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11 August 2025

Economic Regulation Authority
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Submitted online via: <https://www.erawa.com.au/current-consultations>

Arc Infrastructure's statement of the depreciated optimised replacement cost, depreciation schedule and supporting material – Invitation for public submission

Co-operative Bulk Handling Limited (**CBH**) is pleased to provide feedback to the Economic Regulation Authority (**ERA**) in relation to Arc Infrastructure Pty Ltd's (**Arc**):

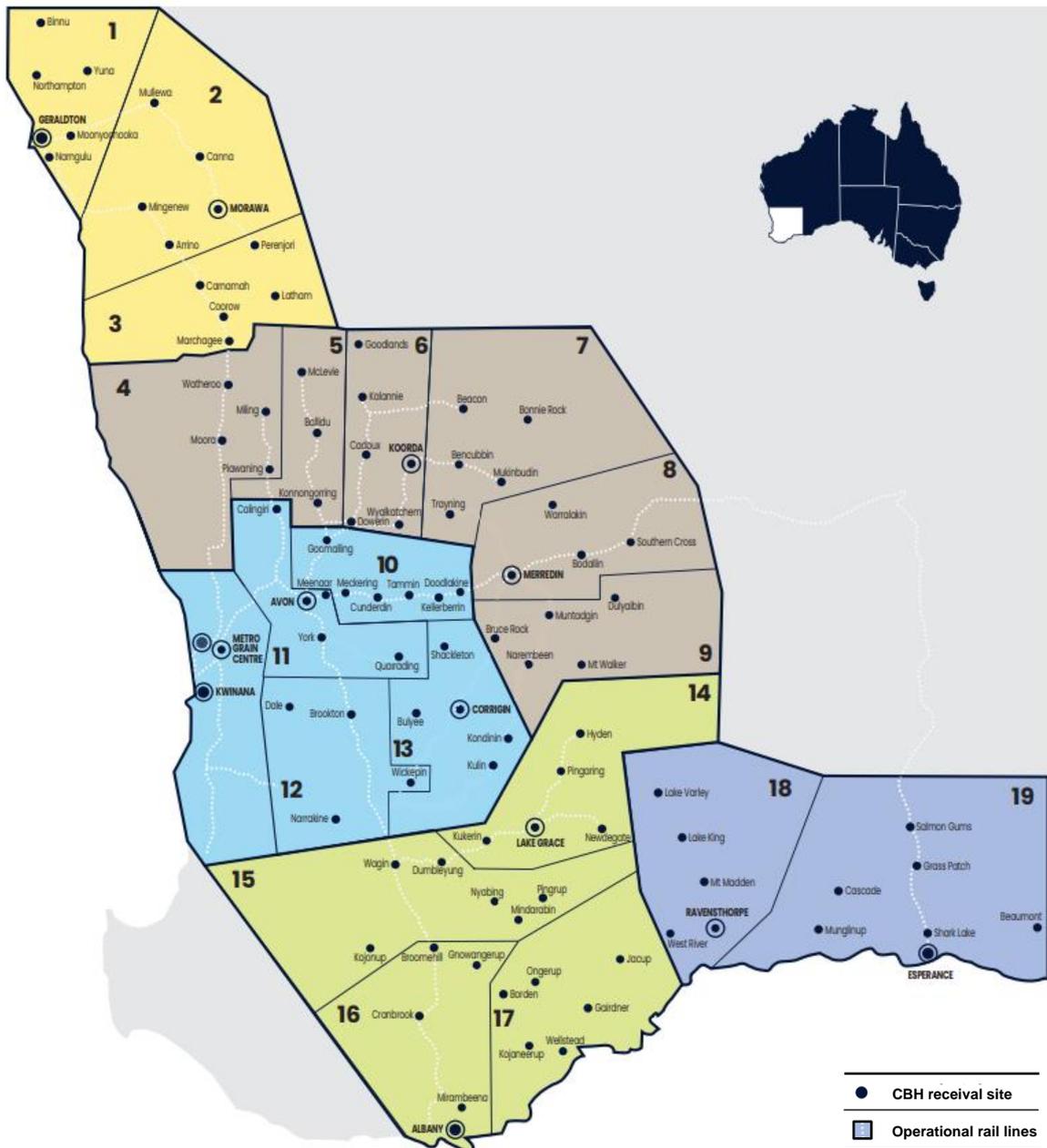
- Statement of the depreciated optimised replacement cost (**Arc's DORC Report**) inclusive of Arc's level of service demand forecast statement and additional supporting material (Part 1 and Part 2); and
- Statement of depreciation schedule (**Depreciation Schedule**).

CBH - background

CBH was formed in 1933 and is Australia's largest co-operative, owned and controlled by around 3,500 Western Australian grain growers. CBH's core purpose is to sustainably create and return value to WA growers, both current and future. CBH operates a bulk handling supply chain which manages the complexities of accumulating, transporting and exporting grain from growers utilising both road and rail infrastructure. CBH's operations extend from Geraldton in the north, Albany and Esperance in the south and Southern Cross in the east over a grain receipt network the size of Victoria.

Since its inception, CBH has relied on the freight rail network to move grain from up-country sites to port, utilising around 70% of the freight rail network operated by Arc. Figure 1 below illustrates the CBH network and the freight rail lines that CBH utilises.

Figure 1: CBH network interface with freight rail network



Code requirements

Sections 47J(1) and 47K(1) of the Code require Arc to prepare and submit the following to the ERA:

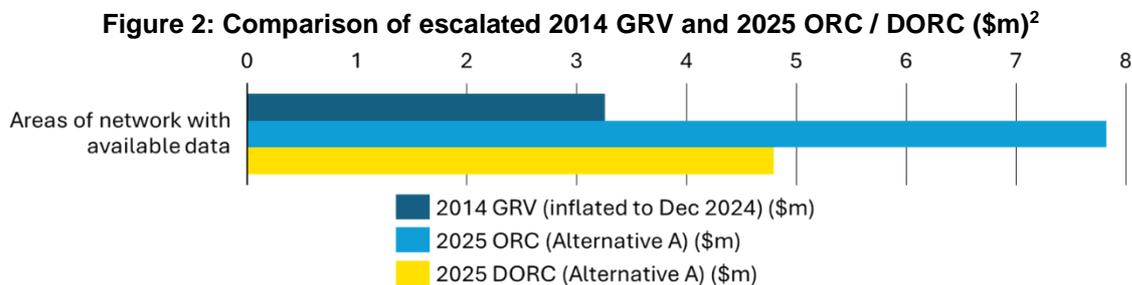
- A statement setting out the depreciated optimised replacement cost for each route section; and
- The depreciation schedule to be applied by the railway owner when determining the updated regulatory asset base, and costs relating to the floor and ceiling price tests.

Arc’s DORC Report and Depreciation Schedule must be consistent with the various requirements in the Code. They must also be consistent with Arc’s Approved Costing Principles dated 30 May 2024 (**Costing Principles**), as required in Section 47H(1) of the Code.

Arc’s DORC estimates are drastically overinflated

CBH’s overarching submission is that Arc’s DORC values are drastically over-inflated and reflect the use of assumptions that are often extreme outliers when compared to regulatory precedents and other accepted benchmarks. CBH estimates Arc’s DORC value is up to seven times more than a reasonable figure.

The extent of over-inflation is demonstrated by comparing escalated gross replacement values (**GRV**) from the ERA’s Brookfield Rail (now Arc) Determination of Costs Relevant to CBH’s Access Proposal dated 10 December 2013 (**ERA 2014 Determination**) to Arc’s proposed optimised replacement cost (**ORC**), (which is equivalent to GRV) and DORC values for selected lines.¹ Figure 2 below illustrates that Arc’s DORC values, which *include* depreciation, are on average 47% higher than escalated GRV values, which *exclude* depreciation – an extraordinary result which CBH submits is inconsistent with the policy intention of the new pricing mechanism contained in the revised Code.



The ERA should not approve Arc’s DORC Report or Depreciation Schedule

CBH submits that the ERA, in exercising its power under sections 47J(3) and 47K(3) of the Code, should not approve Arc’s DORC Report or Depreciation Schedule, or determine what are to constitute Arc’s DORC or Depreciation Schedule, without adopting the recommendations put forth in CBH’s submission.

The establishment of an appropriate DORC and Depreciation Schedule for the freight rail network is critical to ensuring the pricing methodology in the revised Code functions as intended. If the DORC and Depreciation Schedule result in unreasonably high values, the new DORC valuation methodology will not have the intended practical impact of reducing the delta between floor and ceiling prices and constraining over-charging. Such an outcome would effectively make the State Government’s changes to the pricing mechanism meaningless, significantly undermining the intent of the broader Code changes – to create an effective access regime that promotes fairness, transparency, certainty, and efficiency with respect to rail access.³

CBH’s key areas of concern

The key areas of concern contributing to over-inflated values, along with CBH’s recommended actions to address them, are summarised below. Further supporting information is provided in the attached CBH submission document.

1. Application of margins (Sections 4.4 and 5.10)

- Arc has applied compounding indirect cost factors that amount to a 49.5% markup on direct costs, upon which a further ~22% in ‘Railway Owner project costs’ are applied. This results in a total uplift of more than 80% on direct material and labour costs—meaning for every \$100 million in direct costs, Arc is adding over \$80 million in indirect and owner-related charges.
- The markups included in Arc’s DORC Report are unjustified in terms of quantum and methodology (compounding), are significantly higher than those seen in any other

¹ Unredacted GRV values were escalated to 2024 terms using the Western Australian Road and Bridge Construction index. The Western Australian Road and Bridge Construction index was selected as it reflects cost escalation associated with the construction of similar infrastructure to that identified in Arc’s DORC Report.

² The values in this figure represent approximately 2,000km of the freight rail network. Figures from ‘Alternative A’ were used as Arc articulated this was their preferred option in their submission cover letter. The specification assumed in Alternative A is also more closely aligned with what was assumed in the 2014 GRV valuation.

³ [Review of the Western Australian Rail Access Regime – Final Decision Paper, WA Government Media Statement – New Rail Access Code for fairer access arrangements.](#)

comparable DORC valuation, and are inconsistent with past regulatory precedent in Western Australia.

- CBH submits Arc should instead adopt a 1-2% allowance for contractor indirect costs, and a 20% Design Construction Project Management (**DCPM**) margin-consistent with the ERA 2014 Determination and aligned with the quantum of allowances adopted in other comparable DORC valuations.⁴

2. Funding costs (Section 5.11)

- In Arc's DORC Report, Arc has proposed the inclusion of \$9.1 billion in funding costs — equivalent to 30% of the Optimised Replacement Cost (ORC). Funding costs are intended to reflect the costs that would be incurred by an efficient Railway owner to fund the theoretical construction of the rail network. However, Arc's calculation includes the time required to construct cuttings and embankments across the entire freight rail network, despite the Code explicitly excluding the cost of such works completed prior to 2000.
- This is extreme and an outlier when compared to the historical precedent set by the ERA in 2014, where funding costs were approximately 1.6% of total construction costs.
- CBH submits that Arc should apply the same funding cost methodology adopted by the ERA in 2014 to ensure consistency and reasonableness.

3. Asset specifications (Sections 4.5 to 4.11)

- Arc has proposed 'gold plated' asset specifications that do not reflect the lowest current cost to replace railway infrastructure with assets that have the capacity to provide the level of service that meets the actual and reasonably projected demand; and are modern equivalent assets, as required by the Code. This includes specifications that are not appropriately differentiated by gauge, tonne axle load (**TAL**) or use (i.e. mainline vs. siding).
- For example, Arc have proposed use of 50kg/m and 60kg/m rail on the Burakin to Beacon line section, which currently operates with 30kg/m rail. CBH cannot understand why 41kg/m rail was not specified in this region, particularly when this was adopted in the ERA 2014 Determination and Arc's DORC Report clearly states this rail weight is 'readily obtained'.
- CBH submits that Arc should adopt appropriate Modern Equivalent Asset (**MEA**) specifications that are differentiated by gauge, TAL, and use, so as not to unduly inflate costs. Specific MEA recommendations are outlined in CBH's broader submission.

4. Supply and installation costs (Sections 4.5 to 4.11)

- Benchmarking of rates suggests Arc have used unreasonably high unit rate assumptions in a number of instances.
- For example, Arc have proposed a direct fibre optic cable supply and installation rate of \$504 per metre, which is more than five times the (\$99 per metre) rate provided by CBH's Tier 1 construction contractor.⁵
- CBH submits that the ERA should validate proposed rates across Arc's DORC Report as they often appear high compared to benchmarks.

5. Contributed capital (Section 7.1)

- Section 7.1 of Arc's DORC Report states that 'Arc has confirmed that none of the assets in this DORC are contributed assets. There has therefore been no adjustment for any contributed investment'.
- This assertion directly contradicts publicly available information, which clearly demonstrates that significant financial contributions, estimated to be in excess of \$1.3 billion dollars, have been made by Government and third parties since the commencement of the lease in 2000. For example, several government funding agreements are documented on the Public Transport Authority's website, including the narrow-gauge re-sleeper program initiated

⁴ See page 13, [ERA 2014 Determination](#).

⁵ This rate is based on an estimate for fibre optic cable installation costs in the Pilbara.

after the Strategic Grain Network Review (**SGNR**), which involved a \$241 million Government grant.⁶

- CBH submits that the ERA should scrutinise Arc's claim regarding contributed capital and ensure that appropriate adjustments are made to the DORC valuation wherever contributed capital is identified to ensure compliance with Section 47G of the Code.

6. Treatment of redundant assets (Section 5)

- Arc has retained non-operational lines in the optimisation step of the DORC build-up. This means, for example, the \$240 million (Alternative A) cost of the Katanning to Nyabing line, which has not been operational since ~2005, is reflected in the optimised replacement cost.
- This is inconsistent with Arc's proposed treatment of redundant non-operational sidings, which are removed in the optimisation section of Arc's DORC Report. It also diverges from regulatory precedent set in the Australian Rail Track Corporation (**ARTC**) DORC Report, where all redundant assets are excluded through optimisation. Failure to remove such assets from the optimised replacement cost artificially increases construction timelines and inflates funding costs.
- CBH submits that any assets that are no longer used to provide a service to meet actual and reasonably projected demand, including non-operational lines, should be removed in the optimisation section of Arc's DORC Report.

7. Depreciation approach (Section 6)

- Arc's inconsistent application of depreciation assumptions across different asset classes has resulted in understated accumulated depreciation and higher DORC values.
- For example, Arc has calculated accumulated depreciation for ballast based on an 878-year life, while forecast depreciation is based on the 50-year asset life prescribed in the Costing Principles. This inflates the valuation and effectively allows Arc to generate both a higher return on capital, by assuming very little historical depreciation on assets that are in some cases over 100 years old, and a higher return of capital through assuming accelerated forecast depreciation. It also fails to account for the fact that a significant portion of the capital invested in such assets has likely already been recovered.
- Furthermore, Arc has selectively applied higher weighted average remaining life for the route section to assets such as timber sleepers that are expected to be life expired based on commissioning dates included in public records.
- CBH submits that Arc's approach to depreciation should ensure:
 - Accumulated depreciation appropriately reflects the fact that a proportion of invested capital will have been recovered already;
 - Forecast depreciation is consistent with the Standard Design lives articulated in the ERA-approved Costing Principles; and
 - That economic lives do not exceed the Standard Design Lives listed in Appendix 2 of the approved Costing Principles, consistent with *TPI vs ERA Redetermination of Costs Relevant to Brockman Iron's Access Proposal*.

CBH's submission structure

In the attached submission, CBH provides general comments on the suite of documents provided by Arc, followed by specific comments on various elements of the documents. The intent is to:

- Clearly articulate areas where Arc's DORC Report and Depreciation Schedule do not comply with the requirements of the Code.

⁶ See Schedules 6 to 10, [Project Agreement for Capital Works – Dedicated Narrow Gauge Grain Lines](#).

- Where possible, suggest the inclusion of specific information or changes to Arc's DORC Report and Depreciation Schedule to address issues and non-compliance, and include evidence / justification as to why these are required.
- Where it's not possible to suggest specific changes, articulate who is best placed to initially formulate an appropriate solution to address the specific issue or non-compliance, noting that the ERA as the Regulator should ultimately determine the appropriate solution to address the apparent shortcoming.

The opportunity to make a submission is greatly appreciated and we would welcome the opportunity to engage further. Please contact Nelson Aylmore or CBH's Manager Network Planning, Kristina Primus, [REDACTED] if you require any further information.

Yours sincerely,

For: Co-operative Bulk Handling Limited



Nelson Aylmore
HEAD OF NETWORK PLANNING



CBH submission on Arc Infrastructure's statement of the depreciated optimised replacement cost and statement of the depreciation schedule published on 16 June 2025

11 August 2025

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Introduction

1. On 16 June 2025, Arc Infrastructure's (**Arc**) statement of depreciated optimised replacement cost (**Arc's DORC Report**)¹ and statement of depreciation schedule (**Depreciation Schedule**) were published on the Economic Regulation Authority's (**ERA**) website.
2. Additional supporting material was provided by Arc and subsequently published on the ERA website on 11 July 2025 and 17 July 2025.
3. In this submission, Co-operative Bulk Handling Limited (**CBH**) provides general comments on the suite of documents provided by Arc, followed by specific comments on various elements of the documents. The intent is to:
 - a) Clearly articulate areas where Arc's DORC Report and Depreciation Schedule do not comply with the requirements of the Code.
 - b) Where possible, suggest the inclusion of specific information or changes to Arc's DORC Report and Depreciation Schedule to address issues and non-compliance and include evidence / justification as to why these are required.
 - c) Where it is not possible to suggest specific changes, articulate who is best placed to initially formulate an appropriate solution to address the specific issue (i.e. ERA or Arc) or non-compliance, noting that the ERA as the Regulator should ultimately determine the appropriate solution to address the apparent shortcoming.

General comments on Arc's DORC Report

4. As per Sections 47J(1) and 47K(1) of the Code, Arc is required to submit the following documents to the Regulator (ERA):
 - a) A statement setting out each of the following:
 - (i) The determinations made of the depreciated optimised replacement cost (**DORC**) for each route section; and
 - (ii) Supporting material demonstrating the basis for each determination.
 - b) The depreciation schedule to be applied by the railway owner when determining the updated regulatory asset base and costs referred to in Schedule 4 clauses 7 (relating to the floor price test) and 8 (relating to the ceiling price test).
5. In addition to meeting the requirements set out above, Arc's DORC Report and Depreciation Schedule must be consistent with the ERA-approved Costing Principles dated 30 May 2024, as per Section 47H(1) of the Code.
6. Review of Arc's DORC Report and Depreciation Schedule indicates that Arc's DORC estimates are drastically over-inflated and, in many cases, reflect the use of assumptions that are outliers when compared to regulatory precedents and other benchmarks. CBH estimates that **Arc's proposed DORC valuation is up to seven times more than a reasonable figure**.
7. This is also evidenced by comparison to alternative valuations of the Western Australian (**WA**) freight rail network. For example:
 - a) An indicative DORC valuation based on escalated Gross Replacement Value (**GRV**) figures from previous ERA determinations depreciated by between 47% (based on understated average network depreciation from Arc's DORC Report) and 65% suggests the DORC value should be in the range of \$2.0 to \$3.1 billion.²

¹ Inclusive of Arc Infrastructure's level of service demand forecast statement and additional supporting material.

² See Addendum 1 for further detail on the calculation methodology / assumptions.

- b) Accounting valuations of the freight rail network based on depreciated replacement costs, drawn from:
- (i) The Public Transport Authority's (PTA) 2023–24 Annual Report, which includes a fair value estimate of \$2.9 billion conducted by independent valuers, engineering and management professionals adjusted for obsolescence (which includes physical depreciation).³
 - (ii) Arc's 2024 financial statements, which range from between \$2.4 billion and \$3.1 billion depending on the methodology adopted.⁴
8. While CBH acknowledges the book valuations in the PTA annual report and Arc financial statements are not like-for-like DORC assessments, they are underpinned by common principles and assumptions and provide compelling context that highlights the excessive nature of Arc's proposed DORC valuation.
9. This is further supported by Figure 1, which compares escalated GRV values from the ERA's Brookfield Rail (now Arc) Determination of Costs Relevant to CBH's Access Proposal dated 10 December 2013 (**ERA's 2014 determination**) to Arc's proposed optimised replacement cost (**ORC**), (which is equivalent to GRV) and DORC values for selected lines.⁵ Unredacted GRV values were escalated to 2024 terms using the Western Australian Road and Bridge Construction index, which results in 2014 rates increasing by a factor of 1.32.⁶ The Western Australian Road and Bridge Construction index was selected as it reflects cost escalation associated with the construction of similar infrastructure to that identified in Arc's DORC Report.

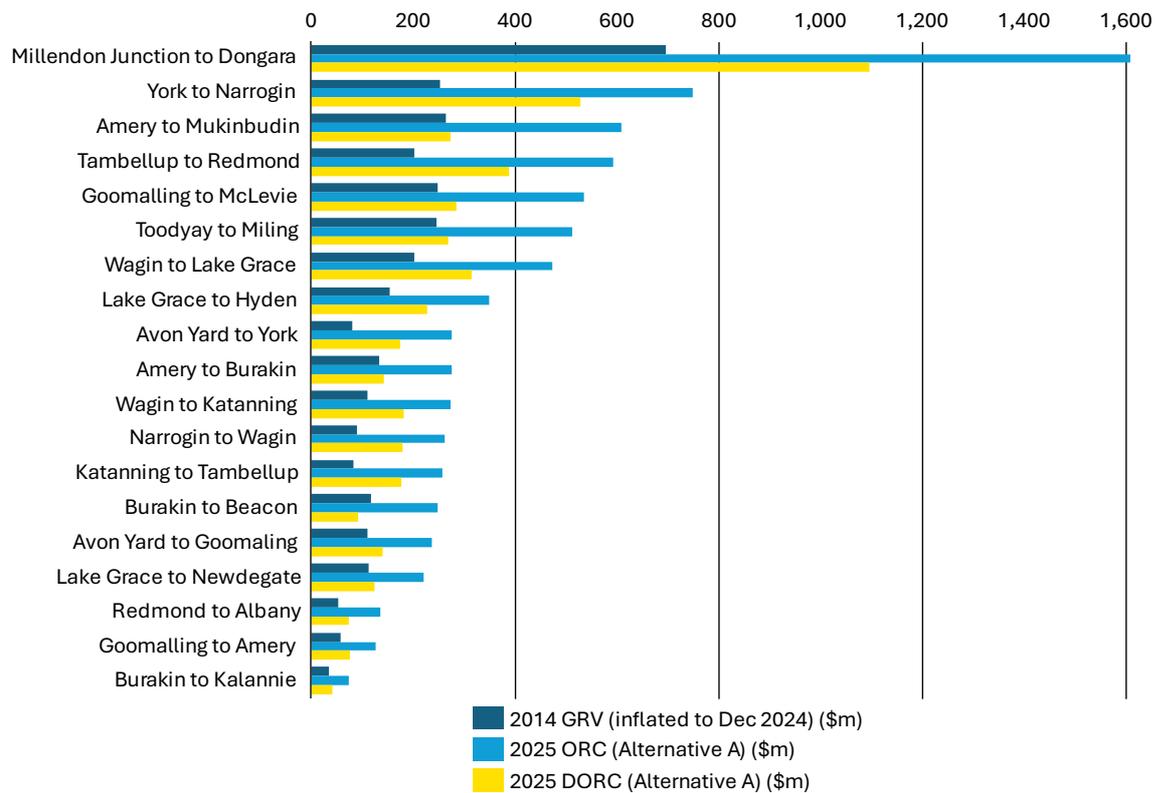
³ See pages 123-125 of [PTA's 2023-24 Annual Report](#).

