



Maroona to Portland Rail Line Business Case



Australian Government

ARTC

Australian Rail Track Corporation
Australian Government

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EXECUTIVE SUMMARY

Efficient infrastructure networks play a pivotal role in facilitating trade and economic development as well as driving industry competitiveness in Western Victoria

Exports are critical to the prosperity of Victoria. They contribute \$45 billion to the State's economy each year and support 330,000 jobs. Western Victoria, which produces grain, mineral sands, and plantation timber, is one of the State's export powerhouses.¹ With increasing global demand for these commodities there is a clear growth opportunity for the Region.

Grain, mineral sands, and timber produced in Western Victoria are generally transported to international markets via sea utilising either road or rail networks. The Maroona to Portland Rail Line ('Portland Line') is a 173.3km standard gauge rail line that links the Port of Portland with the national rail network and is a vital component of the regional supply chain that enables the movement of key commodities to international markets through the Port of Portland.

Stakeholder consultation and market analysis highlighted a number of problems currently face exporters, supply chains and the broader community in Western Victoria

Three key themes that arose from stakeholder engagement and market analysis included:

- Freight rail infrastructure in Western Victoria is not being fully utilised by regional exporters, which is driving up supply chain costs and reducing the competitiveness in export markets.
- There is a continued shift of the freight task from rail to road which is increasingly impacting the regional road infrastructure, community safety and environmental outcomes.
- Degraded access to the Port of Portland undermines the national supply chain resilience and the regional investment attractiveness of Australia's priority industries.

Addressing these problems is expected to help improve (i) the commercial sustainability of freight infrastructure; (ii) the competitiveness of regional industries; (iii) supply chain reliability and resilience; and (iv) community amenity and safety.

Upgrading the Portland Line was identified as being the preferred investment strategy to address the problems and realise the full extent of potential benefits for the Region

Three key strategic options were identified to address the problems outlined above:

- **Strategic Option A:** Improving the performance of the Maroona to Portland line.
- **Strategic Option B:** Redirection of rail freight to other ports.
- **Strategic Option C:** Price incentives to increase use of rail freight.

The three strategic options outlined above were assessed against a range of criteria including the potential benefits, costs, delivery time, risks and uncertainties, disbenefits and adaptability. Based on the outcomes of the relative assessment, **Strategic Option A** (upgrade focus) was identified as the preferred investment strategy as it was more likely to deliver the full range of benefits identified, support modal shift which mitigates safety and amenity issues faced by the community and improve overall supply chain resilience.

A number of potential project options were identified that varied in terms of allowable tonne axle loads (TAL) and speeds. The project options were assessed against a range of criteria including potential benefits, costs, risks, uncertainties, and dis-benefits. Option 3 (23 TAL / 60km/h) had the highest BCR (1.32) amongst the five project options under a medium demand scenario, slightly above Option 2 (21 TAL / 80km/h). Given Option 2 and Option 3 both had a similar BCR, stakeholder perspectives and other non-quantifiable risks, uncertainties and disbenefits were considered in selecting a preferred project option. In this context, Option 3 was viewed as the preferred project option given its higher operation standards, strong stakeholder support, and the fact that the performance specification of the Portland Line will increase to 23 TAL / 80 km/h after 10 years of operation, helping to future proof operations.² In contrast, it is worth noting that significant capital investment would be required under Option 2 if axle loads of 23 TAL were deemed necessary at some point in the future.

¹ For more information, please see: <https://www.premier.vic.gov.au/forging-new-pathways-victorian-exports>

² The ongoing sleeper insertion planned as maintenance will overtime increase the performance specification of the Portland Line. For Option 3, the first 10 years of maintenance re-sleeping activity has been brought forward into the capital expenditure program. This combined with ongoing maintenance tamping, reconditioning and ballasting, will enable Option 3 to have a track structure capable of 23TAL @ 80km/h by the tenth year of operations.

Upgrading the performance specification of the Portland Line to 23 TAL / 60 km/h is expected to lead to an increased rail mode share and deliver net community benefits for Western Victoria

An increase in the allowable axle loads and speed along the Portland Line is expected to raise the demand for rail freight services to the Port of Portland across a number of commodities including grain and mineral sands. The annual tonnage of commodities transported to the Port of Portland at 2035 under the preferred option is expected to be approximately 1.2 million tonnes under a medium demand scenario, which is close to a six-fold increase from the base case. The increased volume of commodities transported to the Port of Portland via rail is expected to raise the rail freight mode share to close to 70 per cent under a medium demand scenario.

The increased utilisation of the Portland Line is expected to deliver a wide range of incremental economic benefits to members of key industry supply chains as well as the regional community including supply chain productivity improvements and positive externalities such as lower carbon emissions and reduced accidents on the local road network. In particular, the preferred project option was found to deliver a BCR of 1.32 under a medium demand scenario. Consistent with the level of net community benefits expected to be generated from the preferred project option, multiple letters of support have been obtained from rail operators and freight owners located in Western Victoria that expect to utilise the upgraded Portland Line in order to transport commodities to the Port of Portland (Appendix 4).

ARTC intends to deliver the rail upgrades over a period of approximately 24 months while maintaining current operations in order to avoid disruption to regional supply chains

Five key workstreams will be required to deliver the preferred project option and accommodate axle loads up to 23 TAL and increased speeds:

- **Project design and management**, including environmental studies and permits (where required).
- **Track works**, including the replacement of timber sleepers with new concrete sleepers, and the deepening of ballast along the rail corridor.
- **Structure works**, including the renewal and replacement of bridges and culverts.
- **Turnouts**, including refurbishment of a select number of turnouts.
- **Signalling**, including the introduction of axle counters at level crossings to provide for automated crossing protection to improve transit times.

Two models were considered to deliver the scope of works outlined above (i) closing the Portland Line while upgrade works are undertaken; or (ii) maintaining current operations while delivering the preferred project option. The latter is the preferred model as it is consistent with current ARTC operating practices and the trade-offs associated with both options including impacts on the project schedule, construction costs, and customer service levels.

The scope of works is expected to take approximately 24 months to deliver following the receipt of funding. The inherent risks associated with the preliminary project schedule stemming from the large number of rail and road projects expected to be delivered over the next few years across the State have been addressed via a number of mitigation measures and a prudent risk contingency.

ARTC regularly implements track upgrade works across its broader rail network and has established a range of business-as-usual procedures and practices that can be leveraged to deliver the upgrades

Three distinct work packages were identified for procurement, each of which are not overly complex, involve proven technology / products that are well understood, and can be delivered by a range of suppliers.

The Major Construction Projects (MCP) division of ARTC will be responsible for delivering the Portland Line upgrades, and as such, existing risk management, governance, asset and change management, and approvals processes will apply in implementing the Portland Line upgrade. The ARTC will also continue to re-engage with stakeholders during the pre-delivery, delivery and post-delivery phases aligning with the ARTC's Project Management Procedure (EGP-20-01).

ARTC will maintain the Portland Line following the upgrades with the intention of increasing the performance specification of the track to 23 TAL / 80km/h within 10 years of operation.

1

Project overview and strategic alignment

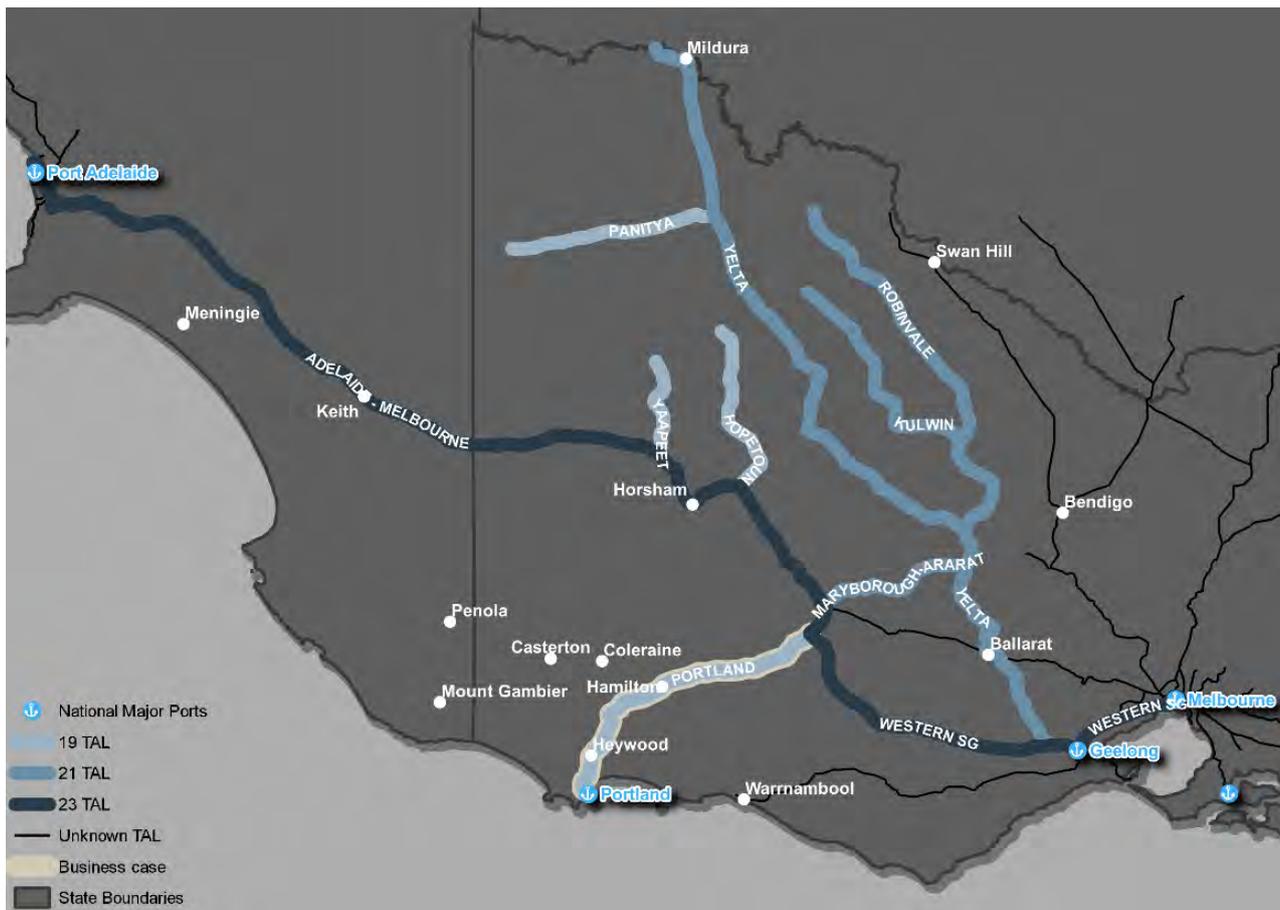
1. INTRODUCTION AND APPROACH

The section below outlines the background, purpose, approach and structure of the Maroona to Portland Rail Line Business Case and describes the subsequent approval and funding process.

1.1. INTRODUCTION

The Maroona to Portland Rail Line ('Portland Line') is a 173.3km standard gauge rail line that links the Port of Portland with the national rail network (Figure 1). The Portland Line is a vital component of the regional supply chain that enables the export of timber, grains, and minerals to domestic and international markets through the Port of Portland.

Figure 1: Maroona to Portland Rail Line



Source: Geoscience Australia, Foundation Rail Infrastructure, 2022; Geoscience Australia, Populated Places, 2006; Australian Bureau of Statistics, State Boundaries, 2021

Commercial interfaces

The ARTC commenced a 50-year lease of the Portland Line from the Victorian Government in 2008 as part of its overall lease of the Victorian Interstate Standard Gauge Network. ARTC's role and responsibilities cover the management and maintenance of the rail line to the conditions/performance criteria defined in the Interstate Infrastructure Lease.³

Rail operators, including s47G(1)(a), s47G(1)(b), provide rail freight services on the Portland Line for freight owners such as s47G(1)(a), s47G(1)(b) and s47G(1)(a), s47G(1)(b). Access to the line is granted by ARTC on the terms and conditions of the ARTC Interstate Track Access Agreement (TAA). Under the terms of its lease, there is a requirement for parity in access charging on the Portland Line and for rail traffic heading to the Port of Geelong.

³ For more information, please see: https://www.artc.com.au/uploads/news_2008-07-10.pdf

1.2. BACKGROUND

This document represents the Business Case for the Portland Line and considers the range of planning and feasibility studies conducted over the course of 2015 - 2021 as outlined in Table 1 below.

Table 1: Background to the Maroona to Portland Rail Line Business Case

| Work package | Overview of the key findings |
|------------------------|------------------------------|
| s47G(1)(a), s47G(1)(b) | |

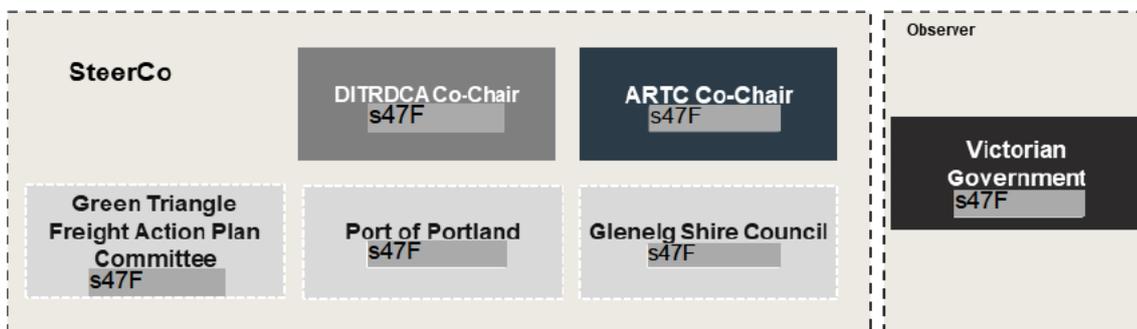
1.3. PURPOSE OF THE BUSINESS CASE

The purpose of this Business Case is to assist decision makers to determine the best option for the Portland Line given the impacts on the regional economy, the wider freight network impacts, and the social, economic and financial costs and benefits to the community as a whole. ARTC has developed this Business Case in a manner consistent with the Infrastructure Australia Assessment Framework ('the Framework').

1.4. APPROACH TO DEVELOPING THE BUSINESS CASE

This Business Case has been prepared in consultation with a Project Steering Committee (the SteerCo) that was established by ARTC and the Commonwealth Government. The SteerCo comprises representatives of ARTC, the Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA), Glenelg Shire Council, the Port of Portland, and the Green Triangle Freight Action Plan Committee. It also includes representatives of the Victorian Department of Transport and Freight Victoria as observers as shown in Figure 2 below.

Figure 2 SteerCo Structure and Representatives



To support the development of the Business Case, ARTC has also sought professional advice from a number of technical and commercial advisors and commissioned a series of targeted work packages that have underpinned this Business Case (Table 2). The reports generated through these work packages have been used to support the development of the options and the analysis within the Business Case and are detailed in full within the appendices.

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Table 2: Work packages underpinning the Business Case

| Work package | Description |
|---|--|
| Concept design Lead: Lycopodium | The purpose of the Business Case is to inform a decision by the Federal Government around the preferred option for the Portland Line. Accordingly, a key aspect of the Business Case development has involved an extensive package of work to develop concept designs and assess the scope of works and staging required for each of the options. |
| Capital cost modelling Lead: Lycopodium | The purpose of the capital model development is to estimate all capital expenditure requirements associated with the development for each of the detailed options considered within the Business Case. The capital model, developed by Lycopodium, has considered any required (i) upgrades to the existing rail line; (ii) new infrastructure; (iii) ongoing maintenance costs; and (iv) lifecycle maintenance costs. |
| Economics Lead: HoustonKemp | The Business Case considers the social, environmental, and economic costs and benefits associated with each project option against the base case, through a comprehensive economic analysis. The economics work package has been supported by a rigorous demand assessment that has been underpinned by extensive stakeholder consultation and desktop research regarding the relative attractiveness of rail versus road freight under a range of scenarios. |
| Financial analysis and funding strategy Lead: PwC | The Business Case considers the whole-of-life financial costs and potential revenue streams associated with the preferred options relative to the base case. A funding strategy was in turn developed to identify how the preferred option would be paid for including potential contributions from private and public sectors as well as funding mechanisms such as user pay models. |
| Implementation planning and consultation Lead: ARTC | The detailed timeline and implementation plan, to progress the project through ARTC project management process into construction, is a key input to the Business Case development. The analysis will also be used on an ongoing basis in later stages of the feasibility work and project realisation, providing key stakeholders with greater clarity around each element of the transition and informing considerations around planning, resourcing requirements, risk management, and stakeholder engagement. |

1.5. MARKET & STAKEHOLDER ENGAGEMENT

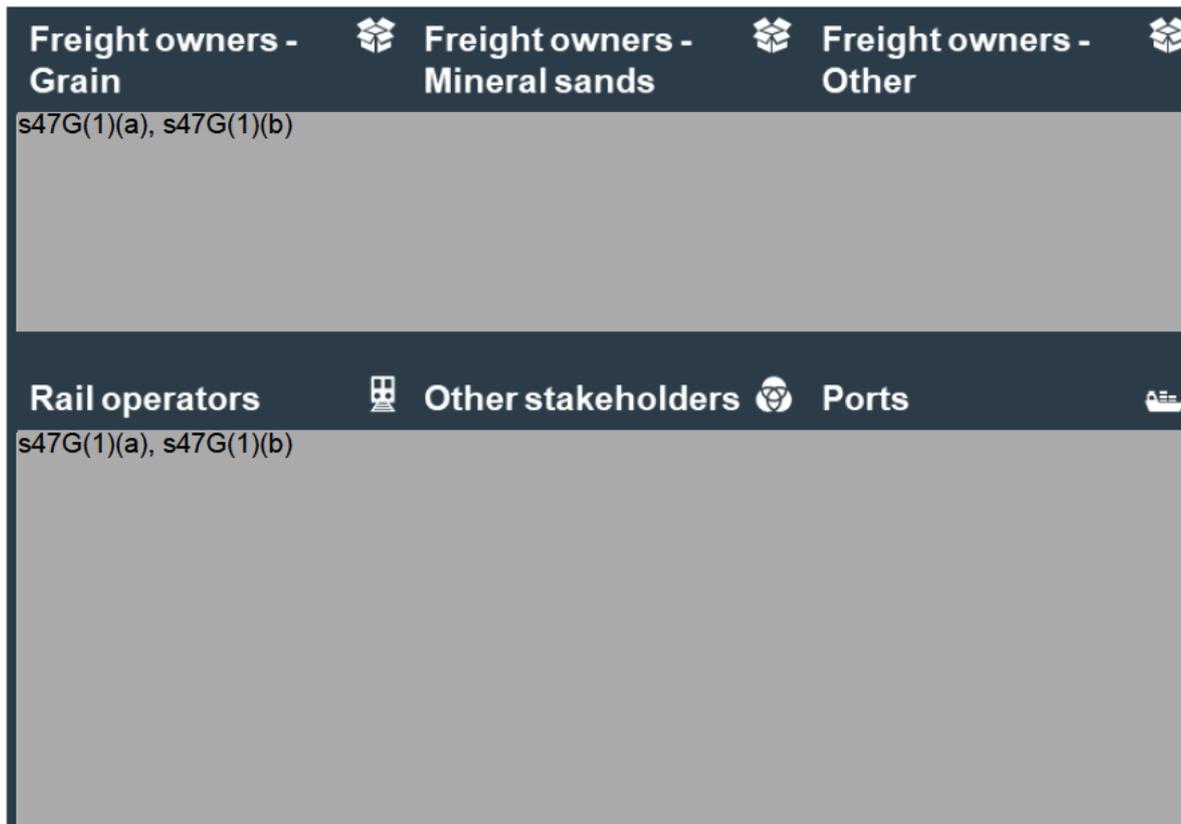
In preparing this Business Case ARTC has also sought the views of various participants in the regional supply chain. This has included port owners, freight handlers and owners, rail operators, and representatives of various arms of local and state government. These parties were engaged over two rounds of consultation:

- initially to provide their perspectives on the role of the Port Portland, the performance of the Portland line, the efficiency of the regional supply chain, and the future opportunities for export growth, and;
- subsequently to provide any additional views on the options being put forward through the Business Case.

The participation of these parties in the process has been critical to understanding the problems to which the proposed investment responds and the drivers of rail freight demand into the future.

Outcomes of the consultation exercise are covered throughout the Business Case and the list of parties that were engaged through the process are identified in the figure below.

Figure 3 Breakdown of stakeholders engaged in consultation



1.6. STRUCTURE OF THE BUSINESS CASE

Consistent with the Framework, this Business Case is structured as follows:

Section 1 – provides the background and context for the overall project, identifying key information and methodology in framing the approach to the Business Case.

Section 2 – describes the case for change including the rationale for the project; the identified problems and the priority of and urgency of action.

Section 3 – details the benefits to relevant stakeholders associated with addressing the problems, as well as potential benefit delivery risks, uncertainties and interdependencies.

Section 4 – the identification and assessment of strategic options to address the problems identified in Section 2, as well as a framework to identify the benefit impact outlined in Section 3.

Section 5 – details the identification and assessment of project options that align to the parameters of preferred strategic option to identify the preferred project option through a detailed benefit, financial, risk and stakeholder analysis.

Section 6 – provides detailed financial analysis of the preferred project option including, but not limited to:

- Operating assumptions: An overview of operating and financial assumptions underpinning the evaluation of the base case and the preferred project option.
- Financial appraisal: Analysis of the financial impacts of the project on the operations of the rail line, and of the financial return from the project.

Section 7 – provides a detailed demand and economic analysis of the preferred project option including but not limited to:

- Demand analysis: An overview of the aggregate demand forecasts for grain, mineral sands and other key commodities realised from the preferred project option.
- Cost-benefit analysis: The analysis of the social and economic costs and benefits of the project that are quantifiable, and whether the benefits outweigh the costs.

Section 8 – outlines a plan for the implementation of the preferred options including a procurement and delivery strategy, the proposed project governance, project delivery risks, benefits realisation strategy, and the stakeholder consultation plan.

Appendices – The Business Case is supported by a series of Appendices (provided in a separate document), namely:

Appendix 1: Demand assessment and cost benefit analysis

Appendix 2: Technical report

Appendix 3: Financial appraisal methodology report

Appendix 4: Letters of support.

1.7. THE APPROVAL AND FUNDING PROCESS

This Business Case has been prepared by ARTC, in consultation with, and for consideration by, the Commonwealth Government. This Business Case has been prepared in accordance with relevant Infrastructure Australia standards (where relevant) and captures all relevant costs and benefits and considerations in the financial, economic and commercial analysis.

The Business Case includes consideration of suitable funding arrangements, taking account of the line's commercial sustainability. This includes funding and financing options and any potential commercial options.

Any capital funding sought by this Business Case is anticipated to be limited to additional funding sought by ARTC to undertake capital improvements to the Portland Line. ARTC is responsible for the ongoing operational and maintenance costs associated with the Portland Line in the regular course of business.

This Business Case includes capital and operational expenditure associated with ancillary infrastructure investments to be undertaken by private entities (e.g. at the Port of Portland). This Business Case does not consider the funding arrangements for assets owned by these private entities. ARTC anticipates these private entities will develop their own funding strategy for any capital improvements in the regular course of their business. Where private entities funding strategies (in part, or full) are known to ARTC, they may be noted in this Business Case as information only.

1.8. BACKGROUND AND CONTEXT

A number of state-significant export industries are located in Victoria's Western Region, creating a platform for continued economic growth

Exports are critical to the prosperity of Victoria. They contribute \$45 billion to the State's economy each year and support 330,000 jobs. Victoria's Western Region, which produces grain, mineral sands, and plantation timber, is one of the State's export powerhouses.⁴ With increasing global demand for these commodities there is also a clear growth opportunity for the region.

Grain has traditionally been one of the primary outputs of Victoria's Western Region with grain production focused predominantly on the west and north of the State (Table 3). Grain represents a significant proportion of Victoria's food and fibre production which in turn represent over half of the State's total exports⁵. With growing global demand for food and fibre products, the sector has been identified as one of Victoria's seven 'future industries'⁶. While grain exports do face some natural constraints in terms of fluctuations in weather, growing domestic consumption and limitations on the area of land available, industry productivity is expected to see continued growth in outputs.

Growth in exports is expected to be further supported by the emergence and growth of new industries. There is significant opportunity, for example, in the production of mineral sands. Mineral sand deposits contain a concentrated amount of economically important minerals known as 'heavy minerals' including zircon, rutile and ilmenite. Once processed, the minerals are widely used in products such as paint, paper, plastics, ceramics and welding materials, plus a range of clean energy technologies. Mineral sands are therefore key inputs into the production of household and business consumer goods with the four biggest markets being Taiwan, India, China and Mexico⁷. Continued improvements in living standards across Asia is expected to underpin future growth in mineral sands exports. In addition, as a key component of wind turbines and solar

⁴ For more information, please see: <https://www.premier.vic.gov.au/forging-new-pathways-victorian-exports>

⁵ For more information, please see: <https://agriculture.vic.gov.au/about/agriculture-in-victoria/victorias-agriculture-and-food-industries>

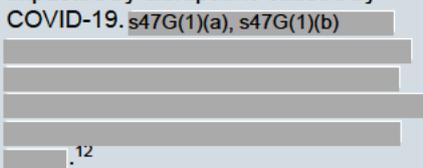
⁶ For more information, please see: <https://business.vic.gov.au/grants-and-programs/future-industries>

⁷ IBISWorld, B0805 Mineral sand mining in Australia industry report (2021)

technology⁸, mineral sands will play an increasing role with the domestic and international transition towards net zero. Between ~25 and ~50 per cent of Australia’s mineral sands resources (depending on the specific resource) are located in Victoria. Underlining the scale of local opportunity, most of Victoria’s mineral sands deposits are located in the Western Region.⁹

Lastly, the Green Triangle, Australia’s second-largest collective plantation and wood processing zone, spans Victoria’s Western Region and eastern South Australia. A considerable quantity of the timber that is extracted from the Green Triangle is processed into woodchips and other timber products at a facility located close to the city of Portland and/or is exported through Portland to key markets in Asia and Europe. Exports are anticipated to see continued growth over the medium- to long-term with industry investing more than \$130 million over recent years in 110,000 hectares of new plantations.¹⁰

Table 3: An overview of key export industries in Western Victoria

| Commodity | Location | Value |
|---------------|--|--|
| Grain | <p>Victoria’s grain growing areas are mainly located in western and northern Victoria, predominantly in the Mallee, Wimmera and North Central regions.</p> <p>Key export markets for grain producers in Western Victoria including China, Indonesia and Vietnam.</p> | <p>In 2019-20, Victoria’s total grains exports were valued at \$1.1 billion. It is estimated that approximately 9,600 persons work on farms that produce grains in the year to May 2021.¹¹</p> |
| Mineral sands | <ul style="list-style-type: none"> - Approximately three quarters of Victoria’s mineral sands deposits by area are located in Western Victoria. Mineral sands are: <ul style="list-style-type: none"> o excavated and processed at a number of mine sites located across Western Victoria, and are then either: <ul style="list-style-type: none"> ▪ exported domestically or internationally, or ▪ further refined and processed at a specialist facility before being exported. <p>Key export markets include Taiwan, India, China and Mexico.</p> | <p>The volume and value of mineral sands produced in Victoria can fluctuate from year-to-year and has recently been impacted by disruptions caused by COVID-19. s47G(1)(a), s47G(1)(b)</p>  <p>.¹²</p> |
| Timber | <p>A significant proportion of the Green Triangle, Australia’s second-largest collective plantation and wood processing zone, is located in Western Victoria with timber processing operations concentrated close to the city of Portland. A large volume of logs, woodchips, and other timber products that are sourced from the Green Triangle are exported internationally to South East Asia and other key European export markets.¹³</p> | <p>The Green Triangle forestry industry (Victoria and South Australia) is estimated to generate an estimated \$2.6 billion in economic output annually.¹⁴ Industry sources estimate the Green Triangle timber export industry underpins around 18,000 jobs and 151 business within the south-east of South Australia and western Victoria.¹⁵</p> |

In addition to the three industries outlined above, Alcoa’s Portland aluminium smelter is a major contributor to the regional economy, producing 19 per cent of Australia’s total aluminium. The smelter is located five kilometres north-west of the Port of Portland. It directly employees 600 people and indirectly supports a further 300 jobs in manufacturing. The smelter produces approximately 350,000 tonnes of aluminium ingot annually which is largely exported through the Port of Portland and Port of Melbourne.^{16 17 18}

⁸ For more information, please see: https://www.minerals.org.au/sites/default/files/Mineral%20sands_May%202020.pdf

⁹ For more information, please see: <https://www.australianresourcesandinvestment.com.au/2022/01/18/victoria-turms-the-sands-of-time/#:~:text=Of%20these%20resources%2C%20Victoria%20holds,%2C%20respectively%2C%20among%20Australian%20states.>

¹⁰ For more information, please see: https://www.awe.gov.au/sites/default/files/sitecollectiondocuments/forestry/green_triangle_investment_ver8.pdf

¹¹ Agriculture Victoria, VICTORIAN GRAINS INDUSTRY FAST FACTS, June 2021

¹² s47G(1)(a), s47G(1)(b)

¹³ Regional Development Victoria, Wimmera-Southern-Mallee Regional Economic Development Strategy SUPPORTING ANALYSIS, 2022

¹⁴ EY, Capturing the full benefits of plantation forestry in the Green Triangle, 2020

¹⁵ For more information, please see: <https://railfreightalliance.com/wp-content/uploads/2014/06/freightactionplan2016.pdf>

¹⁶ For more information, please see: <https://www.visitportland.com.au/industry/portland-aluminium-alcoa/>

¹⁷ For more information, please see: <https://www.alcoa.com/australia/en/pdf/value-prop-poster.pdf>

¹⁸ For more information, please see: <https://blog.id.com.au/2017/economic-analysis/how-much-is-an-aluminium-worker-worth/>

The efficiency of the freight supply chain is a critical influence on export competitiveness and therefore the ability of Victoria’s Western Region to maximise its export opportunities

Supply chains and the efficient movement of freight play a pivotal role in facilitating trade and economic development as well as driving industry competitiveness in Western Victoria. The supply chain is comprised of a number of different parties, including the primary producers (such as grain growers and miners), transport services (such as road haulage companies and rail operators), storage and export terminal operators, and port owners. Industry development and growth are heavily dependent on efficiency of the relationship between these various parties, which together provide the connection from point of production to international bulk commodity markets.

Industries located in Western Victoria typically operate in a market where the export price is driven by external factors such as world prices and foreign exchange movements – both of which are outside the control of local industries. The cost of transport services is therefore one of the few drivers of the final export price that are to some degree controllable by local industry and/or governments.

For Western Victoria, supply chain costs are a significant proportion of total production costs for grain production and mineral sands production – around 30 per cent and 22 per cent respectively. With grain and mineral sand operations generally considered to be highly efficient, supply chain costs are the cost component where further efficiencies are considered possible, and which need to be harnessed if producers are to remain internationally competitive.¹⁹

Supply chain costs in Victoria’s Western Region are influenced by the efficiency of a transport system comprising ports, roads, and rail lines

Grain, mineral sands and timber produced in Victoria’s Western Region are generally transported to domestic markets mostly via road and rail, and international markets via sea. Exporters have access to four alternative ports between Adelaide and Melbourne, including the Port of Portland. While the various ports are differentiated in terms of supported trades and capacity, they all generally have the capability to accommodate the key commodities from the region (Table 4).

Table 4: Key characteristics of the network of ports supporting exporters located in Western Victoria

| | Melbourne* | Port Adelaide^ | Geelong* | Portland* |
|-----------|------------------------|----------------|----------|-----------|
| Ownership | s47G(1)(a), s47G(1)(b) | | | |
| Berths | | | | |
| Trades | | | | |
| | s47G(1)(a), s47G(1)(b) | | | |

When considering how to transport primary commodities to port, exporters located in Western Victoria typically have a number of pathways to choose from that involve the use of the rail and/or the road networks. The specific pathway adopted for a given consignment will be driven by the cost, time and risks associated with alternative options.

The use of the rail network for transporting primary commodities over long distances is generally considered to have a natural advantage over road due to the efficiencies which can be gained from increased volumes per trip, greater productivity in loading and unloading freight and lower operating costs per tonne. Over shorter distances, road is generally more efficient.

The distance at which one mode is more efficient than the other has shifted over time. This has been in large part due to the increasing road network access for Oversize and Overmass (OSOM) freight vehicles such as B-Doubles, A-Doubles and B-Triples. Other changes, such as the increase in on-farm storage, have increased the importance of flexibility to exporters which has also favoured greater use of road transport (see Box 1).

¹⁹ Department of Economic Development, Jobs, Transport and Resources, Murray Basin Rail Project Final Business Case, 2015

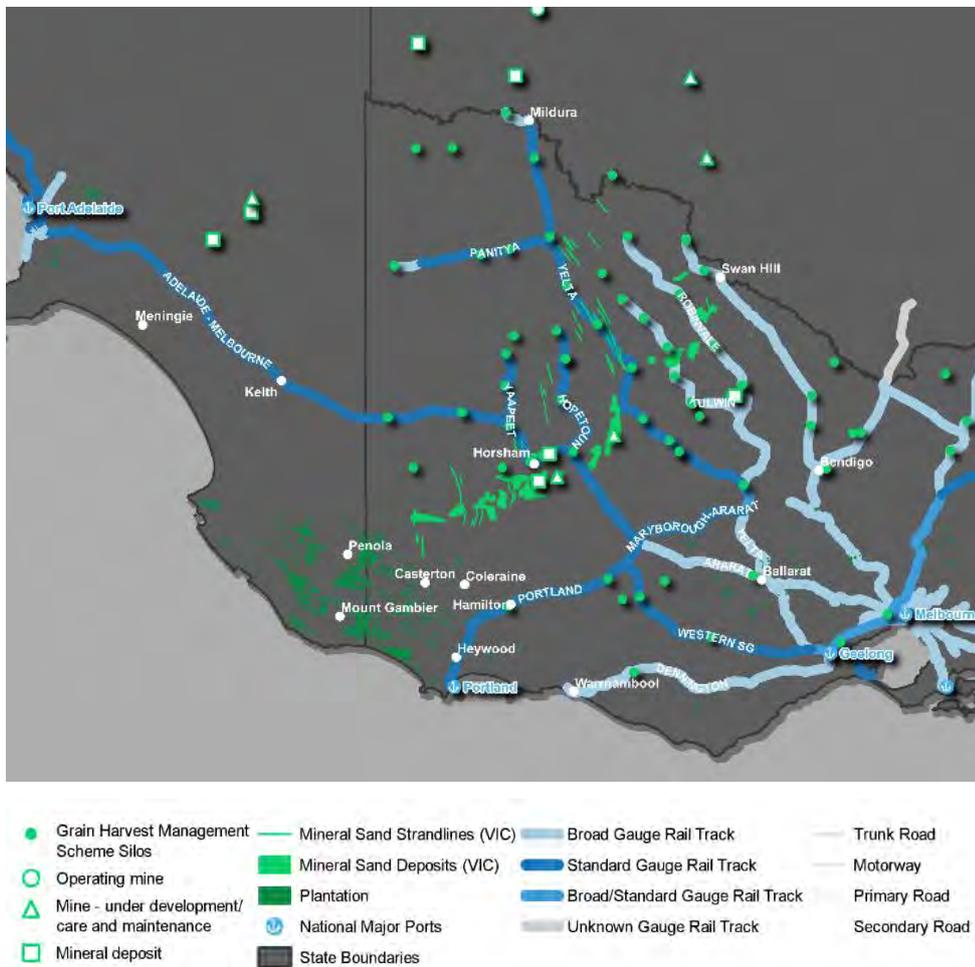
Box 1: Infrastructure requirements within the grain supply chain²⁰

There have been significant recent changes to grain industry storage arrangements, with an increase in on-farm storage and a consolidation by grain traders of storage at ‘super’ sites. This gives producers and grain marketers, respectively, more control over the export of their product and the ability to take advantage of high prices. Typically, this has facilitated an increase in road mode share particularly during harvest, when producers seeking to take advantage of higher pricing require flexible and reliable transport options.

The location of, and access to, intermediate processing and storage facilities can also influence choices. Grain storage silos and mineral sands processing facilities have been located in close proximity to roads and rail lines that provide timely access to the freight network and major ports (Figure 4 and Figure 5).²¹ In some cases, this critical infrastructure can be owned and operated by integrated supply chain businesses which also own loading facilities at various ports. For grain exports, for example, s47G(1)(a), s47G(1)(b)

While each of these businesses provide a degree of open access to the facilities they control, there remains a financial incentive to maximise the proportion of grain they move through their own facilities. This means that irrespective of the relative efficiency of transport networks, commodities will not always be exported through their closest port.

Figure 4: Freight railway network and supply chain infrastructure



Based on the land use patterns, location of supply chain infrastructure and the relative efficiency of road and rail outlined above, key trends in the movement of freight by exporters in Western Victoria have included:

- The Port of Geelong is the primary gateway through which grain exports from the Western Region are moved. Consultation with key industry stakeholders indicated that this port benefits from greater storage

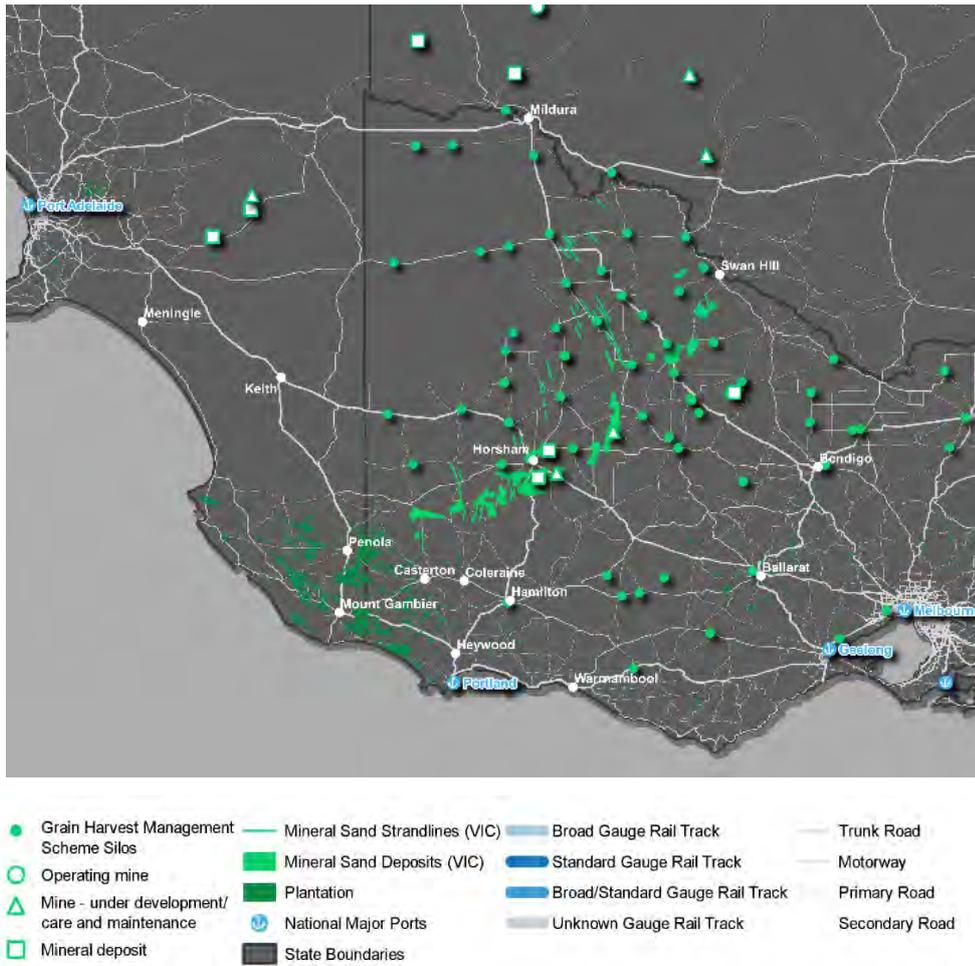
²⁰ Department of Economic Development, Jobs, Transport and Resources, Murray Basin Rail Project Final Business Case, 2015

²¹ The Mineral Separation Plant at Hamilton is currently closed, under care and maintenance with a view to recommence activity once suitable course deposits are sourced for processing. For more information, please see: <https://www.iluka.com/CMSPages/GetFile.aspx?guid=2a8aea3b-5078-45cf-9b68-35e83313bf17> and <https://www.iluka.com/CMSPages/GetFile.aspx?guid=2a8aea3b-5078-45cf-9b68-35e83313bf17>

and more efficient rail and quicker ship loading. The Port of Portland has been considered an overflow option for Grain when Geelong is capacity constrained.

