PRICEWATERHOUSECOOPERS

**In association with**
AECOM

## Economic Regulation Authority

# Review of Floor and Ceiling Cost Proposal of the Pilbara Infrastructure Pty Ltd

## Draft Report

February 2011

# Disclaimer



**Contact Details:**

For further information on this report contact:

Scott Lennon
Partner – PricewaterhouseCoopers
Ph: 02 8266 2765
Email: scott.lennon@au.pwc.com

Barry Moore
Group Manager, Rail, WA
AECOM
Ph: 08 6430 2341
Email: barry.moore@aecom.com

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# 1 Introduction

Under Schedule 4 of the Railways (Access) Code 2000, (the Code) the Economic Regulation Authority (ERA) is required to approve the floor and ceiling costs for railway routes subject to, or likely to be subject to, third party access requests. On 2 June 2010 the ERA approved arrangements, specified in the Costing Principles (CP) document of The Pilbara Infrastructure Pty Ltd (TPI), which set out principles, rules and practices to be applied to determine the floor and ceiling costs to apply in relation to third party access to the TPI railways network.

TPI's floor and ceiling cost proposal is contained in a model submitted to the ERA dated 2 July 2010. We note that Fortescue Metals Group (FMG) submitted the proposal on behalf of TPI. The Code identifies TPI as the owner of the railways network. In this report we refer to TPI as the railway owner in terms of the Code and therefore as the entity subject to the provisions of the Western Australian rail access regime. This report by PricewaterhouseCoopers (PwC) in conjunction with AECOM provides an assessment of the TPI proposal - in terms of its key assumptions, processes, input data and calculated costs - against the provisions of TPI's approved CP, and also against the requirements of the Code, where matters contained in the cost proposal are not otherwise prescribed in the CP.

## 1.1 Regulatory Framework

The regulatory regime to facilitate third party access to prescribed railway infrastructure in Western Australia (WA) is provided under the Railways (Access) Act 1998 (the Act), the object of which is to establish a rail access regime that encourages the efficient use of, and investment in, railway facilities by facilitating a contestable market for rail operations.

Section 4 of the Act provides for the Minister to establish a code governing the use of certain facilities for rail operations by persons other than the railway owners. The Minister established the Railways (Access) Code 2000 which determines the parts of the railways network and associated infrastructure opened to access, the process and procedures to negotiate access, the matters to be considered in access agreements, the information requirements of the regulator, and outlines the pricing principles to be applied in determining prices to be paid for access. The Code also requires the owner of a railways network covered by the Code to submit for regulatory approval specific regulatory instruments as prescribed by the Code.

The WA rail access regime, comprising the Act and the Code, became effective on 1 September 2001.

Section 3 of the Act defines the ERA as the regulator in respect of the access regime provided by the Act and Code. The ERA is responsible for monitoring and enforcing compliance by railway owners with the Act and Code and is otherwise to perform the functions and exercise the specific powers that are set out in the Act and Code.

On 1 July 2008, the Railway and Port (The Pilbara Infrastructure Pty Ltd) Agreement Act 2004 (the Agreement Act) amended the Act and the Code to bring TPI's railways network under the WA rail access regime.

The Agreement Act required TPI to submit to the ERA segregation arrangements (in terms of Division 3, Part 3 of the Act) and the "Part 5 instruments" as set out in section 40(3) of the Code.

Under the WA rail access regime, a railway owner is required to put in place segregation arrangements in order to comply with section 28 of the Act. Under section 29 of the Act, the railway owner must obtain the regulator's approval before new or varied segregation arrangements are put in place. The ERA's powers under section 29 of the Act allow it to direct a railway owner to amend the owner's segregation arrangements.

Section 40(3) of the Code sets out specific Part 5 instruments which are required to be submitted by a railway owner and approved by the regulator. The Part 5 instruments comprise:

- the Train Management Guidelines (TMG), as specified in section 43 of the Code;

- the Train Path Policy (TPP), specified in section 44 of the Code;
- the Costing Principles, specified in section 46 of the Code (the CP represent principles, rules and practices to be applied by a railway owner to determine the floor and ceiling price tests, and to keep and present the railway owner's accounts and financial records pertaining to the determination of costs and prices); and
- the Over-payment Rules (OPR), specified in section 47 of the Code which, in effect, ensure against over-recovery of access revenues by railway owners.

TPI's approved Costing Principles provide the framework for the assessment of the TPI floor and ceiling cost model provided in this draft report.

Section 46 of the Code sets out the power of the ERA to approve the CP and to direct a railway owner to amend or replace its CP with CP determined by the ERA.

TPI's proposed CP were lodged with the ERA on 15 August 2008. The ERA's final determination on the principles and procedures to be incorporated into the CP was made on 12 March 2010. The ERA's approval of the CP, which incorporated the ERA's required amendments to the CP as initially proposed by TPI, was given on 2 June 2010.

Under section 9 of the Code, on receipt of a written proposal for access to a declared railways network, the railway owner must within seven days provide the following to the access seeker (from section 9(1)(c) of the Code):

> "(i) the floor price and the ceiling price for the proposed access;
>
> (ii) the costs for each route section on which those prices have been calculated; and
>
> (iii) a copy of the costing principles that for the time being have effect under section 46."

These requirements mean that a railway owner should have in place a floor and ceiling cost model at the commencement of the application of the rail access regime to its network. Conditions associated with the ERA's approval of the CP included the requirement for the CP to prescribe the basis to the floor and ceiling cost model and the timeframe for lodging the model to the ERA. In this regard, section 2 of the approved CP (Timing and route sections) states as follows:

> "TPI will develop and provide to the ERA its Costing Model and its proposed floor and ceiling costs submission within three months of the Authority issuing its final determination of TPI's Costing Principles."

TPI submitted its floor and ceiling costs, in the form of a spreadsheet cost and pricing model, to the ERA on 2 July 2010. Section 6.2 of the approved CP (Calculation of floor and ceiling) states that the calculation of floor and ceiling costs will be consistent with the provisions in Schedule 4 of the Code. In relation to the calculation of ceiling costs, the CP provide that "TPI will demonstrate to the ERA that these costs are efficient." The TPI submission of 2 July 2010 represents the application of component cost and quantity values in a spreadsheet model (to calculate total floor and ceiling costs and prices) rather than a demonstration of the efficiency of the component costs applied by the model.

In this report, unless stated otherwise, references to the TPI floor and ceiling cost model are to those aspects of the submitted model which determine floor and ceiling costs for 2010/11.

The submission date of the model is more than three months after the ERA's final determination on the TPI CP, of 12 March 2010.

Clauses 7 and 8 of Schedule 4 of the Code define the Floor Price Test and Ceiling Price Test respectively and are to be reflected in a railway owner's floor and ceiling cost model. In addition, clause 3 of Schedule 4 provides for the regulator to determine the weighted average cost of capital (WACC) to be used as an input in the calculation of floor and ceiling prices (as per clause 2 of Schedule 4 of the Code).

On 22 June 2010, the ERA determined a WACC value to apply to the TPI network for the period 1 July 2010 to 30 June 2011.

## 1.2 TPI Proposal

The TPI floor and ceiling cost proposal assessed by this report comprises the model submitted to the ERA by TPI on 2 July 2010 entitled "20100709 D38905 The Pilbara Infrastructure Pty Ltd – Floor and Ceiling Costs Model – Public Version[1].XLS" (the TPI model) and the additional information provided by TPI outlined in section 1.4 below.

As noted in section 1.1, TPI's approved CP require a ceiling cost proposal to demonstrate that the proposed costs are efficient. Also, there should be associated supporting detail on matters such as unit rates, assumptions and sources of information in relation to the model(s) used to calculate costs (from the definition of "TPI Costing Model" in section 8 of the CP). We do not consider the level of associated supporting detail provided with the TPI model to be sufficient to enable a full assessment of the costs as proposed.

The TPI model calculates total costs for access to the TPI railway infrastructure based on the cost elements included in the definition of total costs in clause 1 of Schedule 4 of the Code, as follows:

> "(a) operating costs;
>
> (b) capital costs; and
>
> (c) the overheads attributable to the performance of the railway owner's access-related functions whether by the railway owner or an associate."

The total costs calculated by the model are converted to an access price per tonne by dividing the total cost amounts by an estimate of the number of tonnes per year.

This assessment by PwC of the model as submitted is of the floor and ceiling costs calculated by the model, rather than of the floor and ceiling prices calculated by the model. General information on the model, in terms of its data inputs, structure and operation, is provided in section 3 of this report.

The TPI model contains total cost calculations for only one route section. The single route section that comprises the TPI railway network in the approved CP of 2 June 2010 is specified in Appendix C of the CP as follows:

> "The railway infrastructure described in the TPI Railway and Port Agreement between the loadout at the Cloudbreak mine and the dump station servicing TPI's port facilities and additional infrastructure at Anderson Point, Port Hedland."

This assessment is focussed only on the route section covered by the TPI submission and which is specified in the CP approved by the ERA on 2 June 2010.

## 1.3 Public Submissions

The ERA received one public submission on the TPI model, from the North West Iron Ore Alliance (NWIOA), of 23 July 2010.

The NWIOA's submission provides a preliminary view of its assessment of the TPI model. The NWIOA presents that input values used in the model are not fully substantiated, that the model contains computational errors and that specific assets used in the calculation of capital costs appear not to relate to the access-related functions of TPI and appear unlikely to require ongoing maintenance or future replacement (and therefore those assets should be not be included in the capital costs in the model).

The NWIOA also comments that because the data input to the model is in respect of one customer and one route segment only, without data being entered for other customers and segments, it is not possible to fully test the application of the model to a situation of third party access.

The NWIOA also expresses the view that the model does not comply with TPI's approved CP.

Issues raised by the NWIOA are discussed in section 3 of this report in relation to our assessment of specific worksheets in the model.

The focus of this assessment is on the floor and ceiling costs calculated by the model for 2010/11, rather than on the derivation of floor and ceiling prices by the model, or the model calculations in relation to years post 2010/11. Further, as noted above, this assessment is focussed on the single route section covered by the TPI submission and as specified in the CP approved on 2 June 2010. Consistent with this focus, while the NWIOA raises issues in relation to the derivation of unit prices and the functionality of the model to deal with multiple users and route sections, comments by the NWIOA on these particular issues are not addressed in this report.

## 1.4 TPI Information

In addition to the information contained in the model, TPI provided further information to the ERA which has been used in this assessment. The sources of the additional information from TPI are:

- a letter of 28 July 2010 in response to an ERA information request of 19 July 2010;
- a document of 17 September 2010 outlining TPI's general response to a data request from PwC of 13 September 2010;
- emailed documents of 22 September 2010 in response to the PwC data request of 13 September 2010; and
- a mailed CD of 23 September 2010, containing documentation on the characteristics, specifications and purchase costs in relation to a range of assets and other input components used in the model. (This information was also provided in response to the PwC data request of 13 September 2010).

The additional information provided by TPI has been treated as commercial-in-confidence in our public report.

## 1.5 Scope of Work

The scope of work agreed to in the PwC engagement letter to the ERA of 10 February 2010 and based on the brief from ERA is shown in Table 1 below.

**Table 1. Agreed Scope of Work**

| Task No. | Task Description |
|---|---|
| | **Inception Meeting** |
| **1** | **Review Proposed costs and models.** |
| | ***Financial & Economic Evaluation*** |
| 1.1 | Review TPI's proposal and supporting information. |
| 1.2 | Verify the costing model provided in TPI's proposal. |
| 1.3 | Assess TPI's proposed Modern Equivalent Asset (MEA) assumptions for administrative/overhead costs. |
| | Assess the input costs submitted by TPI. |
| 1.4 | Review all submissions received by the Authority on TPI's proposal following completion of the public comment period. |
| 1.5 | Prepare a report for the Authority based on the information provided in TPI proposal and the analysis by PwC. |

| Task No. | Task Description |
|---|---|
| | Incorporate feedback from the Authority on the 1st draft report and submit a final first report for public release. |
| | ***Engineering Evaluation*** |
| 1.6 | Review TPI's proposal and supporting information. |
| 1.7 | Assess TPI's proposed engineering input cost parameters. |
| 1.8 | Review and evaluate the capital expenditure forecasts over the three year period from 1 July 2009 submitted by TPI in its submission. |
| 1.9 | Review all submissions received by the Authority on TPI's proposal following completion of the public comment period. |
| 1.10 | Prepare an Engineering Report for the Authority based on the information provided in TPI proposal and the analysis by AECOM. |
| **2** | **First Report to the Authority** |
| | Prepare a 1st draft for the Authority based on the information provided in TPI's proposal, the public submissions and analysis by PwC and AECOM. |
| | Incorporate feedback from the Authority on the 1st draft report and submit a final first report for public release. |
| **3-5** | **Second Report to the Authority** |
| 3 | Review of Draft Determination |
| | Attend meeting with the Authority. |
| | Review draft of the Draft Determination and provide track-changes comments. |
| | Stakeholder Consultation Time |
| | Consider and evaluate the issues raised by stakeholders in submissions. |
| | Meetings and / or telephone consultations with stakeholders to clarify issues. |
| 4 | Prepare Second Report |
| | Participate in a phone discussion with the Authority. |
| | Refine and expand analysis in 1st report to address submission feedback & submit a 2nd Draft report to the Authority. |
| | Incorporate feedback from the Authority on the 2st draft report and submit a final 2nd report for public release. |
| 5 | Review the Authority's Final Determination |
| | Review the draft of the Final Determination and provide track-changes comments. |
| | Potential participation in a meeting with the Authority. |

This report represents step 2 in the task list above, representing the First Report to the Authority. This report details the testing of the accuracy and reasonableness of the TPI floor and ceiling cost proposal, and provides recommendations on changes to cost values as proposed by TPI based on an assessment of the proposed costs against the requirements of the WA rail access regime.

In this report, recommended changes to the calculation of floor and ceiling costs from TPI's proposal represent recommendations to the ERA for the purpose of its determination of floor and ceiling costs for the TPI railways network.

## 1.6 Report Structure

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

- section 2 explains the basis of our assessment of the TPI floor and ceiling cost model;
- section 3 sets out the results of our assessment of the calculation of the floor and ceiling costs in the model, in terms of the individual component costs and other input factors used in the model;

- section 4 sets out the conclusions from our assessment and provides a revised calculation of floor and ceiling costs to those as proposed in the model; and
- the Appendix contains the engineering report in relation to key input costs assessed by AECOM and a letter from AECOM providing a high level summary of the conclusions in the report. The recommendations from AECOM's engineering evaluation are incorporated into our assessment in section 3.

# 2 Assessment Basis

## 2.1 Key Provisions

Consistent with the requirements of the Code, the CP are to represent principles, rules and practices to be applied by a railway owner to determine the floor and ceiling price tests. Clauses 7 and 8 of Schedule 4 of the Code define the Floor Price Test and Ceiling Price Test respectively and those provisions are accordingly to be reflected in the railway owner's floor and ceiling cost model.

Section 46 of the Code sets out the power of the ERA to approve the CP, with or without required amendments, and to direct the railway owner to amend or replace its CP with CP determined by the ERA. In relation to the exercise of its powers under the Act or Code, the ERA is to take into account the factors in section 20(4) of the Act. The factors in section 20(4) include the interests of the railway owner, the interests of access seekers and the benefit to the public from having competitive markets.

TPI's CP were submitted to the ERA on 15 August 2008 and, after a process of assessment and public consultation, the ERA approved the CP (incorporating the ERA's required amendments to the CP as initially proposed by TPI) on 2 June 2010.

Section 1 of the approved CP (Introduction) states as follows:

> "These Costing Principles are:
>
> > a statement of principles, rules and practices to be applied by TPI in the determination of floor and ceiling costs;"

In addition, sentence 2 of section 2 of the CP (Timing and route sections) states:

> "The Costing Model will be prepared in accordance with the approved Costing Principles."

The requirements of the WA rail access regime in relation to a railway owner's CP, and the assessment by the ERA of the TPI CP against those requirements (including the ERA's specification of required amendments to the CP to ensure that the CP complies with the regime), means that it is appropriate in our view to use the approved CP as the primary reference point for the assessment of the TPI model against the regime requirements.

## 2.2 Assessment Principles

In this report we assess the key assumptions, processes and input data in the TPI model for consistency with the principles and processes as set out in the approved CP. Where processes and data in the model are not prescribed in the CP, we assess whether those aspects of the model are consistent with our interpretation of the economic principles that underlie the relevant Act and Code provisions. Key economic principles applied are those incorporated into the cost definitions in Schedule 4 of the Code.

The assessment of the input data applied by the model uses benchmark data from railways networks with similar characteristics to the TPI railways network adopting efficient practices applicable to the provision of railway infrastructure. This part of the assessment is performed by AECOM. AECOM's assessment of the reasonableness and efficiency of input data is provided in the Appendix to this report. The results of AECOM's assessment are incorporated into the broader assessment provided in section 3 of this report. AECOM's specific approach has been to:

- assess reasonable cost values for input data contained in the model based on technical specifications, purchase cost information and other supporting data provided by TPI;
- liaise with suppliers for direct quotes;

- liaise with rail construction contractors for quotes – this was undertaken through AECOM's relationships with major contractors;
- utilisation of cost data used by AECOM for recent work – AECOM have undertaken recent cost estimation for several large rail projects in the Pilbara and Mid West and, where available, these unit prices have been used to compare with TPI's estimation;
- knowledge and experience of AECOM personnel – as a cross-check, and typically where there may be a spread of costs depending on the source, the personal knowledge and experience of AECOM personnel has been used to judge the reasonableness of costs;
- liaise with AECOM's Shanghai office for supply of rail and steel sleepers from China – this process, and the conditions attached to information received, is described in more detail in the AECOM report; and
- liaise with other AECOM offices in Australia – this was undertaken specifically for validation of maintenance costs.

In AECOM's assessment, direct supplier quotes are given precedence over other sources, even if other sources provide corroborating prices to that provided by TPI.

Following the assessment of TPI's unit input prices (both directly supplied and derived from the GRVs, in the case of asset data) using the approach above, and the assessment of any product specification issues or other assumptions, AECOM applied a check for reasonableness. Typically, if AECOM's unit cost check results in a corroborating price that is within +/-10% of TPI's proposed value, the TPI value is considered to be reasonable. This is based on the estimating range most achievable when costing a project from detailed design for construction. If the costs obtained by AECOM fall outside this range, further clarification is sought from AECOM's sources and/or the issues driving the cost differences are identified. If AECOM's obtained costs are less than the TPI value, and no reasonable account can be made for this, a recommendation is made to use the cost derived from the lower input price from the AECOM data.

