PRICEWATERHOUSECOOPERS

In association with
Hughes Consulting Services

Economic Regulation Authority

Review of WestNet Rail's Floor and Ceiling Costs for Certain Rail Lines

March 2007

Disclaimer

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1. Introduction

In September 2006, WestNet Rail (WNR) proposed to the Economic Regulation Authority (ERA) the floor and ceiling costs for the Mainline, Worsley line and terminal end bits. This was followed in October 2006 with the proposed costs for three grain lines, being Avon to Goomalling, Katanning to Tambellup and Kulin to Yilliminning.

PricewaterhouseCoopers (PwC) was retained by the ERA to review the proposed costs, building on the experience developed in the 2003 price determination. PwC undertook this engagement with the specialist railway engineering assistance of Hughes Consulting Services ("HCS").

The scope of works agreed to the in the engagement letter are shown in Table 1.

Table 1: Agreed scope of works

Category	Task
Review proposed costs and access pricing model	Review WNR's proposed costs
	Review Worley Parsons report commissioned by WNR
	Phone hook-up with ERA and WNR on proposed changes
	Review new costings and calculations
	Review and test WNR's Access Pricing model
	Test and confirm compliance with revised costing principles
	Test and verify proposed rates for materials and capital items
	Assess any MEA changes from earlier determinations
	Discuss recommended adjustments with ERA and WNR
	Review implementation of draft determination's adjustments
Review stakeholder submissions	Review submissions on WNR's proposed costs
	Review submissions on ERA's draft determination
Report to the ERA	Report on the accuracy, reasonableness and recommendations
	Produce report for public release
	Report on the implementation of draft determination adjustments
Review determinations prepared by the ERA	Review draft determination
	Review final determination

This is a report which details the sample testing of the accuracy and reasonableness of the pricing model, and it provides some recommendations on changes to unit cost assumptions proposed by WNR.

Proposed costs

WNR's proposed new floor and ceiling costs for the relevant nine lines, compared to 2003 determination costs, are presented in Table 2.

Table 2: WNR's proposed charges

Line		2003/2004		2006		Change	
		Floor	Ceiling	Floor	Ceiling	Floor	Ceiling
Grain lines – Last determination applied from 1 January 2004							
1	Avon to Goomalling	$60,957	$3,621,996	$96,253	$4,385,906	58%	21%
2	Katanning to Tambellup	$30,499	$2,662,278	$43,360	$3,113,891	42%	17%
3	Kulin to Yiminning	$26,843	$5,264,827	$37,780	$6,497,751	41%	23%
Main lines – Terminal end bits last determination applied from 1 January 2004. All other mainlines 1 July 2003.							
4	Kwinana to Bunbury	$2,038,047	$21,689,693	$2,097,863	$25,723,536	3%	19%
5	Brunswick to Premier	$518,712	$6,857,280	$275,069	$7,729,445	-47%	13%
6	Forrestfield to Kalgoorlie	$4,668,724	$99,181,635	$7,425,287	$121,900,516	59%	23%
7	Kalgoorlie to Leonora	$341,741	$18,933,978	$387,605	$23,217,467	13%	23%
8	Kalgoorlie to Esperance	$1,059,677	$32,102,300	$1,957,193	$39,852,414	85%	24%
9	Terminal end bits	$645,912	$2,542,413	$118,562	$3,111,869	-82%	22%

Source: WNR.

Some of the main reasons for the magnitude of the average increase in the floor and ceiling costs are:

- commodity prices boom, impacting the cost of materials;
- the strength of the WA economy, which has driven up the cost of labour. Specifically, the ABS Wage Price Index for WA has risen 12.7% over the period from July 2003 to the June 2006.
- Australian inflation levels being at the higher end (or on occasions above) the 2-3% range targeted by the Reserve Bank, which is reflected in the ABS indices used by WNR to escalate some of the components of the floor and ceiling costs.
- The ABS Eight Capital Cities All Groups CPI increased by 8.9% from December 2002 to March 2006 with this being the escalation index is used in the Costing Principles for escalations. The Perth CPI over the same period rose 10.3%.

Report structure

The remainder of this report is structured in the following order:

- section 2 will set out the procedures PwC/HCS undertook to verify the accuracy of the WNR pricing model and will present the results thereof;
- section 3 will summaries the views from Public Submissions and evaluates issues around the application of the MEA assumption;
- section 4 discuss the reasonableness of the prices of materials and capital items used as inputs to the calculations of floor and ceiling costs;
- section 5 will outline the conclusions; and
- appendix A provides a breakdown of recommended floor and ceiling costs by route section.

2. Pricing model review

The assumptions made with regard to the current MEA for the grain and main lines are to be retained from the 2003/04 determinations for each of these. The WNR standard for calculation of the GRV for the grain lines is summarised in Table 3.

Table 3: WNR proposed MEA standard for the grain lines

Grain line	Avon to Goomalling (1) and Katanning to Tambellup (2)	Kulin to Yiminning (3)
Axle Load – Freight (tonnes)	19 tal	16 tal
Rail weight (min Kg/m)	41	31 (if 31 not available, then 41 to be substituted)
Sleeper type, pattern and spacing	1:4 steel/timber "B' type 2100mm x225mm x130mm – 1320/km min	1:4 steel/timber "A" type 2100mm x225mm x115mm – 1320/km min
Ballast type & min depth (mm) for Continuously Welded Rail (CWR)	Metal – 150	Gravel/Metal - 150
Ballast type & min depth (mm) for Mechanically Jointed Rail	Not Applicable	Gravel/Metal - 100
Fasteners	Plated timber sleepers, elastic fasteners throughout	Plated curves <800 radius, non-elastic fasteners in timber
Formation depth (m)	1.0 (including capping layer)	1.0 (including capping layer)
Target speed maximum (kph)	80 (subject to operating requirements)	60 (subject to operating requirements)

Source: ERA October 2003 WNR Grain lines Floor & Ceiling Cost Determination.

The WNR standard for calculation of the GRV for the five nominated lines is summarised in Table 4

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Table 4: WNR proposed MEA standard for the main lines (excluding the terminal end bits[1])

Main line	Kwinana to Bunbury (SWM)	Brunswick to Premier	Forrestfield to Kalgoorlie (EGR)	Kalgoorlie to Leonora	Kalgoorlie to Esperance
Axle Load Freight (tn) & Max. Speed Freight (kph) [loaded/empty]	At 21tn: 115/115 (NG) At 23tn: 80/80 (NG)	At 21tn: 50/70 (NG)	At 21tn: 115/115 (DG & SG) At 23tn: 80/80 (DG & SG)	At 21tn: 50/70 (SG)	At 23tn: 70/80 (SG)
Max. Speed Passenger (kph)	160 (NG)	N/A	160 (SG)/100 (DG)	N/A	N/A

[1] The WNR standard for calculating the GRV for the mainline 'Terminal end bits' shall be similar to the standard for the adjoining mainline.

Main line	Kwinana to Bunbury (SWM)	Brunswick to Premier	Forrestfield to Kalgoorlie (EGR)	Kalgoorlie to Leonora	Kalgoorlie to Esperance
Ave. Formation height (m)	1.0	1.5 (Brunswick East to Worsley) 1.0 (Worsley to Hamilton & Worsley to Premier)	1.5	1.5	1.5
Rail (kg/m)	50	50	60	50	50
Ballast depth (mm)	250	250 (Concrete sleepers) [2] 150 (timber sleepers)[3]	300	200	250
Sleeper Type & spacing/km	Concrete/ 1,500	Concrete/1,500 Timber/1,470	Concrete/1,500	1 in 4 Steel/1,500	1 in 2 Steel/1,640

Sources: ERA September 2003 WNR Clause 9 Floor & Ceiling Cost Determination (page 18) and October 2003 Worsley Floor & Ceiling Cost Determination (page 4).

Tests to reviewing the pricing model

PwC/HCS undertook two types of tests in reviewing the pricing model: line-specific tests and general model tests.

For each of the line-specific tests that were undertaken, PwC/HCS selected a number of lines which would be covered by those tests. The guiding principle was that, although such sampling would increase the efficiency of the review, rotating the selection of the lines being tested would ensure sufficient coverage across the nine lines.

The pricing model was checked to ensure that floor and ceiling prices reported by WNR in their submission were consistent with those being calculated within the model. The model was tested to check the integrity of the workings and to ensure that the methodology used for the GRV, ceiling and floor calculations was consistent with the approved Costing Principles as well as being carried out in accordance with the approved standards. The track distances for routes and route sections were checked to ensure consistency with the previous determination. This review also assessed and discussed with WNR the variations to the calculations proposed by WNR for this determination such as the inclusion of the Communications and Signal equipment for the SWM and EGR.

The route-specific tests applied to assess consistency with prior determinations included reviewing the:

- MEA standard and the actual current standards.
- line section operational usage (ie train number and/or GTKs by route section).
- The uniformity and consistency in pricing model calculations.

[2] For the section Brunswick East to Worsley
[3] For sections East and North of Worsley

The review of operating and overhead costs focused on assessing:

- operating cost and overhead cost efficiency
- detailed reviews of any new cost items (eg self-insurance costs)
- the consistency of application of costs in relation to specialist labour, environmental, engineering support and logistics operations
- the application and consistency of escalation of costs with ABS indices
- breakdowns for train control and communication and signalling costs across the WNR network.

Table 5 lists the line-specific tests that were undertaken and presents their outcomes.

