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Sustainable competition assessment for the Tarcoola-Darwin railway

A final report for the Essential Services Commission of South Australia

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Disclaimer

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1. Introduction

The Tarcoola-Darwin railway is subject to a third party access regime established under the *AustralAsia Railway (Third Party Access) Act 1999* for railway infrastructure services.

The Essential Services Commission of South Australia (Commission) is the regulator of this access regime under the *AustralAsia Railway (Third Party Access) Code* (the Code). The Code requires the Commission to undertake a periodic review of whether the below rail service provider has earned excessive revenues from services that do not face sustainable competition (the excessive revenue test). This requires the Commission to determine which freight services are not subject to sustainable competition.

In its 2015 review, the Commission found that[1] intermodal freight services were subject to sustainable competition, but bulk freight services were only commercially viable over long distance via rail. Accordingly, the Commission only considered below rail access revenue from bulk freight in the excessive revenue test.

The Commission is scheduled to undertake another review of excessive revenues on the Tarcoola-Darwin railway. To this end, the Commission has engaged HoustonKemp to assess whether its 2015 findings on which freight types are subject to sustainable competition continue to remain valid.

The remainder of this report is structured as follows:

- section 2 sets out the project background, including the Commission's 2015 findings;
- section 3 provides the definition of sustainable competition and our assessment framework;
- section 4 details our assessment of sustainable competition for bulk freight services on the Tarcoola-Darwin railway;
- section 5 describes our assessment of sustainable competition for intermodal freight services; and
- section 6 summarises our conclusions for this project.

Appendix A.1 contains the detailed assumptions we have used to develop our case studies.

[1] ESCOSA, *Tarcoola- Darwin Railway: 10 Year Review of Revenues*, Final Report, August 2015, p 27.

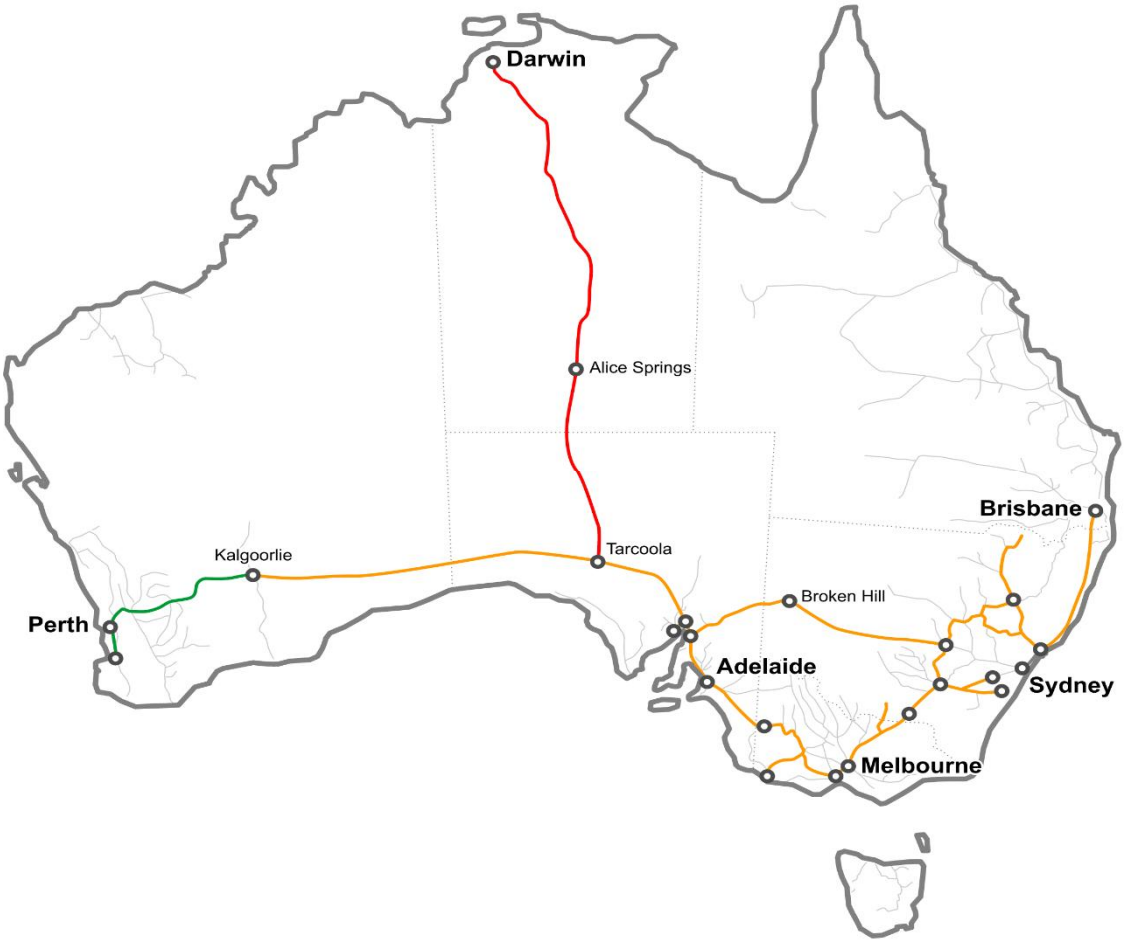
2. Project background and decision

This section provides an overview of the Tarcoola – Darwin railway, the access and pricing arrangements for the railway and the key findings from the Commission's 2015 review.

2.1 Overview of the Tarcoola – Darwin railway

The railway line between Tarcoola – approximately 600km north-west of Adelaide – and Darwin is used to transport bulk freight, intermodal freight and passengers. As shown on the Australian Rail Track Corporation (ARTC) map of Australia's rail network in figure 2.1Figure 2.1 below, it is the only railway line that connects the Northern Territory to other parts of Australia.

Figure 2.1: The Tarcoola – Darwin line (denoted in red)



Source: Australian Rail Track Corporation (ARTC) website, available at: https://www.artc.com.au/customers/standards/route/.

The below rail service provider on the Tarcoola – Darwin railway is One Rail Australia (North) Pty Ltd (One Rail). One Rail (formerly Genesee & Wyoming Australia (North) Pty Ltd, a wholly owned subsidiary of Genesee & Wyoming Inc) operates and manages the railway infrastructure under a 50-year concession rights from the AustralAsia Railway Corporation (AARC).[2]

[2] ESCOSA, *Tarcoola – Darwin railway: 10-year review of revenues – final report*, August 2015, pp 7-8.

As a vertically integrated business, One Rail provides above rail freight haulage services along the same route. Although open access arrangements are in place, One Rail has been the only above rail provider transporting freight on the Tarcoola – Darwin line since 2015. One Rail conducts six weekly intermodal freight services in each direction between Tarcoola and Darwin as well as regular bulk freight and passenger services.

2.2 Access and pricing arrangements

The rules for third party access and pricing on the Tarcoola – Darwin railway are set out in the *AustralAsia Railway (Third Party Access) Code* (the Code).[3] The Code regulates the provision of below-rail services only. One Rail's above rail services are indirectly subject to regulation as it is required to keep separate financial accounts from its below rail business.

The Code establishes a negotiate-arbitrate framework, where above rail service providers are encouraged to negotiate access agreements with the below rail service provider but allows for regulatory arbitration if a dispute cannot be resolved.

Third-party access to the below rail infrastructure is regulated by the Commission under the Code. The Commission publishes guidelines, pursuant to the Code, which provide further detail regarding access and pricing arrangements.

The regulated access pricing principles (the principles) are set out in Division 1 of the Schedule to the Code, titled 'Access pricing in connection with freight services'. If arbitration is required, the arbitrator must determine the appropriate access price in accordance with the methodology set out in the principles and the supporting Commission guidelines. The methodology varies depending on whether the service has a sustainable competitive price but must fall between the floor price and ceiling price. The methodology is summarised in table 2.1.

Table 2.1: Access price calculation methodology under arbitration

Price	Services with a sustainable competitive price	Services with no sustainable competitive price
Ceiling Price	Total stand-alone cost of infrastructure	Stand-alone cost of infrastructure, apportioned between access holders
Access Price	Competitive imputation price based on price of comparable services less incremental above rail cost	Arbitrator determines price based on several factors listed in clause 21 of the Code
Floor Price	Incremental, or avoidable, cost of access to below-rail infrastructure	

Source: AustralAsia Railway (Third Party Access) Code, Schedule, Attachment A: process for determining the arbitrated access price; and ESCOSA, Review of rail guidelines for the Tarcoola-Darwin railway – Final decision, October 2019, pp 9-10.