The AECOM report provided in the Appendix discusses in detail the reasonableness of costs input to the model.

As commented in section 1.2, we do not consider the information in the TPI model or the level of associated supporting detail to model to be sufficient to enable a full assessment of the costs as proposed.
In this report we have sought to describe the purpose of the key calculations and the key units of measure used in the model. The descriptions are intended to provide a background to our assessment of particular model processes or input data and are not intended to be definitive in relation to the detailed operation of the model.

Our assessment of the principles contained in the model formulas and input values applied is of whether they reflect appropriate economic principles and does not involve consideration of accounting or tax issues.

The procedures used by PwC and AECOM in assessing the model and its input values do not constitute any form of audit or review in accordance with Australian or other auditing standards. Consequently, no assurance of any kind is expressed in relation to the model.

# 3 TPI Proposal Assessment

## 3.1 Proposed Costs

A summary of TPI's proposed floor and ceiling costs, expressed in aggregate terms based on the total cost definition in clause 1 of Schedule 4 of the Code, is shown in Table 2 below.

**Table 2. Summary of the TPI Floor and Ceiling Cost Proposal (2010/11 Costs)**

| Cost Base | Cost Component | Cost Allocator | Cost Value |
|---|---|---|---|
| **FLOOR COSTS** | | | |
| Capital Costs | Initial Capital Base | Equal Split | $131,054,022 |
| | | Cloudbreak to Port Dumper | $22,925,008 |
| | | All | |
| | Capex | | |
| | Total Capital | | $153,979,030 |
| Opex | | Direct | $17,104,293 |
| | | Train Km | $29,665,748 |
| | Total Opex | | $46,770,041 |
| Asymmetrical Risk Cost | | | $2,256,697 |
| Total Floor Cost of Service | | | $203,005,767 |
| **CEILING COSTS** | | | |
| Capital Costs | Initial Capital Base | Equal Split | $131,054,022 |
| | | Cloudbreak to Port Dumper | $22,925,008 |
| | | All | $11,922,391 |
| | Capex | | $3,996,861 |
| | Total Capital | | $169,898,282 |
| Opex | | Direct | $17,104,293 |
| | | Train Km | $41,438,396 |
| | Total Opex | | $58,542,689 |
| Asymmetrical Risk Cost | | | $2,490,007 |
| Total Ceiling Cost of Service | | | $230,930,978 |

## 3.2 MEA Standards Assumptions

Section 3.1.1 of the CP (Gross replacement values) provides as follows:

> "Modern equivalent assets (MEA) - replacement values must reflect the MEA value, if appropriate, and current market tested unit rates for materials."

Specification and categorisation of cost items has been taken to be as described in the documentation provided by TPI in support of its floor and ceiling cost proposal. Unless there appears to be a material effect on the determination of the unit costs today (eg if an originally specified item is no longer available) then the same specifications for the item have been applied.

Where specifications have not been provided, and where there is sufficient information to otherwise do so, industry standard specifications have been assumed, using Australian Standards as a reference. The standards and specifications with regard to the MEA are summarised in Table 3 below.

**Table 3. MEA Standard Applied in Assessment**

| Parameter | TPI Standards/Specifications |
|---|---|
| Axle load (tonnes) | 40 tonne axle load (TAL) |
| Rail weight (Kg/m) | 68 kg/m, to Australian Standard AS1085.1<br>Profile 136RE HT |
| Sleeper type, pattern and spacing | Design to 1085.1 Part 14, 40 TAL capacity,<br>Spacing 675mm<br>1480 sleepers/km |
| Ballast type and minimum depth (mm) | 'H' Class per AS 2758.7- 1996 (Part 7)<br>250 mm minimum on underside of sleeper |
| Fasteners | Pandrol 'E' type |
| Formation depth | 250mm capping layer<br>Bulk fill embankment depths vary with alignment and topography |
| Target maximum operating speed | 80km/he for loaded and empty trains<br>100 km/hr for light locomotives |

In addition, the annual throughput capacity with regard to the MEA is assumed as 80 million tonnes per annum (mtpa) (gross) inferred from the CP and from data provided by TPI for this review.

## 3.3 Submission Model Structure

The TPI floor and ceiling cost proposal is provided in an excel model comprising 15 worksheets, some of which represent information or navigation worksheets in that those worksheets are not directly involved in the calculation of the costs and prices in the model.

Table 4 below provides a general summary of the contents of the worksheets comprising the model. The worksheets in italicized text represent the information or navigation worksheets that are not directly involved in the calculation of the costs and prices in the model.

Our discussion of the model contents in sections 3.4 to 3.10 below is focussed on the worksheets involved in the calculation of floor and ceiling costs.

**Table 4. Model Contents Summary**

| No. | Title | Worksheet Contents Summary |
|---|---|---|
| *1.* | *Cover* | *Cover page only.* |
| *2.* | *Contents* | *File navigation links only.* |
| *3.* | *Other Info* | *General Information on the structure and operation of the model.* |
| *4.* | *Assumptions* | *General model assumptions and sources of assumptions made.* |
| 5. | Data | This worksheet contains the input values to the model, other than input data in relation to the initial asset values, which are entered into the Rail Assets worksheet. |
| *6.* | *Switching* | *This worksheet determines the quantitative bases to the use of the railways network by customer and segment. Presently, the railways network is used by one customer and comprises one segment and this functionality is not applied in determining the prices shown in the model.* |
| *7.* | *Smart Data* | *This worksheet represents a summary sheet in respect of the quantitative bases to the use of the railways network by customer and segment. Presently, the railways network is used by one customer and comprises one segment.* |
| *8.* | *Rail Reg Reqs* | *This worksheet provides a description of the model in terms of its compliance with the approved CP.* |
| 9. | Rail CAPEX | This worksheet determines annual annuity values for capital |

| No. | Title | Worksheet Contents Summary |
|---|---|---|
| | | investment (based on input values entered to the Data worksheet) and allocates the values determined to particular segments and years. The capex input values from the Data worksheet, which are in respect of four capital expenditure projects, comprise: initial values; completion dates; useful lives; and specification of the basis that each project cost is to be allocated to segments (the allocation bases used are described in relation to the Rail Asset Calcs worksheet below). |
| 10. | Rail Assets | This worksheet contains input data in the form of: initial asset values (identified by Asset ID and Asset Name); economic lives of assets; and the selected allocation base to allocate each asset to network segments. The allocation bases used are described in relation to the Rail Asset Calcs worksheet below. Presently, the railways network comprises only one segment and the total asset annuity value is allocated to this segment (ie Cloudbreak to Port Dumper).<br>This worksheet calculates the annual annuity charges in relation to initial asset values (Gross Replacement Values (GRV)) by amortizing those values using:<br>• the WACC value entered to the Data worksheet; and<br>• the economic life values entered to this worksheet.<br>The annuity charges calculated in this worksheet are ceiling cost values. |
| 11. | Rail Asset Calcs | This worksheet sets out the allocation of the annuity charges for initial assets and for future capital investment, and applies the asymmetric risk cost (a cost calculated within the Data worksheet) by segment. In the case of the annuity values for capital investment and the asymmetric risk cost, this worksheet also determines the annual charges for these items for future years.<br>This worksheet sets out the allocation of annuity values as:<br>• "Direct" to segments (where the asset is directly identified in the Rail Assets worksheet against a particular segment); or<br>• allocated to segments, based on whether the asset is classified as "All" (to be allocated equally across active segments) or "Equally Split" (allocated by track length).<br>The base asymmetric risk cost value is a ceiling value. The floor asymmetric risk cost value is calculated by proration of the base value (the proration is according to "Direct" + "Equally Split" annuity charges as a proportion of total annuity charges[1]). |
| 12. | Rail Expenses | This worksheet allocates the expense data entered at the Data worksheet by customer, segment and year. The expense data allocation bases from the Data worksheet are: "Gross TKM"; "Train KM"; and "Direct". Track and signals maintenance expenses are currently allocated based on Train KM, while operating and overhead expenses are treated as Direct expenses. Presently, the Gross TKM allocator is not applied and total expenses are fully allocated to the customer |

[1] Where total annuity charges comprise "Direct" + "Equally Split" + "All" annuity charges.

| No. | Title | Worksheet Contents Summary |
|---|---|---|
| | | and route segment (Cloudbreak to Port Dumper) existing at the time of the submission.<br>The base expenses calculated are ceiling expenses. From year 2, the expenses calculated are escalated by CPI.<br>Floor expenses are calculated by applying a minimum load percentage factor (as entered to the Data worksheet) to those expenses that are allocated by Train KM. |
| 13. | Rail Cost Summary | This worksheet determines unit prices based on the cost and quantitative data by segment and year determined by other worksheets above. The cost data used is from the Rail Asset Calcs and Rail Expenses worksheets. The data from those worksheets is in floor and ceiling terms. Aggregation of such data in this worksheet determines floor and ceiling costs and prices.<br>Floor cost calculations in this worksheet (unlike ceiling cost calculations) do not include asset and capex annuity charges classified as "All" (ie annuity charges allocated equally across active segments). |
| 14. | Rail Pricing | This worksheet calculates access prices per customer for the year ending 30 June 2011. It applies the unit costs (expressed in rates per tonne, per route) from the Rail Cost Summary worksheet. Because the Rail Cost Summary worksheet does not incorporate cost allocations to customers (as performed in relation to expenses only, in the Rail Expenses worksheet), the processes used in the model to allocate costs to customers are not used in calculating access prices in this worksheet. |
| *15.* | *Global Error Check* | *Spreadsheet auditing control.* |

As described in section 1.2 above, the assessment by PwC of the model as submitted is of the floor and ceiling costs calculated by the model, rather than of its derivation of floor and ceiling prices. This means that the calculations in the Rail Pricing worksheet, for example, are not evaluated in detail in this report.

Also, as described in section 1.1 above, the assessment in this report relates to floor and ceiling costs for 2010/11 only. Aspects of the model relating to the derivation of costs for later years are not evaluated in this report.

In this report, recommended changes to the calculation of floor and ceiling costs from TPI's proposal represent recommendations to the ERA for the purpose of its determination of floor and ceiling costs for the TPI railways network.

## 3.4 Data Worksheet

This worksheet contains the basic input values to the model, other than data on the initial asset values which is entered to the Rail Assets worksheet.

The headings used in this section 3.4 conform to the headings used in relation to the data entry matrices in this worksheet.

### *3.4.1 General Model Inputs*

This section of the Data worksheet sets out global parameters regarding the model start date (1 July 2010), mine life, the estimated shipping amount and other factors. Some values entered to this section are not applied by the model.

The key parameter in this section, which is used in the calculation of the costs and prices in the model, is the WACC parameter.

**Table 5.A Proposed WACC**

| Worksheet | Cell Range | Description | TPI Value |
|---|---|---|---|
| Data | C25 | WACC (Nominal Pre Tax) | 14.33% |

In relation to the WACC, section 3.1.3 of the CP (Rate of return) states as follows:

> "In accordance with the Code, the WACC as applied to TPI will be determined by the ERA and reviewed (by the ERA) each year at 30 June as applied to TPI."

The term "WACC" in section 8 of the CP (Definitions) is as follows:

> "Means the target long term weighted average cost of capital appropriate to the railway infrastructure expressed as an annual interest rate and determined by the ERA in accordance with Clause 3, Schedule 4 of the Code."

Clause 3 of Schedule 4 of the Code sets out the process through which the ERA is to determine a WACC value as at 30 June in each year.

On 22 June 2010, the ERA determined a pre tax real WACC value of 11.43% to apply to the TPI network for the period 1 July 2010 to 30 June 2011.

The WACC value entered to cell C25, of 14.33%, generally reflects the addition of the real WACC value determined by the ERA and the inflation value of 3% as entered to cell C24 (and accordingly the WACC value reflects a pre tax nominal WACC).[2]

In order to be consistent with the CP and with the ERA's WACC determination, we believe that a real pre tax WACC value should be entered to cell C25:

- The WACC value in cell C25 is used by the model to calculate the capital amortization (or annuity) charges in relation to the initial capital value of the network (this is calculated in the Rail Assets worksheet) and in relation to the future capital investment in the network (the amortization charges for capex are calculated in the Rail CAPEX worksheet).
- It would be consistent with the "annuity due" basis of the calculation of amortization charges (which is specified in section 3.1.4 of the CP), with the specific pricing provisions contained in the CP, and with the ERA's WACC determination, for a real WACC value to be entered to cell C25 and applied in the calculation of amortization charges.

This issue is considered in section 3.6.3 of this report below. Section 3.6.3 sets out in more detail the basis in the CP for applying a real WACC value to the determination of the amortization charges in the model.

**Table 5.B Recommended WACC**

| Worksheet | Cell Range | Description | Recommended Value |
|---|---|---|---|
| Data | C25 | WACC (Real Pre Tax) | 11.43% |

[2] The inflation value of 3%, as entered to cell C24, is not consistent with the value calculated based on the process set out in paragraphs 2 and 3 of section 6.1 of the CP, which derives an inflation value for cell C24, of 1.93% for 2010/11. Based on our suggested revision to the cost calculations in section 3.6.3, this inflation factor should not impact on the determination of 2010/11 floor and ceiling costs.

### 3.4.2 *Efficient Infrastructure Capacity, Customer Data*

These sections in the Data worksheet contain data to the effect that the model presently covers only one customer (the TPI rail operations), that estimated tonnes are 40 mtpa and estimated train numbers are 1,217 per year.

The same values are also entered as values to prescribe the efficient capacity of the network. In that particular context, however, the values entered do not appear to directly affect the calculation of costs in the model.

We understand that the TPI railways network has a design basis of a minimum of 80 mtpa (gross). In the context of this design basis, and assuming a 15% factor for the weight of rolling stock, the efficient capacity assumption in the model would relate to less than 60% of this minimum design capacity. The AECOM assessment of cost components is on the basis of the 80 mtpa design capacity. The use of the capacity/consumption data in the model in the determination of unit prices is not a point of focus of this assessment.[3]

### 3.4.3 *Asymmetric Risk Cost*

**Table 6.A Proposed Asymmetric Risk Cost**

| Worksheet | Cell Range | Description | TPI Value |
|---|---|---|---|
| Data | C47 | Asymmetric Risk Factor | 1.09% |

In relation to this issue, section 6.3 of the CP (Asymmetric Risk) states as follows:

> "TPI will include an allowance for asymmetric risk as an annual operating cost in its model and in its floor and ceiling cost proposal. The quantum of the allowance and methodology will be reviewed by the ERA as part of the floor and ceiling determinations."

In its final determination on the CP, the ERA specified in Required Amendment 15 that Section 6 of CP should be amended to include a new sub-section (sub-section 6.3) headed "Asymmetric Risk". The ERA's Required Amendment is reflected in the provision quoted above. The ERA also noted in its final determination that any asymmetric risks (such as stranding risk) identified by TPI would be considered by the ERA as part of the assessment of TPI's proposed floor and ceiling costs, rather than being accounted for under the WACC.

In the model, the asymmetric risk cost is calculated in cell E47 by applying the percentage factor of 1.09% in cell C46 to the value in cell D47. The value in cell D47 represents the sum of total ceiling costs calculated in the Rail Pricing worksheet, less a value representing the asymmetric risk cost (hence, this calculation gives rise to a theoretical circularity in the determination of the asymmetric risk cost). The resulting calculation in cell E47 (ie the asymmetric risk cost) also appears as an entered value in cell F47.

The value entered to cell F47 is used as the base (ceiling) asymmetric risk cost in the model.[4] The use of an entered value at cell F47 (which is applied in the calculation of total ceiling costs) would appear to be to overcome the circularity that would arise in the model in calculating this factor based on total costs in order to apply it to the determination of those costs.

---

3 Capacity and consumption data is used also in the cost allocation processes in the model. Allocation issues are not material in relation to this assessment, which relates to one route section only.

4 The floor asymmetric risk cost is calculated by prorating the base (ceiling) asymmetric risk cost. The proration is based on the annuity charges that are allocated according to "Direct" + "Equally Split" allocators, expressed as a proportion of total annuity charges.

TPI has not substantiated the basis of the percentage loading for asymmetric risk of 1.09% and has not justified why the value should be applied to total costs (rather than, for example, to capital costs only, where limitations to conventional assessments of risks [as based on symmetrical, or systematic, risk] generally arise). The NWIOA, at paragraph 25 of page 6 of its submission notes, in effect, that Asymmetric Risk costs have been included in the Rail Assets Calc worksheet and that no rationale has been provided for this cost amount.

In view of the fact that the specific costs that these factors may seek to address are not quantified or substantiated, and that, in our view, an asymmetric risk cost factor would not be encompassed by the components of the definition of total costs in clause 1 of Schedule 4 of the Code, we recommend that the asymmetric risk cost factor is set to zero so that an asymmetric risk cost is not applied in the calculation of the costs in the model.

**Table 6.B Recommended Asymmetric Risk Cost**

| Worksheet | Cell Range | Description | Recommendation |
|---|---|---|---|
| Data | C47 | Asymmetric Risk Factor | Deletion of % factor and of asymmetric risk costs from the model |

### 3.4.4 Rail Segments

This section of the Data worksheet contains data to the effect that there is presently only one active segment to the TPI railways network, Cloudbreak to Port Dumper, and that the length of this segment is 273,534 metres.

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The track length of the network estimated by AECOM based on diagrams provided by TPI is 282.7 kilometres. Distance-based costs quoted in the AECOM report are in terms of this track distance. Based on the same source data, the route length of the railways network is estimated to be 256.1 kilometres. The measure of route length is not relevant to this assessment of rail costs, which is focussed on floor and ceiling costs, rather than unit prices.[5]

This section of the model is generally consistent with paragraph 3 of section 2 of the CP (Timing and route sections) which states that:

> "TPI will design its costing model to accommodate the addition of multiple route sections in the future."

[5] Route distance has been considered in this assessment in respect of determining a length of access roads in section 3.6.1(h).

