
# Environment Report

## Attachments

Inland Rail - Beveridge to Albury

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# Attachment I

## Economic Benefits Analysis

KPMG

# Inland Rail

## T2A: Beveridge to Albury (Stage 1)

### Economic benefits assessment

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Revision 0

## Disclaimers

### Inherent Limitations

This report has been prepared as per the purpose outlined in the Introduction section. The services provided in connection with this engagement comprise an advisory engagement, which is not subject to assurance or other standards issued by the Australian Auditing and Assurance Standards Board and, consequently no opinions or conclusions intended to convey assurance have been expressed.

No warranty of completeness, accuracy or reliability is given in relation to the statements and representations made by, and the information and documentation provided by, ARTC management, personnel and stakeholders consulted as part of the process.

KPMG have indicated within this report the sources of the information provided. We have not sought to independently verify those sources unless otherwise noted within the report.

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The findings in this report have been formed on the above basis.

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This report is solely for the purpose set out in the Introduction and for ARTC's information, and is not to be used for any other purpose without KPMG's prior written consent.

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# 1 Introduction

An economic benefits assessment has been undertaken to identify and assess the likely benefits of the Beveridge to Albury proposal, as a discrete project, to the community. This analysis assesses only those impacts that would be likely if freight operators were to respond to the completion of the individual proposal. These economic benefits have been estimated based on the impacts of the proposal on the transport network, in particular freight operators.[1] Where the proposal improves the transport connectivity and efficiency between freight origins and destinations, these movements across road and rail have been assessed in the appraisal.

In the context of the proposal, this assessment measures the incremental benefit of upgrading existing track between Tottenham and Albury. In this regard, the net freight benefits are expected to be modest within the context of the total Program.

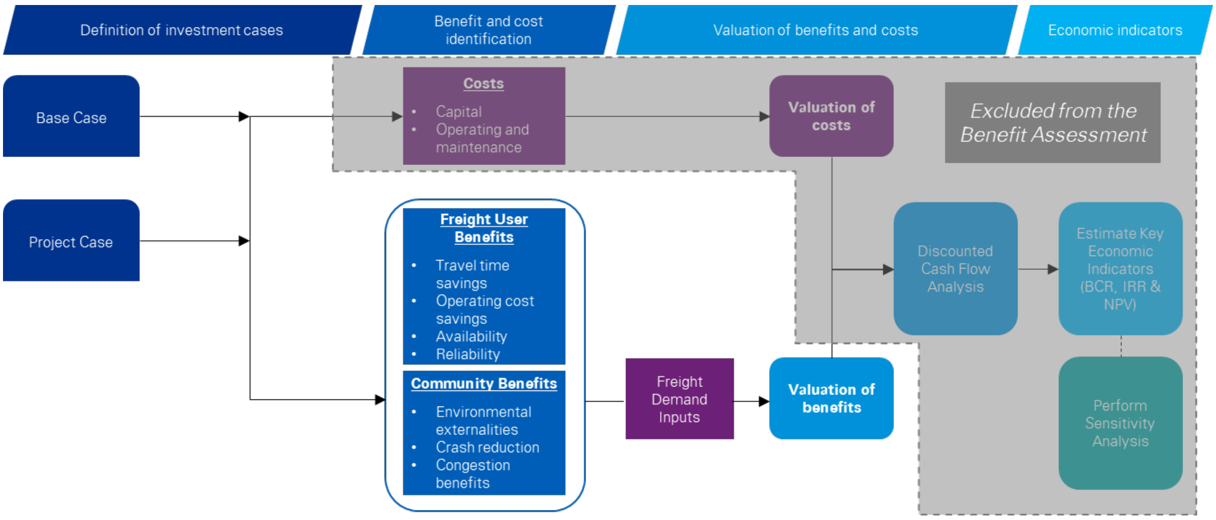
# 2 Methodology

The approach below reflects the three-step benefits assessment modelling process adopted for the purposes of the Environment Report:

1. **Define base and investment cases**: a clear articulation of the problem, investigation and definition of Base Case and Project Case options, and future demand drivers.
2. **Identify benefits**: identification of relevant economic, social and environmental benefits associated impact groups which can be measured for the proposal.
3. **Monetise benefits**: quantification, monetisation and assessment of benefits over the project appraisal period.

The figure below outlines a typical CBA approach and its application to the assessment of the proposal.