2.3 The Commission's 2015 review of excessive revenues

Under the Code, the Commission is required to assess whether the revenue collected by the below rail service provider is excessive or not on a periodic basis (the excessive revenue test). More specifically, the excessive revenue test requires the Commission to assess:

- the relevant services – identify freight services that are not subject to sustainable competition from other transport modes;
- the relevant revenue – revenue collected by the below rail service provider from relevant services; and

[3] *AustralAsia Railway (Third Party Access) Act 1999* (SA), Schedule – AustralAsia Railway (Third Party Access) Code.

- the relevant costs – the costs of providing the relevant services, which includes a reasonable rate of return on assets and a contribution to fixed costs.

In 2015, the Commission completed its first excessive revenue review, covering the period from 15 January 2004 to 30 June 2013. The Commission concluded that:[4]

- the relevant services only included bulk freight services because:
  - a sustainable competitive price for bulk freight services does not exist but does exist for intermodal freight services; and
  - under the Code, passenger services are excluded from the test;
- the relevant revenue (ie, revenue from bulk freight services) over the review period were $136.6 million; and
- the relevant costs (ie, the costs that can be attributed to providing bulk freight services) over the review period ranged from:
  - $197.2 million if government financial and asset contributions are excluded; to
  - $408.9 million if government contributions are included.

As the relevant revenue collected ($136.6 million) was below the estimated range of relevant costs ($197.2 million to $408.9 million), the Commission concluded that the below rail service provider did not earn excessive revenues during the review period.

[4] ESCOSA, *Review of rail guidelines for the Tarcoola-Darwin railway – Final decision*, October 2019, p 2.

3. What is sustainable competition?

This section discusses the Code's definition of sustainable competition, the approach to market definition and our assessment framework for this project.

3.1 The definition set out in the Code

The Commission is required to make its assessment in a manner that is consistent with the Act and the Code. The Code considers that a freight task has a sustainable competitive price if it passes the following two tests:[5]

> 1. there are no regulatory, technical or other practical impediments to the transport of the freight by a mode of transport other than the railway or combination of such alternative modes; and
>
> 2. the availability or potential availability of modes of transport other than the railway is an effective constraint on the price of transporting such freight on the railway…

The Code also provides further guidance on the definition of effective constraint, noting that: [6]

> … an effective constraint will be taken to exist when it is likely that a supplier (or the threat of entry by a potential supplier) of transportation services by a mode other than rail (supplier A) will prevent another supplier of the same or similar transportation services by rail (supplier B) from sustaining prices materially above supplier B's long term efficient cost of supply without offering materially more in return.

The code also lists out criteria that the Commission should have regard to when assessing whether other modes of transport provide an effective constraint. These factors are set out in the table below.

Table 3.1: Relevant criteria listed in the Code

Description as set out in the Code
1. the number and size of participants in the market;
2. the type and volume of freight involved and any unequal backhaul loadings;
3. whether there are any regulatory, technical or other practical barriers to entry;
4. the extent of product differentiation in the market, including the differences in the ancillary services and convenience offered by different modes of transport;
5. the dynamic characteristics of the market including any fluctuations in demand for transportation services;
6. the costs and service characteristics of transporting freight by different modes of transport (including the time for delivery of the freight, rail rolling stock or other vehicle axle loadings, length and speed of trains, and any infrastructure upgrade requirements);
7. contractual terms (such as duration and frequency of service, whether for a specific volume or at call);
8. congestion and bottleneck inefficiencies caused by constraining points on the road, railway or other relevant infrastructure;
9. the safety requirements the different modes of transport are required to meet;
10. the direct and indirect costs of environmental impacts of the different modes of transport; and
11. any other relevant matters.

Source: AustralAsia Railway (Third Party Access) Code, pp 27-28.

[5] *AustralAsia Railway (Third Party Access) Code*, p 27.

[6] *AustralAsia Railway (Third Party Access) Code*, p 5.

3.2 Market definition used for this study

In its 2015 review, the Commission considered that the Tarcoola-Darwin railway provided two distinct freight services, the provision of bulk freight transport services and the provision of intermodal freight transport services. Several other regulators, such as the Queensland Competition Authority (QCA)[7] and the Australian Competition and Consumer Council (ACCC),[8] have also taken similar approaches to delineate the rail freight market.

Market definition is the identification of the competitive constraints that are likely to have a substantial effect on a particular product or service (they are 'in' the market), as distinct from those that are likely to have a less immediate effect (they are 'out' of the market).

Consistent with previous studies we have defined two separate markets for this study, ie:

- the transportation of bulk freight services; and
- the transportation of intermodal freight services.

We consider that these two freight services are in two separate markets because the competitive constraints upon them are different, ie:

- the below rail service provider can set a different access charge for intermodal freight and bulk freight services based on their ability to pay to use rail;
- the potential for substitution between the use of rail and road differs between intermodal and bulk freight because:
  - the cost of switching to road from rail is higher for bulk freight services than for intermodal freight for a given price of rail usage – given this, switching to road is likely to be less viable for bulk freight services; and
  - containerised freight is likely to be more time sensitive – road offers faster door-to-door time, which is more valuable for intermodal freight rather than bulk freight.

The above suggests that the competitive constraints on the transportation of bulk and containerised freight services are different, and so should be considered separately in the analysis.

3.3 Our assessment framework

Our assessment framework is consistent with the definition of sustainable competition as set out in the Code. For the period between 1 July 2013 to 30 June 2018, we have considered whether bulk and intermodal freight services pass the following two tests:

- test 1: whether there were impediments to transporting freight by other means; and
- test 2: whether other modes of transport provided an effective constraint.

If a freight service passes both tests, then we would conclude that it is subject to sustainable competition from another transport mode, and so a sustainable competitive price exists for that freight services.

The key objective of test 1 is to examine whether other transport modes were a practical and viable alternative to rail. In making our assessment for test 1, we have considered the following:

- the degree to which alternative transport modes have been used to undertake a similar task; and

[7] For example, see QCA, *Final recommendation – part B: Queensland Rail declaration review*, March 2020.

[8] For example, see ACCC, *Draft decision – Australian Rail Track Corporation's 2018 Interstate Access Undertaking*, December 2018, p 9.

- if alternative transport modes have not been used or only used in a limited manner, whether it could have been a practical alternative to rail.

Test 2 is focused on whether another transport mode has provided an effective competitive constraint to the below rail service provider on the Tarcoola-Darwin railway. In our opinion, the concept of effective constraint is closely related to the definition of a workably competitive market. When a product or service is in a workably competitive market:

- the ability of firms to profitably set prices above (or quality below) the competitive level over the long term is constrained by the threat of (actual and potential) competitors, ie, firms cannot act independently of competitors and/or customers; and
- the revenue earned by suppliers over the long term will approximate the efficient expected costs of supplying the product or service.

To assess whether other transport modes have been an effective constraint, we consider the following factors:

- evidence of competition between rail and other transport modes, including:
  - changes in market share over time; and
  - whether other modes have constrained the below rail operator's ability to profitably increase prices;
- whether revenues earned by the below rail provider have been above the likely costs of providing the services; and
- other factors in the code.

4. Assessment of bulk freight services

This section discusses the Commission's 2015 findings for bulk freight services and our assessment of whether bulk freight services have been subject to sustainable competition in the period we are examining.

4.1 The Commission's 2015 findings

In its 2015 report, the Commission considered that there are minimal regulatory or technical impediments to transport of freight by road along the corridor. The Commission highlighted that heavy vehicles continued to be used along the along the corridor and suggested that this was evidence that there were limited regulatory or technical barriers to using road as an alternative to rail freight.

The Commission then considered whether there were other practical impediments to using alternative modes along the corridor, including whether it was commercially practical to use alternative modes. The Commission considered that it was not commercially practical for bulk freight to be transported by road over longer distances. To support its conclusion, the Commission pointed to the following evidence:

- it is generally accepted that rail does not face sustainable competition in the transport for bulk freight;
- stakeholder submissions supported the notion that road does not provide a sustainable competitive price to rail for bulk freight; and
- data provided by the below rail operator at the time, which indicated that it assumed that its bulk mineral customers were not subject to sustainable competitive prices from road.

Given the above, the Commission considered that bulk freight services were not subject to sustainable competition from road.

4.2 Assessment of the bulk freight task

4.2.1 Test 1: were there impediments to using other transport modes

In making our assessment for test 1, we have considered whether alternative transport modes are used to undertake a similar task and, if not, did alternative transport modes represent a practical alternative?