### 3.4.5 Rail Incremental Costs by Segment

**Table 7.A Proposed Minimum Load Factor**

| Worksheet | Cell Range | Description | TPI Value |
|---|---|---|---|
| Data | C86:V86 | Rail Incremental Costs by Segment (minimum load percentage factor) | 71.59%, applied to expenses (Train KM) |

This section of the Data worksheet sets out a minimum load factor of 71.59%, which is entered to the cell range C86:V86. The cell range covers potential segments to the railways network. Currently, the network comprises one segment.

The expense data (Rail Operating Costs) entered to the model (see 3.4.6 below) represent expenses in respect of ceiling costs. The minimum load factor value is applied in determining floor costs. Specifically, it is applied to those expenses that are categorized and allocated on the basis of Train KM. The application of this factor to ceiling expenses to determine floor expenses occurs in the Rail Expenses worksheet, discussed in section 3.8 below.

The NWIOA, at paragraph 24 of page 6 of its submission, notes that approximately 28% of operating costs are removed from the ceiling price to calculate the floor price and that no rationale for the reduction has been provided by TPI. The NOWIA submits that the ERA should request an appropriate explanation.

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The expenses by Train KM, to which the minimum load factor applies, comprise approximately 71% of the total expenses in the cost model and the application of the minimum load factor model results in floor expenses that are 80% of the total ceiling expenses.

We note that in the case of the WestNet Rail (WNR) floor and ceiling cost model, floor expenses represent approximately 15% of total ceiling expenses. In the absence of further information on the determination of the floor expenses in the TPI model, we consider the WNR result to be more consistent with the floor price provisions in the Code.

With the network being assessed comprising one route section and one operator using the network (TPI), the concept of “incremental costs” under clause 1 of Schedule 4 of the Code, upon which the floor cost calculations are to be based, has uncertain application. Incremental costs should be those “that the railway owner or the associate would be able to avoid in respect of the 12 months following the proposed commencement of access if it were not to provide access to that operator or group of operators”.

Given that the TPI railways network appears to have been constructed primarily to support TPI’s rail operations for FMG, most of the costs currently included in the model are unlikely to be avoided if TPI were not to provide access to a third party operator.

An assessment of avoidability should take into account the particular requirements and costs associated with dealing with access by third party operators. We do not have information on these matters and note that an assessment of avoidability could be performed at the time a third party proposal for access to the network is made under the Code (or at the time the ERA considers that such a proposal is likely to be made).

We consider that the extent of avoidability of costs in relation to the TPI network may be closer to the cost avoidability calculated in the WNR model for the WNR network than as currently calculated for the TPI network. In the light of this, and before any assessment is made based on an actual or anticipated access proposal from a third party, we recommend that indicative floor expenses are calculated for the TPI network based on the factor derived from the WNR floor and ceiling cost model. This would mean applying a factor of 15% to the total ceiling expenses for the TPI network. This factor could be reviewed based on an assessment made by the ERA at the time an actual access proposal from a third party is made (or at the time the ERA considers that such an access proposal is likely to be made).

**Table 7.B Recommended Minimum Load Factor**

| Worksheet | Cell Range | Description | Recommendation |
|---|---|---|---|
| Data | C86:V86 | Rail Incremental Costs by Segment (indicative minimum load percentage factor) | 15%, from the WNR model, to be applied to total expenses |

### *3.4.6 Rail Operating Costs*

This section of the Data worksheet sets out the value of operating costs for four categories of expenses, and specifies the basis upon which each category of expenses is to be allocated to segments. The expense values entered to cell range C94:C97 are ceiling expense values.

The expense categories indentified, and for which cost data has been entered against in this section, are:

- Rail Track Maintenance;
- Rail Signals Maintenance;
- Support; and
- O'Head.

As noted above, the expense values as entered to the cell range C94:C97 form part of the base (ceiling) cost calculations and are modified (according to the process described in section 3.8) to arrive at floor costs.

Section 4.2 of the CP (Efficient cost tests), states that “TPI will test whether the operating costs used for determining the Floor and Ceiling are efficient …” This provision of the CP also sets out specific tests to be applied.

In addition, section 6.2 (Calculation of floor and ceiling) states as follows:

> “Calculation of floor and ceiling costs will be consistent with the provisions of Schedule 4 of the Code.
>
> *Calculation of ceiling*
>
> There will be one regulatory ceiling for all access seekers on a route section, based on the sum of capital costs, operating costs and overhead costs.
>
> TPI will demonstrate to the ERA that these costs are efficient."

### a) Cost Analysis

The NWIOA, at paragraph 13 of page 3 of its submission notes, in effect, that the expense values in the cell range above constitute the Rail Operating Costs and that each value represents a single per annum input amount. The NWIOA seeks a breakdown of the components of these costs in order to understand whether the cost amounts entered represent efficient costs.

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Establishing a true and reasonable estimate of efficient operating and overhead costs is difficult given that:

- unlike capital costs (which are typically visible to third parties during design and construction of railways), operating and maintenance costs remain part of the railway owner’s proprietary business information and as such, are typically less transparent;
- no two railways are physically the same (although similar locations and freight tasks can be assessed for a reasonable comparison);

- operating and maintenance costs vary considerably with annual tonnage and axle loads;
- railways that are privately owned and relatively new may often be delivered within a business model that seeks to minimise capital expenditure, while accepting an offset of costs into operating budgets for a period of years (It is emphasised that there is no evidence that this is the case for the TPI railways network); and
- the composition of cost data is not always readily apparent. For example, the basis on which overheads are treated can vary widely, and between private and public railway owners.

As a result, making an assessment as to whether the absolute cost of maintaining the TPI railways network is reasonable is constrained by the difficulty in obtaining a direct comparison from third parties, and the consideration that the railway is very early in the operating phase of the project lifecycle.

Maintenance rates depend upon a number of variables associated with the specific nature of the route being considered:

- axle loading – higher axle loads lead to greater wear and tear per train movement;
- traffic volume – higher volumes lead to the need for more frequent maintenance and renewal intervention;
- asset age – newer assets will require less maintenance than those that have been in service for a long time;
- structures: number and type – more structures on the route will result in the need for increased requirements for activities such as bridge audits and resulting renewals;
- route geometry – higher numbers of low radii curves will increase the need for maintenance;
- signalling system type – fixed signalling equipment will require higher maintenance effort; and
- strategic value of route – a railway infrastructure company as a private entity may make strategic decisions as to the business value of specific route infrastructure and direct investment accordingly (This will have more bearing for a mining company that has a network of rail routes, in comparison to TPI whose rail infrastructure forms the backbone of their current operation).

TPI's total expenses (Rail Operating Costs) are $58,542,689 which equates to $207,084 per track kilometre per annum.

AECOM has undertaken past work on the QR system in Queensland that indicates maintenance costs per kilometre ranging from $21,000 to $41,000 for trunk freight and passenger routes with axle loads up to 26tal. Previously assessed maintenance costs for WNR in WA are at the lower end of this range for the more heavily trafficked lines (www.erawa.com.au).

There is an order of magnitude difference between TPI's figures and those for WNR or QR. However, there is a reasonable expectation that maintenance costs will be significantly higher for a 40tal railway in the Pilbara region in comparison to general use railways elsewhere in Australia (on which information is available) for the following reasons:

- higher annual tonnages – the annual throughput capacity of the network is assumed to be 80mtpa – in comparison to WNR, which has no more than 15mtpa on its busiest lines;
- the Pilbara region location – the area is remote and subject to cyclonic activity, increasing the amount of support and the frequency of unplanned maintenance activities. In addition, the Pilbara region attracts a premium on labour rates that is not necessarily experienced elsewhere in Australia; and
- In TPI's case, there may be an initial period of consolidation of maintenance regimes while the railway infrastructure is used early in its design life.

Although there is an order of magnitude difference between the per kilometre operating costs of the TPI railways network compared to networks for which equivalent information is available, the latter networks run trains with axle loads that are markedly below the axle loads on the TPI railways network. Taking into account the cost conditions in the Pilbara relative to conditions in areas in which comparator railways on which there is readily available information operate, and that it is reasonable for TPI to incur initial costs while the infrastructure is used early in its design life, on the basis of the information made available by TPI, it is difficult to refute TPI's claimed maintenance costs, even if direct comparison with a comparable railway in the Pilbara is available.

We recommend that TPI's operating cost estimates (Rail Operating Costs in the Data worksheet) are adopted for the initial calculation of floor and ceiling costs, but in order for these cost amounts to be accepted by the ERA for the purpose of determining the floor and ceiling costs, we recommend that TPI should demonstrate to the ERA: the basis of the component cost amounts included in operating costs; justification for including each component cost in railway infrastructure costs; and that each component cost represents an efficient amount.

## b) **Expense Allocation**

Section 4.3 of the CP (Allocation of operating costs) sets out the following allocation principles:

> "Track and signalling maintenance costs are directly allocated to route sections based on the nature and population of the infrastructure. Centralised train control cost will be apportioned directly to routes based upon actual train control resources managing traffic over each route.
>
> The allocation of non-sector specific operating costs to route sections will be performed in accordance with the allocators listed in Appendix B." (This appendix prescribes, for operating costs, a GTK allocator for railway infrastructure management indirect costs, and train movements as an allocator of network management indirect costs).

Section 5.2 of the CP (Allocation of Overhead costs) states that the basis of the allocation of overhead costs to route sections is set out in Appendix B. In Appendix B, GTKs and train numbers are set out as the allocator of overheads (it is assumed that the allocation base may be either of these measures, according to the characteristics of the particular cost components involved).

The allocators of expenses (Rail Operating Costs) are selected in the Data worksheet. The allocators assign costs to particular routes, and provide an allocation to customers. These allocators are applied in the Rail Expenses worksheet.

The expense categories used in this section of the Data worksheet do not in all cases align with the categories used in the CP. Based on the principles and specific allocators in the CP, the following allocators from the CP can be considered to align with the expense category values in cell range C94:C97:

- Rail Track Maintenance Expense – direct attribution, and where costs are not directly attributable, GTK;
- Rail Signals Maintenance Expense – direct attribution, and where costs are not directly attributable, GTK (signalling systems) and train numbers (signalling operations);
- Support Expense – GTK and train numbers; and
- O'Head Expense – GTK and train numbers.

The NWIOA, at paragraph 13(d) of page 3 of its submission, states that while within the CP, the track maintenance allocator is defined as GTK, this allocator is not calculated within or applied by the cost model. The NWIOA submits that this divergence from the approved CP should be rectified. The NWIOA also notes at paragraph 13(h) of page 4 of its submission that, within the CP, the track maintenance allocator (in respect of overheads) is defined as per train number, while in the cost model, support and overhead expenses are treated as direct costs and are not allocated on the basis of train numbers. The NWIOA submits that these costs should be allocated in proportion with train numbers in order to be consistent with the CP.

The values in each expense category cannot be disaggregated at this stage. Given this, in our view it is appropriate to apply the predominant CP allocator from the CP to each expense category. We consider a reasonable allocation basis, comprising a single, representative allocator for each expense category in accordance with the CP, to be as follows:

- Rail Track Maintenance Expense – GTK;
- Rail Signals Maintenance Expense – GTK;
- Support Expense – train numbers; and
- O'Head Expense – train numbers.

For consistency with the CP, we recommend that the allocation bases above should replace the allocators currently selected in cell range E94:E97.

Similar to the approved CP, elements of the model have been developed based on there being more that one route section on the network. At this stage, any change in the allocation bases in the model will not have an immediate effect on route section costs given that the railways network currently comprises a single route.[6] Application of the allocators in terms of the approved CP is considered necessary in order to deal with additional routes that may be created by extensions to the railway infrastructure or by any future segmentation of the existing single route. This is consistent with the TPI objective in developing the CP as reflected in section 2 of the CP (Timing and route sections) which states as follows:

> "TPI will design its costing model to accommodate the addition of multiple route sections in the future."

As this assessment and the model relate to calculation of total costs for a single route section, the recommended changes above will not have an immediate effect on the calculation of ceiling costs.

In section 4.2 below we comment on the overall cost allocation process (operating and capital costs) used in the model.

### *3.4.7 Rail Capital Expenditure*

This section of the Data worksheet sets out the values for four capital expenditure projects, their completion dates, useful lives and specification of the basis of how each project cost is to be allocated to segments. The capex values entered relate to ceiling costs. These values are converted to annual annuity values in the Rail CAPEX worksheet. Three of the four projects (Projects “1” to “3”) have completion dates before the end of 2010/11.

TPI has not substantiated the nature of the projects, nor demonstrated that the project costs for the projects are efficient. Further, the basis of the useful life of each project, of 30 years, has not been justified. Similar comments are made by the NWIOA at paragraph 13(c) of page 3 of its submission which seeks further information on the Rail Capital Expenditure amounts to determine whether these amounts can be considered to be included in the ceiling costs.

In view of the fact that the amortization charges arising from the data in this section represent a small component of total capital amortization charges in year 1 of the model (approximately 2.5% of total amortization charges in that year) and that the useful life value is similar to the average of the asset lives listed in Appendix A of the CP (and also broadly reflects the period to reserve depletion), we recommend that

[6] There would, however, be an effect on the calculation of avoidable costs under the current approach in the model, where the expense avoidability factor is applied only to expenses that are allocated based on Train KM. In section 3.4.5 we recommend revising that approach.

the ERA accepts the data as entered to this section, although at future reviews of floor and ceiling costs, further data on these projects would be required.

## 3.5 Rail CAPEX Worksheet

This worksheet determines yearly annuity values for capital investment projects (based on input values entered to the Rail Capital Expenditure section of the Data worksheet) and allocates these values by particular segment and year. This sheet processes the data entered to the Data worksheet and calculates annuity values to recover the capital expenditure costs. Issues concerning the annuity methodology used by the model are discussed in relation to the Rail Assets worksheet.

The capex annuities calculated in this worksheet, and the annuities in respect of the initial capital of the railways network (as calculated in the Rail Assets worksheet), are combined to form the total capital amortization charges for the railways network in the Rail Assets Calcs worksheet.

As described in section 1.1 above, the assessment in this report relates to floor and ceiling costs for 2010/11 only. Aspects of the model relating to the derivation of costs for later years are not examined in any detail in this report.

## 3.6 Rail Assets Worksheet

This worksheet contains input data in the form of: initial asset values (identified by Asset ID and Asset Name); economic lives; and the selected allocation base to allocate each asset to segments.

This worksheet calculates the annual annuity charge in relation to initial asset values by amortizing those values using the WACC input value entered to the Data worksheet and the economic life values entered to this worksheet.

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The annual annuity charges calculated in this worksheet are ceiling cost values.

### *3.6.1 Initial Asset Values*

Section 3.1.1 of the CP (Gross replacement values) sets out as follows:

> “TPI will complete a valuation in accordance with the GRV methodology. To arrive at this value, assumptions will need to be made regarding …[the CP lists considerations that could be viewed as being be more suitable to a depreciated network, rather than the TPI network as a greenfields development] ..”
>
> "TPI has built unit rates into the Costing Model based on an independent engineering consultant’s report where these rates have any adjustment for scale or scope or the impact of location, these assumptions will be included. This information is contained in the Costing Model, will be made available to the ERA and contains information of the source and the assumptions that are currently used in the model. In addition, TPI will identify and provide to the ERA unit rate information and assumptions that it considers can be released as part of the public consultation process for the ERA’s determination of the floor and ceiling costs.”

In addition, section 3.1.1 sets out particular considerations to the setting of the initial capital base value. Some of the considerations prescribe TPI’s approach to determining particular costs:

> “Design, construction and project management fees - TPI will apply design construction and project management fees at a rate of 20% of the total cost of the infrastructure and based on an economic life of 50 years."
>
> “Financing charge during railway infrastructure construction – consistent with the Code requirement that the GRV be applied as part of the calculation of the capital charge, TPI will include in the capital cost an allowance for its cost of capital and related financing fees and charges during the construction period." The CP sets out that a 50 year amortization period would apply to such costs.
>
> “Equity raising costs –the GRV will include an estimate of the cost of raising equity capital. This will be calculated as an increment to the GRV …"

As noted in relation to the assessment of operating costs in section 3.4.6 above, the CP states that in the calculation of ceiling costs (in section 6.2) “TPI will demonstrate to the ERA that these costs are efficient.”

The PwC/AECOM assessment of the initial asset values contained in the Rail Assets worksheet is summarised below. Further assessment of these matters is provided in the AECOM report contained in the Appendix.

## a) Sleepers

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Based on the confidential information provided by TPI about the type, spacing and quantity of sleepers contained in the railway infrastructure, the GRV for Asset ID 1277 corresponds within 3% of a quote that AECOM received from WA sleeper suppliers in late 2008. This is consistent with 2010 prices for standard gauge pre-stressed concrete sleepers ex Perth. In this context, the asset value used in Asset ID 1277 is considered to be reasonable based on the available unit cost.

## b) Ballast

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The unit cost information provided by TPI is consistent with quotes obtained by AECOM for ballast supply in 2008, which range from $28 to $32 per tonne inclusive of delivery within 150km of a quarry. Projects that AECOM is currently working on evidence ballast costs of a similar magnitude, of $35.00 per tonne in the case of a rail project for an existing iron ore miner in the Pilbara and $33.00 per tonne for a rail project for a prospective iron ore railway in the Mid West (this later cost amount excludes establishment costs for supply).

The information provided by TPI in terms track construction parameters (which are informative in relation to ballast quantities) and unit price data are consistent with cost data provided by TPI and with benchmark data from comparator networks. However, the cost data does not reconcile with the asset value for ballast against Asset ID 100. We consider it feasible for the value in Asset ID 100 to include establishment costs for supply (the establishment of quarries and associated facilities) and to also include some transport-related costs that are not incorporated into the ballast unit cost rates as supplied by AECOM.

Based on the AECOM analysis in relation to costs per tonne for delivery of ballast to site and the quantity of ballast supplied, the total cost of ballast in ID 100 would equal $22,219,200, leaving approximately half of the Asset ID unaccounted for. We recommend that the value calculated by AECOM is applied as the reasonable rate for ballast supply in place of the value listed against Asset ID 100. In order for the GRV for Asset ID 100 in the cost model to be accepted by the ERA for the final determination of floor and ceiling costs, we recommend that TPI demonstrates to the ERA the basis of this GRV amount and that it represents an efficient cost.