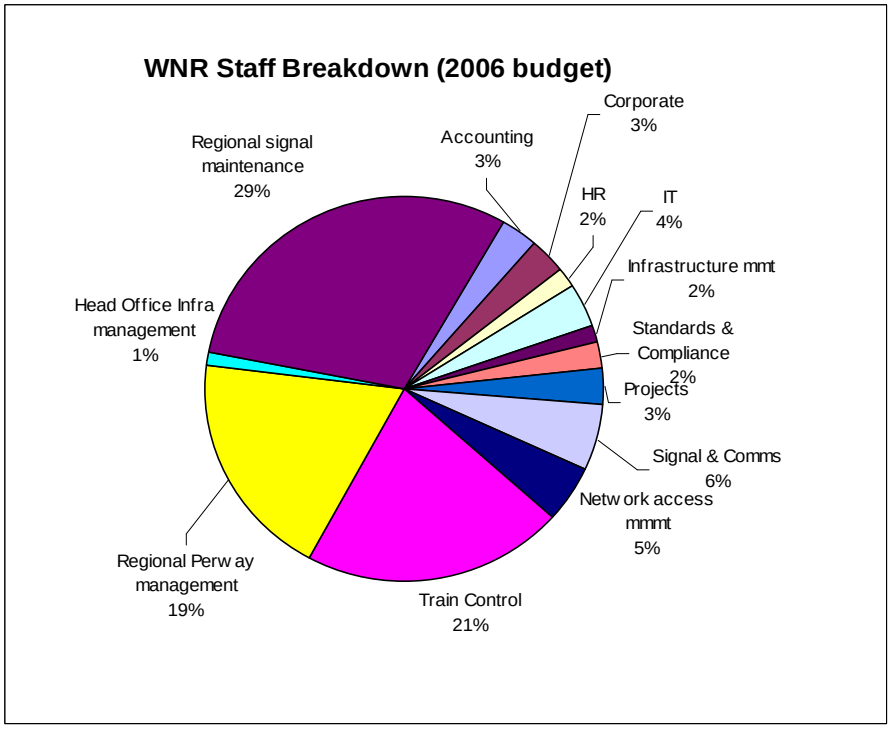
Table 5: Outcomes of the line specific tests undertaken

Test	Grain lines			Main lines					
	1	2	3	4	5	6	7	8	9
Agree 2006 figures in the report to pricing model	✔	✔	✔	✔	✔	✔	✔	✔	✔
Agree 2005 figures in the report to pricing model	✔	✔	✔	✔	✔	✔	✔	✔	✔
Agree 2006 line length to 2005 line length	✔	✔	✔	✔	✔	✔	✔	✔	✔
Ensure that line models have consistent calculation processes	✔	✔	✔	✔	✔	✔	✔		✔
Sample testing to confirm train number information	✔	✔		✔	✔			✔	✔
Sample testing to confirm GTK information			✔	✔	✔	✔			✔

The outcomes of the general model tests are summarised in Table 6.

Table 6: Outcomes of the general tests undertaken

Test	Outcome
Analyse the efficiency of the activities driving the overhead costs	▪ The overall proposed $16.2 million overhead cost reflects a reduction in the cost of insurance. ▪ WNR has a labour budget for FY 2006 based on194 WNR full-time equivalent (FTE) employees. Of this total 35 are included in the calculation of overhead costs, 41 are in train control, 39 are in perway management, 59 are in regional signal maintenance (with these costs being covered in the maintenance unit rates), 11 are in Signal and Communications management and 9 staff being in network access management. Of the staff in the overhead category 22 are in accounting, HR, IT & corporate. In the period since the separation of WNR into a standalone entity, WNR has had associated headcount growth in HR, IT and the Commercial groups. The pie chart below show the relative functional mix of the WNR employees.

Test	Outcome
	 In relation to specific tests of overhead efficiency PwC/HCS observed: ▪ One FTE employee is tasked with accounts payable. The unit cost of this function (before overhead and IT allocation) is viewed as reasonable at less than $5 per account payable. ▪ The payroll function is outsourced. PwC/HCS assessed the cost per pay run and this was below $10 per pay which is an efficient outcome for a relatively small entity. ▪ Sundry Contract Costs account for 55% of the IT budget. PwC/HCS sighted the breakdown of that amount into its 22 constituent items, of which only one accounted for more than 10% of the total being Transitional Services. While the amount was somewhat uncharacteristically large compared to the other components of that section of the IT budget, it is related to relatively resource-intensive projects such as the maintenance and support of HR and timekeeping systems and the maintenance of email and Blackberry services. ▪ In sample testing, PwC/HCS also assessed the costs of the WNR IT helpdesk. The labour allocation (2.5 FTEs) and the subsequent cost appears a reasonable cost given the salary range for adequately-skilled IT workers and the supporting infrastructure required. ▪ Of WNR's motor vehicle fleet, 62% is comprised of 4X4s and inspection vehicles, indicating that most of the cost is incurred directly in relation to the core activities. Fleet management costs were outsourced and confirmed as efficient. The actual WNR cost for fleet in 2006 was 10% above that requested by WNR within the access pricing model with WNR making a minor adjustment to reflect their view on efficient costs.
Review the proposed $6m civil and control & signalling (C&S) costs	An amount of $6.0 million has been allowed by WNR to cover overall contract administration, project management and overheads in relation to the major maintenance contract with John Holland Constructions and with other maintenance related contracts as required. PwC/HCS has reviewed the breakdown of this cost category. The largest item, accounting for around 26% of the total cost is the John Holland contract. PwC/HCS sighted copies of John Holland invoices to confirm this expenditure. ▪ This allowance, as reviewed by PwC/HCS, is separate to other WRN office overheads and shall be allocated to each line proportionally to the maintenance expenditure for that line as appropriate. This allowance does not include the cost of WNR maintenance inspectorial or other direct project cost, but will include; ▪ Head Office maintenance contract administration and support staff,

Test	Outcome
	▪ Head Office maintenance management, accounting, etc and support staff, ▪ Professional support services including legal, accounting, engineering, surveying, etc, ▪ Management and inventory of materials and personnel including rail safe working practices of maintenance staff, ▪ Regional maintenance contract administration, management and support staff, and ▪ Other resources and equipment as required to meet the maintenance activities of WNR. PwC/HCS also tested whether John Holland costs would be lower for a new MEA network. WNR stated that it had not adjusted for a new MEA network as the nature of these costs are not influenced by the age or MEA standard of the network with these costs being incurred regardless of the status of the network. The materials management, storage and handling represent the cost of holding sufficient inventory for emergency and scheduled maintenance activities. The environmental and engineering services are part of the infrastructure management overhead to provide technical and regulatory advice on an "as required" basis. PwC/HCS considers that this allowance is fair and reasonable to meet WNR responsibilities regarding the management and operation of the maintenance contract(s) undertaken to maintain a safe railway network.
Agree the escalation of costs to ABS indices	PwC/HCS verified that the increases in the ABS's WA Non-building Construction and Road and Bridge Construction indices were 18.14% between July 2003 and June 2006. PwC/HCS's discussions with ABS indicated that these are the most appropriate indices for use in rail network operations. Whilst the main original Costing Determinations were released in September –October 2003 and a further Determination in July 2004 (terminal end bits) as the later Determinations were based on the same unit cost data, as the date of the source data is more relevant for accurate escalation than the date of the Determinations, we recommend applying the same escalation methodologies and levels across all routes. There is a range of support for the WNR view that rail network cost growth has been greater than CPI: ▪ The escalation outcomes from indices used by WNR appear conservative when compared to benchmarks such as the WA Department of Housing and Works Building Cost Index (BCI). The BCI for Perth accounts for the costs of non-residential construction and it increased by 40% between December 2002 and March 2006. ▪ In a Victorian regulatory decision on the PN intra-state rail network (May 2006), the Essential Services Commission escalated some cost items by the same ABS Non-building Construction Index, indicating that it is the most appropriate indicator for measuring cost movements in rail network operations and maintenance.[4] ▪ The WA Minister for Planning and Infrastructure said that 'in Western Australia, construction costs had increased by 30% over the past two years'[5]. ▪ The NSW Minister for Roads stated last year that 'bitumen and steel costs had increased about 20% since last year'[6], ▪ WNR indicated that the company experience wages growth of 13% between June 2003 and June 2006. This is in line with the ABS WA all industries wage index growth of 12.7% over the same period, as well as the Australia-wide comparable index increase of 12.8% .
Validate the inclusion of the amount for self-insurance	WNR advised that the self-insurance amount equates to 41% of total WNR insurance and 12% of total overheads. The self-insurance component is based on the cost of attending to minor incidents considered "non recoverable" and represents only the variable ("out of pocket") cost component to each response ie it does not include an allocation of labour costs already funded elsewhere in the WNR cost structure. WNR provided a detail breakdown of this calculated by incident to PwC/HCS. This cost has not been adjusted for the potentially lower incident rate which may occur on a new MEA network however, WNR stated that most incidents are caused by Acts of God or Operator equipment failure which cause loss and the age of a well maintained the network is not a key driver behind incident levels.

[4] See p 86: http://www.esc.vic.gov.au/NR/rdonlyres/95B1F977-DEFC-40FE-829D-9F1C96CE3C02/0/DTR_FinalDecision_PacificNationalProposedAccessArrangement31052006.pdf
[5] Australian Financial Review, 13 June 2006.
[6] Ibid.

Test	Outcome
Validate the breakdown of communications and signalling costs	Signals and communications systems appear to be appropriate and detailed, although it is difficult to compare these against a benchmark quote as the network consists of a number of base components provided and installed by specialist technicians, etc. These systems should not exceed the relevant ABS index on top of the 2003 determination. WNR's proposed increase of 10% is in line with the increase in CPI between June 2003 and June 2006.
Validate the 10% increase in communications and signalling materials cost in 2004-05	
Ensure no redundant assets are included in the MEA	The WNR register of assets has been reviewed by PwC/HCS and from that review followed by further discussions with WNR, PwC/HCS is not aware of any redundant asset at this time which may form a part of the MEA as the basis for the GRV calculations.