- The majority of grain exports (by tonne) are transported to the Port of Portland via road 70 per cent. Inversely 70 per cent of the grain export via the Port of Geelong travel via rail.²²
- The Port of Portland is the primary gateway through which timber exports from the Western Region are moved. These exports are moved by road due to the proximity of plantations to the port.
- The Port of Portland has traditionally also supported the majority of mineral sands exports from the Western Region. Prospective projects have suggested that future volumes are contestable with a number of potential port options. There is no clear preference between the mode of transport noting both road and rail have previously played a role in supporting mineral sands exports.

Figure 5: Road network and supply chain infrastructure



1.9. RISKS AND OPPORTUNITIES FOR THE MAROONA TO PORTLAND LINE

The State Government has identified that one of the major risks to the economic potential of Victoria's future high grow industries is the ability of exporters to efficiently transport goods to foreign markets.²³ The grain, mineral sands and timber industries located in Western Victoria all require access to efficient and resilient supply chains in order to realise the potential growth opportunities.

The current reliance on road transport, while attractive to exporters due to increased flexibility and relatively lower prices, creates externalities that increase the impact of supply chains on communities. There is an opportunity to broaden the role that the rail network in Western Victoria currently plays within the supply chains of key export industries. The rail freight sector is complicated however, and any significant changes in

²² Maroona to Portland rail line upgrade – Demand forecast, Houston Kemp, July 2022

²³ Department of Economic Development, Jobs, Transport & Resources, Food and Fibre Sector Strategy, 2016

patronage may require the involvement of several levels of government, infrastructure managers and private sector freight operators. As a result, it can be difficult to ensure different organisations and aspects of a project are sufficiently coordinated to realise the potential benefits for the region.

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2

The case for change

2. PROBLEM IDENTIFICATION AND ANALYSIS

CHAPTER SUMMARY

An Investment Logic Mapping (ILM) process was undertaken with key personnel from ARTC to assist in the development and documentation of the logic underpinning ARTC's proposed project solution. The first stage of the ILM process was the identification and analysis of the key problems faced by the regional community to be addressed by the preferred project option. The analysis of the key problems was tested and confirmed through a detailed industry stakeholder consultation process, enabling the identification of potential benefits, and underpinned the strategic options assessment outlined in Chapter 4.

The key problems identified through the process outlined above were synthesised into three broad problem statements:

- **Problem 1:** Freight rail infrastructure in Western Victoria is not being fully utilised by regional exporters, which is driving up supply chain costs and reducing the competitiveness in export markets.
- **Problem 2:** Continued shift of the freight task from rail to road is increasingly impacting the regional road infrastructure, community safety and environmental outcomes.
- **Problem 3:** Degraded access to the Port of Portland undermines the national supply chain resilience and the regional investment attractiveness of Australia's priority industries.

2.1. PURPOSE OF SECTION

This chapter builds upon the analysis of the freight network and current functioning of regional supply chains in Western Victoria presented above to define the fundamental problems that ARTC is seeking to address. The analysis of the key problems to be addressed enables the identification of potential benefits to be realised and underpins the strategic options assessment outlined in Chapter 4.

2.2. APPROACH

The ILM process was undertaken to succinctly identify the fundamental problems to be addressed, and is a nationally recognised process to ensure complex project evaluations properly articulate the primary need for an investment and the benefits the investment is expected to deliver.

The ILM examines the overarching interventions and the solutions to address the problems which include the expected changes in overall service outcomes, and the potential assets that may deliver the service outcomes and expected benefits. The ILM was developed in consultation with key ARTC personnel and has been tested and confirmed via consultation with a range of stakeholders in Western Victoria comprising of port operators, freight owners, rail operators, and government agencies.

The section below is structured around each of the identified problem statements and breaks these down into further sub-problems for the purposes of targeted, evidence-based analysis.

2.3. PROBLEM IDENTIFICATION AND ANALYSIS

The problems identified through the ILM process were tested and confirmed through engagement with key supply chain participants and other regional stakeholders that provided important insights on the challenges facing regional exporters and communities. The current capacity and performance specification of the Portland Line was identified as a contributor to these challenges including:

- operating restrictions that reduce the competitiveness of rail freight and therefore increase the costs of transport for exporters
- a resulting reliance on road freight which is impacting on road infrastructure and community safety
- decreasing resilience of the national supply chain from degraded access to a significant port.

These challenges ultimately impact the productivity and competitiveness of local industries and the economic opportunity for local communities. For the purposes of this Business Case the challenges outlined above have been synthesised into three broad problem statements that are discussed in greater detail below.

PROBLEM 1: FREIGHT RAIL INFRASTRUCTURE IN WESTERN VICTORIA IS NOT BEING FULLY UTILISED BY REGIONAL EXPORTERS, WHICH IS DRIVING UP SUPPLY CHAIN COSTS AND REDUCING COMPETITIVENESS IN EXPORT MARKETS

Rail's role in the regional supply chain has reduced over time as the productivity of road freight has improved

The proportion of the freight task and variety of goods carried by rail over time has changed as improvements in road vehicle productivity and the expansion of the proportion of the road network available to the heaviest freight vehicles has increased. Today, the role of rail in the Western Region economy is largely concentrated on the transport of grain and mineral sands from upcountry silos and processing plants to ports for export. Transport of these commodities has, however, become increasingly contested as road transport has continued to improve.^{24 25}

The reliance on a decreasing number of increasingly contested commodities has brought the commercial sustainability of rail infrastructure into question. Branch lines such as the Portland Line have become highly exposed to fluctuations in commodity markets that see volumes vary significantly from year to year.

The Portland Line has become reliant on grain and mineral sands and recent demand shocks have seen investment in the line and its overall condition decline

s47G(1)(a), s47G(1)(b)

This decline is largely attributable to the conclusion of mining operations at the s47G(1)(a), s47G(1)(b) . Output from this mine had previously been transported for processing at Hamilton from where the output was transported by rail to the Port of Portland. Operations ceased in 2017 and from this time the Portland Line has exclusively serviced grain transport.²⁶

While grain output is weather dependent and therefore always variable, the closure of the s47G(1)(a), s47G(1)(b) coincided with poor seasonal conditions in eastern Australia that resulted in a series of years of low output. s47G(1)(a), s47G(1)(b)

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s47G(1)(a), s47G(1)(b)

²⁴ Bureau of Infrastructure, Transport, and Regional Economics, *Information Sheet 34: Road and rail freight: competitors or compliments* (2009)

²⁵ Australian Export Grains Innovation Centre, *Australia's grain supply chains: costs, risks, and opportunities* (2018)

²⁶ Iluka Resources, Murray Basin newsletter (November 2018)

²⁷ Agriculture Victoria, *Victorian grain industry fast facts* (July 2021)

s47G(1)(a), s47G(1)(b)

While export volumes are ultimately expected grow, the current condition of the Portland Line means rail demand is unlikely to return with road freight now the least-cost option for transport to the Port of Portland

Ultimately the decline in export volumes is expected to be temporary. Grain harvests have improved in recent years and rail traffic has returned to the line. Average export volumes are ultimately expected to continue to increase as growing international demand and sector productivity are likely to see output continue to grow at the long-term rate of three per cent per annum.

Further, market engagement indicates up to four new mineral sands mines may commence operations within the next decade. s47G(1)(a), s47G(1)(b)

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s47G(1)(a), s47G(1)(b)

²⁸ Deloitte, Portland Rail Line Upgrade, 2021

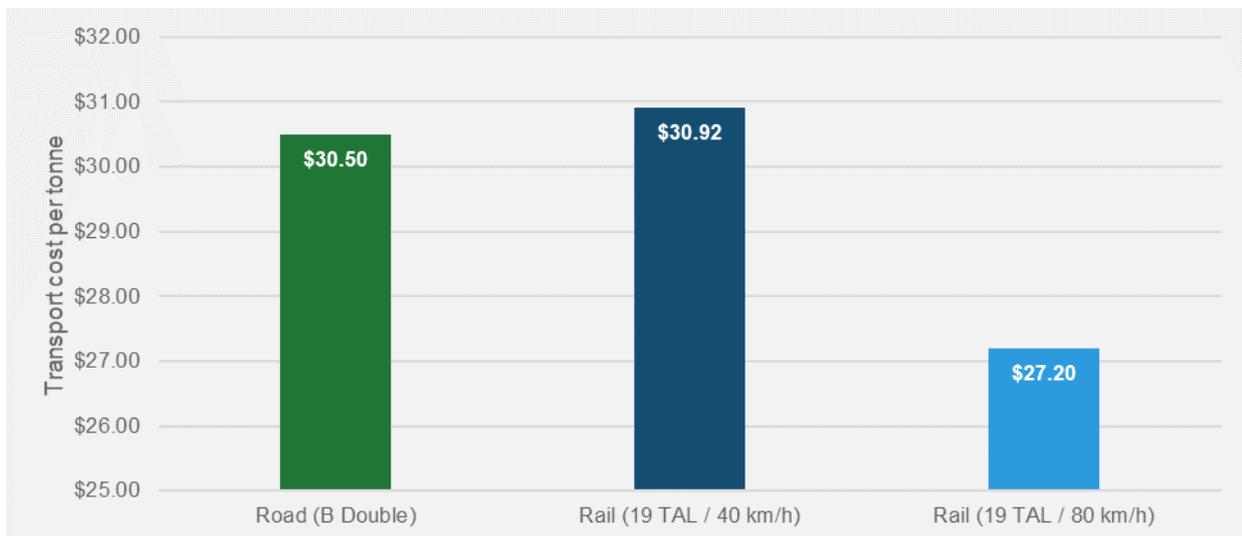
Without improvements to the Portland Line the majority of the growing export task is likely to be transported by road with the current condition of the Portland Line meaning the competitiveness of rail freight is significantly compromised.

Poor asset condition and operating restrictions on the Portland Line and other regional branch lines further increase the time, cost and risk associated with exporters utilising the rail network to transport primary commodities. They have directly impacted competitiveness of rail in three ways:

- First, operating restrictions that increase rail cycle times increase costs for rail operators. It increases the crewing requirements for any given journey and decreases relative utilisation rates of rolling stock. These increased costs are passed through as higher prices for rail freight.
- Second, inconsistencies in operating standards limits the flexibility of rail operators to optimally distribute their rolling stock with some lines limited in the specification of locomotives and wagons they are able to accommodate (axle loads and gauge, for example)
- Third, decreasing reliability increases supply chain risks. This leads to some businesses supplementing (or substituting) rail freight with road freight in order to ensure a steady state of production and that order levels and shipping deadlines can be met.

Today the cost of moving a tonne of freight on the Portland Line is as much as 15 per cent higher than it was prior to the introduction of operating restrictions. Importantly, it is now higher than moving a tonne of freight via road (see Figure 9).

Figure 9: Comparison of grain transport costs from Doon to Port of Portland



Source: Houston Kemp, Maroona to Portland Rail Line Upgrade Business Case – demand forecast (2022)

This comparison reveals a negative spiral whereby declines in demand lead to reduced investment which erodes rail freight performance and will ultimately lead to further declines in demand. It also demonstrates that deteriorating rail infrastructure condition will likely lead to producers opting for higher-cost transport options that will ultimately undermine the competitiveness of Victoria’s exports.

Without coordinated investment across the supply chain the region could see an additional 39,000 truck trips on the road every year

Without intervention the growing export task and poor performance of the Portland Line could see an additional 756 weekly (or 39,000 annual) truck trips on the Western Victorian road network by 2055.

Industry has flagged through market engagement its desire to make use of rail and make its own complementary investments under the right circumstances. Breaking the current cycle of declining demand and investment, however, is a complex undertaking.

The Portland Line is only one element of the broader supply chain. Increasing the use of rail in the regional supply chain requires a whole-of-system perspective that accounts for capacity constraints across the broader supply chain and the performance of supporting infrastructure that connects the network to producers and ports. Importantly, it requires coordinated action from a range of supply chain participants, including ARTC and the Victorian Government as Rail Infrastructure Managers, port owners, rail operating companies, and potential rail users / customers.

PROBLEM 2: CONTINUED SHIFT OF THE FREIGHT TASK FROM RAIL TO ROAD IS INCREASINGLY IMPACTING REGIONAL ROAD INFRASTRUCTURE, COMMUNITY SAFETY AND ENVIRONMENTAL OUTCOMES

The declining cost competitiveness of rail has led to continued rise in the movement of freight via road

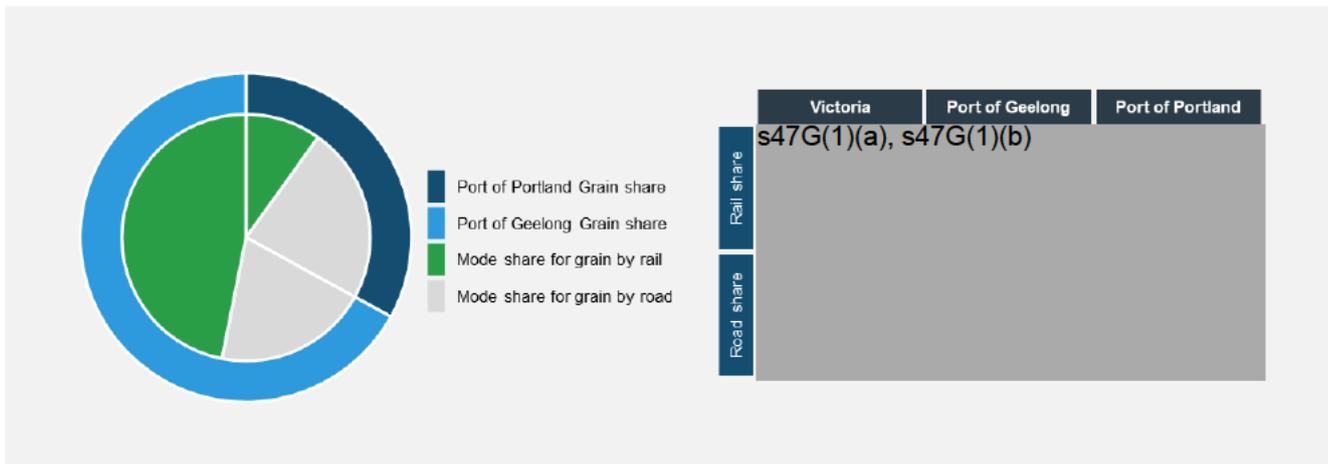
The issues outlined in 'Problem 1' above, together with the utilisation of larger and productive freight vehicles, have increased the relative cost, time and risks associated with the transportation of primary commodities to port via the rail network and, in turn, has resulted in an increased demand for the use of the road network by exporters.

As outlined above, when considering how to transport primary commodities to port, exporters located in the Western Region typically have a number of pathways to choose from that include choice of port as well as choice of mode. The specific pathway adopted for a given consignment will be driven by the perceived cost, time and risks associated with alternative options.

Over time changes in the relative unit costs of the two modes have shifted outwards the distance from ports at which rail becomes more competitive than road. As noted above, the cost to move grain by rail from Dooen to the Port of Portland is \$30.92 per tonne with the Port of Portland line's existing capacity. Comparatively, the cost to move freight by road is \$30.50 per tonne.²⁹

A comparison of the relative rail mode shares for grain exports through the Ports of Portland and Geelong suggest the increasing cost of moving goods on the Portland Line is leading to a higher reliance on transport by road. For example, the Port of Geelong, which benefits from a 23 TAL connection to the main interstate rail line and therefore lower rail transport costs, sees 70 per cent of grain exports arrive by rail. By comparison, the Port of Portland – which has an axle load limit of 19 TAL as well as other operating restrictions previously identified – sees only 30 per cent of grain exports arrive by rail (Figure 10). Given these two ports are generally receiving exports from the same region, the difference in mode share is likely, in large part, attributable to the differences in the standard of their respective rail connections.

Figure 10: Grain share and mode share across Port of Portland and Port of Geelong



Source: Houston Kemp, Maroona to Portland Rail Line Upgrade Business Case – demand forecast (2022)

Regional road infrastructure has not been built to accommodate the volume and scale of freight movements that are now occurring

As a result of this high road mode share, the Western Victoria road network is now accommodating a freight task to which it is not suited. The region's roads were constructed decades ago to design standards and specifications that were a function of the anticipated traffic volume and pavement loading at the time.

Since this period, there have been significant advances in larger and more productive freight vehicles, with truck productivity in Victoria increasing approximately 60 per cent from 1995 to 2015.³⁰ In the grain sector specifically, the average load size on a single truck servicing the s47G(1)(a), s47G(1)(b) network increased from ~23.5mt in 2009/10 to ~29.5 in 2016/17.³¹

²⁹ Deloitte, Portland Rail Line Upgrade, 2021

³⁰ Department of Economic Development, Jobs, Transport and Resources, Murray Basin Rail Project Final Business Case, 2015

³¹ Australian Exports Grains Innovation Centre, Australia's grain supply chains Costs, risks and opportunities, October 2018

Today there a range of High Productivity Freight Vehicles (HPFV) on the roads of the western region:

- Semi-trailers with a maximum gross vehicle mass of 45.5 tonnes (31.5 tonne load)
- B-double trucks with a maximum gross vehicle mass of 68 tonnes (44 tonne load).
- High productivity freight vehicles including:
 - o Super B-doubles: 77.5 tonnes (on designated freight routes in Victoria)
 - o Super B-doubles (restricted to Port precinct usage): 109.0 tonnes
 - o Road Trains (A-doubles): 79.5 tonnes and up to 85.5 tonnes - B-triples: 82.5 tonnes and up to 91.0 tonnes.³²

The declining competitiveness of rail in the region together with the unprecedented changes in the scale and scope of freight vehicles has placed an increased load on the regional road network that could not have been factored into account when the road network was constructed.

The scale of today’s road freight task has seen the rapid deterioration of road asset condition

Industry consultation and VicRoads pavement condition data both indicate that there are a number of road segments that feed Port of Portland that have been adversely affected by the volume and scale of the freight movements that are now occurring (Table 5).

Table 5: Condition of roads that serve Port of Portland

| Road segment | Industry perspective | VicRoads pavement condition data |
|--------------------------------|---|---|
| Princes Highway (A1) | Satisfactory condition. | Road segments are generally rated 'good' or 'fair' in the South Western Region. |
| Portland - Nelson Road | Requires heavy patching and sectional resealing. | Contains a number of sections with a 'poor' to 'very poor' rating for cracking and roughness assessment categories in the South Western Region. |
| Henty Highway (A200) | Requires rehabilitation, some heavy patching and sectional resealing. | |
| Gleneig Highway (B160) | Requires heavy patching and sectional resealing. | |
| Portland-Casterton Road (C195) | Requires rehabilitation, heavy patching and sectional resealing. | |
| Casterton-Dartmoor Road | Requires sectional patching. | |
| Condah-Coleraine Road | New to satisfactory. | Road segments are generally rated 'good' or 'fair' in the South Western Region. |

Sources: Port of Portland – Port Development Strategy 2018, VicRoads Pavement Conditions data

The table highlights that there are a number of critical routes that now require rehabilitation. Anecdotal evidence suggests there’s an even higher number of local roads, servicing first and last mile of many freight journeys, that are in a similar state. The repair of these roads is often beyond the budget capacity of local councils and the scale of works required on the arterial network is beyond the scope of the State’s annual works plans.

The result is that, like the rail network, temporary speed restrictions have been introduced on several segments. While this may support greater use of rail, it does not do so in a way that is of benefit to the economy.

High numbers of heavy vehicle movements and degraded assets present a safety risk to the community

Deteriorating road pavements are driving up costs by causing damage to vehicles and trailers. Safety of transport industry workers is also a concern. These issues are compounded by the negative amenity impacts

³² Department of Economic Development, Jobs, Transport and Resources, Murray Basin Rail Project Final Business Case, 2015

on the community of such high truck volumes. Representatives of local councils confirmed that noise is negatively impacting those that live close to freight corridors and the volume of truck traffic through suburbs and small regional towns impedes road crossing and connectivity. Travel times are also impacted as high-performance freight vehicles can often not be safely overtaken and the condition of road pavements has led to the introduction of temporary speed restrictions in some areas.

The most prominent concern, however, of both industry and the community, is road safety. These concerns arise due to both the condition of roads as well as the conflict between the scale of those roads and the size of the vehicles operating on them.

In the face of these impacts, 'social license' becomes an increasingly important consideration. It is possible that, without change, growing community opposition may be an impediment to the continued growth of existing and development of new industries.

PROBLEM 3: DEGRADED ACCESS TO THE PORT OF PORTLAND UNDERMINES NATIONAL SUPPLY CHAIN RESILIENCE AND THE REGIONAL INVESTMENT ATTRACTIVENESS OF AUSTRALIA'S PRIORITY INDUSTRIES

Underinvestment in rail infrastructure also has broader economic consequences for Australia related to regional economic development and the future efficiency and resilience of supply chains.

The performance and quality of rail infrastructure is a key driver of regional investment decisions

Regional economies can only operate and grow if they can efficiently move goods between primary producers, manufacturers, wholesalers, importers, exporters and customers. Transporting agricultural produce, mineral products and manufactured goods from the regions to markets requires safe, reliable and efficient freight connections.

In Western Victoria, industry development and growth are heavily dependent on efficient and reliable freight connections to the Port of Portland, which provides an international gateway for export and import of bulk commodity products. The capacity and efficiency of rail freight lines is a key driver of industry investment decisions and can stimulate the growth of existing and new industries such as mineral sands, opening up access to new markets for those industries. The current low performance level and utilisation of the regional rail network by exporters in Western Victoria therefore poses a risk to the financial feasibility of investment projects and future investments in key industries such as mineral sands.³³

Engagement with industry has supported this view. For example, representatives of various mineral sand mining companies have noted that transport costs can make or break the feasibility of projects.

Port of Portland's role in the Victorian supply chain is likely to change overtime and be underpinned by rail access

Beyond the viability of individual projects, higher costs and reduced port access also have broader economic consequences.

As outlined above, exporters located in Western Victoria currently have access to four major ports including Port of Melbourne, Port of Geelong, Port Adelaide, and Port of Portland. While competing for a share of the export task, each port also has its own advantages and role in the supply chain.

The Port of Melbourne Development Strategy³⁴, for example, outlines how strong population growth and economic development mean containers will continue to be the largest Port trade and require significant upgrades to container terminals and substantial expansion of the overall container capacity at the Port. The growing prevalence of domestic and international containerised trade at the Port of Melbourne, as well as the limited ability to expand the Port's land area, is likely to have a cascading effect on both the Port of Geelong and the Port of Portland with:

- the Port of Geelong playing an increasingly important role in accommodating current activity at the Port of Melbourne such as the Bass Strait trade
- the Port of Portland playing an increasingly important role in accommodating current activity at the Port of Geelong including, for example, the storage and handling of grain.

³³ In the demand forecasts outlined below, a conservative assumption has been made that the project options are assumed to affect how exporters choose between transport modes and ports only i.e. not the level of exports that are channelled through the Port of Portland.

³⁴ Port of Melbourne, 2050 Port Development Strategy, 2020

Importantly, the Port of Portland has certain comparative advantages that underline the critical role it has to play in the State's supply chain. In particular, its natural depth means it can handle larger vessels without the need for high-cost interventions such as channel widening and deepening. With an international trend toward the use of 'mega ships', this comparative advantage may become increasingly important.

Restricted access by rail to the Port of Portland will reduce the ability of the Port to grow and expand overtime and specialise in trades that aligns with its comparative advantage and that improve the overall efficiency of the broader port network.

Access to Ports reduces costs to exporters and ensures supply chains can be maintained in the event of network disruptions

Supply chain resilience reflects the ability to anticipate, resist, absorb, recover, transform, and thrive in response to shocks and stresses to realise positive social, economic and environmental outcomes. The advent of COVID-19 and recent natural disasters has highlighted the potential for supply chains to be disrupted and the importance of ensuring resilience is embedded into the freight network (Box 2).

In the short-term, the Port of Portland's primary role and function within the broader port network will be to accommodate seasonal commodity production and overflow from the Port of Geelong when capacity is reached. Once the upgrade of the Portland line is complete, the Port of Portland will play a significant role in ensuring the resilience of the broader export supply chain with the ability to accommodate additional primary commodities in the event that a shock or stress to the broader freight network restricts access to the other major ports in the network. The current performance level of the Portland Line hinders the resilience of the overall freight network and its ability to accommodate future shocks such as adverse weather events.

Box 2: Case study – Port Kembla³⁵

Heavy rainfall at the beginning of March 2022 caused a major embankment failure on the Moss Vale - Unanderra line (owned by ARTC), which had an immediate impact on grain and inter-state steel trains accessing Port Kembla. At the time, services were able to be routed through the crowded Sydney suburban network to travel via Waterfall and Wollongong, as capacity allowed.

In early April 2022, further rainfall caused major landslides at several locations on the suburban network which ruled out its ability to accommodate diverted freight and effectively isolated Wollongong from the passenger and freight networks. Repairs to the suburban network were able to be completed within a month, which provided limited capacity for freight services while the line from Moss Vale remained closed due to the extensive nature of the repair works required.

TIMING: INTERVENTION IS REQUIRED IN THE NEAR TERM

Intervention is required to break the current cycle of declining demand and investment. The status quo is not commercially sustainable for rail infrastructure managers like ARTC which, on the Portland Line, realises revenues that represent less than a third of ongoing operating costs.

ARTC has limited ability to address the situation. Track access fees, for instance, cannot be increased to ensure rail operators cover the cost of keeping the line open. Requirements for parity in charging on the Portland Line and Geelong aside, increased access fees would only erode rail's cost competitiveness further and accelerate the decline in demand.

If this situation were to continue there would be increasing pressure to ultimately close the line, even if demand were to continue at current levels.

Without a response this outcome could have significant negative consequences for the regional economy and community. As outlined above, mineral sands export volumes are projected to steadily increase over the coming decade. If these additional export volumes were to be transport via road it would see a significant increase in truck trips on the regional road network ever year compounding the challenges identified above.

³⁵ For more information, please see: <https://www.railjournal.com/infrastructure/heavy-rainfall-disrupts-rail-services-in-new-south-wales/>

3

Outcomes to be delivered

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3. OUTCOMES TO BE DELIVERED

CHAPTER SUMMARY

The second stage of the ILM process was the identification and analysis of the key benefits to be realised through addressing the problems identified in Chapter 2 above. Four key benefit statements were identified:

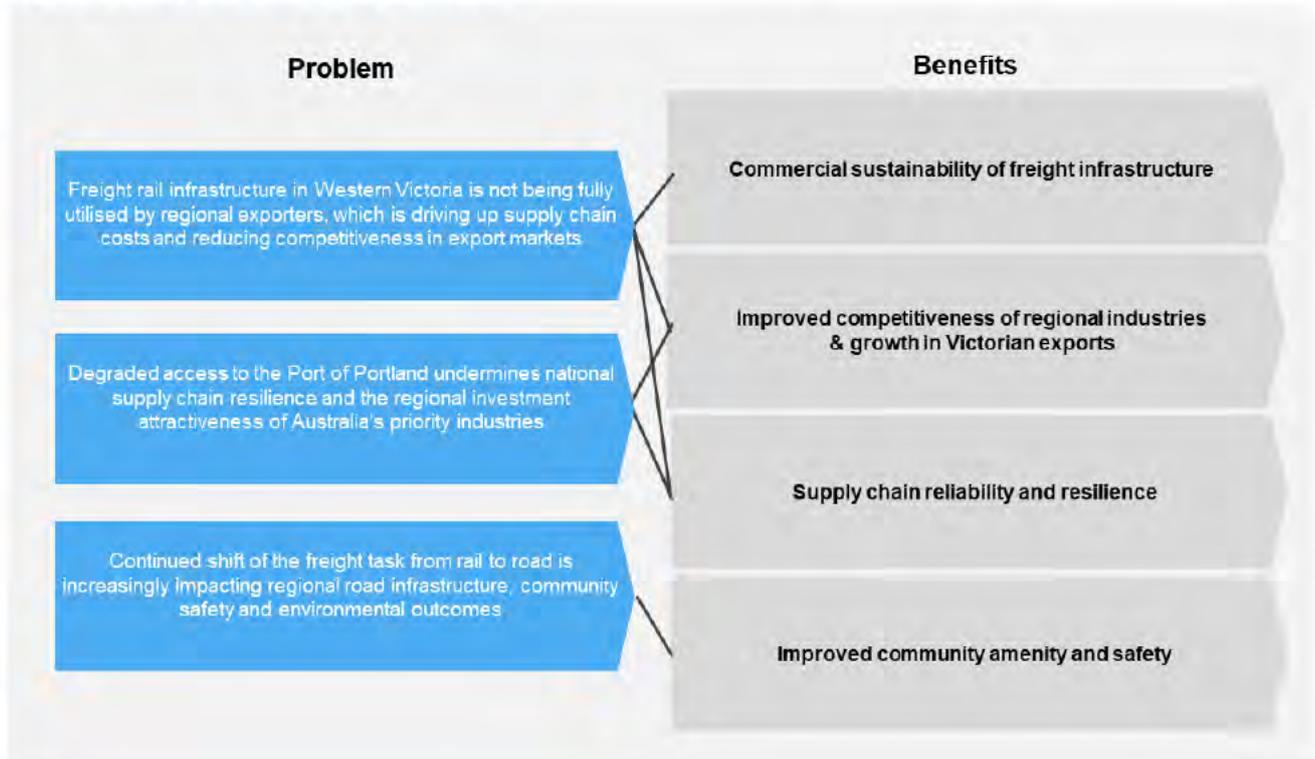
- **Commercial sustainability of freight infrastructure**, as a result of increased demand and access revenues that support reinvestment in the network.
- **Improved competitiveness of regional industries and growth of Victorian exports**, as a result of more productive transport services that yield lower transport costs.
- **Supply chain reliability and resilience**, through greater flexibility to redirect freight flows in the case of network disruption or outages.
- **Improved community amenity and safety**, through reduced risk of road accidents and broader reductions in volumes of heavy vehicles on load roads.

Realisation of the identified benefit is subject to certain risks, uncertainties and interdependencies. This includes the need for investment in terminal capacity, loading facilities, intermodal terminals, and rolling stock. It also includes uncertainties with respect to demand

3.1. BENEFITS

Resolving the problems identified in Chapter 2 is expected to yield significant benefits for Western Victoria. These benefits are summarised in Figure 11 and described in further detail below.

Figure 11: Key benefits to be delivered



BENEFIT 1: COMMERCIAL SUSTAINABILITY OF FREIGHT INFRASTRUCTURE

Addressing the current capacity and performance issues across the Western Region's rail network will help to increase the utilisation of the rail network by exporters

Addressing the current problems outlined above with the regional rail network will help to increase average travel speeds, improve the reliability of transit times, and reduce the transportation costs faced by exporters. The catchment area that would be expected to directly benefit from improved performance of the rail network includes a number of grain and mineral sands exporters. Exporters within the Western Region that are currently using road freight have flagged during the market sounding process the desire to make greater use of rail to the extent that improved performance and capacity helps to reduce operating costs and/or transit risks.

Increased utilisation of the rail network will help to improve the financial return on infrastructure assets across the supply chain

An increased utilisation of the regional rail network will help to improve the financial return on infrastructure assets across the supply chain for a number of stakeholders, including ARTC and rail operators. Increased returns on assets would ultimately ensure rail lines can remain open and may enable rail operators to offer lower unit prices.

Improved returns on financial assets will help to reverse the current vicious cycle and provide incentives for increased maintenance and infrastructure upgrades

As outlined above, the regional rail network has found itself in a vicious cycle as low levels of demand have led to poor financial returns, which have in turn resulted in low levels of maintenance and investment. Improved levels of financial returns will help aid the ability and incentives for infrastructure owners to increase maintenance, performance and investments in infrastructure capacity. These investments will help maintain the performance and utilisation of the rail network overtime and help reverse the current cycle.

BENEFIT 2: IMPROVED COMPETITIVENESS OF REGIONAL INDUSTRIES & GROWTH IN VICTORIAN EXPORTS

Optimisation of load capabilities along a standardised network will support industries in transporting their products to port via rail

Addressing the problems outlined above with the current regional rail network will provide exporters located in Western Victoria with the ability to transport a larger volume of freight per consignment with reduced and more reliable transit times. In particular, lower transport costs are expected for exporters due to the:

- consolidation of freight into fewer shipments can reduce the fees charged by logistics companies as fewer pickups are required.
- increased speeds and reduced transit times will result in reduced cycle times and labour costs for freight operations.

As outlined above, exporters located in Western Victoria typically operate in a market where the export price is driven by external factors such as world prices and foreign exchange movements – both of which are outside the control of local industries. Transport costs are one of the few drivers of the final export price that are to some degree controllable by local industry and/or governments. Lower transportation costs can help exporters located in Western Victoria to be more cost competitive in global markets and, in turn, increase market share and the volume of primary commodities sold.

Addressing the current problems associated with the regional rail network will help to improve the financial feasibility of regional investments

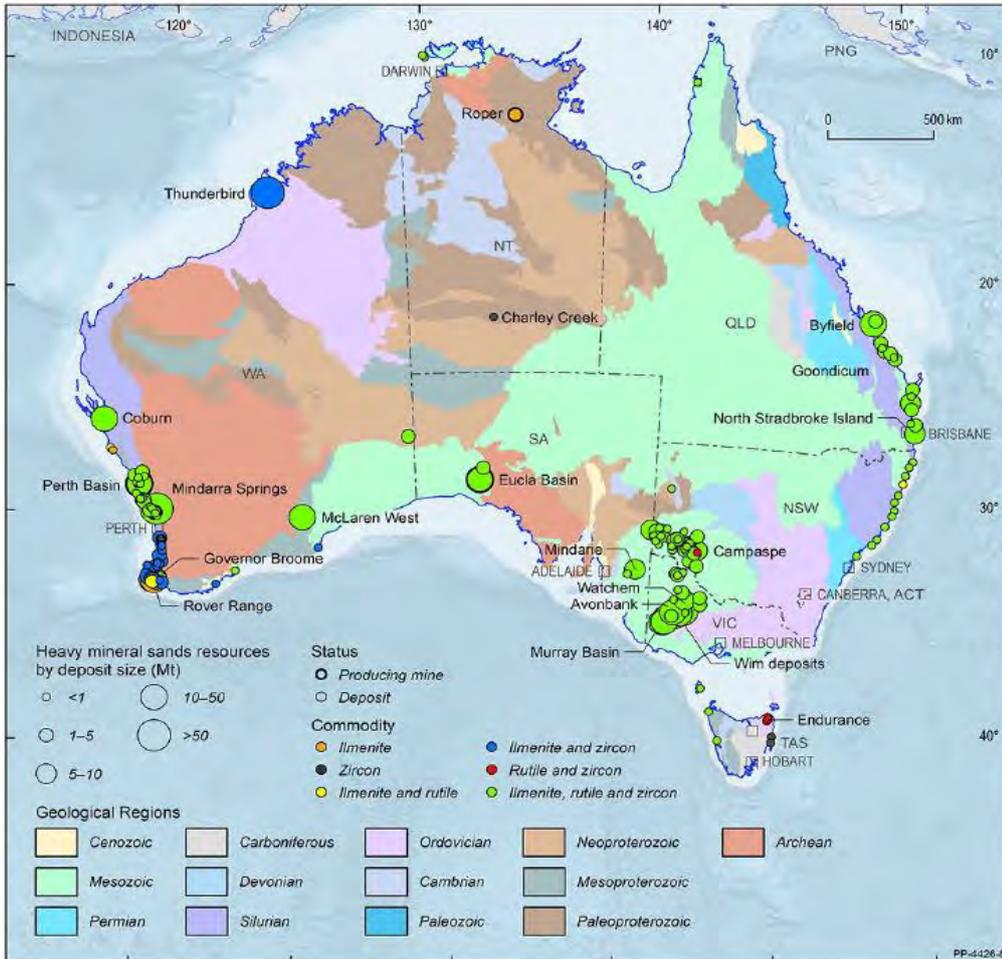
Western Victoria possesses nationally significant mineral sand deposits that have the potential to be mined and exported overseas via the Port of Portland (Figure 12). The financial feasibility of regional investments in key industries such as mineral sands will be driven in part by the time, cost and risks associated with transporting primary commodities to international markets through the Port of Portland. In particular, high quality rail infrastructure and services in the Western Region has the potential to:

- reduce transport and operational costs for exporters and, in turn, improve the commercial viability of new capital investments and/or expansions to current operations,
- enable efficient production levels and investment in supply chain infrastructure through reducing cycle times, and

- improve the overall functioning of regional supply chains.

Addressing the current problems associated with the regional rail network can help to provide these benefits to exporters in the Western Region and improve the financial feasibility of regional investments. This could ultimately lead to increased future investments in new production facilities and/or expansions to current facilities.

Figure 12: Australian heavy mineral sands deposits



Source: Geoscience Australia, Australia’s Identified Mineral Resources 2021, available at <https://www.ga.gov.au/digitalpublication/aimr2021/commodity-summaries>, accessed on 30 June 2022.

BENEFIT 3: SUPPLY CHAIN RELIABILITY AND RESILIENCE

Addressing the current challenges that exporters face in accessing ports via rail will help to mitigate future supply chain disruptions as well as increase the efficiency of the broader port network.

Maintaining the performance of the Portland Line and accessibility to the Port of Portland will help to improve the resilience of the broader regional supply chain

Benefits of improving the resilience of the broader regional supply chain network are expected to be realised in the event that a shock (an adverse weather event, for example), disrupts elements of the regional freight network and restricts exporters’ access to alternative ports. Exporters that are unable to transport primary commodities overseas through pre-existing supply chains face a number of risks related to delivery delays, cancellations and loss of income. Depending on the duration of the supply chain disruptions, the risks outlined above can have a significant impact on the commercial viability of regional industries.

Maintaining the performance of the Portland Line and accessibility to the Port of Portland will help to enable exporters to have choice of multiple ports and multiple pathways to overseas markets in the event of a supply chain disruption and reduce the financial risks and impacts of such events including reduced delivery delays, delivery cancellations, and financial losses.

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Improved rail access to the Port of Portland will help to improve the efficiency of the broader port network

As outlined above, the Port of Portland is expected to play an increasingly important role in accommodating current activity at the Port of Geelong (and potentially the Port of Melbourne) including, for example, the storage and handling of grain, as strong population growth and economic development will require expansion of the overall container capacity across the port network. Given its position as a deepwater port, it also has greater ability than its competitors to handle larger vessels. The maintenance of high-performance rail services to the Port of Portland will enable the Port to grow and expand overtime and specialise in trades that aligns with its comparative advantage and that improve the overall efficiency of the broader port network.

BENEFIT 4: IMPROVED COMMUNITY AMENITY AND SAFETY

Addressing the current high volume of freight vehicles on the regional road network transporting commodities will help to reduce road degradation and improve amenity and safety outcomes for the local community.

Fewer high-capacity vehicles using regional roads and less frequently will increase accessibility, reliability of and performance of the road network for the community.

A reduction in the rate of the deterioration of the road network will see a reduction of hazards on current heavy vehicle routes and considerable improvements to road condition and ride, including improved speeds. Currently a number of local roads have advisory speed restrictions impacting the duration of trips of the local community. Fewer truck movements will also contribute to a reduction in road disruption and road traffic/congestion impacts in regional towns and cities and port areas, particularly around freight consolidation points during peak harvest periods.

Lower numbers of freight vehicles on regional roads can help improve safety outcomes for local communities

The Victorian Road Safety Strategy 2021 - 2030 commits to the ambitious target of eliminating death from our roads by 2050, with the first step of halving road deaths by 2030. Nearly two thirds of all fatal road crashes occur on rural and remote roads in Australia³⁶ despite comprising one third of the residential population.³⁷ The utilisation of rail to transport freight can have a significant impact on safety outcomes such as traffic accidents and deaths involving freight vehicles and other motor vehicles or pedestrians. In particular, road freight has been estimated to produce 14 times greater accident costs than rail freight per tonne kilometre.³⁸ It is also expected that the number of accidents where road quality factors such as increased pavement roughness, reduced road widths and increased rutting, will be reduced as a consequence of improved road maintenance outcomes. Changes in the rail freight mode share can therefore have a significant impact on the number and severity of traffic accidents and contribute towards road safety targets and strategies at a state and national level.

Reductions in the regional road freight mode share can help reduce carbon emissions and contribute towards the State's target of achieving a net zero carbon emissions target by 2050

The potential environmental outcomes that stem from freight movements have become increasingly significant in the context of the Federal and State Government commitments to achieve a net zero carbon emissions target by 2050. The National Climate Change Authority has estimated that the transport sector (including road freight and passenger vehicles) accounts for close to 16 per cent of Australia's annual greenhouse gas emissions (Figure 13).³⁹ Road freight is in turn estimated to account for approximately 20 per cent of transport sector emissions (or close to 3 per cent of national greenhouse gas emissions) and 16 times as much carbon pollution as rail freight per tonne kilometre. Changes in the rail freight mode share can therefore have a significant impact on national and state carbon emission levels and our ability to meet net zero emissions by 2050.