We understand that Asset ID 1792-1816 Ballast relates to **<c-i-c>** representing assets relating to rail operations. Accordingly, the value of Asset ID 1792-1816 should not be included in the model used to calculate floor and ceiling costs in relation to access-related functions.

## c) Turnouts

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Based on AECOM's examination of confidential technical drawings supplied by TPI and on cost data sourced from suppliers, the asset value for Asset ID 1765 appears low. If the costs of installing most of the turnouts are assumed not to be included in this Asset ID (and only assumed mainline turnouts are included), then the asset value would be within the expected range. Based on AECOM's assumptions, the value for this Asset ID, which is assumed to only relate to the supply of the three mainline turnouts, is considered to be reasonable.

## d) Tracklaying

The cost model provides several Asset IDs that potentially relate to tracklaying (ie the installation of all railway infrastructure above formation, including rail, sleepers, and ballast):

- Asset ID 58 "Ballast Superlift";
- Asset ID 1792-1816 "Ballast"; and
- Asset ID 102 "CB to PH Railway Line".

The NWIOA, at paragraph 19(b) of page 4 of its submission, considers that a number of asset values warrant review, and highlights Asset ID 102 CB to PH Railway Line in this regard.

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In late 2008, enquiries were made through AECOM's offices in Shanghai, China for supply of rail to the Australian market from Chinese manufacturers. A rate of US$1100/tonne was quoted FOB (Free On Board) at a Chinese port for all rail weights, including 68 kg/m. A cost per tonne for shipment from China to Western Australia then needs to be considered. This shipment cost will need to include marine freight costs, insurance, unloading and shipment to the final destination (in this case, Port Hedland). **<c-i-c>** It is assumed that these costs (broadly estimated at A$400 per tonne) are accounted for in Asset ID 102.

On the basis of 282.7km of track **<c-i-c>** , a total of 38,447 tonnes of rail would be required for the project, resulting in a cost of $57.7m at $1500 per tonne (inclusive of an estimate for shipping).

From TPI's clarifications and analysis of the Asset IDs provided by AECOM, the following items may also considered to be part of Asset ID 102, as they appear to be unaccounted for elsewhere in the model:

- Rail supply;
- Welding (including establishing a Flashbutt Welding facility);
- Level crossings (surfacing); and
- Turnout installation.

Table 8 on the following page establishes AECOM estimates for each of these components.

**Table 8. AECOM Assessment of Potential Components to Asset ID 102**

| Item | Amount | Unit cost | Total | Unit cost source |
|---|---|---|---|---|
| Rail Supply | 38,447 tonnes | $1,500 per tonne | $57,670,500 | Reflects data from quote through AECOM Shanghai Office late 2008 & 2010 Aust. Supplier quote |
| Flashbutt Welding Facility | 1 no. | $50,000,000 | $50,000,000 | AECOM knowledge of new facility costs for another Pilbara project |
| Welds | **<c-i-c>** | **<c-i-c>** | $9,611,800 | Assessed costs for WNR with allowance for CPI |
| Turnout Installation | **<c-i-c>** | **<c-i-c>** | $3,240,000 | Assessed cost for WNR with allowance for CPI |
| Level Crossings | **<c-i-c>** | **<c-i-c>** | $405,000 | Allowance. |
| TOTAL | | | $120,927,300 | |

The TPI's rail supply costs compare favourably with the range of prices being quoted for rail supply in 2010 by Australian suppliers on West Australian projects. A price range was obtained from **<c-i-c>** for projects at different stages of procurement, of between $1,650 and $1,750 per tonne CPT (Carriage Paid To) Perth for similar rail sections. These prices are likely to reflect a general economic up cycle in the region as well as supply constraints in the current market and adjustment for these factors reinforce the assessment that TPI costs for the Asset ID 102 are reasonable. No direct quotes or relatively reliable price information was available for imported products for 2010.

Although "Ballast Superlift" (Asset ID 58) occurred at a point after the opening of the railway to first trains, it is a continuation of what would be a typical construction sequence of maximum 100mm lifts to achieve the required design ballast depth. As such, it is considered reasonable to include as a cost attributable to constructing the railway to the required design parameters.

Using the GRV of $196,368,238 (Asset ID 102) plus $21,160,991 (Asset ID 58) and subtracting the above potential components results in a GRV of $96,601,929 as a rough estimate of residual tracklaying costs, equating to $342 per track metre.

It should be noted that the inclusion of a Flashbutt Welding facility has a significant effect on the outcome of the above analysis. Examination of the cost model shows that there is no other logical Asset ID within which such costs could be included. Confirmation of this assumption with TPI would, however, allow greater certainty of assessment in this area.

Quotes obtained in late 2008 from a contractor undertaking tracklaying activities in the Pilbara indicate a cost of approximately $300 per metre. TPI's unit cost, derived from the above GRV, is within 20% of that rate.

There remain uncertainties about the composition of Asset ID 102 and about the implied tracklaying cost included in that Asset ID, of $342 per track metre, which is higher than the AECOM analysis. Our recommendations in relation to Asset IDs 102 and 58 follow the logic above.

Based on a consideration of the composition of those Asset IDs on a joint basis, we recommend that the value for Asset ID 58 should be accepted, but that a value of $184,366,309 should be applied for Asset ID 102 for the 2010/11 cost calculations, unless TPI can substantiate the value of the component costs, including the specific tracklaying costs, included in Asset ID 102. The total costs calculated in this draft report are based on adoption of the calculated value of $184,366,309 for Asset ID 102.

The calculated value of rail and tracklaying costs above, of $184,366,309, encompasses the full track length: in particular, it covers straight and curved track sections (this would include Curves <400 [Asset IDs 102.01-

102.11] and Curves 400><800 [Asset IDs 102.12-102.22]). Accordingly, separate values for curved track as encompassed by Asset IDs 102.01-102.22 are not included in the recommended GRV initial asset base. Further information on these Asset IDs should be sought from TPI. The cost values for the assets covered by IDs 102.01-102.22 could be included in the initial asset base value where TPI demonstrates that these costs are efficient and not otherwise encompassed by the cost calculations above in relation to Asset ID 102.

## e) Bridges

***Commercial-in-Confidence Material Deleted***

Based on the detailed drawings provided on a commercial-in-confidence basis by TPI, AECOM has assessed the costs of individual bridges on a per square metre basis. AECOM's assessment of a reasonable rate for heavy haul bridge construction in the Pilbara is based on a minimum rate of $15,000 per m2. This assessment is based on information from a 2008 bridge project completed in the Pilbara for a similar heavy haul railway and from contractor sourced cost information in relation to an ongoing heavy haul rail bridge construction project, also in the Pilbara during the same time period.

On the basis of this, the derived unit costs from the information that TPI have provided appears to be low in comparison to the expected unit cost.

It should be noted that the rate per square metre benchmark nominated above is inclusive of all items for construction of the bridge, including:

1. Geotechnical investigations;
2. Hydrology investigation and design;
3. Upstream and downstream flood training and guide bank protection;
4. Abutments; and
5. All piling, substructure and superstructure.

As a minimum, Items 4 and 5 should be included within the individual bridge Asset IDs provided by TPI. However, Items 1 to 3 will include costs captured in other areas (eg Items 1 and 2 within Asset ID 2073 "Pre-Prod Dev – Rail Infrastructure" and Item 3 within Asset ID 102.23 "CB to PH Rock Armour").

In addition to the above considerations, economies of scale will have an effect on the cost of bridges in relation to the TPI railways network. Some of the background analysis to AECOM's benchmarking is based on the construction of single bridges. TPI constructed seven bridges as part of one project and would derive benefit from design standardisation, large scale supply orders for structural steel, and continual mobilisation of experienced construction crews.

Taking into account economies of scale **<c-i-c>** GRVs provided in the model can be considered to be reasonable on the basis that they do not exceed expected costs for a typical asset.

A similar per square metre rate comparison is not appropriate for Asset ID 89 "BHP Overpass", which would potentially contain the following items that would not be considered in a typical unit cost rate for rail bridges:

- Approach earthworks (as an extra/over to what would have been required if the overpass was not required). This may be inclusive of drainage and culverts;
- Modifications to BHP infrastructure;
- Specific environmental costs; and
- Derailment protection.

As a broad assessment, the GRV figure of $29,386,043 can be compared with $20m cost expected for grade separations in the Perth metro area.

Although further disaggregation of the GRV data in the model would allow a more detailed assessment of each bridge, on the basis that the higher than expected costs for the BHP Overpass are balanced out by lower than expected costs for bridges covered by Asset IDs relating to the remaining bridges, we recommend that the Asset ID values for bridges, including the BHP Overpass, are accepted. To affirm the basis of this acceptance of the GRVs for Asset IDs relating to bridges above, we also recommend that TPI demonstrates to the ERA that the costs of the **<c-i-c>** bridges and the BHP Overpass represent efficient costs.

## f) Culverts

***Commercial-in-Confidence Material Deleted***

From the confidential data provided by TPI, AECOM has been able to determine a unit cost of $62.60 per metre of Corrugated Steel Pipes (CSP) culvert (assuming that Asset ID 102.23 accounts for rock armour), representing an average unit cost across diameters 600mm to 3600mm.

AECOM does not have readily available project information that can be used to provide a direct comparison for this item. To establish reasonableness, AECOM referenced the 2010 edition of Rawlinsons “Australian Construction Handbook”. Typical per metre prices are shown for sample sizes in Table 9 below.

**Table 9. Culvert Rates Per Metre**

| Diameter | Cost (inc. laying) |
|---|---:|
| 600mm | $131.00 per m |
| 1200mm | $285.00 per m |
| 1800mm | $501.00 per m |
| 3000mm | $1525.00 per m |

Averaging the above figures results in a cost per metre of $610 for CSPs. As a result, there appears to be an order of magnitude difference between the GRV provided by TPI and a level of cost that would be considered reasonable. We recommend that the ERA accepts the asset value for Asset ID 1373, although TPI should be given opportunity to submit additional information on the basis of its proposed GRV for rail culverts, which could be taken into account by the ERA in determining TPI’s floor and ceiling costs.

## g) Earthworks

***Commercial-in-Confidence Material Deleted***

Asset ID 101 “CB to PH Rail Earth Works”, with a GRV of $561,933,697, can be considered to relate to earthworks costs. To make a meaningful assessment of the reasonableness of this cost, the following information would be required to derive unit cost data:

- Typical formation and cutting details (batter, layer thicknesses);
- Bills of Quantities;
- Breakdown of cost by layer type (capping, bulk earthworks) and cutting requirements (rock, granular material);
- Details regarding earthworks balance and borrow; and
- Details relating to longitudinal drainage.

Such information has not been made available.

The GRV provided for Asset ID 101 results in a cost of $2,194,196 per kilometre on a route length basis.

AECOM has previously assessed a cost of $481,760 per kilometre as reasonable on the basis of a 250mm capping layer and average 2m high embankment (sourced from per m3 unit costs for capping layer and bulk earthworks from a project in the Mid West of Western Australia).

Using a batter profile of 1:2, TPI's GRV would suggest an average embankment height of 6m. It is expected that embankments of this height will be found on the alignment, although the figure of 6m appears high as an average value.

It is emphasised that the GRV for earthworks costs would comprise costs for both fill and cut, with the amount of cut in rock having a proportionally higher effect on overall cost. **<c-i-c>** However, with a general appreciation of the topography and route available from public domain sources, the route will have rock cut, as a minimum, through the Chichester Ranges. It is not possible to make any reasonable estimate as to the quantities between ground types.

Information from FMG's website (www.fmgl.com.au) suggests a total of 11 million cubic metres of earth was moved for the project. By dividing this figure through the total GRV for earthworks provided in the model, this would suggest an average rate of $51.08 per m3 for earthworks. This is more than double previously assessed rates of $21 per m3 for general bulk fill. As discussed above, reasons for this variation likely include:

- Inclusion of non-earthworks items in the GRV (eg items relating to other civil works and drainage, which do not appear to have been accounted for in other Asset IDs);
- Variation of rates between earthworks activities (from clearing and grubbing, through bulk fill and rock excavation, and drill and blast); and
- Proportionally higher amounts of rock cut and drill and blast for the railway construction.

For a railway in the Pilbara, crossing the Chichester Ranges, the GRV for Earthworks appears not to be unreasonable, where the total construction cost of a single track railway in greenfields terrain may be considered to be within the range of $2m to $3m per kilometre.

The value of Asset ID 101, in terms of its derived per kilometre rate of $2,194,196, is within these general bounds. For the purposes of this draft report, PwC recommends that the value for Asset ID 101 proposed by TPI is accepted. In order for the GRV for Asset ID 101 in the cost model to be accepted by the ERA for the final determination of floor and ceiling costs, we recommend that TPI should demonstrate to the ERA the basis of this GRV amount and that it represents an efficient cost. The demonstration of the basis of the proposed GRV should address the relevant matters in section 3.1.1 of the CP (Gross replacement values) and should involve provision of the following information to enable a more detailed assessment by the ERA:

- Typical formation and cutting details (batter, layer thicknesses);
- Bills of Quantities;
- Breakdown of cost by layer type (capping, bulk earthworks) and cutting requirements (rock, granular material);
- Details regarding earthworks balance and borrow; and
- Details relating to longitudinal drainage.

### h) Access Roads

Asset ID 99 "Rail Access Road" has a value of $3,989,014. No other information has been made available regarding the extent of the access road. On the basis of the assumption that an access road parallels the railway for a route length of 256.1km, a unit cost of $15,576 per kilometre can be derived. Contractor quotes for access road construction at 2008 prices generally reflect the unit cost derived above, based on construction of a "typical" railway, although it is noted that access road costs are difficult to compare from one railway to another due to variables such as:

- Access to surrounding infrastructure;
- Topography; and

- Grade and quality of road.

Although little information is available in relation to these variables for TPI, the GRV as proposed appears to be reasonable.

## i) Signalling and Communications

The following Asset IDs and GRVs in the cost model appear to represent costs associated with Signalling and Communications.

**Table 10. Signalling and Communications IDs**

| Asset ID | Asset Name | GRV |
|---|---|---|
| 24 | 50W UHF Base Station Communication | $860,044 |
| 33/35 | Comms Towers | $139,019 |
| 48 | Amtech Transponder Tag AT5113 | $88,519 |
| 1290 | Port Leaky Feeder in TUL Tunnel | $180,587 |
| 1359-1372 | Radio Base Stations | $9,419,015 |
| 1374 | Rail Signals and Communication | $63,145,951 |
| 1632 | Wayside Signals | $558,623 |
| 2016 | Relay Train Control | $513,485 |
| 2017 | Implement Train Controls in FM | $643,678 |
| TOTAL | | $75,548,921 |

The above combined GRV equates to a cost per track kilometre of $267,241.  No further disaggregation of costs for items associated with signalling and communications was made available.

***Commercial-in-Confidence Material Deleted***

At paragraph 20 of page 4 of its submission, the NWIOA sets out assets that its consultants consider should not be included in below rail costs and for which further information is sought (the list of the particular asset IDs is provided in Table 1 of page 5 of the NWIOA submission).  Based on the confidential information provided by TPI, AECOM has determined Asset IDs 48 and 1290 (the first two items in the NWIOA list ie Amtech Transponder Tag AT5113 and Port Leaky Feeder in TUL Tunnel) to be part of the signalling systems and communication systems.  Accordingly, these assets should be included in the railway infrastructure for floor and ceiling cost modelling.

Although there is some breakdown in the cost model of the individual items comprising signalling and communications assets, the majority of these costs are contained within Asset ID 1374.  It is not possible to disaggregate this item further using the level of information provided.  However, a comparison of per kilometre costs is possible on the basis of accepted unit costs for other railways, such as WNR.  To make the comparison, the most heavily trafficked of the WNR routes were considered below.

**Table 11. Benchmark Signalling and Communications Costs**

| Line | Section | Signalling Cost (per km) | Communications Cost (per km) | Total (per km) |
|---|---|---|---|---|
| Forrestfield to Kalgoorlie | Avon Yard to West Merredin (167km) | $174,170 | $38,630 | $212,880 |
| Kwinana to Bunbury Port | Mundijong Junction to Pinjarra (43km) | $190,408 | $69,196 | $259,604 |

Source: WestNet Rail Signalling and Communications Cost (extracted from Report for Review of Unit Prices, October 2008 (www.erawa.com.au)

On the basis of the above, TPI's GRV for signalling and communications can be considered to be reasonable.

## j) Miscellaneous

This section considers the remaining assets nominated in the TPI cost model that have not been analysed above. The remaining Asset IDs are discussed below, either individually or as part of a group of Asset IDs.

Asset ID 1455 – Signals for HBI Crossing
Asset ID 1455 "Signals for HBI Crossing" appears to relate to a specific crossing at Port Hedland. The GRV is given as $324,259. Previously assessed costs for active protection of level crossings with lights suggests a unit cost in the range $125,000 to $157,000, depending on the type of system installed (either DC Westrak or Predictor). If this asset ID refers to two sets of active light crossings at this location then the GRV provided is reasonable. We recommend that TPI confirms whether Asset ID 1455 relates to two sets of active light crossings.

Asset ID 1629 – Water Bores Along Rail Lines
The GRV for this asset is shown as $7,676,541. No additional details of water bores have been provided.

Typically, water bores may be established by the earthworks contractor, and hence form part of the rate for earthworks. However, it is feasible that TPI established the bores prior to construction for other purposes. Without information regarding numbers or locations of bores, it is not possible to assess the reasonableness of the value proposed in relation to this Asset ID. We recommend that the value as shown is included in the total GRV for the purposes of this draft report. In order for the GRV for this Asset ID in the cost model to be accepted by the ERA for the final determination of floor and ceiling costs, we recommend that TPI should demonstrate to the ERA the basis of this GRV amount (including the basis of including these costs in railway infrastructure costs) and that it represents an efficient cost.

Asset ID 2073 – Pre-Prod Dev – Rail Infrastructure & Asset ID 1705 IOCP Fleet Development Project
The GRVs for Asset IDs 2073 and 1705 are shown as $22,991,160 and $512,192 respectively

The NWIOA, at Table 2 on page 5 of its submission, lists these two assets (along with Asset ID 2017 Implement Train Controls in FM) and suggests that these assets should be excluded from the cost calculations on the grounds that they do not appear likely to require replacement or ongoing maintenance activities. Asset ID 2017, based on additional data provided by TPI, is considered to be included in the signalling and communications systems as part of the railway infrastructure (as noted above).

