AUSTRALASIAN RAILWAY ASSOCIATION

ARA23CW/07

31 January 2023

The Hon Stephen Jones MP
Assistant Treasurer
Minister for Financial services
[redacted]

Dear Minister

2023-24 Pre-Budget Submission

I write to you on behalf of the Australasian Railway Association (ARA) to provide our 2023-24 Pre-Budget submission outlining a proposal to secure our national supply chain by strengthening the resilience of our national rail freight network.

As you are aware, the ARA is the peak body for rail in Australia, representing over 200 heavy and light rail operators in passenger and freight, infrastructure owners and managers, manufacturers and suppliers of rolling stock (trains), contractors who build the infrastructure and consultants. Our members include listed and private companies, government agencies and franchisees.

Rail freight plays a critical role in the national supply chain, and Australia's rail freight infrastructure must be strengthened to ensure the safe, reliable and efficient delivery of commercial goods to support Australian families and businesses. Rail currently contributes up to 56 per cent of the national freight task and is forecast to meet almost three quarters of the growth in demand over the next decade. To improve safety outcomes in communities and help achieve greater transfer of freight from road to rail, the next generation rail freight network in Australia must be both reliable and resilient.

Over the last 12 months we have witnessed the devastating impacts that severe weather events and flooding have had on communities around the country. These events have also heavily impacted the rail freight network and resulted in significant disruptions to our national supply chain.

The attached proposal outlines in detail the impacts from several flooding related incidents that disrupted the rail freight network in 2022. This included a 300km section of track on the East-West rail freight corridor that was closed for 24 days while urgent repairs were carried out as a result of flood damage. This single event heavily disrupted supply chain connections between New South Wales, Western Australia, South Australia and the Northern Territory, with the economic cost to the nation evaluated to be $320 million.

In addition to the events outlined in the proposal, in recent weeks there have been more significant flooding related disruptions to the rail freight network. The Broken Hill rail freight line between Condobolin and Ivanhoe, which forms part of the ARTC interstate network, was significantly damaged by flooding in December 2022. Over 70km of track was closed with 18 different sites requiring urgent repair, this closure extended for several weeks and was only able to be reopened last week on 23 January. As with the other examples outlined in the attached proposal, this closure has disrupted important supply chains and resulted in significant economic impacts.

The Australian rail industry has an overarching goal to improve Australia's productivity and help make rail the mode of choice in the national logistics chain. To achieve this goal, the entities that operate and maintain our rail freight infrastructure must be able to deliver safer, more reliable, and robust rail networks that exceed customer expectations.

Unfortunately, much of our rail freight infrastructure was built more than 100 years ago and was simply not constructed to modern design standards capable of withstanding the effects of climate change and increasingly extreme and frequent weather events. This has highlighted the need to improve the national freight rail network through a greater understanding of network vulnerabilities and plan for resilience improvements.

The attached proposal has identified six key projects (developed in consultation with major rail infrastructure managers) that the ARA believes would deliver the greatest value and impact to the rail freight network over the longer term. These projects are focussed on improving rain and flood resilience, as well as enhancing redundancy to maintain operations in the event of network outages. Each project has undergone a high-level cost benefit analysis and all demonstrate a positive economic return on investment.

The primary recommendation of the Pre-Budget submission is that the Commonwealth Government allocate $50 million in the 2023-24 Budget to conduct a detailed and evidence-based business case process for these priority rail resilience projects.

The submission also outlines additional policy recommendations that would enable governments, together with industry, to better support resilience activities across the rail industry and empower industry participants to best prepare and respond to resilience challenges.

The ARA believes the Commonwealth Government has an opportunity to work with the rail industry to fundamentally improve the resilience of our nationally critical rail freight infrastructure. Allocating funding in the 2023-24 Budget to develop the detailed business cases for priority rail resilience projects will ensure that further investment in our rail freight network is evidence-based, robust, and effective in strengthening and securing our national supply chain.

[redacted]

Yours sincerely

[redacted]

Caroline Wilkie
Chief Executive Officer

AUSTRALASIAN RAILWAY ASSOCIATION

SECURING THE NATIONAL SUPPLY CHAIN

National rail freight network resilience project

JANUARY 2023

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01 Introduction

Rail freight plays a critical role in the national supply chain, and must be optimised to ensure the safe, reliable and efficient delivery of commercial goods to support Australian families and businesses.

Rail currently contributes up to 56 per cent of the national freight task and is forecast to meet almost three quarters of the growth in demand over the next decade. To improve safety outcomes in communities and help transition greater freight from road to rail, the next generation rail freight network in Australia must be both reliable and resilient.

The Australasian Railway Association (ARA) and Freight on Rail Group (FORG) have undertaken a review of potential projects which will help build a resilient rail network based on the "four R's" of redundancy, reliability, resistance and recovery.

This business case proposal summary outlines six potential projects on the National Rail Interstate Network across three major rail infrastructure manager (RIM) networks in Australia (Australian Rail Track Corporation (ARTC), Arc Infrastructure and Aurizon). These projects have been proposed on the basis that they should achieve the most effective near-term solutions for national supply chain resilience, have a positive overall economic impact, and through increased resilience improve and protect the national freight network's reputation However, derailed hydrological investigations are currently underway and will provide further evidence which may mean outlined projects require refinement or adjustment

02
The value of rail freight

Rail freight is critical for the Australian economy, directly contributing $5.28 billion to the economy in 2019 and enabling modern national and multi-modal supply chains.

Australia's population is forecast to double by 2070, reaching almost 45 million people. This growing population requires an increased allocation of goods, adding pressure on existing freight networks to deliver.