Other transport modes have not been used to undertake a similar task

The existing rail bulk freight task on the Tarcoola-Darwin railway involves the transport of mining products from the mine to port for export. Whether a mine would find it beneficial to use the Tarcoola-Darwin railway depends on the location of the mine and port, and the distance it would take to complete the task via rail compared with road.

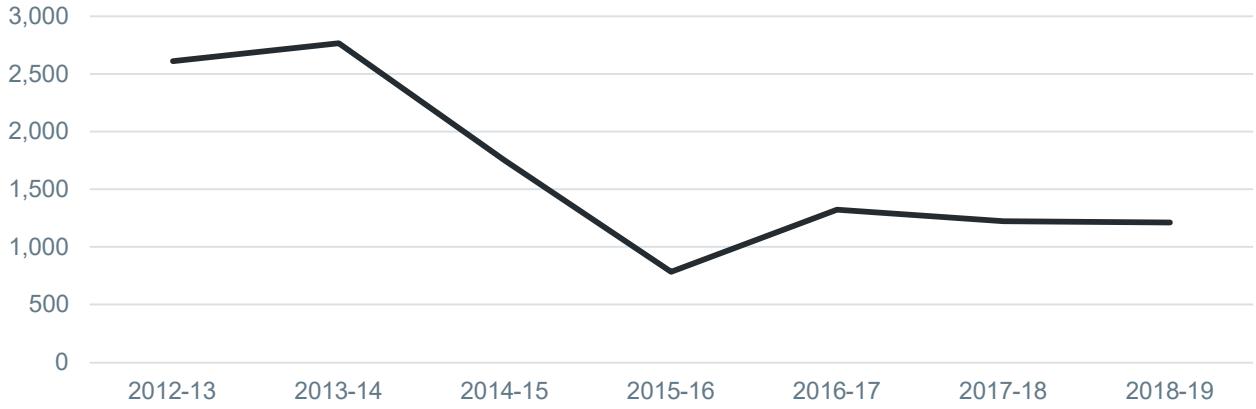
Our discussions with stakeholders indicate that rail is used to transport mining products from existing mines that use the Tarcoola-Darwin railway to port – the role of heavy road vehicles is limited to the transport of mining products from the mine to the nearest rail siding site where relevant.

Figure 4.1 shows the amount of bulk freight transported on the Tarcoola-Darwin railway between 2012-13 and 2018-19. The data shows significant yearly fluctuations in volumes between 2012-13 and 2018-19 and an overall decrease in freight volumes over the period.

We understand that the change in bulk freight volumes were due to changes in mine output rather than the task switching to other transport modes. The significant drop in bulk freight flows between 2013-14 and 2015-16 were due to the suspension of mining at Territory Resources' Frances Creek mine in 2014 and the

cessation of output from the OM Manganese Bootu Creek mine near Tennant Creek in November 2015.[9] The increase in 2016-17 was due to the resumption of the service between the OM Manganese mine and the Port of Darwin.[10]

Figure 4.1: Bulk freight flows on the Tarcoola – Darwin railway (tonnes, thousands)



Source: Analysis of data from AustralAsia Railway Corporation (AARC) annual reports 2012-13 to 2018-19, available at: http://www.aarail.com.au/about/publications/. See 'business overview' section of each report.

Rail has a significant cost advantage over road in completing a similar task

We expect that road is the only viable alternative transport mode to undertake the bulk freight task, ie, transport of mining products to port for export. Transport by air would likely be significantly more expensive than road or rail.

To examine whether road represents a viable alternative to rail, we consider the costs of transporting mining products from a hypothetical mine in the Northern Territory to Port of Darwin using rail compared with using road only. We further assume that this mine exports around 450,000 tonnes of product per year.

To estimate the costs of completing this freight task using road only, we have made the following assumptions:

- the task would be completed by triple road trains;
- mine to port distance of using heavy vehicles is 800 kilometres; and
- there is no backhaul.

We understand that the above assumptions and task would be typical for a mine that uses the Tarcoola-Darwin railway.

To estimate the costs of completing the same freight task by rail, we have made the following assumptions:

- heavy vehicles would transport the mining products from the mine to the rail siding site – the mine to rail siding distance is 100 kilometres and would be completed using triple road trains;
- there would be costs associated with loading and unloading at the rail siding site;
- the rail to port trip would involve 750 kilometres;

[9] AARC, *Annual report 13/14*, 26 August 2014, p 7; and AARC, *Annual report 15/16*, 15 November 2016, p 7.

[10] AARC, *Annual report 16/17*, 12 December 2015, p 6.

- below rail access charge is: [11]
  - > $7.58 per thousand gross tonne kilometres (kGTK); plus
  - > $6.321 per train kilometre; and
- there is not backhaul.

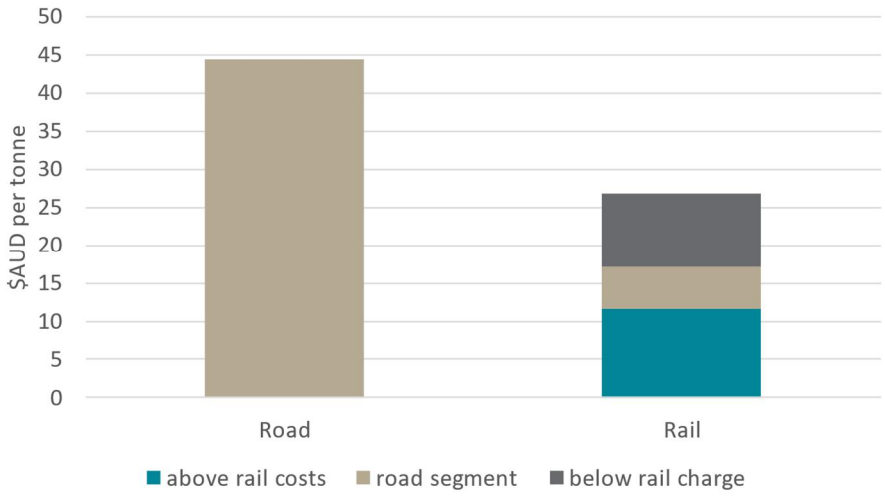
Appendix A.1 contains the detailed assumptions we have made to estimate the costs of completing this freight task by road only and via rail.

The diagram below shows cost of completing the task on a per tonne basis by mode. The estimated costs of transporting freight using heavy vehicles only is around $44.5 per tonne. The costs of completing the freight task via rail is around $26.8 per tonne, comprising:

- $11.6 per tonne to cover above rail costs, including the cost of loading and unloading the mining products at the rail siding site;
- $5.5 per tonne to cover the costs of transporting the mining products from the mine to the rail siding site; and
- $9.7 per tonne associated with the below rail access charge.

Overall, the cost of using just heavy vehicles is around $18 per tonne (or 66 per cent) higher than the cost of transporting via rail.

Figure 4.2: Transport costs for the hypothetical mine – by road and rail



In general, bulk freight is 'price sensitive' rather than 'time sensitive'. In other words, transport costs are the main driver for mines in determination of which transport mode to use. The hypothetical example above suggests that the costs of transporting bulk freight via rail is materially lower than road. This suggests that road freight services do not provide a sustainable competitive price. In other words, the below rail operator could increase its price by a small but significant amount (of, say five to ten per cent) and there would likely be limited switching from rail to road.

[11] This is based on ARTC's published indicative access charges for Tarcoola-Alice Springs. Available at: https://www.artc.com.au/customers/access/access-interstate/access-charges/

4.2.2 Test 2: do other transport modes represent an effective constraint?

The first test set out in the code is whether there are impediments to transporting freight along the corridor using other modes. The test has a broad definition of impediments – it could be regulatory or technical impediments, or other practical impediments.

Given the broad definition of impediments, we consider it reasonable that commercial viability is considered as a practical impediment. That is, if road freight services do not represent a commercially viable alternative, then there are practical impediments to using road freight services as an alternative.

Notwithstanding this, alternative transport modes that are not commercially viable also do not represent an efficient constraint. As discussed above, the cost difference between using road and rail means that below rail charges could increase by 5 to 10 per cent and rail freight services would still have a material cost advantage over road freight services.

4.3 Assessment against the Code

We have concluded above that bulk freight services have not been subject to sustainable competition along the Tarcoola-Darwin freight corridor. Given this, we have not undertaken an assessment of bulk freight against other criteria set out in the Code.

5. Assessment of intermodal freight services

This section describes the Commission's 2015 findings for intermodal freight services and our assessment of whether intermodal freight services have been subject to sustainable competition in the period we are assessing.