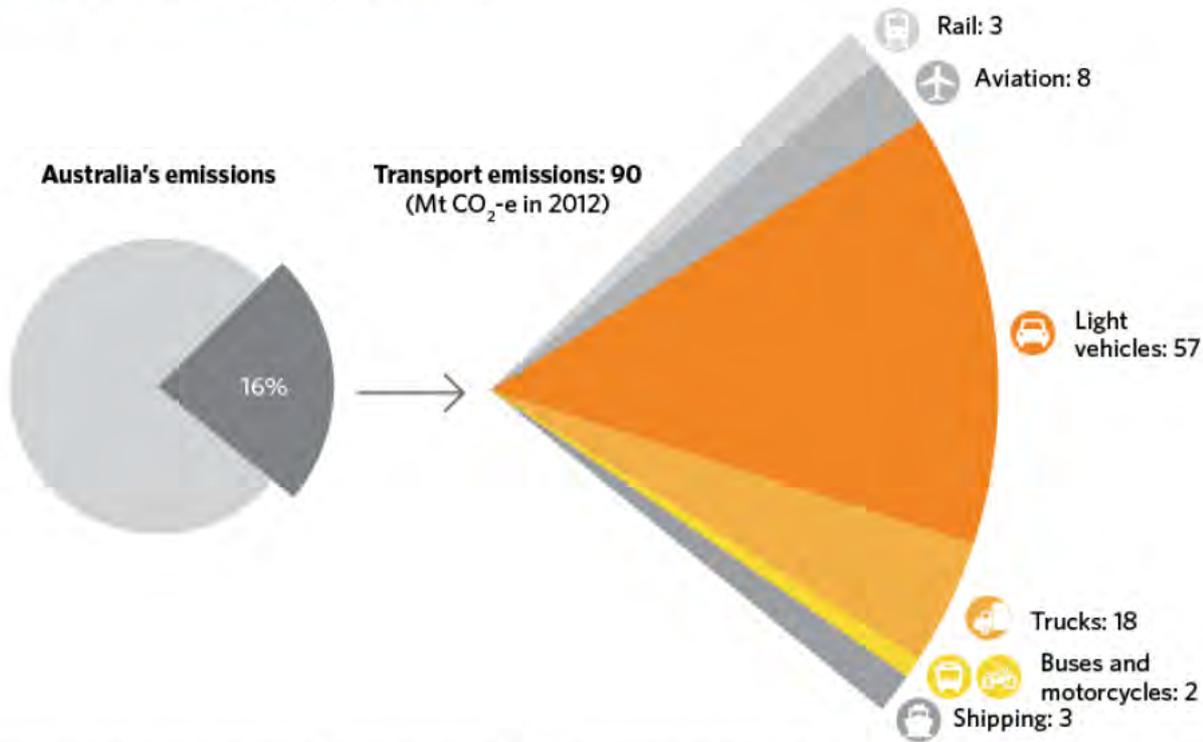
³⁶ Table 1.15, Deaths by Remoteness Area 2020, BITRE

³⁷ 2016 Census, Australian Bureau of Statistics

³⁸ Ibid.

³⁹ For more information, please see: <https://www.climatechangeauthority.gov.au/reviews/light-vehicle-emissions-standards-australia/opportunities-reduce-light-vehicle-emissions>

Figure 13: Australia's transport emissions



Source: <https://www.climatechangeauthority.gov.au/reviews/light-vehicle-emissions-standards-australia>

3.2. RELEVANCE OF PROJECT BENEFITS TO GOVERNMENT

The benefits are given further significance through their alignment with broader government policy. With Australia's freight task expected to increase by 35 per cent by 2040 and sector productivity and real freight costs having not improved since the 1990s, there has been significant freight policy development in the last five to 10 years by both the Commonwealth and State Governments.⁴⁰ The performance of Australia's freight rail system is central to these policies and within that context three key areas of policy priority have emerged, including the importance of harmonising operating standards to enhance efficiency and cost competitiveness. These policy priorities are clearly aligned to the benefits outlined above.

In addition, broader economic and supply chain contributions, there is also clear alignment with local policy. Glenelg Shire Council, for example, through its own community vision has expressed the importance of improving road safety and supporting the growth of local business.

This alignment of the benefits to government policy is captured in Table 6.

Table 6: Alignment of benefits to government priorities

| Stakeholder | Strategy / action | Relevance of project benefits |
|--------------------|---|--|
| Federal Government | <p>National freight and supply chain strategy 2019</p> <ul style="list-style-type: none"> - Action 1.1: Ensure that domestic and international supply chains are serviced by resilient and efficient key freight corridors, precincts and assets. - Action 1.2: Provide regional and remote Australia with infrastructure capable of connecting regions and communities to major gateways, through land links, regional airports or coastal shipping | Addressing the performance and capacity of the Portland Line will help to improve the resilience of the regional freight network and connect regional exporters from Western Victoria to international markets through the Port of Portland. |

⁴⁰ National Freight and Supply Chain Strategy, Transport and Infrastructure Council, August 2019

| Stakeholder | Strategy / action | Relevance of project benefits |
|------------------|--|---|
| | A net zero carbon emissions target by 2050 | Addressing the current high number of freight vehicles on the regional road network by increasing the performance of the rail network will help reduce carbon emissions and contribute towards the national net zero target by 2050. |
| State Government | Victorian Freight Plan 2018 - 50 <ul style="list-style-type: none"> - Priority 3: Better use of our rail freight assets - Priority 4: Plan for Victoria's future port capacity | Addressing the performance and capacity of the Portland Line and improving accessibility to the Port of Portland aligns with priority of better utilisation existing rail assets and planning for Victoria's future port capacity. |
| | The Victorian Road Safety Strategy 2021 – 2030 Eliminating death from our roads by 2050, with the first step of halving road deaths by 2030 | Addressing the current high number of freight vehicles on the regional road network by increasing the performance of the rail network will help reduce the safety risks associated with freight vehicles. |
| Local Government | Glenelg Shire 2040 Community Plan and Vision <ul style="list-style-type: none"> - Theme 1: Our Natural Environment: Enhance Environmental Responsibility; Address and mitigate the effects of climate change. - Theme 2: Our Industry, Education and Employment: Support our local business to increase vitality and prosperity. - Theme 4: Our Access, Transport and Technology; Ensure our roads are safe for our community, industry and tourists. | Addressing the current high number of freight vehicles on the regional road network by increasing the performance of the rail network will help address the safety of local roads embedded in Theme 4 and the mitigation of effects of climate change in Theme 1. More efficient rail services will also help to reduce operational costs and support local businesses (Theme 2). Mode-shift and increased utilisation of rail will reduce road congestion and improve road safety (Theme 4). |
| Port of Portland | Port of Portland – Port Development Strategy 2018 Port Vision: We enable our customers to access global markets by providing reliable, safe and high- quality infrastructure and port services that will add value for customers, employees, shareholders and the community. | Addressing the performance and capacity of the Portland Line will provide Port of Portland customers increased efficiencies and access to the Port as well as improved access to global markets. This in turn, provides a more efficient supply-chain system to benefit the wider community. |

3.3. BENEFIT DELIVERY RISKS, UNCERTAINTIES AND INTERDEPENDENCIES

Realisation of the identified benefit is subject to certain risks, uncertainties and interdependencies. This includes the need for investment in terminal capacity, loading facilities, intermodal terminals, and rolling stock. It also includes uncertainties with respect to demand.

Investments required in supporting infrastructure

Investment in other critically interdependent projects would be required to materially impact rail's mode share. The following additional investments are seen as potentially critically interdependent to realising this Project's full benefits:

- Improved capacity and efficiency of rail facilities within ports
- Increases to the capacity and performance of privately-owned up-country rail terminals
- Any private investments by rail operators to increase the capacity of trains to accommodate increased loads and volume of primary commodities being transported via rail.

External factors that could influence demand for rail freight

Several benefits are contingent on the ability of any investment to increase rail's share of the regional freight task. There are a variety of external factors that may influence the extent to which these benefits can be delivered, including:

- The willingness of shipping lines to service different ports
- The ownership of freight handling infrastructure at different ports and the commercial incentives this creates for freight handling and haulage companies to direct volumes to one port over another
- Continued investment in road network improvements and other technological advancements that could increase the relative competitiveness of road freight.

There is also broader uncertainty in relation to the overall scale of the regional freight task that will influence the absolute value of benefits realised. This includes the likelihood of the various mineral sands projects currently at feasibility study stage commencing commercial operations within the next 10 years.

4

Strategic options identification and assessment

4. STRATEGIC OPTIONS DEFINITION

CHAPTER SUMMARY

The third stage of the ILM process involved the identification and analysis of strategic options that would address the problems and realise the potential benefits outlined above. Three key strategic options were identified including:

- **Strategic Option A:** Improving the performance of the Portland Line.
- **Strategic Option B:** Redirection of rail freight to other ports.
- **Strategic Option C:** Price incentives to increase use of rail freight.

The three strategic options outlined above were assessed against a range of criteria including the potential benefits, costs, delivery time, risks and uncertainties, disbenefits and adaptability.

Based on the outcomes of the relative assessment, **Strategic Option A** (upgrade focus) was identified as the preferred investment strategy. This assessment was based on the perception that:

- It was more likely to deliver the full range of benefits identified, making a material contribution to shifting commodities bound for the Port of Portland from road to rail by significantly improving the productivity of rail freight and lowering transport costs for exporters.
- This ability to support mode shift would mitigate safety and amenity issues faced by the community and associated with the current reliance on road freight as well as increasing the commercial sustainability of the rail line.

Overall supply chain resilience would also be improved, with more efficient access to the Port of Portland enabling a wider evolution of the roles of Victoria's various ports and greater ability to leverage Portland's comparative advantages.

4.1. PURPOSE OF SECTION

This section identifies how the problems identified in Chapter 2 ('Problem identification and analysis') could be addressed. It includes consideration of reform as well as capital investment solutions, and presents the results of multi-criteria assessment based on economic appraisal principles to identify a preferred investment strategy.

4.2. APPROACH

ARTC undertook a formal Investment Logic Mapping ('ILM') process and multi-criteria analysis to identify and analyse a series of strategic options to address the problems and realise the potential benefits outlined above.

Step 1: Facilitated ILM workshops

A series of facilitated ILM workshops were conducted with ARTC and their commercial and technical advisors to identify:

- problems associated with the current regional infrastructure network that needed to be addressed
- the benefits of addressing the identified problems
- potential strategic interventions that could be considered to address the identified problems.

Consistent with Infrastructure Australia's Reform and Investment Framework Guidelines, the strategic interventions ranged from the capital intensive to others giving greater prominence to opportunities to improve export competitiveness and supply chain performance with less capital investment.

Step 2: Development of a long-list of strategic options

High-level actions to address the problems (strategic options) were developed from the interventions and tested with the SteerCo to identify and assess their practical application. A broad range of strategic options were initially considered as part of the ILM process including combinations of the three short-listed options detailed in this Chapter.

Step 3: Short-listing strategic options

Each long-listed strategic option was considered against a set of criteria including:

- **technical feasibility:** is the strategic option capable of being constructed or developed from a technical and/or engineering perspective given the current state of the infrastructure network?
- **commercial / financial feasibility:** is the strategic option likely to be affordable for ARTC, government and end-users?
- **viability of developing a detailed project option to include in the business case:** is the strategic option capable of being sufficiently detailed and specified for the purpose of this Business Case?

Strategic options that satisfied these criteria were short-listed, scoped in further detail, and subject to multi-criteria analysis.

Step 4: Assessment of strategic options

Consistent with Infrastructure Australia's Reform and Investment Framework Guidelines, the short-listed strategic options were assessed relative to a base case scenario against several criteria including potential benefits, costs, time, risks, disbenefits and adaptability. Each option was scored against the criteria above based on professional judgement that was underpinned by a literature review of similar initiatives that have been undertaken within Australia. The preferred strategic option based on the multi-criteria analysis was tested and confirmed with the SteerCo.

4.3. BASE CASE

Without intervention and the commitment of new investment, the rail network in the Western Region would be expected to continue to operate to its current performance standard. ARTC would continue to undertake the work necessary to ensure that the condition of its network can be maintained and the Portland Line remains open.

The Victorian Government has committed to upgrading the Maryborough to Ararat rail line under Stage 3 of the Murray Basin Rail plan. This would be expected to see axle load limits on that line increase to 21 TAL which would, in effect, give exporters on the Mildura corridor the option to run higher capacity rail services into the Port of Geelong.

In addition to those rail investments, there are a number of significant commitments to upgrades of the Victorian and South Australian road networks. This includes Princes Highway upgrades on both sides of the border and duplication of the Western Highway. These upgrades would be expected to improve journey time reliability for freight being moved by road.

Under the base case, rail's share of the total regional freight task may ultimately decline. Port of Portland is the preferred export gateway for mineral sands due to its experience in handling the materials which are, at times, radioactive. Therefore between 0.5 to 1 million tonnes of mineral sands would be expected to be taken to the Port of Portland via road, leading to a significant increase in the volume of B-Doubles and A-Doubles on the road network. More generally, if the Portland Line maintained its current performance standard, continued improvements to the efficiency of road freight would be expected to reduce rail's relative mode share.

Overall, it is likely that the problems identified in Chapter 2 would persist under the base case.

4.4. STRATEGIC INTERVENTIONS

There are a number of interventions that could be made by ARTC, the Commonwealth and Victorian Governments, and others to address the problems identified in Chapter 2. For the purposes of this Business Case, these interventions are considered in two broad categories:

- Management of demand (for freight transportation mode and utilisation of port assets) – addressing the demand and supply side through utilisation and efficiency options
- Improve productivity (of freight network) – addressing the ability to improve services through capacity and availability.

Table 7 below provides an overview of the strategic interventions identified and their alignment with the intervention types.

Table 7: Strategic interventions

| Intervention type | # | Strategic interventions |
|---|---|--|
| Management of demand for freight transportation mode and utilisation of port assets | 1 | <p>Offer pricing incentives for exporters to make greater use of rail network</p> <p>Stakeholders have identified that, among service performance issues previously identified, rail operators are required to pay fixed access fees and distance-based charges that make them comparatively more expensive than road freight whose road access fees are limited to annual registration fees. Price reductions, subsidies, or rebates are therefore an avenue through which government may seek to improve rail freight's relative competitiveness. This could be administered (for example) through tax incentives for exporting businesses.</p> <p>This could have the impact of increasing rail's mode share and, potentially, increasing the competitiveness of regional exports through reduced transport costs.</p> |
| | 2 | <p>Introduce policy that ensures the price of road freight reflects its true social cost</p> <p>As an alternative to rail pricing incentives, regional road pricing could rebalance modal preferences and see more freight shift back to rail. There are multiple avenues through which the Commonwealth or State government may seek to introduce regional road pricing, including adjustments to:</p> <ul style="list-style-type: none"> - Fuel excise duties levied by the Commonwealth Government - Heavy vehicle registration charges collected by the Commonwealth Government under the National Heavy Vehicle Accreditation Scheme or those collected by State Governments <p>Road pricing could be set reflect the true social and environmental costs of road freight as well as its road infrastructure impacts. This would be expected to increase the relative competitiveness of rail freight.</p> |
| Improve productivity of freight network | 3 | <p>Upgrade rail loading and handling facilities at Ports</p> <p>There are currently port-side constraints to the productivity and use of rail freight at both the Port of Portland and Geelong. Upgrades might include the construction of additional rail sidings, extension of rail sidings alongside storage facilities and shipping births, and the installation of handling facilities that can unload trains more efficiently.</p> <p>These upgrades could improve rail freight competitiveness and lift rail freight mode share by enabling rail operators to run longer trains and increase utilisation of rail rolling stock.</p> |
| | 4 | <p>Initial life-cycle maintenance of the Portland Line to support removal of operating restrictions.</p> <p>Life-cycle maintenance of the Portland Line is expected to require a program of works to replace sleepers to address the current speed restrictions. Some signalling upgrades at level crossings have also been assumed to ensure that the average speed across the Portland Line is maximised.</p> <p>While these works would not increase the tonnage, an individual service is permitted to carry on the line, it would be expected to lead to significant reductions in travel time and therefore assist in improving asset utilisation and reducing rail freight unit costs.</p> |
| | 5 | <p>Upgrades to the Portland Line to enable accommodation of higher axle loads</p> <p>The upgrade to the performance of the Portland Line is expected to require a significant program of works to replace sleepers to ensure that rail operators are free from any unnecessary operating restrictions related to speed and can operate at higher axle loads. Some upgrades to level crossings have also been assumed to ensure that the average speed across the Portland Line is maximised.</p> <p>The upgrades would enable significant improvements in rail freight productivity. If axle load limits were increased from 19 to 21 TAL, for example, it would enable each train to increase its load by 14 per cent.</p> |
| | 6 | <p>Upgrades to the capacity of regional branch lines to enable accommodation of higher axle loads</p> |

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| Intervention type | # | Strategic interventions |
|-------------------|---|--|
| | | Increase TAL on branch lines to Rainbow and Hopetoun, between Ararat and Maryborough to ensure exporters have upcountry access to more productive transport services. |
| | 7 | <p>Upgrade rail links where required to provide improved access to Port of Geelong and Port of Melbourne</p> <p>Upgrades would be considered to the Maroona to Gheringhap Line and/or additional maintenance funding to ensure that the network could efficiently accommodate higher demand for rail freight into other ports servicing the region.</p> |
| | 8 | <p>Upgrade regional road network to support safe access of High-Performance Freight Vehicles (HPFVs) into Port of Portland.</p> <p>The scope of works to improve the regional road network could include replacing the Portland Line with a dedicated network of roads for freight vehicles accessing the Port of Portland. Upgrades could entail:</p> <ul style="list-style-type: none"> - Upgrades to road surfaces, - Widening some road sections, and - Widening intersections were required. <p>The purpose of this intervention would be to ensure that the regional road network servicing the Port was capable of accommodating HPFVs and mitigating the impact of greater use of HPFVs on regional communities.</p> |

Box 3: Victoria's Mode Shift Incentive Scheme

The Victorian Government is committed to getting trucks off local roads and giving exporters more options through the Mode Shift Incentive Scheme. Over the past eight years, more than \$30 million has been invested to make rail freight more cost effective and allow exporters to get their goods to port sooner. The Victorian Government will provide \$3.5 million to extend the scheme until 30 June 2023. Under the scheme, four freight operators will receive incentives to move up to a combined 42,500 containers by rail, taking the equivalent of 28,000 truck trips every year off regional and urban roads and reducing truck congestion at the Port of Melbourne. Current recipients are:

- Shepparton corridor – Linx Portlink (Tocumwal)
- Horsham corridor – Wimmera Container Line
- Warrnambool corridor – Westvic Container Export
- Mildura corridor – Seaway Intermodal (Merbein)

4.5. STRATEGIC OPTIONS

As part of the solution development process undertaken to address the problems outline above, three high-level strategic options were identified that represent alternative investment pathways.⁴¹ The options were assessed for their feasibility and capacity to deliver the benefits sought from this Project. These options are described further below.

STRATEGIC OPTION A: IMPROVING THE PERFORMANCE OF THE MAROONA TO PORTLAND LINE

Strategic Option A would focus on upgrading existing infrastructure including the Portland Line and other complementary investments required to realise the potential benefits outlined above including, for example, upgrades to the configuration and/or capacity of the Port of Portland to facilitate increased volumes of freight

⁴¹ Combinations of the three strategic options outlined in this Chapter were not viewed to be practical in light of the third criteria above. In particular, the proposed project option would potentially seek initial funding for infrastructure upgrades conditional on pricing controls of some form being in place two to three years into the future when the upgrades are completed. There is currently no basis to assume this would be the case, and seeking some form of commitment from state and/or federal government to support the business case was viewed as challenging given the expected timeframe for planning and track upgrades and the uncertainty surrounding future demand and cost profiles, and in turn, the required or efficient level of price controls needed.

via rail. The problems outlined above are, at least in part, due to the current performance of the Portland Line which has increased the relative attractiveness of the road freight network. Exporters located in Western Victoria, as well as the broader community, would be expected to benefit from upgrades to existing infrastructure via:

- reduced time, costs and risks currently associated with rail freight
- increase the utilisation of the rail freight network
- reduced supply chain costs and in turn improved cost competitiveness for exporters
- improved resilience of the broader freight network.

Importantly, the upgrades would be intended to enable rail to capture a greater proportion of the freight sectors that it currently services as well as attract new sectors, reducing demand risk for Rail Infrastructure Managers.

STRATEGIC OPTION B: REDIRECTION OF RAIL FREIGHT TO OTHER PORTS

Strategic Option B would seek to facilitate greater use of rail freight into the Port of Geelong and other ports servicing the Western Region. Rail traffic on the Portland Line is currently largely limited to overflow grain volumes that the Port of Geelong is not able to process. This alternative to 'Strategic Option A' would therefore increase the capacity of the supply chain that feeds into the Port of Geelong to ensure the current diversion of seasonal and overflow freight volumes to the Port of Portland is not necessary. The Portland Line would consequently be closed and investment that otherwise would have gone into the line redirected to enhancing the capacity and performance of the interstate mainline. This Strategic Option would also likely require portside infrastructure improvements to ensure additional rail volumes could be efficiently accommodated. The Port of Portland would continue to service road-based freight and therefore parallel investments in improving the road network would also be required to minimise any disbenefits to the community.

STRATEGIC OPTION C: PRICE INCENTIVES TO INCREASE USE OF RAIL FREIGHT

Strategic Option C would seek to incentivise exporters located in the Western Region to increase their utilisation of the rail freight network via the use of subsidies (for rail freight) and/or taxes (for road freight). The use of financial incentives could help to achieve a more efficient freight mode share across the Region by ensuring that the prices that exporters would face to utilise either the rail or road network would better reflect the social margin cost of their transport mode choices i.e. the relative price of utilising the road freight network would reflect the safety and amenity externalities associated with heavy freight vehicles.

STRATEGIC OPTIONS AND INTERVENTIONS

Table 8 summarises each of the options considered and the level of alignment against each of the defined strategic interventions previously outlined.

Table 8: Strategic options and interventions matrix

| # | Intervention type | Base case | Upgrade focus | Redirection of freight focus | Price incentives focus |
|---|---|-----------|---------------|------------------------------|------------------------|
| 1 | Offer pricing incentives for exporters to make greater use of rail network | | | | ✓ |
| 2 | Introduce policy that ensures the price of road freight reflects its true social cost | | ✓ | | ✓ |
| 3 | Upgrade rail loading and handling facilities at Ports | | ✓ | ✓ | |
| 4 | Maintain the existing operational performance of the Portland Line via ARTC's current maintenance program | ✓ | | | |
| 5 | Upgrades to the Portland Line to enable accommodation of higher axle loads | | ✓ | | |

| # | Intervention type | Base case | Upgrade focus | Redirection of freight focus | Price incentives focus |
|---|---|-----------|---------------|------------------------------|------------------------|
| 6 | Upgrades to the capacity of regional branch lines to enable accommodation of higher axle loads | | ✓ | ✓ | |
| 7 | Upgrade rail links where required to provide improved access to Port of Geelong and Port of Melbourne | | | ✓ | |
| 8 | Upgrade regional road network to support safe access of HPFVs into Port of Portland | | | ✓ | ✓ |

4.6. STRATEGIC OPTIONS ANALYSIS

STRATEGIC OPTIONS FRAMEWORK

To arrive at a preferred approach from the three strategic options identified, a strategic options assessment was undertaken consistent with Infrastructure Australia's Reform and Investment Framework Guidelines. As part of this process each of the options were assessed against the following criteria:

- **Benefits:** Each project option was assessed based on the extent to which it is expected to address or realise each of the four key benefit categories. An overall weighted averaged benefit score was then calculated based on the weights allocated to each individual benefit category in the ILM.
- **Costs:** Order of magnitude capital and operating costs were estimated then aggregated to provide an indication of the likely financial impact of each option over the 30-year appraisal period.
- **Time:** The time required in years to deliver each project option was estimated based on a benchmarking exercise with similar projects.
- **Risks and uncertainties:** Key risks and uncertainties associated with achieving the benefits were identified and categorised as 'high', 'medium' or 'low', based on an assessment of both likelihood and consequence. An overall risk profile for the options was approximated based on the rating of each risk.
- **Disbenefits:** Disbenefits that are likely to occur as a consequence of the options were identified and categorised as being Low, Moderate or High.
- **Adaptability:** The ability of the strategic option to adjust or accommodate to future demand scenarios without further significant capital outlay.

STRATEGIC OPTIONS ASSESSMENT

Based on the outcomes of the relative assessment, **Strategic Option A (upgrade focus) was identified as the preferred investment strategy.** This assessment was based on:

- It was more likely to deliver the full range of benefits identified, making a material contribution to shifting commodities bound for the Port of Portland from road to rail by significantly improving the productivity of rail freight and lowering transport costs for exporters
- This ability to support mode shift would mitigate safety and amenity issues faced by the community associated with the current reliance on road freight as well as increasing the commercial sustainability of the rail line
- Overall supply chain resilience would also be improved, with more efficient access to the Port of Portland enabling a wider evolution of the roles of Victoria's various ports and greater ability to leverage Portland's comparative advantages.

Strategic Option A is not without risks, particularly in relation to demand uncertainty. This risk, however, could be mitigated through a strategic approach to capital investment that enables upgrades to be progressively delivered as demand evolves.

The other options considered were discounted based on the perception that they would be unlikely to deliver the same degree of benefit. Strategic Option B could potentially lead to increases in rail mode share, but it would also likely see volumes of road freight into the Port of Portland increase with detrimental effects for the

community. Strategic Option C may similarly result in some increase in rail mode share, however the feasibility of the scheme was seen to be questionable as exporters may ultimately be worse off with higher priced road freight and underperforming rail infrastructure.

A summary of the assessment outcomes is provided in Table 9 followed by a commentary on the key findings for each area of assessment.

Table 9: Strategic options analysis

| Intervention type | Base case | Strategic Option A (Upgrade focus) | Strategic Option B (Redirection of rail freight focus) | Strategic Option C (Price incentives focus) |
|---|----------------|---------------------------------------|---|--|
| Benefits* | | | | |
| 1. Commercial sustainability of freight infrastructure (10%) | Low (0) | High (2) | High (2) | Moderate (1) |
| 2. Improved competitiveness of regional industries and growth in Victorian exports (30%) | Low (0) | High (2) | Medium (1) | Moderate (1) |
| 3. Supply chain reliability and resilience (30%) | Low (0) | High (2) | Low (0) | Low (0) |
| 4. Improved community amenity and safety (30%) | Low (0) | High (2) | Medium (1) | Moderate (1) |
| Weighted benefit rating | Low (0) | High (2) | Medium (0.8) | Medium (0.7) |
| Present value whole of life costs | | | | |
| Estimated over the remainder of ARTC lease. | Low | High | High | Medium |
| Timeframe for delivery (years) | | | | |
| Estimated timeframe for delivery. | - | 3 | 3 | 2 |
| Key risks and uncertainties | | | | |
| Strategic option does not lead to anticipated behavioural changes / benefit levels or are insufficient to justify investment. | High | High | Medium | High |
| Critical independent projects do not occur and reduce the benefits achieved from the strategic option. | n.a. | Medium | Medium | Medium |
| Changes in technology or broader market conditions reduce the severity of current problems or the scope of expected benefits. | Medium | Medium | Medium | Low |
| Uncertainties regarding the technical, regulatory and/or commercial feasibility of the strategic option. | Low | Medium | High | High |
| Aggregate risk and uncertainty rating | Medium | Medium / High | Medium / High | Medium |
| Disbenefits | | | | |
| Reductions in revenue for some businesses in the supply chain through changes in transport mode choices | Low | Medium | High | Medium |
| Adaptability | | | | |

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| Intervention type | Base case | Strategic Option A (Upgrade focus) | Strategic Option B (Redirection of rail freight focus) | Strategic Option C (Price incentives focus) |
|--|-----------|---------------------------------------|---|--|
| Adaptability of solution to accommodate future demand scenarios. | Low | Medium / High | Low | Low |
| Ranking | | | | |
| Ranking of strategic options. | 4 | 1 | 3 | 2 |

* As outlined above, a series of facilitated ILM workshops were conducted to identify a number of possible strategic interventions to address the identified problems and through which the anticipated benefits could be realised. The weightings allocated to the benefit categories in Table 9 above are consistent with the weightings attached to the benefits identified in the ILM.

Strategic Option A is the only strategic option that is expected to realise the full extent of the potential benefits

- **Base case:** The base case scenario assumes no improvement to the current performance specification of the Portland Line and hence the potential benefits would only be marginally realised due solely to upgrades across the broader rail network and/or or new infrastructure projects in the region.
- **Strategic Option A (Upgrade focus):** It is expected that the upgrade focus will increase the capacity and performance of the Portland Line and be the only strategic option that fully addresses the potential project benefits when this is combined with complementary investments across the broader freight network including network resilience and reduced use of heavy freight vehicles.
- **Strategic Option B (Redirection of rail freight focus):** The redirection of rail freight to Geelong and other alternative ports would be expected to partially realise selected project benefits related to the competitiveness of regional exporters. It would not, however, be expected to address the resilience of the broader freight network. Further, while road upgrades would be expected to deliver some safety and amenity improvements for the community, any material reduction in the volume of road freight travelling to the Port of Portland would be unlikely and therefore the underlying problems may remain.
- **Strategic Option C (Price incentives focus):** Financial incentives would be expected to help increase the volume of freight moved by rail, though the degree to which the mode share could change would be limited by the current performance specification of the Portland Line. The ability of the approach to address commercial sustainability of critical infrastructure and amenity and safety issues faced by the community would be highly dependent on its ability to facilitate mode shift. Irrespective of this outcome, the strategic option would not, however, be expected to address long-term resilience of the regional freight supply chain as the performance of the rail line would remain unchanged.

The capital-intensive options are expected to be the costliest

A benchmarking exercise was undertaken to determine the approximate delivery timeframe of the alternative strategic options.

- **Base case:** The costs for the base case would be relatively low to maintain a performance specification of 19 TAL / 40 km/h.
- **Strategic Options A and B (Upgrade focus and redirection of rail freight focus):** It is expected that Strategic Option A will be relatively high cost, reflecting the scale of improvement required on the Portland Line. Strategic Option B would likely require a similar scale of investment, however, noting the potential geographic breadth of improvements to the road network. Both options would also require significant port-side investment to accommodate expected increases in rail freight.
- **Strategic Option C (Price incentives focus):** Strategic Option C is expected to be less costly compared to the capital-intensive strategic options above as the incentives will be targeted, spread across a longer time horizon (reducing the present value of costs), and limited in uptake from the performance specification of the Portland Line. The full extent of costs, however, would be difficult to quantify, noting the investment requirement would be proportionate to industry’s relative desire to shift transport modes.

All options have inherent risks and uncertainties regarding their ability to realise potential benefits

- **Base case:** The key risk in the base case is that low utilisation of the Portland Line results in the rail line becoming commercially and/or operationally unsustainable leading to closure.

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- **Strategic Option A (Upgrade focus):** Strategic Option A faces inherent risks associated with rail line upgrades not leading to anticipated behavioural changes / benefit levels or are insufficient to justify investment. In addition, there are risks associated with the timing or feasibility of complementary investments across the broader supply chain that may be required to realise the full extent of the potential benefits. Upgrades of the line would ultimately require higher levels of ongoing investment to sustain performance standards. Without the anticipated increase in demand, there is a risk these levels of investment cannot be sustained.
- **Strategic Option B (Redirection of rail freight focus):** Strategic Option B also faces inherent risks associated with interventions not leading to anticipated behavioural changes / benefit levels or are insufficient to justify investment. In particular, the rail upgrades may not sufficiently encourage freight to be redirected to alternative ports via rail and/or road upgrades may not be feasible to include on all key routes and/or lead to inadequate safety and community amenity benefits. In addition, permanently closing the Portland Line would require the ARTC to negotiate with the State Government who own the infrastructure asset. It is uncertain whether the State Government would agree to closing the Portland Line.
- **Strategic Option C (Price incentives focus):** Financial mechanisms will generally be associated with less risk as they involve relatively small amounts of upfront capital and can be ceased if / when it is clear that the community benefits do not justify the financial investment. The current performance and capacity of the Portland Line suggests that only a modest mode shift may however be feasible. In addition, to be effective, providing financial incentives to exporters located in Western Victoria to utilise the rail network to transport primary commodities to the Port of Portland may require an extension to the Victoria's Mode Shift Incentive Scheme. It is uncertain whether the State Government would agree to extending the Mode Shift Incentive Scheme to the Portland Line and broader Murray Basin Rail Network.

Strategic options that maintain the current freight movements minimise the scale and scope of Disbenefits

- **Base case:** The base case is assumed to maintain the status quo in relation to the rail freight mode share and is not expected to lead to disbenefits to the regional community.
- **Other options:** All other options have the potential to lead to disbenefits to the extent they lead to reductions in revenue for road freight businesses or ports from which freight is redirected. Strategic Option B is perceived to be likely to create marginally more disbenefit to the extent it disadvantages the Port of Portland in favour of its competitors.

All of the strategic options (excluding the base case) provide some degree of adaptability to accommodate future demand scenarios

- **Base case:** The base case assumes that the performance specification of the Portland Line remains unchanged overtime and is therefore not adaptable to potential changes in industry needs or upgrades to the broader network.
- **Strategic Option A (Upgrade focus):** The upgrade focus will be adaptable to future changes in industry demand to the extent that the preferred project option increases the tonnage and speed of the Portland Line.
- **Strategic Option B (Redirection of rail freight focus):** The redirection of freight focus will be adaptable to future changes in industry demand to the extent that the preferred project option increases the capacity of the supply chains that feed into alternative ports. The strategic option would not however be adaptable to future changes in demand for rail to the Port of Portland due (for example) to new infrastructure investments of industry development.
- **Strategic Option C (Price incentives focus):** Financial mechanisms have the potential to be highly adaptable to changes in future demand scenarios depending on the budget that is available to support them. The assumption that the Portland Line remains at the current performance specification indicates however that the option would not be fully adaptable to changing industry needs.

Based on the relative assessment, Strategic Option A is preferred as this option has the potential to realise the largest proportion of the project benefits

- **Base case:** The base case is considered to be a viable option. The commercial viability of the Maroona to Portland line would ultimately come into question and the regional supply chain would likely have an increase impact (in terms of amenity and safety) on the community as a result. Exporters would also continue to face high transport costs which would ultimately constrain regional economic growth.
- **Strategic Option A (Upgrade focus):** Although the costliest of the strategic options, Strategic Option A has the ability to address all of the identified problems and realise the full extent of the potential project

benefits, including improved community safety and broader freight network resilience. These benefits are contingent on port-side investment in particular, with upgrades to rail handling facilities at the Port of Portland required to accommodate increased rail traffic. Irrespective of these investments, demand uncertainty would be a risk to the commercial sustainability of the upgrades and the Line.

- **Strategic Option B (Redirection of rail freight focus):** The redirection of freight focus is assessed to be the third preference due to (i) the relatively high cost required, (ii) the potential to only partially realise the full extent of the benefits, and (iii) the required closure of the Portland Line which will reduce the resilience of the freight network and the competitiveness of the Port of Portland.
- **Strategic Option C (Price incentives focus):** The incentivisation focus was assessed to be the second preference. While financial incentives are potentially a cost-effective tool to increase the utilisation of the freight network that can be spread overtime, the current performance specification of the Portland Line is not expected to accommodate a significant transport mode shift.

5

Project options identification and assessment

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5. PROJECT OPTIONS IDENTIFICATION AND ASSESSMENT

CHAPTER SUMMARY

The fourth and final stage of the ILM process involved the identification and analysis of project options that fit within the boundaries and parameters of the preferred strategic option identified in Chapter 4.

A number of potential project options were identified that varied in terms of allowable tonne axle loads (TAL) and average speeds. The project options were assessed against a range of criteria including the potential benefits, costs, risks, uncertainties, and dis-benefits.

Option 3 (23 TAL / 60km/h) had the highest BCR (1.32) amongst the five project options under a medium demand scenario, slightly above Option 2 (21 TAL / 80km/h). Given Option 2 and Option 3 had similar BCRs, stakeholder perspectives and other non-quantifiable risks, uncertainties and disbenefits were considered in selecting a preferred project option. In this context, Option 3 was viewed as preferable to Option 2 given its higher operation standards, strong stakeholder support, and the fact that the performance specification of the Portland Line will increase to 23 TAL / 80 km/h following 10 years of operations, helping to future proof operations. In contrast, it is worth noting that significant capital investment would be required under Option 2 if axle loads of 23 TAL were deemed necessary at some point in the future.

5.1. PURPOSE

This section builds on the strategic options assessment undertaken to identify a range of detailed project solutions to improving the performance of the Portland Line. The section includes consideration of a range of potential upgrade options that vary in terms of the allowable tonnage and speed and presents the results of an economic appraisal to identify a preferred project option.

5.2. APPROACH

As outlined above, high-level strategic options were developed to address the three key problems and assessed based on a qualitative multi-criteria analysis. From this comparative assessment, upgrading the Portland Line was identified as the preferred strategic option. This determined the parameters for a series of more detailed project options to be developed.

A series of technical workshops were facilitated to identify various scopes of works that could be considered to upgrade the Portland Line that varied in terms of the allowable tonnage and speed of the upgraded track. A list 12 options in total were developed based on asset condition and operational requirements with varying treatments for track, signals, and structure upgrades. This list was reduced based on asset configuration, operator/stakeholder demand assessment, and broader consultation to a short-list of five options (Appendix 2).

The short-listed project options were subject to a multi-criteria analysis that included a cost benefit analysis (Section 5.5.6), with the options assessment also supported by insights and learnings from a detailed stakeholder consultation process (Section 5.5.5).

5.3. PROJECT OPTION SCOPE FRAMEWORK

Increasing rail freight competitiveness and improving regional supply chain efficiency requires coordinated action on the part of a number of different government and private sector parties. Within this context, an initial project scope framework was developed that displays the complexity of the investment and the potential interrelationship between investments under the control of ARTC and third parties. This framework identifies those investments which are critical to realisation of the project objectives and benefits and their respective treatment in the definition and analysis of project options (Table 10).

Table 10: Project scope framework

| Investment areas | Definition |
|--------------------------------|--|
| Current projects | <p>Infrastructure projects that are assumed to be to be delivered prior to the upgrades to the Portland Line that would have a material impact on the performance of the regional supply chain. These projects are considered as part of the base case scenario included in the project options assessment process.</p> <p>Current projects are assumed to include Murray Basin Rail Project Stage 3 which will see the Ararat to Maryborough line upgraded to accommodate services running at 21 TAL and 80 kilometres per hour.</p> |
| Core scope of works | <p>Scope items which are essential to improving the performance of the Portland Line and are under the control of ARTC. These projects also form the basis of all financial analysis. They may include upgrade of rail track infrastructure, re-sleepering, upgrade of structures and signalling improvements</p> |
| Interdependent projects | <p>Scope items or projects essential for the project to achieve its objectives or mitigate unacceptable impacts. Interdependent projects are included in the core economic appraisal but are delivered separately from the core scope of works and therefore excluded from the financial appraisal and project funding.</p> <p>Interdependent projects will include the investment necessary by other entities to take up any performance improvements delivered under the core scope of works. This might include, depending on the option, portside capacity increases, upcountry intermodal terminal construction, or investment by above rail operators in new locomotives and wagons.</p> |
| Complementary projects | <p>Scope items or projects which can extend the benefits delivered by the Project but are not essential for the project to achieve its objectives. Any complementary investments are not considered as part of the project options assessment or core economic appraisal, though may be considered as part of sensitivity testing of the core cost benefit analysis results.</p> <p>Complementary projects might include, for example, further upgrades of Victoria's Murray Basin Rail Network to increase axle loads or extend gauge standardisation.</p> |

5.4. PROJECT OPTION IDENTIFICATION AND RATIONALE

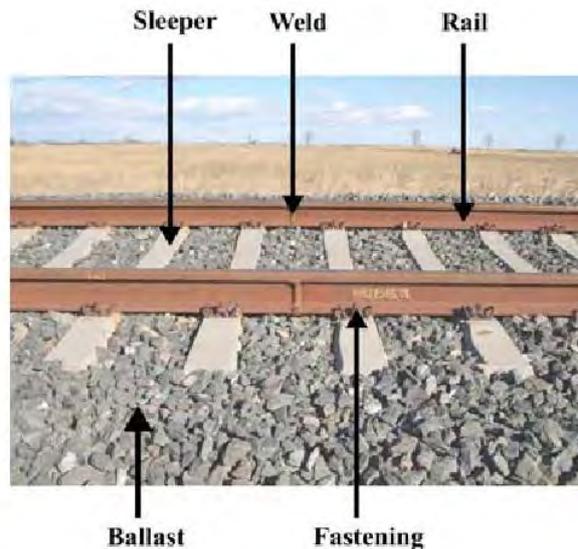
5.4.1. FACTORS INFLUENCING LINE PERFORMANCE

Chapter 2 described how performance issues on the Portland Line are driving up regional supply chain costs and reducing the competitiveness of rail freight for the transport of export commodities destined for the Port of Portland. Specifically, axle load limits that are lower than other parts of the regional standard gauge network and operating speed restrictions constrain the productivity of trains operating on the line.