***Commercial-in-Confidence Material Deleted***

Asset ID 2073 would appear to relate to concept, design and investigation work. It is not clear whether this properly belongs in assessing the replacement cost of the railway. The knowledge that was developed to enable the construction of the railway, and the associated intellectual capital, will not necessarily need to be recreated in any scenario where the asset needs to be replaced like-for-like.

We note however that section 3.1.1 of the approved CP states as follows:

> "TPI will apply design construction and project management fees at a rate of 20% of the total cost of the infrastructure and based on an economic life of 50 years."

This suggests that the costs of Asset ID 2073 (which are materially less than 20% of the total cost of the infrastructure, as limited by section 3.1.1 of the CP) may be recovered through access charges. Subject to TPI providing information to verify: the cost amount for this asset ID; and that it relates to railway infrastructure (rather than rail operations), we recommend that the costs in Asset ID 2073 are included in the initial capital base.

The title of Asset ID 1705 "IOCP Fleet Development Project" suggests that this asset relates to development work, rather than a physical asset.

We have no information on the nature of the project to which Asset ID 1705 relates. The project is not referred to in the CP and there is no information to relate it to the access-related functions of TPI. In view of this, and in the absence of information to explain the nature of the project or to justify its inclusion in network access cost model, we recommend that the value associated with Asset ID 1705 is not included in the floor and ceiling cost calculations.

Asset ID 2032 – Capitalised Rail Spares

The GRV for this asset is shown as $1,423,937. No disaggregation of this item has been provided. We are uncertain whether the rail spares covered by this asset ID relate to materials that may be used in track maintenance. TPI has provided a breakdown of materials within the track maintenance budget, which has been assessed by AECOM in terms of the operating costs in section 3.4.6 of this report. We recommend that the GRV for this asset ID is retained in the initial asset base for the railways network. In order for the GRV for this Asset ID in the cost model to be accepted by the ERA for the final determination of floor and ceiling costs, we recommend that TPI should demonstrate to the ERA the basis of this GRV amount (including the basis of including these costs in railway infrastructure costs) and that it represents an efficient cost.

Workshop and Yard Facilities (Multiple Asset IDs)

***Commercial-in-Confidence Material Deleted***

In addition, if the assumptions stated in relation to Asset ID 1765 (Rail Turnouts CB to Port) as discussed above are correct, the cost of the supply of **<c-i-c>** turnouts (out of a total of **<c-i-c >** turnouts) can be considered to be incorporated into the GRV for Workshop and Yard Facilities. The derived cost of the **<c-i-c>** turnouts equates to $5,643,750 and, under that assumption, a GRV of $25,305,508 remains for the Asset IDs relating to Workshop and Yard Facilities.

There are a number of additional Assets that are considered likely to fall within the category of "Workshops and Yards", and a breakdown of the total GRV in relation to this asset category grouping is shown in Table 12 below.

**Table 12. Grouping of Asset IDs to "Workshop and Yard Facilities"**

| Asset ID | Name | GRV |
|---|---|---:|
| Multiple | Workshop and Yard Facilities (exc. Turnout installation) | $25,305,508 |
| 2044 | Trackmobile | $416,970 |
| 2019 | Supply of Portable Office | $750,595 |
| 2020 | Gantry and Shotblast Equipment | $394,463 |
| 2021 | Sealed Roadways | $3,540,125 |
| 2022 | Traction Alternator | $2,249,112 |
| 2023 | 7FDL Engine & Alternator | $226,781 |
| 2024 | Occupational and Hygiene Monitoring | $33,749 |
| 305 | Light Vehicles Refuelling Station | $396,163 |
| 308 | Lube Oil Dispensing Stations | $19,448 |
| 309 | Lube Oil Storage Tank | $53,171 |
| 310 | Lube Oil Unloading System | $41,390 |
| N/A | Ancillary and Support Plant | $937,749 |
| 373 | MFG Single Axle Drop Table | $446,916 |
| 1535 | Tesco Tool Cart | $117,059 |
| 1573 | Underfloor Wheel Lathe | $3,541,075 |
| 1715 | Lockers | $842 |
| TOTAL | | $38,471,115 |

With the level information provided, and apparent inconsistent treatment of items in this category (with items either being captured under a general Asset ID, or itemised very specifically, such as in the case of Asset ID 1715), a comprehensive assessment of reasonableness is not possible. However, AECOM considers the overall GRV of $38.5m for these facilities is not excessive in the context of the known detail.

The Asset IDs in Table 12 above are also contained in the NWIOA's Table 1 of its submission of 23 July 2010, which represent assets that the NWIOA's consultants consider should not be included in below rail costs. The NWIOA list does not include Asset IDs 305, 2021 and 2024, but includes Asset IDs 48 and 1290.

As noted above, Asset IDs 48 and 1290, based on additional data provided by TPI, are considered to be included in the signalling and communications systems as part of the railway infrastructure.

Table 13 below sets out a consideration of each of the asset IDs from Table 12 in terms of whether these IDs are likely to reflect the below rail component of TPI's costs. The classification of whether particular asset IDs should be included in the below rail costs of TPI is based on our general understanding of what the asset ID relates to and whether such an asset is considered likely to fall within the definition of railway infrastructure in section 3 of the Act.

In order for the GRVs for the assets in Table 13 to be accepted by the ERA for the final determination of floor and ceiling costs, we recommend that TPI should demonstrate to the ERA: the basis of the individual GRV amounts; the basis of including the costs of each particular Asset ID in railway infrastructure costs; and that each cost included represents an efficient amount.

**Table 13. Workshop and Yard Facilities – Whether Railway Infrastructure**

| Asset ID | Name | Assessment |
|---|---|---|
| Multiple | Workshop and Yard Facilities (exc. Turnout installation) | A majority, but potentially not all of the costs of this item, could be considered to be within the definition of railway infrastructure in section 3 of the Act. This item relates to the on-ground infrastructure such as track and formation.<br>Between 'Yard' and 'Workshop', a battery limit would generally be defined to prescribe the boundary of open access infrastructure to third parties (marshalling yard and locomotive provisioning[7]) with the exclusive access infrastructure related to rolling stock maintenance facilities (repair and maintenance workshops for locomotives and ore cars). The plans **<c-i-c >** provided by TPI do not show this battery limit.<br>As a notional estimate, the ratio of railway infrastructure costs to rail operations costs is taken to be in the order of 65:35 (ie included versus excluded from the railway infrastructure definition). Further information is required on the components of this asset ID which should be included/ excluded from the GRV. |
| 2044 | Trackmobile | This represents equipment to remove 'unfit to run' and 'planned for maintenance' ore cars from trains and ferry them to the removal sidings or workshop. These assets associated with the 'unfit to run' removal function are considered to be within the definition of railway infrastructure. |
| 2019 | Supply of Portable Office | Some functions performed in portable offices may relate to rail operations. However, considering the apparent indivisibility of the costs in this asset ID and that a material proportion of such costs are likely to be access-related, we have treated the costs of this asset ID as being within the definition of railway infrastructure. |
| 2020 | Gantry and Shotblast Equipment | This represents rolling stock maintenance facility equipment and as such is not considered to be included in railway infrastructure. |
| 2021 | Sealed Roadways | It is assumed that this asset ID pertains solely to the access road from public roads to the marshalling yard and maintenance facility cluster. Given the indivisibility of the assets, it would be reasonable to consider the costs of this asset ID to be within the definition of railway infrastructure. |

[7] 'Locomotive provisioning'- a facility, generally located close to or within the marshalling yard, where locomotives are re-fuelled and serviced, typically once every round trip to the mines. Generally operated as self service by train drivers, the services include basic minimum cleaning (eg windscreens and toilets), refilling consumables and pre-departure inspection.

| Asset ID | Name | Assessment |
|---|---|---|
| 2022 | Traction Alternator | This item relates to major overhauling/component exchange of locomotives. It is not a part of 'provisioning' and is not considered to be included in railway infrastructure. |
| 2023 | 7FDL Engine & Alternator | This item relates to major overhauling/component exchange of locomotives. It is not a part of 'provisioning' and is not considered to be included in railway infrastructure. |
| 2024 | Occupational and Hygiene Monitoring | This item has been included as railway infrastructure based on the principle of indivisibility. |
| 305 | Light Vehicles Refuelling Station | This item has been included as railway infrastructure based on the principle of indivisibility. |
| 308 | Lube Oil Dispensing Stations | This asset ID is considered to be a part of locomotive provisioning, a facility necessary for, and integral to, operation of the railway infrastructure. The costs of this ID are considered to be included in the railway infrastructure definition. |
| 309 | Lube Oil Storage Tank | This asset ID is considered to be a part of locomotive provisioning, a facility necessary for, and integral to, operation of the railway infrastructure. The costs of this ID are considered to be included in the railway infrastructure definition. |
| 310 | Lube Oil Unloading System | This asset ID is considered to be a part of locomotive provisioning, a facility necessary for, and integral to, operation of the railway infrastructure. The costs of this ID are considered to be included in the railway infrastructure definition. |
| N/A | Ancillary and Support Plant | The quantum of cost for this item suggests it is less likely to be a part of locomotive provisioning and more likely to be a cost in relation to a rolling stock maintenance facility. We consider it reasonable not to include these costs in the costs of the railway infrastructure. |
| 373 | MFG Single Axle Drop Table | This is taken to represent an item relating to major overhauling/ component exchange of locomotives. It is not a part of 'provisioning' and is not considered to be included in railway infrastructure. |
| 1535 | Tesco Tool Cart | The nature of the asset covered by this ID cannot be determined based on the available information. These costs have not been included in the costs relating to railway infrastructure. |
| 1573 | Underfloor Wheel Lathe | This is taken to represent equipment for ore car and locomotive wheel re-profiling which are 'rolling stock maintenance' activities and therefore should be not be included in the costs relating to railway infrastructure. |
| 1715 | Lockers | The nature of the asset covered by this ID cannot be determined based on the available information. These costs have not been included in the costs relating to railway infrastructure. |

Based on the considerations above, the value of the assets in Table 12 that can be considered to be within the definition of railway infrastructure in the Act is $21,700,190.

Where an asset in Table 13 above is not considered to relate to railway infrastructure, the asset value is not included in the GRV. In the case of the values for the IDs associated with Workshop and Yard Facilities, a total value of $16,448,580 has been used in place of the value of $25,305,508 as shown in Table 12 (the value used is the Table 12 value multiplied by the notional factor of 0.65, as per the notes in relation to this item in Table 13).

<u>Asset ID 2041 – Ore Car Tracking System, Asset ID 2018 – Supply of Testing and Monitoring, Asset ID 1734 Port Hedland Air Monitoring Services</u>

The applicability of these items to a third party access model is not clear. They appear to be company specific items that a third party would not benefit from when utilising TPI's railway infrastructure. We recommend that these asset items are not included in the floor and ceiling cost calculations in relation to access to the railways network.

### k) Revised Initial Asset Base

Table 14 below sets out the effect on the initial asset base value (GRV) proposed by TPI of the adjustments and exclusions in relation to individual asset IDs as recommended above. In order for the GRVs for Asset IDs listed in Table 14 as initially proposed by TPI to be accepted by the ERA for the purpose of determining floor and ceiling costs, we recommend that TPI demonstrates to the ERA the basis of the proposed GRV amounts and that each amount represents an efficient cost. In addition, this report adopts unamended GRVs for particular Asset IDs for which it is recommended that additional information is sought before the ERA can accept those values in the final determination. Key Asset IDs in this latter regard are Asset ID 101 “CB to PH Rail Earth Works”, Asset ID 2073 “Pre-Prod Dev - Rail Infrastruc”, Asset ID 1629 “Water Bores along Rail Line” and Asset ID 2032 “Capitalised Rail Spares”.

**Table 14. Revisions to Proposed GRV**

| Asset ID | Asset Description | GRV |
|---|---|---:|
| All | Total Initial Assets | $1,131,126,251 |
| *Less* | | |
| 100 | CB to PH Ballast (adjustment value) | $21,969,913 |
| 102 | CB to PH Railway Line (adjustment value) | $12,001,930 |
| 102.01-102.11 | Curves < 400' | $7,472,669 |
| 102.12-102.22 | Curves 400><800' | $13,252,947 |
| 373 | MFG Single Axle Drop Table | $446,916 |
| 1535 | Tesco Tool Cart T24303 | $117,059 |
| 1573 | Under Floor Wheel Lathe Type U | $3,541,075 |
| 1705 | IOCP Fleet Development Project | $512,192 |
| 1715 | Lockers - 305W Elitebuild | $842 |
| 1734 | Port Hedland Air Monitoring Pr | $181,468 |
| 1792-1816 | Ballast | $7,159,142 |
| 2018 | Supply of Test and Monitoring | $9,535 |
| 2020 | Gantry and Shotblast Equipment | $394,463 |
| 2022 | Traction Alternator | $2,249,112 |
| 2023 | 7FDL Engine & Alternator Lifti | $226,781 |
| 2024 | Occupational Hygeine Monitorin | $33,749 |
| 2041 | Ore Car Tracking System | $174,721 |
| N/A | Ancilliary and Support Plant | $937,749 |
| Multiple | Workshop and Yard Facilities (adjustment value) | $8,856,928 |
| All | Total Initial Assets (revised) | $1,051,587,060 |

## 3.6.2 *Economic Life*

Section 3.1.2 (Economic life) of the CP provides as follows:

> “In calculating a ceiling (and if appropriate a floor) cost, the economic life assumption underpinning the annuity payment calculation for these types of capital costs will be based on the economic life of assets listed in Attachment A unless a shorter life is adopted due to the assets servicing a time limited project.”

The economic lives entered into the Rail Assets worksheet (in cell range G8:G55) are in all material respects consistent with the economic lives for asset classes as listed in Appendix of the CP.

### 3.6.3 Amortization

Section 3.1.4 of the CP (Annuity) sets out as follows:

> "The annuity calculation provides a return on capital and implicitly provides for depreciation of the asset. TPI has adopted the methodology (applying the PMT formula) used in a Microsoft Excel spreadsheet to calculate the annuity required."

Section 3.1.4 also sets out the basis for the input parameters for the annuity (PMT) function in Microsoft Excel as follows:

> "Rate of Interest: be set at the relevant WACC as defined by the Code.
>
> Nper: be expressed in years and based on the relevant economic life of the track sections.
>
> Pv: is the GRV of the relevant route section.
>
> Fv: is the salvage value, if any, which remains at end of economic life. When an asset achieves its full economic life, then the salvage value is to be set at zero.
>
> Type: be set at the start of the period by inputting "1"."

The selection of the "Type" parameter above as "1" means that the formula to be applied by the model is to calculate an "annuity due" (being an annuity based on the assumption that payments will be made at the start of each payment period) rather than an ordinary annuity (where payments are assumed to be made at the end of each payment period).

The ERA's Required Amendment 7 in its final determination on the CP required TPI to set out the annuity calculation methodology along similar lines to the methodology set out under section 2.6 of the WNR CP, which sets out an annuity due methodology.

**Table 15.A Proposed Annuity Approach**

| Worksheet | Cell Range | Description | TPI Provision |
|---|---|---|---:|
| Rail Assets | H8:H55 | Annuity Formula | Ordinary Annuity |
| Rail CAPEX | G9:G23 | Annuity Formula | Ordinary Annuity |

The annuity calculations in cell range H8:H55 the Rail Assets worksheet are consistent with section 3.1.4 of the CP and with the ERA's requirements, except that the formula version used by TPI in the model is the ordinary annuity version of the formula (that is, the "Type" parameter field has been left blank in the formula version used in the model). The same issue also exists for the annuity calculations in cell range G9:G23 of the Rail CAPEX worksheet which calculates yearly annuity values for capital investment projects.

At paragraph 14 of page 2 of its submission, the NWIOA presents that the annuity calculation on the Rail Assets worksheet is incorrect and should be on the same basis of that in the WNR floor and ceiling cost model.

We recommend that the annuity formulas in the cell ranges referred to are converted to the annuity due version, in accordance with the approved CP.

**Table 15.B Recommended Annuity Approach**

| Worksheet | Cell Range | Description | Recommendation |
|---|---|---|---:|
| Rail Assets | H8:H55 | Annuity Formula | Annuity Due |
| Rail CAPEX | G9:G23 | Annuity Formula | Annuity Due |

The adoption of the annuity due methodology in the amortization calculation is also considered to be consistent with specific pricing provisions contained in the CP. In this regard, paragraph 3 of section 6.1 (Indexation of floor and ceiling) states as follows:

> "TPI will index the Floor and Ceiling costs based on CPI less the "X" factor. CPI will not apply in the year that the GRV and operating costs are reset. The "X" factor will be set at one quarter of CPI for the second and third years."

The above provision is a condition applied by the ERA's Required Amendment 13 in the final determination on the approval of the TPI CP. Required Amendment 13 required the TPI CP to reflect similar conditions in the WNR CP.

In the context of the above requirement, if the amortization charges in the model were to be based on the application of a nominal WACC value (instead of a real WACC value) to the determination of capital charges in the year that the GRV and operating costs are reset (2010/11 in the case of the TPI model), the condition in sentence 2, paragraph 3 of section 6.1 of the CP would not be met.[8]

It would be consistent with the annuity due approach as specified in section 3.1.4 of the CP, and with the price path specified in paragraph 3 of section 6.1 of the CP, that:

- there should be no CPI-X escalation of the 1 July 2010 costs over the course of 2010/11 to determine the prices to apply in 2010/11. This is because, under the annuity due approach, all income is assumed to be received by TPI at the start of the year, so that only costs as at 1 July 2010 should apply; and
- for the start of 2011/12, costs should be escalated by the CPI-X factor, consistent with providing TPI with an appropriate nominal return on investment (less the X efficiency factor). This first application of the escalation factor would occur effectively one year after the reset date (ie to derive costs as at 1 July 2011).

We consider the process described above to be consistent with the relevant principles set out in the CP. To this effect, we recommend that cost escalators in the model should reflect the process as described above. This means that the amortization charges should be calculated using a real (pre tax) WACC.