5.1 The Commission's 2015 findings

The Commission considered that there were minimal regulatory and practical barriers of using road freight services along the Tarcoola-Darwin corridor. It noted that road transport dominated inter-modal routes in Australia and despite the long distance of the Tarcoola-Darwin route, road transport continued to operate in competition with the railway. As such, the Commission did not consider that there were impediments to using road to transport intermodal freight.

The Commission examined whether road transport represented an effective constraint by examining the criteria set out in the Code. The Commission's analysis is summarised in table 5.1 below. Based on its assessment against the criteria, the Commission concluded that intermodal freight services were subject to sustainable competition.

Table 5.1: The Commission's analysis against the criteria set in the Code

Factors	The Commission s 2015 findings
The number and size of operators in the market	The only competition comes from road transport. The road freight sector has a large number of operators and is highly competitively. There are many operators offering services from Adelaide to Darwin.
The type and volume of freight involved and any unequal backhaul loadings	Competition from road freight is principally for intermodal freight. There is unequal loading as most of the freight travelling from south to north.
Whether there are any regulatory, technical or other practical barriers to entry	The Commission concluded in its 2015 review that there are minimal barriers to entry for road freight and some for coastal shipping.
The extent of product differentiation in the market	The main difference between road and rail is the flexibility that road offers in comparison to rail. However, the Commission considered that this becomes less important over longer distances.
The dynamic characteristics of the market including any fluctuations in demand for transportation services	The Commission found that the share of rail freight on the Adelaide-Darwin route fluctuated between around 50 per cent between 1972 to 2008. Since 2008, rail's market share of the contestable intermodal freight increased to 90 per cent in 2013-14. This suggests that the case for road transport providing sustainable competition is diminishing over time. However, The Commission considered that road freight was competitive with rail over the review period.
The costs and service characteristics of transporting freight by different modes of transport	The Commission considers that rail becomes more competitive against road as the distance and weight of the freight task increases.
Contractual terms (such as duration and frequency of service, whether for a specific volume or at call)	The Commission found that intermodal freight is generally at call, and so a container could be booked onto a train without the need for a contract.
Congestion and bottleneck inefficiencies caused by constraining points on the road, railway or other relevant infrastructure	The Commission considered that neither mode had a substantial advance over the other in this area.
The safety requirements the different modes of transport are required to meet	The Commission noted that some of the safety rules are different in the road and rail freight sectors. However, the Commission did not consider that these requirements would prevent effective competition between the two modes.
The direct and indirect costs of environmental impacts of the different modes of transport	The Commission noted that rail freight is more environmentally friendly than road freight. However, the Commission did not consider this would prevent effective competition between the two modes.
Any other relevant matters	The Commission did not identify any other relevant matters.

5.2 Test 1: were there impediments to using other transport modes?

The intermodal freight task on the Tarcoola-Darwin railway generally involves the transport of containerised goods between the Northern Territory to capital cities in the south of Australia (particularly Adelaide). Test 1 involves assessing whether there were impediments to using alternative modes to undertake a similar freight task. That is, whether the containerised freight between the Northern Territory to South of Australia could have practically been transported by other modes.

We expect that road is the only transport mode that could represent a practical alternative. Coastal shipping does not appear to be a practical alternative – for example, Bureau of Infrastructure and Transport Research Economics (BITRE) data indicates there were no/limited domestic sea freight that went from Darwin Port to Port Adelaide and vice versa in 2016-17.[12] Transport of containerised goods via air is likely to significantly more expensive than road or rail, and so is commercially unviable.

The Australian Bureau of Statistics (ABS) road freight movement survey data suggests that around one million tonnes of the containerised freight was transported from southern capital cities to the Northern Territory and vice versa in 2013-14 – table 5.2.[13] We expect that this road freight would have most likely involved travel along the Stuart Highway to and from the Northern Territory. Given this, we consider that this freight could have potentially be transported via the Tarcoola-Darwin railway given the distance and the origin destination of the trip.

Table 5.2: Road freight flows to and from Northern Territory by key capital cities (tonnes, thousands)

	From the NT	To the NT	Total
Adelaide	377.2	517.0	894.20
Sydney	147.3	9.6	156.90
Melbourne[14]	0.0	0.0	0.00
Perth	7.1	7.1	14.20
Total	531.6	533.7	1065.30

Source: *unpublished data from ABS Road Freight Movements* survey

Annual traffic volumes suggest the amount of containerised freight transported via the Stuart Highway has increased since 2013-14.[15] Figure 5.1 presents the average annual daily traffic (AADT) for Austroads class 11 and 12[16] vehicles on the Stuart Highway, 200 meters north of Kulgera. The data shows that AADT of class 11 and 12 has been increasing steadily since 2014, growing at a rate of roughly 2.5 per cent per year from 2014 to 2019.

[12] BITRE, Australian Sea Freight 2016-17, October 2019, table 2.3.

[13] ABS, Microdata: Road freight movements, Australia 2014, 22 June 2016.

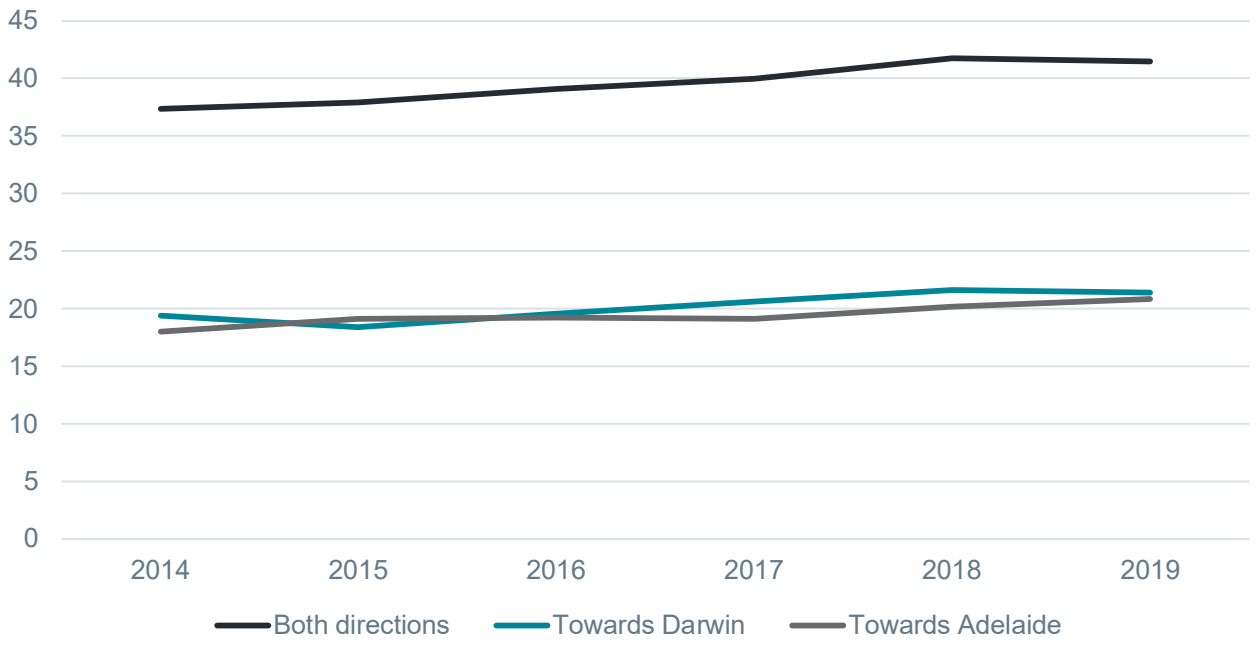
[14] ABS's road freight movements data is the best available data we have found during this project. 8,000 trucks were included in the road freight movement analysis where respondents reported its driving activities over a one week period within the reference year. In some cases, the road freight movement suggests there is no freight going from one destination to another, eg, Melbourne to Northern Territory. In some cases, there could be freight going from these origin destinations but are not captured by ABS's data due to sampling error.

[15] The Northern Territory Department of Infrastructure, Planning and Logistics publish annual traffic reports. These reports provide the AADT by vehicle type on key parts of the road network. These reports are available at https://dipl.nt.gov.au/data/traffic-report.

[16] Class 11 and class 12 represent the largest vehicle types under the Austroads vehicle classification system. For example, a double road train is classified as a class 11 vehicle and a triple road train is classified as a class 12 vehicle.