3. Public submissions

As part of the public consultation process, ERA received two submissions: one from ARTC and a joint submission from Alcoa World Alumina and Worsley Alumina. In response to those submissions, PwC/HCS performed a number of tests in addition to those discussed above.

Regarding the issue of the allocation of Centralised Train Control costs raised by ARTC, it is the PwC/HCS understanding that those costs are allocated directly to the main routes based on effort exerted by the train controllers for each route. This is a more appropriate method than allocating based on train numbers or GTK. PwC reviewed the full cost per FTE employee (including on-costs, payroll tax, super, workers comp etc) of approximately $128,000 and verified this against financial system data. The documentation outlining the allocation across the lines was also sighted. WNR has increased the number of staff in train control from 29 in the 2003 Determination to 37 in the 2006 determination. This has arisen due to placing an additional control desk in the MidWest region to deal with projected demand for all Stage 1 projects in the region (4 controllers) and an additional desk in the Eastern Goldfields for projected increase in traffic for Portman expansion and new business growth in Iron Ore -Golden West Resources and others (4 controllers).

Furthermore, in relation to the abovementioned submission, PwC made two sets of enquiries. The first related to the prices of inputs quoted by the submitters. The resolutions to those recommendations are summarised in Table 7.

Table 7: Outcomes of discussions with Indec, the consultants to Alcoa and Worsley Alumina

Test	Outcome
Ballast cost	WNR proposed the ex-quarry ballast price of between $20 and $25.50 per tonne. Hanson provided Indec with a quote of $20.70 per tonne ex-quarry for the delivery to Bunbury, which WNR estimated at $25. PwC confirmed with Hanson the validity of their quote. To test these quotes, PwC independently sought further ballast cost information from another rail network operator and was advised that the average price per tonne across central Australia is $15 ex-quarry, while the ballast price accepted by the ESC in Victoria for PN was an average of $25/tn ex-quarry and $30/tonne delivered. To further test the ballast market PwC obtained quotes from two ballast suppliers: i. Boral: which indicated that they do not have the capacity to deliver the quantities required for WNR, nor do they have 50mm ballast available. However, a hypothetical price for 40mm ex Perth would be $36 per tonne. ii. ReadyMix (Rinker) provided a quote for 50mm ballast on WNR's account of $31.90 ex Gosnells (18km south west of Perth). Overall, the quotes from ReadyMix and Boral are likely to be above the efficient cost for a large scale order with the two suppliers providing the 'list price' consistent with our approach being a hypothetical request for supply. It is recommended that the Hanson price of $20.70 per tonne ex-quarry at Bunbury should be adopted with pro-rata distance adjustments for locations more distant from quarries (reflecting WNR proposed mark-ups from Bunbury). Whilst rail ballast prices of $15/tonne (ex-quarry) appear available for large orders elsewhere in central Australia, on balance it appears the Hanson price represents a more realistic efficient cost benchmark for Western Australia. But the availability of ballast at $15/tonne (ex-quarry) across central Australia provides greater confidence that the efficient / high volume price for the Bunbury region of the WNR network is closer to $20.90 (rather than $25/tonne). A review of all ballast costs throughout the WNR network is included in Table 12 of this Report which reflects the discussions held with Indec and later submissions from Alcoa/Worsley and which reduces the cost of ballast (ex–quarry) pro-rata to that generally proposed by Indec for Alcoa/Worsley.

Test	Outcome
Rail costs	WNR proposed a 60kg price of $1,440/tn and 50kg of $1,500/tn (both delivered to Midland). Assessing the efficiency of rail prices is challenging as OneSteel is the predominant domestic rail manufacturer. PwC confirmed with a leading Australian rail network operator that their OneSteel large order price is $1,240 per tonne for a 60kg rail ex-works excluding flashbutt welding ($200 per weld per 110 metres or $30/tn for 60/kg) providing a price ex-works including welding of $1,270. Adding to this an estimated rail transport cost of approximately 12 cents per km and applying this to a Whyalla-Midland movement (approx. 2,340km) produces a transport cost of approximately $280/tn generating a complete rail cost delivered to Midland of $1,550/tn for 60kg. The WNR proposal of 60kg of $1,440/tn is reasonable when assessed against this calculated price.
Sleeper cost	WNR has proposed a price of $95 per SG concrete sleeper from Humes at Welshpool. WNR sought to further support this claim by providing more recent emails from Humes (Rinker) illustrating a further modest price prise. Indec referred to the contract price for SG concrete sleepers of $75, as provided by Rocla (Mittagong & Grafton in NSW) to ARTC.[7] However, PwC/HCS independently confirmed that their free on train (ex Rocla works) price is $86 for 1.35 million concrete sleepers including jewellery over 2.5 years. Whilst the $86/sleeper ex-works price from Rocla appears cheaper once transport is added-in, the delivery cost from Mittagong to Midland (3,930km) is likely to be between $70 and $90 per sleeper making supply ex-Mittagong uncompetitive. Austrak at Port Hedland is manufacturing SG (40tal) concrete sleepers for BHP Billiton and more recently for FMG. We understand the cost of these Austrak Port Headland 40tal concrete sleepers is slightly above the SG 23 tal benchmarks relating to the greater strength and density of the product as well as issues relating to higher labour cost in remote areas. Overall, the $95 per SG concrete sleeper from Humes in Perth appears reasonable as the current price in WA. However, the Rocla information appears to suggest that lower prices can be achieved where higher economies of scale are present.
Premium paid for 50kg rail vis-à-vis 60kg rail	50kg rail is currently a higher cost per tone option and Indec (on behalf of Alcoa/Worsley) believe this is mainly because it is produced by OneSteel in relatively lower volumes than 60kg rail. Indec argued that the rates used across the different rail weights should be reset to the lowest price per tonne, with this being the 60kg rail price as the Costing Principles assume a large-scale network construction, which would lead to material production volumes for 50kg rail so that, by economies of scale, costs, thus prices per tonne, across the weights should progressively move to broadly equal levels. However, it is noted that under this assumption, when the price of rail is assessed on a per metre basis that 50kg will remain 17% cheaper per metre than 60kg rail. Overall, the PwC/HCS view is that the Indec argument is valid and that if both sizes had large scale production volumes, the price of 50kg and 60kg should be broadly the same per tonne (ie efficient rail unit prices for large scale orders should be assumed to equal to lowest price per tonne for a given size across all sizes). Similarly, the 41 Kg rail price, under a large scale re-railing of the grain network, would be likely to fall to the 60kg price. See discussion of this issue at section 4.
Bridges & culvert costs unit prices should be based on efficient costs today (& not 2003 costs indexed)	WNR submissions stated that an escalation approach was used as they did not have enough recent construction volumes for particularly for new bridges to provide documentary evidence on the most recent unit price outcomes. WNR additionally held the view that the rise in unit costs for bridges & culverts between 2003 and 2006 would be likely to be in excess of their escalation claim based on the ABS index rise of 17.3%. Whilst ideally this review would have appreciated more evidence to assess the change in bridge and culvert costs, after reviewing a range of cost index movements (see Table 6) which provide support that construction costs have risen by more than the proposed escalation (generalised range 20%-40%).

[7] According to a Rocla press release, at www.pipe.rocla.com.au/news/200605/article401.shtml, the cost is $85 per sleeper.

Test	Outcome
Inclusion of communications backbone costs omitted in 2003 review	WNR has requested that the ERA include $4.99m of communications backbone assets for the Kwinana to Bunbury into the GRV which were inadvertently overlooked in 2003 review.. Some communications backbone components were also omitted for the Forrestfield to Kalgoorlie routes. PwC/HCS has discussed this issue in detail with WNR and has also reviewed a breakdown of the omitted component and confirm they are prudent and necessary inputs for an effective comms system. PwC/HCS has also reviewed the unit costs of the comms assets and has confirmed them to be reasonable, inclusive of economies achieved by large scale orders and capturing efficiencies via combining some trenching for signalling and comms assets. As indicated in the 2003 Determination, communication and signalling network backbone provides the "Safe Working" validation for the rail network. The method of developing the communications and signalling network had been reviewed by PwC/HCS previously in that as a "design and construct" contract this was provided by competitive tendering. Accordingly, this achieves value for money, efficiency and at the same time meets specification and compliance requirements of safe working.
Signalling asset list and installation	The comments made for the communications backbone also largely apply for the signalling assets components and their installation. PwC/HCS has discussed the signalling asset list and installation approach in detail with WNR and views these outcomes as reasonable. PwC/HCS has also reviewed the unit costs and has confirmed them to be reasonable and inclusive of economies achieved by large scale orders.

PwC addressed the remaining concerns raised in the joint submission from Alcoa and Worsley by requesting additional supporting information from WNR. Table 9 presents the results of those tests.

The Alcoa/Worsley submission also raised some issues around the application of the MEA assumption for calculating the GRV of the network which are discussed in the section below.

