjustments to the proposed maintenance cost. It is important to recognise that where a total maintenance cost is approved, this indicates that this cost represents an efficient maintenance cost for the network at a given level of volumes. Estimating the slope of the cost curve is an appropriate indicator for the variable cost. While there are limitations associated with the method, these have been outlined in the report and Jacobs SKM finds that the approach utilised is reasonable to estimate a variable cost tariff.

The QRC raised a concern that Jacobs SKM did not provide appropriate evidence to suggest that the Hunter Valley Coal Network (the benchmark comparator) is an optimally efficient company.

Jacobs SKM's conclusions and recommendations for the estimated AT₁ reference tariff do not rely heavily on the outcome of the benchmarking exercise. Jacobs SKM has drawn conclusions from data from a number of sources, including engineering judgement, about whether Aurizon Network's proposed values were appropriate and these are documented in the report. The appropriateness of Jacobs SKM's method for proposing an alternative has been discussed above.

It is not within Jacobs SKM's scope of works to assess the efficiency of the HVCN.

The QRC raised concerns that the role of the AT₁ tariff has changed significantly with the move to annual tonnage forecast resets.

The QRC recommended that the Authority considers any changes to (and even the possible removal of) the AT₁ reference tariff in the context of other proposed changes to monitoring and modification of the maintenance cost allowance on an annual basis.

Jacobs SKM's scope of works did not include assessing the role of the AT₁ reference tariff. Jacobs SKM's scope of works included assessing the reasonableness of the value proposed by Aurizon Network, and where the proposal was not found reasonable, to propose an alternative value.

2.9 Technical advice on the trade-off between asset renewals and maintenance

The QRC proposed a number of recommendations for the Authority's consideration, which are outlined below:

"Prior to finalisation, the QRC suggests that the QCA:

- Asks Aurizon Network for more examples of current renewal projects which are designed to provide a capital related solution to a maintenance problem.*
- Assesses Aurizon Network's indicative renewals expenditure in the context of the actual spend by asset class. Where there are significant differences, request Aurizon Network to explain why it expects expenditure in that asset class to increase significantly in the future.*
- Ask Aurizon Network to provide a timetable for the introduction of the more planned approach to asset renewals that SKM has noted on a number of occasions (for example, refer to Section 4 of SKM's report).*
- Replace the indicative allowance for 2013/14 with a specific estimate of projects that are actually being completed. A more specific estimate for 2014/15 should also be developed." (QRC, 2014, p22)*

Jacobs SKM agrees that there would be merit in a greater level of detail being provided about specific renewal projects prior to approval. However, it should be noted that the actual capital projects will be subject to a prudency review by the Authority prior to approval, and therefore the level of detail required at this stage is lower than what would be required for prudency assessment of individual projects.

Jacobs SKM has therefore focussed their review on the extent to which the level of expenditure is reasonable, and hence as to whether Jacobs SKM considers that the expenditure proposed is reasonable in the context of the value of the RAB and in comparison to the forecast maintenance expenditure.

The QRC also raised concern that Jacobs SKM did not undertake a benchmarking exercise against historical asset renewal classes.

The QRC also raised concern that the indicative renewals expenditure includes \$20m on telecoms assets (17% of the total), but the telecoms assets make up a very small proportion of the RAB.

Jacobs SKM's scope of works does not include a benchmarking exercise for forecast asset renewals. Jacobs SKM is only able to undertake a review of the information available, and in this circumstance, the information provided was a typical breakdown of asset renewals expenditure by asset class. In this regard, Jacobs SKM focussed on the level of capital expenditure, and not the breakdown proposed.

Given that the asset renewals expenditure provided to Jacobs SKM is indicative only, Jacobs SKM does not consider that a historical benchmarking exercise by asset class would add value to the assessment.

With regards the proportion of telecoms assets mentioned, Jacobs SKM does not consider that the breakdown of renewals in the context of the proportion of the RAB is important to the extent that the renewal is undertaken for end of life assets, which would likely be the case for any renewals of telecom assets. For circumstances such as these, Aurizon Network should be required to demonstrate that the specific assets have reached end of life, and that no adjustments have been made to assumptions about useful life which are not appropriate. For example, Jacobs SKM recommended that the Authority requires Aurizon Network to re-instate a useful life of 40 years for power distribution assets.

The QRC suggested that Aurizon Network should point to projects which are planned to address a specific maintenance deficiency.

Jacobs SKM agrees that Aurizon Network should identify projects which are planned to address specific maintenance deficiencies, but that this should be undertaken as part of the prudency review of individual projects. Jacobs SKM considers that individual projects would likely comprise of a mix of renewals for end of life assets as well as projects planned to address a specific maintenance deficiency, although Jacobs SKM has not been provided information about specific renewal projects for this review.

