Hunter Valley Coal Network

Submission on compliance with the pricing principles in the NSW Rail Access Undertaking 2015-16 to 2017-18

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Contents

1 Introduction

The NSW Rail Access Undertaking (the Undertaking) is the framework by which a Rail Infrastructure Owner (RIO) is required to assess requests for access to the NSW Rail Network.

In relation to access pricing, the Undertaking requires RIOs to comply with the Asset Valuation Roll Forward Test, Ceiling Test and Floor Test, on an annual basis.

Table 1: Compliance tests in the NSW Rail Access Undertaking

Test	Description
Asset Valuation Roll Forward Test	The Asset Valuation Roll Forward Test defines the value of the Regulatory Asset Base (RAB) for a particular network, on an annual basis: • The RAB in year t is given by: • $(RAB_{t-1} \times CPI_t) + ADD_t + Capex_t - Dep_t - Disp_t$ • Only capital expenditure (capex) that relates to the relevant traffic on a standalone basis is to be included. • A capital expenditure consultation process is required for all networks.
Ceiling Test	The Ceiling Test requires that access charges set by RIOs do not exceed its Full Economic Costs (FEC) on a standalone basis: • The FEC on a standalone basis comprises of direct costs, shared costs, depreciation and return on assets. • The RIO is obliged to maintain an unders and overs account which keeps track of deviations around the rate of return and if any access seekers breach the Ceiling Test.
Floor Test	The Floor Test requires that access charges set by RIOs must cover the direct costs imposed by the access seekers. Further by sector or group of sectors the access revenue along with line specific CSOs if applicable at least cover full incremental costs. Full incremental costs are defined under the Undertaking as costs that are not incurred if a sector(s) is removed from the network.

Hunter Valley Coal Network – RailCorp

The RailCorp-owned portion of the Hunter Valley Coal Network (HVCN) comprises the five sectors between Newstan Junction and Woodville Junction, as shown in Table 1.

Table 2: RailCorp-owned sectors of the Hunter Valley Coal Network

Sector	Name
405	Newstan Junction to Cockle Creek
406	Cockle Creek to Sulphide Junction
490	Sulphide Junction to Adamstown
407	Adamstown to Broadmeadow (via Main)
497	Broadmeadow to Woodville Junction

This submission outlines RailCorp's compliance with the Undertaking for the financial years 2015-16 to 2017-18 for the HVCN. It focuses on three groups of Access Seekers; trains carrying coal, freight and both coal and freight. The passenger Access Seeker group has not been considered in this submission as the operational requirements and fixed costs of rail

infrastructure for passenger trains are significantly different than for freight-only services and access fees are generally not charged.

2 Key changes to approach since last submission

In previous decisions, the Independent Pricing and Regulatory Tribunal (IPART) determined that RailCorp had not complied with the Ceiling Test as claimed operating costs were higher than the efficient costs based on an optimal configuration of a freight network.

As a result, RailCorp has adopted some changes to its approach to estimating the FEC to address the issues identified by IPART.

There have been two key changes to the methodology that RailCorp has adopted with the estimation of the FEC:

- Determination of the optimal configuration of rail infrastructure that is required in order to serve all Access Seekers operating in a common end market, consistent with clause 2.2(c), Schedule 3 of the Undertaking
- Determination of the efficient benchmark of operating and maintenance costs (i.e. maintenance costs, network control costs and corporate and system overheads) based on an optimal configuration of the rail network.

These are discussed in more detail below.