Modern Equivalent Asset issues

In its submission, Alcoa recommends that *'based on the failure of WestNet to provide the MEA standard claimed in December 2002 over the entire SWM, the ERA needs to monitor that MEA upgrades are delivered on a timely basis or alternatively act promptly to revise the ceiling down until the committed standard is delivered'*. However, the basis of the MEA is defined in the Costing Principles as *'an optimised network that is re-configured using current modern technology serving the current load with some allowances for reasonably projected demand growth up to five years into the future. The MEA excludes any unused or under utilised assets and allows for potential cost savings that may have resulted from technological improvement.''*

WNR during the 2003 determination provided SWM stakeholders with summary level capital works planning documents which outlined a series of sleeper and ballast upgrades to move closer to the MEA for most components. A supplementary submission to this 2006 review by WNR stated that it has completed 55% of the SWM upgrade for concrete sleepers and that the remaining 76km of timber sleeper would be targeted for upgrading to concrete in 2008/09. It should be noted, however, that for some components of the MEA specification, such as the earthworks height, it may be prohibitively costly (ie not economically efficient) for the rail network owner to universally adopt the MEA as the minimum actual standard. Reinforcing this interpretation of the intent and requirements of the regime were comments from the Independent Rail Access Regulator within the 2002 Costing Principles Determination which confirmed that *'there is no obligation for the railway owner to provide a network that is MEA or to adopt the specific maintenance practices assumed in the regime as its actual practices. However, Clause 13(c)(i), Schedule 4 of the Code requires the prices for access to reflect the standard of the infrastructure concerned and the operations proposed to be carried on by those using the network.*' It should be noted, however, under Schedule 4 clause 2 of the Code, the ERA has the discretionary judgement on when it is appropriate (ie efficient and reasonable) to apply the MEA standard and consequently, the ERA's September 2003 Determination stated that the Regulator will monitor service levels and will revise the MEA standard if it can be demonstrated that WNR is consistently not meeting the expected level of standard and service.

Overall, it was not the intention of the ceiling price calculation within the WA Regime to require the network owner to provide a completely MEA compliant network. However, it may be commercially sensible for the network owner to progressively implement components of the MEA specification (eg replacing timber sleepers with concrete). The intention of the MEA was to facilitate the setting of the absolute upper limit of prices using a simplifying set of modern construction assumptions, with prices to be negotiated to appropriate levels below the ceiling to reflect the standard of the infrastructure concerned. This approach:

- reduces regulatory costs by simplifying and streamlining ceiling price calculations,
- provides some potential to pass onto to customers gains from technological innovation (eg centralised train control);
- precludes inefficient outcomes which could require the network owner to replace otherwise fit-for-purpose assets prior to their life expiry (eg timber bridges or lower height formations); whilst
- protecting access seekers from abuse of monopoly power by containing the upper limit of prices to the efficient cost levels which would prevail if the network was totally replaced.

To be understand the materiality of the difference between a ceiling cost based on current configuration and the MEA, Section 5 of this report provides a sensitivity test which compares the ceiling costs of the SWM as-is (45% timber sleepers) and under the MEA assumption (100% concrete sleepers).

4. Review of WNR input prices

WNR's unit rate costs are generally consistent, whether the materials apply to grain or main lines. Those rates are provided in WNR's respective submissions to the ERA on the proposed costs for the grain and main lines.

The reasonableness of the prices of the key materials and capital items used to derive WNR's proposed costs was established by reference to supporting third-party documentation. Table 8 presents the outcomes of those reasonableness checks.

A key item in the reasonableness checking of WNR proposed ceiling prices relates to relative prices of rail by weight category per tonne. This issue is material for ceiling prices for the WNR network due to its mix of 41kg, 50kg and 60kg rail with WNR seeking a 7% premium for 50kg and an 11% premium for 41kg rail over the nominated price for 60kg rail. The most popular size for new rail being layed in Australia is 60kg per tonne rail with its price being considered to be the more readily established efficient / high volume market benchmark price (see 60kg rail prices in Table 7). Whereas, in the case of 50kg and 41kg rail, while market price data is available it is based on more modest volumes. The current lower demand, less frequent production and smaller production runs of 50kg relative to 60kg rail means that costs of producing 50kg rail are higher.

Whilst the general reasons behind the current price differences for 50kg and 60kg per tonne are understood to be mainly based on economies of scale, we do not have access to relevant cost data to establish the actual relativity of production costs between these weight categories when both are reduced at high volumes. However, we expect that the costs of inputs (raw materials, energy etc) would represent a large percentage within the total cost structure of rail production, and that those input costs would not vary to any significant degree on a $/tonne basis in the production of the different rail categories. This general characteristic of the production cost structure would serve to moderate the effect of any diseconomies of scale on total production costs. Consequently, under high volumes assumptions, the current prevailing premium for 50kg (due to its lower economies of scale than 60kg) is expected to dissipate and total production costs expressed $/tonne basis is unlikely to be significantly different. Hence it appears reasonable, under high volume assumptions for competitive market-based prices for both weight categories to also broadly aligned. This position is considered to be a more realistic than alternative positions ie that 50 kg/m rail production costs will be materially higher, or lower, than those for 60 kg/m rail. Given this position of broad equivalence in pricing in $/tonne, and the lower tonne/km involved with 50 kg/m rail, the cost of 50 kg/m rail, expressed on a $/km basis, still remains 17% lower than 60 kg/m rail.

Table 8: Reasonableness of the key materials and capital items' prices

Item	WNR Proposed Price ($)	Reasonable?	Justification
Track			
Steel sleeper cost for DG	289	✔	Verified by reference to a May 2006 quote from OneSteel. The price is comparatively high due to low production quantity for this product.
Cost per 60 kg/m Rail per tonne (including flashbutt weld and delivery to Midland)	1,440	✔	As per Table 7, PwC/HCS has tested the WNR proposed cost by obtaining the breakdown of the price paid by a leading Australian rail network operator [ARTC] including transport and flashbutt welding and the WNR proposal is reasonable.
Cost per 50 kg/m Rail per tonne (including flashbutt weld and	1,500	✘	Recommend assuming price is equivalent to the 60kg price. While the premium for 50kg is generally justified based on lower volumes (ie less economies of scale in production),

Item	WNR Proposed Price ($)	Reasonable?	Justification
delivery to Midland)			these need to be adjusted for a significant order quantity of 50 kg/m rail, We consider price equivalence in $/tn of 50 kg/m rail with 60 kg/m rail to be obtainable in this instance.
Cost per 41 kg/m Rail per tonne (including flashbutt weld and delivery to Midland)	1,600	✗	Recommend assuming price is equivalent to the 60kg price for same reasons as per the price adjustment for 50kg rail.
Timber sleeper cost for DG	147	✔	The WNR cost is lower than PwC/HCS estimates of market costs. WNR advise that the reasons behind the sharp rise in the DG timer sleepers is unclear and that the cost of the jewellery for a DG sleeper in the original determination may have been understated. The plates and fasteners on a DG sleeper are factored by 1.5 of a SG sleeper to allow for the third rail on the DG sleeper.
Concrete sleeper cost for NG	95	✗	As per Table 7, PwC/HCS has tested the WNR proposed cost by obtaining the breakdown of the price paid by a leading Australian rail network operator including transport and jewellery. Lower prices are obtainable on the east coast compared to current WA prices driven by higher volumes and economies of scale. This analysis requires an assumption of large volume purchases providing economies of scale. Whilst WNR has provided evidence from Humes supporting sleeper costs of $95 (NG) & $107 (SG) including jewellery the Rocla evidence illustrates that the Humes price does not appear to represent the most cost efficient outcomes achievable from a large scale competitive tender.
Ballast cost per tonne Esperance	26	✗	A lower price is available from Hanson for rail ballast ex-quarry at Bunbury. Refer to Table 7. The average price paid by for rail ballast across central Australia is $15 per tonne ex-quarry. As a comparator, albeit interstate, prices endorsed by the ESC in the Victorian Rail Access decision were $25 per tonne ex quarry and $30 per tonne delivered. Price data was obtained from the SWM ($20.70) and from the Kalgoorlie region ($15/tn ex quarry). These prices were drawn upon, with adjustments for delivery to more remote locations based on WNR unit price differentials, to inform the final recommended prices. This issue is further discussed in Table 12 of this report.
Cost per 47 kg/m turnout for DG	412,726	✔	The rates provided by the supplier are similar to that provided to other rail operators. Furthermore, the $192,872 sought by WNR for SG turnout is less that the $220,000 paid by ARTC in November 2006[8].
Catchpoint cost per item	46,000	✔	Verified by reference to a October 2006 quote from VAE Railway Systems
Earthworks Kalgoorlie to Leonora	250,000	✔	The methodology used in 2003 determination has been rechecked and confirmed by HCS as acceptable. HCS recommends a price change consistent with ABS roads and bridge construction index increase of 17%. PwC concurs with WorleyParsons that the formation fill be sourced locally and only the higher-quality capping layer be imported.