Overall, while Jacobs SKM finds that Aurizon Network's discussion in the UT4 Maintenance Submission about the trade-off between asset renewals and maintenance expenditure is valid, Jacobs SKM does not consider that the level of asset renewals would be significant such to have a significant impact on the maintenance cost forecast. However, this is not to suggest that individual projects should not be assessed to consider the trade-off between maintenance and renewals expenditure, and Jacobs SKM has evidenced that this process occurs through Aurizon Network's Stage Gate Process. It is recommended that the Authority require that this process is undertaken for all prudency reviews where a project is identified to address a specific maintenance deficiency. In addition, since the maintenance cost forecast is pre-approved, Aurizon Network should be required to demonstrate how maintenance funds which may have been attached to the specific asset will be re-allocated across the network.

The QRC raised concern that a detailed breakdown of asset renewals expenditure is unknown, since Jacobs SKM's report notes that the renewals strategy for the UT4 period has been informed by improvements in the ability to recognise when an asset has reached the end of life as well as a greater understanding of failure modes and drivers of asset failure.

Jacobs SKM reports that this statement was provided by Aurizon Network, it was not a conclusion drawn by Jacobs SKM. Jacobs SKM's conclusions are documented in the report. However, Jacobs SKM does consider that Aurizon Network is undertaking measures which will provide enhanced information about network condition which will inform identification of end of life assets. In addition, the Asset Management Strategy has been designed to provide intervention levels, on a tonnage or timeframe basis as appropriate, to address potential asset failure.

The QRC would like to understand how Jacobs SKM has concluded that expenditure will be appropriately allocated to highest and best use and will be found prudent with regard to scope standard and cost given the extent of their previous comments on the potential limitations of the Stage Gate process.

Jacobs SKM's comments about the limitations of the Stage Gate process refer to the method by which the projects are identified. Once identified, the Stage Gate process would ensure that projects are not implemented which are not prudent with regards to scope, standard and cost. These factors are also subject to review by the Authority for individual projects.

2.10 Review Aurizon Network's ability to deliver its asset renewals work program

Jacobs SKM based this assessment of reasonableness on reviews of Aurizon Network's weekly planning summary. Jacobs SKM consider Aurizon Network's 15 to 23 days of planned downtime to be sufficient. Despite this, a figure titled 'Figure 4 Aurizon Network's historical day/year availability after planned and unplanned downtimes' illustrates historic planned downtime over the last five years as 24 days, with 42 days of unplanned downtime. It is unclear whether Jacobs SKM considered the extent of work performed during these historic periods against the extent of work to be performed during these 15 to 23 days.

The QRC notes that there were major expansion projects affecting all systems during UT3 and these projects increased the number of closures on the network. Accordingly, the QCA should confirm that Aurizon Network is intending to complete its asset renewals program in a reduced number of planned closure days during UT4.

Jacobs SKM based its assessment on the scope of the asset renewals work program (i.e. planned preventative maintenance) in the context of the proposed maintenance work program, the proposed major growth projects, Aurizon Network's human resources (in particular track staff) and plant resources (e.g. access to tampering machines) and the track closure times that would be necessary to achieve the proposed asset renewals and maintenance work programs as well as deliver the major projects.

Jacobs SKM finds that the planned activities can reasonably occur, given the available human and plant resources, during the planned track closures as detailed in the asset renewals work program.

3 Aurizon Network's submission

3.1 Maintenance

3.1.1 Constrained ballast undercutting scope

Jacobs SKM recommended that the scope of the ballast undercutting task be limited until such time as the new spoil wagons have been acquired.

Aurizon Network reiterated their need for an additional 24 spoil wagons and the upgrade of 56 ballast wagons and summarised their undercutting programme as:

- *spoil wagons, 8 sets of 3 wagons to be delivered by December 2015;*
- *ballast wagon upgrades, 14 sets of 4 wagons to be delivered by December 2014;*
- *RM900, the existing undercutting machine, system upgrades to be completed by December 2014;*
- *upgrades to storage and loading facilities at 4 sites by June 2015.*

Aurizon Network stated that the Investment Approval Request for the procurement of Ballast Upgrade Programme was authorised in 2013.

Aurizon Network recommends that the full scope for Ballast Undercutting remains in place to ensure our statutory and contracted obligations for rail safety, asset condition and asset performance is not put at risk.

Jacobs SKM notes that the ballast undercutting task in the UT4 period is high due to an under-delivery of scope in the UT3 period. Achievement of the ballast undercutting scope is an important objective as it accounts for a significant proportion of the maintenance cost allowance. Jacobs SKM also found that historically the debt of ballast undercutting has continued due to Aurizon Network's failure to achieve the forecast scope in each approved undertaking.