2.1 Overall approach

To estimate the FEC for each year between 2015-16 and 2017-18, RailCorp has:

- Used the Closing RAB as at 30 June 2015 from IPART's Final Decision in 2014-15
- Rolled forward the value of the RAB for major periodic maintenance capital expenditure, depreciation, disposals and increases in the Consumer Price Index (CPI) each year, consistent with clause 3, Schedule 3 of the Undertaking
- Apportioned the value of the RAB used to serve coal and general freight users based on the amount of gross tonne kilometres (gtk) hauled by each group of Access Seekers, which allows the estimation of separate RAB values for coal, general freight and combined coal and general freight Access Seekers on a standalone basis
- Determined the optimal configuration of rail infrastructure required to serve all Access Seekers operating in the market for coal and general freight, consistent with clause 2.2(c), Schedule 3 of the Undertaking. This is discussed further in Section 2.2
- Determined the efficient unit costs for operating and maintenance, network control and corporate and system overheads based on the optimal configuration of the rail network. This is discussed further in Section 2.3
- Modelled the FEC for each of the coal, general freight and combined coal and general freight Access Seekers on a standalone basis, including consideration of an appropriate rate of return and depreciation.

2.2 Optimal configuration of rail infrastructure

Schedule 3 of the Undertaking requires that:

- The estimate of FEC as part of the Ceiling Test reflect the costs on a standalone basis for the Access Seeker or group of Access Seekers
- The assessment of costs on a standalone basis are based on the optimal configuration of rail infrastructure in order to serve all Access Seekers operating in a common end market.

RailCorp has sought to determine the optimal configuration of rail infrastructure in order to serve the market for the supply and transportation of coal and general freight on the HVCN (i.e. to serve all Access Seekers operating in a common end market). This optimal configuration of the rail network would be used to underpin the estimate of benchmark operating costs for RailCorp's HVCN and used to model the FEC.

2.2.1 Key issues

In this submission, the optimal rail configuration on a standalone basis has been based on a "Brownfield approach" and examines the assets in situ and then determines whether they are required by particular groups of Access Seekers and the required amount of assets.

RailCorp considered using a "Greenfield approach" to determining the optimal configuration of the rail network, which assumes a 'first principles' basis on a hypothetical area free of any development. It involves determining the replacement cost of assets based on what is the most cost-effective (or optimal) set of assets to achieve the required level of economic benefits in terms of capacity, service quality and useful life.

While there could be some theoretical merit to adopting a Greenfield approach, RailCorp has chosen not to adopt such an approach because a Greenfield approach:

- Is inconsistent with IPART's previous decisions for RailCorp
- Does not have any precedent for use under the Undertaking
- Was not adopted by IPART's consultant (Booz) when determining the initial RAB for the HVCN in 2001. IPART asked Booz to determine the initial RAB for the HVCN and the TOR asked for both a Brownfield and Greenfield assessment DORC. However Booz did not appear to adopt any greenfield assumptions and instead "followed a fairly pragmatic approach and not considered radical and purely theoretical combinations of technology, structure and layout", which IPART subsequently adopted
- Is more costly and timely to estimate
- Is subjective and the outcome would be sensitive to the interpretation of the 'first principles' underpinning a Greenfield approach in this instance (e.g. is it a rail solution at all? If so, what is the alignment and what easements required?).

Therefore, to determine the optimal configuration of the HVCN and the Metropolitan Rail Network (MRN) as standalone networks for coal and general freight access seekers, RailCorp adopted a Brownfield approach. To do this, RailCorp used the existing assets and configuration of the HVCN as a starting point and considered whether assets were required by particular groups of Access Seekers and the required amount of assets.

To do this, RailCorp:

- Facilitated a number of workshops were held with key internal stakeholders from TfNSW and Sydney Trains
- Reviewed IPART's previous decisions on the definition of the optimal rail configuration on a standalone basis and the grouping of Access Seekers
- Considered the types of Access Seekers across each of the networks e.g., coal, bulk freight, non-bulk freight and passenger
- Analysed network use by different Access Seekers (i.e. number of train paths) and assessed how this has changed over time
- Reviewed the existing constraints on the networks when considered as brownfield sites.