[8] As per the ARTC press release, at www.artc.com.au/docs/news/pdf/news_011106.pdf

Item	WNR Proposed Price ($)	Reasonable?	Justification
Tracklay Brunswick to Worsley	117,510	✗	Track laying is not often tested for price, hence WNR consulted with contractors and most tracklay prices were adjusted by 17% - coincidently the same rise as the ABS based rise of 17.4% used elsewhere in this report. However, this proposed tracklay increase is 25% is higher than the other tracklay rises. After considering this issue particularly the reasonable proximity of the Worsley line and the SWM, and in the absence of more specific detail on why tracklay costs more for the Worsley line, PwC/HCS recommends assuming a uniform rise in tracklay costs.
Culvert			
2100X2100	4,554	✔	Material cost agreed to quote provided by Humes. Installation cost expressed as 80% of material cost, in accordance with the ratio approved in the 2002 determination.
2400X2400	5,202	✔	

Table 9: Outcomes of the additional tests undertaken in response to the joint submission

Test issue	Outcome
The reasoning behind the locating of the new loop at Venn to the north of the major traffic growth area south of Wagerup & the change in cost for the Venn loop	WNR explained that the requirement for the new crossing loop at Venn (north of Pinjarra) is based on future pathway requirements. The Pinjarra crossing loop is constrained from further extension due to major protected level crossing infrastructure to the north and south of Pinjarra. The preferred site of Venn has been selected to accommodate a long loop consistent with other loop extensions along the SWM corridor. PwC/HCS tested whether the shorter loop at Pinjarra will still be required if a loop is added at Venn and WNR advised that the Pinjarra loop is still needed as it is the stopping place for the Australind passenger services and for passing short trains. Pinjarra is the junction point for all Alcoa traffic from Calcine to Kwinana. The Pinjarra loop will be required to hold Alcoa trains departing from Calcine when opposing trains are in the same section. Overall, PwC/HCS is of the view that the proposed new loop at Venn is operationally justified and generally supported by customers. However, as the timing for the construction of the new loop is to be primarily driven by demand from existing customers, it is not clear as to when this will eventuate and therefore PwC/HCS have excluded it from the present GRV and resulting floor and ceiling calculation. However, if WNR subsequently needs to provide the Venn loop before 2009, it may e appropriate to adjust the ceiling cost to reflect this addition. It is also noted that WNR originally sought a capital cost of $1.35m based on an initial desk-top estimate developed by the WNR Access Group. WNR later revised this estimate based on input from the WestNet Engineering Group to a capital cost of $3.22m with the cost growth mainly driven by an understatement in the allowance for signalling costs.
The reason behind the locating of the new loop at Burekup	WNR explained that they had been in consultation with users of the network on the need for a passing loop at Burekup. Target commissioning date is set for Q3 2007. Overall, PwC/HCS is of the view that the proposed new loop at Burekup is operationally justified and generally supported by customers.
The justification for the three loop extensions	WNR explained that the extension of Brunswick, Benger and Yarloop to accommodate longer trains is necessary to maximise pathway utility. Network management planning has been undertaken to consider all future expansion requirements of all current WNR customers, including Alcoa, Worsley, Griffin, Cockburn Cement, Iluka and the general freighters. The Alcoa/Worsley submission endorses only needing an extra passing loop at Burekup. While Alcoa/Worsley notes in the future there is a need for extended loops between Pinjarra and Bunbury if longer trains are required to meet future increases in tonnages, at this stage Alcoa has no plans to increase train lengths. Alcoa/Worsley also note that if Worsley expands operations there will be a requirement for additional loops between Brunswick Junction and Bunbury Inner Harbour. In order to have operational flexibility the new and extended crossing loops are deemed by WNR to be necessary to accommodate the known expansions from the existing customer base. To date, Griffin has already absorbed a daily pathway between Brunswick and Kwinana. While other expansions have not yet been contractually agreed, WNR is obligated to provide for existing and reasonable projected demand. The lead time to seek all planning and statutory approvals including construction exceeds 12 months. WNR maintains that it must consider network capacity from the customers' perspective, as well as ensuring the operational integrity to maximise on-time service delivery. Overall, PwC/HCS is of the view that the proposed extension of three loops is operationally justified and generally supported by customers.
Was the 23% increase in overheads driven by underlying cost growth or the emergence of WNR as a stand-alone entity?	WNR maintains that the rise in overheads is driven by both the physical separation of the company and the underlying cost growth, with an offsetting decrease in insurance costs. In the 2003 determination, the overheads were allocated between three business entities operating under the Australian Railroad Group (ARG). Since its sale in June 2006, WNR operates as a stand-alone business and the operating budget approved by the Board of Directors is the basis of the overheads used in the Access Pricing Model. WNR provides the following to justify the increase: ▪ Perth CPI increased 13.6% since the previous determination, which has driven a genuine uplift in costs; and ▪ The overhead baseline approved in the September 2003 determination was based on a shared services model with ARG and an assessment of WNR's level of consumption of those shared services.

Test issue	Outcome
	As overheads are primarily wages and salaries, and given these have generally risen by an average of 4% pa over the past 3 years (or 12.5% in total), it would appear that the 23% rise in overheads is comprised of 54% wages growth and 46% cost growth associated with the separation into a standalone entity. Overall, PwC/HCS is of the view that the proposed rise in overhead costs appears reasonable given intervening wages growth and the extra costs associated with separating the above and below rail businesses arising from the sale of ARG (AWR and WNR) to QLD Rail (above rail) and Babcock & Brown (network or below rail) respectively.
Earthworks	The general principle adopted by Alcoa/Worsley is accepted except that railway construction covers an elongated site with considerably more terrain variation (cuts, fills and creeks) laterally than a building site (of the same area) as generally covered by Rawlinson rates as indicated in Alcoa/Worsley letter of 9 February 2007. This elongated site then increases unit costs (over those proposed by Alcoa/Worsley using the Rawlinson rates) due to; - limited site construction width for equipment movement - toe-in of batters to reduce sideways movement (especially on curves) - topsoil stripping and stockpiling - provision of environmental protection - provision of silt barriers to watercourse - protection of cuttings from scouring - grassing, topsoiling and stabilising of fill and all earthwork batters - provision of access points and pads for maintenance, including removal and revegetation of construction roads at completion In some instances such as railway construction, the earthwork rate can be doubled by the provision of "external" items included in the item as 'earthworks' as indicated above over the standard "cut to fill" or "borrow to fill" rates indicated. Most 'greenfield' sites of a terrain such as SWM will obtain fill from 'borrow' beside the construction for which the rate should be marginally higher than cut to fill as was the principle adopted in 2003 Determination. Overall, PwC/HCS is of the view that the proposed WNR approach to calculating earthworks quantities appears reasonable.

Maintenance costs

Both submissions raised the issue of maintenance costs. A review of WNR's proposed maintenance costs for all lines has been undertaken.

Table 10 lists the proposed WNR price for the six main lines and the terminal end sections. Overall WNR has proposed a uniform escalation of 17.4% (based on ABS indices) to 2003 Determination rates to provide the 2006 unit costs.

Table 10: Proposed maintenance cost per kilometre for the main lines

Route	2003 ORAR Approved Unit Costs ($ per km)	2006 WNR Proposed Units Costs ($ per km)
Kwinana to Bunbury	15,000	17,610
Brunswick to Worsley	15,000	17,610
Worsley to Premier	8,000	9,392
Terminal end sections (9)	8,000	9,392

Route	2003 ORAR Approved Unit Costs ($ per km)	2006 WNR Proposed Units Costs ($ per km)
Forrestfield to Kalgoorlie	16,000	18,784
Kalgoorlie to Esperance	10,000	11,740
Kalgoorlie to Leonora	8,000	9,392

In assessing the reasonableness of WNR's proposed new maintenance costs for undertaking routine maintenance for a MEA network which commences from a new condition, PwC/HCS compared the WNR proposal to the actual maintenance unit costs being incurred in maintaining the existing network. Whilst these actual maintenance unit cost outcomes are confidential precluding release of full details, the proposed WNR maintenance costs on four of the mainlines are between 8% and 50% below the actual WNR 2006 unit cost outcomes. However, on one of the mainlines the WNR actual 2006 cost was 32% below the proposed unit cost with this being due to how maintenance effort is deployed over the network within any one year.

It should be noted that the WNR $6.0 million contract administration, management and overhead cost of the maintenance contracts as indicated previously in this report are excluded from the Maintenance Costs per km for individual lines as indicated in Table 10 above.

Alcoa/Worsley provided a maintenance cost specification suggesting an efficient cost of $12,700/km for the SWM. This was an update of their 2003 submission which lifted the rate by 7.5% to reflect current labour rates. The key difference between the WNR unit rate and the Alcoa/Worsley unit rate is the latters view that at MEA there should be a lower number of trackside staff because of concrete sleepers as the current focus on inspection-related work to ensure safe working would be reduced and at MEA there is no need for extra staff to complete rail grinding to improve rail life and rideability.

After reviewing both labour specifications and assessing resources required to concurrently fulfil both the inspection requirements of the Rail Safety Act and other routine maintenance functions, PwC /HCS is of the view that the WNR staff proposal is reasonable.

WNR has proposed an approach to maintenance costs which uses the unit rate as the average across a route but within route sections WNR has proposed to use higher and lower unit rates reflecting factors such as the complexity and asset count of specific sections of track (eg turnouts, cross overs, signals, level crossings).. PwC/HCS has reviewed the proposed approach and view it as reasonable particularly as it does not impact overall route costs.

Finally, the rates proposed are generally lower than the maintenance costs on comparable lines (excluding grain), as shown in table 11 below:

Table 11: Comparable maintenance costs

Line	Routine Maintenance cost ($ per km)
WNR (sectional variance range)	From 9,392 to 17,610
Moura[9]	29,350
Newlands[10]	30,630
ARTC network-wide (including some MPM)	14,662[11]
ESC Decision Victoria – freight (grain) network[12]	$5,109
ESC Decision Victoria Non-RFR Passenger[13]	$11,034

The 2003 Clause 9 Determination reviewed the issue of estimating efficient routine maintenance unit costs in detail. The PwC/HCS recommended levels where then independently reviewed, checked, tested rail engineers from Bovis lend Lease with this review endorsing the PwC/HCS unit rtes as reasonable and efficient. In summary, the 2003 Clause 9 Determination reported that QR's average maintenance cost (excluding MPM) is just over $6,000/km on 16-19tal branch lines with annual tonnages of less than 1mgt, between $7,000-$9,000/km on 19tal lines where annual tonnages are in the range of 1 to 3mgt, and between $8,000-$11,000/km on 19/21tal lines where annual tonnages are in the range of 3 to 6mgt, depending on terrain and location. Whilst it would be reasonable to now escalate these 2003 QR rates by approximately 17% these rates continue to support retention of the proposed 2006 rates. In relation to the 2004/05 ARTC maintenance cost (including MPM) of $14,662/km, without MPM, the ARTC routine maintenance cost is estimated to be less than $10,000/km.