Jacobs SKM is still of the opinion that Aurizon Network's proposed ballast undercutting scope and costs are reasonable in the context of historical ballast fouling and the impact of new volumes. However, the recommendation to limit the scope of the ballast undercutting task until Aurizon Network acquires the additional ballast wagons proposed in the UT4 Maintenance Submission is still valid in light of the previous under-achievement of ballast undercutting scope.

Jacobs SKM notes that in its response Aurizon Network has committed to providing the supply chain and the Authority with additional reporting and greater transparency. It is proposing annual updates on the performance of the ballast undercutting programme and scope delivery. Jacobs SKM suggests a quarterly review of ballast undercutting progress would be more appropriate.

3.1.2 Additional savings for productivity assumptions for turn-out grinding

Jacobs SKM recommended an adjustment for additional savings from Aurizon Network's productivity assumptions for turnout rail grinding.

Aurizon Network stated that productivity improvements had already been factored into the rail grinding scope and form part of its overall pricing proposal. It claims productivity improvements include:

- *rescheduling of cyclical maintenance activities to better coincide with medium to long term system closures required by the ports or the mines;*
- *remodelling of the work shifts to increase productivity (made possible through changes to the Industrial Agreements);*
- *taking more track access around turnouts to include adjacent cross overs and passing loops.*

Jacobs SKM's review of the productivity improvements assumed by Aurizon Network indicated that most of the planned productivity improvements are achievable; however forward planning is fundamental in ensuring savings are realised. Jacobs SKM made an adjustment for savings which should be realised from the improved productivity for the turnout rail grinding maintenance task, however further review and analysis of the data previously provided, shows that the productivity improvements had been factored into the rail grinding scope, although the data provided by Aurizon Network specifically relating to productivity improvements contradicted this assumption.

Jacobs SKM's proposed adjustment from the review of the UT4 maintenance submission (a total of \$140,090.18) is unnecessary.

3.1.3 Retrospective reporting on planned preventative maintenance, unplanned preventative maintenance and corrective maintenance

Aurizon Network states that it supports and has embraced the concept of transparency, and is currently progressing an initiative to make available an extensive suite of products and services to all supply chain participants and stakeholders via a range of customer focussed, delivery service models.

Aurizon Network state that this approach will complement the current range of industry engagement forums already in place covering commercial, operational and strategic issues. Refer to section 3.3.2 of the 2013 DAU Maintenance Submission Volume 4.

Jacobs SKM has recommended that to provide transparency on the efficiency of forecast and actual maintenance activities, Aurizon Network distinguishes on a yearly basis (i) the location of its planned preventative maintenance activities for the coming year (i.e. those areas where condition-based projections have identified the need for intervention), (ii) the location of its unplanned preventative maintenance activities for the past year (i.e. those areas, different from the planned preventative maintenance locations, where condition-based assessments have identified an unexpected need for intervention) and (iii) the locations of its corrective maintenance activities for the past year.

3.1.4 Adjustments to maintenance cost allowance based on Energy Economics volume forecast

Aurizon Network expresses a number of concerns for the potential disparity between its tonnage forecasts and those of Energy Economics:

Firstly when compared to both medium and long-term forecasting, due to lower degrees of variability attributable to input variables, short-term forecasts should inherently prove to be more accurate. Energy Economics volumes are already 6.5% below those re-forecasted for the FY13/14 concerns could be raised about the amount of error already inherently contained within the longer term forecasts.

It also Aurizon Network's view that the volumes forecast by Energy Economics in the later years of the regulatory period do not accurately reflect the conditions of the CQCR particularly for railings associated with the Wiggins Island Rail Project (WIRP) and the Goonyella to Abbot Point Expansion Project (GAPE).

A further consideration is that although the Energy Economics analysis provides a view on total production it does not provide for the production volume by specific locations within the four systems. That is, it does not include the production forecast by mine with the nominated destination. This is a critical component in determining the locations of tonnage based maintenance activities such as rail grinding. The maintenance programme also utilises this production profile by location and destination to determine maintenance requirements on assets that are geographically dispersed.

It is important that the forecast and actual production profile closely align for several reasons, including reducing tariff price variation and providing greater certainty for maintenance planning.

Aurizon Network suggest that the Authority assess the tonnage profile in light of more recent production rates

considering the overall production volume based on access agreements including the mine location and destination similar to that proposed in Appendix K in the Explanatory Material of UT4.

Jacobs SKM has recommended that proposed adjustments to the maintenance cost expenditure to account for the impact of alternate volumes as forecast by Energy Economics during the UT4 period, as well as a maintenance cost estimate for the 2017/18 financial year.

3.2 Incremental AT₁

3.2.1 Adjustment to the assessment of the AT₁ tariff

Aurizon Network has conducted an assessment of the short run variable costs, and states that a summary of the findings along with further discussion on this matter is contained within Section 10.4.2 of Volume 2 of the Explanatory Material for the Regulatory Framework.