2.2.2 Summary

In RailCorp's view:

- It is worth noting that while the Undertaking requires the HVCN to be treated as a standalone coal network for the purposes of determining efficient maintenance costs the HVCN is part of the Australian interstate rail network which is a critical component of the broader national supply chain. The network effects of considering the HVCN as a standalone coal network should therefore be considered, as the constraints to the HVCN's network capacity would impact on all services nationally.
- There are three important access seeker groups that would be impacted by considering the HVCN on a standalone basis (as a single line). For coal and general freight services the 21km of the HVCN represent only a small part of the total journey on the RailCorp network. In fact the majority of their journey is on the MRN:
    - There are two types of coal trains that originate from the western coal fields – one from Clarence and the other from the Airly and Lidsdale region. The Clarence train uses the MRN line which is located west of Katoomba to export coal to Newcastle via the HVCN. The Airly and Lidsdale train uses the Country Rail Network west of Lithgow transport to export coal to Newcastle via the Western and Northern corridors of the RailCorp network, and finally RailCorp's HVCN.
    - Interstate intermodal trains which are up to 1,500m long use the HVCN. These services are time sensitive operating between Melbourne and Brisbane or Sydney and Brisbane. Their train path through the HVCN are timed to integrate with train paths on the ARTC network and to arrive at their destination at a time required to meet the needs of the logistics industry.
    - Suburban passenger services operating between Berowra and Strathfield on the MRN do not operate on the HVCN, however freight trains running out of course impact on these services. They also impact Intercity passenger services operating between Sydney and Newcastle.
- While it may be possible to operate coal trains on a single line HVCN if the network is considered in isolation, the HVCN is a small part of a larger network that operates multiple services that need to be integrated across the wider network. It is considered that the HVCN should be treated as a double track network from a network capacity point of view.

As a result, RailCorp's determination of the optimal configuration is based on the following:

- The key differences between the current rail configuration and the optimal configuration of rail infrastructure as required by clause 2.2, Schedule 2 of the Undertaking are:
    - An optimal coal only or a general freight only network would require significantly less signalling than the current shared network. It could be argued that for a coal or freight only network (without suburban passenger services) the number of signals could be reduced by 50% with consequent reductions in signal maintenance tasks
    - If the networks only operated coal and freight trains (based on current volumes) on a double track network there would be no need for additional crossing loops as there would be sufficient capacity to operate coal and freight services
    - If the networks only operated coal and freight trains, points and crossings would only be required at crossing loops and junctions. It is estimated that 50% of existing points & crossings assets would be required to allow freight trains to use the alternate track during maintenance works

- All other assets and aspects of the current configuration of the HVCN are consistent with the optimal configuration of rail infrastructure in order to serve all Access Seekers operating in a common end market, as defined under clause 2.2, Schedule 2 of the Undertaking.

As a result, to summarise, RailCorp has determined an optimal rail configuration that is the status quo configuration with the following changes:

- Only 50% of the current signalling and control assets
- No electrification, stations or depots (required for passenger operations only).

2.3 Efficient benchmark operating and maintenance costs

RailCorp has undertaken a benchmarking exercise of its maintenance costs on the HVCN against rail networks with similar operating characteristics to estimate the efficient unit costs based on the optimal configuration of the rail network determined above.

2.3.1 Approach

The approach to benchmarking is based on comparing maintenance costs for networks with similar operating characteristics. There are no rail networks in Australia that are similar to the RailCorp network in all respects. The RailCorp network is a shared network operating a combination of high density passenger services throughout the day including substantial periods when access for freight services is restricted due to passenger peak capacity constraints. In addition to passenger services, the RailCorp network also provides capacity to operate coal and general freight services. As a result, any benchmarking exercise must be undertaken with care and the impact of network, regulatory and environmental differences must be considered in interpreting the findings.

However, there are some valuable insights that can be inferred from a benchmarking exercise on the range of costs that are likely to be efficient for the HVCN based on the optimal configuration of the rail network as determined above.