Overall, the proposed WNR increase in maintenance costs of 17.4% appears reasonable as it is in line with the relevant ABS indices, as established in Table 6. This increase is also consistent with the rise in the cost of the John Holland outsourcing contract.

[9] As per WorleyParsons
[10] Ibid
[11] For 2004/05 See: http://www.artc.com.au/docs/accessSeeker/pdf/access_2.10/Unit%20Costs%202004-05%20for%20web.pdf
[12] http://www.esc.vic.gov.au/NR/rdonlyres/95B1F977-DEFC-40FE-829D-9F1C96CE3C02/0/DTR_FinalDecision_PacificNationalProposedAccessArrangement31052006.pdf
[13] http://www.esc.vic.gov.au/NR/rdonlyres/95B1F977-DEFC-40FE-829D-9F1C96CE3C02/0/DTR_FinalDecision_PacificNationalProposedAccessArrangement31052006.pdf

Operating and overhead costs

In the period since the separation of WNR into a standalone entity, WNR has had associated headcount growth in HR, IT and the Commercial groups which has added to costs. This has been significantly offset by a reduction in insurance costs. PwC/HCS has completed a range of assessments of individual items in the operating cost budget (as summarised in Table 6) as well as other aggregate comparisons.

Allocation methodologies

The approved WNR Costing and Pricing Principles (2003) endorse the allocation of operating costs based on train movement number (or train paths) and the allocation of overhead costs based on 50% train movements and 50% gross tonnes kilometres (GTKs). In 2005/06 ERA established a working group of interested stakeholders to assist with the review of methodologies for allocating common costs for the purposes of calculating floor and ceiling costs under the WA Rail Access Regime. Following the review of methodologies in other jurisdictions, the working group recommended that train control costs to be directly attributed to rail lines based on time spent by train control staff monitoring specific lines. This new approach had the desirable benefit of reducing the quantum of operating costs requiring allocation and producing a more accurate / cost reflective outcomes. The new cost allocation methodology is reflected in the proposed WNR costs and the recommended PwC/HCS floor and ceiling costs for rail lines.

In the submission from Alcoa and Worsley, it is stated that they still do not consider that the allocation of common costs to route sections provides a fair representation of allocated costs but they do acknowledge that the direct allocation of operating costs has been improved substantially since 2003 although the overall increase in these costs on a network wide basis is totally unacceptable and does not reflect efficient costs. Alcoa/Worsley notes that the amount of overhead allocated to the terminal end bits remained proportionally excessive. The short nature of these sections coupled with the relatively higher number of movements sees the ceiling prices in these sections made up of proportionally more overheads. In assessing his issue, PwC/HCS is of the view that assessing the equity of the overhead allocation is best done on a route basis, rather than a route section basis. Furthermore PwC/HCS understand that the separation out of the terminal end bits into formal route sections was only undertaken to enable some customers to more fully attribute costs between their operating divisions.

Alcoa and Worsley also sought:

- a more detailed breakdown of Operating Costs including separate figures for Working Capital, Operating Costs, Overheads and Network Management Costs for the lines under review.
- identification of costs allocated to other lines on the network not the subject of the proposed review.
- key indicators, such as number of full time equivalent employees, transaction costs and IT costs to prove efficient costs are being used.

PwC/HCS has reviewed such a more detailed breakdown as part of a confidential submission lodged by WNR with summarised results provided in Table 6 of this report.

5. Conclusion

The costs that PwC recommends be changed are shown below in Table 12.

Table 12: Recommended cost changes

Item[14]	2002 Approved Price ($)	2006 WNR Price ($)	2006 Alcoa Price ($)	2006 Recommended Price ($)	Justification
Track					
Cost per 60 kg/m Rail per tonne (delivered Midland)	1,102	1,440[15]	1,240	1,440	As per Table 7 – WNR price appears reasonable.
Cost per 50 kg/m Rail per tonne (delivered Midland)	1,173	1,500[16]	1,240	1,440	The price for 50kg should be reduced to the 60kg price (reasons explained in Table 8)
Cost per 41 kg/m Rail per tonne (delivered Midland)	1,138	1,600[17]	1,240	1,440	As above for 50kg/m Rail
Concrete sleeper cost SG (delivered Midland)	81	95	75	90	The information from Rocla suggests that higher volumes can generate economies of scale and lower prices down to $86/sleeper (ex-works). WNR has generally assumed an order size for the GRV of 100km of track[18] which is equivalent to an order of 160,000 sleepers which is approximately a quarter of the size of the recent order placed by ARTC with Rocla (550,000pa of 1.35m over 2.5 years). The transport component of this cost (Welshpool-Midland or 20km) is not material and may well be

[14] PwC tested a sample of the items for which unit prices were provided. For those categories which yielded discrepancies between the price sought by WNR and the price deemed appropriate by PwC – such as ballast – all the items in that category were then calculated and listed in this table.
[15] Price includes delivery to Midland
[16] Price includes delivery to Midland
[17] Price includes delivery to Midland
[18] See Annexure 7.1 of WNR Proposed Costing Principles (2002) http://www.era.wa.gov.au/rail/files/determination/finalcost_prin.pdf

Item[14]	2002 Approved Price ($)	2006 WNR Price ($)	2006 Alcoa Price ($)	2006 Recommended Price ($)	Justification
					included as part of large orders. Consequently, PwC/HCS recommends the WNR price be reduced by 5% to recognise a further scale discount but result in a price slightly above that of the $86 ex-work price for Rocla and also recognising WA may have some other input costs which are higher than eastern states.
Concrete sleeper cost NG (delivered Midland)	72	85	69	82	The NG sleeper price is typically 8% to 10% below the SG price based on it being shorter (requiring less concrete) and being cheaper to transport. PwC/HCS recommends a 9% reduction from the recommend SG price.
Ballast cost per tonne Bunbury	15	25	21 (ex quarry)	21	The lower price is available from Hanson.
Ballast cost per tonne Esperance	15	26	N/A	21	The estimate is based on the Hanson quote for delivery to Bunbury, adjusted based on the relationship of the WNR proposal for Esperance vis-à-vis Bunbury.
Ballast cost per tonne Kalgoorlie	15	20	N/A	17	The estimate is based on the Hanson quote for delivery to Bunbury, adjusted based on the relationship of the WNR proposal for Kalgoorlie vis-à-vis Bunbury.
Ballast cost per tonne Kwinana	15	25	N/A	21	The estimate is based on the Hanson quote for delivery to Bunbury, adjusted based on the relationship of the WNR proposal for Kwinana vis-à-vis Bunbury.
Ballast cost per tonne Midland	15	25	N/A	21	The estimate is based on the Hanson quote for delivery to Bunbury, adjusted based on the relationship of the WNR proposal for Midland vis-à-vis Bunbury.

Item[14]	2002 Approved Price ($)	2006 WNR Price ($)	2006 Alcoa Price ($)	2006 Recommended Price ($)	Justification
Tracklay Collie East	94,000	117,510	N/A	110,356	Track laying is not often tested for price. WNR and WorleyParsons used a GHD hypothetical estimate, but an applicable increase should be based on the relevant ABS index. The proposed increase of 25% is higher than the 17% rise in the relevant index. PwC recommends that the new price be the 2002 price, increased by 17%.
Tracklay South West Main	94,000	117,510	N/A	110,356	The proposed increase of 25% is higher than the 17% rise in the relevant index. PwC recommends that the new price be the 2002 price, increased by 17%.
Tracklay Grain Region	93,000	116,260	N/A	109,182	The proposed increase of 25% is higher than the 17% rise in the relevant index. PwC recommends that the new price be the 2002 price, increased by 17%.
Tracklay EGR dual gauge track	126,000	144,300	N/A	144,300	The proposed increase of 15% is lower than the 17% rise in the relevant index.
Tracklay Brunswick to Worsley	94,000	117,510	N/A	110,356	The proposed increase of 25% is higher than the 17% rise in the relevant index. PwC recommends that the new price be the 2002 price, increased by 17%.

For other key input prices such as culverts, bridges etc the WNR prices have been sample tested for efficiency and economies of scale. Following this sample testing, PwC/HCS did not identify any instances where WNR's proposed costs were significantly above efficient cost benchmarks.

Table 13 lists the floor and ceiling costs as recommended by PwC.