Axle load and operating speed limits are driven by the condition of key track components and assets. As identified in the figure below, these include:

- **Sleepers:** Horizontal supports which lie underneath the rail, helping hold them in place.
- **Weld:** Joint where two sections of rail connect.
- **Rail line:** The metal track that trains travel on.
- **Ballast:** Forms the trackbed upon which rail sleepers are laid. It is used to bear the load from the rail sleepers and facilitate the drainage of water.
- **Fastening:** Where the rail connects to sleepers.

Figure 14: Railway track components



The condition of these components are one of a number of factors that influence line performance as is further explored in the figure below. Aging timber sleepers, degraded or fouled ballast, and unreliable train detection at level crossings are issues that have led to the imposition of operating restrictions on the Portland Line.

Figure 15: factors that influence line performance

| | Track | Structures | Level crossings | Line capacity | External factors |
|----------------------------|---|--|--|--|---|
| Impact on line performance | The integrity of sleepers and ballast impacts the stability of rail operations and therefore the speed at which services can reliably operate. | The strength of bridges and culverts on the line influence the axle loads the line is able to accommodate. | The level of protection offered at level crossings influences the degree to which train operations are constrained. | The number of locations at which opposing train movements can pass dictates total line capacity. | Availability and efficiency of upcountry and portside loading/unloading facilities as well as the axle load limits on other parts of the regional network. |
| Current status of line | Fouled ballast and aged timber sleepers have resulted in the introduction of operating speed restrictions along most of the line. These restrictions are generally to 40 kmph but on some segments are as low as 10 kmph. | Bridges and culverts on the line are generally built to accommodate 19 TAL. Accommodating higher axle loads would require the upgrade of those structures. | Low traffic volumes and fouled ballast compromises the reliability of signalling track circuits at level crossings requiring manual activation by 'bell runners' and for trains to stop until activation can be confirmed. | Some passing loops have deteriorated to a greater degree than other parts of the track impacting their useability, particularly for trains running at higher axle loads. | Performance of grain loading facilities at Port of Portland is an existing constraint on the cycle times of trains on the Portland line. 19 and 21 TAL limits on Victorian branch lines is also a limiting factor on rail productivity. |

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5.4.2. THE 'DO MINIMUM' BASE CASE

The base case has been defined as a 'do minimum' scenario that assumes a continuation of the current performance specification

The need to replace or repair failing track components and other assets has been recognised by ARTC. Under the current and committed maintenance program, ARTC progressively replaces life-expired assets and resolves other failures as they occur. This includes the replacement of aged timber sleepers and fouled ballast which are two the primary causes of operating restrictions on the line today.

The annual works plan (AWP) currently contains a major period maintenance allocation to replace approximately 2,000 timber sleepers on an annual basis to maintain gauge. Between Maroona and Portland the sleeper configuration consists of approximately 276,500 timber sleepers, with approximately 11,200 concrete sleepers installed between Heywood in Portland in 2001. While replacing all timber sleepers under the current plan is a long-term objective, a prioritisation process is undertaken by ARTC to identify which particular sleepers will be replaced based on the condition of the timber sleepers and operating environment (e.g. proximity to level crossings, and the contours and/or curves of the rail line).

A detailed site inspection and maintenance modelling indicated that the continuation of the current performance specification would require an increase in the scope and cost of maintenance activities moving forward, which has been incorporated into the base case consistent with the Infrastructure Australia's Assessment Framework.

Based on the expected condition of the Portland Rail Line as well as broader upgrades to the freight network and infrastructure projects located in the Western Region assumed under the base case scenario, the current utilisation of rail freight is expected to remain broadly unchanged over the forecast horizon

The continuation of operating restrictions on the Portland Line would be expected to result in a future demand profile that is broadly consistent with the utilisation levels that have been observed over the past couple of years (all else constant). Consistent with this view, it is assumed that one to two rail services operate per week, on average, on the Portland Line over the forecast horizon with the road network continuing to maintain a disproportionate share of the timber, grain and mineral sands that are exported via the Port of Portland.

5.4.3. PROJECT OPTIONS DEFINITION

Under the base case life-expired assets will gradually be replaced over time. Over 50 or more years this would include full replacement of the remaining timber sleepers, track and other legacy assets. By the time the full spectrum of works had been undertaken, it could be expected that the operating standard of the line could be increased.

The five project options presented consider the potential to accelerate elements of this long-term investment program to deliver operating standards to be increased in the short-term. The options propose incremental increases in the scale of intervention with Option 5, proposing the most significant level of intervention, ultimately replacing or renewing the majority of assets, including replacement of all timber sleepers, fouled ballast and rail. This investment would see operating standards on the Portland Line align increase to at least 23 TAL at 80 kilometres per hour, consistent with Inland Rail.

The other four options presented propose lesser improvements, noting that both the interstate network into which the Portland Line connects and the Victorian network from which most Portland traffic originates operate at lower standards than would be delivered under Option 5.

The options therefore enable consideration of the optimal level of short-term investment in the Portland Line from a financial and economic perspective within the context of restrictions that exist on other parts of the network.

The five options and their relative performance standard are summarised in the figure below.

Figure 16: Project options improvements summary

| | Axle load limits & operating speeds | | | |
|-----------|---|--------|--------|---------|
| | 19 TAL | 21 TAL | 23 TAL | 23 TAL+ |
| Base case | Continuation of existing speed restrictions | - | - | - |
| Option 1 | Reduction of existing speed restrictions | - | - | - |
| Option 2 | 80 kph | 80 kph | - | - |
| Option 3 | 80 kph | 80 kph | 60 kph | - |
| Option 4 | 80 kph | 80 kph | 80 kph | - |
| Option 5 | 80 kph | 80 kph | 80 kph | 80 kph |

The incremental improvements in line performance would be achieved through a progressive expansion of the scale of the capital program:

- **Option 1** enables reduction of speed restrictions through partial re-sleepering with every second timber sleeper replaced with a concrete sleeper.
- **Option 2** extends the capital program to include renewal and replacement of track ballast, enabling the line to support trains of up to 21 TAL.
- **Option 3** proposes additional investment in re-sleepering of curves and other higher-risk sections of the line as well as upgrading of bridges and culverts, enabling the line to support trains of up to 23 TAL. Operating speeds would increase to 80 km/h over a ten-year period.
- **Option 4** would fully re-sleeper the line and add greater depth to track ballast, notionally achieving the same operating standards as Option 3 but 23 TAL trains operating at 80 km/h from the first year.
- **Option 5** would upgrade all infrastructure with re-railing undertaken in addition to the scope proposed under Option 4. This would enable trains to operate beyond 23 TAL should there be customer demand to do so.

A high-level view of the capital scope under each option is provided in the figure below.

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Figure 17: Capital scope summary by option

| | | Base case | Option 1 (Reduce speed restrictions) | Option 2 (21 TAL / 80 km/h) | Option 3 (23 TAL / 80 km/h) | Option 4 (23 TAL / 80 km/h) | Option 5 (23 TAL / 80 km/h) | |
|--------------------------|-----------------|---|---|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------|
| Capital scope categories | Track | Ballast renewal or replacement | | ✓ (150mm depth) | ✓ (200mm depth) | ✓ (200mm depth) | ✓ (250mm depth) | ✓ (250mm depth) |
| | | Resleeping (replacement of timber sleepers with low-profile concrete sleepers) | | ✓ (Partial, 1:2) | ✓ (Partial, 1:2) | ✓ (Partial, 1:2) | ✓ (Full) | ✓ (Full) |
| | | Rerailing (replacement of existing rail with new 80kg rail) | | | | | | ✓ (Full) |
| | | Turnout refurbishment (replacing life expired timber bearers) | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Structures | Bridge and culvert renewal (to accommodate higher axle loads) | | | | ✓ | ✓ | ✓ |
| | Level crossings | Signalling upgrade (to provide for automated crossing protection) | | | ✓ (Axle counters) | ✓ (Axle counters) | | |
| | Line capacity | Passing loops upgrade (to accommodate higher line demand) | | | | ✓ | ✓ | ✓ |

The five options also approach the treatment of level crossings in different ways. Level crossing reliability on the Portland Line is currently compromised by fouled ballast which impede the proper functioning of track circuits used for train detection. The issue is further exacerbated by low train volumes where surface rust and other contaminants on the rail head may compromise train detection. In response, manual activation of level crossing signals is currently required with trains having to stop until it is clear that the crossing has been activated. This approach would be maintained under Option 1. Under Options 2 and 3 those precautionary restrictions would be removed as a result of the installation of axle counters which are not prone to the same detection issues when ballast is degraded or train volumes are low. Under Options 4 and 5 the ballast around level crossings would be reformed which would, along with the higher train volumes expected to be realised due to the increased operating performance, mitigate risks of track circuit reliability.

The retention of timber sleepers under Options 1-3 would necessitate ongoing capital investment with the expectation that at least 75 per cent of the remaining sleepers would need to be replaced at some point within the next 30 years. The timing of this investment would ultimately depend on the volume of traffic supported, although under Options 1 and 2 additional investment would likely be required within the first 10 years noting the minimal level of re-sleeping proposed. Under Option 3 this requirement could potentially be deferred by 15 years or more while under Options 4 and 5 additional capital investment would not be required within the next 30 years.

Further information on the technical scope of options is provided in Appendix 2.

Opportunities to consolidate level crossings or undertake track re-alignment were considered but ultimately discounted

Other scope opportunities that were considered in defining the project options included level crossing consolidation and track geometry changes to enable operating speeds beyond 80 km/h. Level crossing consolidation was ultimately ruled out as, given the distance between crossings on the line, the potential impacts of crossing closures on industry and the community was seen to be unacceptably high. Track geometry changes, including re-alignment of sections of the Portland Line, were ruled out due to the scale of capital investment required. The nature and volume of rail demand in the region was not seen to warrant these types of investments.

5.5. PROJECT OPTIONS ANALYSIS

As previously noted, the options presented are intended to enable identification of the optimal level of investment in the Portland Line from a financial and economic perspective. A multi-criteria analysis was

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undertaken to make this determination, focussed largely on cost-benefit analysis ratified through consideration of other non-quantifiable criteria. Specifically, each option was assessed against the following criteria:

- **Realisation of economic and other project benefits:** An economic appraisal was used to estimate the value of economic benefits likely to be realised under each project option. The outcomes were then compared to the expected performance of the options against the benefits identified in the Investment Logic Map to test whether the economic appraisal appropriately reflected the full extent of these benefits and their respective weighting.
- **Aggregate financial impacts and projected revenues:** Capital and operating costs were estimated for each project option in order to provide an indication of the likely financial impact of each option over the 30-year appraisal period. Demand projections also supported estimation of the likely track access revenues that ARTC would receive under each option as an offset to those costs.
- **Interdependent projects and associated costs:** Capital costs were also estimated for the interdependent portside, upcountry and above rail investments deemed to be required to realise the increased operational performance and associated benefits estimated under each option. These costs were accounted for in the economic appraisal for the purposes of determining a Benefit-Cost Ratio but excluded from the financial analysis as they are outside of respective funding requirement of government to deliver each option.
- **Other risks, uncertainties and disbenefits:** Key risks to achieving the project benefits were identified and categorised as 'high', 'medium' or 'low', based on an assessment of both likelihood and consequence. An overall risk profile for each project option was approximated based on the rating of each risk and quantified for the purposed of the risk-adjusted cost estimates. Key uncertainties and disbenefits were also identified and categorised as 'high', 'medium' or 'low', based on professional judgement of the level of uncertainty and consequence.
- **Stakeholder perspectives:** The views from key stakeholder groups were canvassed regarding which project option would be preferred. Stakeholder preferences were then compared to the performance of project options against the quantitative and qualitative metrics outlined above.

A preferred project option was determined based on consideration of:

- the findings from each of the work packages above,
- trade-offs associated with the project options with regard to cost, risk, and benefits, and
- sensitivity analysis of key operating assumptions including future demand profiles,

5.5.1. BENEFITS ANALYSIS

SUMMARY FINDINGS: BENEFITS ANALYSIS

Economic benefits realised under each project option are primarily driven by relative reductions in transport costs. Under the scope of upgrades proposed, it has been estimated that costs of moving freight by rail would reduce by between 4 and 13 per cent.

The economic benefits that are expected to stem from these relative cost reductions include:

- Increased productivity of regional supply chains,
- Improved amenity and road safety for communities in Western Victoria, and
- A more reliable and resilient freight supply chain.

The quantum of benefits delivered is expected to rise as the axle load increases across the incremental project options, with Option 5 forecast to deliver the highest level of economic benefits for the regional community. There is expected to be a declining marginal benefit, however, as the axle load is upgraded from 19 TAL to 23 TAL due to the fact that only the interstate network is designed to accommodate 23 TAL with all feeder lines at 19 or 21 TAL. This means that there is only a portion of services that would be able to take up the full payloads available under a 23 TAL upgrade.

The total value of those benefits ranges from \$53 million (present value) over 30 years under Option 1 to \$168 million under Option 5.

The quantum of benefits generated over time by each of the project options outlined above will be a function of three key variables:

1. The future volume of commodities exported via the Port of Portland and Port of Geelong that could potentially be transported via the Portland Line.
2. The extent to which the proposed scope of works under each project option changes the relative cost, availability and reliability of rail freight services on the Portland Line.
3. The change in exporters' demand for rail freight services provided on the Portland Line with respect to the change in cost, availability and reliability.

The volume of contestable commodity export volumes for the Portland Line is expected to grow solidly over the next 10 to 20 years underpinned by grain and mineral sands

Grain is currently the only commodity that uses the Portland Line. The proposed project options have the potential, by reducing relative transport costs, to increase both the quantity of grain and other commodities transported via the Portland Line. This includes mineral sands exports bound for the Port of Portland as well as other products manufactured in Portland bound for other locations.

The detailed stakeholder consultation process and demand forecasting analysis outlined in Appendix 1 and found that (under a 'medium' forecast scenario):

- **Grain** production and exports from the region are expected to grow solidly in the future and continue to be a potential source of demand for rail freight services to the Port of Portland.
- **Mineral sand** production and exports from the region are expected to also grow solidly over time with a number of new mining operations expected to come online over the next 5 - 10 years which may be a potential source of demand for rail freight services to the Port of Portland if the Portland Line is upgraded.
- **Aluminium ingot** production from the local smelter exported via Port of Melbourne may potentially use the Portland Line if it is upgraded.
- **Logs and fertilisers**, the other major commodities exported / imported through the Port of Portland, were deemed not feasible to travel on rail regardless of the potential scope of works included as part of the project options. This was because timber plantations were largely located within 100 to 200 kilometres of the Port, a distance at which rail would struggle to compete with road transport. The plantations were also largely to the west of the Portland Line meaning the use of rail would require longer transport times to the Port. Back-loading grain trains with fertilisers bound for farming regions was discounted due to potential operating complexities including contamination.

In theory, reduced transport costs due to rail line upgrades could lead to 'second-round' effects for regional exporters such as increased cost competitiveness, international export market share and production volumes. As a conservative assumption, the forecasts of contestable exports of grain, mineral sands and aluminium ingot for the Portland Line do not consider such 'second-round' effects (i.e. the project options outlined above are assumed to affect how exporters choose between transport modes and ports, not the level of exports that are channelled through the Port of Portland (Table 11)).

Table 11: Assumptions that underpin forecasts of future commodity exports from Port of Portland

| Relevant commodities | Key assumptions |
|----------------------|---|
| Grain | <ul style="list-style-type: none"> - Victorian grain production is expected to grow, on average, by 3.1 per cent per annum over the forecast period. - Close to 45 per cent of Victorian grain production is exported overseas in the base year - A one per cent increase in population leads to a 1.06 per cent increase in domestic grain consumption - 60 per cent of grain exports are shipped as bulk commodities. - 50 per cent of Victoria's bulk grain exports are produced in the Western Region. |
| Mineral sands | <ul style="list-style-type: none"> - Three new mineral sands projects are expected to come online within the next 5-10 years (under a medium demand scenario) that will utilise the Portland line, depending on project option |

| Relevant commodities | Key assumptions |
|----------------------|---|
| Aluminium ingots | <ul style="list-style-type: none"> - There is an aluminium smelter located 5 kilometres by road from the Port of Portland. A key product from this smelter is aluminium ingots, which is exported in containers via Port of Melbourne. - Feedback from market soundings suggested that there could be up to 547G(1)(a), 547G(1) tonnes of aluminium ingots produced per year. |
| Copper | <ul style="list-style-type: none"> - Stavelly mine will proceed to production stage in the high demand scenario and use the Portland line under certain project options |

Rail transport costs are expected to reduce (and the availability and reliability of rail freight services increase) as the axle load increases across the incremental project options and travel speed increases. Increases in axle loads are associated, however, with a declining marginal benefit due to broader network constraints

For freight that is transported to the Port of Portland via rail, the origin of the rail journey will vary depending on the location of the exporter and/or key infrastructure such as rail terminals and/or storage facilities. **Figure 18** provides an overview of where the grain, mineral sands and other commodities that could be transported via rail to the Port of Portland are expected to originate from under a medium demand scenario. The majority of grain, for example, that is forecast to be transported to the Port of Portland via rail is expected to originate from the Rainbow, Hopetoun and Mildura corridors.

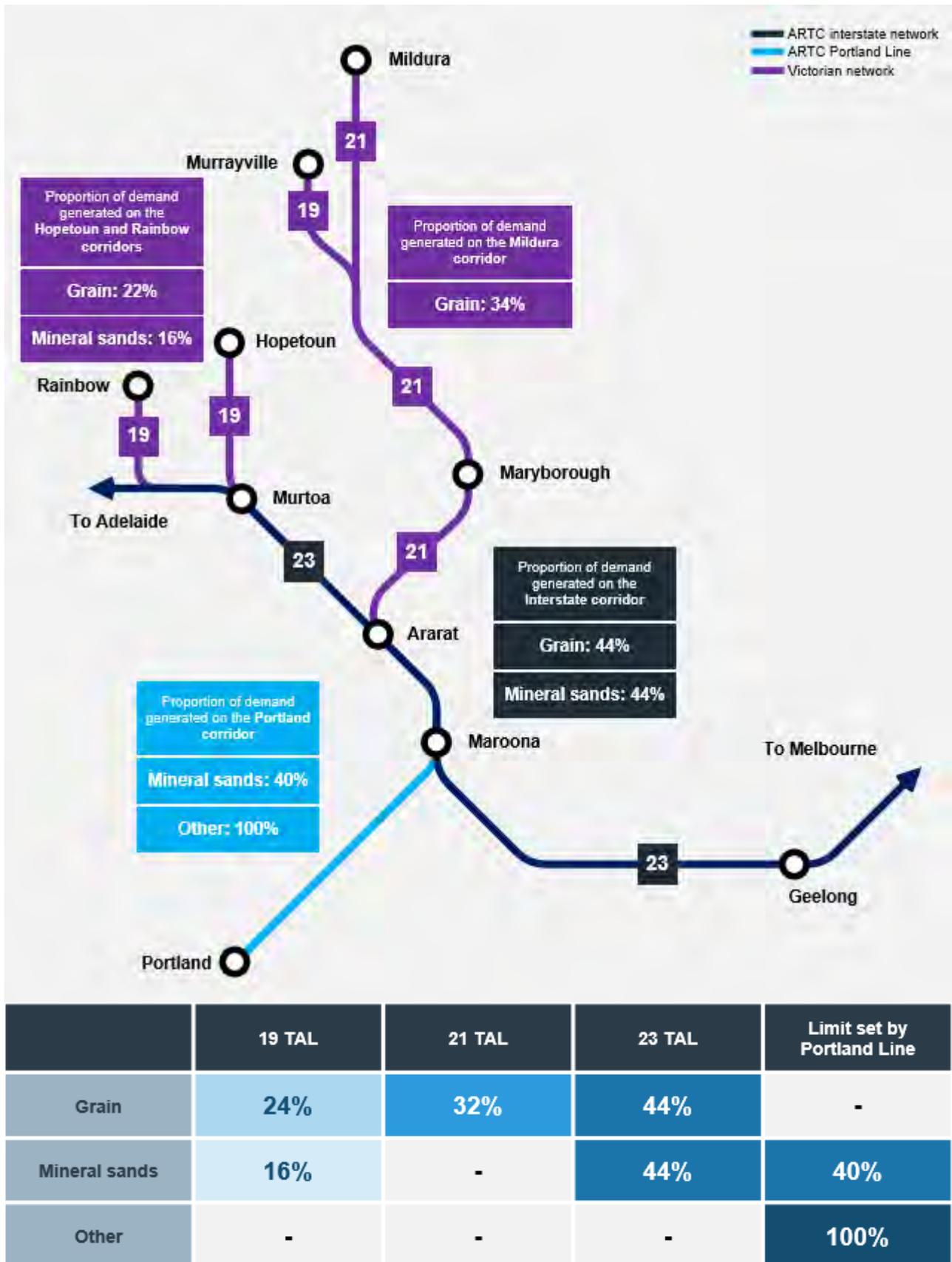
For exporters that only utilise the Portland line in transporting commodities to the Port of Portland, the change in the relative attractiveness of rail freight will be solely dependent on the new performance specification assumed under each of the project options. In contrast, for exporters that utilise additional corridors across the broader rail network in transporting commodities to the Port of Portland, the change in the relative attractiveness of rail freight will be a function of the new performance specification within the Portland line and the existing performance specification of alternative rail lines that make up the overall freight journey.

There are various axle load limits across the broader rail network and exporters are expected to be constrained by the lowest axle load limit across the freight journey (**Figure 18**). For example, trains departing the Mildura corridor can only be loaded to 21 TAL, irrespective of the allowable axle loads on the Portland Line. In practice, this means that there would be no incremental advantage from a 23 TAL upgrade (as opposed to a 21 TAL upgrade) for exporters along the Mildura corridor.

The change in the cost and relative attractiveness of rail freight for exporters due to the upgrade works to the Portland Line included as part of a given project option will thus be dependent in part on the origin of the rail freight journey.

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Figure 18: Origin of demand for the Portland Line



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Under four of the five project options, grain exporters could realise unit transport cost savings of more than 10 per cent

Unit transport costs are expected to reduce as the axle load increases across the incremental project options, based on assumptions with respect to export origins and relative cost of transporting exports to the nearest rail head. In particular, increases in the allowable axle load are expected to improve the train payload and reduce the number of trips required to transport a given volume of commodity to the Port of Portland. The average cost per tonne faced by exporters is, in turn, expected to reduce due to lower fuel and labour costs, access charges and up-country handling costs. Increasing the axle load from 19 TAL to 23 TAL on the Portland Line is expected to, for example, reduce transport costs for grain exporters by 13 per cent (Table 12). There is however a declining marginal benefit with respect to transport costs as the axle load is upgraded from 19 TAL to 23 TAL due to the fact that only a few feeder lines have a 23 TAL rating and therefore it would be uncommon that a train could accommodate a 23-tonne load for the entire journey.

For other relevant commodities such as mineral sands and aluminium ingots, changes to axle loads and speed allowances are expected to have a similar effect on transport costs faced by exporters.

Table 12: Comparison of regional transport costs for grain by option

| | Base Case (Continuation of speed restrictions) | Option 1 (Reduction of speed restrictions) | Option 2 (21 TAL / 80km/h) | Option 3 (23 TAL / 60km/h) | Option 4 (23 TAL / 80km/h) | Option 5 (23 TAL+ / 80km/h) |
|---|--|--|--------------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|
| | Road ^A | Rail | Rail | Rail | Rail | Rail |
| Based on a weighted average of trips from multiple rail heads to the Port of Portland⁴² | | | | | | |
| Unit cost of transport (\$ per tonne) at maximum allowable payload | 42.25 | 35.71 | 34.17 | 31.94 | 31.37 | 31.07 |
| Reduction from base case (%) | - | - | -4 | -11 | -12 | -13 |
| Based on trips from the Dooen rail head to the Port of Portland | | | | | | |
| Unit cost of transport (\$ per tonne) at maximum allowable payload | 30.5 | 29.5 | 28.27 | 26.12 | 24.59 | 24.46 |
| Reduction from base case (%) | | | -4 | -11 | -17 | -17 |

⁴² In order to develop an aggregate measure of the change in the cost and relative attractiveness of rail freight across the broader region due to a given project option, a series of assumptions were made regarding the expected origin of freight journeys and any additional trips required to transport commodities to a rail head. For grain, these assumptions included:

- all grain travelling via rail must first make a 25-kilometre journey to the rail head on a heavy vehicle to be loaded onto the train and sent to the port for export.
- aggregate rail supply costs are based on the average weighted supply costs from each distinct grain catchment area to port, weighted by that catchment's share of total bulk grain exports.

Lower rail transport costs, and increases in the availability and reliability of rail services, are expected to lead to greater utilisation of the Portland Line and reduce the number of heavy freight vehicles on the local road network

The project options are expected to increase the availability and reliability of rail freight services and result in the cost of transporting commodities via the Portland Line to be cheaper for a number of exporters than alternative transport modes and / or port choices leading to:

- freight previously transported to the Port of Portland (and to Port of Melbourne for aluminium ingots) via road transferring to rail
- freight previously transported to the Port of Geelong via road or rail now being transported to the Port of Portland via rail.

At a speed of 80km/h, annual tonnages, weekly trip numbers and rail mode share are expected to increase as the axle load increases across the incremental project options. Increasing the axle load from 19 TAL to 23 TAL on the Portland Line is expected to, for example, increase the rail mode share from 25 per cent to 76 per cent. There is also expected to be a declining marginal benefit with respect to the utilisation of the Portland Line as the axle load is upgraded from 19 TAL to 23 TAL due to the fact that only a few feeder lines have a 23 TAL rating and therefore it would be uncommon that a train could accommodate a 23-tonne load for the entire journey (Table 13).

Table 13: Comparison of rail mode share by option (medium demand scenario)

| | Base Case (Continuation of speed restrictions) | Option 1 (Reduction of speed restrictions) | Option 2 (21 TAL / 80km/h) | Option 3 (23 TAL / 60km/h) | Option 4 (23 TAL / 80km/h) | Option 5 (23 TAL+ / 80km/h) |
|--|--|--|---|---|---|--|
| Annual tonnage (Portland and Geelong) (Total – year 30) | 1,888,223 | 1,995,022 | 2,642,149 | 2,748,707 | 2,748,707 | 2,748,707 |
| % Increase on base case | - | 5.7 | 39.9 | 45.6 | 45.6 | 45.6 |
| Annual tonnage (Maroona to Portland) (Total – year 30) | 408,680 | 621,053 | 1,421,626 | 1,588,281 | 1,588,281 | 1,588,281 |
| Weekly train trips to Port of Portland (year 30) | 7 | 10 | 21 | 23 | 23 | 23 |
| Rail mode share for Portland only (year 30) | 25% | 35% | 71% | 76% | 76% | 76% |
| Change from base case (%pts) | - | 10% | 46% | 51% | 51% | 51% |

The corollary of increased demand for rail freight is a reduced demand for road freight under the project options considered (Table 14). For an 80km/h speed limit, annual tonnages, weekly road trip numbers and road mode share are expected to reduce as the axle load increases across the incremental project options with a declining marginal benefit.

Table 14: Comparison of road mode share by option (medium demand scenario)

| | Base Case (Continuation of speed restrictions) | Option 1 (Reduction of speed restrictions) | Option 2 (21 TAL / 80km/h) | Option 3 (23 TAL / 60km/h) | Option 4 (23 TAL / 80km/h) | Option 5 (23 TAL+ / 80km/h) |
|--|--|--|---|---|---|--|
| Annual tonnage (Portland and Geelong) (Total – year 30) | 1,855,134 | 1,748,336 | 1,101,209 | 994,650 | 994,650 | 994,650 |
| % decrease on base case | - | -5.8 | -40.6 | -46.4 | -46.4 | -46.4 |
| Annual tonnage (Maroona to Portland) (Total – year 30) | 1,221,044 | 1,159,492 | 578,127 | 497,325 | 497,325 | 497,325 |
| Weekly truck trips (Year 30) | 1,209 | 1,148 | 572 | 492 | 492 | 492 |
| Road mode share (Year 30) | 74.92 | 65.12 | 28.91 | 23.85 | 23.85 | 23.85 |

| | Base Case (Continuation of speed restrictions) | Option 1 (Reduction of speed restrictions) | Option 2 (21 TAL / 80km/h) | Option 3 (23 TAL / 60km/h) | Option 4 (23 TAL / 80km/h) | Option 5 (23 TAL+ / 80km/h) |
|---|--|--|---|---|---|--|
| Change from base case (%pts) | - | -9.80 | -46.01 | -51.07 | -51.07 | -51.07 |

Reduced unit transport costs, and the increase availability and reliability of rail services, are expected to increase the utilisation of the Portland Line and lead to a number of economic benefits for Western Victoria

Economic benefits stemming from the outcomes outlined above are expected to include:

- **Increased productivity of regional supply chains.** The reduction in the unit cost of transporting commodities via rail to the Port of Portland is expected to lower operating costs for exporters and commodity owners across Western Victoria and, in turn, improve profitability and competitiveness.
- **Positive externalities for third parties within Western Victoria.** A shift in mode share from road to rail is anticipated to lead to a number of positive externalities for the regional community including, but not limited to, reduced carbon emissions, safer and less congested roads and reduced road maintenance costs.
- **A more reliable and resilient freight supply chain.** Upgrades to the Portland Line are expected to:
 - o reduce the cost and time associated with transporting freight to the Port of Portland in the event that there is a temporary closure to neighbouring ports and/or segments of the rail network.
 - o reduce the planned and unplanned maintenance required following upgrading the Portland Line, which will lead to a reduction in rail service delays and cancellations.

A cost benefit analysis framework was adopted to value of the benefits associated with the change in the freight movements under each project option based on the key parameters and assumptions outlined in Infrastructure Australia's Assessment Framework (Table 15).

Table 15: Value of economic benefits by project option (medium demand scenario)

| Project option | Option 1 (Reduction of speed restrictions) | Option 2 (21 TAL / 80km/h) | Option 3 (23 TAL / 60km/h) | Option 4 (23 TAL / 80km/h) | Option 5 (23 TAL+ / 80km/h) |
|--|--|---|---|---|--|
| Economic impact (\$ million - PV 2023 @ 7%) | | | | | |
| Incremental economic benefits | | | | | |
| Freight productivity benefits | 41 | 113 | 127 | 129 | 129 |
| Avoided externalities | 3 | 8 | 9 | 10 | 10 |
| Amenity benefits | 0.2 | 0.4 | 0.5 | 0.5 | 0.5 |
| Safety benefits | 3 | 8 | 8 | 8 | 8 |
| Avoided road maintenance | 3 | 8 | 9 | 9 | 9 |
| Resiliency benefits | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Residual value | 3 | 4 | 5 | 8 | 11 |
| Total | 53 | 141 | 159 | 165 | 168 |

The economic benefits generated by the project options are well aligned to the desired project benefits identified in the Investment Logic Map

The investment logic mapping exercise identified four key benefits that were expected to be realised if the underlying problems outlined in this Business Case were resolved (see Chapters 2 and 3). These 'project benefits' were:

- **Benefit 1:** Commercial sustainability of freight infrastructure
- **Benefit 2:** Improved competitiveness of regional industries and growth in Victorian exports
- **Benefit 3:** Supply chain reliability and resilience
- **Benefit 4:** Improved community amenity and safety

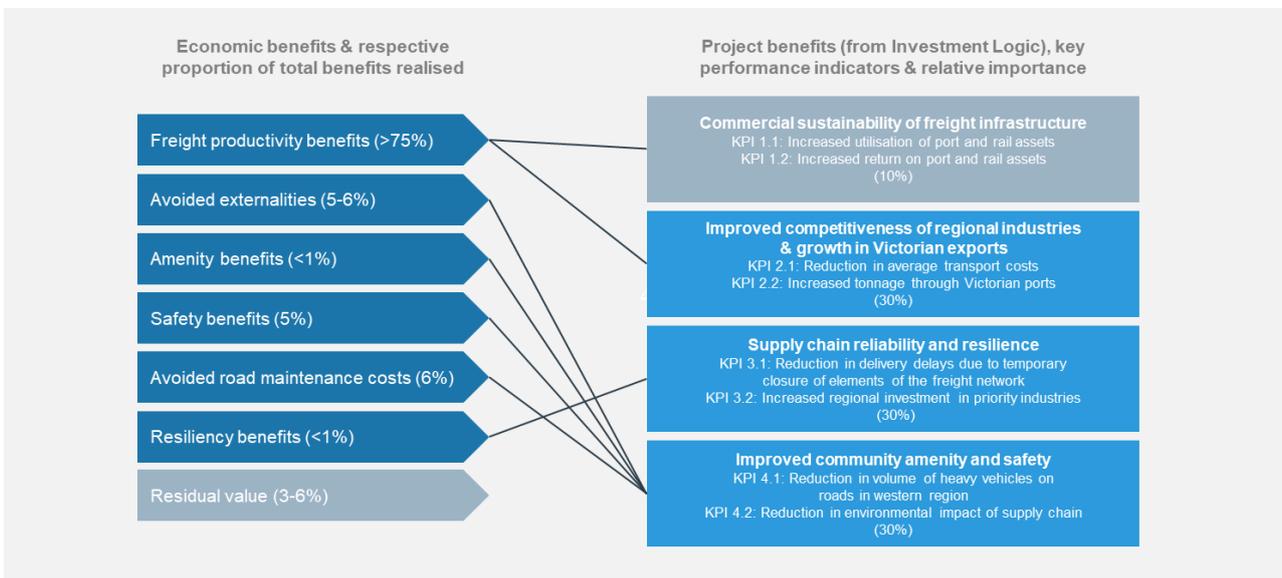
As identified in Figure 19 below, the economic benefits previously identified are well aligned to these project benefits. This suggests that the relative economic impact of each project option is a reasonable representation of the respective likelihood of the option delivering the project benefits.

Notwithstanding this point, there are differences between the value of economic benefits and the relative importance of project benefits. Freight productivity benefits (which relate to Benefit 2), at more than 75 per cent of the total economic benefits realised by each option, are the single largest contributor to economic impact. Amenity, safety, and avoided externalities (which relate to Benefit 4) represent, at 20 per cent of total economic benefits, are a relatively smaller contributor.

Resiliency benefits (which relate to Benefit 3) make very little contribution to economic impact at less than 1 per cent of the total benefits realised by each option. This contrasts to the relative importance placed on each project benefit through the investment logic process which weighted Benefits 2, 3, and 4 equally. These differences, however, relate to each option equally and would not influence the respective ranking of the project options in respect to their relative alignment with the project benefits.

Reflecting the strong alignment between economic and project benefits, project benefit delivery has not been separately considered and accounted for through this options assessment process.

Figure 19: Alignment of economic and project benefits



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5.5.2. FINANCIAL ANALYSIS

SUMMARY FINDINGS: FINANCIAL ANALYSIS

The financial analysis considered upfront capital costs required to deliver each project option, ongoing maintenance costs, as well as expected access revenue to (partially) offset ongoing costs. The quantum of capital costs increases as the scope of capital upgrade and asset replacement expands across the incremental project options. Option 5 is consequently forecast to require the largest capital outlay at \$266 million (real) and Option 1 the lowest at \$78 million (real).

The ongoing costs of each project option have an inverse relationship to the capital cost. That is, the ongoing costs reduce as the scope of capital upgrade expands. Option 1 is consequently forecast to require the largest ongoing investment at \$93 million (real) over 30 years while Option 5 has the lowest at \$42 million (real).

All options are projected to lead to a reduction in operating costs when compared to the base case (\$111 million over 30 years). While project options with higher axle loads are expected to result in lower ongoing operating costs and higher access revenues, the relative change across the project options are forecast to be smaller in comparison to the significant incremental capital outlays required. As a result, upgrading the Portland Line is not a commercial undertaking (i.e. self-funding) under any of the project options considered. Only Option 5 would be expected to realise a positive operating position with revenues exceeding ongoing costs across the appraisal period. Even under this option, however, revenues would fall considerably short of covering capital costs.

Capital and operating cost estimates have been prepared for each of the five project options to support financial analysis. Estimates are presented in real, nominal, and Net Present Cost (NPC) terms. The cost estimates for each project option are based on the cost modelling prepared by Lycopodium (attached as Appendix 2). These estimates are based on visual assessments of existing track and assets which have informed the proposed scope of each of the project options.

Key inputs and assumptions

The cost estimates have also relied on a number of key inputs and assumptions that are identified in Table 16.

Table 16: Key inputs and financial appraisal assumptions

| Item | Assumption | Source and comments |
|-----------------------|------------------------|---|
| Appraisal period | 30 years | A 30 year analysis period is consistent across cost estimates, financial and economic analysis. |
| Appraisal start date | 1 July 2023 | ARTC Management Assumption. |
| Base costs | FY 2022/23 Q1 | Real capital and operating costs provided by Lycopodium. |
| Cost Escalation | s47G(1)(a), s47G(1)(b) | |
| Revenue Escalation | | |
| Nominal discount rate | | |
| GST | Excluded | - |
| Rounding | - | Tables and figures in this chapter have been rounded to 1 decimal place. Numbers across tables may not add due to rounding differences. |

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Capital costs

Capital costs for the five project options are estimated to range from \$77.7 million under Option 1 to \$265.7 million under Option 5 on a real term basis. Table 17 below, outlines a summary of the key elements of the capital cost estimate for the base case and each of the project options.

Table 17: Capital costs (\$M)

| | Base Case (Continuation of speed restrictions) | | Option 1 (Reduction of speed restrictions) | | Option 2 (21 TAL / 80km/h) | | Option 3 (23 TAL / 60km/h) | | Option 4 (23 TAL / 80km/h) | | Option 5 (23 TAL+ / 80km/h) | |
|---|--|------|--|------|--------------------------------------|-------|--------------------------------------|-------|--------------------------------------|-------|---------------------------------------|-------|
| | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. |
| Capital costs (excluding cost contingency) | | | | | | | | | | | | |
| Project management, approvals, and spoil management | s47G(1)(a), s47G(1)(b) | | | | | | | | | | | |
| Sleepers, ballast, and civils | s47G(1)(a), s47G(1)(b) | | | | | | | | | | | |
| Structures | s47G(1)(a), s47G(1)(b) | | | | | | | | | | | |
| Turnouts | s47G(1)(a), s47G(1)(b) | | | | | | | | | | | |
| Level crossing train detection | s47G(1)(a), s47G(1)(b) | | | | | | | | | | | |
| Sub-total | s47G(1)(a), s47G(1)(b) | | | | | | | | | | | |
| P50 | s47G(1)(a), s47G(1)(b) | | | | | | | | | | | |
| P90 Incremental | s47G(1)(a), s47G(1)(b) | | | | | | | | | | | |
| Sub-total | s47G(1)(a), s47G(1)(b) | | | | | | | | | | | |
| Gross Capital Costs (P90) | 0.0 | 0.0 | 77.7 | 84.9 | 117.8 | 128.8 | 136.7 | 149.5 | 200.5 | 219.2 | 265.7 | 290.5 |
| NPC | 0.0 | | 68.8 | | 104.1 | | 120.8 | | 177.2 | | 234.9 | |

Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

s47G(1)(a), s47G(1)(b)

| | | | | | | | | | | | | |
|--------------------|--|--|--|--|--|--|--|--|--|--|--|--|
| [Redacted content] | | | | | | | | | | | | |
|--------------------|--|--|--|--|--|--|--|--|--|--|--|--|

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Figure 20 highlights estimated costs by scope category.

Figure 20: Capital cost comparison

§47G(1)(a), §47G(1)(b)



Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

Ongoing costs

The ongoing costs required to operate and maintain the Portland Line are expected to total \$111.2 million (real) over 30 years under the base case. Under each of the project options, these costs are reduced, coming down to between \$95.8 million (real) under Option 1 and \$41.7 million (real) under Option 5.

Ongoing costs are made up of three cost categories:

- **Fixed annual maintenance costs**, covering activities such as asset inspections that are incurred irrespective of the level of traffic on the line
- **Variable annual maintenance costs**, covering other maintenance activities that are driven by the level of traffic on the line
- **Ongoing capital costs**, relating largely to the replacement of life-expired assets such as timber sleepers with investment assumed to occur every five years.