We have analysed traffic volumes from the Kulgera site because it has the lowest AADT of all the available vehicle counting stations along the Stuart Highway. It follows that the Kulgera site is likely to have the lowest amount of localised traffic, and so a larger proportion of the road traffic would likely be interstate containerised freight to and from the Northern Territory. [17]

Figure 5.1: AADT of class 11 and 12 heavy vehicles on the Stuart Highway – 200 metres North of Kulgera



Source: Department of Infrastructure, Planning and Logistics (NT) annual traffic reports, 2014 – 2019. Notes: In each report we took the AADT count for count station RAVDP003 (from table 2.1) and the percentage of class 11 and class 12 heavy vehicles in the total traffic count at that count station (from table 5.2). We multiplied the fraction of class 11 and 12 vehicles by the total count to obtain the average daily number of class 11 and 12 vehicles for each year. Inbound was confirmed by the Department to be towards Darwin.

The above analysis suggests that a significant amount of containerised freight has been transported between the Northern Territory and Capital cities in southern Australia via the Stuart Highway and this road freight has increased over time. Given this, we consider that road has been a viable alternative and road freight services could have provide a sustainable competitive price for intermodal freight.

5.3 Test 2: do other transport modes represent an effective constraint?

To assess whether road freight services represent an effective constraint for rail intermodal freight travelling on the Tarcoola-Darwin railway, we have considered the following:

- evidence of competition between rail and road, including:
  - changes in market share over time; and
  - whether road freight services have constrained the below rail service provider's ability to profitably increase prices;
- whether revenue earned from intermodal services by the below rail service provider have been above the likely costs of providing these services; and

[17] However, we note that heavy vehicles going between Darwin and Sydney may elect to travel via A2 Highway rather than the Stuart Highway.

- the criteria listed in the Code.

5.3.1 Evidence of competition between road and rail

The market share of road has increased from 2014 to 2019

We have estimated the market share of interstate containerised freight that travels along the Tarcoola-Darwin corridor by mode. Our approach to estimating market share is as follows:

- rail freight volumes are based on data available from AARC annual reports;[18] and
- road freight volumes have been estimated as follows:
  - volumes in 2013-14 have been estimated using ABS road freight data, which suggests that around 1.1 million tonnes have been transported between the Northern Territory to other capital cities in southern Australia – Table 5.2; and
  - we have assumed that road freight in following years changes in line with changes in AADT of class 11 and 12 vehicles at the Kulgera vehicle counting site – figure 5.1.[19]

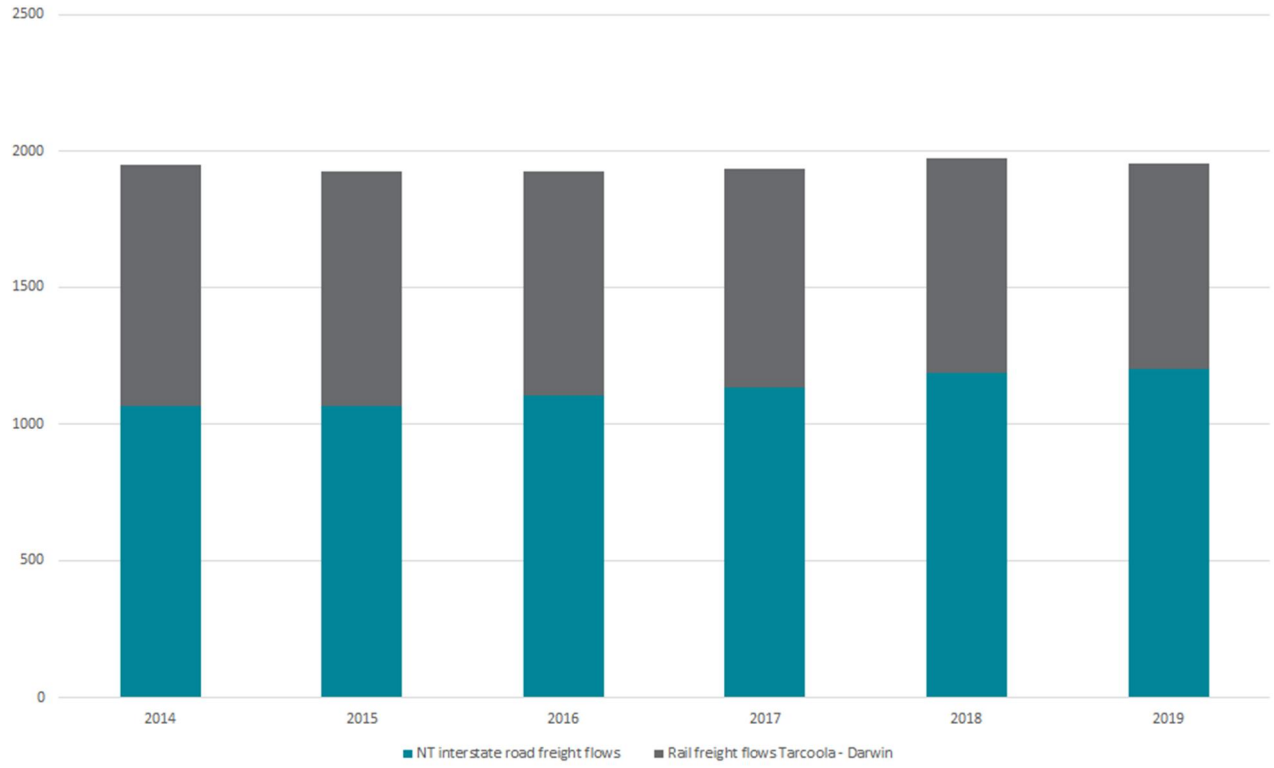
Figure 5.2 below shows how the market share between road and rail has changed between FY2014 and FY2019. This highlights that:

- the total amount of interstate containerised freight travelling along the Tarcoola-Darwin corridor has remained largely unchanged between 2013-14 and 2018-19, or slightly less than two million tonnes per year during the period;
- the amount transported via road has increased steadily over this period, going from around 1.1 million tonnes in 2013-14 to 1.2 million tonnes in 2018-19;
- the share of rail freight has declined over the period, going from 0.87 million tonnes in 2013-14 to 0.75 million tonnes in 2018-19; and
- consequently, the market share undertaken by road has increased from 55 per cent in 2013-14 to 62 per cent in 2018-19.

[18] The AARC annual reports are available at https://www.aarail.com.au/publications

[19] We have selected the Kulgera site because it has the lowest vehicle count along the Stuart Highway. It follows that it will have the lowest proportion of localised traffic and the highest proportion of interstate traffic when compared to other vehicle counting sites. Notwithstanding this, some of the AADT captured by the AADT could be localised traffic, which means that changes in AADT could be due to changes in localised traffic rather than changes in interstate freight volumes.

Figure 5.2: Intermodal freight travelling along the Tarcoola-Darwin corridor by mode (FY, tonnes, thousands)



Source: HoustonKemp analysis

Below rail service provider's ability to price is likely restricted by road freight services

To examine whether road freight services represent an efficient constraint, we consider the costs of transporting containerised products by road and rail for a hypothetical logistics company. The hypothetical logistics company moves around 14,000 Twenty-foot Equivalent Unit (TEUs) per year between its distribution centre in Darwin and its distribution centre in Adelaide.

To estimate the cost of completing the freight task by road, we have assumed that:

- the distance between the two distribution centres using heavy vehicles is 3,000 kilometres;
- the trip would be completed using triple road trains; and
- the load factor is 90 per cent and 40 per cent on the north and south bound legs, respectively.

To estimate the cost of completing the same freight task by rail, we have made the following assumptions:

- the distribution centre to rail terminal distance is 15 kilometres at both ends and would be completed using a triple road train;[20]
- two hours of train operator handling is required at each end;
- the rail distance is 2,975 kilometres;

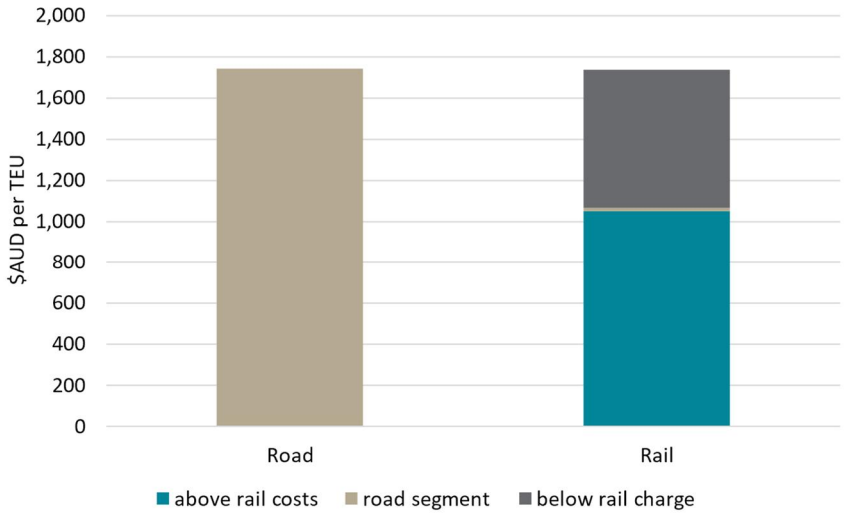
[20] We have implicitly assumed that the distribution centre will be located in an area that has access to the road train network. The first and last leg for may need to be completed by a smaller heavy vehicle, such as a six axle articulated truck. However, this will likely have a minor difference to overall costs.