Aurizon Network suggests that any adjustment to the AT₁ methodology provides for the short run variability costs in providing maintenance services. It is claimed that these short run variable costs are differentiated from the long run incremental cost that was considered in Jacobs SKM's assessment. The short run variable costs reflect the controllable costs in so much as annual maintenance delivery can be adjusted e.g. external contracts varied, service and procurement contracts varied or terminated, closure regime adjusted to suit volatility in train orders and associated variation in maintenance requirements for tonnage driven maintenance products.

Aurizon Network claim that the intent of this alternative approach is to provide for minimum variation of cost to expenditure in a given year, as reasonably managed by Aurizon Network. Current assessment of the short run variation is that approximately 37% of maintenance costs are variable in the short term (annual). This approach would replace and simplify the proposed methodology provided in Section 10.4.2 of Volume 2 of the Explanatory Material for the Regulatory Framework.

Jacobs SKM has recommended that the Authority seeks to commission an update to the analysis conducted in 2001 (Working Paper 2: Usage-related infrastructure maintenance costs in railways) to address the limitations outlined in Section 2.2.2 of Jacobs SKM report and therefore providing a more accurate estimation of incremental costs for the CQCR. Specifically, it is recommended that an update would consider maintenance costs for various tonnage profiles (from very low to very high tonnages) on an individual system basis.

Jacobs SKM's scope of works does not include a review of the appropriateness of the AT₁ mechanism nor a review of the existence of the AT₁ tariff itself. We were not requested to provide comment on Aurizon Network's proposed alternative method.

Aurizon Network acknowledges the assessment conducted by Jacobs SKM in assessing the variable cost and accepts their view that the cost curve may have changed since the 2001 decision. Aurizon Network says it would like to further explore the escalation of the AT₁ tariff modelling utilising the MCI rather than the Consumer Price Index, calming this would provide a more standardised approach to cost escalation across the various cost components of UT4.

3.3 Operating expenditure

3.3.1 Adjustment to the Commercial Development work group cost forecast

Aurizon Network claims that the cost allocation for Commercial Management is based on the resources, internal and external, that are required to deliver a range of other services that are not linked entirely to Train Paths. It states that the optioneering for alternate rail configuration, the management of associated services including electricity services, Transfer Facility Licences, installation and operation of veneering systems and land management matters are some of the issues provided for by the Commercial Management team.

Aurizon Network does not accept this recommendation as its forecast costs for Commercial Management are not based upon train path but are based upon whole of business.

Jacobs SKM accepts that forecast costs for Commercial Management are not based upon train path but are based upon whole of business costs. However, the increase in unit costs proposed suggest that the level of commercial management effort is higher than the forecasted operations of similar below rail organisations.

3.3.2 Adjustment to the utilities cost forecast

Jacobs SKM have determined that utilities costs would be expected to remain consistent regardless of growth in train paths, and this is observed in the UT4 forecasts each year. Jacobs SKM finds that forecast utilities costs should be adjusted downwards to reflect the average for the UT3 period (\$0.8 million per year).

Aurizon Network claims that the average utility cost for the UT3 period is not indicative of the annual costs for the UT4 period.

Aurizon Network claims the direct costs recognised for financial year 2013 were only \$20,547. Under the functional organisational model introduced during financial year 2012 they state that these costs are now incurred centrally as corporate costs. For financial year 2013 they state that these costs were still budgeted within Aurizon Network rather than in the corporate function, however actual costs were recognised in the corporate function. As the corporate cost allowance has been derived from the financial year 2013 4+8 forecast, Aurizon Network states that the allowance does not include these utilities costs. However, they should still be part of the overall operating cost allowance, and therefore in Aurizon Network's view this reduction is inappropriate.

It is unclear to Jacobs SKM what Aurizon Network is suggesting here. If Aurizon Network is referring to corporate overhead costs then they shouldn't be included within the direct cost build up.

Jacobs SKM recommends that the Authority seeks further clarification from Aurizon Network regarding this submission.

3.3.3 Adjustment to the Moura system cost to reflect the efficiency in train control, safeworking and operational costs

Jacobs SKM recommends that Aurizon Network adjust the system allocation of train control, safeworking and operations costs to ensure costs are efficiently allocated. This recommendation arises from Jacobs SKM review on an individual system basis which has indicated that train control, safeworking and operations for the Moura system has become less efficient compared to the UT3 period, while the unit cost for other systems is trending downwards.

Jacobs SKM determined that "the inefficiency of unit costs for the Moura system is due to fluctuations in forecast train paths during the UT4 period which result in a lower average number of train paths compared to the UT3 period"

Because of this, Aurizon Network suggests that this recommendation be reviewed given the total costs which increase slightly causing a decline in efficiency in the context of dollars per train path.