Table 18 provides a summary of the ongoing costs by option with fixed and variable annual maintenance costs aggregated as total maintenance costs.

Table 18: Ongoing costs (\$M)

| | Base Case (Continuation of speed restrictions) | | Option 1 (Reduction of speed restrictions) | | Option 2 (21 TAL / 80km/h) | | Option 3 (23 TAL / 60km/h) | | Option 4 (23 TAL / 80km/h) | | Option 5 (23 TAL+ / 80km/h) | |
|--|---|-------|---|-------|-------------------------------|------|-------------------------------|------|-------------------------------|------|--------------------------------|------|
| | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. |
| Operating & maintenance costs | | | | | | | | | | | | |
| Total Maintenance Costs | 95.8 | 172.9 | 57.2 | 105.9 | 47.2 | 91.5 | 46.9 | 91.0 | 45.0 | 86.0 | 38.1 | 72.5 |
| Ongoing capital costs | | | | | | | | | | | | |

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| | Base Case (Continuation of speed restrictions) | | Option 1 (Reduction of speed restrictions) | | Option 2 (21 TAL / 80km/h) | | Option 3 (23 TAL / 60km/h) | | Option 4 (23 TAL / 80km/h) | | Option 5 (23 TAL+ / 80km/h) | |
|--|--|-------|--|-------|--------------------------------------|-------|--------------------------------------|-------|--------------------------------------|-------|---------------------------------------|------|
| | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. |
| Re-sleeping costs | s47G(1)(a), s47G(1)(b) | | | | | | | | | | | |
| Risks and Contingency (R&C) | | | | | | | | | | | | |
| P50 | s47G(1)(a), s47G(1)(b) | | | | | | | | | | | |
| P90 Incremental | | | | | | | | | | | | |
| R&C total | | | | | | | | | | | | |
| Gross ongoing Costs (P90) | 111.1 | 200.5 | 95.8 | 181.0 | 80.5 | 158.7 | 74.5 | 150.7 | 52.5 | 100.4 | 41.7 | 79.3 |
| NPC | 52.4 | | 41.4 | | 32.3 | | 28.5 | | 22.3 | | 17.9 | |

Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

Generally, the total ongoing costs of the project options declines with the scale of the capital program proposed. The higher the upfront spend, the lower the ongoing requirement for routine and reactive maintenance, major periodic maintenance, and ongoing capital investment in replacing life expired assets.

For example, Options 1, 2, and 3 propose only partial re-sleeping as part of the initial capital investment and therefore require ongoing investment in additional concrete sleepers to maintain operating standards, delivering an almost fully re-sleepered line by FY2052/53.

Options 4 and 5, conversely, propose to fully re-sleeper the line by FY2024/25 and therefore have no ongoing re-sleeping costs with the useful life of concrete sleepers at least 50 years. Further, the additional investment in ballast renewal among other asset improvements Options 4 and 5 make them better equipped to accommodate heavier trains and therefore variable maintenance costs are generally also lower under these options.

Figure 21 provides a visual representation of operating cost comparisons across the base case and project options.

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Figure 21: Operating costs comparison

s47G(1)(a), s47G(1)(b)



Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

Whole-of-life costs

Combining capital and ongoing cost estimates suggests the whole-of-life costs of the project options range from \$173.5 million (real) under Option 1 to \$307.4 million (real) under Option 5. s47G(1)(a), s47G(1)(b)

[Redacted line]

[Redacted] Table 19 Table 19 below outlines whole-of-life costs for the base case and each of the five project options.

Table 19: Whole-of-life costs (\$M)

s47G(1)(a), s47G(1)(b)

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s47G(1)(a), s47G(1)(b)

Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

Specific observations in respect to the whole-of-life costs of each option are:

- **Option 1** is 56 per cent higher in whole-of-life costs than the base case in real terms. 34 per cent of these costs derive from the capital outlay, 47 per cent from operating and ongoing capital costs and 19 per cent from risk and contingency.
- **Option 2** is 79 per cent higher than base case whole-of-life costs in real terms. The capital outlay as well as operating and ongoing capital costs comprising of similar costs levels across the assessment period with 43 per cent and 35 per cent respectively. Risk and contingency make up the remaining 22 per cent.
- **Option 3** is ~1.8 times base case costs in real terms. Similar to Option 2, capital costs make up 48 percent with operating and ongoing capital costs 30 per cent respectively. As with Option 2 risks and contingencies which make up 22 per cent of the whole of life costs.
- **Option 4** is ~2.3 times base case costs in real terms, due to the significantly higher upfront capital cost to replace all sleepers which equates to 68 per cent of the whole-of-life costs. As a result, ongoing capital costs are not required, making operating costs a far smaller proportion than the earlier options at just 18 per cent. Risks and contingencies which make up the remaining 15 per cent of the whole of life costs.
- **Option 5** is ~ 2.8 times base case costs in real terms with capital cost making up the majority of whole-of-life costs at 71 per cent of the total. As with Option 4, ongoing costs are just 12 per cent of the total with risk and contingency making up the remaining 16 per cent.

The proportional difference between the total of cost of options varies in nominal and NPC terms. Given the higher proportion of ongoing costs (which are spread across the 30 year appraisal period) under Options 1, 2 and 3, their nominal whole-of-life costs are more significantly discounted in present value terms.

Conversely, under Options 4 and 5 the upfront capital costs make up most whole-of-life costs. Given this expenditure is in FY2023/24 and FY2024/25 there is reduced impact of discounting.

As a result, whilst Option 3 and 4 are similar in total nominal terms, (\$300.2 and \$319.6 million respectively) and have a total present value difference of \$50 million (\$149.3 and \$199.5 million respectively).

Figure 22 illustrates how timing of the costs effect the total whole-of-life in real, nominal and NPC terms.

Figure 22: Whole of life costs comparison

s47G(1)(a), s47G(1)(b)



Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

Track access charges

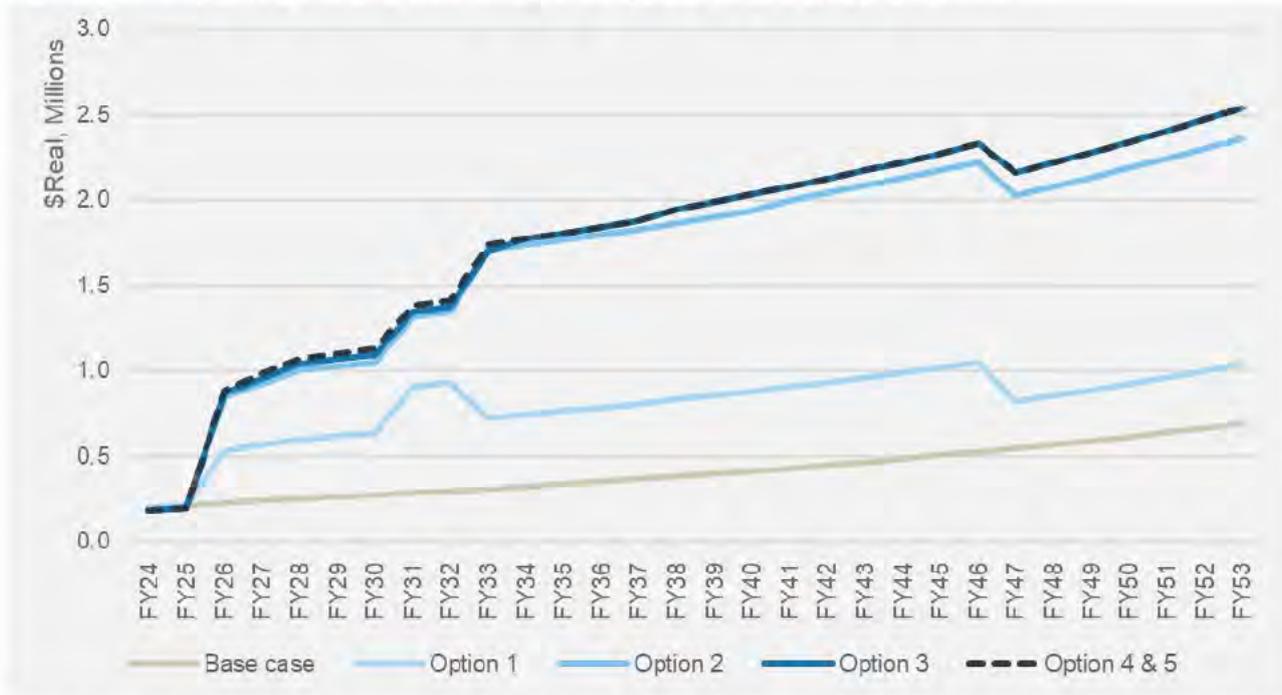
s47G(1)(a), s47G(1)(b)



Under all project options, revenue over the 30-year appraisal period is expected to increase over time. The biggest jump in revenue is from Option 1 to Option 3, while Option 4 and Option 5 are forecasted to have the same revenue outcomes.

As shown in Figure 23 below, Option 2, Option 3 and Option 4 & 5 have similar revenue projections and see periods of revenue ramp-ups at between FY2023/24 to FY2026/27, FY2030/31 to FY2032/33, and FY2046/47 to FY2052/53.

Figure 23: Annual track revenue over the first 30 years for each project option



Source: HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

Revenue estimates have been prepared on the basis of demand modelling⁴³ and the application of track access charges for the Portland Line only estimated according to the current ARTC Interstate Access Undertaking. These charges comprise:

- **Variable access charges** based on a standard rate of \$3.763 (real) for every thousand gross tonne-kilometre.
- **Flagfall access charges** based on a standard rate of \$2.221 (real) by the kilometres travelled on the Portland Line

The revenue for each project option is calculated through forecasting the net tonnage and distance travelled on the line in view of proposed upgrades under each option. Table 20 outlines track access charges for each of the project option in real, nominal terms and present value terms.

Table 20: Track access charges (\$M)

| | Base Case (Continuation of speed restrictions) | | Option 1 (Reduction of speed restrictions) | | Option 2 (21 TAL / 80km/h) | | Option 3 (23 TAL / 60km/h) | | Option 4 (23 TAL / 60km/h) | | Option 5 (23 TAL+ / 80km/h) | |
|--|---|------|---|------|-------------------------------|------|-------------------------------|------|-------------------------------|------|--------------------------------|------|
| | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. |
| Revenue | | | | | | | | | | | | |
| Annual average track access revenue | 0.4 | 0.7 | 0.8 | 1.3 | 1.7 | 2.7 | 1.8 | 2.9 | 1.8 | 2.9 | 1.8 | 2.9 |
| Total track access charges | 12.3 | 20.2 | 23.9 | 38.2 | 50.4 | 82.1 | 52.7 | 86.2 | 52.9 | 86.5 | 52.9 | 86.5 |
| NPV | 4.4 | | 9.0 | | 17.7 | | 18.4 | | 18.6 | | 18.6 | |

Source: HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

⁴³ Maroona to Portland rail line upgrade Business Case – demand forecast and cost benefit analysis, pg.124, HoustonKemp, 3 August 2022

As anticipated, track access revenue is projected to increase with the scale of the capital upgrade program. Even under Option 1, which proposes a relatively modest upgrade to reduce current speed restrictions, track access revenue is projected to double on account of the halving of transit times on the line and the additional demand this will attract.

Under the other options, track access revenues would be more than four times higher than the base case at \$50.4 million under Option 2 and almost \$53 million under Options 3, 4, and 5 on a real term basis.

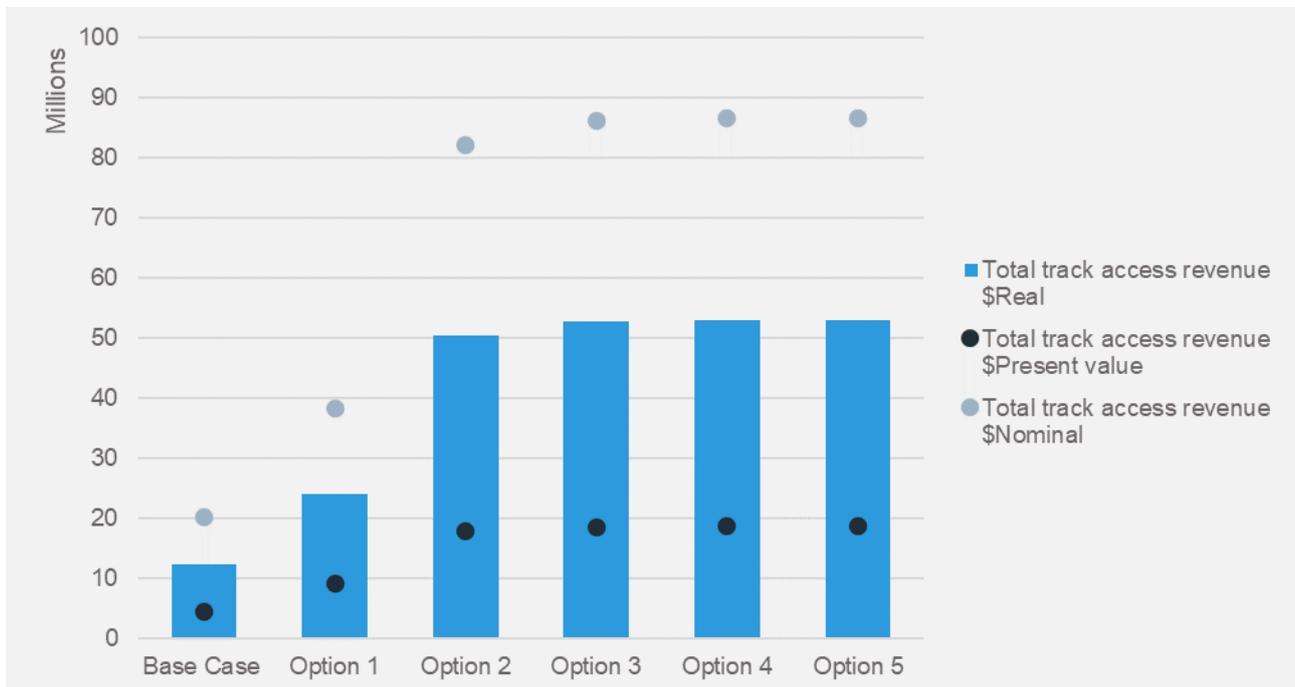
The relatively modest incremental increase on revenue from Option 2 to Options 3, 4, and 5 reflects the constraints on operators being able to take up the additional axle load limits enabled under the latter options.

As highlighted earlier, the majority of potential demand on the Portland Line originates from secondary and branch lines that are axle load limited to 19 or 21 TAL. This means that even under a 23 TAL upgrade (as proposed under Options 3, 4, and 5) the majority of traffic would still be operating at 21 TAL or below.

Option 5 would theoretically be capable of accommodating axle loads beyond 23 TAL but the potential for this is not reflected in the demand modelling and track access revenue estimates noting there's limited precedent for trains operating at these axle loads on the ARTC network.

Figure 24 shows the total revenue in real, nominal and present value terms to compare the outcome of each option to the base case

Figure 24: Track access charges comparison



Source: HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

Net operating impacts

Despite the significant increases on the base case, track access revenues are projected to generally remain below the ongoing costs of operating and maintaining the Portland Line even after the upgrade.

Under the base case, the net position on the line (revenue less ongoing costs) is projected to be a loss of \$98.8 million.

Under the project options presented, this net position loss would reduce to between \$71.8 million under Option 1 to \$21.8 million under Option 3. Option 4 is close to breakeven, whereas Option 5 is the exception to this rule with relatively lower ongoing costs leading to a projected net position surplus of \$11.2 million over the 30-year appraisal period.

Once the upfront capital outlay is accounted for the net operating position loss ranges from \$98.8 million under base case to \$254.4 million under Option 5 over the 30-year operating period. Hence, as the extent of initial capital outlay increases across the project options spectrum the net operating position deteriorates as presented in Table 21.

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Table 21: Net operating impact comparison (\$m)

| | Base Case (Continuation of speed restrictions) | | Option 1 (Reduction of speed restrictions) | | Option 2 (21 TAL / 80km/h) | | Option 3 (23 TAL / 60km/h) | | Option 4 (23 TAL / 80km/h) | | Option 5 (23 TAL+ / 80km/h) | |
|---|--|---------------|--|---------------|--------------------------------------|---------------|--------------------------------------|---------------|--------------------------------------|---------------|---------------------------------------|---------------|
| | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. |
| Operating and maintenance costs | 111.1 | 200.5 | 67.4 | 124.9 | 55.4 | 107.3 | 55.0 | 106.8 | 52.5 | 100.4 | 41.7 | 79.3 |
| Ongoing capital investment requirements | 0.0 | 0.0 | 28.4 | 56.1 | 25.1 | 51.4 | 19.6 | 44.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Revenue | 12.3 | 20.2 | 23.9 | 38.2 | 50.4 | 82.1 | 52.7 | 86.2 | 52.9 | 86.5 | 52.9 | 86.5 |
| Net position | -98.8 | -180.3 | -71.8 | -142.8 | -30.1 | -76.6 | -21.8 | -64.6 | 0.4 | -13.9 | 11.2 | 7.1 |
| Upfront capital costs | 0.0 | 0.0 | 77.7 | 84.9 | 117.8 | 128.8 | 136.7 | 149.5 | 200.5 | 219.2 | 265.7 | 290.5 |
| Net operating position | -98.8 | -180.3 | -149.5 | -227.7 | -147.9 | -205.4 | -158.5 | -214.0 | -200.1 | -233.2 | -254.4 | -283.3 |

Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

This analysis suggests that the upgrade is not an entirely commercial undertaking under any of the project options considered in respect of the upgrade being potentially 'self-funded' through future revenues. Importantly, the upgrade is however likely to decrease net operating losses on the line, however, under most options it would still require ongoing support.

5.5.3. INTERDEPENDENCIES

SUMMARY FINDINGS: INTERDEPENDENCIES

Upgrades to the Portland Line are expected to enable a higher volume of freight to be transported through the Port of Portland via the regional rail network. Some increase in the capacity and / or productivity of the Port of Portland is likely to thus be required to support additional throughput projected under some options. Upgrades may also be required for upcountry rail heads and loading facilities as well as investment in new rolling stock capable of carrying heavier payloads. The scope, cost and timing of critical interdependent infrastructure investments required to support the project options were therefore estimated to help inform broader community costs considered in the cost benefit analysis.

While infrastructure investment will be required regardless of whether freight volumes is moved by roads or rail (such as storage sheds and processing facilities). However, as uptake of rail increases and increased freight volumes move to the Port of Portland, greater ancillary infrastructure including rail upgrades are required.

The relatively low level of demand projected under the base case due to the continuation of current speed restrictions and axle loads is assumed to be associated with minimal additional ancillary infrastructure from external parties, mostly to accommodate freight moved via trucks.

New port facilities for increased volumes of bulk mineral sands and grain, new port rail siding/s, and upgraded crossing loops on Portland Line (Grampians Loop, then Chrome Loop) are expected to be required under each project option, though are expected to be required sooner for project options with higher initial axle loads and speed allowances due to the anticipated acceleration in demand and capacity constraints.

Options 3, 4 and 5 consequently are forecast to require the largest capital outlay by external parties at \$80 million (real) over 30 years with the same timeframe, with exception of initial grain storage and handling facilities required one year earlier for Option 4 and 5 compared to Option 3.

Table 22 below identifies critical interdependent infrastructure project deemed necessary to complement public investment and support the demand forecasts under each of the project options.

Table 22: Summary of interdependent project cost estimates (\$M, real)

s47G(1)(a), s47G(1)(b)



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Appropriate infrastructure such as storage facilities, efficient interconnectivity and loading/unloading facilities are all essential to accommodate increased uptake of the rail line. While infrastructure investment will be required regardless of whether freight volumes is moved by roads or rail (such as storage sheds and processing facilities). However, as uptake of rail increases and increased freight volumes move to the Port of Portland, greater ancillary infrastructure including rail upgrades are required.

Estimates of works required that align to demand scenarios conducted by Lycopodium,⁴⁴ indicate that existing infrastructure for grain, log and aluminium facilities is sufficient to manage increased freight movement for these industries via rail.

Demand forecasts for mineral sands see the existing 60,000 tonne undercover storage capacity for mineral sands at the Port of Portland as insufficient to cater for a significant increase in the volume of mineral sands. An expansion of the shed capacity as well as new unloading facilities will be required under a number of the project options. The scope of works would include:

- Expansion of shedding at the Port of Portland,
- Construction of a new mineral sands unload facility (suggest this could be a half-height container facility), and
- Upgrade of Track 2/6 arrival road to provide additional track capacity and conveyor expansion.

In order to support the increase in freight volumes expected under a number of the project options outlined above, it is assumed that an additional mineral sand loading facility and an additional grain storage shed will be required at some point across the network. No additional aluminium or timber facilities are assumed to be required given the current infrastructure that is currently in place.

Upcountry infrastructure will require upgrades for shortlisted options 3,4 and 5, and existing Above Rail infrastructure is sufficient to support predicted demand scenarios for all shortlisted options.

Figure 25 shows the existing portside infrastructure, such as storage facilities and processing plants. As seen below, the mineral sands facility and current grain storage sheds will require expansion to accommodate increased volumes of mineral sands and grain freight. However current aluminium or timber facilities are deemed sufficient to manage expected volumes over the next 30 years.

Figure 25: Existing Port of Portland portside infrastructure and storage facilities.



⁴⁴ Lycopodium

Table 23: Summary of interdependent project cost estimates (\$M, real)

| | Base Case (Continuation of speed restrictions) Real | Option 1 (Reduction of speed restrictions) Real | Option 2 (21 TAL / 80km/h) Real | Option 3 (23 TAL / 60km/h) Real | Option 4 (23 TAL / 80km/h) Real | Option 5 (23 TAL+ / 80km/h) Real |
|--|--|--|--|--|--|---|
| s47G(1)(a), s47G(1)(b) | | | | | | |
| Gross Capital Costs (including contingency) | 38.3 | 59.5 | 79.1 | 79.1 | 79.1 | 79.1 |
| Discounted Real (P50 @ 7.0%) | 20.9 | 25.7 | 44.9 | 46.7 | 47.7 | 47.7 |

The base case will operate at a low demand scenario over the duration of the assessment period. This therefore incurs no additional ancillary infrastructure for rail activities, however additional portside mineral sands and grain storage and handling infrastructure will be required to support demand via road.

All other options maintain a medium demand scenario over the majority of the assessment period and as such require the same levels of additional development. The main costs derive from new port facilities for bulk mineral sands and grain in line with the additional demand created by rail. As shown in Table 23 timing of the demand for the ancillary infrastructure differs between each option. The later the infrastructure is delayed the greater the effect of the discounting. This is estimated to require in order of costs, a half-height container rotator facility or side dump unload facility, a storage warehouse (100,000 tonne storage facility) for 850,000 tonne per annum, a conveyor from hopper to storage and an all-weather hardstand for container storage and unload (assuming half height container solution used). A constant 25 per cent contingency has been allowed for across the interdependent infrastructure projects required in the base case and project options. The contingency rate applied reflects the current level of uncertainty regarding the delivery timeframes and costs.

5.5.4. OTHER RISKS, UNCERTAINTIES AND DISBENEFITS

SUMMARY FINDINGS: OTHER RISKS, UNCERTAINTIES AND DISBENEFITS

A range of risks, uncertainties and disbenefits associated with the project options but not explicitly accounted for above in the economic and financial analysis above were also considered. Key risks and disbenefits were generally found to rise with the axle load increases across the incremental project options in line with the required scope and scale of construction works and potential changes to market dynamics.

The nature and potential consequences of the risks and uncertainties identified suggest that spread capital investment requirements over a longer period would be better positioned to respond to changes to market conditions may provide increased value to ARTC, government agencies and the community more broadly.

Options 3, 4, and 5 were consequently considered to be the highest risk as their associated economic benefits are contingent on significant increases in demand for rail freight on the Portland Line. This means they are also expected to result in the greatest disbenefits with reductions in revenue for road haulage businesses and ports that would be expected to see a reduced market share as a result of the upgrade.

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The economic and financial analysis outlined above accounts for a range of risks related to scope, costs, and procurement. It does not, however, explicitly account for a range of other risks such as external factors that may influence demand for rail freight on the line.⁴⁵ Similarly, it does not account for broader uncertainties or disbenefits that may influence the choice of a preferred project option. Assessment of these risks, uncertainties and disbenefits is intended to complement cost benefit analysis and highlight any other material considerations that should be accounted for in ranking the project options and determining whether to proceed with the option that delivers the highest Benefit Cost Ratio or an alternative.

Key risks to the quantum of benefits realised by each project option include the commitment of the broader supply chain to critically interdependent projects and the resulting change in demand for rail freight services

As outlined above, each project has critically interdependent projects that are required to be delivered by the broader supply chain in order for project benefits to be fully realised. The extent to which these projects are delivered within an appropriate timeframe and to the required specification is a clear risk to demand for rail freight services of the Portland Line. The level of risk that necessary investments are not made across the broader supply chain is expected to increase with the scope and scale of critically interdependent projects required. Thus, the level of risk related to critically interdependent projects is expected to increase with the incremental project options as track upgrades with higher axle loads and speed allowances will require higher levels of investment by the broader supply chain. In order to mitigate this risk, ARTC is in the process of discussing potential commitments to the use of an upgraded line with key members of the supply chain.

Even if the required critically interdependent projects are delivered, residual risks remain related to the change in demand for rail freight services on the Portland Line due to (for example) a lower-than-expected reduction in rail costs for exporters and/or the possibility that key mineral sands projects do not come online.

The nature and potential consequences of the risks outlined above suggest that project options that allow for some degree of adaptability and flexibility overtime to alter the performance specification of the Portland Line in line with actual demand may provide increased value to ARTC, government agencies and the community more broadly.

Key uncertainties that have the potential to affect the benefits of each project option include changes to the performance specification of alternative corridors across the broader rail network that impact the demand for the Portland Line and changes in the road network, cost and/or environmental efficiency of road freight that impact the relative attractiveness of rail for exporters

There is some inherent degree of uncertainty surrounding the extent to which each of the project options will be able to realise the project benefits based on possible changes to:

- the performance specification of alternative corridors across the broader rail network that impact the demand for the Portland Line
- technology, broader market conditions and/or weather that may affect the aggregate level of contestable export commodity volumes produced in the region
- future land use developments across the broader region including key mineral sands projects that impact the demand for the Portland Line
- the road network, cost and/or environmental efficiency of road freight that impact the relative attractiveness of rail for exporters
- the scale and/or scope of neighbouring ports that affect the role and function of the Port of Portland.

The nature and potential consequences of the uncertainties outlined above suggest that project options that allow for some degree of adaptability and flexibility in their delivery to enable the performance specification of the Portland Line to be altered overtime in line with changes to market conditions may provide increased value to ARTC, government agencies and the community more broadly.

⁴⁵ For the purpose of this section, we have not considered risks that have implicitly been included in the P50 / P90 cost estimates above such as (i) construction risks that may increase capital cost and/or delay the project schedule including adverse weather, availability of suitable labour resources, and challenges with the management of spoil; and (ii) operating and maintenance risks that may increase ongoing expenditure including unanticipated freight volumes, availability and/or price of required resources and potential embankment stability issues due to increased tonnage.

Key disbenefits related to the project options include reduced future growth in the activity and income within the road freight industry and at the Port of Geelong due to changes in the transport mode and port chosen by exporters

Each project option is expected to help reduce the cost to exporters of transporting commodities to the Port of Portland via rail and, in turn, reduce:

- the volume of commodities transported via road to the Port of Portland
- the volume of commodities transported to the Port of Geelong from the local region.

The changes to freight movements across the Region outlined above are expected to reduce the future growth in activity and income within the road freight industry and at the Port of Geelong. The magnitude of the disbenefit is expected to increase with the incremental project options at a diminishing rate. For example, options with 23 TAL are expected to lead to the largest reductions in transport costs for exporters and, in turn, the most significant changes to existing patterns of freight movement within the Region.

The potential income and/or job losses outlined above, should not, in and of themselves, be a reason to dismiss any of the project options. In the case of the road freight sector, it would be expected that:

- The transition to increased utilisation of rail freight will lead to net community benefits
- Any income and/or job losses in the road freight sector would, to some extent, be offset by corresponding benefits in the rail freight sector
- People that lose their job or hours worked would be expected to transition into a more efficient role (from a state-wide perspective) over time.

In the case of the Port of Geelong, while some reduction in activity and income may be expected in the short-term, overtime, the upgrades to the Port of Portland would be expected to allow both Ports to specialise in the processing and transportation of commodities for which they have a comparative advantage.

Table 24: Key risks, uncertainties and disbenefits by project option

| | Base Case (Continuation of speed restrictions) | Option 1 (Reduction of speed restrictions) | Option 2 (21 TAL / 80km/h) | Option 3 (23 TAL / 60km/h) | Option 4 (23 TAL / 80km/h) | Option 5 (23 TAL+ / 80km/h) |
|---|---|---|----------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| Key risks | | | | | | |
| Project option does not lead to anticipated behavioural changes / benefit levels are significantly less than expected. | Low | Medium | Medium | High | High | High |
| Critical interdependent projects are delayed or do not occur and reduce the benefits realised from the project option. | Low | Low | High | High | High | High |
| Aggregate risk rating | Low | Low | Medium | High | High | High |
| Uncertainties | | | | | | |
| Changes in the performance specification of connecting corridors (e.g introduction of operating restrictions) impact the demand for the Portland Line. | Medium | Medium | Medium | Medium | Medium | Medium |
| Changes in technology, broader market conditions and/or weather that may affect the aggregate level of contestable export commodity volumes produced in the region. | High | High | High | High | High | High |
| Future land use developments in the broader region including key mineral sands projects that impact the demand for the Portland Line. | Medium | Medium | Medium | Medium | Medium | Medium |
| Changes in the road network, cost and/or environmental efficiency of road freight that impact the relative attractiveness of rail for exporters. | Medium | Medium | Medium | Medium | Medium | Medium |
| Changes to the scale and/or scope of neighbouring ports that affect the role and function of the Port of Portland. | Low | Low | Low | Low | Low | Low |
| Aggregate risk rating | Medium | Medium | Medium | Medium | Medium | Medium |
| Disbenefits | | | | | | |
| Reduced income and employment generated within the road freight industry due to the increase in the rail freight mode share. | Low | Low | Medium | Medium | High | High |
| Reduced activity and income at the Port of Geelong due to redirection of some freight volumes to the Port of Portland. | Low | Low | Medium | Medium | High | High |
| Aggregate disbenefits rating | Low | Low | Medium | Medium | High | High |

5.5.5. STAKEHOLDER PERSPECTIVES

KEY FINDINGS: STAKEHOLDER PERSPECTIVES

Extensive engagement was undertaken with supply chain participants and other stakeholders in defining and assessing the project options. Overall, parties consulted were generally supportive of the upgrade and preferred the option that offered the highest rail payload and productivity on the basis that this would lead to the greatest increases in rail mode share.

Reflecting these perspectives Options 3, 4, and 5 were rated as having a 'high' stakeholder alignment, compared to Option 2 which was rated 'medium' and Option 1 which was rated 'low'.

Extensive engagement was undertaken with supply chain participants and other stakeholders in defining and assessing the project options. Overall, parties consulted were generally supportive of the upgrade and preferred the option that offered the highest rail payload and productivity on the basis that this would lead to the greatest increases in rail mode share. In summary, consultation indicated that:

As per the risks, uncertainties, and disbenefits assessment, this qualitative assessment of stakeholder alignment is intended to compliment cost benefit analysis and highlight any other factors that should be considered in determining whether to proceed with the option that delivers the highest Benefit Cost Ratio or an alternative.

In summary, consultation indicated that:

- the **base case** (19 TAL and 40km/h) and **Option 1** (19 TAL and 80km/h) are unlikely to be viewed favourably by key stakeholder groups due to the perceived need to significantly upgrade the Portland Line to sufficiently incentivise rail freight to the Port of Portland.
- **Option 2** (21 TAL / 80km/h) would be viewed by a number of stakeholder groups as the minimum upgrade required. In particular:
 - o s47G(1)(a), s47G(1)(b)
 - o
- **Option 3** (23 TAL / 60km/h) is expected to garner community support given that speed restriction would be progressively removed such that a performance specification of 23 TAL / 80 km/h would be achieved after the tenth year of operations.
- **Option 4** (23 TAL / 80 km/h) and **Option 5** (23 TAL+ / 80 km/h) would be viewed favourably by a number of stakeholder groups due to the perceived need to ensure that the performance specification of the Portland Line is consistent with the performance specification the interstate mainline and feeder lines to the Port of Geelong. Mineral sands owners and rail operators serving that market were the most supportive of these options noting the high weight of mineral sands and the inability to fully load trains at lower axle weights. Some stakeholders did however note that the benefits of upgrading the Portland Line would be reduced somewhat by the current performance specification of connecting lines across the broader network.

Table 25 below outlines the preferences of individual stakeholder groups and relevant insights obtained from consultation process undertaken by ARTC.

Table 25: Preferences and insights obtained from key stakeholders

| Stakeholder group | Preferences and insights | Alignment with project options | | | | | |
|---|--|--|--|-------------------------------|-------------------------------|-------------------------------|--------------------------------|
| | | Base Case (Continuation of speed restrictions) | Option 1 (Reduction of speed restrictions) | Option 2 (21 TAL / 80km/h) | Option 3 (23 TAL / 60km/h) | Option 4 (23 TAL / 80km/h) | Option 5 (23 TAL+ / 80km/h) |
|  Grain owners | <p>Noted significant benefit in higher axle loading allowances on rail. Labour is one of the key cost inputs and therefore being able to move more with less people is hugely beneficial.</p> <p>Rail, however, needs to be efficient to work. This not only includes travel time but, critically, the quality of facilities at the port and how long it takes to discharge grain.</p> <p>Potential trend towards exporting grain during more narrow periods of time when Europe is not actively in the market.</p> <p>While exporters generally wanted a solution that maximised payloads, many would not benefit from any increase above 21 TAL due to restrictions on feeder lines.</p> | | | ✓ | ✓ | ✓ | ✓ |
|  Mineral sands owners | <p>Transporting mineral sands via rail to the Port of Portland would only be feasible if owners could utilise wagon loadings of 21 TAL of higher. One mineral sands owner indicated that if the Portland Line was upgraded the most important aspect would be removing the speed limit.</p> | | | ✓ | ✓ | ✓ | ✓ |
|  Rail operators | <p>Axle loads are a bigger incentive than journey times. That said, journey times do impact crewing costs and are therefore material to rail's competitiveness.</p> <p>There are market dynamics that mean some commodities may not immediately be captured. Over the long term, these dynamics shift and ultimately Portland would be the least cost path to export and this advantage would eventually play out.</p> <p>Important to match performance specification of rail lines feeding the Port of Geelong and consider future-proofing by upgrading to 23 TAL.</p> <p>There is no point investing in an upgrade that doesn't match the interstate mainline in terms of axle loading (23 TAL).</p> | | | | ✓ | ✓ | ✓ |
|  Victorian Government | s47G(1)(a), s47G(1)(b) | | | ✓ | ✓ | ✓ | ✓ |

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| Stakeholder group | Preferences and insights | Alignment with project options | | | | | |
|--|---|--|--|-------------------------------|-------------------------------|-------------------------------|---------------------------------|
| | | Base Case (Continuation of speed restrictions) | Option 1 (Reduction of speed restrictions) | Option 2 (21 TAL / 80km/h) | Option 3 (23 TAL / 60km/h) | Option 4 (23 TAL / 80km/h) | Option 5 (23 TAL + / 80km/h) |
| | s47G(1)(a), s47G(1)(b) | | | | | | |
|  Council(s) | <p>Preferences expressed by Councils are for options that maximise the cost competitiveness of rail freight and therefore lift its mode share.</p> <p>Southern Grampians Shire Council has publicly stated that it has a preferred outcome of 23 TAL and 80 km/r.⁴⁶</p> <p>Other regional Councils have indicated support for the upgrade due to current concerns around ability of the local road network and associated Council maintenance budgets to accommodate high volumes of heavy vehicles.</p> | | | | ✓ | ✓ | ✓ |
|  Port of Portland | s47G(1)(a), s47G(1)(b) | | | | ✓ | ✓ | ✓ |
| Composite | Overall stakeholder alignment | Low | Low | Medium | High | High | High |

⁴⁶ For more information, please see: https://www.sthgrampians.vic.gov.au/Page/Page.aspx?Page_Id=3436

5.5.6. INTEGRATED OPTIONS ANALYSIS

KEY FINDINGS: INTEGRATED OPTIONS ANALYSIS

Option 3 (23 TAL / 60km/h) had the highest BCR (1.32) amongst the five project options under a medium demand scenario, slightly above Option 2 (21 TAL / 80km/h). Options to immediately upgrade the Portland Line to at least 23 TAL 80 km/h (Option 4 and Option 5) had BCRs below one reflecting their minor marginal economic benefits at a significant additional cost (relative to Option 3). Option 1 similarly had a BCR below one due to the limited freight mode shift that it would be expected to support.

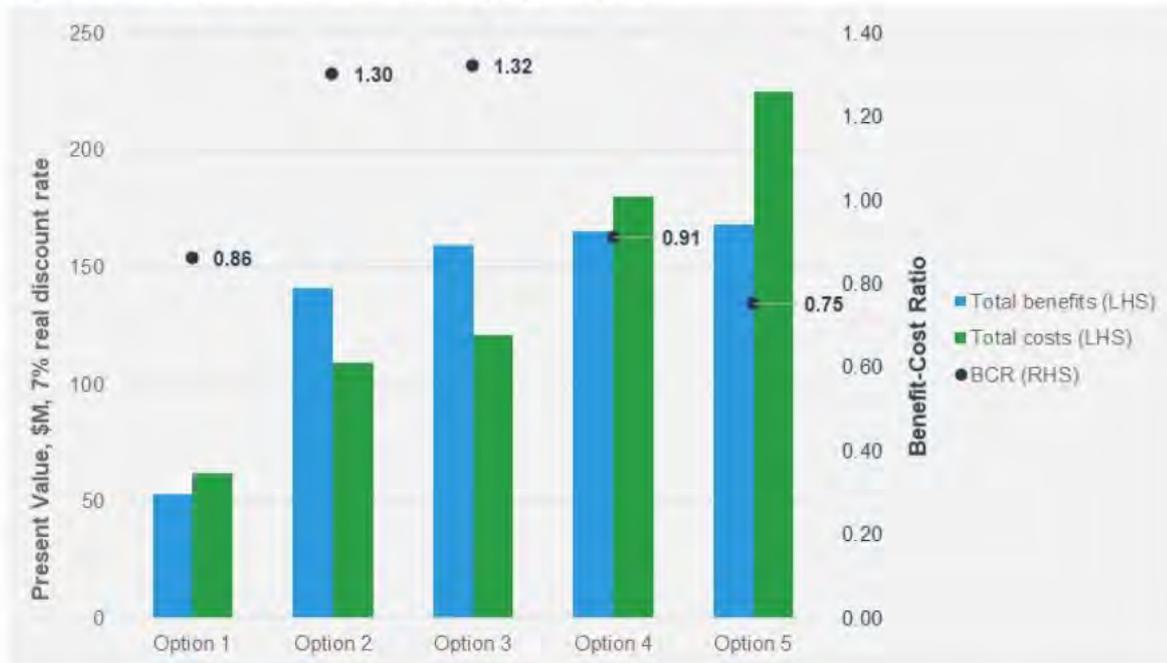
Given Option 2 and Option 3 both had a similar BCR, stakeholder perspectives and other non-quantifiable risks, uncertainties and disbenefits were considered in selecting a preferred project option. In this context, **Option 3 was viewed as preferable to Option 2 given its higher operation standards, strong stakeholder support, and the fact that the performance specification of the Portland Line will increase to 23 TAL / 80 km/h after 10 years of operations, helping to future proof operations.** In contrast, it is worth noting that significant capital investment would be required under Option 2 if axle loads of 23 TAL were deemed necessary at some point in the future.

Table 26 and Figure 26 below provides details the multi-criteria analysis that was undertaken. In summary:

- **Option 3 had the highest BCR (1.32), slightly above Option 2 (1.30), and had the highest overall project ranking.**
 - o In the case of Option 3, the additional capital costs (relative to Option 2) further improves freight productivity by enabling grain travelling from Nhill and most mineral sands to load to 23 TAL (albeit at a lower speed). In addition, economic benefits will be further enhanced over time as maintenance works are expected to lead to the performance specification increasing to 23 TAL / 80 km/h after 10 years of operations (Appendix 2).⁴⁷ This feature of Option 3, in particular, is expected to be strongly supported by key stakeholders and the local community.
 - o In the case of Option 2, the costs required to increase the performance specification of the Portland Line to 21 TAL / 80 km/h are expected to be more than offset by a significant increase in economic benefits that stem from a rise in the rail mode share across Western Victoria. Looking further ahead, it is worth noting that significant capital investment would be required if axle loads of 23 TAL were deemed necessary at some point in the future.