- below rail costs are[21]
  - > $6.238 per kGTK; plus
  - > $5.20 per train kilometre; and
- The load factor is 90 per cent and 40 per cent on the north and south bound legs, respectively.

Appendix A.1 contains the detailed assumptions we have made to estimate the costs of completing this freight task by road only and via rail.

The diagram below shows cost of completing the task on a per TEU basis by mode.

Figure 5.3: transport costs for the hypothetical logistics company – by road and rail



The estimated costs of transporting containerised freight using heavy vehicles only is around $1744 per TEU. The costs of transporting containerised freight via rail is around $1,735 per TEU, comprising:

- $1,050 per TEU to cover above rail costs;
- $18 per TEU to cover the costs of transporting the containers to and from the distribution centre; and
- $668 per TEU associated with the below rail charge.

Overall, the cost of using heavy vehicles only is around $9 per TEU (or 0.5 per cent) higher than the cost of transporting via rail. The limited cost difference between rail and road suggests that the below rail service provider has limited ability to increase its access charge without a risk of losing material market share.

In contrast to bulk freight, containerised freight is more time sensitive. That is, door to door transit time and service availability/frequency are more important factors for containerised freight than bulk freight. Road freight services provide faster transit time and provide more operational flexibility. For example, the AARC noted that one of the reasons it has experienced a decline in its intermodal freight was because Woolworths moved its produce perishable goods to rail to achieve an additional 24 hour shelf life.[22]

[21] This is based on ARTC's published indicative access charges for Tarcoola-Alice Springs. Available at: https://www.artc.com.au/customers/access/access-interstate/access-charges/

[22] AARC, *2017-18 Annual Report*, p 6.

It follows that although the above example is hypothetical, rail freight services will likely need to have lower door-to-door transport costs to be competitive to road freight services. This further constrains the ability of the below rail service provider to increase access charges without the risk of losing material market share.

5.3.2 Revenue earned by the below rail service provider compared to its efficient cost

The key objective of this step is to examine whether the revenue earned by the below rail service provider from intermodal freight exceeds the long term efficient costs of providing intermodal freight services. In other words, has the below rail service provider earned excessive revenues from intermodal freight services?

A full assessment would require a detailed examination of the revenue and costs associated with provision of below rail services for intermodal freight. This will require careful consideration of how revenue and costs should be allocated between:

- the above rail and below rail business, as One Rail is a vertically integrated provider; and
- different below rail services, including other freight services and passenger services.

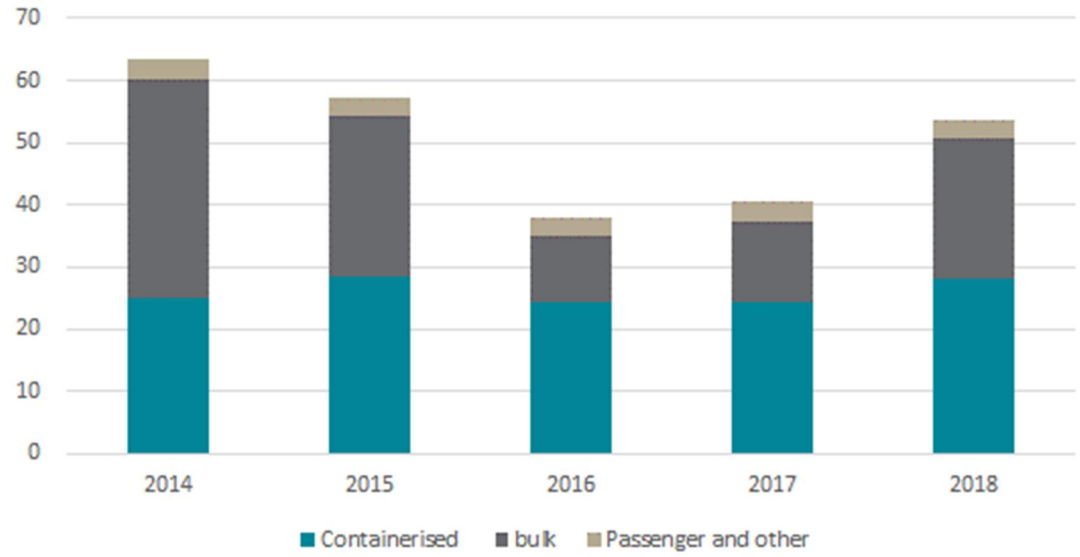
We have undertaken a high level review of costs and revenue for this study, relying on some of the Commission's findings from its 2015 review. We have not considered how revenue and costs should be allocated as we understand that the Commission will undertake this assessment as part of its broader review.

Below rail access revenue has declined over the past five years

Figure 5.4 below depicts the below rail access revenue by source. Overall, revenue collected varied significantly from year to year but has declined over the five year period.

The main driver of changes in access revenue is revenue collected from bulk freight services. Bulk freight revenue declined significantly in 2014-15 and 2015-16, and partially recovered in 2016-17 and 2017-18. Access revenue from intermodal freight has remained relatively stable during the five year period, going from $24.9 million in 2013-14 to $28.2 million in 2017-18. This represents a 10 per cent increase over the period in nominal terms.

Figure 5.4: Below rail access revenue by source (FY, nominal $ millions)



Source: data provided by the Commission

The relevant costs of providing intermodal freight services are likely higher than revenue collected

As mentioned above, we have not undertaken a detailed assessment of what the likely cost of providing intermodal freight services have been. This assessment will also need to consider the cost allocation between above and below rail services given the vertically integrated nature of One Rail. For this study, we have relied on the Commission's 2015 findings. In its 2015 review, the Commission found that:

- the total cost of providing below rail services on the Tarcoola-Darwin railway during the review period ranged from 786.4 million if government contributions are excluded, or $1,622.6 million if government contributions are included – this equates to between $74.9 million to $154.5 million per year[23]; and
- the totals cost attributable to providing bulk freight services on the Tarcoola-Darwin railway during the review period ranged from $197.2 million to $408.9 million – this equates to between $18.8 million to $38.9 million per year. [24]

This suggests that the total costs of providing other below rail services were around $55.9 million to $116.1 million per year between 2004 to 2013 – see table 5.3. We expect that most of these costs would be attributable to the provision of intermodal freight services on the Tarcoola-Darwin railway.

This is significantly more than the revenue that the below rail service provider collected from intermodal freight services between 2013-14 to 2017-18 (around $25 million to $28 million per year). Put another way, costs of providing below rail intermodal freight services would need to have decreased by 50 per cent for revenue to exceed costs. Put another way, the costs attributable to provision of intermodal freight services will need to have decreased significantly since the Commission's 2015 review for the revenue collected to be higher than the relevant cost.

Given the above, we expect that the relevant costs of providing intermodal rail freight services are likely to have been higher than the associated revenue between 2013-14 to 2017-18.

Table 5.3: Costs of operating the Tarcoola-Darwin railway over the ten year review period between 2004 to 2013 (millions, $December 2014)

	Bulk freight services	Other below rail services	Total
Avoidable costs	40.8 – 41.4	111.2 – 111.8	152.6
Fixed costs	156.4 – 367.5	475.3 – 1,107.3	633.8 – 1,470.0
Total during the 10.5 year review period	197.2 – 408.9	586.5 – 1,219.1	786.4 – 1,622.6
Average per year	18.8 – 38.9	55.9 – 116.1	74.9 – 154.5

Source: We have calculated the costs of providing other below rail services as the difference between total cost and bulk freight costs. Some of these costs should be allocated to the provision of passenger services but we expect that this would be a minimal amount. Cost figures have been sourced from ESCOSA, Tarcoola-Darwin Railway: 10 year review of revenues, August 2015, p 41.