From the second year of the TPI pricing regime, these charges and the expense values should be escalated by the CPI-X formula in accordance with paragraphs 2 and 3 of section 6.1 of the CP. As described in section 1.1 above, the assessment in this report relates to floor and ceiling costs for 2010/11 only. Aspects of the model relating to the derivation of costs for later years are not examined in any detail in this report.

We note that section 3.1.4 of the CP (Annuity) also provides that:

> "This formula [ie the annuity due formula] calculates the costs at the beginning of the period which does not reflect the actual payment cycle for access charges. The appropriate methodology is to calculate the change monthly in arrears but this is not possible under the definition in the Code where economic life for the GRV of the railway infrastructure is to be expressed in years as the number of periods. To allow for this, TPI will include in its operating costs a proxy for the working capital required because of the effects of the formula."

We are unable to determine whether the expenses entered to the model (in the Data worksheet) incorporate such a working capital component. By its comments that the annuity calculation on the Rail Assets worksheet should be on the same basis of that in the WNR floor and ceiling cost model, it can be inferred that the NWIOA (at paragraph 14 of page 2 of its submission) may be suggesting that a working capital term should be included in the TPI annuity calculation, given that it is included in the annuity calculation in the WNR model. We are unable to recommend that such a term should be included in the annuity calculations, given

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[8] We note that the application of the inflation factor to operating costs (in the Rail Expenses worksheet) is, however, consistent with the year 1 requirement of sentence 2 of paragraph 3 of section 6.1 of the CP.

that it cannot be determined whether such a term has already been effectively included in the proposed operating costs. The Rail Assets worksheet also provides for annual lease costs to be included in the capital costs recovered by floor and ceiling prices. At this stage, no lease costs are included in the model.

## 3.7 Rail Asset Calcs Worksheet

This worksheet sets out the allocation of the annuity values for the initial assets and future capital investment and applies the asymmetric risk cost (as calculated within the Data worksheet) by segment. As noted above, at present, all costs, and hence total annuity values and asymmetric risk costs, are allocated to the single segment, Cloudbreak to Port Dumper.

In the case of the annuity values for capital investment and the asymmetric risk cost, this worksheet also determines the annual charges for these items to apply in future years. As noted above, this assessment relates to floor and ceiling costs for 2010/11 only.

The base asymmetric risk costs calculated in the model are ceiling values (the ceiling asymmetric risk costs for years 1-6 are calculated within the cell range I72:N91 of this Rail Asset Calcs worksheet). The floor values for asymmetric risk costs for years 1-6 are calculated within the cell range C72:H91 of this worksheet by prorating the base (ceiling) values according to the proportion of annuity charges allocated according to the "Direct" plus "Equally Split" allocators, expressed as a percentage of the total annuity charges.[9] The proration factor applied to the ceiling asymmetric risk cost to determine the equivalent floor cost is around 93% in 2010/11. The proration percentage can change slightly from year to year and is therefore an influence on the floor asymmetric risk cost factor in future years.

Other than the calculation of floor asymmetric risk costs, all costs calculated in this worksheet are ceiling costs. This worksheet also sets out the allocation of annuity values as:

- "Direct" to segments (where the asset is directly identified in the Rail Assets worksheet against a particular segment); or
- allocated to segments, based on whether the asset is classified as "All" (to be allocated equally across active segments) or "Equally Split" (allocated by track length).

The selection of these allocators occurs within the Data worksheet, in the case of annuity values associated with the capital investment projects, and within the Rail Assets worksheet, in the case of annuity values to recover the capital costs of the initial assets.

## 3.8 Rail Expenses Worksheet

This worksheet sets out the allocation of the expense data entered to the Data worksheet, by customer, segment and year. The expense data allocation bases from the Data worksheet are: "Gross TKM"; "Train KM"; and "Direct". In the current model, track and signals maintenance expenses are allocated based on Train KM and operating and overhead expenses are treated as Direct expenses. Currently, the Gross TKM allocator is not applied and total expenses are fully allocated to the customer (TPI) and route segment (Cloudbreak to Port Dumper) existing at the time of the TPI submission.

As noted above, the allocators of expenses (Rail Operating Costs) are selected in the Data worksheet. The allocators assign costs to particular routes, and provide an allocation to customers. These allocators are applied in the Rail Expenses worksheet.

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9 Total annuity charges can be seen to comprise the annuity charges which are allocated using all allocation bases (presently, these are the "Direct", "Equally Split", and "All" allocators).

Allocators that are able to be selected in relation to expenses are consistent with the operating and overhead cost allocators in the CP, except that the selection of allocators by expense type in the model does not align with that in the CP.

In section 3.4.6 above we recommend changing the assignment of the prescribed allocation bases in the Data worksheet. In section 4.2 below we comment on the overall cost allocation process (operating and capital costs) used in the model.

The base expenses calculated in this worksheet are ceiling expenses. Floor expenses are calculated in this worksheet by applying the minimum load percentage factor (as entered to cell range C86:V86 of the Data worksheet) to those expenses that are allocated by Train KM.

## 3.9 Rail Cost Summary Worksheet

This worksheet determines unit prices based on the cost and quantitative data by segment and year determined by other worksheets above. The cost data used is from the Rail Asset Calcs and Rail Expenses worksheets. The data from those worksheets is in floor and ceiling terms: aggregation of that data in this worksheet determines floor and ceiling costs and prices.

Floor cost calculations in this worksheet (unlike ceiling cost calculations) do not include asset and capex annuity charges that are classified as “All” (ie annuity charges allocated equally across active segments).

A summary of TPI’s proposed floor and ceiling costs, expressed in aggregate terms based on the total cost definition in clause 1 of Schedule 4 of the Code, is shown in Table 18 in section 4.3 below.

## 3.10 Rail Pricing Worksheet

This worksheet determines access prices per customer for year 1 only (the year 2010/11). While this assessment covers the year 2010/11, the assessment relates only to floor and ceiling costs calculated by the TPI model, rather than of its derivation of floor and ceiling prices. Accordingly, the calculations in this worksheet are not assessed in this report.

The expenses allocated to customers in the Rail Expenses worksheet (and adjusted appropriately to reflect the avoidability of costs, in the case of floor price calculations) should be used as the customer expenses in this worksheet. In this way, the model would provide a more complete framework to accommodate future third party cost and projected usage data in determining access costs for those customers in accordance with the principles in the CP. As noted above, the assessment by PwC of the model as submitted is of the floor and ceiling costs calculated by the model, rather than of its determination of floor and ceiling prices.

# 4 Conclusion

## 4.1 Total Ceiling Costs

The revisions to TPI's proposed ceiling costs as based on the recommendations in section 3 of this report are shown in Table 16 below.

**Table 16. Summary of Revised Ceiling Costs (2010/11 Costs)**

| Cost Base | Cost Component | Cost Allocator | Revised Cost |
|---|---|---|---|
| Capital Costs | Initial Capital Base | Equal Split | $90,278,963 |
| | | Cloudbreak to Port Dumper | $12,001,070 |
| | | All | $8,946,313 |
| | Capex | | $3,257,339 |
| | Total Capital | | $114,483,685 |
| Opex | | Direct | $17,104,293 |
| | | Train Km | $41,438,396 |
| | Total Opex | | $58,542,689 |
| Asymmetrical Risk Cost | | | $0 |
| Total Ceiling Cost of Service | | | $173,026,374 |

It is emphasised that a number of key Asset IDs have been included in an unadjusted form in the revised GRV for the network. It is recommended that additional information is sought from TPI in relation to such Asset IDs before the ERA can accept those values in the final determination of floor and ceiling costs. Key Asset IDs in this regard are Asset ID 101 "CB to PH Rail Earth Works", Asset ID 2073 "Pre-Prod Dev - Rail Infrastruc", Asset ID 1629 "Water Bores along Rail Line" and Asset ID 2032 "Capitalised Rail Spares". In addition, the calculations above include revised GRVs for particular Asset IDs from the values initially proposed by TPI. We recommend that TPI demonstrates to the ERA the basis of its proposed GRV amounts in relation to such assets and that each asset amount represents an efficient cost. Key Asset IDs in this regard are Asset ID 100 "CB to PH Rail Ballast", Asset ID 102 "CB to PH Railway Line" and "Workshop and Yard Facilities" (multiple Asset IDs). In a similar context to capital costs, while the revised ceiling costs in this report incorporate operating costs as initially proposed by TPI, we recommend that further information should be sought from TPI in relation to the component values of these operating costs before they can be accepted by the ERA as efficient costs for the purpose of determining floor and ceiling costs for the network.

## 4.2 Total Floor Costs

The NWIOA notes in its submission (at paragraph 5 of page 1 and at paragraph 10 of page 2) that the data input to the model is in respect of one customer and one route segment only and that, without data being entered for other customers and segments, it is not possible to fully test the application of the model to a situation of third party access.

In section 3 of this report we set out issues regarding the cost allocation processes used in the model. While the only rail operations being conducted on the railways network being assessed are internal to TPI, the allocation processes do not have a practical effect. The allocation bases of expenses and capital costs however prescribe the way in which incremental costs are determined for the purposes of the calculation of floor prices.

The allocators of expenses (Rail Operating Costs) are selected in the Data worksheet. The allocators assign costs to particular routes, and provide an allocation to customers. These allocators are applied in the Rail Expenses worksheet.

The allocators that are able to be selected in relation to expenses are consistent with the operating and overhead cost allocators in the CP, except that the selection of allocators by expense type in the model does not align with that in the CP.

The CP do not specify allocators of capital costs. In the model, allocators of capital costs are selected in the Data worksheet, in the case of future capital expenditure, and are selected in the Rail Assets worksheet, in the case of the values for the initial GRV of the network. The allocators of capital costs are only in respect of allocation of such costs to routes. The allocated initial capital base costs are determined in the Rail Assets Calcs worksheet and the allocated capex costs are determined in the Rail CAPEX worksheet.

Because the focus of this assessment is of floor and ceiling costs for 2010/11 in relation to one route section which we understand is utilised by TPI's rail operations, issues relating to the application of floor and ceiling costs to multiple users and route sections are not addressed in this report. These issues are however relevant to the assessment of the way in which floor costs are determined under TPI's proposal.

The base total cost calculations in the model are ceiling costs. Floor costs are determined by applying specific processes to the particular cost components used in the build-up of the ceiling costs. The factors applied to reduce expenses, and the basis for identifying capital cost components to be excluded from the calculations to arrive at floor costs, have not been substantiated. The application of the TPI factors and processes means that the proposed floor cost represents around 88% of the ceiling cost. We note in the WNR floor and ceiling cost model that floor costs represents around 5% of ceiling costs.

With the network being assessed comprising one route section and one operator (TPI) using the network, the concept of "incremental costs" under clause 1 of Schedule 4 of the Code, upon which the floor cost calculations are to be based, has uncertain application. The Code specifies that incremental costs should be those "that the railway owner or the associate would be able to avoid in respect of the 12 months following the proposed commencement of access if it were not to provide access to that operator or group of operators".

Given that the TPI railways network for which costs are provided in the model appears to have been constructed principally to support TPI's rail operations for FMG, most of the costs currently included in the model are unlikely to be avoided if TPI were not to provide access to a third party operator.

An assessment of avoidability should take into account the particular requirements and costs associated with dealing with access by third party operators. We do not have information on these matters and note that an assessment of avoidability could be performed at the time a third party proposal for access to the network is made under the Code (or at the time the ERA considers that such a proposal is likely to be made).

In section 3.4.5 above we noted that the minimum load factor (of 71.59%) applied by TPI to ceiling expenses (Rail Operating Costs) to determine the floor value of costs applies only to those operating costs categorized (allocated) on the basis of Train KM. Costs allocated by Train KM comprise approximately 71% of the total operating costs in the cost model, and the application of the minimum load factor model results in a value for floor operating costs that are approximately 80% of the total ceiling operating costs. In section 3.4.5, we recommended that the value for floor operating costs should be determined for the purposes of this draft report by applying a 15% minimum load factor to total ceiling operating costs (reflecting a similar level of avoidable, to total, operating costs in the WNR model).

In relation to the initial capital base of the railway infrastructure, avoidability of particular capital costs is based on whether the asset ID is identified as "All" (that the asset would appear to be a joint network asset, rather than being directly attributable to a particular route). Some 7% of the total asset value relates to assets identified as "All". The cost model treats these capital costs as not being avoidable and consequently treats the residual capital cost value (comprising some 93% of the total initial capital base value) as avoidable costs (and therefore the basis for the capital cost component within floor costs). The level of avoidable capital costs in the TPI model, of 93%, contrasts with the level of avoidability of capital costs in the WNR model, of around 2% of total capital costs.

We do not consider the level of avoidability of capital costs (hence resulting floor capital costs) in the model to be realistic.  However, the level of such costs within total capital costs would depend on the nature of access to the railway infrastructure sought by a third party.  In order to show an indicative floor cost in relation to a third party access, we have applied a notional 15% avoidability factor to the direct and proportionally allocated capital costs.  The result is an indicative value for floor costs (shown in Table 17 below).  It is emphasised that the floor capital costs are notional values only in the context of the current operations of the network and that the efficient avoidable capital costs should be considered based on information on an actual, or prospective, access proposal under the Code.

**Table 17. Summary of Revised Floor Costs (2010/11 Costs)**

| Cost Base | Cost Component | Cost Allocator | Revised Cost |
|---|---|---|---|
| Capital Costs | Initial Capital Base | Equal Split | $13,541,844 |
| | | Cloudbreak to Port Dumper | $1,800,161 |
| | | All | |
| | Capex | | |
| | Total Capital | | $15,342,005 |
| Opex | | Direct | $2,565,644 |
| | | Train Km | $6,215,759 |
| | Total Opex | | $8,781,403 |
| Asymmetrical Risk Cost | | | $0 |
| Total Floor Cost of Service | | | $24,123,408 |

In order to accept the avoidability of capital costs included in TPI's cost proposal, we recommend that the ERA obtains justification from TPI as to why all of the initial capital costs in the model that are either directly incurred or proportionately allocation to route sections should be treated as avoidable costs for the purpose of determining the floor costs.

Because the railway infrastructure covered by the model relates to a single route that connects FMG facilities and appears to have been designed principally around FMG's internal requirements, the provision of access to the railways network to a third party could be expected to give rise to costs and other effects that are currently not foreshadowed in the model.  We recommend that the data input to the model, and the allocation and pricing processes in the model, are reassessed at the time a third party proposal for access to the railway infrastructure is made under the Code (or at the time the ERA considers that such a proposal is likely to be made).

## 4.3 Total Cost Summary

A summary of the recommended revisions to TPI's proposed floor and ceiling costs is provided in Table 18 below. As stated in section 4.2 above, the indicative floor costs represent a notional calculation of floor costs only, in the light of appropriate information on the avoidability of capital and operating costs not being available at present.

**Table 18. Summary of Revised Total Floor and Ceiling Costs (2010/11 Costs)**

| Cost Base | Cost Component | Cost Allocator | Cost Value | | Variation |
|---|---|---|---|---|---|
| | | | TPI Proposal | Revised Cost | |
| **CEILING COSTS** | | | | | |
| Capital Costs | Initial Capital Base | Equal Split | $131,054,022 | $90,278,963 | |
| | | Cloudbreak to Port Dumper | $22,925,008 | $12,001,070 | |
| | | All | $11,922,391 | $8,946,313 | |
| | Capex | | $3,996,861 | $3,257,339 | |
| | Total Capital | | $169,898,282 | $114,483,685 | -32.6% |
| Opex | | Direct | $17,104,293 | $17,104,293 | |
| | | Train Km | $41,438,396 | $41,438,396 | |
| | Total Opex | | $58,542,689 | $58,542,689 | 0.0% |
| Asymmetrical Risk Cost | | | $2,490,007 | $0 | |
| Total Ceiling Cost of Service | | | $230,930,978 | $173,026,374 | -25.1% |
| **FLOOR COSTS** | | | | | |
| Capital Costs | Initial Capital Base | Equal Split | $131,054,022 | $13,541,844 | |
| | | Cloudbreak to Port Dumper | $22,925,008 | $1,800,161 | |
| | | All | | | |
| | Capex | | | | |
| | Total Capital | | $153,979,030 | $15,342,005 | -90.0% |
| Opex | | Direct | $17,104,293 | $2,565,644 | |
| | | Train Km | $29,665,748 | $6,215,759 | |
| | Total Opex | | $46,770,041 | $8,781,403 | -81.2% |
| Asymmetrical Risk Cost | | | $2,256,697 | $0 | |
| Total Floor Cost of Service | | | $203,005,767 | $24,123,408 | -88.1% |

We recommend that the basis of the floor costs is determined by the ERA at the time a third party proposal for access to the network is made under the Code (or at the time the ERA considers that such a proposal is likely to be made), when appropriate information on third party access arrangements is likely to be available.

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Appendix A AECOM Report

TPI Track Access Pricing
PriceWaterhouse Coopers
21st December 2010
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AECOM

# Unit Cost Assessment for TPI Track Access Pricing

# Unit Cost Assessment for TPI Track Access Pricing

Prepared for

PriceWaterhouse Coopers

Prepared by

**AECOM Australia Pty Ltd**
3 Forrest Place, Perth WA 6000, GPO Box B59, Perth WA 6849, Australia
T +61 8 6430 2000 F +61 8 6430 2999 www.aecom.com
ABN 20 093 846 925

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# 1.0 Introduction

This report presents AECOM's assessment and validation of unit prices and cost information submitted to the Economic Regulatory Authority (ERA) of Western Australia, by The Pilbara Infrastructure Pty Ltd (TPI), for the purposes of defining a costing model for calculation of track access charges for their railway in the Pilbara region of WA. This report is designed to be standalone, but it is understood that some or all of its contents may be incorporated into a wider review of TPI's costing model to be submitted to the ERA by PriceWaterhouse Coopers.

# 2.0 Methodology

## 2.1 AECOM's Methodology

This report is confined to the review of TPI's Floor and Ceiling Cost Proposal, dated 2nd July 2010, and the information submitted after this date, in support of the cost model presented. In this report, this information is hereafter collectively referred to as "TPI's 2010 Cost Model". As such the methodology outlined below is designed to validate the contents of this model and check the reasonableness of cost. In addition, AECOM's review considers some of the wider assumptions and context that may affect the determination of unit prices for input into the Floor and Ceiling Cost review process.