*Figure 1: CBA approach and the economic benefits assessment*




Source: KPMG

Critically, the key difference between the complete CBA approach and the economic benefits assessment approach adopted in this analysis is the exclusion of costs. As a consequence, the estimation of economic

[1] The benefits associated with the entire Inland Rail Program are well established and are presented in the Inland Rail Business Case.

indicators is not applicable to this analysis; rather, the discounted present values of the benefits is the focus of the assessment.

# 3 Base Case and Project Case

The benefits assessment measures the incremental benefits derived by the proposal, by defining two network performance scenarios:

- The **Base Case** adopted for this benefits assessment is a 'do nothing' scenario, where it is assumed that no other sections of the Inland Rail Program are progressed, and freight continues to be moved via either coastal rail or the road network.
- The **Project Case** adopted for this benefits assessment is the proposal. The economic benefits estimated as part of the analysis assess only those impacts that would be likely if freight operators were to respond to the completion of this individual project.

Key assumptions and parameters adopted for use in the benefits assessment are presented in Table 6.

*Table 1: Economic benefits assessment assumptions*

| Parameter | Value | Source |
|---|---|---|
| **Discount rate** | A 7 percent real discount rate is used for the central case with sensitivity tests conducted at 4% and 10%. This is consistent with jurisdictional requirements for project evaluation and those of Infrastructure Australia. | Infrastructure Australia Business Case Assessment Template 2016 |
| **Price year** | 2021 | |
| **Discount reference year** | 2021 | |
| **Appraisal period** | 50 years from the year of opening. First year of measured benefits is 2024 (first full year of benefits).[2] | Australian Transport Assessment and Planning (ATAP) Guidelines (Category 4, section 2.4) |
| **Temporal treatment of benefits and costs** | Demand model outputs for 2024, 2054 and 2074 were used as the basis for analysis. Linear interpolation has been undertaken to estimate benefits between these years. | Inland Rail Program Business Case (2015) and KPMG analysis |
| **Indexation** | Unit costs and parameter values indexed to the price year by the appropriate price indices (see parameters in the following sections). | Australian Bureau of Statistics |
| **Annualisation** | Demand projections are presented in annual terms. | Inland Rail Program Business Case (2015) |

Sources: Identified in table.

# 4 Freight demand

At the request of ARTC, demand inputs to the benefits assessment have been sourced from the freight demand projections developed by ACIL Allen for the Inland Rail Program Business Case (2015). The assumptions

[2] While noting that the operational life of the proposal is 100 years, the benefits assessment has been conducted for a 50 year appraisal period in line with best practice methodologies, as specified in the ATAP guidelines.

underpinning these demand projections are documented in Chapter 7 of the Inland Rail Program Business Case (2015). This section outlines how these demand projections have been adopted for the proposal EIA.

The demand projections developed by ACIL Allen are presented in terms of 66 different origin-destination (OD) pairs for both the Base Case and Project Case. These OD pairs span the entire Program length and, as discussed above, many represent freight movements that would not be impacted if the proposal were to be constructed independently of the overarching Inland Rail Program.

To enable an incremental economic benefits assessment to be undertaken for the proposal, selected OD pairs were chosen which represent freight movements that would benefit from the improved rail connectivity associated specifically with the proposal. The selected OD pairs, which are considered likely to traverse the proposal, consist of:

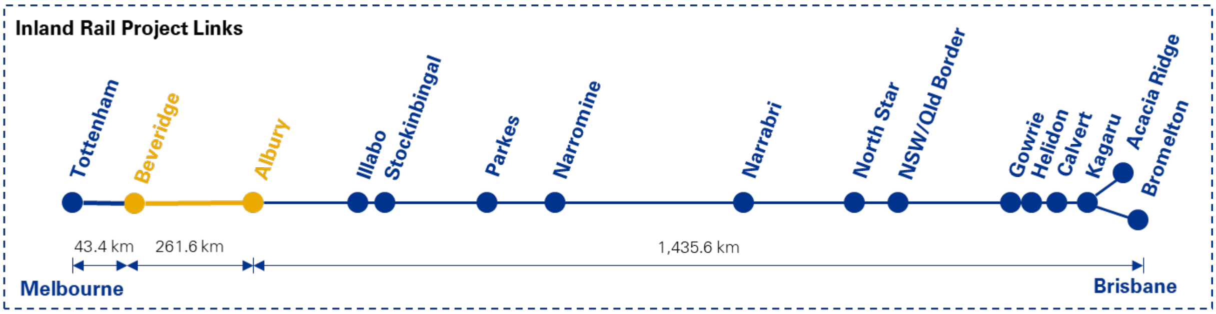
- Albury - Brisbane
- Shepparton-Brisbane
- Albury Region - Moree Region
- Albury Region - Newcastle
- Albury Region - Port Kembla
- Maldon - Narromine Region
- Maldon - Parkes Region
- Maldon - Riverina Region
- Manildra - Melbourne Port
- Melbourne Port - Riverina Region
- Parkes Region - Melbourne Port
- Werris Creek Region - Albury Region
- Benalla - Melbourne Port
- Benalla - Geelong

The transport network and surrounding areas impacted by these freight movements represent the project area for the purposes of the economic benefits assessment.