According to the National Freight and Supply Chain Strategy, Australia's freight task is expected to grow by over 35 per cent between 2018 and 2040. This is an increase of 270 billion tonnes which will bring the total volume moved to just over 1000 billion tonne kilometres every year. The role of rail freight is critical in meeting this future demand and maintaining international competitiveness.

Australia's rail freight task is set to grow by 41 per cent between 2016 and 2030, more than any other freight mode. Equivalent to the payload of 894,542 B-Double trucks per year.

The ARA's Value of Rail Report 2020[1] found that for every one per cent of the national freight task that moves to rail, there are benefits to society of around $72 million a year, detailed as follows.

- **Delivering everyday essentials**

Whether it be bulky products delivered to major hardware chains, white goods to department stores or food to local supermarkets, rail freight is playing a growing role in the freight supply chain to ensure the safe, reliable and efficient delivery of everyday essentials to support Australian families. Rail freight is increasingly being adopted by retailers as a cost effective, safe and environmentally beneficial transport option that can contribute to their logistics operations.

- **A safer way to transport freight**
  Ask any driver stuck on a major Australian highway if they would like to see less trucks on the road and the answer will be the same. Yes. Rail freight gets heavy vehicles off the roads, not only on our highways but in our capital cities. Rail is up to nine times safer than road freight, and is an effective way to improve safety outcomes across Australia's transport network.

- **A critical part of the logistics supply chain**

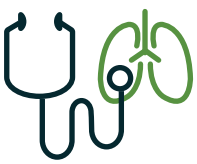
LOWER CARBON EMISSIONS

Rail freight produces 16 times less carbon pollution than road freight

A SAFER CHOICE

Accident costs associated with road freight are 20 times higher than rail

A HEALTHIER CHOICE



Rail freight generates 92 percent less PM10 emissions than road

COIMMUNITY BENEFITS

For every one per cent of the national freight task that moves to rail, society gains $72 million a year in benefits

Value of Rail 2020, Deloitte Access Economics for ARA, November 2020, https://ara.net.au/wp-content/uploads/REPORT-ValueofRail2020-1.pdf

A growing economy means a growing freight task, with the amount of freight moved around Australia expected to increase by 26 per cent over the next decade. Rail is the most cost-effective mode of transport for inter-capital containerised freight movements and has a critical role to play in meeting this freight growth, particularly for medium to long distance freight within a fully integrated multi-modal system.

- **Supporting key industries**
  Rail freight is fundamental to maintaining the international competitiveness of Australia's mining and resources industry. Every hour of every day, rail freight companies move thousands of tonnes of coal, iron ore and other minerals as well as agricultural and general freight around the nation. Around 98 per cent, or 1.20 billion net tonnes, of Australia's total rail freight task is bulk freight.

- **A major Australian employer**
  Rail freight is a critical home-grown industry, employing over 21,000 FTEs and supporting many local communities, including for example the Pilbara region of Western Australia and the Hunter Valley in New South Wales. Rail freight jobs have grown 50 per cent since 2016.

- **The environmentally friendly option**
  Rail is the best performing land transport mode for large volumes of freight and is more fuel efficient and produces less carbon than heavy vehicles. Rail freight produces 16 times less carbon pollution than road freight.

- **Reducing maintenance costs on our roads**
  Studies show heavy vehicle road freight users do not face the full maintenance costs that they cause, and that under recovery of these costs are around $7,000 and $10,500 per truck each year. Shifting more freight on to rail will result in less damage being done to our roads and will help to reduce the maintenance costs on our Australia's major freight routes.

- **A key part of the economy**
  In terms of its economic impact, the rail freight sector is continuing to grow. It's contribution to the overall economy is forecast to grow at a rate of 2.8 per cent to 2021-22, which is higher than GDP growth in the same period, which is expected to rise to an annual rate of 2.6 per cent.

- **Reducing congestion in our cities**
  The avoidable cost of congestion for Australian capital cities is estimated to be around $16 billion, and will rise to around $30 billion by 2030. Nowhere is this felt more acutely in Australia than in and around our major ports, where trucks interact with commuters. Short haul rail shuttles in our cities – which connect our ports to inland freight hubs – are helping to manage freight growth and the surge of truck movements on our city roads.

- **Supporting rural and regional Australia**
  Regional rail freight is critical to ensuring efficient access to and from our regional markets and facilitating freight flows from farms, mines and ports to national and overseas markets. The inland rail project, linking Brisbane to Melbourne via New South Wales, will be vital to regional Australia in the future, with around 9 million tonnes of agricultural freight expected to divert to Inland Rail. For every one per cent of the national freight task that moves to rail, society gains $72 million a year in benefits.

Building rail resilience

The Australian rail industry has an overarching goal to improve Australia's productivity and help make rail the mode of choice in the national logistics chain.

It is critical that rail infrastructure managers (RIMs), such as ARTC, Arc Infrastructure and Aurizon promote the greater use of rail by delivering a safe, more reliable and robust rail network which exceeds customer expectations.

Severe weather-related events are increasing in frequency, highlighting the need to improve the national freight rail network through a greater understanding of network vulnerabilities and plan for resilience improvements.

In January 2022, a major flooding event impacted over 300km of ARTC's track between Crystal Brook and Kalgoorlie. The repair cost for the 18 sites impacted by this event alone was close to $40 million. Importantly, this event has had a negative impact on rail operators, the reputation of RIMs and freight on rail more broadly, as well as having wider economic impacts. Whilst this type of event is rare, it highlights the growing importance of network resilience in the face of more extreme and frequent climatic events, in particular where areas are classified as critical network, with no, or poor alternative options.