⁴ See page 27 for the Director's valuation of \$3.1 billion and page 42 for the Asset Revaluation Reserve, which was used to adjust the Director's valuation and produce a cost accounting valuation figure of \$2.4 billion in the financial statements and reports for Arc Infrastructure WA PTY LTD for year ending 31 December 2024, lodged with Australian Securities & Investments Commission (ASIC)

⁵ Based on information from Table 4, [ERA 2014 Determination](#).

⁶ Escalation was calculated using price index information from September 2013 to December 2024 as published by the Australian Bureau of Statistics (ABS) available at <https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/producer-price-indexes-australia/mar-2025/6427017.xlsx>

Figure 1: Comparison of escalated 2014 GRV and 2025 ORC / DORC (\$m)⁷



10. This comparison illustrates that Arc's DORC values, which *include* depreciation, are on average 47% higher than GRV values, which *exclude* depreciation.
11. CBH contemplated using a variety of alternative relevant price indices, including the Australian Steel Beams and Sections Index⁸, the Australian All Sector Wage Price Index⁹ and the Australian Reinforcing Steel Index.¹⁰ The Australian Reinforcing Steel index returned the highest escalation of all relevant indices explored. Even if this index was applied to all assets, Arc's DORC values would still be 27% higher than GRV values. This demonstrates the significant extent to which Arc's DORC valuation is over-inflated.
12. As far as CBH is aware, there have been no material changes to infrastructure on these lines, which are primarily used for the transportation of grain, between 2014 and 2025 that would justify the extent of the valuation differences.
13. This highlights the risk that if appropriate adjustments are not made, the changes to the Code pricing mechanism will have no practical impact.

⁷ Figures from 'Alternative A' were used as Arc articulated this was their preferred option in their submission cover letter. The specification assumed in Alternative A is also more closely aligned with what was assumed in the 2014 GRV valuation.

⁸ Using this index results in 2014 rates increasing by a factor of 1.39 (39%). Escalation was calculated using price index information from September 2013 to December 2024 published by the ABS available at, <https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/producer-price-indexes-australia/mar-2025/6427018.xlsx>

⁹ Using this index results in 2014 rates increasing by a factor of 1.34 (34%). Escalation was calculated using price index information from September 2013 to December 2024 published by the ABS available at, <https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/wage-price-index-australia/latest-release#overview>

¹⁰ Using this index results in 2014 rates increasing by a factor of 1.52. Escalation was calculated using price index information from September 2013 to December 2024 published by the ABS available at, <https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/producer-price-indexes-australia/mar-2025/6427018.xlsx>

14. The key areas of concern contributing to over-inflated values include:
- a) **The application of margins:** Arc has proposed the application of compounding indirect cost factors that amount to a 49.5% markup on direct costs, upon which a further 22% in Arc project costs are applied. The result is a total markup on direct costs of more than 80%. This means for every \$100 million in direct costs, Arc is adding over \$80 million in indirect and owner-related charges.
 - b) **Asset specifications:** Asset specifications are 'gold plated' and have not been appropriately differentiated by gauge, tonne axle load (**TAL**) or use (i.e. siding vs mainline). For example, Arc have proposed use of 50 and 60kg rail on the Burakin to Beacon line section, which currently operates with 30kg rail.
 - c) **Supply and installation costs:** Benchmarking of rates suggests Arc have used unreasonably high unit rate assumptions in a number of instances. For example, Arc have proposed a direct fibre optic cable supply and installation rate of \$504 per metre, which is five times the rate provided by CBH's Tier 1 construction contractor.
 - d) **Funding costs:** The inclusion of \$9.1 billion funding costs, equivalent to 30% of the ORC value, is extreme and an outlier when compared to regulatory precedents. Funding costs are intended to reflect the costs that would be incurred by an efficient Railway owner to fund the theoretical construction of the network. However, Arc's calculation includes the time required to construct cuttings and embankments across the entire network, despite the Code explicitly excluding the cost of such works completed prior to 2000.
 - e) **Contributed capital:** Arc have determined that 'none of the assets in the DORC are contributed assets'. This is despite various public sources indicating third parties have made significant contributions to the freight rail network since 2000 and the fact that the Code explicitly states the value of such assets needs to be excluded from the Regulatory Asset Base (**RAB**). For example, several government funding agreements are documented on the Public Transport Authority's website, including the narrow-gauge re-sleeper program initiated after the Strategic Grain Network Review (SGNR), which involved a \$241 million Government grant.
 - f) **Depreciation assumptions:** The selective application of depreciation assumptions across different asset classes has resulted in understated accumulated depreciation. For example, Arc have calculated accumulated depreciation for ballast over an 878-year life from commissioning dates, instead of the 50-year life defined in the Costing Principles. As a result, accumulated depreciation on some lines where ballast is over 100 years old, such as within the Great Southern Rail (**GSR**) Network Group, which includes Code route sections from Avon to Albany, is only 15%.
15. CBH asserts that the number and extent of miscalculations and errors identified in Arc's DORC Report are substantial. While various erroneous tables were corrected in the supporting information provided by Arc on 11 July and 17 July 2025, some errors still exist. In Table 5-22 of the supporting information, which relates to Railway Owner Project Costs, calculation errors have an estimated combined effect of inflating Arc's DORC valuation by approximately \$364 million under Alternative A and \$333 million under Alternative B (see Addendum 2 for further detail).
16. In addition to the use of inappropriate assumptions to inflate costs, Arc's DORC Report does not comply with section 47J(1) of the Code because it lacks supporting material to demonstrate the basis for each Code route section DORC determination. While the additional supporting material published on the ERA's website provides *some* assumptions and outputs at a route section level, there are various assumptions and outputs that are only reported on an aggregate 'Network Group' basis. Moreover, there is limited detail on the methodologies used or the sources of information relied upon, making it difficult to verify the underlying assumptions and calculations.
17. CBH submits that the ERA, in exercising its power under sections 47J(3) and 47K(3) of the Code, should not approve Arc's DORC Report or Depreciation Schedule, or determine what are to constitute

Arc's DORC or Depreciation Schedule, without adopting the recommendations put forth in this submission.

18. The establishment of an appropriate DORC and Depreciation Schedule for the freight rail network is critical to ensuring the pricing methodology in the revised Code functions as intended. If the DORC and Depreciation Schedule result in unreasonably high values, the new DORC valuation methodology will not have the intended practical impact of reducing the delta between floor and ceiling prices and constraining overcharging. Such an outcome would effectively make the changes to the pricing mechanism meaningless, significantly undermining the intent of the broader Code changes – to create an effective access regime that promotes fairness, transparency, certainty, and efficiency with respect to rail access.¹¹
19. Where possible, CBH has suggested the inclusion of specific details or changes to Arc's DORC Report and Depreciation Schedule to address issues and non-compliance and included evidence / justification as to why these are required. In doing so, CBH has sought to include specific references to source information throughout this submission. Source information includes but is not limited to the following:
 - a) Regulatory precedents including:
 - (i) The ERA 2014 Determination;
 - (ii) GHD Advisory's (**GHD**) Developing a Regulatory Asset Base value for the Australian Rail Track Corporation Interstate Network, using the Depreciated Optimised Replacement Cost method Concluding Public Report to the Australian Competition and Consumer Commission (2021) (**ARTC DORC Report**)¹²; and
 - (iii) WestNet Rail's Floor and Ceiling Costs Review - Final Determination on the Proposed 2009-10 Floor and Ceiling Costs for Mainlines, Worsley Line, Terminal Ends, Kwinana to Soundcem, and Grain Lines (**ERA 2009 Determination**)¹³.
 - b) Engineering, construction and economic resources including:
 - (i) Advice from CBH's economic advisor Frontier Economics;
 - (ii) Advice from CBH's engineering and construction advisors, including a Tier 1 construction contractor and cost estimator, drawing on their experience working on rail construction projects in WA and the State more broadly¹⁴; and
 - (iii) Rawlinson's Australian Construction Handbook 2025 (**Rawlinson's 2025**).
 - c) Other public records that provide asset condition information and contributed capital information such as:
 - (i) Various documents related to the Government inquiries into the management of WA's Freight Rail network;
 - (ii) Funding agreements relating to the freight rail network, which are available on the PTA website; and
 - (iii) Other public sources of information such as annual reports and media publications.

Section 1 of Arc's DORC Report: Introduction

20. Section 1 of Arc's DORC Report sets out the DORC valuation method, the Arc network and the purpose of the Report and its limitations.
21. The limitations section of the Report states that 'GHD has prepared this report on the basis of information provided by Arc Infrastructure Pty Ltd and others who provided information to GHD

¹¹ [Review of the Western Australian Rail Access Regime – Final Decision Paper, WA Government Media Statement – New Rail Access Code for fairer access arrangements.](#)

¹² [ARTC DORC Report.](#)

¹³ [ERA 2009 Determination.](#)

¹⁴ Due to commercial sensitivity, the identity of engineering and construction advisors has been withheld.

(including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work.’

22. This is distinctly different from the ARTC case, where the Australian Competition and Consumer Commission (ACCC) engaged GHD to develop an *independent* RAB for the ARTC’s Interstate Network using the DORC valuation method.¹⁵

Section 2 of Arc’s DORC Report: Key Assumptions

23. Section 2 of Arc’s DORC Report documents key assumptions that underpin the DORC valuation.
24. This includes a caveat around the accuracy of cost estimates included in the DORC valuation ranging from -30% to +50%. This raises concern over the accuracy of Arc’s estimates and is a peculiar inclusion in the context of a DORC Report where nothing is *actually* being built. The risk of scope change is eliminated as one can assume that what is theoretically planned, is what is theoretically constructed.
25. In relation to construction costs, Arc submits that ‘where markets experience significant temporal variability due to external factors (such as where construction rates depend on global demand), mid-market rates are assumed where the market is neither unduly strong nor unduly weak.’
26. It is unclear where, or how this approach has impacted construction costs documented in Arc’s DORC Report.
27. CBH submits this text should however be removed as the approach is inconsistent with the Code definition of DORC, which is to reflect ‘the lowest current cost to replace the railway infrastructure’. The valuation should therefore reflect selection of the lowest rates and not mid-market rates.
28. CBH has included specific commentary on other key assumptions as they are referenced in the broader DORC Report below.

Recommendation 1: Key Assumptions

- (a) Remove the following text from the Construction cost assumption ‘where markets experience significant temporal variability due to external factors (such as where construction rates depend on global demand), mid-market rates are assumed where the market is neither unduly strong nor unduly weak’.
- (b) Arc should update all costs in the Report to ensure they reflect the lowest current cost and not mid-market rates.

Section 3 of Arc’s DORC Report: Asset Inclusions and Groupings

29. Section 3 of Arc’s DORC Report articulates the asset categories included in the DORC valuation and the Arc “Network Groups” that Code route sections have been aggregated into for presentation purposes.
30. CBH contends Arc’s proposed Network Groups do not provide supporting material to demonstrate the basis for the determination of DORC values at a Code route section level as required by section 47J(1) of the Code and set out in Appendix 1 of the approved Costing Principles.
31. This approach obscures the use of assumptions that are not appropriate at a Code route section level through aggregation to a Network Group level where such nuances are less apparent.
32. While the additional supporting material published on the ERA website provides *some* assumptions and outputs at a route section level, there are various assumptions and outputs that are only reported on an aggregate ‘Network Group’ basis. Specific examples illustrating this are included throughout this submission.

¹⁵ See page 15, [ARTC DORC Report](#).

33. CBH submits that Arc must provide the DORC values and all supporting material demonstrating the basis for their determination on a Code route section basis.

Recommendation 2: Asset inclusions and groupings

- (a) Arc to provide DORC values and all supporting material demonstrating the basis for their determination on a Code route section basis as required by s47J(1) of the Code.

Section 4 of Arc's DORC Report: Construction Replacement Cost

Construction Replacement Cost Approach (Section 4.1)

34. Section 4.1 of Arc's DORC Report articulates Arc's approach to determining the replacement cost for the freight rail network.
35. Arc's replacement cost estimates are supposedly based on rates and prices that have been benchmarked on a series of projects and adjusted to account for differences.
36. Most of the 'recent and relevant projects' referenced in Arc's report are Perth Metro-based PTA / Metronet projects on the electrified network, which is not indicative of the majority of ARC's network. Furthermore, these projects were largely delivered during the COVID pandemic as part of the \$5.5 billion WA Recovery Plan (from July 2020), and therefore during a period of unusual economic activity with tight (high cost) input markets for capital and labour.
37. CBH's Tier 1 construction contractor has advised that these projects were largely constructed with low output production rates due to the shorter and more complex project conditions, and that the associated construction cost per meter for these projects is generally more expensive than constructing track at scale using high output machinery.
38. In the absence of further information as to how costs might have been adjusted to account for dissimilarities, CBH is concerned that direct replacement costs are likely to be overstated based on Arc's proposed benchmark projects.
39. CBH has, where possible, benchmarked the proposed costs for each asset class and recommended the adoption of alternative rates if the rates provided by Arc were not reflective of the lowest current cost to replace railway infrastructure as required by the Code.
40. CBH submits that the basis on which the costs and assumptions included in sections 4.5 to 4.11 are presented is not appropriate. For example:
 - a) Fulsome supporting material demonstrating the basis for proposed costings across all assets is not provided.
 - b) Assumptions are not provided at a Code route section level as required by the Code and therefore cannot be validated. For example, the aggregation of assumptions means that it is not possible to tell what rail weight and sleeper type have been assumed for 16 TAL lines vs 21 TAL lines. While the additional supporting material provides *some* assumptions and outputs at a route section level, many other assumptions and outputs are only reported on an aggregate 'Network Group' basis.
41. Notwithstanding this, CBH has endeavoured to provide fulsome commentary and recommendations on specific asset classes in the following sections.

Contractor's Direct Costs (Section 4.2)

42. In this section Arc specifies contractor's direct costs are determined by establishing unit rates for each item. These unit rates cover the costs associated with labour and materials. The rates are then

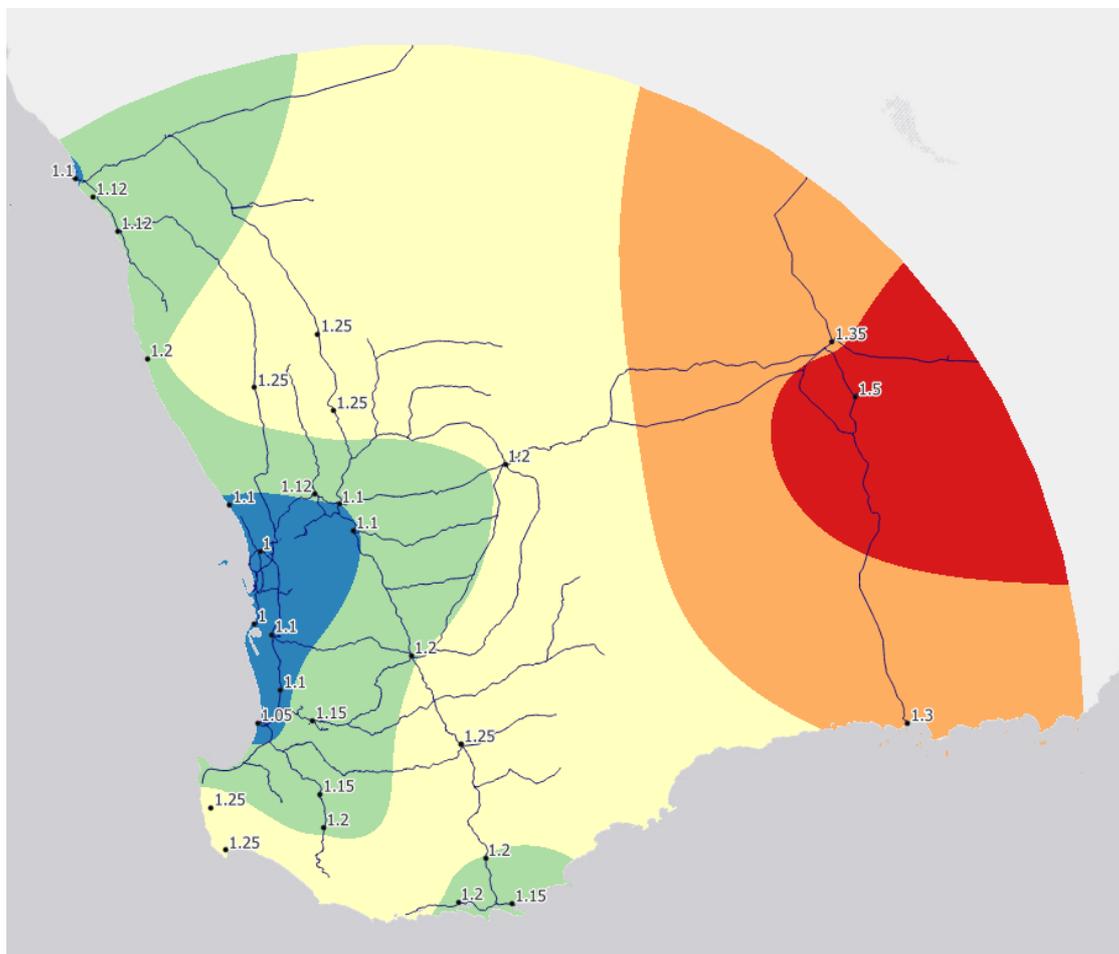
multiplied by the Modern Equivalent Asset (**MEA**) unit quantity to produce the direct replacement cost.

43. It is unclear whether economies of scale have been considered in the development of direct replacement costs. This is, whether rail unit rates reflect volume discounts expected from purchasing materials to support construction of thousands of kilometres of track.
44. CBH submits that if economies of scale have been considered in the development of direct replacement costs, Arc should clearly state this. If not, direct replacement costs should be amended to reflect for this.
45. CBH has included specific commentary on replacement costs under each asset category below.

Location Adjustment Factor (Section 4.3)

46. In this section, Arc proposes escalation factors to be applied to direct costs to account for increased costs associated with regional construction. The proposed factors are based on GHD's experience and are displayed in map form in Figure 4-2 of Arc's DORC Report.
47. In both the ERA 2014 Determination and the ARTC DORC Report, regional indices used to calculate the cost of constructing assets in different geographic areas were taken from an independent information source - Rawlinson's Australian Construction Handbook.
48. CBH has prepared a map overlaying Rawlinson's 2025 regional indices with the freight rail network below.¹⁶ In most instances, the Rawlinson's regional factors are lower than those proposed by Arc, except for Arc's proposed factor in "Central Zone".

Figure 2: Rawlinson's 2025 regional indices



¹⁶ Rawlinsons Australian Construction Handbook 2025.

49. In line with the regulatory precedent established by the ERA's 2014 Determination and the ARTC DORC Report—and to ensure consistent treatment of railway owners—CBH submits that the independent Rawlinson's regional indices should be used instead of the indices proposed by GHD.
50. In its DORC report for the ARTC, GHD used a GIS tool to calculate a weighted average location factor for each track segment. CBH considers this method the most appropriate for determining location factors, especially given that access is priced at a Code route level.

Recommendation 3: Location adjustment factors

- (a) Arc should adopt Rawlinson's 2025 regional indices in place of the indices proposed by GHD.
- (b) Arc should provide weighted average location factors at a Code route level.

Contractor's Indirect Costs (Section 4.4)

51. Section 4.4 of Arc's DORC Report illustrates the approach taken to determining contractor's indirect costs.
52. As highlighted in Figure 4-3 of Arc's DORC Report, a 'construction replacement cost rate' is calculated by applying a series of compounding percentages to direct costs factored by location. The percentages applied are as follows: Contractor's overheads and profit of 9.5%, contractor's preliminaries of 30%, and contractor's risk allowance of 5%. The sum of the markups is 44.5%, but as each factor has been applied multiplicatively, the total indirect cost markup on top of location factors is 49.5%.
53. CBH contends that Arc has not provided a justification for the use of multiplicative markups. The use of multiplicative markups can only be justified if an increase in direct cost would also cause a compounding increase in indirect costs. CBH submits there is no evidence of such relationships for these cost categories.
54. Based on Arc's approach, CBH understands that for an area such as the 'Central Region' with a location factor of 1.2, a \$100 million direct cost estimate in the Perth area translates to:
 - a) \$120 million in direct costs adjusted to reflect locational factors.
 - b) \$131.4 million including a further \$11.4 million (9.5%) in contractor overheads and profit.
 - c) \$170.8 million including a further \$39.4 million (30%) in contractor preliminaries.
 - d) \$179.4 million including a further \$8.6 million (5%) in contractor risk allowance.

This is *before* further proposed uplifts associated with 'Railway Owner Project Costs' are applied in section 5.10 of Arc's DORC Report.

55. Arc offers limited justification for the size of these markups, noting percentages "have been based on recently tendered similar works in WA, adjusted as appropriate to account for any change(s) in circumstances, and are therefore reflective of the current market at the valuation date".
56. CBH submits that this is not a sufficient basis to justify the quantum of markups that have been applied. Particularly as they are materially higher than markups observed in other valuations and that differences in underlying dollar costs do not justify higher markups in percentage terms.
57. The method used by GHD in Arc's DORC Report is different to, and produces much higher markups than, the ARTC DORC Report. In the ARTC valuation, a 15% indirect cost allowance inclusive of construction management, project management and corporate and overheads costs was allowed in addition to a 2.5% allowance for planning and design costs. Direct costs also included an unknown allowance for contractor distributables and risk.
58. It is unclear why a different approach has been applied by GHD in respect of the Arc network given the similar nature of the works.

59. The markups included in Arc's DORC Report are also incongruous with the markups included in the ERA 2014 Determination. In the 2014 valuation, the ERA accepted Brookfield Rail's (now Arc) proposal to include contractor's indirect costs of 1-2% across its asset costings and a Design Construction Project Management (DCPM) margin of 20% on all capital items before financing charges.¹⁷ Again, this indicates a much lower markup on direct costs of 22%.
60. With respect to the 5% construction risk allowance, GHD refers to ACCC's acceptance of a construction risk allowance in the access dispute between Glencore Coal Assets and Port of Newcastle Operations (**Glencore v PNO Determination**).
61. The decision to include a construction risk allowance in this instance was made in the context of broader mark-ups and what were deemed 'acceptable costs'. The ACCC included a 5% risk allowance on top of Arup's valuation for Glencore, which had materially lower mark-ups (of 19%) than the alternative valuation undertaken by AECOM for PNO (which included mark-ups of 39%).
62. Arup's valuation included overheads and profits in direct costs (said to be 8-10%), preliminaries of 4%, project management, design and client costs of 10%, and construction supervision costs of 5%.
63. Whereas AECOM's valuation for PNO provided for contractor's overheads, profits and preliminaries of 20%, construction risk of 5% and a further 14% allowance for project management costs.¹⁸
64. Effectively, the markup approved by ACCC was 24% on direct costs (19% + 5%) or 34% if direct costs exclude contractor overheads and profits. This is much lower than the 49.5% indirect cost mark-ups proposed by GHD for ARC's DORC Report.
65. In addition to the 49.5% mark-up for indirect costs, Arc's DORC Report includes further markups for 'Railway Owner project costs' on the basis that Arc "would incur costs in developing the project and constructing the infrastructure". The total allowance for Railway Owner project costs is a further 22% markup on the optimised construction cost (**OCC**) to account for design, construction management, supervision and corporate costs, as well as a fixed cost for project planning and development.
66. It is apparent that there is considerable overlap between these additional costs and the costs captured under direct, indirect or DCPM costs under other valuations described above.
67. The aggregate impact is that total markups (inclusive of indirect costs and Railway Owner project costs) are approximately 82%, which is extreme relative to the comparable total markups of:
 - a) approximately 22% in the ERA 2014 Determination;
 - b) 34% in the 2018 Glencore v PNO Determination; and
 - c) 17.5% plus an unknown mark-up for contractor distributables and contractor risk in GHD's ARTC DORC Report.
68. In summary, the markups included in Arc's DORC Report are unjustified in terms of quantum and methodology (compounding), are significantly higher than those seen in any other comparable DORC valuation and are inconsistent with past regulatory precedent in WA.
69. CBH submits that the ERA should reject Arc's proposed approach to indirect costs and railway owner project costs.
70. Furthermore, Arc should adopt the approach set out in the ERA 2014 Determination, which included a 1-2% allowance for contractor indirect costs, and a 20% DCPM margin.