As the projected travel time (both in terms of net tonne hours and hours travelled) for these OD pairs are dependent on downstream upgrades, the benefits associated with these freight movements have been apportioned. The factor used to scale these benefits is the ratio of the length of track upgrades that forms the proposal, and the total length of proposed track upgrades from Narromine to the Inland Rail Program extent at Tottenham (e.g. 261.6 km / 808 km). [3]

Notably, some freight movements are not presented in terms of OD pairs, and instead are presented by commodity (e.g. 'agriculture'). To account for these general freight movements, the proportion of freight movement associated with the proposal has been estimated using the ratio of the length of track upgrades that forms the proposal and the total length of track upgrades as part of Inland Rail (e.g. 261.6 km / 1,740.6 km). Notably, this does not include any induced freight demand.

*Figure 2: Inland Rail Program - proposal extents*




Source: ARTC

[3] The track length used in the economic benefits assessment is based off the Inland Rail alignment published in February 2017.

# 5 Benefit categories

The economic benefits assessment considers a range of benefit types, which have been categorised into two broad benefit streams:

- **Freight benefits:** these benefits include the changes in the cost to freight operators by switching mode from road to rail; and
- **Community benefits:** these benefits include the changes in costs to the community resulting from a reduction in delays on the road network, and other externalities such as crash reductions and reduced environmental impacts.

A description of each of the benefits included in the assessment are provided in the following table.

*Table 2: Benefit category descriptions*

| Benefit Category | Description |
|---|---|
| **Freight Benefits** | |
| **Travel time savings** | Freight travel time cost savings represent the value to the economy associated with freight arriving at its destination more efficiently as a result of improvements to the rail network that enable shorter distances, faster travel times, and subsequently, increased capacity.<br>Where freight demand is induced (either diverted from road to rail, or new generated freight travel) as a result of improvements to the rail network, the rule of half[4] has been used to estimate the benefits to the new rail freight. Notably, there is no induced freight demand assumed for the proposal. |
| **Operating cost savings** | Operating cost savings represent the reduction in costs associated with fuel, crew, maintenance and depreciation to both road and rail freight operators as a result of operators making use of the proposal. Many of the benefits in this category are derived from the savings associated with shifting freight from road onto rail which has lower operating costs per net tonne kilometre. |
| **Improved service availability** | Improved service availability represents the increased flexibility in arrival and departure times afforded to the rail freight network as result of the proposal. This is due to fewer restrictions on freight service times provided by the increased network capacity.<br>Freight service availability benefits have been estimated based on the values presented in the Inland Rail Program Business Case (2015). These benefits were derived by ARTC in 2015 and have been apportioned to individual projects for the purposes of this incremental benefits assessment. The values calculated by ARTC have been escalated to a 2021 price year using PPI Rail Freight Transport (A2314067L). |
| **Improved service reliability** | Improved service reliability represents the certainty in transit time and subsequent economic efficiency gains to freight operators. This provides reduced wait times at points of loading / unloading along the network, allowing goods to reach their destinations in a more timely manner.<br>As with availability benefits, reliability benefits have been estimated based on the values presented in the Inland Rail Program Business Case (2015). These benefits were derived by ARTC in 2015, and have been apportioned to individual projects for the purposes of this incremental benefits assessment. The values calculated by ARTC have been escalated to a 2021 price year using PPI Rail Freight Transport. |
| **Community Benefits** | |
| **Crash reduction** | Crash cost savings represent the reduced costs associated with fatal and serious injuries resulting from both road and rail incidents. |

[4] If people change mode in response to an infrastructure project or public transport service improvement, their perceived benefits (B) are valued at half the unit benefits to existing users (A). Source: Australian Transport Assessment and Planning, 2021, Economic analysis framework

| Benefit Category | Description |
|---|---|
| **Environmental externalities** | Reduced environmental externality costs represent reductions in air pollution and greenhouse gas emissions due to the proposal. The majority of these benefits can be attributed to the mode shift from road freight to rail freight. |
| **Road decongestion benefits** | As the proposal encourages greater movement of freight by rail, the reduced truck movements that are projected upon completion of the proposal result in reduced congestion in urban areas. |

Source: KPMG

### *Freight Benefits*

The freight benefits have been quantified and monetised using demand assumptions from the Inland Rail Program Business Case (2015) and the parameters set out in the table below.