Rail has a crucial role to play in supporting our national freight task

56%

Of Australia's national freight task is transported by rail (ARA research)

Railways are a **climate-smart and efficient** way to move freight, providing a **clean and compact** transport mode for millions of tons of goods

Recent severe weather events closed the Trans-Australian railway for

24 days

with **18 locations** along **300km** of track requiring major repair

80%

of land freight to WA impacted by recent closures

Major

supermarket chains forced to **introduce buying limits** on pasta, meat, frozen food, toilet paper and sanitary products

A more resilient national rail freight network requires durable and reliable infrastructure. Beyond upgrades, this requires a focus on prevention and mitigation against network shocks and stresses, and improvements to RIMs' ability to respond to those unplanned events.

Network vulnerabilities arising from threats such as climate change and weather events, specifically rain and flood events, are a major threat to RIMs providing a resilient network.

This proposal uses the definition of resilience as defined by The Resilience Shift[1], being:

"The ability to withstand, adapt to changing conditions, and recover positively from shocks and stresses.

Resilient infrastructure will therefore be able to continue to provide essential services, due to its ability to withstand, adapt and recover positively from whatever shocks and stresses it may face in the future."

[1] Resilient Leadership: Learning from crisis – an experiment in reflective learning during the Covid-19 pandemic, The Resilience Shift, October 2020, available online: https://www.resilienceshift.org/publication/resilient-leadership-learning-from-crisis/#:~:text=Resilience%20is%20the%20ability%20to,positively%20from%20shocks%20and%20stresses.

Case study: 2022 South Australia floods

The January 2022 flooding event which impacted over 300km of ARTC's track between Crystal Brook and Kalgoorlie underscored the urgent need for investment and decisions to improve the resilience of Australia's national rail freight corridors to secure national supply chains.

As a direct result of this flood event there was an unprecedented 24-day outage and coordinated repair operation which included 18 locations across 300km of track requiring major repairs which cost close to $40 million. Importantly, the network west of Crystal Brook has no alternative route, making goods that rely on this route particularly vulnerable in case of protracted outage. Rapid recovery of this line, in case of major damage, is also compromised by the relative absence of intermodal terminals that could be used to facilitate land-bridging if a section of track is compromised.

A snapshot of the event impacts includes:

- 200mm of rainfall was recorded in a one-day period causing washouts and ballast scouring
- The track was closed for 24 days while repairs were carried out across a 300km section of track
- Road freight was also suspended due to flooding for two weeks, owing to the proximity of road and rail routes
- Typically, 80 per cent of Western Australia's land-based freight arrives by rail
- Supermarkets in Western Australia and the Northern Territory faced supply shortages and were forced to introduce buying limits on pasta, meat, frozen food, toilet paper and sanitary products
- Woolworths was forced to use sea freight for deliveries in Western Australia for the first time in decades
- NSW water utilities faced supply shortages for critical chemicals used in water treatment processes
- **The economic cost to the nation was evaluated at approximately $320 million, or over $13 million per day**

Whilst the 2022 flood event impacting East-West rail traffic was unprecedented in scale and duration, increasingly extreme and frequent weather events have been observed on the network with increasing regularity. In February 2021, the Wooroloo bushfire impacting a 6km section of the East-West line managed by Arc Infrastructure resulted in a six-day outage. In the same month, flooding at Nana Glen resulted in a 10-day outage on the North-South line in northern NSW, saw the derailment of two locomotives and 18 wagons and required the rebuild of 300m of track to restore operations.


Cairns
Nana Glen
Brisbane
Wooroloo
SA floods
Crystal Brook
Perth
Sydney
Canberra
Melbourne
Intermodal Terminal

03 Defining resilience

There are multiple contributors to network resilience.

This proposal adopts a framework employed by the ARTC to articulate four contributors to network resilience.

To ensure that the Australian rail freight network is a resilient network, run by RIMs well equipped to deliver a resilient service offering, there are four components that must be addressed.

How the four Rs bring resilience to the network

Risk area	Resilience	
Flood	●	●
Derailment	●	●
Structure	●	●
Bushfire	●	●
Signals	●	
Rail defects	●	
Temporary speed restrictions	●	
Vegetation	●	
Level crossings	●	
Critical materials	●	

Resistance

Physical robustness in catastrophic events, preventing safety issues. Resistance involves providing additional protection such that physical assets can withstand the harmful effects of identified hazards and threats.

Reliability

Assets that can operate to a defined standard during adverse events. A reliable rail system can operate consistently under a range of conditions such as extreme weather (e.g. extremely high and low temperatures) and through a range of planned and unplanned events such as power failures and periods of very high demand.

Redundancy

Building spare capacity and alternative routes. Redundancy refers to having spare capacity or alternate routes to provide continued track availability in the event of failures on impacted assets or corridors.

Recovery

Preparedness to respond and recover from disruptions, limiting closures. Recovery is about the quick return of the network when an event occurs. This covers both actions taken before or during events to avoid or reduce harmful effects and the response after events to recover quickly to levels of service.

Critical strategic resilience projects are required to address the resilience of the national freight rail network, with priority on measures which can:

Reduce network closures to under 24 hours by undertaking resistance and redundancy focused works

Based on network intelligence, typically issues causing network closures for greater than a 24-hour period (known as 'Category 1') are the result of flooding, derailments, bushfires and significant structure faults. Category 1 events can be mitigated by improving the resistance or capability of the asset to withstand the event, or alternatively by providing a redundancy in network systems with an alternate route in case of closure.