Jacobs SKM understands that Aurizon Network supports Jacobs SKM's recommendation for a recast of the system allocation for train control and safe working on a gross tonnes per kilometre basis.

3.3.4 Coal Loss Management Plan and Queensland Workplace Health & Safety Laws

Aurizon Network states that it is committed to providing a safe workplace for its workers, contractors and the general community and would welcome any review from the Authority to ensure that the cost impacts of the Workplace Health and Safety laws are reflected in the forecast Infrastructure Management costs.

Jacobs SKM recommends that the Authority seeks to confirm that costs of compliance with the Coal Dust Management plan and changes to Queensland Workplace Health and Safety laws are appropriately reflected in both Infrastructure Management and Regulation and Policy cost forecasts.

Jacobs SKM notes that Aurizon Network would welcome any review by the Authority in regard to the application and costs associated with the Coal Loss Management Plan and claim that Aurizon Network is regarded as the Australian leader in coal dust management practices.

3.3.5 Expensed labour costs incurred by operations during planning associated with capital works

Aurizon Network states that "During construction projects normal signalling and safeworking systems have to be suspended and either train movements are suspended or labour intensive manual systems are introduced temporarily over the affected sections in order to maintain train operations across the affected parts of the network. These costs are not included in the capital works as they are incurred for operational reasons during construction activity. They are therefore addressed in the system wide and regional cost forecast. Whilst costly, this solution has been implemented to minimise the impact of construction works on train services. These costs will continue to be maintained over UT4 given the continued level of construction activity. It is Jacobs SKM's view, these costs should be capitalised.

It is Aurizon Network's opinion that it is not appropriate to treat these labour costs as capital and not operational due to existing accounting policies and practices, and hence have treated as operational. The nature of any form of direct cost allocation is complicated by the fact that in any system closure or track work authority, train control and planning are involved in a combination of tasks including scheduling and executing train movements for stowage of revenue trains, movements of maintenance vehicles, maintenance staff and the provision of safe working arrangements for a large number of both maintenance and capital works activities. Aurizon Network are claiming that these tasks are not independent of each other, therefore assigning an allocation of time associated for either maintenance or capital project would be subjective in nature and would create inefficiencies in the service delivery and incur an additional cost burden to the supply chain.

Additionally, Aurizon Network state that the estimate for the Capital Indicator for UT4 does not allow for these costs and if they were to be disallowed from the Operating Cost Allowance, then Aurizon Network would be seeking to recover the costs from the capital cost allocation.

Aurizon Network state that if requested it will provide further information to the Authority to facilitate a more detailed understanding of the tasks described above with a view of how these costs could be directly allocated to a specific capital works project.

Jacobs SKM recommends that the Authority seeks to obtain an estimate of the value of expensed project costs associated with labour intensive operations during capital works, and that these costs are excluded from the approved operating expenditure forecast. Jacobs SKM has attempted to obtain this information from Aurizon Network and to date this information has not been received.

Jacobs SKM understands that it may be difficult to treat and apply these labour costs as capital and not operational due to existing Aurizon Network accounting policies and practices; however it is unclear why these

costs should not be capitalised if they can indeed provide more detail of actual costs which can be directly allocated.

Jacobs SKM recommends that the Authority accept Aurizon Networks offer to provide further information to facilitate a more detailed understanding of the tasks described above with a view of how these costs could be directly allocated to a specific capital works project.

3.3.6 Cost savings associated with regenerative braking

Aurizon Network is currently running a project to test the capacity and impacts of regenerative power on the CQCR. The project provides for the installation of suitable metering at the Powerlink Network Interface points which record the amount and value of energy returned to the Powerlink Grid. The credit adjustments for the electricity returned to the grid is recorded on the electricity bills and the reduced cost is reflected in the EC tariff. These benefits automatically pass through to operators in accordance with the function of the EC tariff.

Aurizon Network state regenerative braking assists in reducing energy consumption in two ways; namely export from the network and electricity reuse by adjacent electric rollingstock. The net effect is a reduction in electricity usage charges. Currently there are 63 locomotives which are owned by various operators that are enabled for and have switched on their regeneration braking capability.

Aurizon Network state that as part of the trial it will monitor the energy quality being returned to Powerlink grid to ensure the regenerative power quality complies with National Energy Regulation performance criteria. Aurizon Network will also ensure that any contractual arrangements between itself, the energy Retailer and Powerlink are not compromised.

With the understanding that the reduction in energy costs function operates on a cost pass through basis Aurizon Network does not consider that any adjustment to the Operating costs is required as the benefits already flow through to operators and the supply chain.