¹⁷ See paragraph 153, [ERA 2014 Determination](#).

¹⁸ Project management costs included pre-development design (5%), supervision (5%) and programme management costs (4%).

Recommendation 4: Contractor's indirect costs

- (a) ERA should reject Arc's proposed approach to indirect costs and Railway Owner project costs and Arc should adopt the approach set out in the ERA 2014 Determination, which included a 1-2% allowance for contractor indirect costs, and a 20% DCPM margin.

Right of Way (Section 4.5)

71. This section of Arc's DORC Report sets out the assumptions and parameters that apply to costing the construction of right of way assets.
72. Page 25 of Arc's DORC Report states: "as well as constructing from a virgin site in a brownfield environment, a DORC framework would also need to allow for the construction of assets [that are] not owned by the asset owner, but are necessary to enable construction of assets owned by the asset owner that are required for the service."
73. With respect to the construction of assets not owned by the asset owner, the ACCC's decision in the Glencore v PNO Determination was to allow for the time, but not the cost, of constructing assets necessary to provide the service in consideration.¹⁹

Clearing and Grubbing (Section 4.5.2)

74. While it is not explicitly stated, CBH presumes the clearing and grubbing costs included in Arc's DORC Report relate to the ~100km section of track from Mullewa to Tilley that was upgraded from 16 TAL to 21 TAL in 2011 / 2012. Clearing and grubbing works conducted prior to 2000 are excluded from the DORC valuation on the basis that these works relate to bulk earthworks (cuttings and embankments) conducted in the same period, which are to be excluded from the DORC valuation in accordance with the Code.
75. The proposed scope of clearing and grubbing works includes removal of vegetation and stripping of an average depth of 0.5m of topsoil based on GHD's 'experience of similar work in WA'.
76. CBH's Tier 1 construction contractor has advised that stripping 0.5m of topsoil is excessive, and that stripping of 0.1m to 0.15m is generally sufficient for clearing and grubbing purposes.
77. CBH submits that Arc should adopt an average topsoil stripping depth of 0.125m.
78. CBH asserts the proposed clearing and grubbing area 8,636,530m² is excessive, particularly if the scope relates to the 100-kilometre section of track upgraded from Mullewa to Tilley. This area corresponds to an average corridor width of 86 metres—approximately eight times CBH's estimate of what is reasonably required.
79. The ERA requested Arc provide supporting information to validate the \$67 million of total costs attributed to clearing and grubbing activities on 2 July 2025.
80. Arc's response, published on 11 July 2025, is inadequate as it provided no explanation as to how the 8,636,530m² clearing area was determined.
81. CBH submits that specific assumptions used in the calculation of the clearing and grubbing area need to be interrogated and reviewed as they appear excessive.

Cuttings and Embankments (Section 4.5.3)

82. In this section, Arc has proposed the inclusion of costs associated with cuttings and embankment works for the ~100km section of track from Mullewa to Tilley that was upgraded from 16 TAL to 21 TAL in 2011 / 2012. All cuttings and embankments created prior to this are excluded from the DORC valuation in accordance with the Code.
83. In relation to the proposed scope of work, Arc's DORC Report states the following assumptions have been made:

¹⁹ See pages 38, 105 and 106 of the Glencore v PNO Determination.

- a) All cut material would be suitable for use as fill;
 - b) All cut material would be hauled to stockpile within the site, then hauled from stockpile to fill; and
 - c) Cut material would have a net bulking factor of 1.2 when compacted and used in embankments. This is based on GHD's experience of realistically achievable net bulking for similar works in the region. In effect, this means that every cubic metre of excavated material can provide 1.2 cubic metres of fill.
84. CBH's Tier 1 construction contractor advised it is not reasonable to assume 100% cut to stockpile to fill as an efficient contractor would aim to minimise double handling of material.
85. CBH submits the costs associated with cutting and embankments should be adjusted to minimise double handling of material as a 100% cut to stockpile to fill assumption is not consistent with an efficient contractor approach.

Formation (Section 4.5.4)

86. In this section, Arc have proposed the inclusion of formation assets where:
- a) It exists on Arc's network (in practice, parts of the network were not originally created with formation and some sections remain without it today);
 - b) High levels of reliability are required, such as on frequently travelled lines. In effect, all twin track sections, the sections from Bunbury to Perth and Perth to Kalgoorlie, and lines to the ports; and
 - c) Relatively high axle loads are run. Typically for iron ore, which would include the line from Tilley to Geraldton.
87. With respect to formation specifications, Arc have proposed a minimum 230mm formation thickness, and width extending 3.5m either side of the track centre line. This equates to 1.6m³ of formation per linear metre of track.
88. Furthermore, it is proposed that construction to the above specifications would require:
- a) Excavation to a depth of 230mm;
 - b) Disposal of excavated material off-site;
 - c) Trimming and compaction of subgrade;
 - d) Filling to subgrade with 230mm of limestone foundation; and
 - e) Trimming and compaction to limestone formation level.
89. CBH contends a formation width extending 3.5m either side of the track centre line is overstated, and that a total width of 6m and 6.5m should be adopted for narrow gauge and standard gauge lines respectively. This is consistent with the widths assumed in the ERA 2014 Determination.²⁰
90. CBH's engineering and construction advisor was unable to assess the reasonableness of Arc's rates due to insufficient information, particularly in relation to excavation and fill material haulage assumptions.
91. In relation to the treatment of all other sections of track (not covered by the criteria set out in paragraph 86), the report first states Arc "have assumed that there is no formation and the subgrade has been sufficiently compacted to provide adequate support for the required level of service through years of train movements".
92. In a later paragraph, Arc states "to provide the closest comparable service standard to the existing asset on these sections (where level of service is defined in terms of axle loads), the modern equivalent replacement would need to compact the subgrade – effectively replicating the compaction that years of train movements has achieved". The construction tasks involved would include:
- a) Clearing and grubbing;

²⁰ See paragraph 266, [ERA 2014 Determination](#).

- b) Stripping the topsoil layer; and
 - c) Proof-rolling the subgrade.
93. CBH asserts these two statements are incongruent. It is not reasonable to include formation costs where no formation exists, and the subgrade has been sufficiently compacted through historical train operations. In a brownfields context, a hypothetical Railway Owner would leverage existing compacted subgrade, negating the need for such costs.
94. Furthermore, it is inappropriate to include clearing and grubbing and top-soil stripping costs within the scope of formation works, as these costs have already been addressed in Section 4.5.2 of Arc's DORC Report. That section clearly states that only costs for such works undertaken after 2000 should be included, in line with the requirements of the Code.
95. CBH submits that all costs, including clearing and grubbing, topsoil stripping and subgrade compaction costs, associated with areas of the network that have no formation should be excluded from formation costs.

Access Roads (Section 4.5.5)

96. In this section, Arc has proposed that access roads are assumed to be cleared, improved, 3.5m wide unsealed dirt tracks along the entire track length of one side of the track. The rate applied to the construction of access roads includes vegetation clearing, topsoil removal, subgrade improvement, and subgrade preparation.
97. CBH submits that access roads should be excluded under a brownfield construction methodology based on the following rationale:
- a) Access roads were valued in a greenfield context in the ERA 2014 Determination.
 - b) The Costing Principles require that Arc's DORC valuation be undertaken on a brownfield basis.
 - c) In a brownfield context, it is reasonable to assume that a higher level of supporting infrastructure, including access roads, already exists.
 - d) This assumption is consistent with GHD's approach in the ARTC DORC valuation, which assumes access roads are already in place.²¹
98. Should the ERA not accept this position, CBH submits that several issues – detailed below – relating to quantity and cost assumptions applied to access roads must be addressed.
99. CBH contends that vegetation clearing and topsoil removal is analogous to clearing and grubbing, and should be treated consistently. The costs associated with these activities should therefore be removed.
100. With respect to the specification of the access roads, CBH contends the requirement for a 3.5m wide access road is over specified. This view is supported by the ERA 2014 Determination, where a 3m wide access track of 50mm depth was adopted.
101. CBH submits a 3m access track of 50mm depth should be reflected in Arc's costings.
102. With respect to costs, Arc has proposed a direct unit cost of \$59,500 per kilometre for access roads. This is 5.9 times the escalated unit rate from the ERA 2014 Determination.²²
103. Therefore, the ERA should not accept Arc's proposed unit cost for access roads on the basis that it is unreasonably high.
104. CBH submits an escalated rate from the ERA 2014 Determination could be used in the absence of another reasonable alternative.

²¹ See page 20, of [ARTC DORC Report](#).

²² To provide a point of comparison, the unit rate from the ERA 2014 Determination was escalated by a factor of 1.32 to 2024 terms using the Western Australian Road and Bridge Construction index.

Recommendation 5: Right of way infrastructure replacement cost

- (a) Clearing and grubbing costs should be based on a topsoil stripping depth of 0.125m in place of Arc's proposed 0.5m depth.
- (b) The proposed 8,636,530m² total clearing and grubbing area needs to be interrogated by the ERA as this appears excessive.
- (c) The costs associated with cutting and embankments should be adjusted to minimise double handing of material as a 100% cut to stockpile to fill assumption is not consistent with an efficient contractor approach.
- (d) With respect to formation costs, Arc should:
 - (i) Adopt a total formation width of 6m for narrow gauge lines and 6.5m for standard gauge lines, in place of Arc's proposed width of 7m for all gauges irrespective of their gauge.
 - (ii) Remove all costs, including clearing and grubbing, topsoil stripping and subgrade compaction costs, associated with areas of the network that have no formation.
- (e) Costs associated with constructing access roads should be removed.
- (f) Should the ERA not accept this position:
 - (i) Arc should adopt a 3m wide, 50mm depth for access roads.
 - (ii) The ERA should reject Arc's proposed unit cost for access roads on the basis that it is unreasonably high.
 - (iii) An escalated rate from the ERA 2014 Determination could be used in the absence of another reasonable rate.

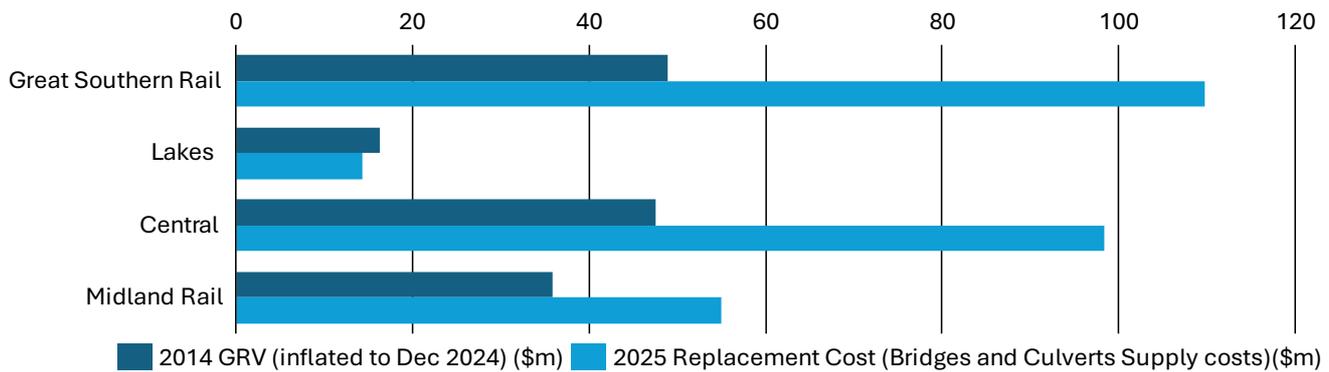
Civil Structures (Section 4.6)

Bridges (Section 4.6.1)

105. In this section, Arc have specified five different MEA bridge types, which all have a 24-tonne load rating. Arc have provided the number of bridges, total deck area and \$/m² on a Network Group basis.
106. Figure 3 below compares total bridge and culvert costs escalated from the ERA 2014 Determination to Arc's proposed replacement cost for bridges and culverts for a subset of Network Groups where information was available. 2025 bridge and culvert costs were amalgamated to align with the 2014 Determination data structure. This demonstrates the 2025 bridge and culvert replacement costs are on average 1.9 times escalated 2014 values.²³

²³ This comparison required the line segments identified in the ERA 2014 Determination to be aggregated to a Network Group level. The 2014 Midland Rail figures do not include costs associated with the section of track between Narngulu to Geraldton as these were redacted. As this segment only constitutes ~3% of the total Network Group track length, CBH believes the value is still useful for benchmarking purposes.

Figure 3: Comparison of total bridges and culverts costs (\$m)



107. Table 1 below provides a more granular comparison of bridge unit rates escalated from the ERA 2014 Determination and Arc's DORC Report. While a strict like for like comparison was not possible due to changes in the categorisation of bridge types, the below table illustrates that Arc's proposed costs are high compared to escalated historical costs for similar size bridges.

Table 1: Comparison of bridge costs

Bridge Type	Span range (m)	ERA 2014 in Dec 2024 terms (\$/m ²) ²⁴	2025 Arc RAB direct cost (\$/m ²) ²⁵
Type 2a	3.7 ≤ 9.7	4,430 – 4,631	8,500
Type 2b	9.7 ≤ 18.0		9,000
Type 3	18.0 ≤ 21.9	5,235 – 5,436	9,000
Type 4	21.9 ≤ 30.5	6,443 – 6,846	8,500

108. Furthermore, the costs for Type 1 bridges, which reflect precast box culverts used for spans less than or equal to 3.7m at \$315,000 per metre, appear grossly overstated when compared to reinforced concrete box culverts from ARTC's DORC Report, which were priced at \$26,540 per culvert (escalated to 2024 terms).²⁶

109. CBH contends neither the infrastructure, the MEA, or the economic environment, have changed to an extent that explains these multiples and that Arc are proposing unreasonably high bridge costs.

110. The ERA should reject Arc's proposed unit costs for bridges on the basis that they are unreasonably high. Any determination of costs, including but not limited to bridge unit rates, needs to be based on transparent and reasonable assumptions.

111. CBH submits escalated rates from the ERA 2014 Determination could be used in the absence of other reasonable rates.

²⁴ Span lengths in ERA 2014 Determination were categorised based on < 12m, 12 - 20m, and > 20m lengths and also included bridge width. No width measurements were provided in Arc's DORC Report. 2014 figures were escalated using the Western Australian Road and Bridge Construction index and rates are inclusive of 1-2% contractor's indirect costs as noted on page 27 of the ERA 2014 Determination. Contractor's indirect costs have not been stripped out as they are immaterial.

²⁵ Extracted from Appendix A-3 of Arc's DORC Report.

²⁶ Cost extracted from page 40 of [ARTC DORC Report](#), escalated using the Australian Road and Bridge Construction index from July 2019 to December 2024 at a factor of 1.24.

Tunnels (Section 4.6.2)

112. Section 4.6.2 of Arc's DORC Report sets out how the replacement costs associated with tunnels have been built up on a Network Group basis.
113. Tunnel costs were not included in publicly available information from the ERA 2009 or 2014 Determinations. There is no commentary in Arc's DORC Report as to why tunnels may have been historically excluded but are now included.
114. CBH has compared the direct unit rates provided by Arc with other benchmarks and considers Arc's proposed unit rates for tunnels to be reasonable.

Culverts (Section 4.6.3)

115. In this section, specifications are included for eight MEA culvert types, which are all reinforced concrete pipe culverts. The number of culverts, length, diameter and cost per meter are provided on a Network Group basis. No references to support Arc's unit cost assumptions were provided.
116. CBH has benchmarked Arc's proposed culvert costs and asserts that the direct cost for 600mm reinforced concrete pipe culverts at \$600 per metre, is unreasonably high when compared to \$410 per metre for the same size culverts in Rawlinson's Australian Construction Handbook 2025.²⁷
117. CBH submits that Arc should adopt a direct unit cost of \$410 per metre for 600mm culverts instead of Arc's proposed cost of \$600 per metre.

Recommendation 6: Civil structures replacement cost

- (a) The ERA should validate the proposed bridge costs as they are unreasonably high compared to historical benchmarks.
- (b) Arc should adopt escalated bridge rates from the ERA 2014 Determination in the absence of other reasonable bridge rates.
- (c) Arc should adopt a direct unit cost of \$410 per metre for 600mm culverts.

Track (Section 4.7)

Rail (Section 4.7.1)

118. In this section, Arc has proposed that all MEA rail weights should be 41kg, 50kg or 60kg per metre rail, referencing the use of 50 and 60kg rail on the PTA network.
119. CBH contends use of the PTA network for 'context' in informing rail weights on the freight rail network may not be appropriate. Standards and specifications from other more appropriate freight rail network comparators such as Queensland Rail's Civil Engineering Track Standards and New South Wales Rail and Rail Joint specifications articulate use of 41kg/m rail on mainlines.²⁸
120. It is not clear why Arc's MEA does not include 47kg/m rail given that Arc's network comprises various 47kg/m rail sections and CBH's engineering and construction advisor has advised this weight can be readily sourced, particularly at scale.
121. Arc provided the MEA rail weights used at a route segment level in Section 4.7.1 of the additional supporting material published on 11 July 2025. CBH have serious concerns regarding overspecification of MEA rail weights. For example, the proposed MEA for Burakin to Beacon is 50 and 60kg rail, whereas Arc's website states the existing rail weight is 30kg.²⁹ No rationale is provided

²⁷ Rates for precast concrete pipes and headwalls were extracted from page 717 of Rawlinson's Australian Construction Handbook 2025 and converted to a \$/m basis using the quantities included in section 4.6.3 of Arc's DORC Report. The rate for 600mm precast concrete pipe culverts is first multiplied by the average length for 600mm culverts, before adding the cost of corresponding headwalls. The sum is divided by the average culvert length to arrive at \$/m culvert cost.

²⁸ Queensland Rail MD-10-575 v.5 Civil Engineering Track Standard, CRN CS 220 Rail and Rail Joints.

²⁹ See [Arc Infrastructure rail size map](#).

for doubling the rail weight. Furthermore, where multiple rail weights are specified for a segment, Arc have not provided their proportional application.

122. CBH cannot understand why 41kg/m rail was not specified in this region, particularly when Arc has clearly stated that this rail weight is ‘readily obtained’ and this was adopted in the ERA 2014 Determination.³⁰
123. With respect to rail weight specifications, CBH submits rail weights need to be set at a Code route section level based on the following:
 - a) All rail that is currently at 41kg/m or below, should have an MEA of 41kg/m.
 - b) All rail that is currently between 42kg/m and 47kg/m, should have an MEA of 47kg/m.
 - c) All rail that is currently between 48kg/m and 50kg/m, should have an MEA of 50kg/m.
 - d) All rail that is currently between 51kg/m and 60kg/m, should have an MEA of 60kg/m.
124. CBH submits that Arc should also advise the route segments and track kilometres where dual gauge track has been specified.
125. Figure 4 below compares total escalated rail and turnout supply costs from the ERA 2014 Determination to Arc’s proposed rail and turnout supply costs for a subset of Network Groups where information was available. 2025 rail and turnout supply costs were amalgamated to align with the 2014 Determination data structure. This demonstrates Arc’s proposed 2025 rail and turnout supply costs are on average 3.6 times escalated 2014 values.³¹

Figure 4: Comparison of total rail and turnout supply costs (inclusive of contractor indirect costs) (\$m)



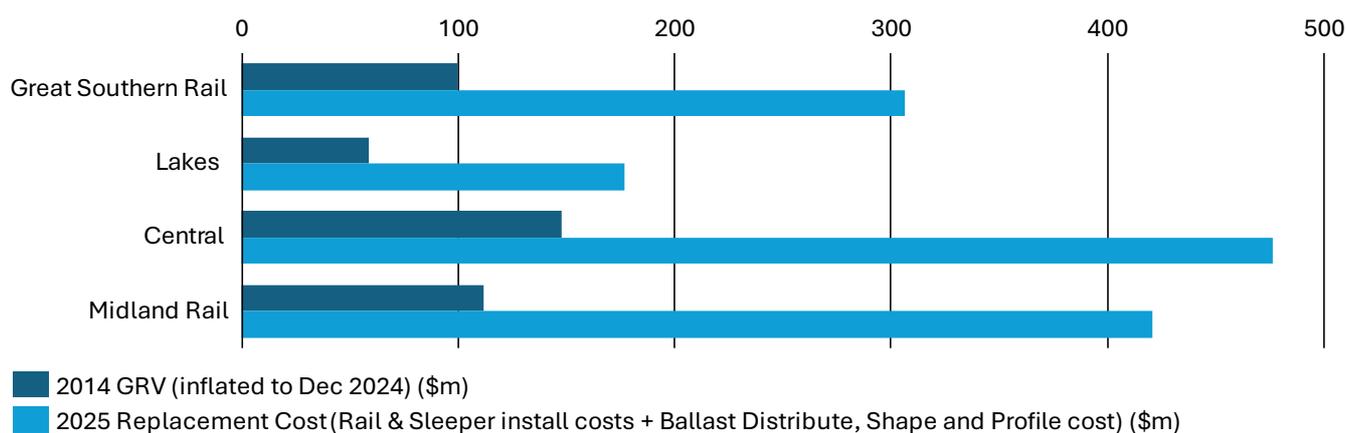
126. Arc’s rail install rate of \$125,000 per km (excluding contractor indirect costs) cannot be directly compared to the ERA 2014 Determination rate as in this Determination, tracklaying was combined with rail, sleeper and ballast installation rates.
127. A comparison of amalgamated Arc rail and sleeper installation costs and ballast distribute, shape and profile costs with the escalated tracklaying costs from the 2014 Determination is presented in Figure 5. This illustrates that the combined ‘tracklaying’ rates proposed by Arc are on average 3.4 times escalated 2014 rates.³²

³⁰ See [Arc Infrastructure rail size map](#) and Table 3 of the [ERA 2014 Determination](#).

³¹ This comparison required the line segments identified in the ERA 2014 Determination to be aggregated to a Network Group level. The 2014 Midland Rail figures do not include costs associated with the section of track between Narngulu to Geraldton as these were redacted. As this segment only constitutes ~3% of the total Network Group track length, CBH believes the value is still useful for benchmarking purposes.

³² 2014 GRV figures were escalated using the Australian Reinforcing Steel index from September 2013 to December 2024 at a factor of 1.52.