⁴⁷ As each option includes capital investment of partial re-sleepering, the ongoing sleeper insertion planned as maintenance will overtime increase the track structure. This will allow Option 3 to achieve an asset configuration where sleepers are replaced to a point where 23TAL @ 80km/h is achievable. For Option 3, the first 10 years of maintenance re-sleepering activity has been brought forward into the capital expenditure program. This combined with ongoing maintenance tamping, reconditioning and ballasting, Option 3 is considered to provide a track structure capable of 23TAL @ 80km/h be achieved by year 10.

Figure 26: Benefit-cost ratio for each project option



- **Options to upgrade the Portland Line to 23 TAL 80 km/h were ranked below others as they are expected to yield only minor marginal benefits at a significant additional cost.** This reflects the fact that the full extent of the assumed freight mode shift for mineral sands and aluminium ingots volumes occurs under project options with lower performance specifications (Option 3 for example). The only incremental increase in demand in Option 4 and Option 5 therefore relates to bulk grain exports, which are restricted from using 23 TAL by the axle loading limits of upstream branch lines. In contrast, the additional financial costs to upgrade the Portland Line to 23 TAL 80 km/h is well in excess of \$50 million more than other project options. The scope and scale of capital investment required is also expected to be associated with relatively high levels of project risk.
- **The option to reduce current speed restrictions only (Option 1) was ranked below others due to the limited freight mode shift that would be expected.** Despite requiring a relatively low upfront capital investment, reducing the current speed restrictions (only) would be expected to lead to only a modest increase in demand and economic benefits as axle loads would be continue to be restricted to 19 TAL. This option also does not align with the perspectives and preferences of stakeholders consulted.

Table 26: Integrated options analysis

| Project option | Option 1 (Reduction of speed restrictions) | Option 2 (21 TAL / 80km/h) | Option 3 (23 TAL / 60km/h) | Option 4 (23 TAL / 80km/h) | Option 5 (23 TAL+ / 80km/h) |
|--|---|-------------------------------|-------------------------------|-------------------------------|--------------------------------|
| Economic impact (\$ million - PV 2023 @ 7%) | | | | | |
| Incremental economic benefits | | | | | |
| Freight productivity benefits | 41 | 113 | 127 | 129 | 129 |
| Avoided externalities | 3 | 8 | 9 | 10 | 10 |
| Amenity benefits | 0.2 | 0.4 | 0.5 | 0.5 | 0.5 |
| Safety benefits | 3 | 8 | 8 | 8 | 8 |
| Avoided road maintenance | 3 | 8 | 9 | 9 | 9 |

| Project option | Option 1 (Reduction of speed restrictions) | Option 2 (21 TAL / 80km/h) | Option 3 (23 TAL / 60km/h) | Option 4 (23 TAL / 80km/h) | Option 5 (23 TAL+ / 80km/h) |
|--|---|-------------------------------|-------------------------------|-------------------------------|--------------------------------|
| Resiliency benefits | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Residual value | 3 | 4 | 5 | 8 | 11 |
| Total | 53 | 141 | 159 | 165 | 168 |
| Incremental economic costs* | | | | | |
| Planning, construction, operation and maintenance of Portland Line upgrades (P50). | 56 | 80 | 90 | 148 | 193 |
| Costs associated with critical interdependent projects and track maintenance on other lines. | 6 | 29 | 31 | 32 | 32 |
| Total | 62 | 109 | 121 | 180 | 225 |
| Benefit cost ratio | 0.86 | 1.30 | 1.32 | 0.91 | 0.75 |
| Non-quantified considerations | | | | | |
| Other risks, uncertainties & disbenefits | | | | | |
| Aggregate risk, uncertainties & disbenefits rating | Low | Medium | Medium | High | High |
| Stakeholder alignment | | | | | |
| Aggregate stakeholder alignment | Low | Medium | High | High | High |
| Preliminary ranking | | | | | |
| Ranking of project options. | 4 | 2 | 1 | 3 | 5 |

*Incremental costs include critical interdependent projects and are measured relative to the base case. The magnitude of the costs in this table are therefore less than the absolute costs associated with each project option reported in tables above (Table 19 and 23).

5.5.7. SENSITIVITY TESTING

KEY FINDINGS: SENSITIVITY TESTING

The sensitivity of the BCR and ranking of each project option to potential changes in the future demand for the Portland Line were tested. The BCR of Option 2 (21 TAL / 80km/h) and Option 3 (23 TAL / 60km/h) were broadly consistent across the demand scenarios considered, with **Option 3 ranked as the highest project option (across each demand scenario) following consideration of a broader range of stakeholder perspectives and other non-quantifiable risks, uncertainties and disbenefits.** The economic viability of the project options is sensitive to future demand scenarios, with all options found to have a BCR less than 1 under the low demand scenario.

The results and findings outlined above were underpinned by a medium demand scenario. To complement this analysis, low and high demand scenarios were developed to vary in terms of the volume of commodities produced in Western Victoria and the number and / or timing of new infrastructure investments in the Region (Appendix 1). Sensitivity analysis was subsequently undertaken to assess the impact of changes in future

demand for rail freight on the economic impact of the project options and, in turn, their respective rankings. The sensitivity analysis demonstrated:

- **Option 2 and 3 had the highest BCR under the low demand scenario, whereas Option 3 had a marginally higher BCR under the medium and high demand scenarios.**
 - o **High demand scenario:** As outlined above, there is expected to be a declining marginal benefit with respect to the utilization of the Portland Line as the axle load is upgraded from 19 TAL to 23 TAL due to the fact that only a few feeder lines have a 23 TAL rating and therefore it would be uncommon that a train could accommodate a 23-tonne load for the entire journey. As result, while the relative ranking of Option 4 and Option 5 improves under the high demand scenario, the additional costs (relative to Option 3) required to upgrade the Portland Line to 23 TAL 80 km/h do not lead to proportional increases in economic benefits.
 - o **Low demand scenario:** The relative ranking and performance of Option 1 (reducing the current speed restrictions) should improve under a low demand scenario as the relatively modest upfront capital cost helps to offset the low level of future demand and, in turn, economic benefits. While the ranking of Option 1 does improve under the low demand scenario, the net economic benefits are significantly hampered by the fact that the line remains at 19 TAL and is therefore not financially viable for a number of exporters.
- **The economic viability of the project options is sensitive to future demand scenarios.** In particular, all project options were found to have a BCR less than 1 under the low demand scenario. Lower levels of demand for rail freight services on the Portland Line reduce the economic costs and benefits associated with project options. In terms of costs, lower levels of demand lessen ongoing maintenance costs. Any cost reductions would, however, be offset by significant reductions in (i) productivity benefits for exporters and supply chains located in Western Victoria; (ii) the number of freight vehicles taken off the road; and (iii) the level positive externalities (such as road safety and amenity) for the local community.

Table 27: Sensitivity testing

| Demand scenario | Key metrics | Option 1 (Reduction of speed restrictions) | Option 2 (21 TAL / 80km/h) | Option 3 (23 TAL / 60km/h) | Option 4 (23 TAL / 80km/h) | Option 5 (23 TAL+ / 80km/h) |
|---------------------------------|--------------------|---|-------------------------------|-------------------------------|-------------------------------|--------------------------------|
| Low demand forecast scenario | Benefit cost ratio | 0.71 | 0.75 | 0.75 | 0.49 | 0.40 |
| | Ranking | 3 | 2 | 1 | 4 | 5 |
| Medium demand forecast scenario | Benefit cost ratio | 0.86 | 1.30 | 1.32 | 0.91 | 0.75 |
| | Ranking | 4 | 2 | 1 | 3 | 5 |
| High demand forecast scenario | Benefit cost ratio | 0.97 | 1.84 | 1.86 | 1.34 | 1.11 |
| | Ranking | 5 | 2 | 1 | 3 | 4 |

5.5.8. RECOMMENDED PROJECT OPTION

Based on the integrated options analysis and sensitivity testing presented above, **Option 3 is the preferred project option.** While Option 2 (21 TAL / 80km/h) and Option 3 (23 TAL / 60km/h) have a similar BCR under the low, medium and high demand scenarios considered, Option 3 will provide higher operation standards, receive strong stakeholder support, and enable the performance specification of the Portland Line to increase to 23 TAL / 80 km/h after 10 years of operations without significant additional capital investment, helping to future-proof operations.

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6

Detailed analysis of preferred project option

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6. DETAILED ANALYSIS OF PREFERRED PROJECT OPTION

CHAPTER SUMMARY

The preferred project option proposes to improve the current performance specification of the Portland Line to 21 TAL at 80km/h with allowance for heavier 23 TAL trains to operate at a 60km/h rising to 80km/h after 10 years of operations.

Scope of works and timing

Five key workstreams will be required to deliver the preferred project option and performance specification improvements:

- **Project design and management**, including environmental studies and permits (where required).
- **Track works**, including the replacement of timber sleepers with new concrete sleepers, and the deepening of ballast along the rail corridor.
- **Structure works**, including the renewal and replacement of bridges and culverts.
- **Turnouts**, including refurbishment of a select number of turnouts.
- **Signalling**, including the introduction of axle counters at level crossings to provide for automated crossing protection to improve transit times.

These works would be delivered over a 24-month period. Given the low traffic volumes on the line, it is proposed that the works would be delivered 'as traffic permits' meaning no line closures would be necessary.

Delivery risks

Risk identification and assessment workshops were undertaken to identify key delivery risks. These were categorised into internal risks (those within ARTC's control) and external risks (those outside of ARTC's control). ARTC's exposure to:

- internal risks stemming from the upgrade works and continued maintenance of the Portland Line are generally considered to be 'low' (post mitigation), given that the type of works proposed are undertaken by ARTC elsewhere on the network on a regular basis.
- external risks associated the upgrade of the Portland Line are more significant and were generally found to be rated as 'moderate' (post mitigation), given the extent to which project benefits are fully realised is dependent on outcomes related to external funding commitments, future demand and the delivery of critical interdependent infrastructure projects.

Financial analysis

The preferred project option will not be a commercial undertaking for ARTC. Comparison of projected revenues against estimated ongoing costs suggests that revenues would fall considerably short of covering capital costs and that the Portland Line will continue to sustain annual net operating losses after the completion of the upgrade. These losses are expected to total \$21.8 million (real) or \$64.6 million (nominal) over the 30 operating years. It should be noted, however, that this represents an improvement on the base case.

Funding and financing

The projected net operating loss faced by ARTC is a likely constraint on its ability to make a contribution to the capital costs of the preferred project option. Full funding is therefore likely required from the Victorian and/or Commonwealth Governments noting the benefits that both levels of government stand to gain from an upgraded Portland Line.

6.1. SCOPE AND STAGING

6.1.1. PURPOSE

The purpose of this section is to identify the detailed scope of works required to deliver the preferred project option outlined in Chapter 5 above, the proposed delivery model, and project schedule. The information contained in this section, together with the risk assessment presented in Section 6.2 below, are key inputs to the cost and funding estimates presented in subsequent chapters of the Business Case.

6.1.2. APPROACH

The approach adopted to complete the three key workstreams included within this section are outlined below:

- **Scope of works** for the preferred project option included track upgrades and structure works to ensure that the performance specification of 23 TAL 60 km/h is achieved on the Portland Line. The required scope of works to achieve the performance specification outlined above was determined based on a site inspection of the entire length of the Portland Line, consultation with ARTC stakeholders, and operational modelling.
- **Project delivery** options were identified including, but not limited to (i) closing the Portland Line to freight operators while construction works are completed; and (ii) adopting construction methods that would allow the Portland Line to remain open intermittently to rail freight operators. The relative trade-offs associated with the alternative delivery methods including time, cost, economic impact and risks were identified and compared before a preferred option was selected.
- **Project scheduling:** Based on the scope of works and the project delivery model identified for the preferred project option, a detailed project schedule was produced for both the planning, construction and commissioning of the rail line upgrades. The timing of individual workstreams included within the scope of works were estimated based on consultation with ARTC stakeholders, industry representatives, and a benchmarking exercise that considered the delivery timeframes of similar ARTC rail upgrade initiatives.

6.1.3. SCOPE OF WORKS

Five key workstreams will be required to deliver the preferred project option and accommodate axle loads up to 23 TAL and increased speeds including track and structure works, renewal of turnouts and signal upgrades

The scope of works to deliver the preferred project options comprises:

- **Project design and management**, including environmental studies and permits (where required).
- **Track works**, including the replacement of timber sleepers with new concrete sleepers, and increase in ballast depth along the rail corridor.
- **Structure works**, including the renewal and replacement of bridges and culverts.
- **Turnouts**, including refurbishment of a select number of turnouts.
- **Signalling**, including the introduction of axle counters at level crossings to provide for automated crossing protection to improve transit times.

Table 28 and Figure 27 below provide a description and illustration of the key components within each workstream that are required to deliver and construct the preferred project option. Ongoing maintenance will form part of the preferred project option whole-of-life costs and is expanded on in Section 6.3.

Figure 27: Scope of works required for delivery of the preferred project option

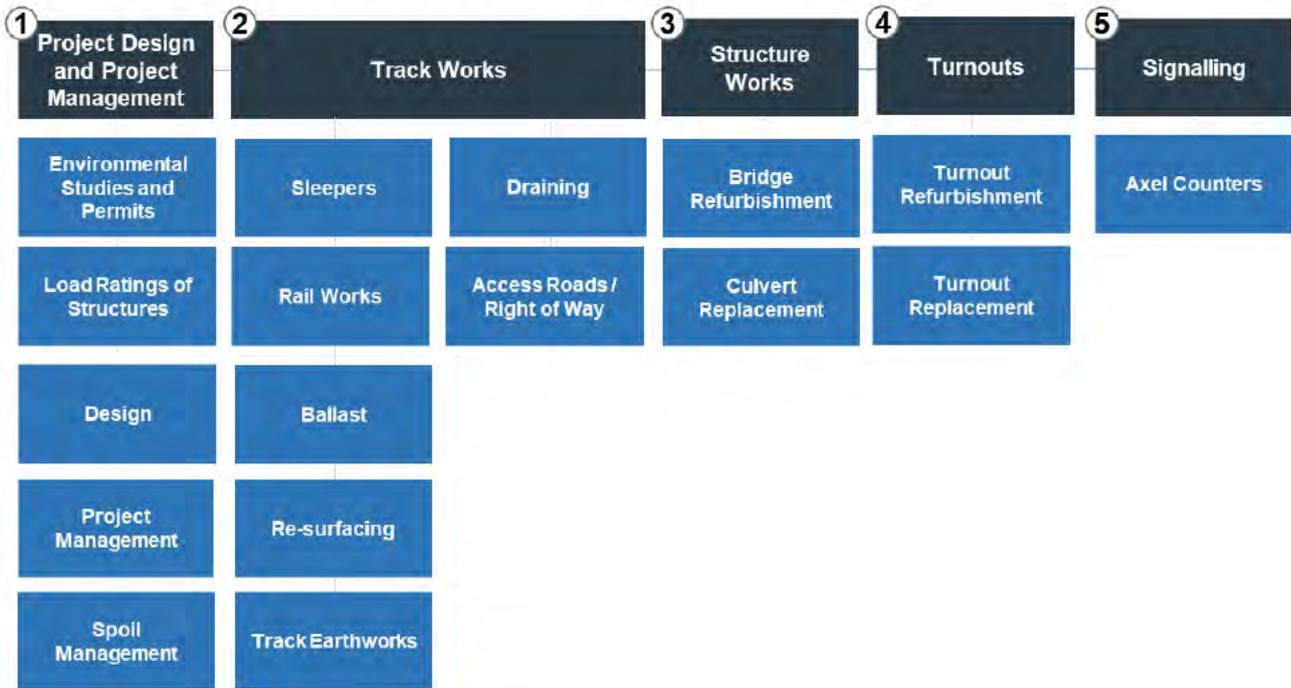
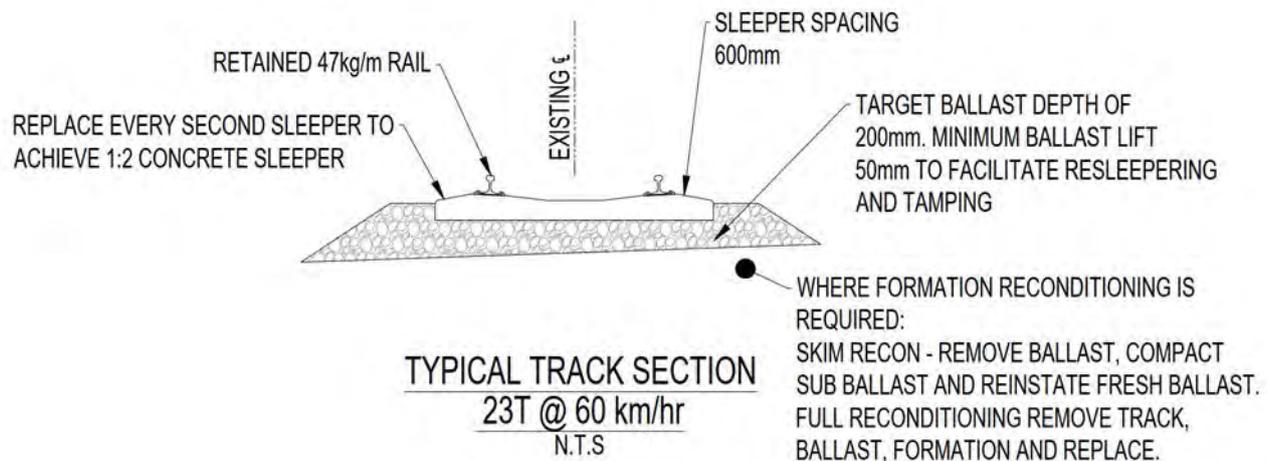


Table 28: Scope of works for preferred project option

| Work component | Description |
|-------------------------|---|
| Track works | |
| Sleepers | Replace timber sleepers with concrete sleepers with a ratio of 1:2. |
| Rail | Retain existing rail line. |
| Ballast | Ballast depth enhancement to be applied through the track to achieve a target depth of 200mm of fresh ballast under the sleepers. The increased depth and replacement of existing foul ballast will support drainage and provide structural support to rail bed in view of increased traffic on the line. |
| Formation | 3 km full reconditioning, involving subgrade renewal, capping and ballast replacement. Formation is the finished surface on which ballast is laid. Upgrades to formation is undertaken to support track structure. |
| Level crossing renewals | 34 level crossings where timber sleepers will be replaced with concrete sleepers. |
| Structures | |
| Bridge / structures | 3 refurbishments of bridge / structures. 3 replacements of bridge / structures. |
| Culvert renewal | 12 renewals of culverts. |
| Turnouts | |
| Turnouts refurbish | 8 turnout refurbished |
| Signalling | |
| Axle counters | Axle counters to be installed at 22 level crossings. |

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Figure 28: Illustration of scope of works for the preferred project option



The ongoing investment program will allow for the progressive increase in operating speeds for higher axle load trains

The technical scope proposes upgrading the line the Portland Line to a standard capable of accommodating 23 TAL trains operating at 80 km/h. ARTC, however, has conservatively estimated that parts of the line may continue to limit operating speeds of these heavier trains to 60 km/h noting that the currently deteriorated timber sleepers are being partially retained. These limits would be gradually reduced over time with 23 TAL trains, like 21 TAL and 19 TAL trains, permitted to operate across the line at 80 km/h by the tenth year of operation.

The changes in operating standards are enabled by the delivery methodology which includes stockpiling of removed timber sleepers of the highest quality for re-use in the line over the short-to-medium term as retained sleepers deteriorate.

The line would ultimately be completely re-sleepered over 40 years

There will ultimately be a long-term requirement to completely replace the remaining timber sleepers (which generally have a residual useful life of up to 40 years when intersperse through the concrete sleepers at a 1 in 2 rate) with concrete sleepers. This would occur through ongoing capital investment which, for the purposes of this business case, has been assumed to commence in Year 15 at five yearly intervals. By Year 40 it would be expected that the line would have moved to almost 1:1 concrete sleepers.

These continued upgrades of the line would not be expected to lift axle load limits beyond 23 TAL but may ultimately reduce the reactive and major periodic maintenance costs on the line, beyond the appraisal period adopted for this business case.

6.1.4. SERVICE MANAGEMENT

The scope of works outlined above are expected to be delivered 'as traffic permits', allowing freight operators to provide services on the Portland Line during the delivery phase

Two primary options were identified to deliver the scope of works outlined above:

- closure of the Portland Line while construction works are completed
- performing the upgrade works 'as traffic permits' ('ATP') i.e. adopting practices that allow freight operators to provide services on the Portland Line during the delivery phase.

ARTC typically delivers maintenance upgrades to its regional rail network ATP to ensure that customer services are maintained and has established workplace safety procedures that are used to reduce interface risks with rail operators.

In the current context, the fact that there are currently only one to two services per week suggests that both possessing or closing the Portland Line for the construction period may be a viable option to consider. While an extended possession of the Portland Line is possible, it would require forward planning and a clear view of when the upgrades would be performed.

Within the context above, the two delivery options would be associated with a series of trade-offs. On the one hand, closing the Portland Line would allow the upgrade works to be conducted in a shorter timeframe and for lower cost. On the other hand, performing the upgrade works ATP would sustain access revenue, allow existing freight services to continue and avoid any additional costs faced by exporters in altering the transport mode and/or the port utilised for export.

In consideration of the context and trade-offs outlined above, as well as the complexity and scope of maintenance works, the preferred project option is expected to be delivered ATP. Given the low volume of traffic, delivery the works ATP is not expected to add material complexity to the construction program. ARTC will develop a detailed delivery plan that will consider possession strategies to help minimise construction costs and disruptions to the project schedule.

6.1.5. PROJECT SCHEDULE

The delivery of the preferred project option is expected to take up to 24 months including approvals, early works and construction

Scope development, associated approvals, procurement and construction of the preferred project option are expected to be relatively straightforward, noting the low complexity of work and ARTC's established processes for major project delivery including risk and project management practices. Delivery of the preferred project option is proposed to span three phases (Figure 29).

- **Phase 1: Scope approval.** The development of this Business Case is part of a broader process that ARTC is undertaking to seek necessary funding to support the delivery of the proposed scope of works. For example, pending the outcomes of the funding process, ARTC will seek the Victorian Government's approval (as the owner of the rail infrastructure) for the proposed upgrade works to the Portland Line in conjunction with any further capital and maintenance works proposed across the broader rail network. The scope approval phase is expected to take up to six months including preparation of necessary documentation, government review processes, and any necessary further consultation, discussion and/or negotiation.
- **Phase 2: Early works.** ARTC will conduct an early works package that will include the detailed design and documentation of the upgrade works required to underpin the procurement process. As outlined in Section 8.1 ('Procurement strategy') it is anticipated that a series of separate work packages will be procured by ARTC including:
 - o inputs including sleepers and ballast
 - o required rail upgrades
 - o installation of axle counters at active level crossings.

It is expected that the work packages will be procured in stages, with (for example) the necessary sleepers and ballast procured prior to contractors to perform the rail upgrades. The procurement of each of the separate work packages is expected to take up to six months.

- **Phase 3: Construction.** Following the necessary procurement of inputs and contractors, three separate work packages will be undertaken to deliver the preferred project option including:
 - o Track works
 - o Renewal and replacement of structures and culverts
 - o Installation of axle counters at level crossings.

The three workstreams will be staged and sequenced to ensure the efficient delivery of the Portland Line upgrades, with (for example) axle counters installed following the necessary track works at level crossings. The upgrade works are expected to take up to 18 months to complete.

Figure 29: Project schedule for the preferred option



Source: Lycopodium

The current expectation is that, if supported, funding for the upgrade would be made available from July 2023 with approvals and early works occurring in the first quarter of the 2023/24 Financial Year. Based on the proposed program outlined above, this would enable completion of the upgrade and application of revised operating standards in the first quarter of 2025/26 financial year.

In the context of the large number of road and rail projects expected to be delivered over the coming years and ongoing industry disruption caused by the COVID-19 pandemic and broader macroeconomic conditions, there are number of risks associated with the preliminary project schedule outlined below including but not limited to:

- Difficulties procuring suitable contractors to deliver the scope of works
- Labour shortages that delay the project schedule.

These and other risks are discussed further in Section 6.2.

6.1.6. ANCILLARY INFRASTRUCTURE INVESTMENTS SUPPORT PROJECT DELIVERY

Ancillary infrastructure will be required to facilitate future increases in demand of freight volumes under the preferred option

The timeline below outlines the type of required ancillary infrastructure and projected expenditure timelines for the preferred option compared to the base case under a medium demand scenario. While ancillary infrastructure scope is not part of the project delivery, the overall success of project delivery is reliant on ancillary infrastructure investments, to ensure increased freight demand is accommodated.

Grain: The movement of grain via rail to the Port of Portland will increase in both the base case and the preferred option. However, the preferred option will see a higher percentage of rail mode that leads to increase Port of Portland mode share and ancillary infrastructure requirements.

Mineral Sands: Similarly, under the preferred option, increased investment requirements for mineral sands storage and processing infrastructure upgrades are required compared to the base case. While the base case sees the movement of mineral sands volumes via road to the Port of Portland only, upgrades for mineral sands processing, handling and storage are required.

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Figure 30: Ancillary Infrastructure requirements for the preferred option compared to the base case

s47G(1)(a), s47G(1)(b)

6.2. RISK ASSESSMENT

6.2.1. PURPOSE

This section builds upon the detailed analysis of the scope and staging of the preferred project option outlined in the previous section to identify a range of risks across each stage of the project life-cycle that may negatively affect the ability of the planned upgrades to the Portland Line to realise the full extent of the potential community benefits. The risk analysis of the preferred project option is a key input into:

- Formal estimates of contingency cost associated with the planned upgrades to the Portland Line.
- The selection of key variables that are subject to sensitivity analysis in the financial and economic assessment of the preferred project option.
- Project management arrangements and strategies that are designed to help mitigate key delivery and operational risks.

6.2.2. APPROACH

A systematic and structured approach was adopted to perform the risk assessment of the preferred project option consistent with best practice principles outlined in the Infrastructure Australia Assessment Framework.

Inputs that informed the risk assessment

The risk assessment was informed by the following inputs:

- Site visit and inspection of the entire length of the Portland Line by engineers from Lycopodium
- Insights and learnings from the stakeholder consultation process provided by key stakeholders from both public and private sectors
- Analysis and assessments performed by the Business Case team that have been outlined above including, but not limited to, forecasts of the future utilisation of the Portland Line
- Detailed literature review of risk assessments performed for other relevant rail projects that have recently been delivered by ARTC including the North East Rail Line Upgrade
- A risk workshop undertaken with the broader Business Case delivery team and key representatives from ARTC.

Risk analysis and assessment

The risk analysis and assessment involved the following steps:

- **Risk identification:** identification of all material project risks including their likely impact e.g. cost impact, timing impact, stakeholder objection
- **Risk likelihood:** the likelihood or probability of the risk occurring, on a scale of 'rare' to 'almost certain'
- **Risk consequence:** the consequence the risk will have on a scale of 'negligible' to 'extreme'
- **Overall risk rating (pre-mitigation):** the overall exposure to the risk, on a scale of 'low' to 'extreme'
- **Risk mitigation:** identification of possible mitigation strategies to reduce the risk exposure.

Each identified risk was assigned a post-mitigation risk rating of either 'low', 'moderate', 'high' or 'extreme' on the basis of the consequence of the risk on broader project objectives, namely, the overarching strategic objectives that govern ARTC decision making and the likelihood of the risk occurring over the course of the project.

Figure 31: Overall risk rating matrix

| | | Consequence | | | | |
|------------|----------------|-------------|----------|----------|----------|---------|
| | | Negligible | Low | Moderate | High | Extreme |
| Likelihood | Almost certain | Moderate | Moderate | High | Extreme | Extreme |
| | Likely | Low | Moderate | High | High | Extreme |
| | Possible | Low | Moderate | Moderate | High | Extreme |
| | Unlikely | Low | Low | Moderate | High | High |
| | Rare | Low | Low | Moderate | Moderate | High |

Outputs from the risk analysis

The outputs from the risk assessment were captured in a risk register which also includes the responsible agency or entity for the mitigation of each risk. The key areas of risk associated with the project were identified as follows:

- **Phase 1:** Planning / design
- **Phase 2:** Procurement
- **Phase 3:** Construction
- **Phase 4:** Maintenance / operations
- **Phase 5:** Demand / supply chain.

6.2.3. RISK ASSESSMENT FINDINGS

Broadly speaking, risks faced by ARTC can be categorised as internal or external risks. Internal risks stem from the core function of ARTC including the upgrade and maintenance of the Portland Line. External risks are generally outside the control of ARTC and relate to issues such as economic conditions and market dynamics.

The table below shows the risk exposure matrix used to determine the risk exposure rating for each identified risk.⁴⁸ In summary:

- **ARTC's exposure to internal risks stemming from the upgrade works and continued maintenance of the Portland Line are generally considered to be 'low' (post-mitigation)** reflecting the fact that:

⁴⁸ It is important to note that a number of key risks have already been considered with in the development of various packages of work, including development of design principles and as such, the risk assessment provides an overview of the broader project risks.

- o the scope of works is generally well known and will be further investigated and confirmed as part of the detailed scoping and development of work packages
 - o the type of works proposed are undertaken by ARTC elsewhere on the network on a regular basis
 - o the rail track upgrades will utilise suitably qualified and experienced contractors where required, that are engaged on a competitive basis, and are actively managed by ARTC to ensure safety and performance objectives are achieved.
- **ARTC's exposure to external risks associated the upgrade of the Portland Line are more significant and were generally found to be rated as 'moderate' (post-mitigation)** reflecting the fact that:
- o the proposed rail upgrades to the Portland Line would occur within a complex operating environment
 - o the extent to which project benefits are fully realised is dependent on outcomes related to external funding commitments, future demand and the delivery of critical interdependent infrastructure projects
 - o the outcomes outlined below are a function of the future behaviour of external stakeholders (as well as factors outside the control of ARTC including weather conditions) and are thus associated with an inherent degree of residual risk. For example, ARTC will not be able to control or influence key drivers of demand for rail freight services to the Port of Portland such as seasonal conditions, market access and international demand. While ARTC is currently consulting with key stakeholders to explore the potential for commitments the utilisation of the Portland Line and the delivery of critical interdependent infrastructure projects, it is not clear that stakeholder will have sufficient incentive and/or appetite to enter into such agreements in advance of the upgrade works being completed.

The Table 29 provides a description of key risks, their respective mitigation strategies, and post-mitigation risk rating. The full risk register prepared by Lycopodium is included in Appendix 2.

Table 29: Risk assessment findings

| Risk number | Risk description | Mitigation strategy | Risk exposure (post mitigation) |
|------------------------|---|---|---------------------------------|
| Planning/Design | | | |
| 1. | Inadequate funding is committed by public and private stakeholders to support the delivery of the project. | <ul style="list-style-type: none"> - Development of a detailed Business Case to demonstrate the community benefits of the project and the rationale for broader funding support. | Moderate |
| 2. | The required scope of works is not accurately defined which leads to future scope variations, increased delivery costs and program delays. | <ul style="list-style-type: none"> - Early and accurate scoping based on field surveys / physical inspections - Coordinate with Corridor and Asset Planning & Investment teams - Prioritisation of scope requirements. | Low |
| 3. | The cost of the required scope of works is not accurately budgeted for which leads to cost overruns and program delays. | <ul style="list-style-type: none"> - Verification of project estimates with market rates as early as practically possible - Existing project contingency - Budget benchmarked to previous re-railing projects - Escalation rates in project estimates tied to appropriate heavy engineering and construction indices. | Low |
| Procurement | | | |
| 4. | Probity issues arise during procurement. | <ul style="list-style-type: none"> - Commitment to competitive tender processes that consider probity roles, guidelines for management of any conflict of interest and retention of information, discussions and decisions. | Low |
| 5. | The large pipeline of road and rail projects in Victoria leads to ARTC not being able to secure a suitable tenderer i.e. quotes exceed budget or insufficient interest from market. | <ul style="list-style-type: none"> - Conduct market research and pre-qualify contractors that will provide competitive bids. | Low |
| 6. | The large pipeline of rail projects in Victoria reduces the availability and/or delays procurement of key inputs such as concrete sleepers and ballast which ARTC plans to procure. | <ul style="list-style-type: none"> - Ensure contracts have adequate terms and conditions. - Establish material storage locations. | Low |
| Construction | | | |
| 7. | Adverse weather leads to program delays. | <ul style="list-style-type: none"> - Investigate all access provisions to site - Improve roads and tracks where required - Prepare wet weather contingency plans - Complete drainage works in advance of other works - Monitor weather daily - Fire Management & Evacuation Planning . | Low |
| 8. | The large pipeline of road and rail projects in Victoria and/or active virus(es) in the community reduces the availability of labour and increase costs, delays the program, and/or reduces the quality of work delivered | <ul style="list-style-type: none"> - Ensure contracts have adequate terms and conditions - Appropriate setting of KPI's - Contractors to nominate key personnel. | Low |

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| | | | |
|-----|---|--|-----|
| 9. | The large pipeline of rail projects in Victoria reduces the availability of key construction inputs required by contractors which increase costs, delays the program, and/or reduces the quality of work delivered. | <ul style="list-style-type: none"> - Ensure contracts have adequate terms and conditions - Appropriate setting of KPI's. | Low |
| 10. | Contractors may have limited buying power and economies of scale which increases material costs. | <ul style="list-style-type: none"> - ARTC will procure materials such as sleepers in order to leverage economies of scale from other rail upgrade projects and maintenance activities across their network. | Low |
| 11. | Environmental approvals are required for construction works to be performed along some segments of the rail line which leads to additional costs and/or program delays. | <ul style="list-style-type: none"> - Early planning of works that may require environmental approvals - Appointment of specialist environmental assessors (where required) - Early submission of environmental approval submissions (where required). | Low |
| 12. | Interface works with the broader rail network and / or feeder lines are delayed or not delivered due to stakeholder management issues. | <ul style="list-style-type: none"> - Early stakeholder engagement to ensure alignment on requirements of interface works and any operating and / or financial implications. | Low |
| 13. | Limited windows of time are available to possess the rail track and conduct the upgrades which leads to delays program and/or increases costs. | <ul style="list-style-type: none"> - Possession Management Procedures - Detailed productivity tracking and forecasting - Completion of contingency plans - Adjustment of train schedules where possible - Early engagement with Operations and Customer | Low |
| 14. | Upgrade works at level crossings are a conflict point with local commuters and may pose safety risks for workers and residents. | <ul style="list-style-type: none"> - Early engagement with local community and VicRoads - Engage traffic controller(s). | Low |
| 15. | Limited space within rail boundaries or access issues lead to difficulties in completing works along some segments of the rail line which increases costs and/or delays the program. | <ul style="list-style-type: none"> - Clear communication of access maps showing limitations / constraints prior to contract finalisation. | Low |
| 16. | Completion and commissioning of upgrade works is not performed to an adequate standard e.g. sleeper insertion methodology. | <ul style="list-style-type: none"> - Detailed Quality Plan and QA/QC processes - Regular inspections by site QA/QC personnel - Independent Quality Manager | Low |
| 17. | The condition of retained assets such as culverts are deemed unsuitable which leads to a revised scope of works, increased costs and delayed program. | <ul style="list-style-type: none"> - Detailed asset assessment prior to upgrade works. | Low |
| 18. | Contractor defaults during works which delays the program and leads to higher delivery costs. | <ul style="list-style-type: none"> - Limit exposure to individual contractors and before finalising the selection process, include a review of corporate and financial information. | Low |
| 19. | Union action / industrial relations problems including safety related problems. | <ul style="list-style-type: none"> - Consider risks of union action / industrial relations problems based on the characteristics of contractors commissioned. | Low |

| | | | |
|-----|---|---|-----|
| 20. | Social issues including community opposition and media attention. | <ul style="list-style-type: none"> - Prepare community consultation plan and undertake consultation - Prepare media briefings - Engage communities in support functions. | Low |
|-----|---|---|-----|

Operations and maintenance

| | | | |
|-----|--|--|-----|
| 21. | Higher than expected freight volumes lead to increased track loading which impacts the structural integrity of the rail track. | <ul style="list-style-type: none"> - Monitoring of freight volumes overtime. - Regular maintenance and inspections of the track consistent with ARTC's maintenance protocols. | Low |
| 22. | The stability of embankments may reduce overtime due to increased freight volumes which impacts the structural integrity of the rail track. | <ul style="list-style-type: none"> - Monitoring of freight volumes overtime. - Regular maintenance and inspections of the track consistent with ARTC's maintenance protocols. | Low |
| 23. | The condition of retained assets such as culverts are unsuitable which impacts the structural integrity of the rail track. | <ul style="list-style-type: none"> - Detailed asset assessment prior to upgrade works. | Low |
| 24. | Non-gazetted level crossings may not be compliant at the new allowable speeds. | <ul style="list-style-type: none"> - Detailed asset assessment prior to upgrade works. | Low |
| 25. | Partial Re-sleeping strategy causes ongoing formation issues which impacts the structural integrity of the rail track. | <ul style="list-style-type: none"> - Monitoring of freight volumes overtime. - Regular maintenance and inspections of the track consistent with ARTC's maintenance protocols. | Low |
| 26. | Labour and/or material shortages may reduce the ability of ARTC to undertake the required maintenance works within the allocated time and budget required. | <ul style="list-style-type: none"> - Resource loaded schedule - Comprehensive recruitment campaigns (where required) - Comprehensive training and development plans (where required). | Low |
| 27. | Completion and commissioning of upgrade works is not performed to an adequate standard e.g. sleeper insertion methodology. | <ul style="list-style-type: none"> - Detailed Quality Plan and QA/QC processes - Regular inspections by site QA/QC personnel - Independent Quality Manager | Low |

Market / demand

| | | | |
|-----|---|---|----------|
| 28. | Overall volume of commodities exported from the Port of Portland is hindered by adverse market conditions, weather events and/or changes in technology. | <ul style="list-style-type: none"> - Adopt an adaptive maintenance program that responds to rail freight volumes. | Moderate |
| 29. | Project option does not lead to anticipated freight mode shift / benefit levels are significantly less than expected. | <ul style="list-style-type: none"> - Early engagement with key stakeholders within the supply chain to test appetite to sign MoUs regarding utilisation - Continued market engagement and monitoring of rail freight volumes and trips. | Moderate |
| 30. | Critical interdependent projects are delayed or do not occur and reduce the benefits realised from the project option. | <ul style="list-style-type: none"> - Early engagement with key stakeholders within the supply chain - Test appetite to sign MoUs regarding complementary investments. | Moderate |

6.3. FINANCIAL APPRAISAL

6.3.1. PURPOSE

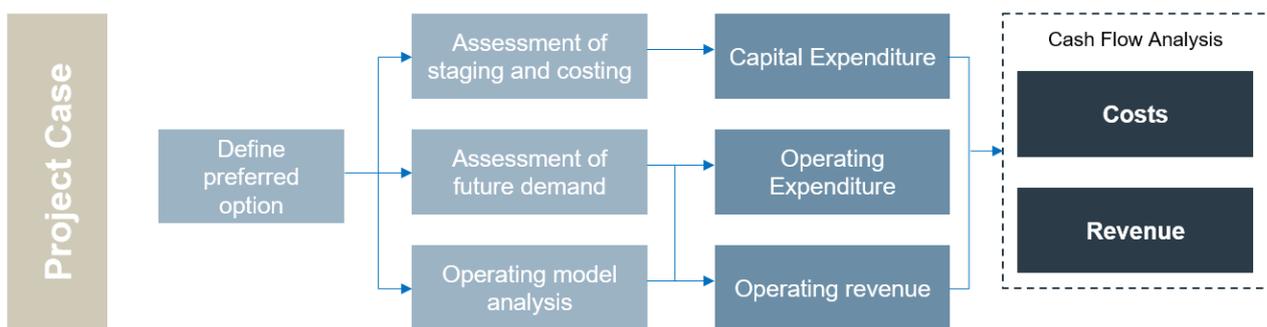
This section is aimed at assessing the financial impact of the preferred project option. It provides additional detail on the estimated capital and ongoing costs beyond as was provided in Section 5.5.2.

6.3.2. APPROACH

The financial appraisal relies on real dollar cost estimates prepared by Lycopodium which have been escalated to calculate the project nominal capital and operating requirements and discounted to calculate the net present whole-of-life costs.

The approach to cost estimation has followed best practice principles outlined in the Infrastructure Australia Assessment Framework. This has included probabilistic estimation of inherent and contingent risks, estimation of revenue streams, and sensitivity analysis. The analytical framework is illustrated in Figure 32.