Jacobs SKM recommended that the Authority seek to gain further evidence from Aurizon Network to support estimated cost savings associated with regenerative braking trials which have been published in Aurizon Network's Investor Briefing dated 18 July 2013 (\$2.5 million). While differential pricing may not yet be feasible due to limitations associated with monitoring individual train contributions, Jacobs SKM finds that these savings should still be reflected in the operating cost forecast. If Aurizon Network does not provide evidence that the savings have already been accounted for, Jacobs SKM recommends that the allowable operating expenditure for the UT4 period is revised down by \$2.5 million, since this would reflect the ongoing minimum saving which would be expected from continuing regenerative braking trials.

Jacobs SKM notes that the QCA are currently undertaking a review to determine whether costs are on a pass through basis.

On the proviso that Aurizon Network does not make any adjustment to the Operating costs as the benefits already flow through to operators and the supply chain, Jacobs SKM recommends that Aurizon Network should provide clear evidence that this has been accounted for in their forecasts.

3.3.7 Forecast frequency rates for derailments and dewirements

Aurizon Network has based its forecast for self-insurance costs, in part, on the volume and severity of derailments on the CQCR. That is the cost allocation is based on historical data. Aurizon Network states that it would not consider it appropriate to make an arbitrary adjustment to that quantum based on the potential for improved performance of the network based on improved maintenance activities as improved asset performance through good maintenance practices are inherent in the original calculation. As such Aurizon Network does not see any advantage in conducting any further analysis on the causation and effects of maintenance on the volume and severity of derailments.

Jacobs SKM recommends that Aurizon Network seek an understanding of specific causes of derailments on the CQCR, which can be assessed against proposed preventative maintenance activities to ensure adequate and applicable maintenance activities are being planned and carried out at the correct intervals and location as required. This simple task, along with assisting future maintenance planning would ultimately provide an improvement in several specific derailment risks (such as alignment, formation failures etc.) which could occur.

Jacobs SKM also considered as an alternative that the Authority request that improvements are realised in the UT5 period i.e. the derailment frequency should decline on a gross tonne per kilometre basis.

As Aurizon Network progressively moves from a reactive to proactive maintenance programme the impacts of the improved maintenance performance should reflect an improvement in the volume but not necessarily the severity of derailments over an extended time frame.

The provision for future self-insurance costs would take into consideration the historical performance of the network as suggested by Jacobs SKM, but also the expected future improvements.

3.3.8 Adjustment to the annual dewirements costs for severe weather events in 2011

Aurizon Network engaged a consultant, Finity, to forecast self-insurance costs on the historical performance of the network and considers it appropriate to leave the forecast for self-insurance costs as they were submitted.

Jacobs SKM accepts that historically dewirements have predominantly been caused by motor vehicles coming into contact with the overhead line equipment at level crossings or when the pantograph of rolling stock and the interface to the overhead line equipment does not perform as designed. With this in mind Jacobs SKM maintains its recommendation to remove the impact of severe weather conditions which occurred during the UT3 period (in 2011) as this distorts the historical frequency of dewirements.

3.4 Asset renewals

3.4.1 Review of Asset Maintenance and Renewal Policy

In regards to Aurizon Network's Asset Maintenance and Renewal Policy document, Aurizon Network notes that Jacobs SKM recommends that the Authority review and approve the policy in accordance with Schedule E of the UT4.

Aurizon Network states that it has a highly developed Asset Management model, which will be enhanced by the Network Asset Management System (NAMS) becoming operational. In both the current and future states the review and maintenance of core documents such as Asset Maintenance and Renewal Policy is critical and as such is constantly monitored and updated as required.

Aurizon Network claims its asset policies form part of its overall Safety Management System and are approved and reviewed by other regulators and as such it would not be considered reasonable to have the Authority approve the Asset Maintenance and Renewal Policy.

In this context Aurizon Network is prepared to provide the Authority and the supply chain reports on the status of the policy.

Jacobs SKM disagrees that Aurizon Network's asset policies should only be reviewed by other regulators. If the prudence of renewal activities are reviewed in accordance Schedule E of UT4, Jacobs SKM would recommend the Authority assesses the appropriateness of the maintenance/renewal triggers in the Asset Maintenance and Renewal Policy.

Jacobs SKM recommends that the Authority accept Aurizon Network's offer of provide the Authority and supply chain members with reports on the status of the Asset Maintenance and Renewal Policy, but would suggest that

the trade-off between maintenance and renewal activities (in particular with regards to ballast) are unclear and deserve the Authority's attention.