Value of freight per tonne hour unit rates have been derived from previous analysis completed for the Inland Rail Program Business Case (2015) and escalated to current year prices using appropriate producer price indices.

The analysis estimated a range of rail operating costs for both the Base Case and Project Case. The rates provided in the table below demonstrate the efficiency improvements gained in rail operations through the completion of the proposal, with improved transit times resulting in lower rail operating parameters (unit rates drop from $0.039 – $0.030 per net tonne kilometre (NTK) in the Base Case down to $0.036 – $0.026 NTK in the Project Case for agricultural freight over the 50 year period 2024 to 2074). These parameters have been estimated based on the outputs from the Inland Rail Program Business Case (2015) and Transport for NSW's Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives (2018).

The freight service improvements utilise the previous analysis completed for the Inland Rail Program Business Case (2015) and have been escalated to current year prices and apportioned to the proposal.

*Table 3: Freight benefit parameter values ($2021)*

| Parameter Value | | Variable/s | Source/s |
|---|---|---|---|
| **Freight Travel Time** | | | |
| **Value of Freight (Rail)** | | $1.71 tonne hour | ATAP, Inland Rail Program Business Case (2015), PPI Rail Freight Transport (A2314067L) |
| **Operating Cost** | | | |
| **Agricultural** | **Rail Operating Cost – Base Case** | 2024: 0.039 $/ntk<br>2054: 0.033 $/ntk<br>2074: 0.030 $/ntk | TfNSW (2018), Inland Rail Program Business Case (2015), PPI Rail Freight Transport (A2314067L) |
| | **Rail Operating Cost – Project Case** | 2024: 0.036 $/ntk<br>2054: 0.029 $/ntk<br>2074: 0.026 $/ntk | TfNSW (2018), Inland Rail Program Business Case (2015), PPI Rail Freight Transport (A2314067L) |
| **Freight Service** | | | |
| **Freight Service Availability** | | 2024: $16.89 m<br>2054: $184.17 m<br>2074: $301.66 m | Inland Rail Program Business Case (2015), PPI Rail Freight Transport (A2314067L) |

| Parameter Value | Variable/s | Source/s |
|---|---|---|
| **Freight Service Reliability** | 2024: $11.26 m<br>2054: $45.72 m<br>2074: $81.73 m | Inland Rail Program Business Case (2015), PPI Rail Freight Transport (A2314067L) |

Source: KPMG

The total freight demand for the proposal consists of agricultural freight traversing the proposal area between Tottenham and Albury. This includes freight from regional Victoria (including Maldon and Albury), Melbourne port, and southern NSW (including the Riverina region) destined for north of the proposal area, as well as from regional NSW (including Narromine, Parkes, Werris Creek and Manildra) destined for south of the proposal area. Consistent with the Inland Rail Program Business Case (2015), induced freight demand has only been modelled for the entire extents of Inland Rail (e.g. Melbourne to Brisbane and Brisbane to Melbourne) and, as such, no induced demand has been included in the analysis for the proposal.[5]

Under the demand projections, existing rail freight users will benefit from a reduction in average travel times by rail in the Project Case (from 5.34 hours in the Base Case to 2.98 hours in the Project Case in 2054). As in the Base Case, all contestable freight travels by rail, and there is no resultant shift of the total freight task from road freight to rail - the total tonnes carried is the same between the Base Case and the Project Case. Notably, as there is no road freight traversing the proposal area in the Base Case or Project Case, the total net tonne kilometres (NTK) travelled remains the same in the Project Case.[6]

Freight benefits have been estimated using the appropriate change in freight demand (such as mNTK) by mode type by the relevant parameter unit. The estimated freight benefits for the proposal are provided over a 50 year analysis period as outlined in the table below. Overall, the proposal's freight benefits represent an incremental $211.23 million in present value terms over the Base Case.

*Table 4: Estimated freight benefits ($2021)*

| Benefit | Undiscounted | Present Value (7%) |
|---|---:|---:|
| **Freight Time Savings** | $21.92 m | $3.94 m |
| **Operating Cost Savings** | $4.40 m | $0.79 m |
| **Freight Service Availability** | $1,207.39 m | $158.82 m |
| **Freight Service Reliability** | $326.99 m | $47.68 m |
| **TOTAL** | **$1,560.70 m** | **$211.23 m** |

Source: KPMG

Freight service availability and reliability represent a combined $206.5 million in present value terms to freight benefits (~98 percent). This is apportioned to the proposal on the basis of the combined service improvements from the broader Inland Rail Program and represent the expected benefit from improved freight service within the proposal area.