Figure 5: Comparison of Tracklaying costs (inclusive of contractor indirect costs) (\$m)



128. Arc have proposed applying standard rail costings to head hardened rail across the network due to the small quantities of head hardened rail and the immaterial impact that head hardened rail costs would have on the DORC value.
129. While CBH is comfortable with Arc’s approach to head hardened rail rates, it is not comfortable with Arc’s proposed rates for standard rail as the below table demonstrates Arc’s proposed costs seem significantly higher than escalated historical costs and rates provided by CBH’s engineering and construction advisor.

Table 2: Comparison of historic and proposed rail supply price comparison

Rail Type	ERA 2014 in Dec 2024 terms (\$/km) ³³	CBH engineering / construction advisor (\$/km) ³⁴	2025 Arc RAB direct cost (\$/km) ³⁵
41kg/m	90,360	-	222,509
47kg/m	-	98,210	-
50kg/m	92,720	105,600	225,884
60kg/m	105,790	126,720	248,666

130. CBH contends that neither the infrastructure, the MEA, or the economic environment, have changed to an extent that explains these multiples and that Arc are proposing unreasonably high rail costs.
131. CBH submits Arc should adopt the following direct cost rates for rail supply in place of Arc’s proposed rates:
- 41kg/m: \$90,360 / km
 - 47kg/m: \$98,210 / km
 - 50kg/m: \$105,600 / km

³³ 2014 figures were escalated using the Australian Reinforcing Steel index from September 2013 to December 2024, which returned the highest escalation of all relevant indices explored. Using this index results in 2014 rates increasing by a factor of 1.52. Rates extracted are inclusive of 1-2% contractor’s indirect costs as noted on page 27 of the ERA 2014 Determination. Contractor’s indirect costs have not been stripped out as they are immaterial. \$/km rates have been derived by firstly, multiplying \$/tonne rates by the nominal rail weight in kg/m divided by 1,000 to convert tonnes to kg, and secondly multiplying the result by 1,000 to convert to km.

³⁴ Rates were provided by CBH’s Tier 1 construction contractor and are based on rates from a recent metropolitan rail project. This contractor did not have recent market rates for 41kg or 50kg rail. CBH have interpolated rates provided for 53kg rail to arrive at indicative 50kg unit rail.

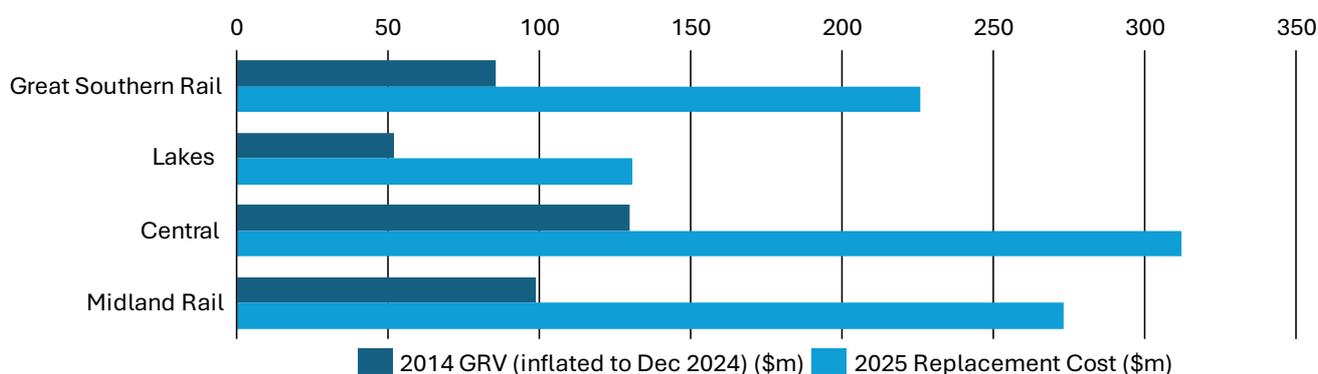
³⁵ Figures extracted from Appendix A-3 of Arc’s DORC Report.

d) 60kg/m: \$126,720 / km

Sleepers (Section 4.7.2)

- 132. Arc have proposed use of concrete sleepers across the entire network at a frequency that replicates current sleeper spacing.
- 133. Arc did not differentiate sleepers by gauge, even though narrow and standard / dual gauge sleepers differ in terms of length, weight and cost.
- 134. Figure 6 below compares escalated total sleeper supply costs from the ERA 2014 Determination to Arc’s proposed sleeper supply costs for a subset of Network Groups where information was available. This demonstrates the 2025 replacement sleeper costs are on average 2.7 times escalated 2014 values.³⁶

Figure 6: Comparison of total sleeper supply costs (inclusive of contractor indirect costs) (\$m)



- 135. Table 3 below provides a more granular comparison of the unit rates provided by Arc with various other benchmarks that CBH has collated. Benchmarks include prices escalated from the ERA 2014 Determination and rates from CBH’s engineering and construction advisors.

Table 3: Historic and proposed sleeper supply price comparison

Sleeper type	ERA 2014 in Dec 2024 terms (\$/sleeper) ³⁷	CBH engineering/ construction advisor (\$/sleeper) ³⁸	2025 Arc RAB direct supply cost (\$/sleeper) ³⁹
Narrow gauge	158	146	185
Standard Gauge	184	170	
Dual gauge	224	232	

- 136. This comparison illustrates that Arc’s proposed sleeper supply rates are inappropriately weighted towards higher cost standard / dual gauge sleepers.

137. CBH submits Arc should adopt the following base unit rates for sleeper supply:

a) Narrow gauge: \$146 / sleeper

³⁶ This comparison required the line segments identified in the ERA 2014 Determination to be aggregated to a Network Group level. The 2014 Midland Rail figures do not include costs associated with the section of track between Narngulu to Geraldton as these were redacted. As this segment only constitutes ~3% of the total Network Group track length, CBH believes the value is still useful for benchmarking purposes.

³⁷ 2014 figures were escalated using the Western Australian Road and Bridge construction index from September 2013 to December 2024 at a factor of 1.32 and rates are inclusive of 1-2% contractor’s indirect costs as noted on page 27 of the ERA 2014 Determination. Contractor’s indirect costs have not been stripped out as they are immaterial.

³⁸ Pricing was provided by CBH’s Tier 1 construction contractor.

³⁹ Extracted from Appendix A-3 of Arc’s DORC Report.

- b) Standard gauge: \$170 / sleeper
- c) Dual gauge: \$232 / sleeper

Ballast (Section 4.7.3)

138. In this section, Arc has proposed that MEA ballast depths should be based on existing ballast depths, which are typically 250-300mm on the standard gauge network and at least 250mm, which is the minimum standard set by Australian Standard Railway Infrastructure – Track Classification AS7630 (2017).
139. CBH has reviewed AS7630 2017 and cannot see a clear reference to a minimum 250mm ballast depth. Furthermore, AS7639 Track Structure and Support (2022) also states "ballast depth generally varies between 200mm and 500mm."⁴⁰
140. Reviewing Arc's assumptions in further detail shows that ballast specifications were assumed to be the same for all gauges as the same dollar per kilometre rate was applied to all lines. This is inconsistent with rail design standards which differentiate ballast specifications by gauge and use (i.e. mainline or siding / yard).
141. CBH contends ballast depths should be differentiated by gauge and use and that the following depths should be adopted based on advice from CBH's engineering and construction advisors:
- a) NG mainline: 200mm
 - b) NG siding: 200mm
 - c) SG / DG mainline: 300mm
 - d) SG / DG siding: 250mm
- CBH contends that ballast depths of 200mm are reasonable for narrow-gauge areas of the network. This is consistent with what was approved in the ERA 2014 Determination. Further supporting the reasonableness of this position, the ARTC permits a much lower minimum ballast depth of 150mm for Light Weight (Class D) lines, which are 19 TAL with a maximum speed of 55 km per hour.⁴¹
142. In addition to ballast depths, Arc proposed use of a bulk density of 1.7 tonnes/m³.
143. CBH contends this is overstated and that a density of 1.6 tonnes/m³ should instead be used. This is supported by advice from CBH's engineering and construction advisors and is consistent with the ERA 2014 Determination.
144. Arc should also provide total ballast volumes to ensure appropriate allowances have been made for sleepers and ballast width.
145. Reverse calculating ballast rates based on Appendix A-3 of Arc's DORC Report suggests that Arc applied a direct supply and cart rate of ~\$32 per tonne and an install rate of ~\$40 per meter (excluding contractor indirect costs and location factors).⁴²
146. CBH submits these back solved unit rates appear reasonable.
147. Figure 7 below compares total escalated ballast supply costs from the ERA 2014 Determination to Arc's proposed ballast supply and cart costs for a subset of Network Groups where information was available.⁴³ The 2025 total ballast supply and cart costs are on average 1.7 times escalated 2014 values. This demonstrates the likely impact of gold-plated specification assumptions and the application of significant margins.

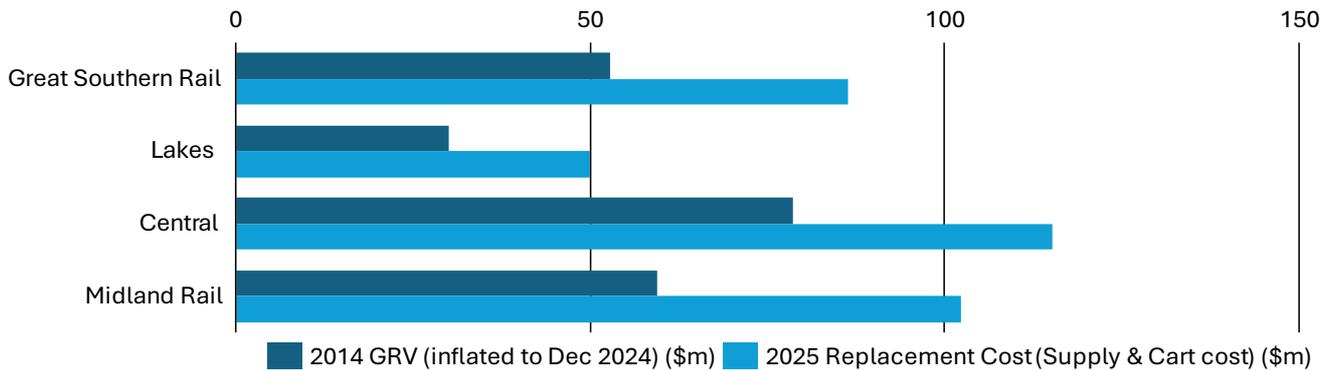
⁴⁰ See section 6.4.1 of [AS 7639 Track structure and support 2022](#).

⁴¹ See Table 4.1, [ARTC Code of Practice Ballast Section 4](#).

⁴² Calculation details can be found in Addendum 3.

⁴³ This comparison required the line segments identified in the ERA 2014 Determination to be aggregated to a Network Group level. The 2014 Midland Rail figures do not include costs associated with the section of track between Narngulu to Geraldton as these were redacted. As this segment only constitutes ~3% of the total Network Group track length, CBH believes the value is still useful for benchmarking purposes.

Figure 7: Comparison of total ballast supply and cart cost (inclusive of contractor indirect costs) (\$m)



Turnouts (Section 4.7.4)

148. In this section, Arc has proposed:

- a) All non-standard turnouts should be replaced with standard turnouts, defined by the Better Rail Code of Practice (BRCoP).
- b) A rail weight of 60kg/m should be used for all turnouts on the basis that it is the industry standard.
- c) Use of concrete sleepers in all turnouts.
- d) Use of 1:10 standard turnouts where existing turnout specifications were not known.

149. CBH was unable to find any reference to BRCoP in the public domain.

150. CBH contends 60kg/m rail is not an industry minimum standard for turnouts and that standard turnouts generally range from 47kg to 60kg and are selected based on the closest weight to that of the mainline upon which they are installed.

151. Table 4 below compares the supply and installation rates provided by Arc with various other benchmarks that CBH has collated. Benchmarks include prices escalated from the ERA 2014 Determination, and rates from CBH’s engineering and construction advisors.

Table 4: Historic and proposed turnout supply and install price comparison

Turnout type	ERA 2014 in Dec 2024 terms (\$/turnout) ⁴⁴	CBH engineering/ construction advisor (\$/turnout) ⁴⁵	2025 Arc RAB direct cost (\$/turnout) ⁴⁶
NG 1:10 concrete bearers	347,200 (60kg)	302,400 (47kg)	250,000 (60kg)
NG 1:12 concrete bearers	455,400 (60kg)	358,800 (47kg)	
SG 1:10 concrete bearers	-	321,300 (53kg)	300,000 (60kg)
SG 1:12 concrete bearers	468,600 (60kg)	388,200 (60kg)	
DG 1:12 concrete bearers	-	474,400 (60kg)	700,000 (60kg)
DG 1:16 concrete bearers	625,700 (60kg)	-	-

152. With the exception of 1:12 DG turnouts with concrete bearers, this comparison demonstrates that Arc’s base rates for turnouts seem reasonable when compared to other benchmarks.
153. CBH submits Arc should adopt a base unit rate of \$474,400 per turnout for supply and installation of 60kg 1:12 DG turnouts with concrete bearers.

⁴⁴ 2014 figures were escalated using the Western Australian Road and Bridge Construction index from September 2013 to December 2024 at a factor of 1.32 and rates are inclusive of 1-2% contractor’s indirect costs as noted on page 27 of the ERA 2014 Determination. Contractor’s indirect costs have not been stripped out as they are immaterial.

⁴⁵ Rates were provided by CBH’s Tier 1 construction contractor and are based on a recent metropolitan rail project and supplier quotes.

⁴⁶ Extracted from Appendix A-3 of Arc’s DORC Report.

Recommendation 7: Track replacement cost

- (a) Arc should adopt the following MEA specifications for rail weights at a Code route section level:
 - (i) All rail that is currently at 41kg/m or below, should have an MEA of 41kg/m.
 - (ii) All rail that is currently between 42kg/m and 47kg/m, should have an MEA of 47kg/m.
 - (iii) All rail that is currently between 48kg/m and 50kg/m, should have an MEA of 50kg/m.
 - (iv) All rail that is currently between 51kg/m and 60kg/m, should have an MEA of 60kg/m.
- (b) Arc should articulate route segments and track kilometres where dual gauge track has been specified.
- (c) Arc should adopt the following direct rail supply rates in place of Arc's proposed rates:
 - (i) 41kg/m: \$90,360 / km
 - (ii) 47kg/m: \$98,210 / km
 - (iii) 50kg/m: \$105,600 / km
 - (iv) 60kg/m: \$126,720 / km
- (d) Arc should differentiate sleepers by gauge and adopt the following base unit rates for sleeper supply in place of Arc's proposed rates:
 - (i) NG: \$146 / sleeper
 - (ii) SG: \$170 / sleeper
 - (iii) DG: \$232 / sleeper
- (e) Arc should adopt the following ballast depth specifications:
 - (i) NG mainline: 200mm
 - (ii) NG siding: 200mm
 - (iii) SG / DG mainline: 300mm
 - (iv) SG / DG siding: 250mm
- (f) Arc should adopt a ballast bulk density of 1.6 tonnes per m³ in place of Arc's proposed bulk density of 1.7 tonnes per m³.
- (g) Arc should also provide total ballast volumes to ensure appropriate allowances have been made for sleepers and ballast width.
- (h) Arc should adopt a direct cost of \$474,400 per turnout for supply and installation of 60kg 1:12 DG turnouts with concrete bearers.

Signalling and Communications/ Control Systems (Section 4.8)

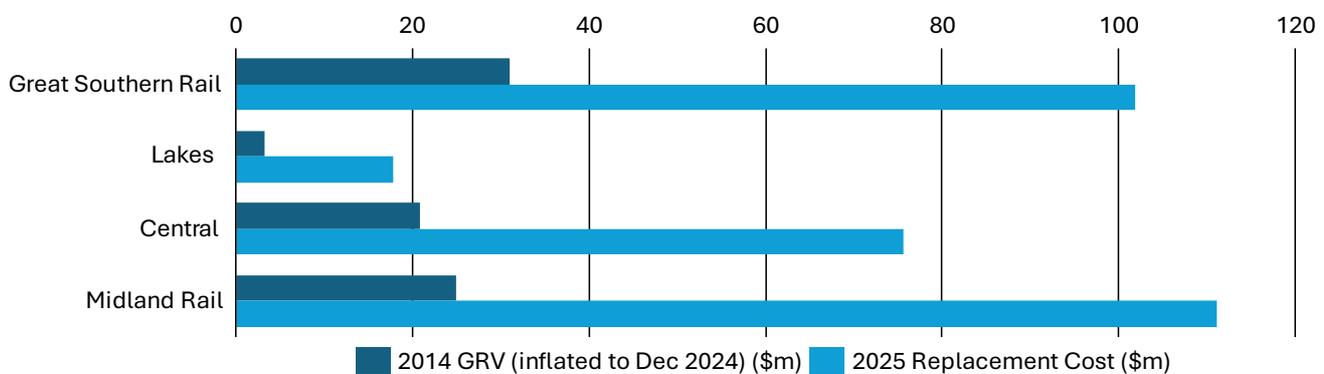
154. In this section, Arc have proposed the MEA for signalling and communications infrastructure should replicate the existing control systems reflected in Figure 4-4 of Arc's DORC Report.
155. Arc have proposed that the principal contractor would be required to engage a specialist signalling and communications contractor for supply and installation, which would incur additional costs. This is reflected via the application of two distinct sets of margins:
- a) Arc applied a 62% margin to direct costs detailed in Appendix A-3 of Arc's DORC Report reflecting multiplicative margins for specialist signalling contractor preliminaries (35%) and overheads and profit (20%).
 - b) A further 49.5% margin was then applied to the total signalling and communications replacement costs to account for principal contractor risk allowance (5%), preliminaries (30%) and overheads

/ profits (9.5%) as evidenced by Table 4-35 in the additional information provided by Arc on 11 July 2025.

A further 22% margin is then applied to account for Railway Owner project costs in section 5.10 of Arc's DORC Report.

156. CBH submits that the margins applied to signalling and communications infrastructure are excessive and unreasonably inflate replacement costs.
157. The extent of this over-inflation can be seen in Figure 8 below which compares total signalling and communications costs from the ERA 2014 Determination to Arc's proposed signalling and communications costs for a subset of Network Groups where information was available.⁴⁷ This demonstrates Arc's 2025 signalling and communications costs are on average 4 times escalated 2014 values.

Figure 8: Comparison of total signalling and communications costs (inclusive of contractor indirect costs) (\$m)



158. Arc have proposed a Radio Based Train Control (**RBTC**) system (Alternative B) as a lower cost alternative to replicating existing infrastructure (Alternative A) in section 5.5 of Arc's DORC Report.
159. CBH submits that a RBTC system should instead be adopted as the MEA at the replacement cost phase as this reflects the lowest current cost to replace railway infrastructure with assets that have the capacity to provide the level of service that meets the actual and reasonably projected demand; and are MEA, as required by the Code. It would also simplify Arc's DORC Report and remove the need for reporting figures for Alternative A and Alternative B.
160. Notwithstanding this, CBH has provided further commentary on the various components of Alternative A below.

Fibre Optic Communications Network (Section 4.8.1)

161. In this section, Arc have proposed fibre optic cable installation along route sections that are currently operated under centralised train control (**CTC**).
162. CBH do not take exception to this proposition but are concerned that it has not been applied appropriately in practice. For example, cable has been priced for the entire ~380km Kalgoorlie to Esperance line, despite the fact that only 16km of the line between Kalgoorlie and Hampton is operated under CTC, while the remaining 364km between Hampton to Esperance is operated under Train Order Working (**TOW**).
163. CBH submits that the 364km section of fibre optic cable between Hampton and Esperance should be removed from Arc's DORC valuation as this section of track is not part of the CTC network.

⁴⁷ This comparison required the line segments identified in the ERA 2014 Determination to be aggregated to a Network Group level. The 2014 Midland Rail figures do not include costs associated with the section of track between Narngulu to Geraldton as these were redacted. As this segment only constitutes ~3% of the total Network Group track length, CBH believes the value is still useful for benchmarking purposes.

164. Arc's proposed average fibre optic supply, test and commission, and installation rate is \$504 per metre (excluding indirect costs). This is significantly higher than the cost provided by CBH's Tier 1 construction contractor, who provided an equivalent rate of \$99 per metre.⁴⁸
165. CBH submits Arc should adopt a fibre optic supply and installation direct cost of \$99 per metre in place of Arc's proposed direct cost of \$504 per metre.

Signalling and Control Systems Assets (Section 4.8.2)

166. Quantities and unit rates for signalling and control systems assets are provided for each Network Group in Table 4-27 of Arc's DORC Report.
167. Eleven pedestrian crossings were costed at a direct cost of \$171,292 each.⁴⁹ Similar costs appear to be represented in Section 4.10.1: Pedestrian Crossings. An explanation should be provided as to how these costs differ to ensure there is no double counting.
168. The ERA should validate all the proposed signalling and control system asset quantities and costs to ensure there is no double counting, and that they reflect the lowest cost to replace existing infrastructure.

Control Centre Signal Assets (Section 4.8.3)

169. In this section, Arc have proposed that the costs associated with control centre signal assets are distributed across the network where signalling assets exist. No unit costs or quantities are provided.
170. CBH is not clear what assets are reflected in this category and has therefore not been able to benchmark costs.
171. CBH submits Arc should clearly articulate what signalling assets are included in this category so that they can be reviewed.
172. Arc have applied the location index to the portion of costs allocated to each Network Group.
173. CBH submits that it is only appropriate to apply the location index relevant to the location of these asset / buildings themselves, rather than of the assets they service as this more accurately reflects the cost of replacing such assets.
174. Arc's proposed control centre signal asset costings need to be updated to reflect this if this is not the case.
175. The ERA should validate all the proposed control centre signal asset costs to ensure there they reflect appropriate quantities / specifications and reflect the lowest cost to replace existing infrastructure.

Communications Assets (Section 4.8.4)

176. Arc have provided asset quantities and unit rates for communications assets for each Network Group in Table 4-30. No rationale or justification was provided for the quantities or costs provided.
177. CBH submits that it is only appropriate to apply the location index relevant to the location of these communications asset / buildings themselves, rather than the assets they service as this more accurately reflects the cost of replacing such assets.
178. Arc's proposed communication asset costings need to be updated to reflect this if this is not the case.
179. Without additional detail on the build scope for each communications asset in Table 4-30, CBH is unable to assess whether the direct unit rates proposed by Arc are reasonable.
180. CBH submits that Arc should provide high level scope details for the communications assets included in Table 4-30 so that they can be appropriately assessed.
181. Furthermore, the ERA should validate all the proposed communications asset costs to ensure there they reflect appropriate quantities / specifications and the lowest cost to replace existing infrastructure.

⁴⁸ This rate is based on an estimate for fibre optic cable installation costs in the Pilbara.

⁴⁹ Rates extracted from Page 207, Appendix A-3 Direct Costs of Arc's DORC Report.

Radio Masts (Section 4.8.5)

182. Arc have costed the replacement of the 114 existing radio masts and allocated the costs according to the proportion of the network that they cover.
183. CBH have not been able to benchmark the quantities or costs provided by Arc in this section.
184. The ERA should validate all the proposed radio mast asset costs to ensure there they reflect appropriate quantities / specifications and the lowest cost to replace existing infrastructure.