Improve the sustained reliability of the network, by addressing infrastructure failures that result in substantial train delay events or require the application of significant Temporary Speed Restrictions (TSR's).

In terms of improving the sustained reliability of the network, ('Category 2') events these are typically signal faults, rail defects, vegetation related issues, level crossing faults and TSRs that are linked to ageing infrastructure components.

04
Existing investment in resilience

Industry is already investing in short-term solutions, but longer-term investment is needed.

Projects such as Inland Rail are key to building longer term resilience and network redundancy, however the majority of national rail freight infrastructure was built more than 100 years ago, and whilst in some cases has been upgraded, was simply not built to modern design standards capable of withstanding the effects of climate change and increasingly extreme weather events which will need significant further investment.

RIMs, as the asset owners, need to build resilience into infrastructure through leveraging asset intelligence to identify and mitigate vulnerabilities to planned, unplanned and changing threats. RIMs are investing heavily in modern intelligence to ensure evidence based investments in both urgent upgrades and strategic major improvements.

As demonstrated in early-2022, flooding has been a critical risk, with RIMs required to be prepared for storms and flooding year-round. RIMs invest significant resources to monitor and prepare the network for potential water-related risks. RIMs are currently managing this risk through:

- 24/7 monitoring: monitoring weather in real-time at control centres where information is received from external meteorologists, the National Weather Service and train operators.
- Ongoing maintenance: RIMs perform maintenance throughout the year to ensure all debris is cleared from ditches and culverts along rail corridors.
- Detection technology: High-water detectors send notifications about track conditions to approaching trains (via train control), informing whether to slow, or perform an inspection before passing.
- Set procedures: RIMs maintain operating instructions on how to prepare for and respond to natural disasters.

There is a high degree of uncertainty and unpredictability in flooding events which is making it harder for RIMs and above rail train operators to safeguard themselves in cases of extreme weather. The recent NSW Parliamentary report titled 'Response to Major Flooding across New South Wales in 2022' acknowledged the importance of improving government rain data infrastructure and flood modelling tools to support RIMs as custodians of critical infrastructure.

RIMs are also investing in new, more modern ways of managing assets to replace manual and labour-intensive asset management practices with 'next gen' asset monitoring solutions including real-time alerts, and insights from data, predictive maintenance, analytics and real-time visibility.

In the main, industry efforts to-date have focused on measures to improve resilience, but have largely been limited to reducing the probability of infrastructure failure. Future proofing rail supply chains will require concerted effort to identify, fund and deliver a program of rail infrastructure upgrades across the country which improve network redundancy, reliability and resistance, particularly in response to climate risk. The emphasis has to be on reducing whole of life costs, even where the upfront ask is higher.

05
Proposed resilience projects for investment

Criteria for project selection

Rail Infrastructure Managers have considered investment options to build long-term network resilience using a series of key principles to determine optimal projects which deliver the greatest value and impact to the network over the longer term. These principles include:

- Limiting disruption to operations given the criticality of operations being open for customers and communities
- Assess the most effective options to create a network that can sustain, adapt and is more resilient from any future major event, predominantly focused on flooding
- Identify near-term projects that build network resilience now and lay the groundwork for long-term considerations
- Identify strategies to address resilience both in a targeted fashion and at scale
- Protecting the national freight network's reputation and ensuring customer support during disruption

The projects proposed represent those which best reflect these principles. The six projects detailed below are all on the National Rail Network.

Please note this does not account for urgent targeted repair funding for high-risk areas such as culverts whilst derailed consideration of more significant projects progress. Further, detailed hydrological studies currently underway could inform amendments or adjustments to the six projects outlined here.

Projects overview

The six projects fall into two groups:

1. **Rail and flood resilience projects** that increase the capability of the network to withstand high rainfall events and reduce the probability of track outages. Rain and flood resilience projects reduce the need to undertake scheduled future asset replacements in many instances.
2. **Projects that provide redundancy** on the network delivering an alternative route to maintain rail operations and supply chains in case of a localised outage in areas of single line dependency.

In order to support the proposed projects, Houston Kemp were engaged to conduct a high-level Benefits Cost Analysis (BCA) of each to demonstrate the economic value of enhanced national rail network resilience and the overall value to Australia. The key elements considered when calculating the benefits of each project are avoided repair costs, reduced freight delays, cost savings of using rail rather than heavy vehicles, and avoided rail operating costs. Detail of the analysis and underlying assumptions can be found in Appendix 1.

The project names and top-line results of the BCA analysis are shown below.

Rain and flood resilience
ARTC Drainage enhancement **BCR: 1.2 NPV: $110 million**
Arc Infastructure Cutting and embankment stregthening **BCR: 2.1 NPV: $330 million**
Aurizon Formation, bridge and drainage enhancement **BCR: 1.5 NPV: $50 million**

Natural hazard redundancy
ARTC Construction of passing loops in flood prone areas **BCR: 5.1 NPV: $200 million**
Arc Infastructure Intermodal terminals **BCR: 3.8 NPV: $340 million**
Aurizon Passing loop **BCR: 1.7 NPV: $30 million**

Note: BCR rounded to 1dp, NPV rounded to nearest $10m

Project details

Rail and flood resilience projects

1. Crystal Brook to Kalgoorlie drainage enhancement – ARTC

Upgrade of all existing drainage assets along Crystal Brook to Kalgoorlie to enhance flood resilience to cope with 1 in 100 year - to 1 in 200-year events