To achieve this RailCorp completed the following:

- Analysed the costs of Sydney Trains' (maintainer of RailCorp network) routine and major periodic maintenance, subtracting costs which related to assets not utilised by freight users
- Obtained cost data from system comparable networks as part of their regulatory submissions. The networks chosen were:
    - ARTC's Hunter Valley Coal Network
    - Queensland Rail's West Moreton Network
    - Aurizon's Moura Network
- Assumed that a standalone efficient network to carry the current freight demand could only realistically be based upon the existing network with unnecessary assets removed, rather than based upon a hypothetical 'new' purpose-built network.

2.3.2 Sources of data

We have relied on publicly available data when modelling the outcomes for ARTC, Moura and West Moreton. ARTC also provided some high level confidential information. To ensure that all data from these companies used was consistent with the Sydney Trains data we:

- Categorisation of capital and operating expenditure by benchmarked companies consistent with Sydney Trains (i.e. expenditure defined consistently to allow comparison of 'apples with apples')
- Benchmarked company data used reflect steady state figures.

This enabled us to use the data to produce the most effective benchmarking outcomes. Below outlines the data details about each comparator we used for the exercise.

- ARTC has provided confidential high level data on maintenance costs for its HVCN, which is predominantly a coal network. However, it is acknowledged that while the part of the HVCN operated by ARTC and the much smaller part of the HVCN owned by RailCorp share engineering characteristics such as standard gauge, concrete sleepers and 60kg/m rail, they are substantially different in scale and operations.
- Maintenance cost data for Queensland Rail's West Moreton system has been sourced from publicly available information such as annual reports. It is predominantly a coal network however, coal trains are restricted to 15.75 tonne axle loads and are 670m in length due to a combination of timber sleepers and rail that ranges from 41kg/m to 60kg/m. Coal trains enter the Brisbane suburban network at Rosewood enroute to the port at Fisherman Island and are subject to similar capacity constraints as are coal and freight trains on the RailCorp network. Unfortunately cost information for the shared Brisbane suburban network is not available.
- Maintenance cost data for the Aurizon Moura system has been sourced from publicly available documents such as annual reports and investor presentations. It is a coal-only network that would be regarded as the most similar to the RailCorp HVCN from an engineering perspective. Although narrow gauge, it is concrete sleepered with 60kg/m rail and operates trains with axle loads of 26.5 tonnes.
- Sydney Trains has provided maintenance data for the RailCorp HVCN and the MRN. The RailCorp HVCN is concrete sleepered with 60kg/m rail and operates trains with axle loads up to 30 tonnes. The data provided by Sydney Trains provides greater detail on input costs, however is not at a level where input costs for the HVCN and MRN can be separately identified. Maintenance costs were provided across the whole network including those parts of the network where no freight trains are operated and are therefore a network wide average. This means that the HVCN costs that we have used in the benchmarking exercise implicitly include the costs of other parts of rail network, some of which are likely to be higher costs than HVCN's unit rates, therefore overstating HVCN's unit costs.

2.3.3 Network comparison

Table 3 compares the key network characteristics of the benchmark comparator rail network operators with that of RailCorp's HVCN.

Table 3: Comparison of rail infrastructure operators

Rail network	RailCorp –HVCN	ARTC – HVCN	Aurizon – Moura	QR – West Moreton
Track configuration	Standard gauge double track	Standard gauge single line with crossing loops, double, triple and quadruple track	Narrow gauge single line with crossing loops,	Narrow gauge single line with crossing loops
Topography, alignment	Urban	Mostly rural / regional	Rural	Rural