4 Vale's submission

4.1 Planned preventative maintenance approach

Vale supports Aurizon Network's planned approach to maintenance believing it should lead to an efficient approach to maintenance and better alignment between the forecast and actual costs of maintenance. In particular, Vale highlight the following:

- a planned preventative maintenance approach should provide a cost efficient solution and an improved maintenance cost position excluding the new extensions and volumes. (Vale note that the WIRP extensions should require minimal maintenance over the UT4 period).*
- further cost reductions should be possible as a planned preventative approach to maintenance should have a significant effect on some of the maintenance task drivers highlighted in table 2.4 of the Jacobs SKM report.*
- a planned approach to maintenance should alleviate some of the costs and inefficiencies relating to the geographical location of the network as these will be approached in a planned manner.*
- planning of the location, time, and dates of maintenance will allow better allocation of maintenance personnel to assist in fatigue management as well as greater flexibility to find and manage accommodation to allow for these maintenance activities.*
- a planned approach will also improve the management and utilisation of maintenance plant and equipment.*

Jacobs SKM agree with Vale's listed benefits of Aurizon Network adopting a planned preventative maintenance program.

4.2 Limited transparency of maintenance activities

Vale highlighted that Jacobs SKM has noted that Aurizon Network does not have sufficient information on the network and in many circumstances the condition of the assets are unknown. Vale supports the recommendations of Jacobs SKM that Aurizon Network should detail for each year of the UT4 period the forecast condition of their infrastructure assets by location and state the location of its intended preventative activities and at the end of each year provide details and locations of actual maintenance spend. Vale supports this preventative maintenance approach because it should improve efficiency in cost and network availability, as well as provide greater transparency.

Vale believes one of the major issues with the current approach to maintenance is the limited transparency on what maintenance activities are required to be completed to maintain the network and importantly whether Aurizon Network completed the planned maintenance.

Jacobs SKM agrees with the importance of detailed cost and asset information from Aurizon Network necessary to complete the engineering review of the forecast maintenance activities. Jacobs SKM agrees that a more structured reporting regime would assist the Authority appraise Aurizon Network's performance.

Jacobs SKM has suggested that Aurizon Network begin by reporting (i) the location of its planned preventative maintenance activities for the coming year (i.e. those areas where condition-based projections have identified the need for intervention), (ii) the location of its unplanned preventative maintenance activities for the past year (i.e. those areas, different from the planned preventative maintenance locations, where condition-based assessments have identified an unexpected need for intervention) and (iii) the locations of its corrective maintenance activities for the past year would provide transparency on the efficiency of Aurizon Network's annual forecast and actual maintenance activities.

4.3 Network Asset Management System

Vale state that one of the key issues to the move to a planned preventative maintenance approach will be determining what level of operations is to be maintained. Generally over maintaining the network can be just as inefficient as under maintaining the network. If you are maintaining the network to a point where there are no breakdowns, you are potentially over maintaining which will cost more but provide very little advantage in throughput and availability.

Vales note the development of the Network Asset Management System by Aurizon Network and Vale support the use of this tool to assist in the development of a transparent process to find the efficient position on the maintenance curve between the cost of planned maintenance and the cost of unplanned maintenance.

Without structured maintenance plans based on reliable data Vale state that it is likely that inefficiencies in the maintenance task will be generated due to over maintenance of some parts of the network and under maintenance of others. Vale believes it will be important for the cost savings gained from the operation of this tool to be clearly reflected in UT4 and future undertakings.

Jacobs SKM agrees that once operational, Aurizon Network's NAMS tool should provide greater transparency to maintenance activities.

4.4 Ballast undercutting

Vale states that one of the key maintenance cost item that needs to be addressed to determine the scope required is ballast undercutting. Jacobs SKM has indicated the ballast undercutting task is required to be high in the UT4 period due to an under-delivery of scope in the UT3 period. Achievement of the ballast undercutting scope is an important objective as it accounts for a significant proportion of the maintenance cost allowance. Vale notes that Jacobs SKM has highlighted that historically the debt of ballast undercutting has continued due to failure of Aurizon Network to achieve the scope that was set when the undertaking was approved. Due to the size of this maintenance cost and the historical under-delivery Vale believes the Authority needs to look at a different approach to the allocation of maintenance costs for this activity to provide some incentive for Aurizon Network to actually complete the ballast undercutting scope set as part of the maintenance cost allowance.

Vale states that Jacobs SKM notes that Aurizon Network is planning to purchase new resurfacing equipment to replace existing equipment which is reaching the end of its life. It is unclear to Vale whether Jacobs SKM has included improved unit rates in the maintenance costs due to this new equipment as you would expect there to be efficiency gains from this purchase. The Jacobs SKM report also appears to suggest the purchase cost of the new equipment is included in the maintenance task. Vale would ask Aurizon Network confirm that this equipment is not utilised in any other non CQCR activities.