Location: Crystal Brook to Kalgoorlie

Indicative capital required: $400 million to $600 million

Benefit-Cost Ratio: 1:1.2

Net Present Value: $110 million

2. Cutting and embankment strengthening – Arc Infrastructure, Easter Goldfields Railway

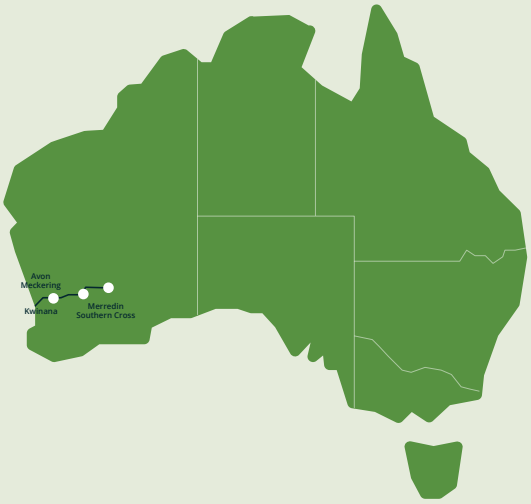
Upgrade of all drainage assets to increase resilience to cope with between 1 in 100- year and 1 in 200-year events to minimise track closures.

Location: Kalgoorlie to Kwinana

Indicative capital required: $340 million

Benefit-Cost Ratio: 1:2.1

Net Present Value: $330 million



3. Formation, bridge and drainage enhancement – Aurizon

Upgrade to formation, bridge protection and drainage assets to cope with between 1 in 100- year and 1 in 200-year events to minimise track closures.

Location: Tarcoola to Darwin

Indicative capital required: $120 million to $150 million

Benefit-Cost Ratio: 1:1.5

Net Present Value: $50 million

4. Construction of two major passing loops – ARTC

Construction of 5km and 6km passing loops to increase redundancy and enable alternative routes during major flooding events. Two passing loops have been identified:

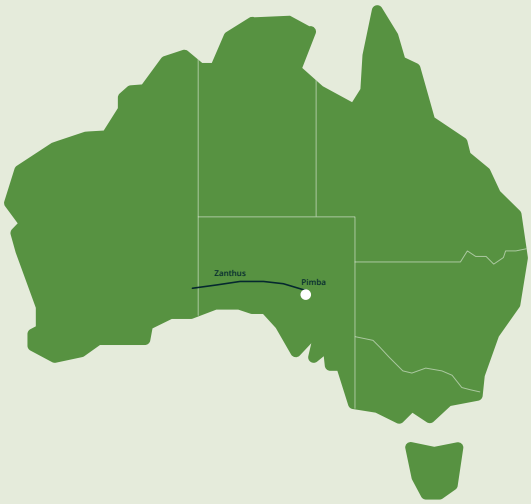
- **5km passing loop located 40km south of Pimba to avoid waterways crossing multiple locations; and**
- **6km passing loop with raised formation at Zanthus at a flooding risk area**

Location: Pimba and Zanthus

Indicative capital required: $46 million

Benefit-Cost Ratio: 1:5.1

Net Present Value: $200 million



5. Construction of intermodal terminals – Arc Infrastructure, Easter Goldfields Railway

Construction of terminals to enable freight movement in the event of extended road or rail closures.

Location: Easter Goldfields Railway, location/s to be determined through business case analysis.

Indicative capital required: $120 million

Benefit-Cost Ratio: 1:3.8

Net Present Value: $340 million

6. Passing loops and formation height – Aurizon

Enhancement of existing and construction of new infrastructure to deliver increased network redundancy, including:

- **Construction of a 5km passing loop south of Adelaide River with raised formation through flood plain areas**
- **Increase length and raise formation of Maria passing loop**
- **Raise formation at various flooding risk areas**

Location: Adelaide river, Maria and other locations on north-south corridor

Indicative capital required: $30 million to $50 million

Benefit-Cost Ratio: 1:1.7

Net Present Value: $39 million

BCA results by network		
ARTC	**1.6 BCR**	**$310 million NPV**
Arc Infastructure	**2.6 BCR**	**$670 million NPV**
Aurizon	**1.6 BCR**	**$80 million NPV**
Overall resilience program	**2.0 BCR**	**$1,060 million NPV**

Note: BCR rounded to 1dp, NPV rounded to nearest $10m

Business case approach

Given the extensive expertise of the ARTC in conducting such investigations, and to ensure a consistent approach to managing assumptions and comparability of outputs, it is recommended that the ARTC be allocated the funding package to project manage. Key stakeholders, including all three RIMs named in this report, the Department of Infrastructure (DITRDC), relevant state and local government representatives and the ARA should be represented on a steering committee to oversee delivery of the investigations across national freight rail infrastructure.

The ARTC will need to retain external advisory support for the necessary technical, economic and commercial analysis and delivery strategy. Based on the range of business cases prepared by ARTC for minor regional upgrades, through to major projects of national significance, and considering the geographic scope, technical complexity and number of stakeholders, a total funding envelope of $50m is required to conduct a detailed and evidence-based investigation into resilience projects materials to the robustness of nationally critical supply chains.