Recommendation 8: Signalling and communications / control systems replacement cost

- (a) Arc should remove all proposed asset specific mark-ups from signalling and communications / control systems assets, including specialist contractor preliminaries (35%) and specialist contractor overheads and profits (20%).
- (b) Arc should adopt a RBTC system (Alternative B) as the MEA for the purpose of calculating replacement costs.
- (c) Should the ERA not accept this position:
- (i) The 364km section of fibre optic cable between Hampton and Esperance should be removed from Arc's DORC valuation as this section of track is not part of the CTC network.
 - (ii) Arc should adopt a direct fibre optic supply and installation cost of \$99 per metre in place of Arc's \$504 per metre.
 - (iii) Arc should provide an explanation as to how pedestrian crossing costs represented in Section 4.8.2 are different to those in Section 4.10.1 to ensure there is no double counting.
 - (iv) The ERA should validate all the proposed signalling and control system asset quantities and costs to ensure there is no double counting, and that they reflect the lowest cost to replace existing infrastructure.
 - (v) Arc should clearly articulate what signalling assets are included in control centre signal asset replacement costs so that they can be reviewed and validated.
 - (vi) The ERA should validate all the proposed control centre signal asset costs to ensure there they reflect appropriate quantities / specifications and the lowest cost to replace existing infrastructure.
 - (vii) Proposed control centre signal costs and communications asset costs should be adjusted to ensure location factors are only applied at the location of the proposed build, not the Network Group they are apportioned to.
 - (viii) Arc should provide high level scope details for the communications assets included in Table 4-30.
 - (ix) The ERA should validate all the proposed communications asset costs to ensure there they reflect appropriate quantities / specifications and the lowest cost to replace existing infrastructure.
 - (x) The ERA should validate all the proposed radio mast asset costs to ensure there they reflect appropriate quantities / specifications and the lowest cost to replace existing infrastructure.

Buildings (Section 4.9)

185. This section sets out how the replacement costs associated with buildings have been built up.
186. The per unit cost for depots appears to be incorrectly represented in millions in Table 4-37.
187. There were no buildings included in the ERA 2009 or 2014 Determinations. There is no commentary in these reports or in Arc's DORC Report as to why buildings were historically excluded but are now included.

188. CBH submits the ERA should validate all building costs to ensure they are appropriate.

Associated Track Structures (Section 4.10)

Pedestrian Crossings (Section 4.10.1)

189. CBH has no specific commentary on this section.

Miscellaneous (Section 4.11)

Plant, Tools and Equipment (Section 4.11.1)

190. Plant, tools and equipment were not included in the ERA 2009 or 2014 Determinations. There is no commentary in these reports or in Arc's DORC Report as to why these were historically excluded but are now included.

191. Arc has proposed quantities and total replacement cost for each 'asset type', without providing corresponding unit rates. In the absence of this, CBH have estimated indicative unit rates by dividing the aggregate cost provided by the quantity specified. Indicative unit rates for plant, tools and equipment are provided in Table 5 below.

192. CBH submits the ERA should validate all plant, tools and equipment costs and quantities to ensure they are appropriate.

Table 5: Indicative unit rates for plant, tools and equipment

Asset Type	Quantity	Unit rate (\$'000)
Light vehicles	153	50
Heavy vehicles	75	155
Trailers	47	53
RRV	107	162
Forklifts	14	21
Ballast wagons	33	161
Power Tools	321	5
Tampers	40	15
Trolleys	11	5
Support equipment	120	39
Hand tools	7	1
Generators	1	150
Asset monitoring vehicle	1	10,000

Signage (Section 4.11.2)

193. CBH has no specific commentary on this section.

Walkways (Section 4.11.3)

194. In this section, Arc proposed replacement of walkways along the entire length of cuttings and embankments. No other information was provided in relation to the specification or quantity of walkways that fed into the replacement cost presented in Table 4-45 of Arc's DORC Report.
195. The ERA requested Arc provide further supporting detail around quantities, unit costs and specifications by Code route section on 2 July 2025.
196. Arc's response to this, which was published on 11 July 2025, is inadequate as while it provided total walkway area it did not provide any specification information.
197. Page 51 of the ERA 2014 Determination states "The walkways are provided in addition to a standard width formation in the same material as the capping and would be constructed at the same time but may not be adjacent to the actual formation. For a 600mm walkway the volume of material required per km of track is 138m³".
198. The ERA should validate the specifications underpinning Arc's walkway quantities and costs and adopt the specifications approved in the 2014 Determination if Arc's specifications are not reasonable.

Fencing (Section 4.11.4)

199. CBH has no specific commentary on this section.

Recommendation 9: Miscellaneous replacement cost

- (a) The ERA should validate building and plant, tools and equipment costs and quantities to ensure they are appropriate.
- (b) The ERA should validate the specifications underpinning Arc's walkway quantities and costs and adopt the specifications approved in the ERA 2014 Determination if Arc's specifications are not reasonable.

Section 5 of Arc's DORC Report: Optimisation

Optimised Replacement Cost Approach (Section 5.1)

Definition of Optimisation (Section 5.1.1)

200. CBH has no specific commentary on this section.

Reasonable Future Levels of Service (Section 5.1.2)

201. Arc's DORC Report states the demand forecast is included in the level of service statement in Appendix A-2, which indicates no anticipated change to the level of service requirements over the forecast period.
202. While CBH does not necessarily take issue with the outcome of Arc's demand analysis for operational lines that CBH utilises, CBH has observed several issues with Arc's approach to defining demand.
203. CBH asserts the level of service statement in Appendix A-2 does not reflect a 10-year demand forecast, it instead reflects Arc's view of network service levels.
204. Arc have also provided a Level of Service Demand Forecast Statement, which is not specifically referred to in the optimisation section of Arc's DORC Report. This statement refers to existing demand, historical demand (over a 10-year period), and forecast demand (over a 10-year period) and is represented in terms of number of agreements, instead of tonnages or gross tonne kilometres (**GTKs**), as was the case in the ARTC DORC Report.⁵⁰

⁵⁰ See page 61, [ARTC DORC Report](#).

205. CBH contends this format makes it difficult to assess the appropriateness of required service levels, as agreement tonnages that may impact service levels can range drastically from hundreds of thousands of tonnes to millions of tonnes.
206. CBH submits Arc's Level of Service Demand Statement should be represented in terms of tonnages or GTK's as the current format does not provide sufficient information to validate required service levels. Arc already publish similar information ('Gross Tonne Kilometres of Freight') for each route section on their website in accordance with Section 7A(1)(a) of the Code.
207. With respect to the forecasting method, Arc's Level of Service Demand Forecast Statement states:
- a) Where an Agreement existed granting access during the prior ten years, the maximum Level of Service required by those Agreements on those route sections is taken as the reasonably forecast Level of Service demanded for the next ten years, on the basis that this demand is expected to continue; otherwise
 - b) Where there has been no Agreement granting Access during the prior ten years (in particular, on non-operational lines), the reasonably forecast Level of Service demanded for the next ten years is taken to be equivalent to the Level of Service when the section was last operational, on the basis that future tasks will require at least that Level of Service because it is typically modest relative to modern railway infrastructure.
208. CBH asserts this approach is inappropriate for the following reasons:
- a) It is not reasonable to assume that demand observed over the past ten years will necessarily continue, especially where operations that drove the need for rail transport have ceased. For example, recent significant reductions in rail tonnages associated with Mineral Resources and Alcoa's operations should be factored into demand forecasts and optimisation.
 - b) In circumstances where there has been no demand for over ten years, it is not reasonable to assume demand for services will exist in the future unless there is clear evidence to support such a position. If there is no foreseeable demand on non-operational lines, no level of service is required, and this should be reflected.
209. CBH submits that the forecasts represented in Arc's Level of Service Demand Forecast Statement should reflect existing contracts and potential future contracts only where there is evidence to suggest they are reasonably *likely* to exist in the future.
210. Furthermore, the Level of Service Demand Forecast Statement should be specifically referenced in Arc's DORC Report, so its relevance to particular sections of the report is clear.

Optimised Asset Configuration (Section 5.1.3)

211. This section of Arc's DORC Report states 'railway infrastructure that is either disposed of or stranded is not included in the definition of optimisation'.
212. CBH contends Arc's reference to disposed of and stranded assets in this section is peculiar and inconsistent with the proposed approach in relation to the removal of redundant sidings. If infrastructure is to be optimised to meet the service level required to meet actual and reasonably projected demand and there is no demand and therefore no service level required, then optimisation would result in the removal of such assets if they were costed in the replacement cost step of the DORC valuation. Such assets could conceivably be disposed or stranded assets.
213. Furthermore, the Costing Principles are intended to outline the principles, rules and practices that are to be followed in establishing the DORC (and other regulatory instruments). They are not intended to be highly prescriptive guidelines. Disposed of and stranded assets are expressly mentioned in the Costing Principles in the context of annual RAB updates, they are not however expressly mentioned in the context of optimisation. This should not mean they are therefore not considered in the context of optimisation.
214. This view is consistent with GHD's definition of redundant assets included in the optimisation section of the ARTC DORC Report. This states "redundant assets are existing assets that are no longer used

to provide the reference service. These assets may still be in the asset register, though they no longer contribute to the immediate or planned service and are therefore excluded from the asset valuation”.⁵¹

215. CBH contends any assets that are no longer used to provide a service now or in the near future should be excluded from the asset valuation.
216. Furthermore, any references to railway infrastructure that is either disposed of or stranded not being included in the definition of optimisation should be removed.
217. In relation to the comparison between the level of service required and MEA capability, Arc’s DORC Report states that there is ‘no opportunity to reduce the replacement cost to resolve any inconsistencies between the level of service provided by the MEA and the existing assets’.
218. CBH contends there are significant differences between the level of service provided by the MEA specification and existing assets. For example, in the “Central” zone, the MEA is approximately 70% 50kg or 60kg rail despite all rail on these 16 and 19 TAL lines currently being between 30kg and 41kg. Instances such as this warrant some adjustment – whether it be to MEA specifications and associated costs, or optimisation.
219. Arc’s DORC Report also states “GHD has identified instances of technical obsolescence that enable a lower cost alternative to the MEA replacement asset. This includes signalling where an alternative signalling system using lower cost technology has been considered”.
220. This statement is again peculiar, as in accordance with the Code, the DORC must reflect “the lowest current cost to replace the railway infrastructure with assets that have the capacity to provide the level of service that meets the actual and reasonably projected demand and are modern equivalent assets”. If there are instances where existing infrastructure is technically obsolete and a lower cost MEA exists, this should be adopted from the outset. The current approach essentially demonstrates a ‘cost saving’ based on an estimate that is not reflective of the lowest cost MEA, which is not appropriate.
221. In relation to the removal of redundant assets, Arc’s DORC Report articulates seven redundant route sections, that are “not currently in use and GHD has seen no evidence to suggest any realistic prospect that they may re-enter service in a reasonable time frame”.
222. CBH is supportive of this concept and submits that ‘non-operational’ (redundant) route sections that are not required to meet current or reasonably projected demand listed in Figure 5-9 of Arc’s DORC Report should also be removed on the same basis.
223. GHD identified opportunities to optimise loops by either reducing their length or removing them entirely.
224. CBH is comfortable with the approach articulated by GHD and the resulting reduction in track kilometres, however, submits that the costs associated with their removal should be clearly outlined so that they can be reviewed and validated.

⁵¹ See page 21, [ARTC DORC Report](#).

Recommendation 10: Optimised replacement cost approach

- (a) Arc's Level of Service Demand Statement should be amended to reflect tonnages or GTK's.
- (b) Forecasts represented in Arc's Level of Service Demand Forecast Statement should be amended to reflect existing contracts and potential future contracts only where there is evidence to suggest they are reasonably likely to exist in the future.
- (c) Arc should reference the Level of Service Demand Forecast Statement in its DORC Report, so the statement's relevance to particular sections of the Report is clear.
- (d) Arc should remove references to excluding disposed of and stranded assets at the optimisation stage including in Section 2 and Section 5 of Arc's DORC Report.
- (e) Arc should include the following definition of redundant assets after the first three dot points in section 5.1.3: 'redundant assets are existing assets that are no longer used to provide an immediate or planned service and are therefore excluded from the asset valuation.'
- (f) Arc should remove all 'non-operational' (redundant) route sections listed in Figure 5-9 of Arc's DORC Report during the optimisation phase of the valuation.
- (g) Arc should clearly outline the reduction in costs associated with the optimisation of sidings so that they can be appropriately reviewed.

Right of Way (Section 5.2)

225. This section articulates the principles that have been applied to the optimisation of right of way assets and the results of the optimisation process that was undertaken.
226. It is however not clear, which principles *actually apply* in the case of right of way infrastructure and the methodology that has been used to then make adjustments.
227. CBH submits further information is required in relation to specific principles, methodology and assumptions used in the optimisation of right of way infrastructure to assess the validity of both the approach and the resulting optimised construction replacement cost (**OCRC**).

Recommendation 11: Right of way optimisation

- (a) Arc to provide specific principles, methodology and assumptions used in the optimisation of right of way infrastructure at a Code route segment level so that they can be reviewed and validated.

Civil Structures (Section 5.3)

228. This section articulates that no scope for optimisation exists in relation to civil structures.
229. CBH questions whether civil structures should also be subject to optimisation, particularly in light of the \$2.7 billion in adjustments made to track assets in the subsequent subsection. If, for example, track assets were optimised on the basis that the MEA specification exceeds existing requirements, the associated civil infrastructure may likewise require optimisation.

Recommendation 12: Civil structures optimisation

- (a) ERA to ensure civil structures have been optimised based on significant track optimisation assumptions.

Track (Section 5.4)

230. This section articulates the principles that have been applied to the optimisation of track assets and the results of the optimisation process that was undertaken.
231. It is however not clear, which principles *actually apply* in the case of track infrastructure and the methodology that has been used to then make adjustments.

232. CBH submits further information is required in relation to specific principles, methodology and assumptions used in the optimisation of track infrastructure to assess the validity of both the approach and the resulting OCRC.

Recommendation 13: Track optimisation

- (a) Arc to provide specific principles, methodology and assumptions used in the optimisation of track infrastructure at a Code route segment level so that they can be reviewed and validated.

Signalling and Communications / Control Systems (Section 5.5)

233. In this section, Arc outlined two signalling and communications system alternatives, one being a direct replacement of signalling and communications capability (Alternative A) and the other being a radio-based train control (RBTC) system where CTC is currently employed (Alternative B).

234. It is noted that a RBTC system was the MEA costed in the ARTC DORC Report.

Alternative A: Conventional Signalling and Communications System Using MEA Equipment (Section 5.5.1)

235. Arc proposed that under Alternative A, optimisation is limited to the removal of lines not currently in use.

236. CBH is supportive of this approach. It is however inconsistent with how other assets on lines not currently in use have been treated.

Alternative B: Radio Communications Based Train Control (Section 5.5.2)

237. Arc have proposed three categories for applying signalling and communications / control systems infrastructure under Alternative B. This includes:

- a) Metropolitan areas, where lineside signalling will be replaced with like for like infrastructure.
- b) Non-metropolitan areas that currently operate under CTC, which will be replaced with a RBTC system without lineside signals and infrastructure.
- c) Areas that are currently operating under TOW, also referred to as 'Dark Territory', which will be replaced with like for like infrastructure.

This is supported by a signalling strategy diagram (Figure 5-2).

238. CBH contends that the signalling strategy diagram does not align with the categories outlined above. For example, Arc have proposed that the following lines currently operating under a lower cost TOW system (as illustrated in Figure 4-4 of Arc's DORC Report), should be replaced with higher cost RBTC, even though the level of service requirements are not expected to change:

- a) Avon to Albany
- b) Hampton to Esperance
- c) Laverton to Kalgoorlie
- d) Millendon Junction to Narngulu
- e) Mullewa to Tilley

239. CBH submits that these lines should be costed as TOW.

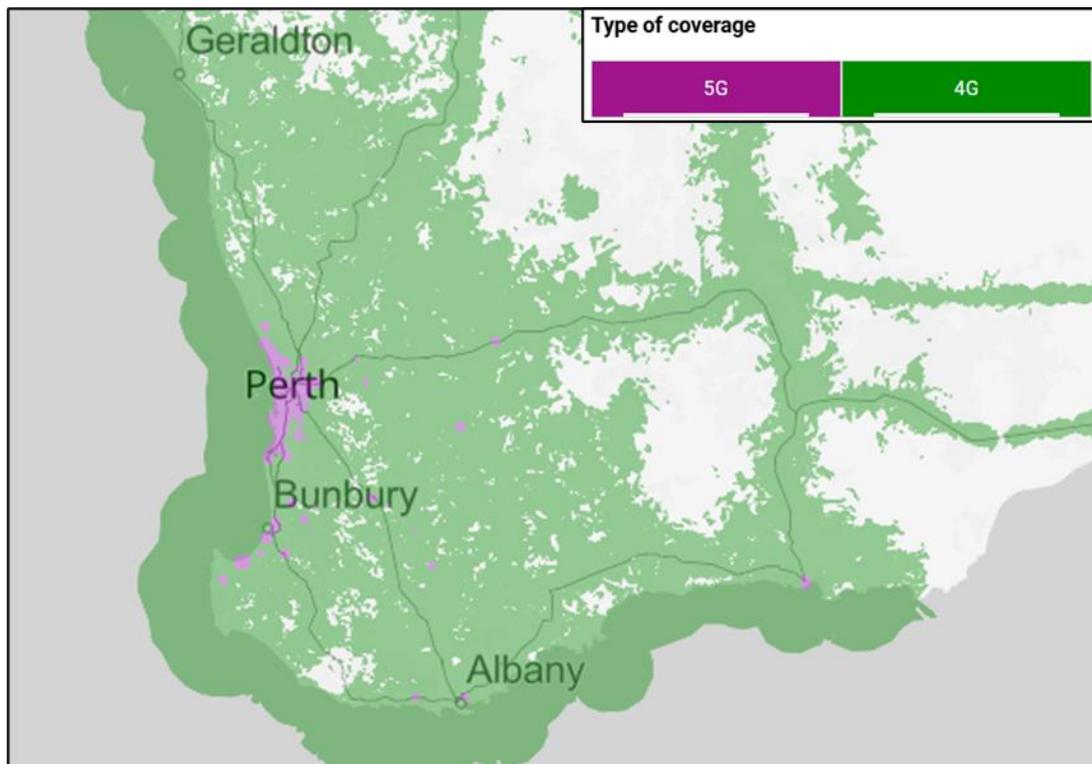
240. Arc have proposed the use of RBCS as it meets or exceeds the level of service requirements at a lower cost, in large part due to minimal requirements for lineside infrastructure. Arc has however proposed installation of a fibre optic cable for the entire track between Avon and Esperance.

241. CBH is unclear whether this is consistent with the requirements of a RBTC system, or the categorisation proposed by Arc outlined in paragraph 237.

Signalling and Communications Optimised Replacement Cost (Section 5.5.3)

242. In this section, Arc has proposed unit quantities and costs for both Alternative A and Alternative B. CBH contends that Arc's fibre optic cable quantities for Alternative B far exceed what is required.
243. CBH's Tier 1 construction contractor has advised that, under an RBTC system with centralised interlocking, the only fibre optic cable required—following the initial connection of the operations centres to the radio network—would be between the radio base centres and the location cases. Installing fibre optic cable along the entire length of the rail network would exceed what is necessary. As such, cable quantities would reasonably be expected to be significantly lower than those quoted in Table 5-7.
244. Similarly, the costings for radio towers fail to account for existing infrastructure. There is precedent in the Australian rail industry for utilising existing Telstra towers to support railway radio infrastructure, removing the need to construct dedicated rail radio towers. As illustrated in Figure 9, there is a minimum of 4G coverage across the entire CTC-controlled network (which would be costed as an RBTC MEA), except for a small section of approximately 10 km near Northern Gulley, east of Geraldton.
245. As 4G has a shorter transmission radius than the 15km proposed by Arc (inferred from Table 5-7), most of the network's radio tower requirements could be met by leveraging existing third-party structures. Therefore, no radio towers should be included in the DORC; only the telecommunications equipment installed on existing Telstra towers to enable RBTC should be accounted for.

Figure 9: Telstra 5G and 4G coverage map⁵²

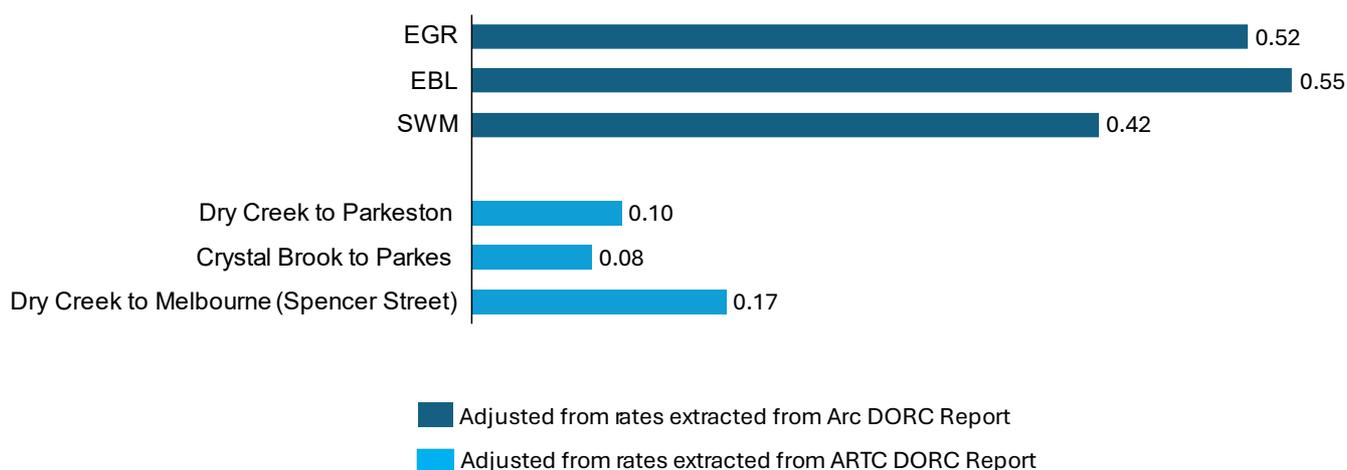


246. CBH has not been able to benchmark all unit rates included in Section 5.5.3, however is concerned that for items where benchmarking was possible, Arc's proposed rates seem unreasonably high.

⁵² Extracted from [Telstra Network Coverage Map](#).

247. For example, in the ERA 2014 Determination Brookfield Rail proposed a combined TOW cost of \$14,000/km which equates to \$18,500/km in 2024 terms⁵³, whereas proposed TOW signalling and communications costs provided in Arc’s DORC Report for the Central zone under the Alternative B, sum to \$23,400/km⁵⁴, (excluding contractor’s indirect costs and location factors). This comparison demonstrates that Arc’s direct TOW costs are up to 27% higher than escalated 2014 rates accepted by the ERA.
248. Arc has also proposed a direct cost of \$504 per metre for the supply, testing, commissioning, and installation of fibre optic cable. As noted in section 4.8, this is significantly higher than the cost provided by CBH’s Tier 1 construction contractor, who provided an equivalent rate of \$99 per metre.⁵⁵
249. CBH is concerned that similar cost increases may be reflected across other areas.
250. This is further supported by a comparison of signalling and communications costs from Arc’s DORC Report and the ARTC DORC Report (which included a comparable ETCS 2 compliant communications-based train control system) as shown in Figure 10. To enable a like-for-like comparison, CBH removed all location factors and specialist/principal contractor indirect costs from both sets of rates and escalated the ARTC figures for comparable line sections.⁵⁶ A comparison of unit rates for longer sections through regional areas—featuring similar terrain to some of Arc’s proposed non-metropolitan routes—illustrates a significant discrepancy in per kilometre costs.