### 2.1.1 Unit Price Checking

In review of unit prices AECOM has relied on information gathered using the following approach:

- Liaison with suppliers for direct quotes.
- Liaison with rail construction contractors for quotes – this is undertaken through AECOM's relationships with some major contractors.
- Utilisation of cost data used by AECOM for recent work – AECOM have undertaken recent cost estimation for several large rail projects in the Pilbara and Mid West and, where available, these unit prices have been used to compare with TPI's estimation.
- Knowledge and experience of AECOM personnel – as a cross-check, and typically where there may be some spread of costs depending on the source, personal knowledge and experience of AECOM personnel has been used to judge the reasonableness of costs.
- Liaison with AECOM's Shanghai office for supply of rail and steel sleepers from China – this process and the conditions attached to information received is described in more detail below.
- Liaison with other AECOM offices in Australia – this was undertaken specifically for validation of maintenance costs.

In terms of precedence, direct supplier quotes will be given precedence over other sources, even if other sources provide corroborating prices to that provided by TPI.

It should be noted that the cost information referred to above and throughout the report has not necessarily been specifically re-validated for this report. However, data no more than 3 years old has been relied upon, and the sourced date is noted where applicable, with appropriate consideration of escalation based on common indices. This is considered appropriate as an approach as it matches the timeframes that TPI have drawn data from, being 2008 and 2009 at completion of construction for the railway.

### 2.1.2 Product Specifications

Specification and categorisation of products has been taken to be as described in the documentation provided by TPI as part of, or in support of, their submission. Unless there appears to be a material effect on the determination of the unit costs today (e.g. if an originally specified product is no longer available) then the same product specifications have been applied.

Where product specifications have not been provided, and where there is sufficient information to otherwise do so, industry standard specifications have been assumed, using Australian Standards as a reference. Any departures from this will be discussed in the appropriate section of this report. The standards and specifications used with regard to the MEA are summarised in Table 2–1.

| Parameter | TPI Standards/Specifications | Industry Standard Specifications |
|---|---|---|
| Axle load (tonnes) | 40 tonne axle load (TAL) | - |
| Rail weight (Kg/m) | 68 kg/m, to Australian Standard AS1085.1<br>Profile 136RE HT | - |
| Sleeper type, pattern and spacing | Design to 1085.1 Part 14, 40 TAL capacity,<br>Spacing 675mm<br>1480 sleepers/km | - |
| Ballast type and minimum depth (mm) | 'H' Class per AS 2758.7- 1996 (Part 7)<br>250 mm minimum on underside of sleeper | - |
| Fasteners | Pandrol 'E' type | - |
| Formation depth | Details not provided | 250mm capping layer<br>Bulk fill embankment depths vary with alignment and topography |
| Target maximum operating speed | 80km/hr for loaded and empty trains<br>100 km/hr for light locomotives | - |

**Table 2–1: Standards and Specifications for the TPI Railway**

#### 2.1.2.1 Capacity Assumption

The annual throughput capacity with regard to the MEA is assumed as 80 Million Gross Tonnes (MGT) inferred from the TPI Costing Principles as well as the data provided by TPI for this review.

### 2.1.3 Cost Reasonableness

Following the assessment of TPI's unit prices (both directly supplied and derived from the GRVs) using the method above, and the assessment of any product specification issues, or other assumptions, a check for reasonableness will be made. Typically, if AECOM's unit cost check results in a corroborating price that is +/-10% of TPI's assessment, then TPI's assessment will be considered to be reasonable. This is based on the estimating range most achievable when costing a project from detailed design for construction. If the costs obtained by AECOM fall outside of this range then further clarification will have been sought from AECOM's sources and/or identification of the issues driving the cost differences will be made. If the AECOM obtained costs are less, and no reasonable account can be made for this, a recommendation will be made to assess the cost at the lower price. Issues affecting the reasonableness of costs as set will be discussed where appropriate.

Where insufficient information is available to make a sensible assessment of cost reasonableness, this will be stated. However, an attempt will be made to add some value to the assessment of the item in question by utilising AECOM's knowledge and experience and any information that may be available in the public domain.

## 2.2 Global Assumptions

In this validation exercise AECOM have made some global assumptions in the assessment of the unit costs. In addition, AECOM have identified some wider issues that have been taken into consideration either across the review or for specific items. They are as follows:

- **Economies of scale utilised to reflect required quantum of asset replacement**
  In order to properly reflect the requirement for the modern equivalent replacement value of the infrastructure all unit costs have been assessed in "project sized" quantities. This means that all quotes and costs are in the basis of large orders required to replace significant quantities of infrastructure. Where TPI have indicated quantities, AECOM have utilised this in making comparison with existing data.
- **Prices need to be free of unusual volatility (i.e. aside from rise and fall resulting from typical domestic economic conditions)**

Given the current market uncertainties it is possible that costs and prices quoted as part of the assessment of this report may be affected by factors that were not present during TPI's determination based on construction costs. Further, there is likely to be unusual volatility driven by uncertainties in the iron ore industry which typically can restrict market supply of rail materials in the short term due to large and long term demand for expansion projects. Assessed prices may be currently artificially high or low for these reasons, but may not reflect the long term situation (over a number of years). It is difficult to accurately assess these effects within the scope and context of this study. However, anecdotal and qualitative evidence will be discussed, where appropriate. This issue is likely to be most relevant for large volume, limited (domestic) capacity products such as rail, sleepers and ballast.

- **Prices consider that production capacity is available and are not adjusted to reflect actual or perceived market supply constraints for the product**
  Notwithstanding the above, suppliers were asked to provide quotations on the basis of the requested quantities being available (i.e. at their typical "list" price), in order to avoid the possibility of price adjustments to reflect currently applicable specific supply constraints. Theoretically, this should result in a quoted price that only reflects long term price movements due to supply and demand. Again, whether this is absolutely the case is difficult to properly assess without an in depth analysis of the particular market for that product, and all its associated drivers.
- **Assessment of present replacement cost by an efficient owner is best derived based on the historical construction costs of the assets in Pilbara.**
  The available detailed data enables assessment of cost items to the detailed specification in the Pilbara at construction in 2008. The Pilbara conditions are not readily replicated by general market data or the data from other railways owing to the unique climatic, market and operating conditions which have significant potential to distort comparisons from benchmarks from other regions. The escalated Pilbara cost data of 2008 is considered as a more reliable proxy than the alternative of 2010 commercial data from other regional areas.
- **Assessment of costs by direct comparison / confirmation of quotes vs. acceptance of use of escalation**
  TPI uses a combination of actual 2008 costs and escalation to assess cost at 2010 prices. In many cases, without revisiting the detailed make up of some cost items (such as for signalling and communications) the use of escalation is a reasonable methodology. However, where possible and appropriate, AECOM have assessed absolute costs against known data, whether quotes or project experience. This may also be in addition to assessing the appropriateness of the escalation that has been used.
- **Acceptance of generalisations and groupings used**
  Where some items have been grouped or generalised for ease of categorisation, AECOM have not challenged this, and have used the groupings to assess the costs as practically as possible. The downside of this is that there is a greater risk of misinterpretation between the TPI cost assessment and AECOM's cost assessment undertaken by another third party. There are a number of issues with grouping of TPI's cost data and instances where these risks are apparent are identified for the specific items.
- **Acceptance that all unit costs identified are sufficient for complete costing of new build**
  AECOM have not analysed whether all the items and unit costs provided by TPI as a totality are sufficient to indicate the total cost of replacement for the railway infrastructure in question. However, in order to analyse the potential contents of Asset IDs, where there is a lack of disaggregated information, some judgements on completeness have been made.
- **TPI's costs are actual at time of construction**
  TPI have represented their costs as actual at the time of construction. As a result the review in this report also serves to determine completeness and distribution of costs between categories, to ensure that the contents of the cost model are logical and appropriate.

# 3.0 Cost Review

## 3.1 Rail

***<u>Commercial-in-Confidence Material Deleted</u>***

As a breakdown of the components of Asset ID 102 has not been provided it is not possible to further analyse the cost from the supplied GRV (Gross Replacement Value). However, as the actual contract price for rail has been provided and corroborated by TPI, this is sufficient for assessment.

Note that the likely breakdown of costs under Asset ID 102 is further discussed in Section 3.6.

Asset IDs 102.01 - 102.11 and 102.12-102.22 appear to relate to curves of tight radius (less than 400m and from 400m to 800m). This may relate to supply of head hardened rail that would typically be utilised on such curves. However, the curve information as background to the cost model supplied does not provide any detail that would allow a separate assessment of unit cost for these curves. In addition, a unit cost for head-hardened rail has not been supplied. As a result, an assessment of the reasonableness of these GRVs cannot be made at this time. It is recommended that further information be sought from TPI.

<u>Assessment of Reasonableness</u>

| Item | TPI's Submitted Cost (2008) | Reasonable? | Justification |
|---|---|---|---|
| 68 kg/m rail | **<c-i-c>** | Yes | Corresponds within 10% of quote AECOM received through our Shanghai Office in late 2008. |

**Table 3-1: Rail Unit Cost Assessment**

In late 2008, enquiries were made through AECOM's offices in Shanghai, China for supply of rail to the Australian market from Chinese manufacturers. A rate of US$1100/tonne was quoted FOB (Free On Board) at a Chinese port for all rail weights, including 68 kg/m. A cost per tonne for shipment from China to Western Australia then needs to be considered. This shipment cost will need to include marine freight costs, insurance, unloading and shipment to the final destination (in this case, Port Hedland). **<c-i-c>** It is assumed that these costs (broadly estimated at A$400 per tonne) are accounted for in Asset ID 102.

On the basis of 282.7km of track **<c-i-c>**, a total of 38,447 tonnes of rail would be required for the project, resulting in a cost of $57.7m at $1500 per tonne (inclusive of an estimate for shipping).

These escalated costs compare favourably with the range of prices being quoted for rail supply in 2010 by Australian suppliers on West Australian projects. The price range, for projects at different stages of procurement is between $1,650 and $1,750 per tonne CPT (Carriage Paid To) Perth for similar rail sections. These prices are likely to reflect a general economic up cycle in the region as well as supply constraints in the current market and their adjustment for these factors reinforce the assessment that TPI costs for the Asset ID 102 are reasonable. No direct quotes or relatively reliable price information was available for imported products for 2010.

Of importance in considering the economic viability of supplying rail from China at any given point of time, is the consideration of exchange rate fluctuations. There has been considerable volatility in the AUD to USD exchange rates over the last few years that need to be taken into consideration with any contract for supply. At the date of this report the AUD to USD exchange rate is close to parity, resulting in a competitive situation for overseas supply of materials. Contractual mechanisms such as hedging can be used to reduce uncertainty from exchange rate movements, but typically a long lead forward order with supply over a reasonable period of time would be required (e.g. to meet a continuous network expansion or renewal target). It is assumed that TPI had such mechanisms in place to ensure certainty of cost of supply.

## 3.2 Rail Welding

***Commercial-in-Confidence Material Deleted***

It is implicit that the cost of welding will be part of Asset ID 102. However, it is not possible to determine unit costs without further specific information.

An assessment of reasonableness cannot be made at this time for the reasons above. It is suggested that further information be sought from TPI.

## 3.3 Sleepers

***Commercial-in-Confidence Material Deleted***

**<Deleted Table 3-2: Sleeper Unit Cost Assessment>**

Assuming one sleeper per 0.66 metres of track, and applying a benchmark cost of $142 per sleeper, results in a cost of sleepers within 7% of the cost listed for Asset ID 1277.

Therefore Asset ID 1277 can be assessed to be reasonable in the context of the assessed unit cost. Further, in unit cost terms, the 2010 prices for Standard gauge pre-stressed concrete sleepers ex Perth are in the range of $142 to $145 from a regionally dominant supplier. The pre-stressed concrete sleepers are generally a regionally sourced material in the industry and the current price range reinforces the assessment that the unit costs reported in the TPI's model are reasonable.

## 3.4 Ballast

***Commercial-in-Confidence Material Deleted***

| Item | TPI's Submitted Cost (2008) | Reasonable? | Justification |
|---|---|---|---|
| Ballast – delivery at site | **<c-i-c>** | Yes | AECOM obtained quotes for ballast supply in 2008 ranging from $28 to $32 per tonne inclusive of delivery within 150km of a quarry. Refer discussion below. |

**Table 3-3: Ballast Unit Cost Assessment**

A supply source for ballast has not been explicitly stated. However, it is understood that TPI sourced ballast locally as part of the project and as is general good practice for the construction of railways. (Ballast is often sourced from the cuttings required for the alignment). As such, the transport cost of $5.40 per tonne for supply within 150km (sourced from suppliers in late 2008) remains reasonable. **<c-i-c>**

From other projects AECOM are currently working on additional unit cost information for ballast is available, and shown in Table 3-4.

| Project | Unit Cost | Comments |
|---|---|---|
| Rail project for existing iron ore miner in the Pilbara | $35.00 per tonne | Unit cost is not for supply to a major construction project and is likely higher due to smaller / infrequent volumes involved |
| Rail project for prospective iron ore railway in the Mid West | $33.00 per tonne | Excludes establishment costs for supply source |

**Table 3-4: Ballast Unit Price Comparison**

Further information should be sought from TPI before the full cost amount for Asset ID 100 can be accepted. In relation to other Asset IDs relating to ballast:

- IDs 1792-1816 Ballast: this relates to **<c-i-c>** (ie not rail infrastructure facilities) and has been excluded from the analysis; and
- ID 85 Ballast Superlift: this asset value is considered in relation to section 3.6 below.

## 3.5 Turnouts

***Commercial-in-Confidence Material Deleted***

Supplier enquiries at 2008 prices provided an estimate of $281,250 for supply and installation of a standard gauge 1:12 turnout on concrete sleepers, and $465,000 for a 1:20 turnout on concrete sleepers, with an approximate 60% / 40% split between supply and installation. It is AECOM's experience that a minimum of $250,000 should be budgeted for supply and installation of a 1:12 turnout and $450,000 for any turnout with an angle greater than 1:16 (e.g. including 1:20).

As such, the GRV for Asset ID 1765 cannot be inclusive of all turnouts for the project on the basis of the track layout (or on the basis of a reasonable expectation of the number of turnouts for such a project).

A logical assessment is that TPI have included all turnouts associated with the marshalling yard and passing sidings with the Asset ID "Workshop and Yard Facilities". Based on this assumption, there would be only three turnouts remaining as part of the mainline, associated with the balloon loop at the port and the two turnouts for the train loading spur at the mine. On the basis of this and on the basis of the above prices assessed as reasonable, an equivalent GRV of $1,211,250 for supply and installation of two 1:20 and one 1:12 turnouts is calculated. If installation is removed (assumed at approximately $120,000 per turnout), a GRV remains at $851,250; within 4% of the GRV provided in the cost model.

This suggests that installation of turnouts is not included within this Asset ID. If this is the case, then the GRV for this Asset ID, assumed to only represent the supply of the three mainline turnouts, is reasonable.

## 3.6 Tracklaying

***Commercial-in-Confidence Material Deleted***

It is understood that Asset ID 102 relates to tracklaying and construction costs over the completed formation. However, from analysis of the Asset IDs, the following items may also be part of this Asset ID, as they appear to be unaccounted for elsewhere in the model:

- Rail supply
- Welding (including establishing a Flashbutt Welding facility)
- Level crossings (surfacing)
- Turnout installation (refer discussion in Section 3.5).

Table 3-5 establishes an estimate for each of these components.

| Item | Amount | Unit cost | Total | Unit cost source |
|---|---|---|---|---|
| Rail Supply | 38,447 tonnes | $1,500 per tonne | $57,670,500 | Refer Section 3.1. |
| Flashbutt Welding Facility | 1 no. | $50,000,000 | $50,000,000 | AECOM knowledge of new facility costs for another Pilbara project |
| Welds | **<c-i-c>** | **<c-i-c>** | $9,611,800 | Assessed costs for WNR with allowance for CPI |
| Turnout Installation | **<c-i-c>** | **<c-i-c>** | $3,240,000 | Assessed cost for WNR with allowance for CPI |
| Level Crossings | **<c-i-c>** | **<c-i-c>** | $405,000 | Allowance. |
| | | **TOTAL** | **$120,927,300** | |

**Table 3-5: AECOM Assessment of Potential Components to Asset ID 102**

Using the GRV of $196,368,238 (Asset ID 102) plus $21,160,991 (Asset ID 58) and subtracting the above potential components results in a GRV of $96,601,929 as a coarse estimate of residual tracklaying costs, equating to $342 per track metre.

Although "Ballast Superlift" occurred at a point after the opening of the railway to first trains, it is a continuation of what would be a typical construction sequence of maximum 100mm lifts to achieve the required design ballast depth. As such, it is considered reasonable to include as a cost attributable to constructing the railway to the required design parameters.

It should be noted that the inclusion of a Flashbutt Welding facility has a significant effect on the outcome of the above analysis. Examination of TPI's 2010 Cost Model shows that there is no other logical Asset ID for this to be within. (The "Workshop and Yard Facilities" Asset ID appears to be another logical possibility for this facility. However, the GRV is not sufficient to cover the cost estimated). Confirmation of this assumption with TPI will allow greater certainty of assessment in this area.

Quotes obtained in late 2008 from a contractor undertaking tracklaying activities in the Pilbara indicate a cost of approximately $300 per metre. TPI's unit cost, derived from the above GRV, is within 20%. Given the number of uncertainties in this Asset ID, further clarification should be sought prior to acceptance or otherwise.

## 3.7 Bridges

***Commercial-in-Confidence Material Deleted***

It is assumed that all items above except the BHPBIO overpass are captured under Asset ID "Bridges" (multiple numeric identifiers) and the overpass is captured in Asset ID 89. In addition, Asset ID 102.23 "CB to PH Rock Armour" will include guide bank rock protection applicable to bridges and we have included the cost for this Asset ID in the overall assessment of bridge costs.

No further disaggregated unit cost data has been made available.