It is proposed that the business case project would be managed through a sequential set of workstreams as follows:

	WORK STREAM	KEY ACTIVITIES	KEY DELIVERABLES
1	**Business case coordination and drafting**	• Develop and agree business case scope and structure, this will include careful consideration of all available evidence to agree projects list for analysis • Define critical problems investment seeks to address and benefits it seeks to realise • Collate and review work previously undertaken • Integrate various technical inputs into overall investment narrative	• Draft(s) and final business case • Submission to IA • Other material required to support assessment process
2	**Technical scope and cost**	• Identify technical scope and investment required to meet required operating standard, including suitability of existing alignment, improvement options, and treatments. • Identify alternative approaches to delivering desired resilience and redundancy outcomes • Undertake detailed engineering designs of preferred technical solution, including targeted survey and geotechnical investigation and preparation of designs for track and civil works • Prepare cost estimates for preferred and other options	• Capacity and demand models • Options identified for detailed analysis in Business Case • Cost estimates
3	**Economic and commercial appraisal**	• Review economic evaluation previously undertaken, including testing demand assumptions • Define and agree economic and commercial evaluation framework tailored to scope of business case • Undertake appraisal of technical and strategic options • Identify preferred option for delivery	• Options assessment framework • Cost Benefit Analysis

4	**Funding strategy and financial appraisal**	• Undertake whole of project life analysis • Prepare probabilistic estimates of required investment • Identify approaches to securing funding contributions from appropriate parties • Develop project funding strategy	• Financial model • Funding strategy
5	**Delivery strategy**	• Develop approach to timing of network improvement • Identify scope packaging options and ability to insource / outsource delivery • Identify potential contracting approaches for tendered packages • Evaluate impact of works on existing traffic on the line • Assess how project fits into broader network works (resource availability and cost implications) • Identify other key project risks • Develop delivery and risk mitigation strategies	• Project risk register • Procurement plan
6	**Market testing**	• Facilitate engagement with key market participants, including port users and rail operators • Identify key market concerns and objectives for investment • Test key aspects of technical and strategy options / preferred option with relevant stakeholders • Prepare specific engagement strategies, objectives, and questionnaires for each stakeholder group • Undertake targeted interviews with relevant market stakeholders	• Market sounding report

It is anticipated this work could be completed over an indicative timeline of six-months.

Recommendation: That the Commonwealth Government consider the national rail resilience projects presented here as priorities for investment to achieve national rail resilience and allocate $50m in the 2023-24 Budget to conduct a detailed business case investigating priority rail resilience projects.

06 Empowering the rail industry

Achieving improved rail network resilience requires more than investment in hard infrastructure, and the complexity and uncertainty of the challenge demands governments, rail operators, suppliers, RIMs and regulators find better ways to work together to address resilience as a shared goal.

The following outlines some policy considerations and recommendations that would enable governments, together with industry, to support resilience activities across the rail industry and empower rail industry participants to best prepare for and respond to resilience challenges.

Supporting preventative maintenance

Proactive, preventative maintenance has a critical part to play in improving rail system resilience. As outlined, RIMs are investing heavily in enhancing capacity and providing a focus on preventative maintenance, real-time monitoring, and weather and risk forecasting to enhance network resilience.

An important part of this agenda, particularly given recent strong growing seasons, is preventative ongoing vegetation management to maintain the safety of the rail corridor and respond efficiently in the event weather causes vegetation to interfere with the operability of the corridor.

This is a similar ongoing challenge faced by utility managers maintaining clearance for power transmission infrastructure. However, unlike RIMs, utility managers are uniformly empowered through relevant regulation to take necessary action to manage vegetation for safety and operational continuity on public and private land unimpeded. RIMs by contrast, are not similarly empowered across Australia. The rail industry seeks equivalent permissions for RIMs to proactively manage vegetation impacting rail corridors for nationally critical rail freight infrastructure and to take necessary action to respond to incidents when they occur.

Recommendation:

Harmonise permissions for RIMs to manage vegetation affecting nationally critical rail freight infrastructure.

Funding for rail recovery

Commonwealth and state and territory governments routinely commit very significant funding packages following extreme weather events impacting the road network to facilitate rapid reconstruction and restoration of the operability of major roads. This appropriately recognises the fact that public road managers do not have sufficient resources to rapidly respond to increasingly frequent extreme weather events impacting the network. However, the equivalent is not available to public or publicly contracted rail infrastructure managers.

The rail industry seeks commitment from governments to consider the objectives, economic and social benefits of more incident specific funding to respond and restore nationally significant rail freight infrastructure more quickly and without compromising the ongoing network investment and maintenance programs of RIMs.

Recommendations:

- Update Disaster Recovery Funding arrangements to include critical rail infrastructure as essential public assets
- Partner with RIMs to provide specific funding to proactively invest in building resilience for nationally significant freight rail infrastructure and recover and 'build back better' following major events.

Integration with government architecture for resilience of critical infrastructure

The Australian Government has a sophisticated architecture for the forecasting, management and response to risks and incidents impacting national critical infrastructure, including the Trusted Information Sharing Network (TISN) for Critical Infrastructure Resilience. Given the recent inclusion of national rail infrastructure through the Security Legislation Amendment (Critical Infrastructure) Bill 2020, rail infrastructure managers and representatives should be afforded membership of the Transport sector group of TISN for better integration with planning, communications and coordination of supply chain response activities in case of national crises, natural disasters and extreme weather, or other risks of national significance potentially impacting national supply chains. This will also support effective implementation of a rail industry national Issues Management Framework.

The rail industry intends to explore establishment of a national Issues Management Framework to better coordinate planning, enhance intra-industry and external communications with both stakeholders and impacted communities, and more effectively coordinate response resources and other strategies to respond to matters impacting the industry's operations or reputation. The industry seeks the participation of Commonwealth and state authorities in the framework.

Finally, as Infrastructure Australia and Infrastructure NSW have highlighted, the greatest opportunity for increasing resilience is during the infrastructure planning phase and so the rail industry seeks commitment from governments to embed resilience requirements in business case, planning, procurement and funding.