Train types	Coal, general freight, intercity passenger, regional passenger	Predominantly coal, some general freight, regional passenger	Coal	Predominantly coal, regional passenger 2 days per week, some general freight
Axle load	30 tonnes	30 tonnes	26.5 tonnes	15.75 tonnes
Maximum train length	1500m	1500m	1600m	670m
Track kilometres	52km including passing loops and sidings at Broadmeadow and Sulphide Junction yards	944km including loops and sidings	230km including crossing loops and sidings	356km including crossing loops, 53km duplicated
Rail	60kg/m	60kg/m	60kg/m	Predominantly 41kg/m, some 50kg/m and 60kg/m
Sleepers	Concrete	Concrete	Concrete	Timber, steel, concrete
Train km	780,011	8,473,000	470,588	1,304,218
Gross tonnes per train	907	5118	5,100	1,693

2.3.4 Summary

The analysis of the maintenance costs of the three comparator rail networks has identified large differences in unit costs of maintenance. This is not surprising given that there are significant inherent differences between the networks, as shown Table 4.

In any benchmarking exercise, there are inevitably gaps in the data particularly when some of that data is sourced from publicly available information such as annual reports. Analysis of this data requires a degree of interpretation and engineering judgement:

- The analysis of maintenance costs for the Aurizon Moura network and the QR West Moreton network was completed based on such publicly available data
- ARTC provided confidential information for the ARTC HVCN, however understandably this data was provided at a high level and is network wide data. The data for discrete track sections is therefore not available.

Table 4: Estimated unit maintenance costs for benchmark comparator networks

System	Costs per '000 gtk
ARTC HVCN	$3.09
Aurizon Moura Network	$7.41
QR West Moreton Network	$13.18

In RailCorp's view:

- While the ARTC HVCN is seen as a good benchmark, its enormous scale economies distort the comparison and costs are heavily influenced (very low in gtk terms) by the very large volumes of coal on that network

- Aurizon's Moura system and Queensland Rail's West Moreton system are of a more similar scale to RailCorp HVCN
- Maintenance costs for the RailCorp HVCN would be higher than for the Moura network and lower than the West Moreton network
- On this basis we conclude that the efficient maintenance cost for the RailCorp HVCN as a standalone coal network would lie between $7.41 and $13.18 per '000 gtk
- An efficient cost of $10 per '000 gtk is attainable for the RailCorp HVCN and has been used in the modelling of FEC.

3 Asset Valuation Roll Forward

The following tables show the Asset Valuation Roll Forward Tests for the HVCN for the combined coal and general freight, coal and general freight Access Seeker groups.

3.1 Combined coal and general freight Access Seeker

Table 5 Asset Valuation Roll Forward Test - Combined coal and general freight Access Seeker ($)

RAB Component	2015-16	2016-17	2017-18
Opening RAB	15,086,489	14,856,597	14,564,098
Opening RAB x CPI	290,332	225,100	294,292
Add CAPEX	0	0	0
Add Additions	0	0	0
Less Depreciation	-520,224	-520,318	-520,325
Less Disposals	0	0	0
Closing RAB	14,856,597	14,564,098	14,338,286

3.2 Coal Access Seeker

Table 6 Asset Valuation Roll Forward - Coal Access Seeker ($)

RAB Component	2015-16	2016-17	2017-18
Opening RAB	6,633,103	6,532,026	6,449,591
Opening RAB x CPI	127,651	98,970	130,325
Add CAPEX	0	0	0
Add Additions	0	0	0
Less Depreciation	-228,728	-230,418	-269,696
Less Disposals	0	0	0
Closing RAB	6,532,026	6,449,591	7,431,848

3.3 General freight Access Seeker

Table 7 Asset Valuation Roll Forward Test - General freight Access Seeker ($)

RAB Component	2015-16	2016-17	2017-18
Opening RAB	8,453,386	8,324,571	8,114,507
Opening RAB x CPI	162,681	126,130	163,967
Add CAPEX	0	0	0
Add Additions	0	0	0
Less Depreciation	-291,496	-289,899	-250,629
Less Disposals	0	0	0
Closing RAB	8,324,571	8,114,507	6,906,438

4 Ceiling Test

The following tables show the Ceiling Tests for the HVCN for each Access Seeker group.