Figure 10: Comparison of signalling and communications rates (\$m/km)



251. CBH submits that Arc should adopt a fibre optic supply, testing, commissioning and installation rate of \$99 per metre.
252. Furthermore, the ERA should validate all other proposed signalling and communications quantities and rates as they appear high compared to other benchmarks.

⁵³ See paragraph 286 of [ERA 2014 Determination](#). Cost for TOW signalling and communications were escalated using the Western Australian Road and Bridge Construction index from September 2013 to December 2024 at a factor of 1.32.

⁵⁴ Central group replacement cost is extracted from Table 5-13 of Arc’s DORC Report, with adjustments made to remove contractor indirect margins and discounted for location adjustment factor of 1.2, before dividing by network group total track length, and rounded to the nearest ten.

⁵⁵ This rate is based on an estimate for fibre optic cable installation costs in the Pilbara.

⁵⁶ 2021 figures were escalated using the Australian Road and Bridge Construction index from July 2019 to December 2024 at a factor of 1.24.

Recommendation 14: Signalling and communications/ control systems optimisation

- (a) The replacement cost for Alternative B should be updated to reflect all segments currently operating under TOW being accurately costed as TOW, not RBTC.
- (b) Alternative B costs should be updated:
 - (i) To appropriately reflect the only fibre optic cable required—following the initial connection of the operations centres to the radio network—would be between the radio base centres and the location cases.
 - (ii) So that radio towers are removed and only the telecommunications equipment installed to enable RBTC on existing third party towers is accounted for.
 - (iii) To reflect a fibre optic supply, testing, commissioning and installation rate of \$99 per metre, in place of Arc’s proposed \$504 per metre.
- (c) The ERA should review and validate all other proposed signalling and communications quantities and rates as they appear high compared to historical benchmarks.

Buildings (Section 5.6)

253. CBH is comfortable with the approach to optimising buildings and the resulting optimisation adjustments.

Associated Track Structures (Section 5.7)

254. This section articulates the principles that have been applied to the optimisation of associated track structures and the results of the optimisation process that was undertaken.

255. It is however not clear, which principles *actually apply* in the case of associated track structures and the methodology that has been used to then make adjustments.

256. CBH submits further information is required in relation to specific principles, methodology and assumptions used in the optimisation of associated track structures to assess the validity of both the approach and the resulting OCRC.

Recommendation 15: Associated track structures optimisation

- (a) Arc to provide specific principles, methodology and assumptions used in the optimisation of associated track infrastructure at a Code route segment level so that they can be reviewed and validated.

Miscellaneous (Section 5.8)

257. This section articulates that no scope for optimisation exists in relation to miscellaneous assets, including plant, tools and equipment, walkways and fencing.

258. CBH questions whether miscellaneous assets, such as walkways may be optimised based on the \$2.7 billion of adjustments made to track assets.

Recommendation 16: Miscellaneous assets optimisation

- (a) ERA to consider whether miscellaneous structures can be optimised based on significant track optimisation assumptions.

Summary Optimised Construction Replacement Cost (Section 5.9)

259. Section 5.9 of Arc’s DORC Report includes tables summarising the effect of optimisation on the construction replacement cost and the resulting OCRC.

260. CBH submits that the information presented in these summary tables is required on a Code route segment basis.

Railway Owner Project Costs (Section 5.10)

Project procurement models (Section 5.10.1)

261. Section 5.10.1 of Arc's DORC Report assesses two different models for procuring infrastructure assets required for the project, which include a conventional procurement scenario and an alternative lower cost procurement model.
262. The majority of proposed alternative procurement savings come from the direct supply of ballast, sleepers, rail and turnouts. The savings were calculated by replacing the contractor risk allowance, preliminaries and overheads factors and with a 5% direct supply management allowance.
263. Additional procurement savings are also apparent for other asset categories, but these were not from direct supply. No information was provided as to how these values were calculated.
264. CBH contends this section is misleading in the way it demonstrates 'cost savings' from selecting the lowest cost approach, which is already required by the Code. This does not reflect real 'cost savings', rather, it illustrates the excessive nature of the contractor markups for a project of this size and configuration.
265. Furthermore, the figures presented in Tables 5-19, 5-20 and 5-22 of Arc's DORC Report do not appear to reconcile with Tables 5-17 or 5-18.
266. Nonetheless, CBH submits there may be further opportunities to reduce costs based on applying the same 'alternative lower-cost procurement scenario' to the procurement of other asset categories such as civil structures and signalling and control systems.

Project design and development costs (Section 5.10.2) and corporate and other costs (Section 5.10.3)

267. In this section, Arc articulates the costs a railway owner would incur with respect to project design, planning and development consent and project, construction management and corporate and other costs. These are set out in the table below.

Table 6: Railway owner project cost sources

Category	Value	Source
Design costs	4% of ORC	"Based on GHD's experience in design studies for rail sector infrastructure, it was considered that the costs for such a task would be in the order of 4-6% of the capital costs for the assets."
Planning and development consent costs	\$237.7 million fixed cost	A bottom-up estimate has been developed.
Project and contract management and supervision	5% of ORC for contractor management costs and 7% of ORC for supervision	With respect to contract management, "GHD would expect a provision of about 5% of the Optimised Construction Replacement Cost". No source provided for contract supervision
Overheads and corporate costs	3% of ORC	No source provided

268. CBH notes potential errors in Table 5-22 as some of the figures presented do not reconcile with the above percentages.
269. CBH utilised total costs for Alternative A to illustrate the impact of railway owner project costs in the following paragraphs.
270. The additional railway owner project costs articulated in Table 5-22 of Arc's DORC Report account for \$3.8 billion or 22% of the OCC. It is unclear how this has been calculated as the figures used in

the build-up between OCC to ORC including design and development costs do not reconcile with the percentages documented in the above table. This holds true in Table 5-22 of the supporting information published on 11 July. For example, 4% multiplied by the OCC Alternative Procurement value for Alternative A (\$17,094 million) equates to \$683 million, whereas \$786 million is represented in both Arc's DORC Report and the supporting information. The calculation errors have an estimated combined effect of inflating Arc's DORC valuation by approximately \$364 million under Alternative A and \$333 million under Alternative B. Addendum 2 provides a further breakdown of these calculation errors.

271. With respect to design costs, CBH submits:

- a) In the case of the ARTC DORC Report, GHD stated that: "Based on our experience in design studies for rail sector infrastructure, we consider that the costs for such a task would be of the order of 2-3% of the capital costs for the assets."⁵⁷ It is unclear why GHD have now suggested these costs should be in the order of 4-6% of capital costs.
- b) Irrespective of this, CBH submits that these costs should be removed as it is not necessary to conduct "feasibility studies" to "support investment decisions" if the investment decision has already been made or to conduct "concept studies" when the project requirements and specifications are known, and business cases are not required.

272. Furthermore, CBH submits that the costs associated with project and development costs should be removed as planning and development approval can be assumed to have already been granted. This view is consistent with the ERA 2014 Determination which stated that: "The 'hypothetical' replacement of infrastructure which already exists is on the basis that all routes are fully designed and optimised. As the costs associated with all land corridors in place at the commencement of the Code are not included in the infrastructure capital cost, as detailed in clause 2(5) Schedule 4 to the Code, it is assumed that all necessary approvals are already in place."⁵⁸

273. In addition, it would be an artificial and incongruous outcome if hypothetical costs for planning and development approval were included as these costs were never borne by the original constructor of the assets and would never be incurred again.

274. With respect to contract management and supervision costs, CBH submits that these costs are inordinately high at a combined rate of 12%, which equates to over \$2 billion. CBH can see no direct equivalent in the ARTC DORC Report prepared by GHD.⁵⁹

275. CBH acknowledges that the costs associated with general project management form part of legitimate project costs, and notes that these costs would be captured in the 20% DCPM margin CBH has proposed should be adopted in Recommendation 4.

276. CBH submits that allowances for railway owner overheads and corporate costs are inappropriate as they have no obvious causal connection with the lowest cost replacement of the infrastructure.

277. CBH submits that the ERA should reject Arc's proposed approach to indirect costs and railway owner project costs.

278. Furthermore, Arc should adopt a 1-2% allowance for contractor indirect costs, and a 20% DCPM margin to collectively cover indirect costs and railway owner project costs.

Recommendation 16: Railway owner project costs

- | |
|--|
| (a) ERA should reject Arc's proposed approach to indirect costs and railway owner project costs and Arc should adopt the approach set out in the ERA 2014 Determination, which included a 1-2% |
|--|

⁵⁷ See page 35, [ARTC DORC Report](#).

⁵⁸ See paragraph 324, [ERA 2014 Determination](#).

⁵⁹ See page 35, [ARTC DORC Report](#).

allowance for contractor indirect costs, and a 20% DCPM margin (consistent with Recommendation 4 relating to contractor indirect costs).

Railway Owner Funding Costs (Section 5.11)

Funding costs in DORC valuations (Section 5.11.1)

279. While CBH acknowledges that funding costs are involved in infrastructure projects and that they can form part of DORC valuations, CBH has observed several issues with Arc's proposed project funding costs as they:

- a) make inconsistent assumptions about valuations in a brownfields context;
- b) ignore relevant precedent set by the ERA in earlier valuations;
- c) ignore relevant precedent from other valuations, including the ARTC DORC Report, which was also based on assumptions developed by GHD; and
- d) unduly lengthen the timeframe associated with pre-construction planning, design, approval, enabling and construction works, consequently increasing the size of the funding task.

These concerns are articulated in further detail in the following subsections.

280. Arc has cited the Glencore v PNO Determination to justify the inclusion of additional cuttings and embankments than those proposed in the replacement cost section of the report in its project development schedule. This justification is on the basis that the Glencore v PNO Determination "confirmed that a DORC framework would need to consider a construction program that allowed for the construction of assets not owned by the Railway Owner if they are necessary to enable construction of assets owned by the Railway Owner that are required for the service, and that the Railway Owner can be assumed to earn revenue from its assets at the end of the assumed construction period".

281. CBH contends the Glencore v PNO determination does not represent an applicable precedent in this instance as the circumstances surrounding the two valuations are different. The application of the Glencore precedent in its entirety, where the construction costs of assets not owned are excluded, is inconsistent with previous ERA valuations and would result in network owners being treated inconsistently.

282. CBH submits that, the cost and time associated with constructing railway infrastructure assets should be limited to what is approved for inclusion in the replacement cost and subsequent optimised replacement cost sections of Arc's DORC Report. For clarity, this means that funding costs should reflect any amendments to gold plated specifications that may have increased construction timeframes or unreasonable assumptions that may have resulted in higher replacement costs.

283. This is consistent with the approach adopted in the ERA 2014 Determination.

Project Development schedule (Section 5.11.2)

284. Arc has proposed including the timeframe associated with building 5,560km of cuttings and embankments in the project development schedule, as shown in Table 5-23 of the DORC Report. CBH submits that including these costs is inconsistent with the Code based on the following rationale:

- a) The Code requires the railway owner to submit a statement setting out the DORC for each route section as per section 47J(1).
- b) The Code defines the DORC in relation to railway infrastructure.
- c) As per Clause 2, Schedule 4 of the Code, the definition of railway infrastructure excludes cuttings and embankments made prior to the commencement of the Code.

- d) It is incongruent to include funding costs associated with the construction of cuttings and embankments as the DORC is defined in relation to railway infrastructure which expressly excludes cutting and embankments.
285. This view is consistent with the ERA 2014 Determination, in which neither the time nor the costs associated with cuttings and embankments prior to 2000 were included in the calculation of funding costs.
286. Arc has also proposed the inclusion of funding costs associated with the construction of access roads.
287. CBH submits that this is inappropriate, as under a brownfields construction scenario, access roads can reasonably be assumed to be already in place. This is consistent with Recommendation 5.
288. The time associated with pre-construction planning, design and approvals should also be removed as planning and development approval can be assumed to have already been granted.
289. This view is consistent with the ERA 2014 Determination which stated that: “The ‘hypothetical’ replacement of infrastructure which already exists is on the basis that all routes are fully designed and optimised. As the costs associated with all land corridors in place at the commencement of the Code are not included in the infrastructure capital cost, as detailed in clause 2(5) Schedule 4 to the Code, it is assumed that all necessary approvals are already in place.”⁶⁰
290. With respect to construction activities, Arc have proposed that the construction schedule should be based on works being conducted across ten lines concurrently due to labour availability constraints.
291. In the 2014 Determination, the ERA based its costings on concurrent construction across 18 routes, which contain the routes CBH requested access to, to represent a practical compromise between fully concurrent and fully sequential build schedules for the purpose of the hypothetical valuation.
292. CBH submits that this precedent should be applied here, and the build schedule should similarly assume concurrent works across an equivalent distance to the 18 routes assumed historically.
293. Should the ERA choose to depart from the precedent set in 2014, CBH submits that Arc’s proposed project development schedule requires careful scrutiny to ensure it does not unduly inflate funding costs.
294. For example, Arc’s proposed ~13-year construction timeframe includes an allowance for commissioning, which was not considered in the ERA 2014 Determination.
295. On this basis, CBH submits the cost and time associated with asset commissioning should be removed.
296. Furthermore, Arc has proposed a single formation construction rate of 528 km per year, despite outlining two distinct formation specifications in section 4.5.4 of its submission.
297. CBH submits full formation construction and proof rolling would reasonably be expected to progress at different rates. As such, construction timeframes—and the associated funding costs—should be adjusted to reflect the different construction methodologies.

Calculation and summary of funding costs (Section 5.11.3 and Section 5.11.4)

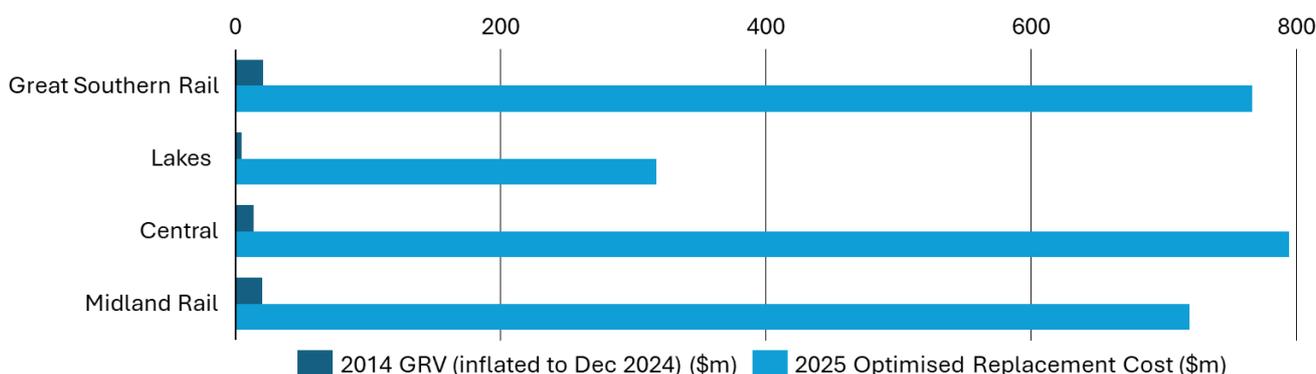
298. Arc has proposed applying the real pre-tax weighted average cost of capital (**WACC**) of 7.46% as determined by the ERA in the calculation of funding costs in section 5.11.3 of Arc’s DORC Report.
299. CBH submits that use of a pre or post tax WACC will depend on how ceiling costs are calculated. If under the DORC methodology the building block model produces a tax allowance, the real post-tax

⁶⁰ See paragraph 324, [ERA 2014 Determination](#).

WACC of 6.22% should be used. Using a pre-tax WACC (which includes a tax burden uplift) in a building block model where an explicit tax allowance is already calculated as part of allowable revenue, would overcompensate Arc by double-counting tax compensation.

- 300. Consequently, the ERA should consider whether use of real pre or post tax WACC is appropriate for use in the calculation of funding costs.
- 301. In comparison to other valuations, at approximately 30% of the ORC, Arc’s proposed funding cost as a proportion of replacement costs dwarf funding costs included in the following precedents:
 - a) ERA 2014 Determination, where funding costs were approximately 1.6% of total construction cost.
 - b) ARTC DORC Report, where funding costs were 15% of total construction cost.
 - c) Glencore v PNO Determination, where funding costs were 21% of total construction cost, when the time associated with constructing assets not owned by the asset owner was included.
- 302. Figure 11 below illustrates the variance between funding costs for selected lines from the ERA 2014 Determination and Arc’s DORC Report.

Figure 11: Comparison of funding costs (\$m)



- 303. In summary, the funding costs included in Arc’s DORC Report are significantly higher than those seen in any other comparable DORC valuations and are inconsistent with past regulatory precedent in WA.
- 304. CBH submits that Arc should adopt the approach and assumptions set out in the ERA 2014 determination.

Recommendation 18: Railway owner funding costs

- (a) The cost and time associated with constructing railway infrastructure should be limited to what is approved for inclusion in the replacement cost and subsequent optimised replacement cost sections of Arc’s DORC Report.
- (b) The time and costs associated with the construction of access roads and pre-construction planning, design and approvals should be removed.
- (c) ERA should reject Arc’s proposed project development schedule and direct Arc to adopt the same approach that was set out in its 2014 Determination.
- (d) Should the ERA choose to depart from the precedent set in 2014, Arc’s proposed project development schedule requires careful scrutiny to ensure it does not unduly inflate funding costs.
- (e) The ERA should consider whether use of a real pre or post tax WACC is appropriate for use in the calculation of funding costs depending on the proposed approach to calculating ceiling costs.

Section 6 of Arc's DORC Report: Depreciated Optimised Replacement Cost

Approach to Depreciation (Section 6.1)

305. In this section, the MEA replacement cost is reduced in proportion to the remaining Economic Life of the existing assets. Arc explains that this reflects a key principle of the DORC valuation methodology: acknowledging that a portion of the capital invested in existing assets has already been recovered, and those assets generally have a reduced remaining service potential compared to new assets. Arc further states that, unlike financial depreciation, the DORC approach also considers any life-extending investments and allows for recovery of the associated capital costs.
306. CBH recognises that in many cases it is appropriate to calculate accumulated depreciation based on estimates of remaining physical life. However, as Arc themselves suggest, depreciation must also reflect the fact that assets are not new and that a portion of the original capital investment has already been recovered. This latter point is of particular significance where assets are long-lived and have already been in the ground for many years.
307. CBH contends, it is not reasonable to claim that long lived or perpetual assets should not be attributed any accumulated depreciation. While they may continue to function physically, it is entirely implausible that i) none of the capital that was originally invested in these assets has been recovered, and ii) it is now appropriate to commence recovery of that capital via a depreciating RAB.
308. Previous DORC valuations have reflected on some of the challenges associated with accumulated depreciation of long-lived assets and relying solely on physical measures. For example, DORC valuations completed for ARTC in 2001 and 2007 noted that earthworks are assumed to be a perpetual asset but are depreciated relative to a nominal life of 50 years, with earthworks over 50 years old depreciated to 50% of their replacement value.⁶¹ Another 2013 DORC valuation of a segment of the ARTC network depreciated similar assets to 50% of the remaining lease life.⁶²
309. CBH submits that, the purpose of asset valuations in an economic context is to provide guiderails for pricing that promotes efficient investment in new assets and the efficient use of existing assets. In this context, no reasonable investor would expect to recover returns on assets more than 100 years after the original investment.

Assessment of physical condition of the asset (Section 6.1.1)

310. Arc has proposed a hierarchy of principles to be used in calculating accumulated depreciation in Table 6-1.
311. CBH submits that the wording in Table 6-1 should be changed from "Remaining life based on condition assessments derived from condition data" to "Remaining life based on condition assessments derived from condition data, unless commissioning dates indicate the asset is providing service beyond its design life, in which case a 10% remaining life will be applied." The 10% remaining life assumption is consistent with what Arc proposed on page 123 of their DORC report.
312. Furthermore, the following text should be changed from "For most assets not in service, 0% of Useful Life has been applied on the basis that these assets are not currently able to deliver a services because of their condition." to "For *all* assets not in service, 0% of Useful Life has been applied on the basis that these assets are not currently able to deliver a services because of their condition" as *all* assets not in service should be fully depreciated if they were not already removed during the optimisation step of developing the DORC.
313. Arc's depreciation assessment should be subsequently updated to reflect these changes.

⁶¹ Booz Allen & Hamilton's [ARTC Standard Gauge Rail Network DORC](#).

⁶² Evans and Peck, [Depreciated Optimised Replacement Cost Calculation for Additional Segments of the ARTC network](#).

Rate of asset consumption (Section 6.1.2)

314. Arc states that no foreseeable changes to asset demand are expected and as such, the forecast depreciation of assets and their associated value is expected to be linear.
315. CBH is comfortable with the adoption of a linear depreciation model.
316. With respect to perpetual assets, Arc states that some asset types do not deteriorate over time (provided correct routine maintenance is carried out) and as such, should not be depreciated, resulting in the full value of the MEA being retained in the RAB in perpetuity.
317. CBH contends this approach is inconsistent with the ERA-approved Costing Principles, as all perpetual Standard Design Lives in Arc's Proposed Costing Principles were rejected by the ERA.⁶³
318. Furthermore, this approach is inappropriate as it seeks to exploit the "best of both worlds", allowing Arc to simultaneously:
- Capture a return *on* capital that effectively reflects 'new assets' because they are undepreciated on grounds of physical wear, ignoring any acknowledgement that a proportion of invested capital will have been recovered already.
 - Capture a return *of* capital from the valuation date by depreciating, in some instances 100-year-old 'new assets', over a forecast period based on nominal lives.
319. Further supporting this, in the case of *TPI v ERA*, the Western Australian Supreme Court found that it would be inappropriate for the economic life of an asset to exceed its technical design life.⁶⁴
320. This ruling is highly relevant to large portions of the freight rail network managed by Arc as there are various examples of assets on grain lines that are 100+ years old and well beyond their technical design (evidenced by date stamps and other records). Depreciation of such assets needs to reflect the fact that a significant proportion, if not all the capital costs, associated with these assets has been recovered over their 100+ years in service to avoid over recovery at the expense of users.
321. CBH submits that Arc's general approach to depreciation should:
- Ensure accumulated depreciation appropriately reflects the fact that, for long-lived assets, a proportion of invested capital will have been recovered already.
 - Ensure forecast depreciation is consistent with the Standard Design lives articulated in the ERA-approved Costing Principles.
 - Ensure that economic lives do not exceed the standard design lives listed in Appendix 2 in the approved Costing Principles.

Recommendation 19: Depreciation approach

- (a) The wording in Table 6-1 should be changed:
- From "Remaining life based on condition assessments derived from condition data"
 - To "Remaining life based on condition assessments derived from condition data, unless commissioning dates indicate the asset is providing service beyond its design life, in which case a 10% remaining life will be applied".
- (b) The wording in Table 6-1 should be changed:
- From "For most assets not in service, 0% of Useful Life has been applied on the basis that these assets are not currently able to deliver a services because of their condition."
 - To "For all assets not in service, 0% of Useful Life has been applied on the basis that these assets are not currently able to deliver a services because of their condition."