Figure 32: Approach to financial analysis



Source: PwC Financial Appraisal Methodology

Detail on the original estimates and technical assumptions underpinning the financial appraisal is provided in Lycopodium's cost report attached as Appendix 2. Further detail on the financial appraisal is attached as Appendix 3.

Key inputs and assumptions

The key inputs to the financial appraisal include:

- Key financial parameters for undertaking discounted cash flow analysis, including discounting and escalation rate assumptions (See Table 30).
- Capital and operating cost modelling to estimate the financial impacts of the preferred project option, based on Lycopodium's base cost estimates (Appendix 2).
- Revenue modelling for the preferred project option over the appraisal period, underpinned by HoustonKemp demand analysis (Appendix 1).
- Risk and contingency allowances including P50 and P90 cost estimates provided by Lycopodium reflective of cost estimate risk for each scope of works.
- Management and delivery assumptions from ARTC, as required.

These key inputs are summarised in the Table 30 below. The input assumptions are consistent with the financial analysis undertaken across other project options as in Section 5.5.2.

Table 30: Key financial inputs and assumptions

| Item | Assumption | Source and comments |
|-----------------------|------------------------|---|
| Appraisal period | 30 years | A 30-year analysis period is consistent across cost estimates, financial and economic analysis. |
| Appraisal start date | 1 July 2023 | ARTC Management Assumption |
| Base costs | FY 2022/23 Q1 | Real capital and operating costs provided by Lycopodium. |
| Cost Escalation | s47G(1)(a), s47G(1)(b) | |
| Revenue Escalation | | |
| Nominal discount rate | | |
| GST | Excluded | - |
| Rounding | - | Tables and figures in this chapter have been rounded to 1 decimal place. Numbers across tables may not add due to rounding differences. |

6.3.3. CAPITAL COSTS

The total capital costs for the preferred project option are estimated to be \$136.7 million in real terms, \$149.5 million in nominal terms, and \$120.8 million in present value terms. Table 31 below provides a detailed breakdown of the capital cost components for Option 3.

Table 31: Capital costs (\$M)

| | Preferred Option (23 TAL / 60 km/h) | |
|--|-------------------------------------|---------|
| | Real | Nominal |
| Base capital costs | s47G(1)(a), s47G(1)(b) | |
| Project management, approvals, and spoil management | | |
| Load Rating of structures | | |
| Design and PM | | |
| Spoil Management | | |
| Project management, approvals, and spoil management subtotal | | |
| Sleepers, ballast, and civils | | |
| Sleepers | | |
| Ballast | | |
| Resurfacing | | |
| Track Earthworks | | |

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Preferred Option (23 TAL / 60 km/h)

| | | | | |
|--|------------------------|--|--------------|--------------|
| Track (Cess) Drainage | s47G(1)(a), s47G(1)(b) | | | |
| Access Roads / Right of Way | | | | |
| Sleepers, ballast, and civils subtotal | | | | |
| Structures | | | | |
| Bridge | | | | |
| Culvert renewal | | | | |
| Structures subtotal | | | | |
| Turnouts | | | | |
| Turnouts refurbish | | | | |
| Turnouts subtotal | | | | |
| Level crossing train detection | | | | |
| Axle counters | | | | |
| Level crossing train detection subtotal | | | | |
| Below Rail total | | | | |
| Risks and Contingency | | | | |
| P50 | | | | |
| P90 Incremental | | | | |
| Risk total | | | | |
| Gross Capital Costs (P90) | | | 136.7 | 149.5 |
| NPC | | | 120.8 | |

Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

| | | |
|------------------------|--|--|
| s47G(1)(a), s47G(1)(b) | | |
|------------------------|--|--|

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Table 32: Key items for contingent risk allowance

| Item | P90 allowance (% of base costs) | Contributing factor |
|----------------------------------|---------------------------------|---|
| Re-sleepering | 14% | <ul style="list-style-type: none"> • Reduced productivity associated with partial re-sleepering; • Increased likelihood of additional sleeper insertion based on condition • Sleeper cost and handling • Contractor costing and availability. |
| Level crossing upgrade (Signals) | 11% | <ul style="list-style-type: none"> • Contractor availability • Material availability • Interfacing to existing signalling system. |
| Project management and design | 7.5% | <ul style="list-style-type: none"> • Resource availability • Time delays (extended duration). |
| Underbridge replacement | 2% | <ul style="list-style-type: none"> • Transport • Local resource/material availability. |

Figure 33 provides a visual representation of capital costs components for the preferred project option.

Figure 33: Capital costs

s47G(1)(a), s47G(1)(b)



Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

6.3.4. ONGOING COSTS

The operating and maintenance costs for the preferred project option are estimated to be \$55.0 million in real terms, \$106.8 million in nominal terms, and \$22.4 in present value terms. The ongoing capital costs for the preferred option are estimated to be \$19.6 million in real terms, \$44.0 million in nominal terms and \$6.0 million in present value terms.

Together this makes the total ongoing costs for the preferred option are estimated to be \$74.5 million in real terms, \$150.7 million in nominal terms and \$28.5 million in present value terms.

As outlined in Section 5.5.2, total ongoing costs are made up of three cost categories:

- **Fixed annual maintenance costs**, covering activities such as asset inspections that are incurred irrespective of the level of traffic on the line
- **Variable annual maintenance costs**, covering other maintenance activities that are driven by the level of traffic on the line
- **Ongoing capital costs**, relating to the replacement of the remaining timber sleepers and occurring at five yearly intervals from FY2037/38.

Of the total ongoing costs, total maintenance costs, \$46.9 million (real), make up 63 per cent; ongoing capital costs, \$16.7 million (real), makes up 22 per cent; whereas risk and contingency costs makes up the remaining 15 per cent (on real terms basis).

Operating and maintenance costs have been estimated on a medium demand scenario with 71 per cent being fixed and 29 per cent variable (demand scenarios are further explored in section 7.1 and sensitivity of operating and maintenance costs to demand are considered in later in this section). Table 33 provides a breakdown of the operating and maintenance cost estimates over the appraisal period.

Table 33: Operating and maintenance costs (\$M)

| | Preferred Option (23 TAL / 60 km/h) | |
|--------------------------------------|-------------------------------------|--------------|
| | Real | Nominal |
| Below Rail | | |
| Fixed annual maintenance costs | 33.2 | 63.5 |
| Variable annual maintenance costs | 13.6 | 27.5 |
| Total Maintenance Costs | 46.9 | 91.0 |
| Risks and Contingency | | |
| P50 | 2.7 | 5.3 |
| P90 Incremental | 5.4 | 10.5 |
| Subtotal | 8.1 | 15.8 |
| Gross Maintenance Costs (P90) | 55.0 | 106.8 |
| NPC | | 22.4 |

Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

As noted above it has been assumed that ongoing capital investment for re-sleeping activities would occur from FY2037/38 at five yearly intervals under the preferred option. This investment would ultimately take the line from a concrete-to-timber-sleeper ratio of ~1:2 to 1:1 by FY2052/53.

This ongoing capital investment for re-sleeping has deemed to be necessary on the basis of the medium demand scenario. The ultimate decision as to the volume of sleepers to be replaced, and the timeframe in which they are replaced, would be undertaken by ARTC in the future. This decision will be based on the actual demand scenario that eventuates. If demand is higher than projected, it is possible that the investment may be required earlier. Conversely, if demand is lower than expected it may be possible to defer further investment beyond FY2037/38.

Table 34: Ongoing capital costs (\$M)

| | Preferred Option (23 TAL / 60 km/h) | |
|------------------------------|-------------------------------------|------------|
| | Real | Nominal |
| Ongoing capital costs | | |
| Re-sleeping costs | 16.7 | 37.5 |
| Risks and Contingency | | |
| P50 | 1.0 | 2.2 |
| P90 Incremental | 1.9 | 4.4 |
| Subtotal | 2.9 | 6.5 |

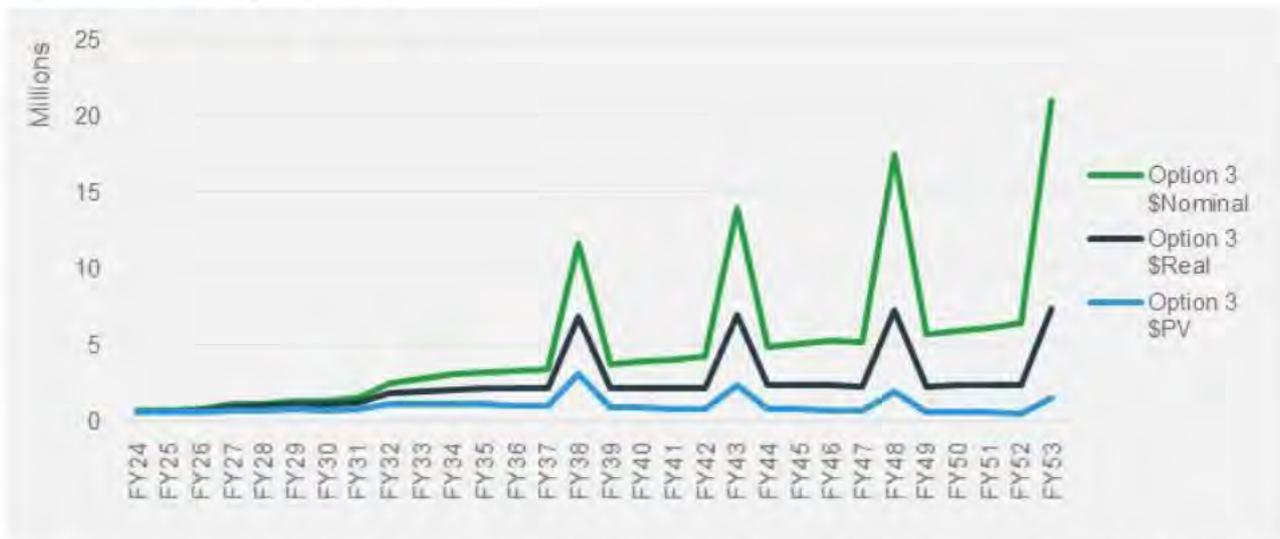
Preferred Option (23 TAL / 60 km/h)

| | | |
|--------------------------------------|-------------|-------------|
| Gross Maintenance Costs (P90) | 19.6 | 44.0 |
| NPC | 6.0 | |

Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

The figure below provides an illustration of the expected operating and maintenance and ongoing capital costs over the next 30 years. In addition to the five-yearly capital investment cycle from FY2037/38 to FY2052/53, it also highlights that operating and maintenance costs are expected to be lower in the first 10 years. This reflects the expectation that the requirement for reactive maintenance will be reduced in the short-term as a result of the upgrade.

Figure 34: Total ongoing costs



Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

6.3.5. WHOLE-OF-LIFE COSTS

The aggregate financial impact of the preferred project option is estimated to be \$149.3 million over the 30 years of operation in present value terms. This estimate is based on a variable cost escalation rate, an average of approximately 3.4 per cent over the assessment period, and a discount rate of 9.0 per cent, consistent with ARTC’s corporate forecasts. A breakdown of this estimate is provided in Table 35.

Table 35: Whole-of-life costs (\$M)

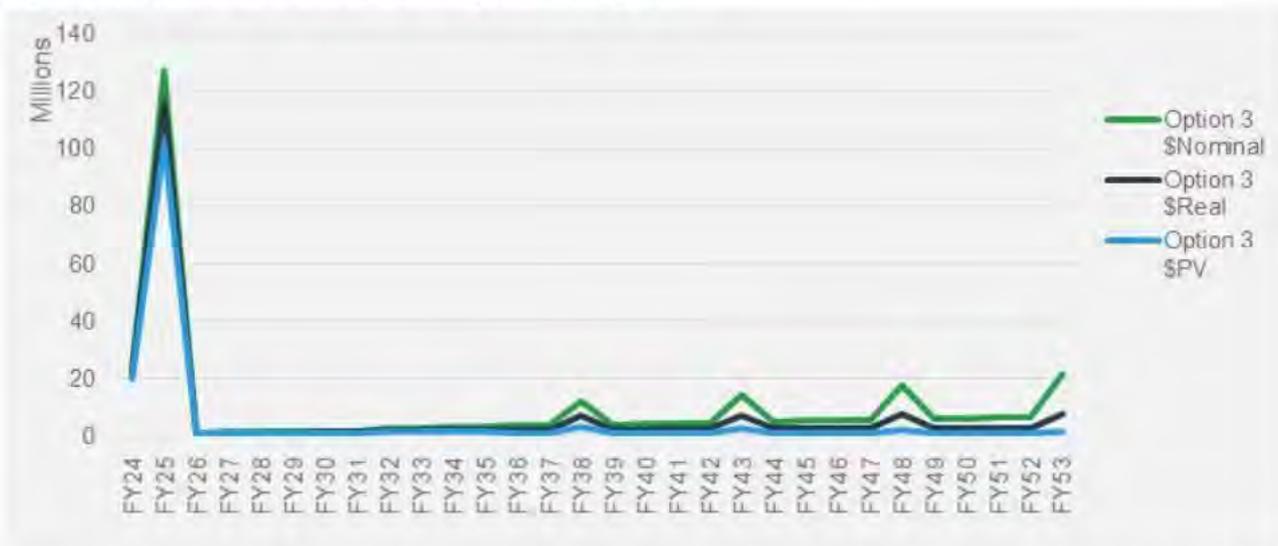
| | Preferred Option (23 TAL / 60 km/h) | |
|---------------------------|-------------------------------------|--------------|
| | Real | Nominal |
| Base capital Costs | | |
| Base capital costs | 100.5 | 109.9 |
| Risk & contingency (P90) | 36.2 | 39.6 |
| Subtotal | 136.7 | 149.5 |
| Ongoing costs | | |
| Total maintenance costs | 46.9 | 91.0 |
| Ongoing capital costs | 16.7 | 37.5 |
| Risk & contingency (P90) | 11.0 | 22.3 |
| Subtotal | 74.5 | 150.7 |

Preferred Option (23 TAL / 60 km/h)

| | | |
|---|-------|-------|
| Whole-of-life costs (incl. contingency) | 211.2 | 300.2 |
| NPC | 149.3 | |

Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

Figure 35: Whole-of-life costs for the preferred option



Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

As expected, expenditure is highest during the first two years of the project. This is driven by initial capital upgrades undertaken during the first 24 months of the project. Subsequently, a steep decline in expenditure follows as the project moves into a largely steady state operations phase. As highlighted in the figure above, there are four exceptions to the 'steady state', with ongoing costs experiencing 'peaks' in FY2037/37, FY2042/43, FY2047/48 and FY2052/53. These peaks represent a capital injection in lieu of ongoing capital costs (i.e., re-sleeping activities) as discussed in section 6.3.4.

6.3.6. REVENUE PROJECTIONS

Traffic on the Portland Line is expected to increase on the completion of the capital upgrade works, with track access revenues projected to average \$1.8 million (real) per year or a total of \$52.7 million (real) or \$86.2 million (nominal) over the 30-year operating period.

Track access revenue projections for the Portland Line were prepared by HoustonKemp based on charges set out in the current ARTC Interstate Access Undertaking. The charges comprise two components:

- **Variable access charges** based on a standard rate (\$3.763) for every thousand gross tonne-kilometre
- **Flagfall access charges** based on a standard rate (\$2.221) by the kilometres travelled on the Portland Line.

Associated demand modelling provided projections for both the number of trains and total tonnage moved on the line provided the basis for estimation of annual track access revenues. Further details on revenue projections are provided in Table 36.

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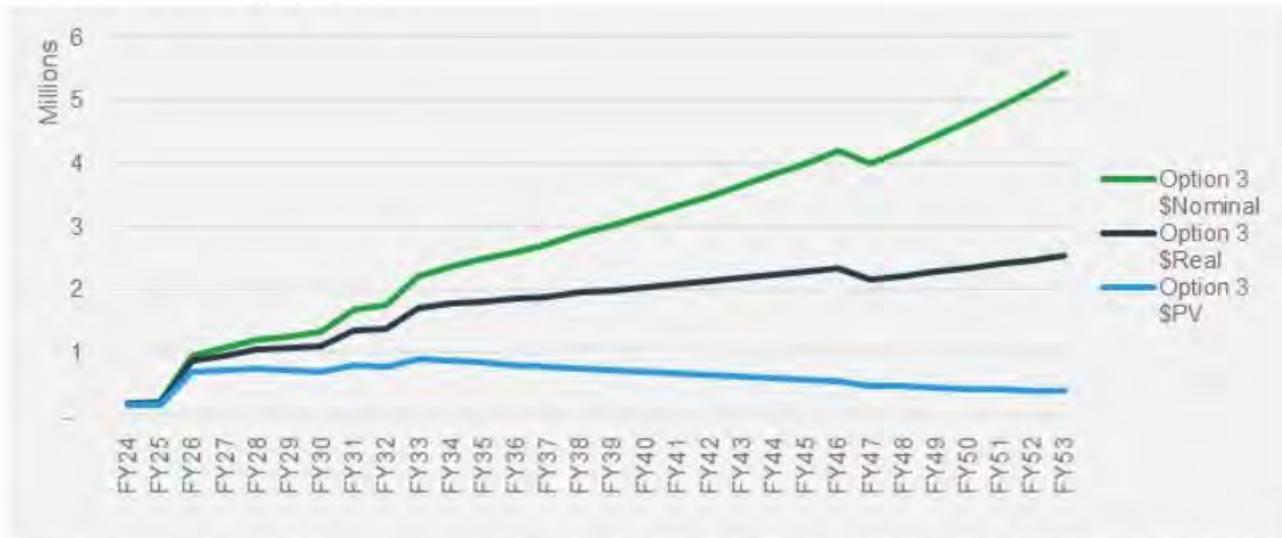
Table 36: Maroona to Portland Line operating revenue under the preferred option (\$M)

| Preferred Option (23 TAL / 60 km/h) | | |
|---|-------------|-------------|
| | Real | Nominal |
| Track access charges | | |
| Variable charges | 42.6 | 69.8 |
| Flagfall charges | 10.1 | 16.4 |
| Total | 52.7 | 86.2 |
| Discounted values – total (PV 2023 @ 9%) | 18.4 | |

Source: HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

The figure below illustrates revenue projections over time. It reflects the expectation that revenue will steadily climb over the first 10 years of operating the upgraded line as new mineral sands projects come online in addition to increasing rail mode share of grain exports moved through the Port of Portland (refer section 7.1 for further information on demand projections).

Figure 36: Revenue projections



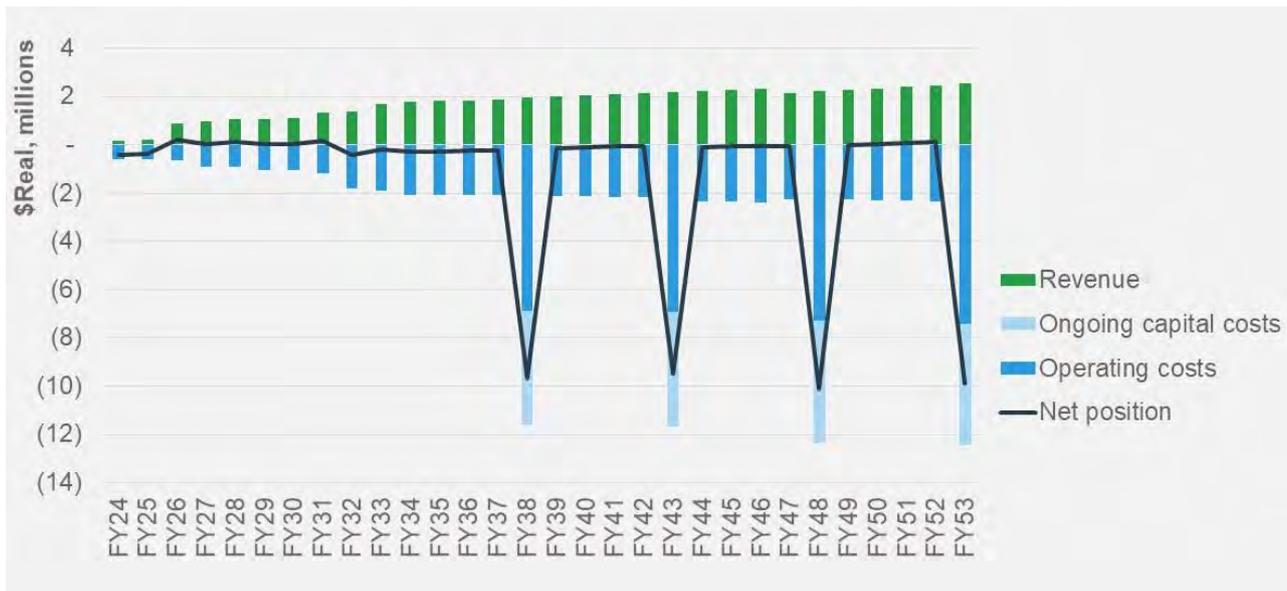
Source: HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

6.3.7. COMMERCIAL SUSTAINABILITY

Comparison of projected revenues against estimated ongoing costs suggests the Portland Line will continue to sustain annual net operating losses after the completion of the upgrade. These losses are expected to total \$21.8 million (real) or \$64.6 million (nominal) over the 30-year appraisal period. It should be noted, however, that this represents an improvement on the base case net position during operations (i.e. an improved commercial position) and, as is discussed in subsequent chapters, the upgraded line will deliver positive economic returns. These costs exclude the upfront capital investment to upgrade the Portland line.

Figure 37 below provides a comparison of revenue projections and estimated ongoing costs over the appraisal period.

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Figure 37: Net position excluding upfront capital costs for the preferred option (\$M, real)

Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

As shown in the figure above, the first 2 years have a negative net position whilst the Portland Line upgrade is in the delivery phase. During this phase, trains will be able to use the track but will be subject to existing speed restrictions.

The yearly net position also drops at FY2037/37, FY2042/43, FY2047/48 and FY2052/53 due to ongoing capital costs associated with delayed re-sleeping activities occurring in these years. In all other years, the net position remains close to breaking even.

6.3.8. SENSITIVITY ANALYSIS

The financial appraisal is subject to a variety of uncertainties and risks. This includes in respect to underlying demand projections as well as a number of assumptions on which the appraisal has relied. To understand the potential impact of these uncertainties and risks, sensitivity analysis has been undertaken that includes consideration of:

- Escalation rate impact on capital costs
- Escalation rate impact on ongoing costs
- Escalation rate impact on revenue
- Demand impact on revenue and ongoing costs.

This approach is consistent with the requirement of Infrastructure Australia for sensitivity analysis of key underlying assumptions.

The results of the sensitivity analysis are outlined below.

Escalation impacts on capital cost requirements

Escalation of input costs in the construction industry are known to be currently high and volatile stemming from the significant demand as a result of national infrastructure pipeline. The financial appraisal assumes escalation rates of between 2.5% - 5.1% in the first 5 years, prior to moving to a long-term average of 3.5%. This results in an average 3.4 per cent over the appraisal period.

To test sensitivity of the capital outlay to changes in escalation, a series of higher rates were assumed. This analysis highlighted that if actual escalation rates were to approximately two to three times higher than the base allowance (+4.0 per cent and +6.0 per cent respectively) the preferred project option's nominal capital requirements would increase by between 10 and 15 per cent. This suggests that the capital outlay is not highly sensitive to changes in escalation which can be attributed to its relatively short development period of 24 months. A visual representation of this is provided in Figure 38 below.

Figure 38: Escalation impact on capital costs



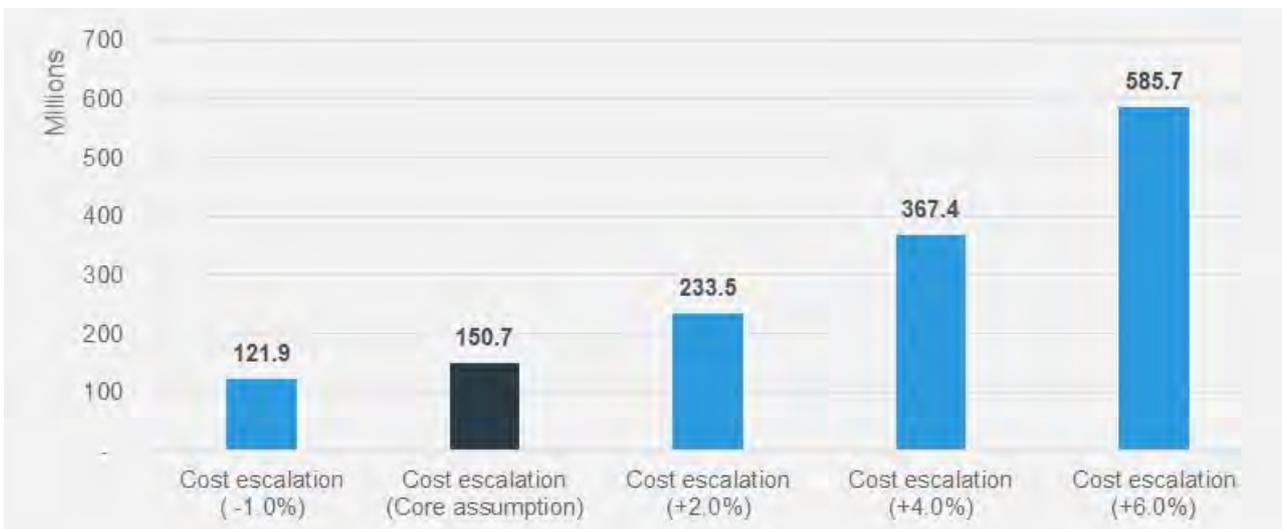
Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

It should be noted that this analysis assumes that construction is completed within two years of the release of funding. If delivery of the upgrade were to be delayed the impacts of a change in escalation rates would be more significant.

Escalation impacts on ongoing costs

Estimated ongoing costs, which are considered over 30 years, are more sensitive to escalation rate assumptions given they occur over a longer time horizon. Applying the same sensitivities identified above suggests that if actual escalation rates were approximately two to three times the base assumption (+4.0 per cent and +6.0 per cent respectively) then ongoing costs would increase by between 144 to 289 per cent. This is visually illustrated in Figure 39.

Figure 39: Cost escalation rate impact on ongoing costs



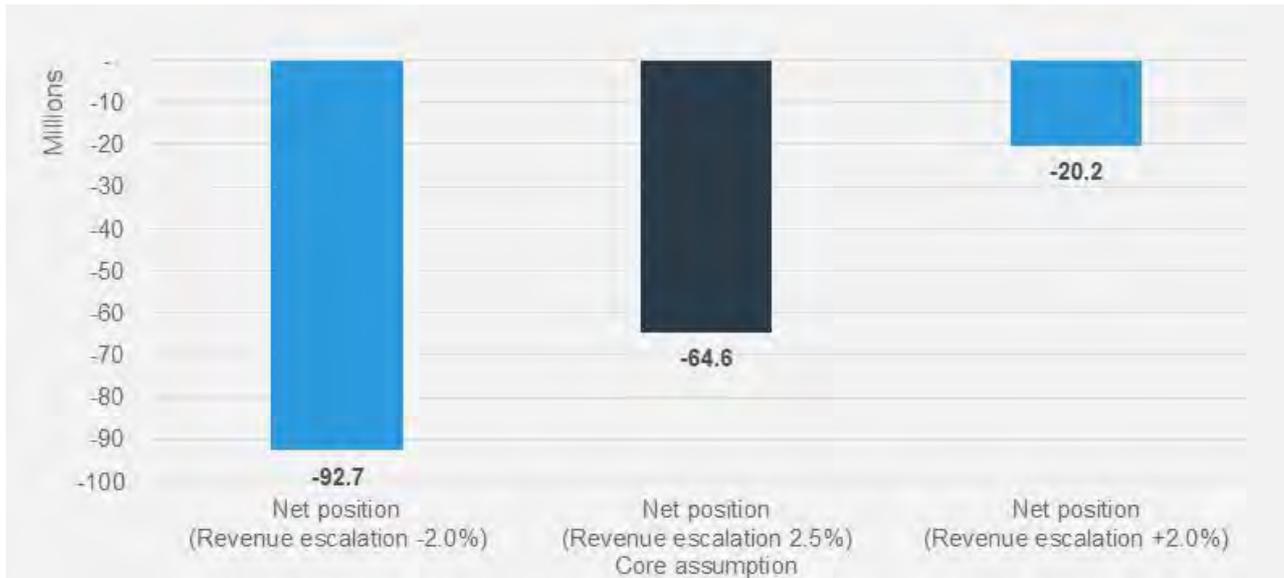
Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

Escalation impacts on revenue

Based on the projected revenue to be realised under a medium demand scenario and a 2.5 per cent escalation rate, the net operating position on the Portland Line over the 30 years could be -\$64.6 million (nominal). Under a sensitivity testing scenario, the net operating position would range from -\$20.2 million (+2.0 per cent) to -\$92.7 (-2.0 per cent) million on a nominal term. This is demonstrated in Figure 40.

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Figure 40: Revenue escalation rate impact

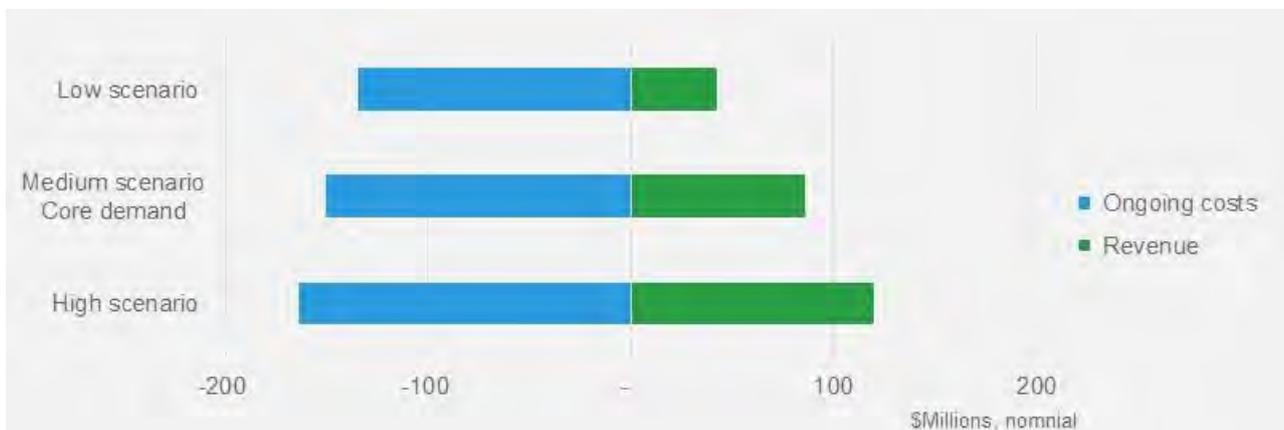


Source: HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

Demand impacts on revenue and ongoing costs

The financial appraisal has been undertaken on the basis of a medium demand scenario which influences both projected revenue and estimated ongoing costs. To inform sensitivity analysis both revenue and ongoing costs have been tested under low and high demand scenarios (refer Section 7 – Detailed demand and economic analysis). This analysis suggests that revenue could be as much as 51 per cent lower under a low demand scenario or 39 per cent higher under a high demand scenario. Operating costs were found to be less sensitive to changes in underlying demand at a reduction of 11 per cent under a low demand scenario and an increase of 9 per cent under a high demand scenario (Figure 41).

Figure 41: Demand impact on revenue and ongoing costs



Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

6.4. FUNDING AND FINANCING

There is currently no capital funding committed to the upgrade of the Portland Line meaning funding equivalent to the estimated (nominal) capital costs of \$149.5 million will be required. There is an expectation that responsibility of the net ongoing costs of the line would continue to be borne by ARTC.

While this Business Case seeks a funding contribution from the Commonwealth Government, the capacity to offset the funding ask of the Commonwealth through contributions from other investment beneficiaries as well as ARTC, as owner of the line, is also considered.

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Potential for funding contributions from industry

Almost 70 per cent of the benefits resulting from the upgrade of the Portland Line – estimated at \$159 million (present value) under the preferred option – are expected to accrue privately, which will flow on to benefit the broader community. This includes financial benefits realised by exporters who can access lower transport costs and rail operating companies that benefit from higher rail demand. These benefits, however, would be realised over 30 years which would reduce industry’s ability to leverage expected gains to make an up-front contribution to capital costs.

While market engagement has validated industry’s expectation of realising these benefits, there was no appetite on the part of industry to consider contributions toward the cost of the upgrade whether that be directly or indirectly. Comment was sought on the appetite of key industry stakeholders to provide commitments to rail volumes which could act as an indirect contribution through guaranteed increases in track access revenue that improve ARTC’s position to partly underwrite the investment. At the time of Business Case preparation those conversations were ongoing, but no party was willing to make a firm commitment at this time.

Instead, industry pointed to the expected level of private investment required to take up the benefits enabled by the upgrade of the Portland Line. As has been addressed in Chapters 5 and 6 of this Business Case, those required investments are estimated to be in the order of \$80 million (net present cost over 30 years).

Potential for funding contributions from ARTC

ARTC does not currently have specific capital investments in the Portland Line budgeted beyond what is required to keep the line open and functional. ARTC’s position to make contributions toward the capital cost of the upgrade is also impacted by other major projects currently in delivery such as Inland Rail.

Further, demand projections and operating cost estimates suggest that ARTC is likely to continue making a net operating loss on the line. While this net operating loss may be reduced from current corporate forecasts given expectations of increased traffic on the line and therefore higher track access revenue, there remains a degree of uncertainty over volumes which raises further questions over ARTC’s ability to make a meaningful contribution.

Remaining funding requirement of the Commonwealth Government

The constraints on industry and ARTC’s ability to make up-front contributions toward capital costs mean that full Commonwealth Government funding of capital costs is required. As the investment is expected to have a positive benefit-cost ratio this approach to funding is appropriate.

Commonwealth funding is expected to be in the form of grants. Increased track access revenue could theoretically create financing opportunities such as Commonwealth equity or concessional loans. The expectation, however, that revenues will remain below the full operating costs of the line mean that these financing approaches are not appropriate in practice given a positive commercial return on investment cannot be guaranteed.

Based on the proposed delivery program, the capital requirement is spread over two years with the real budget impact expected to be \$136.7 million (see Table 37 below), and the nominal budget impact estimated to be \$149.5 million.

Table 37: Budget impact of capital funding requirement, \$millions

| | 2023/24 | | 2024/25 | | 2025/26 | | 2026/27 | | 2027/28 | | 5-year total | |
|---------------------------|-------------|-------------|--------------|--------------|----------|----------|----------|----------|----------|----------|--------------|--------------|
| | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. | Real | Nom. |
| Capital cost | 21.1 | 22.7 | 115.5 | 126.7 | - | - | - | - | - | - | 136.7 | 149.5 |
| Offset from other sources | - | - | - | - | - | - | - | - | - | - | - | - |
| Net budget impact | 21.1 | 22.7 | 115.5 | 126.7 | - | - | - | - | - | - | 136.7 | 149.5 |

Source: Lycopodium, Appendix 2: Technical cost report, November 2022; HoustonKemp, Appendix 1: Demand assessment and cost benefit analysis, November 2022; PwC, Appendix 3: Financial Appraisal Methodology Report, November 2022

Noting many of the economic benefits enabled by the project will have positive impacts on the State in addition to the financial benefits it stands to realise from increased rail traffic on its own network, there may be scope for the Commonwealth to consider joint project funding with the Victorian Government. The potential for funding contributions from the Victorian Government are outside of the scope of this Business Case which has been prepared for consideration by the Commonwealth.

7

Detailed demand and economic analysis

7. DETAILED DEMAND AND ECONOMIC ANALYSIS

CHAPTER SUMMARY

A cost benefit analysis ('CBA') was undertaken to assess whether the preferred project option is expected to deliver net community benefits relative to the base case scenario.

The preferred project option is expected to deliver a wide range of incremental economic benefits to members of key industry supply chains as well as the regional community including productivity improvements and positive externalities such as lower carbon emissions and reduced accidents on the local road network. A range of incremental costs will be required to realise the benefits outlined above including capital expenditure to upgrade the Portland Line and deliver critical interdependent infrastructure projects.

Based on a detailed analysis of the costs and benefits, the preferred project option was found to deliver a benefit cost ratio ('BCR') of 1.32, which indicates that the incremental community benefits are expected to outweigh the incremental costs. Sensitivity analysis indicated that the future volume of contestable commodities produced in Western Victoria and changes to the relative cost of rail will be key drivers of the level of net community benefits realised

The economic appraisal was underpinned by detailed demand forecasts which suggested that the relative transport cost savings, and increase in the availability and reliability of rail freight services, enabled by the upgrade of the Portland Line could see a sixfold increase in rail traffic on the line.

An increase in the allowable axle loads and speed along the Portland Line is expected to raise the demand for rail freight services to the Port of Portland across a number of commodities including grain and mineral sands. The annual tonnage of commodities transported to the Port of Portland at 2035 under the preferred option is expected to be approximately 1.2 million tonnes under a medium demand scenario.

The volume increases would include growth in the proportion of regional grain exported through the Port of Portland and the increased mode share of rail for those grain exports. It would also include the transport by rail of bulk mineral sands exports from three mine projects expected to commence operations by the end of the decade.

Other commodities that could take advantage of the upgrades rail line are containerised aluminium ingots from the Portland smelter to the Port of Melbourne. Logs and fertilisers were deemed not feasible to travel along the Portland Line.

Demand forecasts relied on by this Business Case were tested with and supported by key industry stakeholders.

7.1. DEMAND ANALYSIS

7.1.1. PURPOSE

Central to evaluating the potential net economic benefit generated by the preferred project option is a comprehensive understanding of the incremental demand for rail freight services on the Portland Line relative to the base case. This section outlines the analysis conducted to assess the demand for rail freight services along the Portland Line under the preferred project option and base case.

7.1.2. APPROACH

Articulating the potential nature and extent of demand for the rail freight services on the Portland Line following the delivery of the preferred project option is a critical element of assessing the potential net benefits of the upgrades to the local community, regional industry and the economy more broadly. Given that the proposed speeds and axle loads on the Portland Line have not previously been available (and hence the level of demand is unobserved) there are clearly a range of challenges and uncertainties surrounding the projection of rail freight volumes over a 30-year period including, but not limited to, uncertainty regarding:

- the timing of complementary investments at (for example) the Port of Portland to accommodate an increase in the volume of commodities transported via the Portland Line;

- the time required for businesses to adjust their operating mode and transport modes; and
- the demand response to changes in relative transport modes accruing to the upgrades of the Portland Line.

Within the context of the uncertainty and challenges involved in projecting demand over the coming decades, a detailed stakeholder consultation process was undertaken to understand expected future infrastructure investments and potential responses of market participants to the delivery of the preferred project option. Insights and learnings from the consultation process were used to complement the detailed demand study which:

- identified the size of the potential market for each commodity
- considered the segment of the market that could use the Maroona to Portland Line
- assessed the financial incentive of using the Maroona to Portland rail line under different project options
- established low, medium and high demand assumptions (see Appendix 1 for further details).

The demand analysis undertaken represents the most comprehensive approach available, given the extent of available data and information.

7.1.3. STAKEHOLDER CONSULTATION

ARTC and members of the business case team interviewed senior representatives from the public and private organisations outlined below between June and August 2022. Initial conversations with stakeholders informed the approach to demand modelling and subsequent conversations were used to ratify the demand projections that underpin this business case. While a detailed stakeholder consultation report was produced, due to confidentiality commitments to stakeholders, this has not been included as an appendix. stakeholder findings are summarised below.

General insights gained through the engagement included:

- **Grain:** Strong growth in grain production is expected over the medium to long-term. Moreover, a number of stakeholders indicated that there is likely to be significant upside to the volume of grain transported via rail if the Portland Line is upgraded. Market dynamics may result, however, in some delays to changes to transport routes / modes.
- **Mineral sands:** While a significant increase in the volume of mineral sands extracted and transported is expected across Western Victoria, significant improvement in the rail line are required in order for companies to utilise rail for transportation to the Port of Portland. Transport options are tested on a project-by-project basis. Mineral sand resource development companies indicated that even if projects initially used road, there is the potential to shift to rail as output and capital flexibility increase overtime.
- **Other commodities:** Consultation with State Government agencies indicated that there is expected to be new investment in timber plantations within proximity to the Port of Portland, while other significant industries such as industrial fertiliser manufacturers operated in proximity to the Portland Line. Stakeholders agreed, however, that the movement of logs and fertiliser via rail to and from the Port of Portland was unlikely.
- **Importance of the broader infrastructure network:** There are significant benefits of higher axle loading allowances, however it is important to consider the broader supply chain and, in particular, the efficiency of loading facilities. The importance of complementary supply chain investment needs to be taken into account.
- **Letters of support:** Consistent with the level of net community benefits expected to be generated from the preferred project option, multiple letters of support have been obtained from rail operators and freight owners that operate in the region and are expected to utilise the upgraded Portland Line in order to transport commodities to the Port of Portland (Appendix 4).