4.1 Combined coal and general freight Access Seeker

Table 8 Ceiling Test - Combined coal and general freight Access Seeker ($)

Component	2015-16	2016-17	2017-18
Revenue	**6,379,502**	**6,037,864**	**8,756,261**
Maintenance costs	4,606,131	5,026,441	5,749,204
Network control costs	513,241	554,395	626,903
Corporate & system overheads	701,354	764,574	873,527
Depreciation	520,224	520,318	520,325
Return on RAB	883,321	867,910	852,620
Full Economic Cost	**7,224,271**	**7,733,638**	**8,622,580**
Recovery (negative indicates over recovery)	*844,769*	*1,695,774*	*-133,681*
% recovery of full economic cost	*88%*	*78%*	*102%*

4.2 Coal Access Seeker

Table 9 Ceiling Test - Coal Access Seeker ($)

Component	2015-16	2016-17	2017-18
Revenue	**4,804,654**	**4,304,336**	**6,931,163**
Maintenance costs	1,814,205	2,005,067	2,713,192
Network control costs	174,066	191,826	260,544
Corporate & system overheads	272,393	300,974	407,402
Depreciation	228,728	230,418	269,696
Return on RAB	388,371	382,958	409,502
Full Economic Cost	**2,877,763**	**3,111,244**	**4,060,336**
Recovery (negative indicates over recovery)	*-1,926,891*	*-1,193,092*	*-2,870,827*
% recovery of full economic cost	*167%*	*138%*	*171%*

4.3 General freight Access Seeker

Table 10 Ceiling Test - General freight Access Seeker ($)

Component	2015-16	2016-17	2017-18
Revenue	**1,574,848**	**1,733,528**	**1,825,098**
Maintenance costs	2,791,926	3,021,374	3,036,012
Network control costs	339,175	362,568	366,360
Corporate & system overheads	428,961	463,600	466,125
Depreciation	291,496	289,899	250,629
Return on RAB	494,950	484,953	443,118
Full Economic Cost	**4,346,507**	**4,622,394**	**4,562,244**
Recovery (negative indicates over recovery)	*2,771,660*	*2,888,866*	*2,737,146*
% recovery of full economic cost	*36%*	*38%*	*40%*

5 Unders and Overs Account

The following table shows the Unders and Overs Account for the HVCN from 2015-16 to 2017-18 for the combined coal and general freight Access Seeker.

The Unders and Overs account balance from 2015-16 to 2017-18 has been estimated using RailCorp's new methodology. This has been added to the balance as at 30 June 2015 as determined by IPART in its last compliance decision in 2014-15. The balance in the subsequent years from 2015-16 to 2017-18 has been estimated using RailCorp's new approach.

5.1 Combined coal and general freight Access Seeker

Table 11 Unders and Overs Account - Combined coal and general freight Access Seeker ($)

Item	$
IPART determined: as at 2014-15	
Balance at 30 June 2015	6,830,805
TfNSW modelled: 2015-16 to 2017-18	
2015-16 – estimated under-recovery	844,769
Balance at 30 June 2016	5,986,036
2016-17 – estimated under -recovery	1,695,774
Balance at 30 June 2017	4,290,262
2017-18 – estimated over-recovery	-133,681
Balance at 30 June 2018	4,423,943

The following tables show the Unders and Overs balance for the coal and general freight access seeker group from 2015—16 to 2017-18.