Table 13: Proposed and recommended floor and ceiling costs

	Line	WNR Proposal			Recommendation		
		Floor	Ceiling	GRV	Floor	Ceiling	GRV
Grain Lines							
1	Avon to Goomalling	96,253	4,385,906	51,500,188	96,253	3,537,192	41,109,239
2	Katanning to Tambellup	43,360	3,113,897	37,214,363	43,360	2,416,115	28,777,617
3	Kulin to Yimmining	37,780	6,497,751	80,323,583	37,780	5,010,706	62,537,019
	Total	177,393	13,997,554	169,038,135	177,393	10,964,013	132,423,875
Main lines							
4	**Kwinana to Bunbury**						
	Route Section						
	Kwinana to Mundijong Jn	306,908	4,122,772	36,951,012	302,968	4,046,979	35,950,453
	Mundijong Jn to Pinjarra	466,409	6,073,151	56,715,426	447,251	5,684,642	52,110,972
	Pinjarrato Pinjarra East	109,174	689,231	2,310,330	108,739	685,092	2,259,764
	Pinjarra East to Alumina Jn	136,962	788,122	1,311,123	136,934	787,489	1,303,113
	Pinjarra East to Pinjarra South	42,700	311,767	1,211,948	42,667	308,910	1,175,510
	Pinjarra to Wagerup	155,911	3,420,218	35,197,956	154,675	3,335,911	34,045,596
	Wagerup to Brunswick Jn	345,837	5,302,980	51,219,656	342,170	5,193,163	49,742,622
	Brunswick Jn to Picton Jn	344,031	3,503,197	28,706,611	375,330	3,624,634	29,747,377
	Picton Jn to Bunbury Inner Harb	189,931	1,512,097	8,703,167	188,989	1,502,347	8,582,097
	Total	2,097,863	25,723,536	222,327,228	2,099,724	25,169,167	214,917,505
5	**Brunswick to Premier**						
	Route Section						
	Brunswick North - East	5,359	168,677	1,160,381	13,880	166,204	1,127,498
	Brunswick - Brunswick East	13,922	495,309	3,058,037	89,280	492,587	3,020,928
	Brunswick East - Worsley	90,181	2,745,889	26,688,059	29,847	2,684,854	25,891,535
	Worsley - Worsley North	30,126	493,988	2,811,617	49,986	491,219	2,777,255
	Worsley North - Hamilton	50,745	963,112	7,539,517	8,480	948,236	7,338,466
	Worsley East - Worsley North	8,645	133,628	931,376	9,307	131,662	906,385
	Worsely - Worsely East	9,324	253,792	1,447,545	62,183	251,745	1,419,577
	Worsley East - Ewington Jn	62,438	2,156,284	23,458,746	4,328	2,106,065	22,797,320
	Ewington Jn - Premier	4,330	318,765	3,300,240	0	314,512	3,244,379
	Total	275,069	7,729,445	70,395,518	267,290	7,587,083	68,523,343
6	**Forrestfield to Kalgoorlie**						
	Route Section						
	F'Field Sth to Midland	537,775	5,858,387	49,811,584	534,792	5,822,788	49,364,830
	Midland to Millendon Jn	607,631	5,960,546	48,544,289	602,914	5,920,068	48,053,417
	Millendon Jn to Toodyay West	1,569,129	17,908,433	173,832,446	1,548,234	17,716,832	171,658,048
	Toodyay West to Avon Yard	767,561	8,499,722	77,612,338	758,907	8,421,953	76,711,792
	Avon Yard to West Merredin	1,324,139	27,746,154	284,831,163	1,301,983	27,351,898	279,899,438
	West Merredin to Koolyanobbing	1,059,754	25,270,734	264,058,081	1,045,100	24,942,601	259,907,144
	Koolyanobbing to West Kalgoorlie	1,431,828	26,136,888	256,070,979	1,406,240	25,780,954	251,653,059
	West Kalgoorlie to Border	109,055	1,713,078	13,972,929	108,514	1,703,564	13,838,659
	Avon to West Merredin Sidings	10,410	1,560,569	18,181,379	10,410	1,516,220	17,593,473
	West Merredin to Koolyanobbing Sidings	5,496	856,665	10,009,773	5,496	836,242	9,737,322
	Koolyanobbing to W Kal Sidings	2,509	389,339	4,517,230	2,509	379,249	4,382,635
	Total	7,425,287	121,900,515	1,201,442,191	7,325,098	120,392,368	1,182,799,816
7	**Kalgoorlie to Leonora**						
	Route Section						
	Kalgoorlie to Malcolm	287,966	20,533,476	242,226,407	286,534	20,252,362	238,493,508
	Malcolm to Leonora	99,512	2,660,233	28,593,082	99,364	2,631,278	28,207,372
	Menzies sidings	126	23,759	292,864	126	23,196	284,979
	Total	387,604	23,217,468	271,112,353	386,025	22,906,835	266,985,859
8	**Kalgoorlie to Esperance**						
	Route Section						
	West Kalgoorlie to Hampton	219,260	2,500,679	22,340,303	217,804	2,477,491	22,031,302
	Hampton to Kambalda	278,489	4,094,623	39,882,479	275,825	4,044,740	39,221,519
	Kambalda to Salmon Gums	912,974	22,071,889	240,668,582	892,589	21,762,440	236,701,181
	Salmon Gums to Esperance	545,575	11,005,869	117,268,011	531,179	10,807,540	114,777,143
	Kambalda siding	226	43,804	539,171	226	42,675	523,444
	Norseman Siding	195	39,959	492,797	195	38,987	479,265
	Salmon Gums Siding	473	95,592	1,175,055	473	92,721	1,135,703
	Total	1,957,192	39,852,415	422,366,398	1,918,290	39,266,594	414,869,558
9	**Terminal end bits**						
	Route Section						
	Inner Harbour 485 Pt to Alcoa (Inbound)	20,344	515,754	864,067	20,308	514,483	846,467
	Inner Harbour 486 Pt to ALCOA (Outbound)	12,132	334,228	754,239	12,129	333,297	741,177
	Inner Harbour 487 Pt to Worsley (Outbound)	7,531	219,120	631,563	7,531	218,317	620,288
	Inner Harbour 485 Pt to 486 pts	18,694	471,925	408,448	18,694	471,726	405,663
	Inner Harbour 486 Pt to 487 pts	7,145	180,928	173,927	7,145	180,793	172,036
	Inner Harbour 487 Pt to Woodchips	5,596	308,268	4,097,735	5,596	301,646	4,005,507
	Kwinana no3 points to bauxite junction	27,006	477,046	1,877,640	26,788	472,367	1,813,942
	Alcoa Bauxite Jn - Alcoa Bauxite Sdg	12,723	317,211	1,145,613	12,630	313,978	1,101,028
	Alcoa Bauxite Jn - Alcoa Caustic Sdg Pts	5,240	198,203	1,492,691	5,228	193,557	1,427,618
	Alcoa Caustic Sdg Pts -Alcoa Alumina Sdg Pts	2,150	89,188	734,898	2,149	86,883	702,585
	Total	118,562	3,111,869	12,180,820	118,198	3,087,047	11,836,312

Appendix A provides a more detailed breakdown of the above route costs into floor and ceilings by route section including the capital and operating cost components.

Ceiling price sensitivity test

To understand the relative impact on ceiling costs of specific issues raised in submissions we have completed a sensitivity test, on using the current SWM sleeper mix ie basing the calculations on 76km of the SWM being timber sleepers (rather than concrete). The unit cost used for NG timber sleepers was $103/unit. This is 25% higher than the concrete NG at a PwC/HCS recommended cost of $82/unit as used in the base case. Under this scenario there is an increase in the ceiling cost on the SWM by 1.3% or $0.32m (from $25.169m to $25.490m). The route section results of this sensitivity test are provided in the Table 14 below.

Table 14 - Ceiling price sensitivity test: SWM with 76km of timber sleepers

Line		Recommendation			Recommendation using current configuration		
		Floor	Ceiling	GRV	Floor	Ceiling	GRV
Current configuration							
4	**Kwinana to Bunbury**						
	Route Section						
	Kwinana to Mundijong Jn	302,968	4,046,979	35,950,453	302,968	4,046,466	35,950,453
	Mundijong Jn to Pinjarra	447,251	5,684,642	52,110,972	447,251	5,683,862	52,110,972
	Pinjarrato Pinjarra East	108,739	685,092	2,259,764	108,739	691,718	2,288,866
	Pinjarra East to Alumina Jn	136,934	787,489	1,303,113	136,934	788,400	1,306,844
	Pinjarra East to Pinjarra South	42,667	308,910	1,175,510	42,667	313,389	1,191,753
	Pinjarra to Wagerup	154,675	3,335,911	34,045,596	154,675	3,471,081	34,444,624
	Wagerup to Brunswick Jn	342,170	5,193,163	49,742,622	341,573	5,369,521	50,294,349
	Brunswick Jn to Picton Jn	375,330	3,624,634	29,747,377	375,330	3,624,202	29,747,377
	Picton Jn to Bunbury Inner Harb	188,989	1,502,347	8,582,097	188,989	1,502,182	8,582,097
	Total	2,099,724	25,169,167	214,917,505	2,099,127	25,490,822	215,917,334

Consequently it would not appear efficient and reasonable to use the existing configuration (rather than the MEA) in the ceiling price calculation.