⁶³ See paragraph 397, [Arc's Approved Costing Principles](#).

⁶⁴ THE PILBARA INFRASTRUCTURE PTY LTD -v- ECONOMIC REGULATION AUTHORITY [2014] WASC 346 Redetermination of Costs relevant to Brockman Iron's Access Proposal

- (c) Arc's depreciation assessment should be subsequently updated to reflect the changes to Table 6-1.
- (d) CBH submits that Arc's general approach to depreciation should:
 - (i) Ensure accumulated depreciation appropriately reflects the fact that, for long-lived assets, a proportion of invested capital will have been recovered already.
 - (ii) Ensure forecast depreciation is consistent with the Standard Design lives articulated in the ERA-approved Costing Principles.
 - (iii) Ensure that economic lives do not exceed the standard design lives listed in Appendix 2 in the approved Costing Principles.

Right of Way (Section 6.2)

- 322. Section 6.2 of Arc's DORC Report outlines the proposed methodology and values associated with the depreciation of clearing and grubbing, cuttings and embankments, formations and access roads.
- 323. Arc has proposed that the physical condition of clearing and grubbing, cuttings and embankments, formation assets do not degrade with proper maintenance and therefore have 0% accumulated depreciation and unconstrained (perpetual) economic lives (evidenced by the supporting Depreciation Schedule).
- 324. CBH contends the proposed depreciation methodology for right of way assets allows Arc to generate a return of capital in perpetuity from over a billion dollars' worth of assets which were, in some cases, constructed over a century ago.
- 325. CBH submits that:
 - a) Accumulated depreciation for clearing and grubbing, cuttings and embankments and formations should be calculated in a similar manner to other asset types, using linear depreciation over the standard design life defined in the approved Costing Principles.
 - b) Unless specific commissioning dates are known, the commissioning dates for clearing and grubbing, cuttings and embankments and formations should be the same as those suggested by Arc for ballast in Table 6-19, Method 3. CBH believes such dates are appropriate as it is unlikely that significant formation works occurred after the application of ballast.
 - c) Any right of way assets providing service beyond their design lives should be depreciated to a 10% remaining life.

Recommendation 20: Right of way depreciation

- (a) Depreciation of right of way assets should be updated to reflect depreciation of assets over time in accordance with the Standard Design lives articulated in the ERA-approved Costing Principles.
- (b) Unless specific commissioning dates are known, clearing and grubbing, cuttings and embankments and formation assets should have the same commissioning date as ballast assets in the same location.
- (c) Any right of way assets providing service beyond their design lives should be depreciated to a 10% remaining life.

Civil Structures (Section 6.3)

Bridges (Section 6.3.1)

- 326. Arc's proposed approach to determining accumulated depreciation of bridges is outlined in Table 6-5. This articulates:
 - a) Any bridges on non-operational lines were fully depreciated to zero.

- b) Linear depreciation from installation date was assumed where installation dates were known, while the average age of bridges in the same Network Group was used where installation dates are not known.
 - c) The average age of bridges across the Arc network was used in the absence of asset or Network Group age data.
 - d) A minimum remaining life of 10% was assumed for in-service assets beyond the end of their useful life.
327. As per previous recommendations, CBH submits all non-operational lines should be removed at the optimisation step of the DORC process. Notwithstanding this, CBH asserts Arc's approach to calculating accumulated depreciation for bridges to be reasonable.
328. Arc did not provide any asset commissioning data to support accumulated depreciation figures. This is inconsistent with the Costing Principles, which require Arc to provide the Regulator with all the supporting material necessary to meet its obligations under section 47K of the Code in the evaluation of the Railway Owner's depreciation schedules. This includes asset commissioning date data used to calculate accumulated depreciation.⁶⁵
329. CBH submits that Arc should provide asset commissioning date data for bridges.

Tunnels (Section 6.3.2)

330. In the absence of age or condition data for bridges, Arc proposed that accumulated depreciation for tunnels should reflect the average accumulated depreciation of bridges in the same Network Group, as they have the same design life and have been subject to similar life extending maintenance.
331. CBH notes potential errors in Table 6-7 as some of the Average Remaining Life percentages do not reconcile with DORC values.
332. CBH asserts Arc's approach to calculating accumulated depreciation for tunnels is reasonable.
333. CBH submits that the commissioning date assumptions should be provided to the ERA and other stakeholders for review in accordance with the Code and Costing Principles requirements.

Culverts (Section 6.3.3)

334. Arc's proposed approach to determining accumulated depreciation of culverts is outlined in Table 6-8. This is analogous to that outlined for bridges.
335. CBH asserts Arc's approach to calculating accumulated depreciation for culverts is reasonable.
336. CBH submits that the commissioning date assumptions should be provided in accordance with the Code and Costing Principles requirements.

Recommendation 21: Civil structures depreciation

- (a) Arc should provide commissioning date data / assumptions for bridges, tunnels and culverts to the ERA and other stakeholders for review and validation.

Track (Section 6.4)

Rail (Section 6.4.1)

337. Arc's proposed approach to determining accumulated depreciation of rail assets is articulated in Table 6-11. The majority of rail assets are depreciated in accordance with Method 2, which uses asset condition data to estimate remaining life.
338. Unlike other asset types in the DORC, indicative commissioning dates of rail are not considered in the calculation of accumulated depreciation for rail assets.
339. CBH is aware of various segments of rail track being used beyond their standard design life. For example, 30kg rail dating back to 1949 exists on the Miling Line, which is subject to significant

⁶⁵ See section 2.7, [Arc's Approved Costing Principles](#).

operating restrictions including a 30km/h speed limit for loaded trains between Piawaning and Miling and a further 15km/h permanent speed restriction between Miling and Bindi Bindi.⁶⁶

340. CBH contends that the general approach proposed by Arc would likely result in situations where the economic life of rail assets exceeds the 70-year standard design life prescribed in the approved Costing Principles. Such a result is inconsistent with the precedent set in *TPI vs ERA* and may result in over recovery at the expense of users.
341. CBH submits depreciation of assets needs to reflect the fact that a significant proportion of the capital costs associated with rail assets, has already been recovered.
342. To address this issue and provide greater consistency in the treatment of assets, CBH submits that Table 6-11 should be amended to include an additional method between method 1 and 2. The method should read “Where commissioning data is known and the asset is in use beyond the standard design life articulated in the approved Costing Principles, a 10% remaining life should be applied to reflect the service being provided”. The basis should read: “Follows regulatory precedent by capturing the value of the ongoing service that life-expired assets continue to provide.”
343. With respect to method 2, Arc categorised remaining life into four condition bands:
- a) Less than 10% life remaining
 - b) 10 – 25% life remaining
 - c) 25 – 50% life remaining
 - d) More than 50% life remaining.
344. CBH submits that Arc’s proposed bands are not appropriate as they are skewed toward higher remaining lives. For example, track within the 50-100% remaining life bracket is assigned a remaining life of 75%, however track within the 0-50% remaining life bracket is not conversely assigned a remaining life of 25%. To address this, condition bands should be even and reflect the following:

Table 7: Rail life assessment

Remaining life range	Percentage life remaining assumed
80% - 100%	90%
60% - 80%	70%
40% - 60%	50%
20% - 40%	30%
0% - 20%	10%

345. In the absence of rail condition data to inform remaining life, Arc proposed utilising a weighted remaining life for the route section (method 3) on the basis that the maintenance effort applied is likely to be broadly consistent across all assets in the same route section.
346. CBH submits that the weighted remaining life of *rail* assets on the route section should be used instead of the weighted remaining life for the route section (across all asset classes), as this is likely to be more reflective of rail condition. Using the weighted average life for a route section is likely to overstate remaining life for other assets particularly if these asset lives include ‘perpetual assets’ as proposed by Arc. Furthermore, this is consistent with the approach adopted for bridges and culverts.
347. Additional depreciation assumptions are presented on a Network Group basis in Tables 6-13 and 6-14. Transparency of accumulated depreciation assumptions on a Code route segment basis is important as accumulated depreciation can vary greatly across lines. Furthermore, this information is required as per section 47J of the Code.

⁶⁶ See [Maximum Train Speeds](#) and [Permanent Speed Restrictions](#) listed on Arc’s website.

348. CBH submits that Arc should provide all accumulated depreciation assumptions for rail assets on a Code route segment basis to the ERA and other stakeholders for review.

Sleepers (Section 6.4.2)

349. Arc's proposed approach to estimating accumulated depreciation for sleepers is based on linear depreciation from commissioning dates where they are known, and a weighted remaining life for the route section where commissioning dates are not known.

350. Applying a weighted route segment remaining life to sleepers that do not have commissioning dates is likely to overstate remaining life, particularly for wooden sleepers. This is because most of the wooden sleeper population is likely to be at or beyond its useful life, while other asset types contributing to the weighted average remaining life of a route section are less likely to be as depreciated.

351. One example illustrating this is on the GSR Network Group, encompassing the track between Avon and Albany, where timber sleepers are assumed to have 40% of their life remaining (which is consistent with what is assumed for steel and concrete sleepers), even though ~100,000 timber sleepers (26% of the timber sleeper population) were inserted on this line prior to 2012 and therefore are over 13 years old with a remaining life 13%.⁶⁷ To the best of CBH's knowledge, there has been no significant timber re-sleeping program involving the remaining ~215,000 timber sleepers in this Network Group. Therefore, it is likely that most of the timber sleepers in this Network Group are beyond their 15-year design life. Unless significant quantities of timber sleepers have been replaced like for like recently (and Arc can substantiate this), one would expect the timber sleepers in this section to be depreciated to a much greater extent.

352. CBH submits that where commissioning dates are not known, a more appropriate approach would be to apply a Code Route segment average remaining life based on sleeper type. This would entail for example calculating the average remaining life of all wooden sleepers with known commissioning dates on a Code Route segment level and applying this to wooden sleepers without commissioning dates. If for example no wooden sleeper commissioning dates exist on a Code Route segment, the average remaining life of wooden sleepers on a comparable line should be used as a proxy.

Ballast (Section 6.4.3)

353. Arc have proposed that with proper maintenance, ballast does not normally need replacement. Arc states that in practice, ballast has an effective useful life of 878 years, as Arc typically replaces approximately 6km of ballast per year as part of other works across its 5,270km network.

354. This effective useful life assertion includes over 900km of track that is not maintained for operation.

355. Table 6-19 outlines the approach to determining accumulated depreciation of ballast assets. When track or sleepers have been replaced, it has been assumed that the ballast on these sections would have also been replaced. The age of the remaining ballast is assumed to match the age of the rail alignment. It is assumed that the narrow gauge mainlines were built in the late 1800's to early 1900's, while the standard and dual gauge mainlines were built in 1961 and 1968 respectively

356. CBH asserts the approach to determining ballast commissioning dates is reasonable.

357. In the calculation of accumulated depreciation, it appears as though Arc has applied straight line depreciation over an 878-year asset life instead of the 50-year life documented in Arc's approved Costing Principles. This is based on analysing the 85% average remaining life for the GSR Network Group, which as per Table 6-20 is solely based on the narrow gauge mainline construction date. Multiplying 15% accumulated depreciation by 878 years = 130 years, which aligns with the age of the narrow gauge rail alignment.

358. While accumulated depreciation appears to be based on a useful life of 878 years, the remaining asset life is depreciated over a 50-year life in Arc's depreciation schedule.

⁶⁷ See page 2, [Dedicated Narrow Gauge Grain Lines Strengthening Program Progress Report – Avon to Redmond 2011](#).

359. This approach is inappropriate as it seeks to exploit the “best of both worlds” allowing Arc to simultaneously:
- a) Capture a return *on* capital that effectively reflects ‘new assets’ because they are effectively undepreciated, ignoring appropriate acknowledgement of the fact that a significant proportion of invested capital has been recovered already.
 - b) Capture a return *of* capital from the valuation date by depreciating 100-year-old+ assets over time based on a 50-year standard design life that was ignored for the purpose of calculating accumulated depreciation.
360. CBH submits that accumulated depreciation should be calculated on a straight-line basis from commissioning dates based on the 50-year design life from the approved Costing Principles. In service assets that are beyond their useful design life should be assigned a remaining life of 10%.
361. This would result in ballast assets in the GSR Network Group being assigned a remaining life of 10% (as these assets are over 100 years old) instead of the 85% proposed by Arc.

Turnouts (Section 6.4.4)

362. Table 6-23 outlines the approach to determining accumulated depreciation of turnouts assets. Arc have proposed linear depreciation of turnouts based on known installation dates and standard design lives from the approved Costing Principles. Where install year was not known, the weighted remaining life of the route section was used on the basis that maintenance effort applied is likely to be broadly consistent across all assets in the same route section.
363. Applying a weighted route segment remaining life to turnouts that do not have commissioning dates is likely to overstate remaining life, particularly for turnouts with wooden sleepers. This is because most of the wooden sleeper population is likely to be at or beyond its useful life, while other asset types contributing to the weighted average remaining life of a route section are less likely to be depreciated to the same extent.
364. CBH submits that where commissioning dates are not known, a more appropriate approach would be to apply the weighted Code route section remaining life based on turnout type. If commissioning dates do not exist for a particular turnout type on a Code Route segment, the average remaining life for that turnout type on a comparable line or Network Group should be used and these assumptions should be provided.
365. Based on the approach set out in Table 6-23, Arc has provided a graph illustrating the distribution of remaining life for turnouts. No details have been provided by Arc on the breakdown between different types of turnouts or installation dates.
366. CBH submits that Arc should provide a register of turnout types and all installation dates / installation date assumptions to the ERA and other stakeholders for review and validation.

Recommendation 22: Track assets depreciation

- (a) Arc should provide known commissioning date and condition data / assumptions used to calculate accumulated depreciation for all track assets at the Code Route segment level to the ERA and other stakeholders for review and validation.
- (b) Accumulated depreciation figures should be provided for all asset types at a Code route segment level.
- (c) Table 6-11 should be amended to include an additional method between method 1 and 2. The method should read “Where commissioning data is known and the asset is in use beyond the standard design life articulated in the approved Costing Principles, a 10% remaining life should be applied to reflect the service being provided”. The basis should read: “Follows regulatory precedent by capturing the value of the ongoing service that life-expired assets continue to provide.”
- (d) Arc’s classification of remaining rail life should be updated to reflect the following, evenly distributed bands:

Remaining life range	Percentage life remaining assumed
80% - 100%	90%
60% - 80%	70%
40% - 60%	50%
20% - 40%	30%
0% - 20%	10%

- (e) The weighted remaining life of rail assets on the route section should be used instead of the weighted remaining life for the route section (across all asset classes).
- (f) Where sleeper commissioning dates are not known, a Code route segment average remaining life based on sleeper type should be used. If commissioning dates do not exist for a particular sleeper type on a Code Route segment, the average remaining life for that sleeper type on a comparable line should be used and these assumptions should be provided.
- (g) Accumulated depreciation for ballast should be calculated on a straight-line basis from commissioning dates based on the 50-year design life as per the approved Costing Principles. In service assets that are beyond their useful design life should be assigned a remaining life of 10%.
- (h) Where turnout commissioning dates are not known, a Code Route segment average remaining life based on turnout type should be used. If commissioning dates do not exist for a particular turnout type on a Code Route segment, the average remaining life for that turnout type on a comparable line should be used and these assumptions should be provided.
- (i) Arc should provide a register of turnout types and all installation dates / installation date assumptions to the ERA and other stakeholders for review and validation.

Signalling and Control Systems (Section 6.5)

367. Arc's approach to calculating accumulated depreciation of signalling and control system assets is outlined in Table 6-27. Linear depreciation from installation date is used where installation dates are known, whilst average depreciation across network wide signalling and control system assets is used where they are not.
368. CBH submits that Arc should provide commissioning data / assumptions used to calculate accumulated depreciation in accordance with the requirements of the Code to the ERA and other stakeholders for review and validation.

Recommendation 23: Signalling and control systems depreciation

- (a) Arc should provide commissioning data / assumptions for signalling and control system assets to the ERA and other stakeholders for review and validation.

Buildings (Section 6.6)

369. Arc's approach to calculating accumulated depreciation of buildings is based on linear depreciation from building construction dates, which are provided for each building type and location.
370. CBH submits that the proposed approach and assumptions used to determine accumulated depreciation for buildings seems reasonable.

Associated Track Structures (Section 6.7)

Pedestrian Crossings (Section 6.7.1)

371. Arc have proposed that average route section accumulated depreciation should be applied to pedestrian crossings as no condition or installation date data is available.
372. Arc have not provided any of the route section depreciation values that were applied as required by the Code. CBH is therefore unable to comment on specific numbers proposed by Arc.
373. CBH submits that Arc should provide the depreciation assumptions applied to pedestrian crossings to the ERA and other stakeholders for review and validation as required by the Code.

Recommendation 24: Associated track structures depreciation

- (a) Arc to provide depreciation assumptions applied to pedestrian crossings to the ERA and other stakeholders for review and validation.

Miscellaneous (Section 6.8)

374. Arc proposed that plant tools and equipment should be assumed to be 50% depreciated unless age and/or asset condition data was available. No age or asset condition information was referenced. No commentary around the treatment of signage or walkways was included.
375. Reviewing Arc's forecast depreciation schedule and back solving illustrates that Arc have assumed accumulated depreciation for walkways is ~30% based on an asset life of ~100 years.
376. CBH contends that accumulated seems unreasonably low based on CBH's operational experience, and when compared to the assumptions used in the depreciation of a similar asset class - access roads, where accumulated depreciation is ~51%.
377. Details around the assumptions used in the calculation of accumulated depreciation for signage and walkways should be provided at a route section level to the ERA and other stakeholders for review and validation as required by the Code.
378. CBH submits in the absence of other reasonable depreciation assumptions for walkways, the ERA should direct Arc to apply average route section accumulated depreciation in place of Arc's assumption as it seems unreasonably low.

Recommendation 25: Miscellaneous depreciation

- (a) Arc should provide assumptions used in the calculation of accumulated depreciation for signage and walkways at a Code route section level to the ERA and other stakeholders for review and validation.
- (b) In the absence of other reasonable depreciation assumptions for walkways, the ERA should direct Arc to apply average route section accumulated depreciation in place of Arc's assumption as it seems unreasonably low.

Section 7 of Arc's DORC Report: Adjustments to the DORC

Contributed Capital (Section 7.1)

379. Section 47G of the Code states a railway owner must not, when valuing railway infrastructure under or for the purpose of the Code, include the value of contributed capital that has been funded by an entity other than the railway owner or an associate of the railway owner.
380. As per section 47B of the Code, contributed capital means 'railway infrastructure that has been funded wholly or in part by an entity other than the railway owner or an associate of the railway owner, including by the entity doing any of the following —
- (a) providing cash or in-kind contributions to the railway owner or an associate of the railway owner;
 - (b) undertaking work, or paying for work to be undertaken, for the railway owner or an associate of the railway owner;

- (c) making payments to the railway owner or an associate of the railway owner that —
 - (i) fund the recovery of capital in relation to the railway infrastructure; and
 - (ii) are not payments of prices and charges for access.’

381. Section 7.1 of Arc’s DORC Report states that ‘Arc has confirmed that none of the assets in this DORC are contributed assets. There has therefore been no adjustment for any contributed investment’.
382. This assertion is fanciful as various assets in Arc’s DORC Report clearly appear to be funded by third party capital contributions based on various documents on the public record.
383. For example, evidence of third-party contributions is included in Arc’s 2024 annual report, which shows a total balance of Government and third-party contributions of \$178 million. Of this amount, \$171 million represents Government funding designated for the purchase, construction or acquisition of new assets or as compensation for expenses or losses incurred.⁶⁸
384. Furthermore, CBH cannot see how contributions made by the PTA in the form of grant funding for specific freight railway infrastructure assets, such as the \$241 million (\$2010 terms) narrow-gauge re-sleeper program documented in the PTA and WestNet Rail funding agreement⁶⁹, could not be considered contributed capital in accordance with the Code definition. The following information illustrates this point:
- a) The agreement titled “Project Agreement for Capital Works – Dedicated Narrow Gauge Grain Lines” between the PTA and WestNet Rail dated 9 July 2010 states in Schedule 6 that capital works valued at \$43.5 million (\$2010 terms) would be spent between Avon and Redmond, of which \$35.25 million (\$2010 terms) would be funded by the PTA.
 - b) The Brookfield / Arc monthly reports dated September 2011 show that these works were completed or substantially completed.⁷⁰
 - c) The sleepers replaced between Avon to Redmond form part of Arc’s DORC, having been ascribed an indicative value of \$120 million by Arc.⁷¹ This is despite those assets clearly appearing to have been funded in whole or part by the PTA.
385. CBH estimates the total value of third-party capital contributions to freight rail infrastructure assets (that have been ascribed a value in Arc’s DORC) could be in excess of \$1.3 billion based on the examples presented in the below table, which are substantiated by public records.

⁶⁸ See page 24, Arc Consolidated Annual Report for the year ended 31 December 2024.

⁶⁹ See Schedules 6 to 10, [Project Agreement for Capital Works – Dedicated Narrow Gauge Grain Lines](#).

⁷⁰ [GSR Re-sleeper Project Monthly Report September 2011](#).

⁷¹ The indicative value was estimated by applying the percentage of total sleepers replaced 49.3% (articulated in Pages 12 to 16 of an [Independent Physical Review on Westnet Rail Grain Lines of Proposed Resleeper conducted on behalf of PTA](#)) to total sleeper costs from Avon to Redmond derived from section 4.7.2 of the additional supporting material provided by Arc.

Table 8: Third party capital contributions to Freight Rail Network

Contributor	Description of works funded	Contribution value / date	Value at RAB valuation date ⁷²	Source
1. Government ⁷³	Narrow gauge re-sleeping	\$241m (2010)	\$348m	PTA website, Project Agreement for Capital Works (2010) ⁷⁴
2. Government	Concrete re-sleepering and crossing loop extensions	\$11m (2007)	\$18m	PTA website, Project Agreement – Eastern Goldfields Railway (2007) ⁷⁵
3. Government	Two new passing loops and new rail tracks between Koolyanobbing and Kalgoorlie	\$95m (2011)	\$136m	Western Australian Auditor General's Report, Management of the Rail Freight Network Lease: Twelve Years Down the Track (2013) ⁷⁶
4. Karara Mining Limited	Upgrade to Geraldton to Morowa line	Between \$450 - 550m (2011)	\$646 - \$790m	Securities exchange announcement & media release, Rail access agreement signed for Karara project (2011) Economics and Industry Standing Committee, Inquiry into the management of Western Australia's Freight Rail Network, Session three (2014) ⁷⁷ Inquiry into the management of Western Australia's Freight Rail Network, Further Submission by Brookfield Rail Pty Ltd (2014) ⁷⁸ Economics and Industry Standing Committee, the Management of Western Australia's Freight Rail Network (2014) ⁷⁹
5. Cliffs Natural Resources	Upgrade to Koolyanobbing to Esperance line	\$54m ⁸⁰ (2008) \$12m ⁸¹ (2010)	\$82m \$17m	Cliffs 2010 Annual Report ⁸²
6. Cliffs Natural Resources	Upgrade of rail line used by operations	\$32m ⁸³ (2011)	\$46m	Cliffs 2011 Annual Report ⁸⁴
7. Government	Level crossings and level crossing safety upgrades	Unknown	Unknown	Federal Government Media Statement – WA on track for life-saving level crossing upgrades WA Government Media Statement – Safety review sees major change to Passive Level Railway Crossings
8. Government	22km freight line relocation due to Thornlie Cockburn Line Project	Unknown	Unknown	WA Government Media Statement – Thornlie-Cockburn Link work ramps up with freight rail relocated
Total		\$895-995m	\$1,293-1,437m	

⁷² For simplicity, an inflation adjusted figure, calculated using the Western Australian Road and Bridge Construction index, has been used as a proxy for indicative value as at the RAB valuation date. The RAB valuation date is assumed to be 31 Dec 2024 in

[REDACTED]

- 391. The statement made by Arc in relation to contributed capital should be interrogated to ensure appropriate adjustments to Arc’s DORC are made where contributed capital sources are identified to ensure compliance with Section 47G of the Code.
- 392. CBH also notes that Arc’s DORC Report includes commentary on contributed capital after the depreciation step under the heading ‘Adjustments to the DORC’. The Costing Principles however specify that contributed capital adjustments should take place before depreciation.
- 393. CBH submits that capital contributions should be captured before depreciation in accordance with the Costing Principles to ensure depreciation on contributed assets is not incidentally captured in DORC values, which may result in contributed assets inflating remaining life assumptions.

alignment with Arc’s DORC Report. CBH understands that the Costing Principles specify an alternative methodology for determining the value of contributed capital to be adjusted from the RAB.