One of the key maintenance cost item that needs to be addressed to determine the scope required is ballast undercutting. Due to the size of this maintenance cost and the historical under-delivery Vale believes the Authority needs to look at a different approach to the allocation of maintenance costs for this activity to provide some incentive for Aurizon Network to actually complete the ballast undercutting scope set as part of the maintenance cost allowance. Jacobs SKM supports this recommendation.

Jacobs SKM noted that Aurizon Network is planning to purchase new resurfacing equipment to replace existing equipment which is reaching the end of its life, and can confirm that improved unit rates for this new equipment were included in the maintenance cost review, considering all efficiency gains that will be realised from this purchase.

4.5 Adjustment to maintenance allowance to reflect the lower tonnages

Vale notes that SKM have concluded that the maintenance cost should be adjusted if the forecast tonnage is lowered to reflect the Energy Economics report. Vale supports the approach to adjust the maintenance allowance to reflect the lower tonnages.

Noted.

4.6 Savings in UT5

Vale notes that throughout the maintenance review Jacobs SKM has indicated that many processes that are proposed to be implemented during the UT4 period will have cost saving effect in the next period. The introduction of the changes now will only be of value to stakeholders when their impact flows through to a lower cost and more efficient maintenance task. Vale believes it will be important to ensure these gains identified now do actually flow through to the UT5 period.

Jacobs SKM agrees that the identification of likely benefits in UT5 would be appropriate.

5 Asciano's submission

5.1 Detail, consistency and timeliness of asset information

Asciano's notes that the Jacobs SKM report (page 5) states:

"Given the lack of available asset information on age, condition and remaining capability, SKM found the proposed forecast to be reasonable"

Asciano has a concern that the lack of information indicated by Jacobs SKM brings into question the validity of the Jacobs SKM assessment. Asciano believes that any review of Aurizon Network costs should be based on detailed cost and asset information which ideally should be collected over a period of time at regular intervals using a consistent approach. Asciano notes that Schedule A, clause 5(a) of UT3 requires an initial network condition assessment within 3 months of the commencement of UT3 and an end of period assessment 6 months prior to the termination date. (This later assessment was delivered in August 2013).

Asciano believes that concerns regarding the detail, consistency and timeliness of Aurizon Network costs and asset information could be partially addressed by establishing a more structured annual cost reporting regime and network condition reporting regime for Aurizon Network. Such a regime should be able to utilise information collected in current Aurizon Network internal processes.

Asciano has misquoted the report and Jacobs SKM's full text (page 5) is copied here:

"SKM found that Aurizon Network's forecast asset renewals expenditure was derived on a top-down basis. Given the lack of available asset information on age, condition and remaining capability, SKM found the proposed forecast to be reasonable in the context of the value of the regulated asset base (RAB) and in comparison to forecast maintenance expenditure".

Jacobs SKM agrees with the importance of detailed cost and asset information from Aurizon Network necessary to complete the engineering review of the forecast maintenance activities. Jacobs SKM agrees that a more structured reporting regime would assist the Authority appraise Aurizon Network's performance.

Jacobs SKM has suggested that Aurizon Network begin by reporting (i) the location of its planned preventative maintenance activities for the coming year (i.e. those areas where condition-based projections have identified the need for intervention), (ii) the location of its unplanned preventative maintenance activities for the past year (i.e. those areas, different from the planned preventative maintenance locations, where condition-based assessments have identified an unexpected need for intervention) and (iii) the locations of its corrective maintenance activities for the past year would provide transparency on the efficiency of Aurizon Network's annual forecast and actual maintenance activities.

5.2 Reallocating of costs between tariff components

Asciano also notes that Jacobs SKM are proposing that the proportion of costs allocated to the AT₁ tariff component should be higher. Asciano broadly supports this reallocating of costs between tariff components.

Noted.

5.3 Reduction in number of maintenance windows

Asciano note Aurizon Network has proposed that they are looking to reduce the number of maintenance windows while increasing the length of time each maintenance window will be in force. Asciano is raising this potential change to maintenance operations in order to ensure that it is taken into account in both the Jacobs SKM analysis and the Authority's consideration of the Aurizon Network cost forecasts.

Jacobs SKM can confirm that the potential change to proposed maintenance operations by reducing the number of maintenance windows whilst increasing the length of time each maintenance window has been taken into account in the analysis and consideration of the Aurizon Network cost forecasts. Jacobs SKM are of the opinion that longer maintenance windows will enable more productive, and cost efficient planned maintenance activities.

Appendix A. Jacobs SKM's terms of reference for engineering technical assessment of maintenance, operating and capital expenditure forecasts in Aurizon Network's 2013 Draft Access Undertaking

Appendix B. QRC's submission dated 14 March 2014

Appendix C. Aurizon Network's submission dated 7 March 2014

Appendix D. Vale's submission dated 17 February 2014

Appendix E. Asciano's submission dated 6 March 2014