[5] No new, independent demand modelling has been undertaken to validate the assumptions contained within the Inland Rail Program Business Case (2015).
[6] It should be noted that given the proposal provides a new more direct route for existing rail traffic between Beveridge and Albury, the expected impact would be a drop in distances travelled, and subsequently a reduction in the total mNTK. However, the demand modelling used for the assessment does not indicate any change to distances travelled for trips traversing the project area. KPMG analysis of the demand assessment identifies that there is no modelled net change in total distance between the Base Case and Project Case.

Freight time savings provide $3.94 million in present value terms to freight benefits (~2 percent) as a result of faster travel times only (note there is no shift of freight between rail to road and the distances travelled in the demand projections provided are equal in the Base Case and Project Case).

Operating cost savings represent the remaining (<1 percent) freight benefits of $0.79 million in present value terms. As with freight time savings, this is only representative of the efficiency improvements to travel speeds, with no mode shift occurring in either the Base Case or Project Case under the demand projections.

### *Community Benefits*

As there is no change to the distances travelled by rail, increases to trip frequencies and / or any road freight traversing the proposal area under the demand projections provided, there are no community benefits (e.g. crash reduction, environmental externalities and road decongestion benefits) identified in the assessment. Importantly, while no community benefits are identified within the scope of the economic benefits assessment, the proposal is likely to result in a number of benefits to the local community as identified above.

# 6 Economic benefits assessment results

The results of the economic benefits assessment estimate that the proposal is expected to provide a total of $211.23 million ($2021) in incremental benefits to the proposal area (at a 7 percent discount rate).

Observing the composition of benefits, the largest share of benefits for the proposal is improved freight availability, representing ~75 percent of the total benefits (at a 7 percent discount rate). Freight benefits more broadly (including freight time travel savings, operating cost savings, as well as improved reliability) represent the remaining ~25 percent of the total projected benefits for the proposal.

The full results of the economic benefits assessment are presented in the table below.

*Table 5: Results of the economic benefits assessment ($2021)*

| BENEFITS | Discount Rate | | |
|---|---|---|---|
| | 4% | 7% | 10% |
| **Freight Benefits** | **$441.97 m** | **$211.23 m** | **$117.63 m** |
| **Travel Time Savings** | $7.25 m | $3.94 m | $2.47 m |
| **Operating Cost Savings** | $1.46 m | $0.79 m | $0.50 m |
| **Improved Availability** | $337.35 m | $158.82 m | $86.93 m |
| **Improved Reliability** | $95.91 m | $47.68 m | $27.74 m |
| **Community Benefits** | **$0.00 m** | **$0.00 m** | **$0.00 m** |
| **Crash Reduction** | $0.00 m | $0.00 m | $0.00 m |
| **Environmental Externalities** | $0.00 m | $0.00 m | $0.00 m |
| **Road Decongestion Benefits** | $0.00 m | $0.00 m | $0.00 m |
| **TOTAL BENEFITS** | **$441.97 m** | **$211.23 m** | **$117.63 m** |

Source: KPMG

# 7 Cost Benefit Analysis: Inland Rail Program Business Case

As detailed above, due to the nature of the incremental assessment approach adopted for this Environment Report, a proposal-specific CBA has not been undertaken as the results will not capture the full impact that is expected to be delivered upon completion of the Inland Rail Program. Instead, the results of the economic analysis undertaken for the Inland Rail Program Business Case (2015) are provided to illustrate the anticipated net economic impact of Inland Rail to the community as a whole.

The results of this analysis, as presented in the Business Case, are provided in the table below.

*Table 6: Economic appraisal results for Inland Rail ($2015)*

| | Net Present Value | Benefit Cost Ratio |
|---|---|---|
| **PV at 4% Discount Rate** | $13,928 m | 2.62 |
| **PV at 7% Discount Rate** | $116.1 m | 1.02 |

Source: Inland Rail Program Business Case 2015 Note: Assumes complementary investment on the QR network (Western Line and Brisbane metropolitan network).

The CBA results indicate that Inland Rail is estimated to be economically viable, with an economic benefit cost ratio of 1.02 at a 7 percent discount rate (2.62 at a 4 percent discount rate). By beneficiary, intercapital freight users account for ~68 percent of total benefits, followed by regional freight (16 percent). A further 13 percent of benefits accrue to the broader community.