5.3.3 Assessment against the Code

In this section, we consider the criteria set out the Code. Our analysis above has covered many of the criteria set out in the Code. Table 5.4 below provides our assessment against the Code. Overall, our assessment did not highlight any criteria that would have a material influence on our conclusions.

[23] The review period for the Commission's 2015 review was 15 January 2004 to 30 June 2013, or approximately 10.5 years. Given this, we have divided total costs by 10.5 to estimate the average cost per year.

[24] See comment above.

Table 5.4: Our assessment against criteria set out in the Code for intermodal freight services

Criteria	Our assessment
The number and size of operators in the market	The number and size of operators in the heavy vehicle sector supports our conclusion that intermodal freight is subject to competition from road freight services. The heavy vehicle sector has a large number of operators across Australia. Our analysis in section 5.2 above shows there have been significant interstate road freight movements along the Tarcoola-Darwin freight corridor, which could have potentially used the Tarcoola-Darwin railway. This indicates that road is a viable alternative and heavy vehicle services are available along the corridor. There is only one above rail operator operating along the Darwin-Tarcoola railway. We understand from our discussions with stakeholders that other above rail operators have expressed an interest in operating on this line, but none have entered the market. It is unclear why another above rail operator has not entered the market. However, this could be because of the relatively small rail freight volumes along the corridor makes it financially less attractive for another above rail operator to enter into the market.
The type and volume of freight involved and any unequal backhaul loadings	We do not expect the volume of freight and any unequal backloading to have a material effect on competition between road and rail along the Tarcoola-Darwin freight corridor. Our analysis in section 5.3.1 indicates that rail and road both have significant market share of the freight task along the corridor – in 2018-19 road's market share was 62 per cent compared with 38 per cent for rail). Furthermore, unequal backhaul loading appears to exist for both transport modes: • for road freight services, our analysis of ABS data (section 5.2) suggests that there is unequal backhaul loadings between the Northern Territory and its two main interstate destinations, Adelaide and Sydney; and • for rail freight services, our discussions with stakeholders indicate that there is also unequal backhaul loading for rail freight using the Tarcoola-Darwin railway, with more freight northbound than there is southbound.
Whether there are any regulatory, technical or other practical barriers to entry	The Commission concluded in its 2015 review that there are minimal barriers to entry for road freight. Our analysis in section 4.2 shows that road freight has gained market share between 2014-2019, which supports the notion that the barriers to entry to the road freight sector are not significant.
The extent of product differentiation in the market, including the differences in the ancillary services and convenience offered by different modes of transport	We expect that road freight services would have a competitive advantage over rail freight services from a product differentiation perspective. Transportation via the road network allows for faster door-to-door time and schedule flexibility. As such, rail generally needs to offer lower door to door costs for it to be competitive with road. Furthermore, the investment required to have heavy vehicles as an ancillary service is significantly lower than rail. As such, using heavy vehicles as an ancillary service will be viable for more businesses compared to rail.
The dynamic characteristics of the market including any fluctuations in demand for transportation services	The changes in market share provides evidence of road rail competition along the corridor. The intermodal freight on the Tarcoola-Darwin railway generally involves the transport of containerised freight between Northern Territory and other capital cities. Our analysis shows that the majority of the interstate containerised freight between Darwin and other southern capital cities is undertaken by road, and rail has been losing market share between 2014 to 2019.
The costs and service characteristics of transporting freight by different modes of transport	Our analysis above suggests that road freight services constraints the below rail service provider's ability to increase access charges. The below rail access provider's ability to increase access charges is further limited by road freight service's ability to offer faster door-to-door time and schedule flexibility. It follows that rail freight services will likely need to offer lower door-to-door costs to be competitive with road freight services.
Contractual terms (such as duration and frequency of service, whether for a specific volume or at call)	The Commission found in its 2015 review that inter-modal transport market is generally at call. This allows inter-modal freight forwarders to switch transport modes at short notices. We are unaware of any changes that could change the Commission's findings in its 2015 review.
Congestion and bottleneck inefficiencies caused by constraining points on the road, railway or other relevant infrastructure	The Commission considered in its 2015 review that neither mode had a significant advantage over the other in this area. We have not identified any evidence that would change the Commission's findings in its 2015 review.
The safety requirements the different modes of transport are required to meet	Rail is generally considered to be a safer mode than heavy vehicles. The Commission's 2015 review concluded that safety requirements were unlikely to have a material influence on mode choice between road and rail. We are unaware of any changes that could change the Commission's 2015 findings and we do not expect that this would have a material influence on mode choice between road and rail.
The direct and indirect costs of environmental impacts of the different	Rail is generally considered to be more environmentally friendly than heavy vehicles. The Commission's 2015 review concluded that this was unlikely to have a material influence on

Criteria	Our assessment
modes of transport	mode choice between road and rail. We are unaware of any changes that could change the Commission's 2015 findings and we do not expect that this would have a material influence on mode choice between road and rail.
Other factors considered to be relevant	We did not identify any other factors we consider to be relevant.

6. Conclusion

We have assessed which freight types on the Tarcoola-Darwin railway have been subject to sustainable competition for the period from 1 July 2013 to 30 June 2018.

Consistent with the Code, we have made our assessment having regard to:

1. whether there were any regulatory, technical or other impediments to the use of other transport modes; and
2. whether other transport modes represented an effective constraint

The bulk freight task on the Tarcoola-Darin railway involves the transport of mining products to port for export. In our opinion, this freight task has not been subject to sustainable competition because switching from rail to road is commercially unviable. Our reasoning is as follows:

- alternative transport modes have not been used to undertake a similar task, which supports the notion that road freight services have not been a commercially viable alternative – we understand that all outputs from the mines that currently use the Tarcoola-Darwin railway have been transported to port for export via rail and no switching between road or rail have been observed;
- bulk freight is 'cost sensitive' rather than 'time sensitive' – it follows that the total cost of transport is a key driver in deciding which transport mode is used to transport bulk freight;
- the costs of transporting mining products using rail have been, based on available information, substantially lower than using road; and
- road freight services have not represented an efficient constraint – the cost differences between road and rail means that the below rail service provider could potentially increase its access charge by five or ten per cent without a material risk of this freight task switching to road.

The intermodal freight task on the Tarcoola-Darwin railway generally involves the transport of containerised goods between the Northern Territory and capital cities in the south of Australia, particularly Adelaide. Available evidence suggests intermodal freight has been subject to sustainable competition from the road freight service. Our reasoning for reaching this conclusion is as follows:

- available evidence suggests there have been limited impediments to using heavy vehicles to undertake similar tasks – a significant amount of containerised freight between the Northern Territory and Adelaide/Sydney is undertaken by road freight services and this has increased over time;
- road freight services are likely to have presented an effective constraint, given that:
  - there is evidence of road-rail competition between 2013 and 2018, where:
    - road's market share has increased over time, going from 55 per cent in 2013-14 to 62 per cent in 2018-19; and
    - One Rail's ability to increase access charges have been constrained by road freight services – One Rail has limited ability to increase access charges without a material risk of freight switching to road;
  - revenue collected from intermodal services have likely been lower than the associated costs of providing the services since:
    - below rail access revenue from intermodal services ranged from around $25 million to $28 million per year between 2013-14 and 2017-18;
    - the Commission's 2015 review suggests that the relevant costs of providing non-bulk below rail services ranged from $59 million (if government contributions are excluded) to $116 million (if government contributions are included) – most of these costs would likely be attributable to intermodal freight; and it follows that

- the costs of providing below rail intermodal freight services would need to have decreased by around 50 per cent for revenue to exceed associated costs; and

> our assessment of the criteria in the Code did not identify any factors that would influence our conclusions above.

A1. Detailed costing assumptions

We have estimated the costs of completing the freight task using road and rail for our hypothetical freight task case studies. For heavy vehicles, we have considered the following costs:

- driver labour costs (calculated as hourly wage × time required);
- fuel costs, including road user charge (calculated as fuel price × fuel use per 100 km × distance travelled);
- maintenance costs (calculated as cost per km × distance travelled);
- heavy vehicle capital costs (calculated based on assumptions on vehicle price, useful life of vehicle, residual value and rate of return); and
- registration costs (calculated as registration costs × distance travelled ÷ total distance travelled per year).