5.2 Coal Access Seeker

Table 12 Unders and Overs account - Coal Access Seeker ($)

Item	$
TfNSW calculated 2015-16 to 2017-18	
2015-16 – estimated over-recovery	-1,926,891
2016-17 – estimated over-recovery	-1,193,092
2017-18 – estimated over-recovery	-2,870,827

5.3 General freight Access Seeker

Table 13 Unders and Overs account - General freight Access Seeker ($)

Item	$
TfNSW calculated 2015-16 to 2017-18	
2015-16 – estimated under-recovery	2,771,660
2016-17 – estimated under-recovery	2,888,866
2017-18 – estimated under-recovery	2,737,146

5.4 Implications

TfNSW intends to work with stakeholders to address these issues and is also currently reviewing the pricing framework currently used to determine access charges for the HVCN. The purpose of this review is to identify the key considerations and options for future rail access pricing to address the estimated Unders and Overs account balance, including:

- Determining how to best adjust access charges that comply with the Undertaking,
- Understanding options for a transition path for the treatment of historical over-recoveries and under-recoveries of revenue compared to the Undertaking
- Developing an appropriate new pricing framework that provides flexibility for access charges to adjust in response to changes in the Full Economic Cost or market conditions, consistent with the Undertaking and TfNSW's pricing objectives.

This will provide transparency to customers and stakeholders and also provide a degree of certainty to IPART about future access pricing and compliance.

6 Key assumptions

Component	Inputs
Opening RAB	The Opening RAB for each year from 2015-16 to 2017-18 has been estimated based on: • The Closing RAB as at 30 June 2015 of $15,093,975 (as determined by IPART in its 2014-15 Final Decision) • Major periodic maintenance capital expenditure, depreciation and disposals in 2015-16 and 2016-17 and 2017-18 • Increases for CPI.
Optimal configuration of rail network	Optimal configuration of the HVCN for Access Seeker operating in a common end market (i.e. the market for the supply and transportation of coal and non-coal freight) on a standalone basis is the current network with: • 50% reduction in signalling assets • Removal of all electrification, depots and platforms.
Efficient maintenance costs	Determined an efficient maintenance cost of $10 per '000 gtk for the HVCN based on an optimal configuration of the rail network: • Benchmarking work concluded that the efficient maintenance cost would lie between the estimated unit costs of Aurizon's Moura coal network ($7.41 per '000 gtk) and Queensland Rail's West Moreton coal system ($13.18 per '000 gtk) • ARTC HVCN has very large volumes of coal and its enormous economies of scale distort comparisons with RailCorp's HVCN which has very low volumes • Overheads have been applied to each program at 13.7% this is the maintenance recovery rate provided by Sydney Trains for RM, MPM, Capital, External Works internal resource delivery, on the basis that most of these programs are delivered by an internal Sydney Trains resources.
Network control costs	Determined an efficient level of network control costs of $2.86 per train kilometre: These costs are considered reasonable given that if the separate network control centre were to be established to operate trains over the RailCorp HVCN it would need to be staffed on a 24/7 basis which would require six network control staff on rotating shifts.

Inflation	As required by clause 3 of the Undertaking, inflation has been calculated as the percentage change in the CPI from the year t-2 to the year t-1 using the average of the ABS Sydney All Groups Consumer Price Index for the four quarters to June in the year t-1 when compared to the average for the four quarters to June in the year t-2.
Rate of return	The Return on RAB has been calculated based on a 5.9% post-tax real WACC, consistent with IPART''s Final Decision on its Review of the rate of return and remaining mine life from 1 July 2014. Tax allowance has been estimated consistent with IPART's building block model template (note: for simplicity, straight-line depreciation has been used instead of tax depreciation as a deduction in the calculation of taxable income. Tax depreciation would require the development of a separate tax asset base and maintenance of tax asset lives which are not available for the HVCN).
Depreciation	Depreciation of: • The 'Rail infrastructure' asset class has been estimated based on the remaining mine life (i.e. a terminal date of 2044), consistent with IPART''s Final Decision on its Review of the rate of return and remaining mine life from 1 July 2014 • All other asset classes have been estimated based on remaining technical life.
Capital expenditure	Only major periodic maintenance capital expenditure has been included in the calculation of the Ceiling Test, as this relates to traffic on a standalone basis, all other capital expenditure has not been included.
Underlying internal costs and volumes data	Sourced from TfNSW databases.