Appendix A Recommended Floor & Ceiling Costs by route Section

SWM

	Section Length	Total Ceiling	Capital	Maintenance	Working Capital	Operating	Overhead	Floor	Total GRV
Total Route	**181.69**	**$ 25,169,167**	**$ 16,353,510**	**$ 3,199,614**	**$ 547,843**	**$ 1,404,938**	**$ 3,663,264**	**$ 2,099,724**	**$ 214,917,505**
Route Section									
Kwinana to Mundijong Jn	29.11	$4,046,979	$2,780,671	$509,430	$93,152	$159,048	$504,678	$302,968	$35,950,453
Mundijong Jn to Pinjarra	47.73	$5,684,642	$3,926,749	$746,356	$131,546	$184,921	$695,070	$447,251	$52,110,972
Pinjarrato Pinjarra East	1.47	$685,092	$190,138	$110,785	$6,370	$128,390	$249,410	$108,739	$2,259,764
Pinjarra East to Alumina Jn	0.23	$787,489	$124,372	$134,981	$4,166	$183,397	$340,573	$136,934	$1,303,113
Pinjarra East to Pinjarra South	1.06	$308,910	$96,510	$49,308	$3,233	$55,060	$104,800	$42,667	$1,175,510
Pinjarra to Wagerup	33.52	$3,335,911	$2,464,931	$366,552	$82,575	$109,074	$312,779	$154,675	$34,045,596
Wagerup to Brunswick Jn	42.97	$5,193,163	$3,740,922	$625,665	$125,321	$171,187	$530,069	$342,170	$49,742,622
Brunswick Jn to Picton Jn	22.08	$3,624,634	$2,336,103	$447,839	$78,259	$222,047	$540,386	$375,330	$29,747,377
Picton Jn to Bunbury Inner Harb	3.52	$1,502,347	$693,115	$208,698	$23,219	$191,814	$385,500	$188,989	$8,582,097

Brunswick-Premier

		Section Length	Total Ceiling	Capital	Maintenance	Working Capital	Operating	Overhead	Floor	Total GRV
Total Route		**68.41**	**$ 7,587,083**	**$ 5,224,603**	**$ 891,747**	**$ 175,024**	**$ 189,229**	**$ 1,106,479**	**$ 272,612**	**$ 68,523,343**
Route Section										
Brunswick North - East	17,610	0.91	$166,204	$87,793	$21,633	$2,941	$8,589	$45,248	$5,321	$1,127,498
Brunswick - Brunswick East	17,610	1.03	$492,587	$251,416	$66,556	$8,422	$27,662	$138,531	$13,880	$3,020,928
Brunswick East - Worsley	17,610	22.00	$2,684,854	$1,944,260	$381,382	$65,133	$36,042	$258,037	$89,280	$25,891,535
Worsley - Worsley North	17,610	2.32	$491,219	$236,195	$64,435	$7,913	$29,389	$153,288	$29,847	$2,777,255
Worsley North - Hamilton	9,392	8.58	$948,236	$553,240	$92,360	$18,534	$41,970	$242,132	$49,986	$7,338,466
Worsley East - Worsley North	9,392	1.07	$131,662	$71,213	$13,845	$2,386	$6,734	$37,484	$8,480	$906,385
Worsely - Worsely East	9,392	1.89	$251,745	$108,290	$19,874	$3,628	$19,994	$99,959	$9,307	$1,419,577
Worsley East - Ewington Jn	9,392	28.24	$2,106,065	$1,708,478	$214,828	$57,234	$14,725	$110,801	$62,183	$22,797,320
Ewington Jn - Premier	9,392	2.39	$314,512	$263,718	$16,833	$8,835	$4,126	$20,999	$4,328	$3,244,379

Forrestfield-Kalgoorlie

	Section Length	Total Ceiling	Capital	Maintenance	Working Capital	Operating	Overhead	Floor	Total GRV
Total Route	**856.78**	**$ 120,392,368**	**$ 92,410,557**	**$ 16,093,831**	**$ 3,095,754**	**$ 1,746,243**	**$ 7,045,984**	**$ 7,325,098**	**$ 1,182,799,816**
Route Section									
F'Field Sth to Midland	25.71	$5,822,788	$3,988,982	$978,742	$133,631	$295,249	$426,184	$534,792	$49,364,830
Midland to Millendon Jn	28.25	$5,920,068	$3,964,320	$1,060,940	$132,805	$287,422	$474,582	$602,914	$48,053,417
Millendon Jn to Toodyay West	125.14	$17,716,832	$13,632,536	$2,484,885	$456,690	$266,347	$876,375	$1,548,234	$171,658,048
Toodyay West to Avon Yard	51.83	$8,421,953	$6,123,330	$1,314,430	$205,132	$251,494	$527,567	$758,907	$76,711,792
Avon Yard to West Merredin	190.94	$27,351,898	$21,761,211	$3,297,196	$729,001	$206,854	$1,357,636	$1,301,983	$279,899,438
West Merredin to Koolyanobbing	191.98	$24,942,601	$19,958,287	$2,945,003	$668,603	$169,101	$1,201,607	$1,045,100	$259,907,144
Koolyanobbing to West Kalgoorlie	204.33	$25,780,954	$19,352,880	$3,533,391	$648,321	$189,513	$2,056,848	$1,406,240	$251,653,059
West Kalgoorlie to Border	6.21	$1,703,564	$1,155,384	$304,026	$38,705	$80,264	$125,185	$108,514	$13,838,659
Avon to West Merredin Sidings	18.05	$1,516,220	$1,372,494	$97,747	$45,979	$0	$0	$10,410	$17,593,473
West Merredin to Koolyanobbing Sidings	9.61	$836,242	$758,843	$51,978	$25,421	$0	$0	$5,496	$9,737,322
Koolyanobbing to W Kal Sidings	4.75	$379,249	$342,289	$25,493	$11,467	$0	$0	$2,509	$4,382,635

Kalgoorlie-Leonora

	Section Length	Total Ceiling	Capital	Maintenance	Working Capital	Operating	Overhead	Floor	Total GRV
Total Route	**262.36**	**$ 22,906,835**	**$ 19,262,345**	**$ 2,464,113**	**$ 645,289**	**$ 164,057**	**$ 371,031**	**$ 386,025**	**$ 266,985,859**
Route Section									
Kalgoorlie to Malcolm	237.50	$20,252,362	$17,188,186	$2,113,713	$575,804	$82,028	$292,630	$286,534	$238,493,508
Malcolm to Leonora	24.54	$2,631,278	$2,053,721	$348,328	$68,800	$82,028	$78,401	$99,364	$28,207,372
Menzies sidings	0.33	$23,196	$20,438	$2,073	$685	$0	$0	$126	$284,979

Esperance

	Section Length	Total Ceiling	Capital	Maintenance	Working Capital	Operating	Overhead	Floor	Total GRV
Total Route	**399.73**	**$ 39,266,594**	**$ 30,807,114**	**$ 4,692,865**	**$ 1,032,038**	**$ 515,116**	**$ 2,219,461**	**$ 1,918,290**	**$ 414,869,558**
Route Section									
West Kalgoorlie to Hampton	17.88	$2,477,491	$1,691,225	$320,673	$56,656	$171,887	$237,049	$217,804	$22,031,302
Hampton to Kambalda	38.25	$4,044,740	$2,911,959	$527,207	$97,551	$171,887	$336,137	$275,825	$39,221,519
Kambalda to Salmon Gums	229.60	$21,762,440	$17,467,275	$2,519,704	$585,154	$85,671	$1,104,636	$892,589	$236,701,181
Salmon Gums to Esperance	111.60	$10,807,540	$8,580,379	$1,312,409	$287,443	$85,671	$541,638	$531,179	$114,777,143
Kambalda siding	0.61	$42,675	$38,142	$3,255	$1,278	$0	$0	$226	$523,444
Norseman Siding	0.52	$38,987	$35,013	$2,801	$1,173	$0	$0	$195	$479,265
Salmon Gums Siding	1.28	$92,721	$83,121	$6,816	$2,785	$0	$0	$473	$1,135,703

Terminal End Bits

	Section Length	Total Ceiling	Capital	Maintenance	Working Capital	Operating	Overhead	Floor	Total GRV
Total Route	**10.52**	**$ 3,087,047**	**$ 914,202**	**$ 98,823**	**$ 30,626**	**$ 326,592**	**$ 1,716,805**	**$ 118,198**	**$ 11,836,312**
Route Section									
Inner Harbour 485 Pt to Alcoa (Inbound)	0.51	$514,483	$81,225	$7,851	$2,721	$68,152	$354,534	$20,308	$846,467
Inner Harbour 486 Pt to ALCOA (Outbound)	0.38	$333,297	$67,466	$3,039	$2,260	$42,224	$218,307	$12,129	$741,177
Inner Harbour 487 Pt to Worsley (Outbound)	0.33	$218,317	$54,047	$2,524	$1,811	$25,928	$134,008	$7,531	$620,288
Inner Harbour 485 Pt to 486 pts	0.08	$471,726	$49,505	$574	$1,658	$68,152	$351,837	$18,694	$405,663
Inner Harbour 486 Pt to 487 pts	0.06	$180,793	$20,006	$353	$670	$25,928	$133,836	$7,145	$172,036
Inner Harbour 487 Pt to Woodchips	3.18	$301,646	$265,381	$24,807	$8,890	$399	$2,169	$5,596	$4,005,507
Kwinana no3 points to bauxite junction	1.85	$472,367	$145,802	$26,401	$4,884	$45,401	$249,878	$26,788	$1,813,942
Alcoa Bauxite Jn - Alcoa Bauxite Sdg	1.30	$313,978	$83,859	$15,603	$2,809	$32,808	$178,899	$12,630	$1,101,028
Alcoa Bauxite Jn - Alcoa Caustic Sdg Pts	1.89	$193,557	$98,720	$12,029	$3,307	$12,593	$66,907	$5,228	$1,427,618
Alcoa Caustic Sdg Pts -Alcoa Alumina Sdg Pts	0.94	$86,883	$48,189	$5,640	$1,614	$5,009	$26,429	$2,149	$702,585

Grain lines

	Section Length	Total Ceiling	Capital	Maintenance	Working Capital	Operating	Overhead	Floor	Total GRV
Total Route	**307.30**	**$ 10,964,013**	**$ 9,274,749**	**$ 973,882**	**$ 310,704**	**$ 246,689**	**$ 157,990**	**$ 177,393**	**$ 132,423,875**
Route Section									
Avon to Goomalling	57.69	$3,537,192	$2,876,156	$311,526	$96,351	$151,655	$101,504	$96,253	$41,109,239
Katanning to Tambellup	46.71	$2,416,115	$1,997,515	$252,245	$66,917	$63,356	$36,082	$43,360	$28,777,617
Kulin to Yilminning	99.81	$5,010,706	$4,401,078	$410,111	$147,436	$31,678	$20,404	$37,780	$62,537,019