For rail, we have considered the following costs:

- crew labour costs (calculated as crew hourly costs × time required);
- fuel costs (calculated as fuel price × fuel use per locomotive per km × number of locomotives × distance travelled);
- maintenance costs, which comprises:
  - time based maintenance costs (calculated as cost per hour per locomotive × number of locomotives × time required); and
  - distance based maintenance costs (calculated as costs per wagon/locomotive km × number of wagons/locomotives × distance travelled;
- locomotive/wagon capital costs (calculated based on assumptions on number of wagons/locomotives required, market price, useful life of asset, residual value and rate of return);
- below rail access charge (calculated as charge per kGTK/km × kGTK/km distance travelled); and
- an allowance for handling/terminal costs .

Where possible, we have sourced modelling parameters from publicly available sources, such as Australian Transport Assessment and Planning (ATAP) guidelines and the Australian Trucking Association.

Given ATAP values are in nominal terms from 2013 and 2018, we have indexed these figures using the Australian Bureau of Statistics producer price index to March 2021 levels. We have also excluded GST in our analysis.

The two tables below provide further detail of the assumptions we have adopted for the two hypothetical case studies.

Table A 1.1: Heavy vehicle cost assumptions for hypothetical freight tasks

Category	Assumptions
Fuel costs	• Adelaide terminal gate diesel price excluding GST 122.4 cents per litre;[25] • Fuel excise of 42.7 cents per litre;[26]

[25] Australian Institute of Petroleum, https://www.aip.com.au/pricing/terminal-gate-prices, accessed 12 May 2021.

[26] Australian Taxation Office, https://www.ato.gov.au/Business/Fuel-schemes/Fuel-tax-credits---business/Rates---business/From-1-July-2020, accessed 12 May 2021.

	• Diesel fuel consumption of 73 litres per 100 km.[27]
Registration and road user charges	• Annual registration of $16,584[28] from NTC for triple road train allocated as a proportion of annual operating KMs; • Road user charges of 25.8 cents per litre.[29]
Truck characteristics	• Bulk freight task – payload of 82.42 tonnes and GCM of 125 tonnes;[30] • Containerised freight task – capacity of 6 TEUs based on typical configure of a Triple road train; • Annual operating KMs of 250,000 km[31]; • Average speed of 100KM/h for long distance trips, average speed of 75km for trips near metropolitan centres[32];
Labour	• Hourly labour resource cost of $28.45[33];
Financial parameters	• Rate of return of rate of 10% per year for capital expenditure [34] • ATAP figures indexed to March 2021 levels using ABS producer price index[35];
Capital expenditure	• Capital cost of $707,011 for A-Triple, 10 year asset life and 25% residual value;[36] • Capital expenditure allocated on a per cent of annual operating kms basis.
Maintenance costs	• Maintenance costs of $36.30 per 100 KM;[37] • Tyre life of 120,000km per tyre and assumed resource cost of $695;[38]
Trip characteristics	• Bulk freight task - load factor of 100% on first leg of trip, 0% load factor on return leg; • Containerised freight task – load factor of 90% on first leg; 40% on return leg; • Round-trip distance of 1,600 km and 6,000km for bulk freight task and containerised freight task respectively.

Table A 1.2: Rail model assumptions for hypothetical freight task

	Bulk freight task	Containerised freight task
Energy and fuel costs	• Fuel use per km (per locomotive) of 7.50 litres[39]; • Fuel tax credit of $0.427 per litre[40]; • Adelaide terminal gate diesel price excluding GST 122.4 cents per litre[41].	

[27] Based on fuel use data available in NTC's PAYGO model, available at https://www.ntc.gov.au/sites/default/files/assets/files/PAYGO-model-version-2.3.XLSM

[28] National Transport Commission, https://www.ntc.gov.au/laws-and-regulations/registration-charges-heavy-vehicles, accessed 12 May 2021.

[29] National Transport Commission, https://www.ntc.gov.au/laws-and-regulations/road-user-charges, accessed 12 May 2021.

[30] Australian Trucking Association, https://www.truck.net.au/system/files/industry-resources/TAPs%20-%20Truck%20Impact%20Chart%20March%202018.pdf, accessed 12 May 2021.

[31] HoustonKemp assumption.

[32] HoustonKemp assumption.

[33] Transport Assessment and Planning, https://www.atap.gov.au/sites/default/files/pv2_road_parameter_values.pdf, accessed 12 May 2021 (hereafter 'ATAP Road Parameter Values'), p 19.

[34] HoustonKemp assumption.

[35] Australian Bureau of Statistics, https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/producer-price-indexes-australia/latest-release, accessed 12 May 2021.

[36] ATAP Road Parameter Values, p 15.

[37] ATAP Road Parameter Values, p 14.

[38] ATAP Road Parameter Values, p 12.

[39] Transport Assessment and Planning, https://www.atap.gov.au/sites/default/files/documents/atap-1622-m3-pv3-freight-rail-public-consultation-draft-v4.2-2020-10-06.pdf, accessed 12 May 2021 (hereafter 'ATAP Freight Rail') p 63.

[40] Australian Taxation Office, https://www.ato.gov.au/Business/Fuel-schemes/Fuel-tax-credits---business/Rates---business/From-1-July-2020/, accessed 12 May 2021.

[41] Australian Institute of Petroleum, https://www.aip.com.au/pricing/terminal-gate-prices, accessed 12 May 2021.

Train characteristics	• Train length of 1,500 metres comprising of 70 wagons and four locomotives[42]; • Average speed of 70km/h used to calculate trip time and associated labour costs.[43]	
Labour	• crew cost of $200 per hour[44] with two crew required; • Two hours required at each end for crew to load/unload trains[45];	
Financial parameters	• ATAP nominal expenses adjusted to March 2021 levels using producer price index ABS data[46]; • Rate of return of rate of 10% per year for capital expenditure[47]	
Locomotives	• $8 m capital cost of standard DEL 5000 hp locomotive, 25 year life, 30% half-life refit cost and 5% residual value[48] • Locomotive tare of 170 tonnes[49]; • Maintenance cost of $20 per hour and $1.3 per km[50].	
Locomotives required[51]	• Four locomotives required given payload.	• Three locomotives required given payload.
Wagons	• Mineral Hopper 160 tonne: capital cost of 160,000, 30 year life, 30% half-life refit, and 5% residual value[52]; Assumed five trips per week of active use per locomotive.[53] • Wagon tare of 25 tonnes and typical load of 132 tonnes[54]. • Wagon maintenance cost of $125 per thousand kms[55];	• Triple slot container Wagon: capital cost of 180,000 for container wagon, 30 year life, 30% half-life refit, and 5% residual value[56]; Assumed three trips per week along this segment. • Wagon maintenance cost of $70 per thousand kms[57]. • Typical load of three TEUs per wagon, tare of 22 tones and typical load of 45 tonnes[58].
Trip characteristics	• Rail journey of 1,500 km round-trip; • Road component of 200 km round-trip; • Load factor of 100% on first leg, 0% on return leg.[59]	• Rail component of 5,950 km round-trip; • Road component of 100 km round-trip; • Load factor of 90% on first leg, 40% on second leg[60].
Below rail access charges[61]	• $7.581 per kGTK[62] • $6.321 per train kilometre flag fall charge for heavy freight[62]	• $6.238 per kGTK[62] • $5.20 per train kilometre flag fall charge for regular/super freight

[42] ATAP Freight Rail, p 28 – 30.

[43] HoustonKemp assumption.

[44] ATAP Freight Rail, p 62.

[45] ATAP Freight Rail, p 65.

[46] Australian Bureau of Statistics, https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/producer-price-indexes-australia/latest-release, accessed 12 May 2021.

[47] HoustonKemp assumption.

[48] ATAP Freight Rail, p 61.

[49] ATAP Freight Rail, p 28.

[50] ATAP Freight Rail, p 64.

[51] ATAP Freight Rail, p 28.

[52] ATAP Freight Rail, p 62.

[53] HoustonKemp assumption.

[54] ATAP Freight Rail, p 30.

[55] ATAP Freight Rail, p 64-65.

[56] ATAP Freight Rail, p 61.

[57] ATAP Freight Rail, p 64.

[58] ATAP Freight Rail, p 29.

[59] HoustonKemp assumption.

[60] HoustonKemp assumption.

[61] Based on typical charge on the line

[62] See Australian Rail Track Corporation for Tarcoola - Alice Springs segment, https://www.artc.com.au/uploads/Access-Charges-effective-1-July-2019.pdf, accessed 4 June 2021.

Handling/terminal costs	• 30 minutes driver time per truck required as handing charge[63].	• $8,000 per new load/unload[64] based on train length above 1,200 metres.

[63] HoustonKemp assumption.

[64] ATAP Freight Rail, p 65.

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