Recommendations:

- Elevate resilience within the Commonwealth Government and incorporate explicit resilience targets in government policies and plans
- List the National Interstate and the Hunter Valley Rail Networks as critical supply chain infrastructure
- Work with the ARA and industry participants to convene more forums for industry knowledge sharing
- Include RIMs and industry representatives in the transport sector group of the Trusted Information Sharing Network
- Embed resilience requirements in business case, planning, procurement and funding processes

Insurance market impacts

The increasing frequency and severity of extreme weather events has already had a major impact on the insurance market, with insurance premiums increasing substantially and project to continue.

Insurance plays an important role in managing the risks associated with natural disasters. Insurance providers assess risk and therefore calculate premiums with consideration of risk, which without improved resilience for both RIMs and operators, industry will be faced with rapidly appreciating insurance premiums over successive contract periods.

It is also possible that the exposure of RIMs and operators to natural disasters causing damage and loss of operability, resulting in impact on revenues and commercial competitiveness, creates an insurance burden that insurers will simply choose not to bear, making the industry 'uninsurable'. This has yet to occur on any large scale for Australian infrastructure operators, though step changes in premiums suggest this issue may arise in the short term and there are relevant precedents in the USA.

A May 2022 report published by the Climate Council [1] highlights the link between climate change and insurance premiums. The report found that climate change is "creating an insurability crisis in Australia due to worsening extreme weather and sky-rocketing insurance premiums" and that one in every 25 properties will be 'high risk' by 2030, having annual damage costs from weather or changing climate that make them effectively uninsurable.

Rail freight operators accessing the interstate network have expressed concern about the magnitude of their exposure, such that a catastrophic event could drive them towards 'self-insurance'. In this scenario operators would need to hold capital that they would otherwise spend on the business for any future negative impacts as contingency. There is a limit to the level of capital operators can retain while remaining viable.

The increasing frequency and intensity of events will make this a difficult area to navigate, absorbing considerable resources. Without a significant focus on resistance measures, independent work commissioned by ARTC indicates the rail network by 2060 is likely to experience two major flooding events annually. This scenario would present a high risk and cost to rail operators with the ability of smaller rail operators to continue operating potentially coming into question.

Recommendation:

Investigate options to assist the rail industry with insurance burdens

[1] UNINSURABLE NATION: AUSTRALIA'S MOST CLIMATE-VULNERABLE PLACES, Climate Council Australia, May 2022, available online: https://www.climatecouncil.org.au/wp-content/uploads/2022/05/CC_MVSA0302-CC-Report-Federal-Election_V4-Single-1.pdf

07 Summary of recommendations

Budget funding recommendation

That the Commonwealth Government consider the national rail resilience projects presented here as priorities for investment to achieve national rail resilience and allocate $50m in the 2023-24 Budget to conduct a detailed business case

investigating priority rail resilience projects.

Other policy recommendations

- Harmonise permissions for RIMs to manage vegetation affecting nationally critical rail freight infrastructure.
- Update Disaster Recovery Funding arrangements to include critical rail infrastructure as essential public assets
- Partner with RIMs to provide specific funding to proactively invest in building resilience for nationally significant freight rail infrastructure and recover and 'build back better' following major events.
- Elevate resilience within the Commonwealth Government and incorporate explicit resilience targets in government policies and plans
- List the National Interstate and the Hunter Valley Rail Networks as critical supply chain infrastructure
- Work with the ARA and industry participants to convene more forums for industry knowledge sharing
- Include RIMs and industry representatives in the transport sector group of the Trusted Information Sharing Network
- Embed resilience requirements in business case, planning, procurement and funding processes
- Investigate options to assist the rail industry with insurance burdens

08
Appendix – project business case analysis details

Improving the resilience of the interstate freight network

Cost benefit analysis of rail resiliency projects – discussion of results

11 July 2022

Overview of results from rain and flood resilience projects ($m)

	ARTC	Arc Infrastructure	One Rail	Total
Reduction in major and minor outages	$481	$556	$118	$1,156
- Avoided trackwork repair cost	$4	$4	$4	$12
- Avoided freight delays	$418	$484	$103	$1,006
- Reduced heavy vehicle detours	$39	$45	$7	$92
- Reduced above-rail opex	$19	$22	$4	$46
Rail as an alternative to road	$0	$0	$0	$1
Growth in rail freight from improved reliability	$54	$62	$12	$128
Residual value	$39	$26	$10	$76
Total benefits	$574	$645	$141	$1,361
Total costs	-$462	-$314	-$96	-$872
NPV	**$112**	**$331**	**$46**	**$489**
BCR	**1.24**	**2.05**	**1.48**	**1.56**

Natural hazard redundancy

Overview of natural hazard redundancy projects

Project	Location	Description	Cost requirements
ARTC – Construction of two major passing loops	• Pimba • Zanthus	Construction of 5km and 6km passing loops to increase redundancy and enable alternative routes during major flooding events. Two passing loops have been identified: • 5 km passing loop located 40 km south of Pimba to avoid waterways crossing multiple locations; and • 6 km passing loop with raised formation at Zanthus at a flooding risk area	• $46m in upfront capex • Increase in ongoing costs using ATAP assumptions
One Rail – Passing loops and formation height	• Adelaide river • Maria • Other locations	• 5 km passing loop south of Adelaide River with raised formation through flood plain areas • Increase length and raise formation of Maria passing loop • Raise formation at various flooding risk areas	• $30-50m in upfront capex • Increase in ongoing costs using ATAP assumptions
Arc Infrastructure – Construction of intermodal terminals	• Meckering • Merredin • Kalgoorlie	Construction of terminals to enable freight movement in the event of extended road or rail closures.	• $120m in upfront capex • Ongoing maintenance cost and mobilisation costs

Please note references throughout appendix 1 to OneRail refer to the interstate track now managed by Aurizon.