Bridge costs can be assessed as a per square metre rate. As such the plan dimensions are estimated from the drawings for each bridge as shown in Table 3-6.

| Bridge | Length | Deck Width (Note 1) | Plan dimensions | GRV | Unit cost |
|---|---|---|---|---|---|
| ***Commercial-in-Confidence Rows Deleted*** | | | | | |
| | | **TOTAL** | **<c-i-c>** | $33,715,337 | |

**Table 3-6: Summary of TPI Bridge Dimensions and Unit Cost Estimation**

| Bridge | Length | Deck Width | Plan dimensions | GRV | Unit cost |
|---|---|---|---|---|---|
| BHPBIO overpass | **<c-i-c>** | **<c-i-c>** | **<c-i-c>** | $29,386,043 | **<c-i-c>** |

**Table 3-7: BHPBIO Overpass Bridge**

AECOM's assessment of a reasonable rate for heavy haul bridge construction in the Pilbara should be a minimum of $15,000 per $m^2$. This assessment is based on information from a 2008 bridge project completed in the Pilbara for a similar heavy haul railway and contractor sourced cost information from an ongoing heavy haul rail bridge construction project, also in the Pilbara during the same time period.

The costs derived from the TPI information appear to be low in comparison to the expected unit cost.

It should be noted that the per square metre rate benchmark nominated above is inclusive of all items for construction of the bridge, including:

1. Geotechnical investigations.
2. Hydrology investigation and design.
3. Upstream and downstream flood training and guide bank protection.
4. Abutments.
5. All piling, substructure and superstructure.

As a minimum, Items 4 and 5 should be included within the individual bridge Asset IDs provided by TPI. However, Items 1 to 3 will include costs captured in other areas (e.g. Items 1 and 2 within Asset ID 2073 "Pre-Prod Dev – Rail Infrastructure", Item 3 within Asset ID 102.23 "CB to PH Rock Armour").

In addition to the above considerations, economies of scale will have an effect on the cost of bridges for TPI's railway. Some of the background consideration to AECOM's benchmark is based on construction of single bridges. TPI constructed seven bridges as part of one project and would derive benefit from design standardisation, large scale supply orders for structural steel, and continual mobilisation of experienced construction crews.

If this is taken into consideration, **<c-i-c>** all GRVs provided in the TPI's 2010 Cost Model can be considered to be reasonable on the basis that they do not exceed expected costs for a typical asset.

With respect to the BHPBIO overpass, it is clear that using a similar per square metre rate comparison is not appropriate. Asset ID 89 "BHP Overpass" would potentially contain the following items that would not be considered in a typical unit cost rate for rail bridges:

- Approach earthworks (as an extra/over to what would have been required if the overpass was not required). This may be inclusive of drainage and culverts.
- Potential costs associated with land acquisition.
- Modifications to BHP infrastructure.
- Specific environmental costs.
- Derailment protection.

As a broad assessment, the GRV figure of $29,386,043 can be compared with $20m cost expected for grade separations in the Perth metro area. However, further disaggregation of the GRV in the cost model would allow a more detailed assessment of reasonableness, and further information should be sought from TPI.

## 3.8 Culverts

***Commercial-in-Confidence Material Deleted***

AECOM do not have any readily available project information that can be used to provide a direct comparison for Asset ID 1373 “Rail Culverts”. To establish reasonableness, we have reference the 2010 edition of Rawlinsons “Australian Construction Handbook”. Typical per metre prices are shown for sample sizes in Table 3-8.

| Diameter | Cost (inc. laying) |
|---|---|
| 600mm | $131.00 per m |
| 1200mm | $285.00 per m |
| 1800mm | $501.00 per m |
| 3000mm | $1525.00 per m |

**Table 3-8: CSP Culvert Costs (extracted from Rawlinsons 2010 Australian Construction Handbook)**

Averaging the above figures results in a cost per metre of $610 for CSPs.

As a result, there appears to be an order of magnitude difference between the GRV provided by TPI and a level of cost that would be considered reasonable. Further clarification from TPI should be sought.

## 3.9 Level Crossings

***Commercial-in-Confidence Material Deleted***

Given the lack of specific GRVs associated with level crossings it must be assumed that the cost is accounted for in either Asset IDs 101 or 102.

An assessment of reasonableness cannot be made at this time for the reasons above and further clarification should be sought from TPI.

## 3.10 Earthworks

***Commercial-in-Confidence Material Deleted***

Disaggregated earthworks costs are not available. Asset ID 101 “CB to PH Rail Earthworks”, with a GRV value of $561,933,697 clearly relates to earthworks costs.

To make a meaningful assessment of reasonableness of cost, the following information would be required to derive a unit cost:

- Typical formation and cutting details (batter, layer thicknesses)
- Bill of quantities
- Breakdown of cost by layer type (capping, bulk earthworks) and cutting requirements (rock, granular material)
- Details regarding earthworks balance and borrow
- Details relating to longitudinal drainage

None of this information has been made available.

The GRV provided results in a cost of $2,194,196 per km.

AECOM have previously assessed a cost of $481,760 per km as reasonable on the basis of a 250mm capping layer and average 2m high embankment (sourced from per $m^3$ unit costs for capping layer and bulk earthworks from a project in the Mid West of Western Australia). However, the location-specific nature of earthworks, for both cut and fill, makes any "per km" comparison between projects arbitrary.

Using a batter profile of 1:2, TPI's GRV would suggest an average embankment height of 6m. It is expected that embankments of this height will be found on the alignment, but the figure of 6m is high as an average figure.

Note that GRV for earthworks costs would comprise of costs for both fill and cut, with the amount of cut in rock having a proportionally higher effect on overall cost. **<c-i-c>** However, with a general appreciation of the topography and route available from public domain sources, the route will have rock cut, as a minimum through the Chichester Ranges. It is not possible to make any reasonable estimate as to the quantities between ground types.

Information from FMG's website (www.fmgl.com.au) suggests a total of 11 million cubic metres of earth was moved for the project. By dividing this figure through the total GRV for earthworks provided in the model, this would suggest an average rate of $51.08 per $m^3$ for earthworks. This is more than double previously assessed rates of $21 per $m^3$ for general bulk fill. As discussed above, reasons for this variation likely include:

- Inclusion of non-earthworks items in the GRV (e.g. items relating to other civil works and drainage, which do not appear to have been accounted for in other Asset IDs).
- Variation of rates between earthworks activities (from clearing and grubbing, through bulk fill and rock excavation, and drill and blast).
- Proportionally higher amounts of rock cut and drill and blast for the railway construction.

For a railway in the Pilbara, crossing the Chichester Ranges, the GRV for Earthworks is not grossly unreasonable, where the total construction cost of a single track railway in greenfield terrain may be considered to be within the range of $2m to $3m per km. However, without any data available for a significant number of variables, it is not possible to determine reasonableness to any level other than order of magnitude. Further information should be sought from TPI.

## 3.11 Miscellaneous

This category is designed to account for ancillary works that may not have been accounted for in overall costs elsewhere in the model. Typically this may include shunter's walkways, fencing, access roads and signage.

***Commercial-in-Confidence Material Deleted***

In the TPI model, Asset ID 99 "Rail Access Road" has a value of $3,989,014. No other information has been made available regarding the extent of the access road. On the basis of the assumption that an access road parallels the railway for the route length of 256.1km, a unit cost of $15,576 per km can be derived.

Contractor quotes for access road construction at 2008 prices generally reflect the unit cost derived above, based on construction of a "typical" railway. Access road costs are difficult to compare from one railway to another due to variables such as:

- Access to surrounding infrastructure.
- Topography.
- Grade and quality of road.

With little information available as to these variables for TPI, the GRV as provided appears to be reasonable in the context.

## 3.12 Signalling and Communications

***Commercial-in-Confidence Material Deleted***

In TPI's 2010 Cost Model the following Asset IDs and GRVs appear to represent costs associated with Signalling and Communications:

| Asset ID | Asset Name | GRV |
|---|---|---|
| 24 | 50W UHF Base Station Communication | $860,044 |
| 33/35 | Comms Towers | $139,019 |
| 48 | Amtech Transponder Tag AT5113[1] | $88,519 |
| 1290 | Port Leaky Feeder in TUL Tunnel[2] | $180,587 |
| 1359-1372 | Radio Base Stations | $9,419,015 |
| 1374 | Rail Signals and Communication | $63,145,951 |
| 1632 | Wayside Signals | $558,623 |
| 2016 | Relay Train Control | $513,485 |
| 2017 | Implement Train Control in FM | $643,678 |
| | **TOTAL** | **$75,548,921** |

**Table 3-9: Summary of TPI Signalling and Communications Asset IDs and GRVs**

On the basis of the above combined GRV, a per track km cost of $267,241 results.

***Commercial-in-Confidence Material Deleted***

Although there is some detail breakdown in TPI's 2010 Cost Model as to individual items comprising signalling and communications, the majority of the item cost is contained within Asset ID 1374. It is not possible to disaggregate this item further using the level of information provided. However, a comparison of per km cost is possible on the basis of accepted unit costs for other railways, such as WestNet Rail. To make the comparison, the most heavily trafficked of WestNet's routes are considered:

| Line | Section | Signalling Cost (per km) | Communications Cost (per km) | Total (per km) |
|---|---|---|---|---|
| Forrestfield to Kalgoorlie | Avon Yard to West Merredin (167km) | $174,170 | $38,630 | $212,880 |
| Kwinana to Bunbury Port | Mundijong Junction to Pinjarra (43km) | $190,408 | $69,196 | $259,604 |

**Table 3-10: WestNet Rail Signalling and Communications Cost (extracted from Report for Review of Unit Prices, October 2008 (www.erawa.com.au)**

On the basis of the above, TPI's GRV for signalling and communications can be considered to be reasonable.

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[1] An on-track device for automatic detection of on-board equipment; facilitates monitoring of rolling stock equipment between the train locomotive and centralised train control room.

[2] A (typically a pair of) cable(s) which emits (emit) radio frequency and thereby enables continuity of radio communication across a tunnel structure. On TPI's infrastructure, it appears to be located at the unloader conveyor tunnel at the Port.

## 3.13 Maintenance

TPI have supplied annual operating and maintenance costs as part of the cost model, as follows:

- Rail Track Maintenance - $36,602,260
- Rail Signals Maintenance - $4,836,136
- Support - $7,822,762
- Overhead - $9,221,531
- **TOTAL - $58,542,689**

***Commercial-in-Confidence Material Deleted***

Establishing a true and reasonable estimation of maintenance costs is difficult for the following reasons:

- Unlike capital costs (which are typically visible to third parties during design and construction of railways), operating and maintenance costs remain part of the railway owner's proprietary business information and as such, are typically less transparent.
- No two railways are physically the same (although similar locations and freight tasks can be assessed for a reasonable comparison).
- Maintenance and operating costs vary considerably with annual tonnage and axle loads.
- Railways that are privately owned and relatively new (as is TPI's) may often be delivered within a business model that seeks to minimise capital expenditure (to enable the project to be realised) whilst accepting offset of costs into operating budgets for a period of years. As a result, initial operating and maintenance costs may be higher than what will be the average for the railway's life. (There is no information to suggest that this is the case for TPI).
- The composition of cost data is not always readily apparent. For example, how items such as overheads are treated can vary widely, and between private and public owned rail infrastructure owners.

As a result, making an assessment as to whether the absolute cost of maintaining the TPI railway is reasonable is difficult due to the difficulty in obtaining a direct comparison from third parties, and considering that the railway is very early in the operating phase of the project lifecycle.

As mentioned above, maintenance rates depend upon a number of variables associated with the specific nature of the line being considered:

- Axle loading – higher axle loads lead to greater wear and tear per train movement.
- Traffic volume – higher volumes lead to the need for more frequent maintenance and renewal intervention.
- Asset age – newer assets will require less maintenance than those that have been in service for a long time.
- Structures number and type – more structures on the route will result in the need for increased requirements for activities such as bridge audits and resulting renewals.
- Route geometry – Higher numbers of low radii curves will increase the need for maintenance effort.
- Signalling system type – fixed signalling equipment will require higher maintenance effort.
- Strategic value of route – a railway infrastructure company as a private entity may make strategic decisions as to the business value of specific route infrastructure and direct investment accordingly. This will have more bearing for a mining company that has a network of rail routes, in comparison to TPI whose rail infrastructure forms the backbone of their current operation.

Using TPI's total cost of $58,542,689, this equates to $207,084 per track km per annum.

AECOM have undertaken past work on the QR system in Queensland that indicates maintenance costs per km ranging from $21,000 to $41,000 for trunk freight and passenger routes with axle loads up to 26tal. Previously assessed maintenance costs for WestNet Rail in WA are at the lower end of this range for the more heavily trafficked lines (www.erawa.com.au).

There is an order of magnitude difference in comparison of TPI's figures with that for WNR or QR. There is an expectation that maintenance costs will be higher for 40TAL railway in the Pilbara region in comparison to general use railways elsewhere in Australia. This is for the following reasons:

- Higher annual tonnages (The annual throughput capacity of the TPI network is assumed to be 80mtpa – in comparison to WNR which has no more than 15mtpa on its busiest lines).

- Pilbara region location – the area is remote and subject to cyclonic activity, increasing the amount of support and the frequency of unplanned maintenance activities. In addition, the Pilbara region attracts a premium on labour rates that is not necessarily experienced elsewhere in Australia.
- In TPI's case, there may be an initial period of consolidation of maintenance regimes whilst the infrastructure is used early in its design life.

On the basis of the discussion above, it would be difficult to refute TPI's claimed maintenance costs, even if direct comparison with a comparable railway in the Pilbara was available.

## 3.14 Other Items

This section seeks to address the remaining assets nominated in TPI's 2010 Cost Model that have not been analysed in previous sections. Each remaining Asset ID is discussed below, either individually or as part of a group of Asset IDs.

Asset ID 1455 – Signals for HBI Crossing

Asset ID 1455 "Signals for HBI Crossing" appears to relate to a specific crossing at Port Hedland.

***Commercial-in-Confidence Material Deleted***

The GRV is given as $324,259. **<c-i-c>** Previously assessed costs for active protection of level crossings with lights suggests a unit cost in the range $125k to $157k, depending on the type of system installed (either DC Westrak or Predictor). If this asset ID refers to two sets of active light crossings at this location then the GRV provided is reasonable.

Asset ID 1629 – Water Bores Along Rail Lines

The GRV for this asset is shown as $7,676,541. No additional details of water bores have been provided.

Typically, water bores may be established by the earthworks contractor, and hence form part of the rate for earthworks. However, it is feasible that TPI established the bores prior to construction for other purposes. Without information regarding numbers or locations of bores, it is not possible to assess reasonableness.

Asset ID 2073 – Pre-Prod Dev – Rail Infrastructure & Asset ID 1705 IOCP Fleet Development Project

The GRV for this asset is shown as $22,991,160.

***Commercial-in-Confidence Material Deleted***

It is clear that this Asset ID relates to concept, design and investigation work. It is not clear whether this properly belongs in assessing the replacement cost of the railway. The knowledge that was developed to enable the construction of the railway, and the associated intellectual capital, will not necessarily need to be recreated in any scenario where the asset needs to be replaced like-for-like.

In this context, Asset ID 1705 – IOCP Fleet Development Project may also be relevant. The title of this asset suggests development work, rather than a physical asset.

Review of Section 3.1.1 of Approved Costing Principles for TPI (June 2010) suggests that if such costs are included in the GRV that the % allowance for design and project management be reviewed elsewhere in the model. It is recommended that this be reviewed accordingly, if Asset IDs 2073 and 1075 are accepted as part of the GRV for the railway.

Asset ID 2032 – Capitalised Rail Spares

The GRV for this asset is shown as $1,423,937. No disaggregation of this item has been provided.

Clarification should be sought as to whether these “rail spares” relate to material that may be used in track maintenance. TPI have provided a detailed breakdown of materials within the track maintenance budget, which have been assessed separately (refer Section 3.13).

Workshop and Yard Facilities (Multiple Asset IDs)

***Commercial-in-Confidence Material Deleted***

In addition, if the assumptions stated in Section 3.5 are correct, the cost of the supply of **<c-i-c>** turnouts will be included in this GRV (equating to $5,643,750). If so, a remaining GRV of $25,305,508 remains for this Asset ID.

There are a number of additional Assets that are likely to fall within the category of “Workshops and Yards”, and an assessment of the total GRV in this category as shown in Table 3-11.

| Asset ID | Name | GRV |
|---|---|---|
| Multiple | Workshop and Yard Facilities (exc. Turnout installation) | $25,305,508 |
| 2044 | Trackmobile | $416,970 |
| 2019 | Supply of Portable Office | $750,595 |
| 2020 | Gantry and Shotblast Equipment | $394,463 |
| 2021 | Sealed Roadways | $3,540,125 |
| 2022 | Traction Alternator | $2,249,112 |
| 2023 | 7FDL Engine & Alternator | $226,781 |
| 2024 | Occupational and Hygiene Monitoring | $33,749 |
| 305 | Light Vehicles Refuelling Station | $396,163 |
| 308 | Lube Oil Dispensing Stations | $19,448 |
| 309 | Lube Oil Storage Tank | $53,171 |
| 310 | Lube Oil Unloading System | $41,390 |
| N/A | Ancillary and Support Plant | $937,749 |
| 373 | MFG Single Axle Drop Table | $446,916 |
| 1535 | Tesco Tool Cart | $117,059 |
| 1573 | Underfloor Wheel Lathe | $3,541,075 |
| 1715 | Lockers | $842 |
| | **TOTAL** | **$38,471,115** |

**Table 3-11: Grouping of Asset IDs to “Workshop and Yard Facilities”**

With the level information provided, and the inconsistent treatment of items in this category (that have been captured under a general Asset ID, or itemised very specifically, such as Asset ID 1715), an accurate assessment of reasonableness is not possible. AECOM has broadly assessed an ‘order of magnitude’ split of the ‘included versus excluded’ costs based on the experience and judgement, applying the test of definition of “railway infrastructure” in Section 3 of the Railway (Access) Act 1998. Taking into account the sensitivity of the assumptions to the outcome of the split, it is concluded that out of the $38.5 million costs, assets worth $21.7million are likely to fulfil the ‘include’ criteria of the definition.

Asset ID 2041 – Ore Car Tracking System & Asset ID 1734 Port Hedland Air Monitoring Services

The applicability of these items to a third party access model is not clear. They appear to be company specific items that a third party would not benefit from when utilising TPI's rail infrastructure.

Asset ID 2018 – Supply of Testing and Monitoring

There is insufficient information to attribute this to any area of the project. As such, it cannot be assessed.