⁷³ References to Government in this table may include State or Federal Government and their respective departments.

⁷⁴ See schedule 1: Program of works and Schedule 3: SGNC Report – Dedicated Narrow Gauge Grain Line Capital Expenditure for a breakdown of scope, costs and timing.

⁷⁵ See schedule 2: Resleeping works and schedule 3: Crossing loop extension works and schedule 5 for a breakdown of scope, costs and timing.

⁷⁶ Page 21 references the PTA’s contribution to this project.

⁷⁷ Page 5 includes formal evidence from former Karara CEO describing the companies ‘very high’ fixed costs as a ‘capital charge’.

⁷⁸ Page 2 acknowledges the “\$550 million upgrade project in the MidWest was financed by Brookfield Rail”

⁷⁹ Page 109 specifies ‘Karara Mining’s use of this ‘existing infrastructure’ was contingent upon a significant capital upgrade to the network section in question as well as an access agreement between Karara Mining and Brookfield Rail. Ultimately a 15-year agreement, which resulted in a \$450 million upgrade to the line, was struck in August 2011’. Page 211 specifies ‘The required upgrade for the Karara Mining project was priced at \$450 million, for which Karara Mining provided \$300 million in security by way of bank guarantee’

⁸⁰ Figures were converted from USD to AUD using a December 31, 2008 multiplier of 1.20. [AUD to USD historical exchange rate](#)
[LOFX](#)

⁸¹ Figures were converted from USD to AUD using a December 31, 2010 multiplier of 1.09. [AUD to USD historical exchange rate](#)
[LOFX](#)

⁸² Page 36 states “In 2009, Asia Pacific Iron Ore completed an upgrade of the rail line used for its operations. The upgrade was performed to mitigate the risk of derailment and reduce service disruptions by providing a more robust infrastructure. The improvements included the replacement of 75 miles of rail and associated parts. We spent a total of approximately \$45 million in 2009 and 2008 related to maintenance and improvements to the rail structure. An additional \$11.0 million was spent during 2010 on the second phase of the improvements, which included the upgrade of an additional 15 miles of rail.”

⁸³ Figures were converted from USD to AUD using a December 31, 2011 multiplier of 0.97. [AUD to USD historical exchange rate](#)
[LOFX](#)

⁸⁴ Page 77 states “In 2011, we entered into an agreement to upgrade an existing rail line used by our Koolyanobbing operations. Our portion of the related purchase commitment for the upgrade is approximately \$33 million, of which approximately \$7 million was spent in 2011. Of the remaining amount, approximately \$10 million is expected to be spent in 2012 and \$16 million is expected to be spent between 2013 and 2014.”

Recommendation 26: Contributed capital

- (a) ERA should interrogate the statement made by Arc in relation to contributed capital and ensure appropriate adjustments to Arc's DORC are made where contributed capital sources are identified to ensure compliance with Section 47G of the Code.
- (b) Contributed capital adjustments should be made prior to depreciation in accordance with the Costing Principles.

Operating Costs (Section 7.2)

- 394. In Section 7.2, Arc outlines its approach, and the values associated with, the reduced maintenance costs of an MEA asset compared to the existing physical assets. The present value of this maintenance cost difference was calculated using the approved pre-tax WACC over the remaining life of the relevant assets.
- 395. The principle of DORC valuation is that assets built to a MEA standard would commonly have two advantages over older, existing assets: they would require less maintenance, and would offer superior service potential.⁸⁵
- 396. With respect to the first advantage, Arc has proposed that maintenance cost savings from the MEA would only be realised for sleepers, turnouts, bridges, and signalling and communications infrastructure (depending on which of the alternative options is considered).
- 397. With respect to the second advantage, Arc has not proposed any reduction in value to reflect the difference in service capability of existing assets compared to MEA assets. A DORC value without such a reduction would imply that users place the same value on existing assets as they would MEA assets.
- 398. CBH contends that the net present value of rail user operating costs can act as a proxy for the reduced value attributable to existing assets compared with new assets. This is because significant operating restrictions exist on the current network which impose additional costs on users that would not be experienced if the proposed MEA network was operational.
- 399. For example, consists operating between Bolgart and Miling are restricted to utilising a single locomotive and therefore a shorter train length.⁸⁶ Onerous operating instructions / restrictions emanating from aged or lower specification rail infrastructure decreases the value provided by existing infrastructure by imposing additional operational costs on rail users.
- 400. Additional costs borne by rail users include:
 - a) Additional train crew and locomotive / wagon costs associated with lower payloads and more onerous heat and speed and restrictions.
 - b) Additional site-based costs associated with loading more, lower payload trains or staffing eccentric shifts around train operations impacted by more onerous heat and speed restrictions.
 - c) Additional costs associated with procuring bespoke locomotives capable of running on Arc's 16 TAL lines.
- 401. CBH has monetised *some* of the additional costs associated with lower payloads and speed restrictions using publicly available operational information and economic guidelines for assessing freight transport costs and benefits to provide an indication of how these additional costs may be captured. These are set out in the following paragraphs.
- 402. With respect to payloads, Code route segments that are currently rated at 16 TAL have a MEA specification that is similar or greater than current 19 TAL lines (including if CBH's recommendations to reduce Arc's proposed track specifications in Section 4.7 are adopted). Under the hypothetical

⁸⁵ See, for example Appendix 1, Booz Allen Hamilton, [ARTC Standard Gauge Rail Network DORC Australian Rail Track Corporation Ltd](#), 2007.

⁸⁶ [Arc infrastructure Operating instructions](#)

MEA for existing 16 TAL lines listed below, rail users could operate at 19 TAL. This would allow them to move rail tonnes with fewer trains at a lower operational cost.

- a) Toodyay to Miling
- b) Goomalling to McLevie
- c) Burakin to Beacon
- d) Tilley to Perenjori

403. Using the historic freight task information and publicly available operating cost benchmarking data, CBH have calculated that the reduced payload associated with operating on the current 16 TAL lines vs. the MEA has a present value of \$2.4 million over ten years.⁸⁷ A 10-year period was used for illustrative purposes as the weighted average remaining asset life of the network isn't clearly identified in Arc's DORC Report. Further detail on the assumptions and methodology used to calculate this is included in Addendum 4.
404. CBH have also estimated the difference in speeds / travel time and costs associated with operating on current 16 TAL lines vs. the MEA. This is based on comparing the section run times between Morawa to Mullewa from the Narrow-Gauge Lease⁸⁸, when the lines were 16 TAL, to current run times for the now upgraded line published on the Arc website.⁸⁹ The run time on this section of track has decreased from 165 to 110 minutes, representing a time saving of ~27%. CBH submits that similar time savings would be experienced across other areas of the network under the MEA.
405. Applying a 27% time saving to section run times on all 16 TAL lines provides an estimate of MEA travel times. Using these travel time estimates, historic freight task information from Arc's website, and publicly available operating cost benchmarking data, CBH have calculated that the reduced speeds associated with operating on the current 16 TAL lines vs. the MEA have a present value of \$6.5 million over ten years.⁹⁰ A 10-year period was used for illustrative purposes as the weighted average remaining asset life of the network isn't clearly identified in Arc's DORC Report. Further detail on the assumptions and methodology used to calculate this is included in Addendum 5.
406. CBH are unable to quantify network wide operational costs borne by users, due to the lack of available train frequency / consist data.
407. CBH submits that Arc's DORC should be adjusted to reflect the additional operational costs rail users bear as a result of operating on existing infrastructure vs MEA infrastructure, using publicly available operational cost information.
408. Furthermore, Arc should provide the remaining asset life for each asset class in years to assist with these calculations.

Recommendation 27: Operating costs

- (a) Arc's DORC should be adjusted to reflect the additional operational costs rail users bear as a result of operating on existing infrastructure vs MEA infrastructure, using publicly available operational cost information.
- (b) Arc should provide the remaining asset life for each asset class in years.

⁸⁷ Calculated using [Infrastructure and Transport Minister's Australian Transport Assessment and Planning Freight Rail Guidelines and Transport for NSW Freight Benefit Guidelines](#).

⁸⁸ See Schedule 4, [Rail Freight Corridor Land Use Agreement \(Narrow Gauge\) and Railway Infrastructure Lease](#), 2000.

⁸⁹ See page 5, [Arc's Section Run Times Report](#).

⁹⁰ Calculated using [Infrastructure and Transport Minister's Australian Transport Assessment and Planning Freight Rail Guidelines and Transport for NSW Freight Benefit Guidelines](#).

Addendum 1: GRV Valuation Assumptions

General Inputs

Item	Assumption	Source
Historic GRV valuations	See below	2009 ERA Determination and 2014 ERA Determination
Segment lengths	Various	2009 ERA Determination and 2025 Arc additional supporting material
Inflation rates	Various	ABS: Western Australian Road and Bridge Construction Index
Contributed capital	\$1.3 billion	See section 7.1 on this submission
Average depreciation rate	47%	Average Alternative A network depreciation in Arc DORC Report
Alternative depreciation rate	65%	Indicative average depreciation rate based on adopting CBH recommendations relating to accumulated depreciation of right of way and track assets.
Current operational track length	4,456km	Arc DORC Report

Calculation Methodology

The ERA have determined the replacement cost for large portions of the freight rail network at various points in time since the freight rail network was leased in 2000. A weighted average per kilometre replacement cost was calculated using GRV figures from the ERA's 2009 and 2014 Determinations, which accounts for over 3,600 km of the network. Tier 3 segments were not included in the calculation of this figure.

Historical rail section valuations were inflated to December 2024 using the Western Australian Road and Bridge Construction index to provide a 2024 replacement cost (based on GRV methodology).

This rate was multiplied by the length of operational track in Arc's DORC Report to give an indicative optimised replacement cost value, which was adjusted to account for contributed capital then depreciated by Arc's proposed average depreciation rate of 47% or an alternative depreciation rate of 65%.

Historic and escalated GRV values are included in the following table.

Table 9: Historic and escalated GRV values

Section	Section Length (km)	GRV (2009) (\$)	GRV (2014) (\$)	GRV (Dec 2024) (\$)
Kwinana to Mundijong Junction	29.11	42,333,000	-	63,148,674
Mundijong Jn to Pinjarra	47.73	63,390,000	-	94,559,669
Pinjarra to Pinjarra East	1.47	2,534,000	-	3,780,000
Pinjarra East to Alumina Jn	0.23	1,378,000	-	2,055,580
Pinjarra East to Pinjarra South	1.06	1,334,000	-	1,989,945
Pinjarra to Wagerup	33.52	40,361,000	-	60,207,017
Wagerup to Brunswick Jn	42.97	56,918,000	-	84,905,304
Brunswick Jn to Picton	22.08	34,321,000	-	51,197,072
Picton Jn to Bunbury Inner Harbour	3.52	9,805,000	-	14,626,243
Brunswick North to East	0.91	1,072,000	-	1,599,116
Brunswick to Brunswick East	1.03	2,948,000	-	4,397,569
Brunswick East to Worsley	22.00	28,476,000	-	42,478,011
Worsley to Worsley North	2.32	3,987,000	-	5,947,459
Worsley North to Hamilton	8.58	8,623,000	-	12,863,039

Worsley East to Worsley North	1.07	1,158,000	-	1,727,403
Worsley to Worsley East	1.89	1,925,000	-	2,871,547
Worsley East to Ewington Jn	28.24	33,282,000	-	49,647,182
Ewington Junction to Premier	2.39	3,941,000	-	5,878,840
Forrestfield to Midland	25.71	59,915,000	-	89,375,967
Midland to Millendon Junction	28.25	55,339,000	-	82,549,890
Millendon Junction to Toodyay West	125.14	208,633,000	-	311,220,497
Toodyay West to Avon Yard	51.83	90,959,000	-	135,684,696
Avon Yard to West Merredin	190.94	333,005,000	-	496,747,790
West Merredin to Koolyanobbing	191.98	307,338,000	-	458,460,000
Koolyanobbing to West Kalgoorlie	204.33	305,392,000	-	455,557,127
West Kalgoorlie to Border	6.21	16,240,000	-	24,225,414
Kalgoorlie to Malcom	237.50	250,165,000	-	373,174,309
Malcom to Leonora	24.54	29,621,000	-	44,186,022
West Kalgoorlie to Hampton	17.88	24,053,000	-	35,880,166
Hampton to Kambalda	38.25	43,334,000	-	64,641,878
Kambalda to Salmon Gums	229.60	250,770,000	-	374,076,796
Salmon Gums to Esperance	111.60	132,179,000	-	197,173,094
Millendon Junction to Dongara	395.01	-	529,903,364	697,921,504
York to Narrogin	138.36	-	191,970,222	252,838,829
Amery to Mukinbudin	156.11	-	201,903,771	265,922,040
Tambellup to Redmond	120.69	-	154,639,857	203,672,007
Goomalling to McLevie	139.97	-	189,395,732	249,448,037
Toodyay to Miling	136.23	-	186,702,458	245,900,798
Wagin to Lake Grace	122.72	-	153,315,210	201,927,350
Dongara to Eneabba South	94.38	-	97,294,237	128,143,629
Lake Grace to Hyden	93.18	-	117,581,641	154,863,625
Avon Yard to York	41.90	-	61,018,463	80,365,781
Amery to Burakin	79.35	-	102,169,231	134,564,353
Wagin to Katanning	54.41	-	84,428,677	111,198,745
Narrogin to Wagin	48.41	-	68,959,880	90,825,208
Katanning to Tambellup	51.06	-	63,280,050	83,344,456
Burakin to Beacon	71.73	-	90,078,669	118,640,198
Avon Yard to Goomalling	56.43	-	84,056,720	110,708,851
Lake Grace to Newdegate	61.09	-	85,154,858	112,155,179
Redmond to Abany	25.83	-	40,088,352	52,799,293
Goomalling to Amery	33.78	-	43,139,911	56,818,419
Burakin to Kalannie	20.80	-	27,085,967	35,674,200
Dongara to Narngulu	60.19	-	74,898,087	98,646,261
Total	3,736	2,444,729,000	2,647,065,357	7,133,212,078

Addendum 2: Calculation Errors Identified in Arc's DORC Report

Table 10: Summary of calculation errors

Table reference	Asset category	Arc total represented in table (\$m)	Sum of actual table figures (\$m)	Difference (\$m)	Error commentary (\$m)
<i>Calculation errors impacting optimised replacement cost in Table 5-22</i>					
5-22	Railway Owner Project Costs	Alternative A: \$20,913	Alternative A: \$20,488	Alternative A: \$364	<p><u>Variances identified (Alternative A):</u> Planning and design costs (4% of ORC): \$103 Construction management costs (7% of ORC): \$181 Corporate and other costs (3% of ORC): \$79 Total: \$364</p> <p><u>Variances identified (Alternative B):</u> Planning and design costs (4% of ORC): \$102 Construction management costs (7% of ORC): \$178 Corporate and other costs (3% of ORC): \$79 Total: \$359 (incl. figure variances of \$26)</p>

Addendum 3: Metro Network Group Ballast Cost Calculations

General Inputs

Item	Assumption/value	Source
Shoulder width	300mm	CBH engineering advisor
Sleeper length	2,150mm	
Sleeper width	195mm	
Sleeper depth	215mm	
Ballast side slope ratio	1.5	
Ballast depth	300mm	
Sleeper frequency (average Metro)	1,331 per km	Sleeper numbers and track length in Table 4-20 of Arc's DORC Report
Bulk density	1.7	Arc's DORC Report section 4.7.3
Ballast direct unit cost	\$132,500 per km	Arc's DORC Report Appendix 3 – Direct costs
Ballast direct unit cost supply cost proportion	69.8%	

Calculation

		Inputs
		Calculations
Sleeper Dimension (all in m)	Calculation explanation	
sleeper width		0.195
sleeper length		2.15
sleeper depth		0.215
sleeper per km		1331
Ballast details		
bulk density		1.7
ballast depth (m)		0.3
shoulder width (m)		0.3
ballast side slope ratio		1.5
total height	sleeper depth + ballast depth	0.52
total top width (m)	sleeper length + 2 x shoulder width	2.75
total bottom width (m)	total top width + 2 x total height x ballast side slope ratio	4.30
total volume per km (m ³)	1,000 x total height x (top width + bottom width) / 2	1,814.09
ballast volume per km (m ³)	total volume per km - sleeper per km x sleeper volume	1,694.11
total ballast weight (t/km)	ballast volume per km x bulk density	2,879.99
Per km Costs		
ballast direct unit cost supply cost rate (\$/km)	132,500 x .698	92,485
ballast cost (\$/t)	ballast direct unit cost supply cost rate / total ballast weight	\$ 32.11

Addendum 5: Operational adjustment calculations

General Inputs

Item	Assumption	Source
WACC	7.46%	ERA Determination on the 2024 weighted average cost of capital for the freight and urban railway networks, and for Pilbara railways page 4
NPV time frame	10 years	Illustrative timeframe adopted due to lack of weighted average remaining life information.
Code route transport volumes	3-year average	3-year average calculated using Rail volume data published on Arc's website
Historic section run times	Variable	Rail Freight Corridor Land Use Agreement (Narrow Gauge) and Railway Infrastructure Lease
Current section run times	Variable	Arc Network Specifications
Train distance travelled	Variable	Equivalent to distance between start of Code route segment and end of Code route segment divided by 2, which for simplicity assumes all trains originate in the middle of the line segment.
Average CBH consist length (no. of wagons)	52	CBH experience
Wagon payload (16 TAL)	47 tonnes	CBH experience
Wagon payload (19 TAL)	59 tonnes	CBH experience
Value of time saved per hour	\$1.13	Transport for NSW – Freight Benefit Guidelines – September 2024. Page 108
Train crew costs (per hour)	\$232.75	Australian Transport Assessment and Planning Guidelines – M3 Freight rail, page 31 Escalated to December 2024 using ABS index: 471 Rail freight transport
Locomotive mobile servicing costs (\$/hour)	\$23.27	
Locomotive mobile servicing costs (\$/km)	\$1.51	
Locomotive servicing costs (\$/hour)	\$23.27	
Operational overheads	5%	
Locomotive fuel costs (\$/km)	\$9.08	
Wagon maintenance and servicing costs (\$/1000 km)	\$145.47	

Key assumptions by operating cost

Item	Assumption
Train operating cost / cost savings due to differences in train payload (TAL)	<ul style="list-style-type: none"> Increasing train payloads decreases the number of trains required to move the same volumes. Rolling stock operating cost savings are generated from the resulting reduction in travel time and kilometres travelled. Train operating cost savings attributed to the decrease in total train distance travelled from increasing payload from 16 to 19 TAL were calculated as follows: <ul style="list-style-type: none"> <i>Loco mobile servicing savings = (trains required to move task under 16 TAL operating model – trains required to move task under 19 TAL operating model) x Train distance travelled x \$ / km loco mobile servicing rate x operational overheads</i> <i>Fuel cost savings = (trains required to move task under 16 TAL operating model – trains required to move task under 19 TAL operating model) x Train distance travelled x Fuel cost per km</i> <i>Wagon maintenance and servicing cost savings = (trains required to move task under 16 TAL operating model – trains required to move task under 19 TAL</i>

Item	Assumption
	<p><i>operating model) x Train distance travelled x average no. of wagons x (wagon maintenance and service rate / 1000)</i></p> <ul style="list-style-type: none"> • Train operating cost savings attributed to train travel time savings from increasing payload from 16 to 19 TAL were calculated as follows: <ul style="list-style-type: none"> • <i>Train crew cost savings = (total running time required to move task under 16 TAL operating model – total running time required to move task under 19 TAL operating model) x train crew cost per hour</i> • <i>Loco mobile servicing savings = (total running time required to move task under 16 TAL operating model – total running time required to move task under 19 TAL operating model) x loco mobile servicing cost per hour x operational overheads</i> • <i>Loco stationary servicing cost savings = (total running time required to move task under 16 TAL operating model – total running time required to move task under 19 TAL operating model) x loco stationary service costs per hour x operational overheads</i> • <i>Value of time saved = (total running time required to move task under 16 TAL operating model – total running time required to move task under 19 TAL operating model) x value of time saved</i>
<p>Travel time costs / cost savings due to differences in train speeds</p>	<ul style="list-style-type: none"> • Higher specification rail infrastructure allows faster train movements and decreases the time required for trains to move a set volume of product. • Train run time improvement is based on the following: <ul style="list-style-type: none"> • Analysing the historical and current section run times for track section between Tilley and Geraldton from the Rail Freight Corridor Land Use Agreement (Narrow Gauge) and Railway Infrastructure Lease and Arc's website, the track between Tilley and Geraldton was upgraded to a specification similar to the proposed MEA. • Following upgrade of this section of track to a specification similar to the proposed MEA, section run times decreased by 27% (when averaging the historic empty and loaded run times as a base) reflecting the improvement of track standards. • It was assumed that this improvement would be indicative of the proportional decrease in total run times over the following network segments, which are currently of a specification below that of the MEA: <ul style="list-style-type: none"> • Goomalling to McLevie • Toodyay West to Miling • Avon Yard to York • York to Narrogin • Narrogin to Wagin • Wagin South to Katanning • Katanning to Tambellup • Tambellup to Redmond • Redmond to Albany • Wagin to Lake Grace • Lake Grace to Newdegate • Lake Grace to Hyden • Goomalling to Amery • Amery to Mukinbudin • Amery to Burakin • Burakin to Kalannie • Burakin to Beacon

Item	Assumption
	<ul style="list-style-type: none"> • Train operating cost savings attributed to train travel time savings from increasing speeds due to higher specification rail infrastructure are calculated as follows: <ul style="list-style-type: none"> • <i>Train crew cost savings = (total running time required to move task under current specifications x section run time improvement % x train crew cost per hour</i> • <i>Loco mobile servicing savings = (total running time required to move task under current specifications x section run time improvement % x loco mobile servicing cost per hour x operational overheads</i> • <i>Loco stationary servicing savings = (total running time required to move task under current specifications x section run time improvement % x loco stationary servicing cost per hour x operational overheads</i> • <i>Value of time saved = (total running time required to move task under current specifications x section run time improvement % x value of time per hour</i>