Methodology: Natural hazard redundancy projects

Passing loops (ARTC/One Rail)

- For the proposed passing loops, we have modelled the costs associated with major and minor outages that would result in the base case compared to the project case
- In the absence of the passing loops **(base case)**, during extreme weather events, freight will experience delays or travel via road
- Under the **project case**, redundancy is provided from the construction of passing loops in flood prone areas to reduce the probability of a line outage – probability of outage assumed to go from 2.5% in the base case to 1% in the project case
- We have only quantified the benefits related to improved resiliency. Benefits related to capacity /operation flexibility have not been quantified

Intermodal terminals (Arc Infrastructure)

- The construction of intermodal terminals facilitates redundancy by enabling segments of a rail journey to be replaced by road following extreme weather events
- Under the **base case** during a track outage, freight will experience delays or travel via road
- Under the **project case** during a track outage, freight would be transported via heavy vehicle and from one intermodal to another intermodal, significantly reducing the need for heavy vehicle transport
- Benefits are high as we have assumed that on average one outage (lasting for 5 days) occurs each year due to bush fire season

Overview of CBA results for natural hazard redundancy projects ($m)

	Arc Infrastructure **Intermodal terminals**	ARTC **Passing loops**	One Rail **Passing loop**
Reduced number of major and minor outages	$408	$217	$60
- Avoided repair costs	$0	$0	$0
- Avoided freight delays	$280	$197	$55
- Reduced heavy vehicle use	$97	$13	$3
- Reduced above-rail opex	$54	$7	$2
- Intermodal transfer costs	-$23	$0	$0
Rail as an alternative to road	$0	$0	$0
Growth in rail freight from improved reliability	$47	$25	$6
Residual value	$8	$3	$3
Total benefits	$463	$245	$69
Total costs	-$121	-$48	-$40
NPV	**$342**	**$197**	**$29**
BCR	**3.81**	**5.12**	**1.74**

Detailed assumptions

The key benefit drivers in the CBA

Calculation	Formula	Source
Avoided repair costs	Repair cost per outage ($10 m) * reduced likelihood of major outage due to floods	Cost of repairs based on information provided by ARTC. We have conservatively repair cost savings for shorter outages caused by floods are zero.
Reduced freight delays	*Value of freight time (approx.$36 per tonne day) * days of outage*	Value of freight time based on rural freight time value for B-double using ATAP (Australian Transport Assessment and Planning Guidelines), *PV2 Road Parameter Values,* August 2016.
Cost savings of using rail rather than heavy vehicles	*Cost of completing task using heavy vehicle – cost of task using rail*	Rail and heavy vehicle operating costs based on parameter values for B-double transport from ATAP, *M3 Freight Rail*, October 2020 and ATAP, *PV2 Road Parameter Values,* August 2016. See next table for further details.
Avoided rail operating costs	*Cost of completing rail task when rail is restored – Cost avoided from avoided rail trip*	Above rail operators will incur additional operating costs to 'catch up' on the freight task when there is an outage. By not running a train when there is an outage, above rail operators can save on certain costs (eg, fuel costs) but will still incur some costs (eg, labour costs). The costs of completing the rail task when rail is restored will be greater than the avoided cost from not operating when rail network is out.

Economic costs of road versus rail

Calculation	Formula	Source
Safety	Safety cost ($ per NTK) * net tonne kilometres carried	Safety costs sourced from Inland Rail business case.
Externalities	Externalities ($ per km travelled) * kilometres travelled	Externalities sourced from ATAP, PV5 *Environmental parameter values,* August 2021
Track & road damage	Variable track/road maintenance cost * representative trip 000 GTK	Cost of track maintenance sourced from ATAP, *M3 Freight Rail,* October 2020. Road damage estimates sourced from Austroads, *Reassessment of the Benefits and Impacts of the Use of High Productivity Vehicles on Australian Highway Pavements.*
Rail and heavy vehicle operating costs	We calculate a $ per tonnes for road and rail.	Operating costs for heavy vehicles sourced from ATAP, *PV2 Road Parameter Values,* August 2016. Operating costs for rail based on representative trip modelled consistent with ATAP, *M3 Freight Rail,* October 2020.

Project cost and residual value assumptions

Project	Capital cost estimate	Residual value (Straight-line depreciation)
ARTC – Drainage enhancement	$500m based on mid-point of high-level cost estimate	Estimated using ATAP guidelines and an asset life of 100 years for earthworks
Arc Infrastructure – Cutting and embankment strengthening	$340m based on information provided by Arc Infrastructure	Estimated using ATAP guidelines and an asset life of 100 years for earthworks
One Rail – Formation, bridge and drainage enhancement	$135 m based on mid-point of high-level cost estimate	Estimated using ATAP guidelines and an asset life of 100 years for earthworks
Arc Infrastructure – Intermodal terminals	$120m – based on estimates from Arc Infrastructure	Estimated consistent with ATAP guidelines: midpoint of useful life of concrete road pavements of 70 years
ARTC – Passing loops	$46m – based on costing provided by ARTC	Useful life of 75 years – using midpoint of TfNSW guidelines for asset life of rail
One Rail – Passing loops	$46m – based on costing provided by One Rail	Useful life of 75 years – using midpoint of TfNSWguidelines for asset life of rail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