A more detailed summary of the outcomes of engagement with each stakeholder group is provided in the Table 38 below.

Table 38: Key findings from the stakeholder consultation process related to future levels of demand

| | |
|---|---|
|  | <p>Rail operators are a key member of the supply chain that supports the transportation of commodities via the Portland Line and it is therefore important to understand their commercial drivers and market intelligence.</p> <p>ARTC and members of the business case team interviewed senior representatives from four rail operators during the September quarter 2022.</p> |
| <p>There is significant upside to the volume of grain transported via rail if the Portland Line is upgraded. Market dynamics may result, however, in some delays to changes to transport routes / modes.</p> | |
| <p>While a significant increase in the volume of mineral sands extracted and transported is expected across Western Victoria, Portland Line upgrades would be required in order for companies to utilise rail.</p> | |
| <ul style="list-style-type: none"> - The Port of Portland is an overflow port because of the condition of the rail line and risks associated with operating on it. Geelong will clearly be preferred because there is 23 TAL access and industry confidence that the operating performance will be sustained. - Even post an upgrade, rail is unlikely to be competitive for logs and fertilisers. - With improved access there is no reason why Port of Portland couldn't capture all grain between Maroona and Taillem Bend in South Australia and anything else on Victoria's standard gauge network. The 'least cost path line' or 'line of indifference' (between Ports) will shift from year to year with harvest but you'd be highly confident Portland would always capture grain east of Serviceton. - There are market dynamics that mean some of that grain wouldn't immediately be captured. Over the long term these dynamics shift and ultimately Portland would be the least cost path to export and this advantage would eventually play out. | |
| <p>Future mineral sands production is not likely to be transported to the Port of Portland via road without change to the Portland Line. In particular:</p> | |
| <ul style="list-style-type: none"> - a minimum of 23 TAL would be required on the Portland line to help support the transportation of mineral sands via rail. - axle loads are a bigger incentive than journey times. That said, journey times do impact crewing costs and are therefore material to rail's competitiveness. | |



Grain marketers are involved in storage, logistics, marketing and processing of grains and are a key member of the supply chain that supports the transportation of commodities via the Portland Line. It is therefore important to understand their commercial drivers and market intelligence.

ARTC and members of the business case team interviewed senior representatives from grain owners during the September quarter 2022.

Growth in grain sector productivity is expected to continue over the long-term with producers having benefited from increasing returns attributable to, for example, new varieties of wheat that offer higher output in drier seasons.

There are significant benefits of higher axle loading allowances, however it is important to consider the broader supply chain and, in particular, the efficiency of loading facilities and branch lines from which grain traffic would originate.

- The majority of grain transported to the Port of Portland is by road. Generally speaking, transport distances under 200 km were seen to result in cost advantages for road.
- There is no inherent reason why grain would travel to Geelong over Portland if there were equivalent transport connections and unloading facilities.
- Some proportion of grain volumes currently being transported to the Port of Adelaide could be expected to be captured by Victoria with upgrades to the Portland Line.
- One grain producer saw significant benefit in higher axle loading allowances on rail. There is always a push to maximise axle loading, noting that the extra tonnage is extra productivity. Labour is one of the key cost inputs and therefore being able to move more with less people is hugely beneficial.
- Rail, however, needs to be efficient to work. This not only includes travel time but, critically, the quality of facilities at the port and how long it takes to discharge grain.



Mineral sands owners have a growing portfolio of projects located near existing infrastructure, in the Victorian portion of the Murray Basin.

Current and future projects are a potential source of demand for the Portland Line.

ARTC and members of the business case team interviewed senior representatives from four mineral sands owners during the September quarter 2022.

Mineral sands owners noted that there are trade-offs associated with rail and road transportation. While rail transportation has the potential to be more efficient than road, it can also be associated with higher upfront capital costs and reduced flexibility. For some mineral sand owners, this trade-off may result in rail being incorporated into their operations over time.

- Mineral sands owners were asked about future investment plans. The insights and learnings from these conversations have underpinned the mineral sands project list provided in Section 7.1.6 below.
- Mineral sands owners recognised the efficiency benefits that rail can deliver relative to road.
- Multiple stakeholders made the observation however that mineral sand projects can be capital constrained in the early phases and use of rail can involve additional capital costs (for sidings and loading facilities) that exceed \$10 million. As projects become cash flow positive there is greater opportunity to absorb these costs.
- It was noted, however, that there may be opportunities for third parties such as Rail Operating Companies to absorb these costs on the basis of long-term transport agreements.
- Rail was also seen to be more complex, requiring complex transport agreements with Rail Operating Companies and more constrained transport scheduling with Rail Infrastructure Managers.

Freight Victoria



Freight Victoria sits within the Department of Transport and has been established to coordinate the development of an efficient freight and logistics system.

ARTC and members of the business case team interviewed senior representatives from Freight Victoria on 10 June 2022.

There is significant upside to the volume of grain transported via rail if the Portland Line is upgraded.

Freight Victoria believes that demand on the line has dropped off because of the poor condition of the asset rather than other external factors.

The standardisation for the Mildura line under the Murray Basin Rail Plan has significantly expanded the Port of Portland's catchment for grain services so theoretically there should be significant demand if asset condition and performance is improved.

REGIONAL DEVELOPMENT VICTORIA



Regional Development Victoria, the Victorian Government's lead agency responsible for rural and regional economic development.

ARTC and members of the business case team interviewed senior representatives from Regional Development Victoria (Barwon South West) on 8 June 2022.

The region is projecting continued robust growth in grain exports, while there is also expected to be new investment in timber plantations. Other opportunities also exist to increase the utilisation of rail by (for example) industrial fertiliser manufacturers.

It was noted that a range of heavy industries have access to the line through sidings. Although they do not use rail today they could do in the future if service capacity was improved. This includes industrial fertilizer manufacturers and timber processors such as South-West Fibre and ATC.

GrainCorp currently controls the only grain handling facility at the port and the majority of upcountry grain loading facilities. An upgraded line with new open access facilities at Portland could increase export opportunities for other producers and increase market competition.

7.1.4. AGGREGATE DEMAND FORECASTS

The annual tonnage of commodities transport to the Port of Portland via rail is expected to increase to 1.2 million tonnes by 2035; close to a six-fold increase from the base case

An increase in the allowable axle loads and speed along the Portland Line is expected to raise the demand for rail freight services to the Port of Portland across a number of commodities including grain and mineral sands. The annual tonnage of commodities transported to the Port of Portland at 2035, approximately ten years after the preferred project option would be delivered, is expected to be close to 1.2 million tonnes under a medium demand scenario; approximately a six-fold increase from the base case.

High and low demand scenarios were developed in order to test the sensitivity of future demand for rail freight on the Portland Line to key assumptions related to future commodity production in Western Victoria and the commissioning of key infrastructure projects (Appendix 1):

- **Low demand scenario:** The annual tonnage of commodities transported to the Port of Portland at 2035 is expected to be approximately 0.6 million tonnes under a low demand scenario; close to a three-fold increase from the base case.
- **High demand scenario:** The annual tonnage of commodities transported to the Port of Portland at 2035 is expected to be approximately 2 million tonnes under a high demand scenario; close to a ten-fold increase from the base case.

Figure 42: Exports via rail to Port of Portland

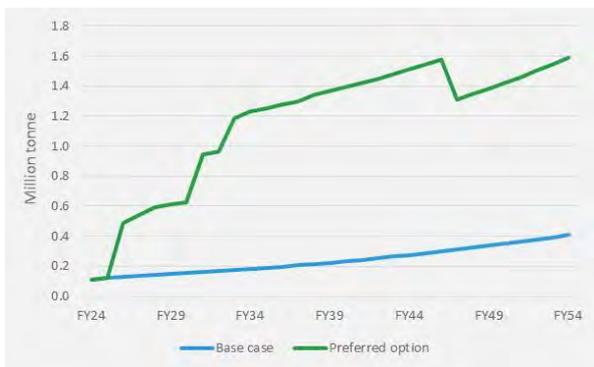
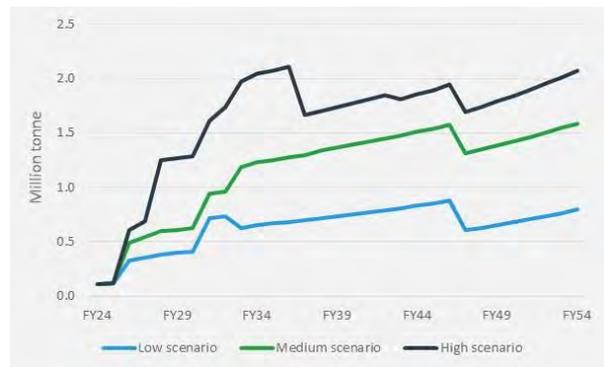


Figure 43: Preferred option: Exports via rail to Port of Portland



The remainder of this section outlines the methodology and assumptions that underpin the demand forecasts across a range of commodities including grain and mineral sands.

7.1.5. GRAIN

The annual tonnage of bulk grain transported to the Port of Portland via rail in 2035 is expected to be approximately 0.5 million tonnes; close to a three-fold increase from the base case

Solid growth in the volume of bulk grain exports produced in Western Victoria and a shift in mode share due to reduced rail freight costs, and an increase in the reliability and availability of rail freight services, is expected to lead an increase in the volume of grain transported via rail to the Port of Portland. In particular, the annual tonnage of grain transported to the Port of Portland in 2035 under the preferred option is expected to be approximately 0.5 million tonnes under a medium demand scenario, which is close to a three-fold increase from the base case.

Under the alternative low demand scenario, the annual tonnage of grain transported to the Port of Portland in 2035 is expected to be approximately 0.35 million tonnes; close to a two-fold increase from the base case. Under the alternative high demand scenario, the annual tonnage of grain transported to the Port of Portland in 2035 is expected to be approximately 0.71 million tonnes; close to a four-fold increase from the base case.

These estimates, including the total volume of grain produced in the region, the total volume of grain moved by rail, and the total volume of grain exported through the Port of Portland were tested with grain owners who confirmed the reasonableness of the projections and underlying assumptions.

Figure 44: Grain via rail to Port of Portland

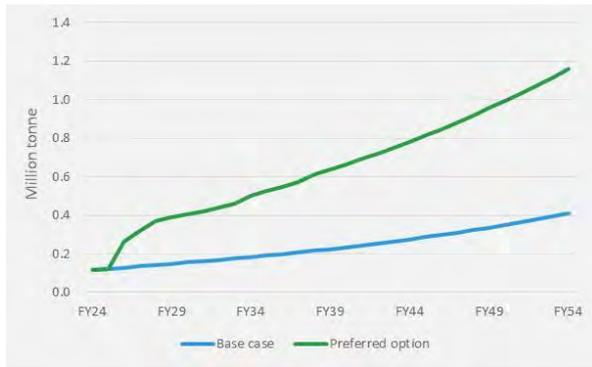
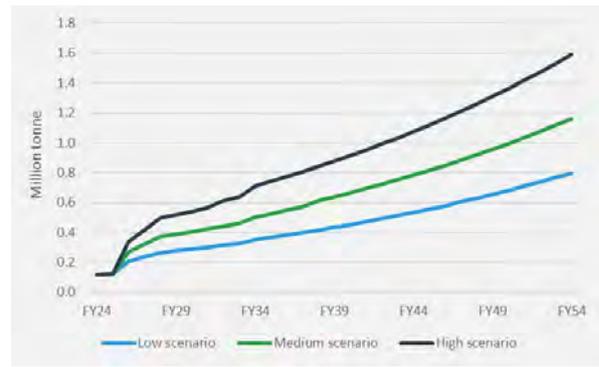


Figure 45: Preferred option: Grain via rail to Port of Portland



The forecasts of bulk grain volumes⁴⁹ transported to the Port of Portland via rail under the base case and preferred project option were developed via two key steps:

1. Estimation of the current and future volume of bulk grain exports that could potentially be transported to the Port of Portland via rail.
2. Estimation of the proportion of contestable bulk grain export volumes that would be expected to be transported to the Port of Portland via rail under the base case and preferred project option given the allowable speed and axle loads.

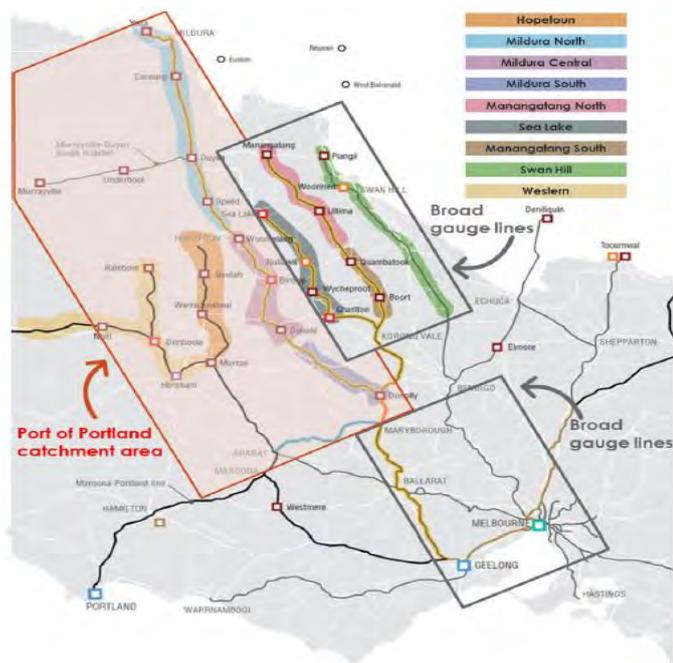
Solid growth in the volume of bulk grain exports produced in Western Victoria is expected to underpin future demand for rail freight services

In order to assess the future volume of grain that is transported to the Port of Portland via the Portland Line it is necessary to determine the size and scope of the potential customer base.

In the current context, the potential customer base includes bulk grain exporters that are located in proximity to the Port of Portland and connecting rail infrastructure such that the transportation of grain via rail to the Port of Portland is financially viable.

Bulk grain exporters located in the region designated as ‘the Port of Portland catchment area’ are assumed to have the option of transporting grain via rail to the Port of Portland if it is deemed to be cost efficient relative to other transport modes and/or ports.

Figure 46: Port of Portland’s Catchment Area



A ‘top-down’ approach was adopted to estimate the grain volumes in the base year, (2023) future Victorian grain production and then estimated the proportion of total grain volumes that are:

- transported in bulk as opposed to containerised
- exported versus consumed domestically
- produced in the catchment of the Port of Portland.

⁴⁹ The Port of Portland is not a container port and is unlikely to become one during the term of our forecast. As such, our demand forecast is limited to grain bulk exports only.

In the current context, the potential customer base and catchment of the Port of Portland was considered to be bulk grain exporters located in the Western Region and proximate to the standard gauge rail network and whose use of the network is considered to be financially viable. Importantly, these exporters are assumed to have the choice of transporting grain via road or rail as well as exporting grain through the Ports of Portland or Geelong, with the relative productivity of the relevant transport modes critical to export pathway decisions.

The Table 39 below outlines the estimated volume of grain exports in the base year and the key assumptions that underpinned the analysis.

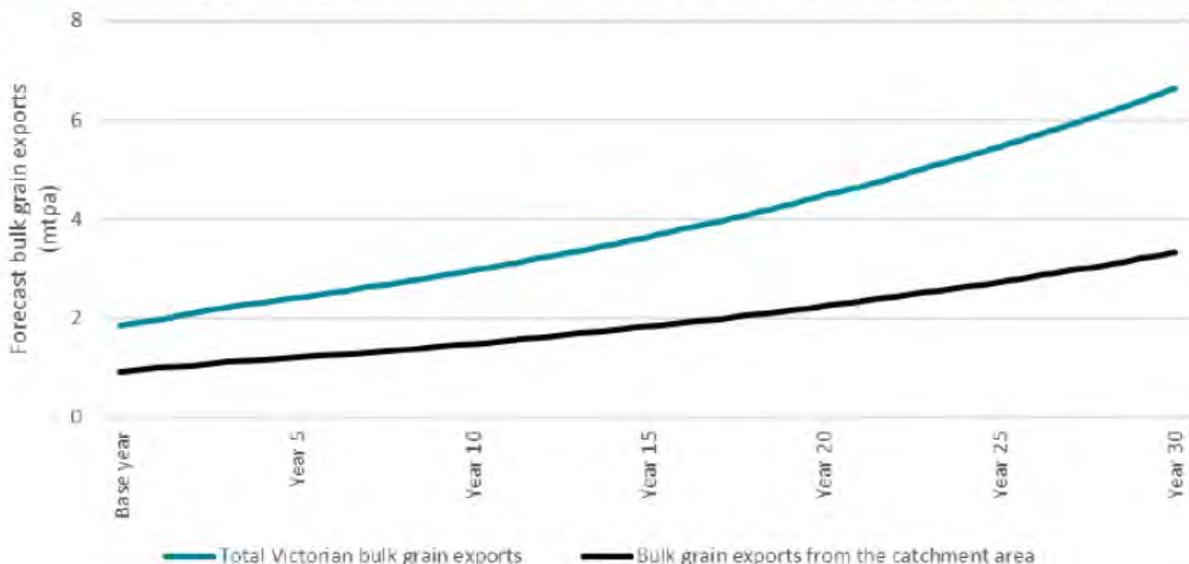
Table 39: Volume of bulk grain exports in base year (FY24)

| Elements of 'top-down' estimate | Value |
|---|-------------|
| Victorian grain production (mtpa) | 6.54 |
| Domestic consumption (mtpa) | 3.45 |
| Victorian grain exports (mtpa) | 3.08 |
| Share of exports shipped as bulk commodity (%) | 60 |
| Share of exports produced within Port of Portland catchment (%) | 50 |
| Total bulk grain exports produced within Port of Portland catchment (mtpa) | 0.92 |

Victorian grain production is expected to grow, on average, by 3.1 per cent per annum over the forecast period, which is consistent with growth rate observed over the past decade. Considering both the historical trends in Victorian grain production and the state of the future international grain market, the following growth assumptions were made:

- four per cent per annum for the first three years of our forecast, which is above the long-term average (3.1 per cent) due to:
 - o high estimated yield for FY22 (8.8 million tonnes) and high forecast yield in FY23 (7.7 million tonnes)
 - o the impact of the War in Ukraine on increasing the role for Australian supply in the international grain market.
- three per cent per annum for the remainder of the evaluation period, which is slightly below the long-term average (3.1 per cent).

Figure 47: Volume of bulk grain exports from the Port of Portland catchment area (Base year = FY24)



A significant mode share shift is expected for bulk grain exports due to the reduction in rail freight costs, and increase in the availability and reliability in rail freight services, following the delivery of the preferred project option

The base case assumes that the proportion of grain that is produced within the Port of Portland's catchment area and is transported by rail to the Port of Portland remains at 12 per cent over the forecast period in line with the fact that the performance specification of the Portland Line remains unchanged.

The increase in allowable axle loads and speed along the Portland Line under the preferred project option is expected to help reduce the weighted average financial cost of transporting grain to Port of Portland via rail by 12 per cent and also improve the availability and reliability of the Portland Line (e.g. greater certainty regarding track speed, total trip time and train path scheduling).⁵⁰ The expected reduction in rail costs, and improvement in the availability and reliability of the Portland Line is expected to, in turn, increase the proportion of bulk grain produced in the catchment area and transported to the Port of Portland via rail from 12 per cent to 32 per cent (please see Appendix 1 for further information).⁵¹

Table 40: Change in the utilisation of rail freight under the project option

| Option | Change in rail costs to Portland relative to base case | Portland market share | Portland rail modal share | Share going to Portland via rail |
|--------------------------|--|-----------------------|---------------------------|----------------------------------|
| Base case | | 36% | 34% | 12% |
| Preferred project option | -12% | 48% | 68% | 32% |

7.1.6. MINERAL SANDS

Mineral sands is expected to start being transported in bulk via rail to the Port of Portland, with the annual volume reaching 0.12 million tonnes by 2030 and 0.63 million tonnes by 2040

The commencement of a number of new mineral sands projects in Western Victoria is expected to lead to a significant increase in the volume of mineral sands exported through the Port of Portland. Since the closure of s47G(1)(a), s47G(1)(b), mineral sands traffic on the Portland Line has ceased along with exports through the Port of Portland. Prior to 2017 and the plant's closure, s47 s47G(1) moved the bulk of output s47G(1)(a), s47G(1)(b) via rail. Irrespective of this point, representatives of mineral sands miners indicated their working assumption that road freight to the port would be most efficient, at least in the short-term and under the current operating restrictions in place on the Portland Line.

Delivery of the preferred project option would be expected to reduce the cost of rail freight and therefore increase its viability for the transport of mineral sands. With new mineral sands mines commencing operations from 2025, demand projections assumed mineral sands will start being transported in bulk via rail to the Port of Portland, with the annual volume reaching 0.12 million tonnes by 2030 and 0.63 million tonnes by 2040.

Under the alternative low demand scenario, the annual tonnage of mineral sands transported to the Port of Portland at 2040 is expected to be approximately 0.3 million tonnes. Under the alternative high demand scenario, the annual tonnage of mineral sands transported to the Port of Portland is expected to peak at 1.1 million tonnes at 2035 and fall back to 0.6 million tonnes by 2040 under a high demand scenario.

⁵⁰ When calculating the rail supply costs for bulk grain exports we assume that all grain travelling via rail must first make a 25-kilometre journey to the rail head on a heavy vehicle to be loaded onto the train and sent to the port for export. The rail supply cost for the purposes of this analysis uses the average weighted supply costs from each distinct grain catchment area to port, weighted by that catchment's share of total bulk grain exports.

⁵¹ The majority of the change in demand is driven by the expected reduction in rail supply costs for bulk grain exports through the Port of Portland achieved with the upgrade. While the improved reliability and availability of the Portland Line is not quantified in the freight rail supply costs modelling, the impact of these factors on demand switching behaviour is captured in our assumed mode and port shares at the Port of Portland. The analysis implicitly assumes that a one per cent reduction in rail supply costs increases demand on the Maroona to Portland line by 13.51 per cent. This demand elasticity represents the quantified impact on demand of reduced rail freight supply costs and the impact on demand of improved reliability and availability, which have not been quantified.

Figure 48: Mineral sands via rail to Port of Portland

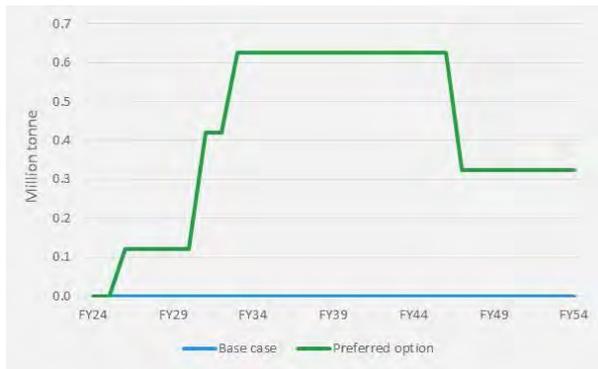
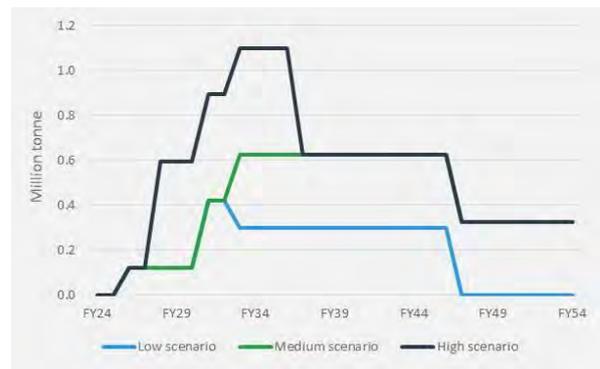


Figure 49: Preferred option: Mineral sands via rail to Port of Portland



Mineral sands can be exported in bulk, containerised bulk, or bags; the choice of export method can influence transport choices

Mineral sands processing broadly comprises two stages:

- the first stage involves separating the valuable material from the ore
- the second stage involves separating the valuable material into their individual mineral species.

The first stage processing is typically done on the mine site, however the second stage requires processing at a specialised plant. This plant can be built on-site, or minerals sands can be transported off-site/offshore for further processing.

Minerals can be transported in three main ways, i.e.:

- bulk in for example half-height bottom or side-dump loaders
- bulk in containers
- if the mineral sands have been separated into their individual species, bagged in containers.

Currently, the only mineral sands processing plant in Victoria is s47G(1)(a), s47G(1)(b) , which has been closed since 2017. Some Victorian mines are looking to construct processing plants on-site, s47G(1) s47G(1)(a), s47G(1)(b) . We understand from market sounding that the majority of mineral sands from Victoria will be exported either as bulk or containerised bulk.

It is understood that the Port of Portland does not have the facilities to accommodate bagged or containerised exports and is unlikely to in the future. Representatives of relevant projects, however, suggested bulk export was currently preferred. Further, there was a strong preference to use the Port of Portland over other available Ports noting its prior experience with mineral sands exports which are often classed as low-grade radioactive and therefore face strict storage and handling requirements.

A number of new mining projects are expected to help underpin an increase in the volume of mineral sands transported to the Port of Portland via rail

A number of potential mineral sand mines have been identified that could choose to export through the Port of Portland. A summary of these potential mine sites, their expected production volumes, as well as the rationale for their inclusion in the central demand forecasts in presented in Figure 50 below.

While no mineral sand exports are currently transported to the Port of Portland via rail, the construction and commission of the mining sites outlined in Table 41 below are expected to:

- increase the volume of mineral sand exports currently transported to the Port of Portland via rail to a peak level of close to 0.75 mtpa within 7-8 years
- maintain an average volume of mineral sand exports transported to the Port of Portland via rail at a level of close to 0.60 mtpa over a 20-year period.

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Figure 50: Total mineral sands export market (Base year = FY24)
s47G(1)(a), s47G(1)(b)



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Table 41: Summary of potential mineral sands mines underpinning demand forecasting

s47G(1)(a), s47G(1)(b)



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s47G(1)(a), s47G(1)(b)



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7.2. ECONOMIC ANALYSIS

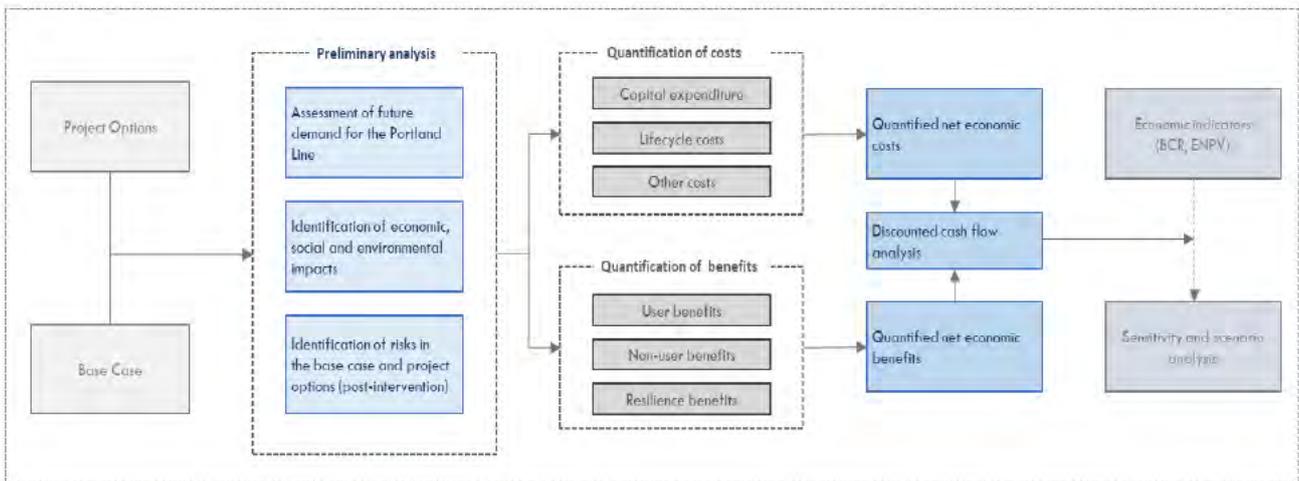
7.2.1. PURPOSE

The purpose of the cost benefit analysis (CBA) is to assess the economic viability of the preferred project option relative to the base case scenario. This section outlines the approach to the analysis, including the guidelines that were used to structure the approach and assumptions, the key inputs into the appraisal, the base case and option definition, and the sources of information used to estimate the economic impacts.

7.2.2. APPROACH

A CBA was undertaken to assess the economic viability of the preferred project option. CBA is an economic appraisal tool that isolates incremental costs and benefits over the evaluation period, relative to the base case scenario, and then uses discounted cash flow analysis to determine the net benefit to society. An overview of the CBA approach for the preferred project option is illustrated by the figure below.

Figure 51: Cost benefit analysis methodology



Economic appraisal guidelines and parameters

The approach and parameters specified in the cost benefit analysis are consistent with relevant economic appraisal guidelines including Infrastructure Australia’s Assessment Framework. The core analysis assumptions and inputs for the CBA are summarised in the Table 43 below.

Table 43: Economic appraisal assumptions and inputs

| Item | Assumption | Source |
|--|--|---|
| Base date for net present value calculations | 2023 | Base assumption |
| Time scale | Annual (financial year) | Base assumption |
| Consumer Price Index (CPI) | 2.5 per cent p.a. | Average based on Sydney CPI |
| Real discount rate | 7.0 per cent p.a. | Infrastructure Australia Assessment Framework |
| Period of analysis | Planning and construction: – FY24 to FY25 Operation: – FY26 to FY54 | Lycopodium |
| Demand analysis | – | Houston Kemp (Appendix 1) |
| Capital and maintenance costs | – | Lycopodium (Appendix 2) |
| CBA guidelines and best practice principles | – | Infrastructure Australia’s Assessment Framework |

The financial appraisal outlined above focuses on the incremental revenue flows, capital and operating costs faced by government in delivering the preferred project option. In contrast, the CBA broadens the analysis to capture the economic impact of the preferred project option on all relevant stakeholders and includes consideration of social and environmental impacts. The CBA is thus an important component of the Business Case, as it provides decision makers with a complete view of the net socio-economic impacts of the investment, that is, the expected total impact on societal welfare that would result from the project.

In the current context, the broader scope of the CBA requires consideration of critical interdependent projects that are required to realise the project benefits. This CBA does not however extend to cover the wider indirect economic impacts that may arise from the project. This is consistent with common economic appraisal methodology. These economy-wide impacts, such as the employment benefits resulting from the project, are discussed in this analysis, but have not been quantified.

7.2.3. COSTS AND BENEFITS ASSOCIATED WITH THE PREFERRED OPTION

The upgrade to the Portland Line and the corresponding increase in the utilisation of the broader rail network will be associated with a range of costs for stakeholders within the supply chain

The upgrade to the Portland Line to enable higher axle loads and speeds is expected to be associated with a broad range of activities and costs including, but not limited to, re-sleeping and upgrade of structures. The increased utilisation of the Portland Line due to the upgrade is, in turn, anticipated to require:

- additional maintenance spending relative to the base case on upstream rail lines,
- maintenance cost savings on the Portland Line as upgrades on the line lowers the need for ongoing maintenance requirements, and
- the delivery of critically interdependent infrastructure projects associated with accommodating increased throughput at the port and upcountry rail facilities.

The Table 44 below outlines the key cost components considered as part of the cost benefit analysis and the expected bearer of the costs.

Table 44: Economic costs considered as part of the cost benefit analysis

| Costs included in analysis | Bearer |
|---|---------------------------------|
| Capital expenditure to upgrade the Portland Line | ARTC |
| Maintenance on the Portland Line | ARTC |
| Incremental maintenance on upstream ARTC track | ARTC |
| Incremental maintenance on upstream third-party track | Third party (VLine) |
| Additional port investment | The Port of Portland |
| Additional investment in upcountry freight facilities | Third party (freight operators) |

The primary benefits of the preferred project option are the anticipated improvements to the productivity of the Portland Line and broader supply chains of key industries located across Western Victoria

The increase in allowable axle loads and speeds on the Portland Line under the preferred project option will help to reduce the cost of rail freight movements to the Port of Portland (relative to the base case) due to the:

- consolidation of freight into fewer shipments can reduce the fees charged by logistics companies as fewer pickups are required
- increased speeds and reduced transit times will result in reduced cycle times and labour costs for freight operations.

The reduced cost of rail freight movements and increased utilisation of the Portland Line are expected to lead to secondary productivity benefits for exporters and key industries located in Western Victoria due to greater competition among ports and the delivery of critical interdependent projects.

A number of positive externalities are also expected to benefit third-parties within Western Victoria due to the shift of freight movements to the Port of Portland from road to rail

The reduction in the relative cost of transporting freight to the Port of Portland via rail is expected to result in increased utilisation of the Portland Line by exporters located in Western Victoria and a corresponding reduction in the number of heavy freight vehicles on the local road network. The shift in mode share from road to rail is anticipated to lead to a number of positive externalities to the regional community including, but not limited to, reduced carbon emissions, safer and less congested roads and reduced road maintenance costs.

Over the longer term, the proposed upgrade to the Portland Line is expected to result in a more reliable and resilient freight supply chain, and help support private investment in key industries within Western Victoria

The preferred project option is expected to improve the reliability and resilience of the regional supply chains by reducing the:

- the cost and time associated with transporting freight to the Port of Portland (relative to the base case) in the event that there is a temporary closure to neighbouring ports and/or segments of the broader rail network
- the planned and unplanned maintenance would be required following upgrading the Maroona to Portland line, which will lead to a reduction in rail service delays and cancellations.

Reductions in the transportation costs stemming from the upgrades to the Portland Line would also be expected to help improve the financial feasibility of infrastructure projects and support the future industry investment across Western Victoria.

Where possible, the broad range of benefits outlined above were valued in order to inform the cost benefit analysis of the preferred project option

In the context of the market dynamics outlined above, the table below outlines the incremental economic benefits associated with the preferred project option, the benefit categories that were monetised for the purpose of the cost benefit analysis, and the key stakeholder groups that are expected to accrue the benefits. Every effort was made to value the full range of benefits that are expected to stem from the preferred project option in order to ensure a meaningful comparison to the costs outlined above. Where this was not possible, due (for example) to a lack of data and/or information to underpin the analysis of the expected benefits, a qualitative description has been included in Appendix 1.

Table 45: Economic benefits considered as part of cost benefit analysis

| Benefit Category | Variable | Description | Beneficiaries | Monetised | Rationale / method / parameters |
|---|--|---|---------------------------------------|-----------|--|
| Improved productivity of the Portland Line and freight network | Freight productivity benefits | Reduced time and cost associated with transporting freight via the Portland Line. | Exporters and industry supply chains. | ✓ | Australian Transport Assessment and Planning Guidelines. |
| | Port-side productivity improvements | Productivity gains from required port investments such as the cycle times for vessels. | | -- | Data availability and potential scale of benefits. |
| | Maritime journey time savings or costs | Reduced time and cost of shipping due to changes to freight routes that stem from greater utilisation of the Port of Portland. | | | |
| | Increased competition among ports | Increased productivity at ports due to higher levels of accessibility and competition. | | | |
| | Cumulative productivity gains | Increased productivity gains from the future upgrade to neighbouring segments of the broader rail network. | | | |
| Positive Externalities | Avoided externalities | Reduced externalities including reduced impact on climate change due to fewer freight vehicles being on the road. | Regional community. | ✓ | Australian Transport Assessment and Planning Guidelines. |
| | Amenity benefits | Reduced air pollution and noise due to fewer freight vehicles being on the road. | | ✓ | |
| | Safety benefits | Reduced accidents on the local road network due to reduced number of heavy freight vehicles. | | ✓ | Consistent with Inland Rail business case. |
| | Avoided road maintenance | Reduced cost to maintain local road network due to reduced number of heavy freight vehicles. | | ✓ | National Transport Commission and Austroads. |
| | Avoided road congestion | Reduced congestion on the local road network due to reduced number of heavy freight vehicles. | | -- | Data availability and potential scale of benefits. |
| | Broader amenity benefits | Other potential amenity benefits that stem from fewer freight vehicles being on the local road network. | | | |
| Longer term benefits related to reliability, resilience and industry investment | Resiliency benefits | Reduced cost and time associated with utilising the Portland Line in the extent of closures across the broader freight network. | Exporters and industry supply chains. | ✓ | Unplanned outage assumptions provided by ARTC. |
| | Reliability benefits | Reduction in rail service delays and cancellations due to upgrade works. | Regional community | -- | Data availability and potential scale of benefits. |
| | Local and regional development | Improved attractiveness of regional infrastructure projects. | | | |
| Other | Residual value of assets | Value of the Portland Line at the end of the evaluation period. | ARTC. | ✓ | Straight-line depreciation. |

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7.2.4. ECONOMIC ANALYSIS RESULTS

The preferred project option is expected to deliver net community benefits in line with the high level of freight productivity benefits that will accrue to exporters and other members of industry supply chains

The methodology and assumptions adopted to value the benefits and costs outlined above are outlined in Appendix 1. Table 46 below details the outputs of the cost-benefit analysis using a 7 per cent real discount rate. In summary:

- The preferred project option delivers a BCR of 1.32, that is, the (quantified) incremental community benefits are expected to outweigh the (quantified) incremental costs
- Close to 80 per cent of the total (quantified) incremental benefits that stem from the preferred project option are expected to reflect freight productivity benefits that will accrue to the exporters and broader industry supply chains
- Close to 15 per cent of the total (quantified) incremental benefits that stem from the preferred project option are expected to reflect positive externalities (including safety) that will accrue to the regional community
- The improved condition of the Portland Line under the preferred project option is expected to result in significant savings in ongoing maintenance spending
- Close to 90 per cent of the total (quantified) incremental costs associated with the preferred project option are expected to reflect capital expenditure to upgrade the allowable axle loads and speeds.

Table 46: Incremental project benefits and costs associated with the preferred project option

| Benefit categories | Variables | Preferred project option (\$m PV 2023 @ 7%) |
|---|-------------------------------|--|
| Improved productivity of the Portland Line and freight network | Freight productivity benefits | 127 |
| Positive externalities | Avoided externalities | 9 |
| | Amenity benefits | 0.5 |
| | Safety benefits | 8 |
| | Avoided road maintenance | 9 |
| Longer term benefits related to reliability, resilience and industry investment | Resiliency benefits | 0.01 |
| Other | Residual value of assets | 5 |
| Total incremental benefits | | 159 |
| Additional track maintenance on other lines | | 5 |
| Incremental operating expenditure | | -18 |
| Capital expenditure | | 108 |
| Port and upcountry investment | | 26 |
| Total incremental costs | | 121 |
| Net present value | | 38 |
| Benefit cost ratio | | 1.32 |

7.2.5. SENSITIVITY ANALYSIS

The future volume of contestable commodities produced in Western Victoria and changes to the relative cost of rail will be key drivers of the level of net community benefits realised

The magnitude of the incremental benefits and costs associated with the preferred project option estimated above are subject to an inherent degree of uncertainty. It is therefore important to consider how the results of the CBA analysis vary with changes to underlying assumptions and the parameters used.

A key uncertainty related to the level of net community benefits generated by the preferred option is the future level of demand for rail freight on the Portland Line. Sensitivity analysis was undertaken to assess how the demand scenarios outlined in Appendix 1 affect the estimated BCR of the preferred project option.

The extent to which the preferred project option delivers net community benefits is sensitive to the level of demand assumed over the forecast horizon:

- In particular, a lower level of contestable commodities produced in Western Victoria over the forecast horizon would be expected to reduce the volume of freight that is transferred to the rail network following the upgrades to the Portland Line and, in turn, the scale of the productivity benefits and positive externalities. **Adopting the assumptions that underpin the 'low demand scenario' outlined in Appendix 1 would result in a BCR of 0.75.** It is worth noting that the 'low demand scenario' assumes reduced level of production and utilisation of the Portland Line across a number of key commodities. The extent to which the preferred project option delivers net community benefits (BCR>1) was found to be insensitive to any one particular infrastructure project going ahead over the forecast period
- Conversely, a higher level of contestable commodities produced in Western Victoria over the forecast horizon would be expected to increase the volume of freight that is transferred to the rail network following the upgrades to the Portland Line and, in turn, the scale of the productivity benefits and positive externalities. **Adopting the assumptions that underpin the 'high demand scenario' outlined in Appendix 2 would result in a BCR of 1.86.**

Additional sensitivity analysis was conducted on the level of cost contingency included in the capital cost estimate and the discount rate applied. The extent to which the preferred project option delivers net community benefits was found to be relative insensitive to the variables outlined directly above, with the BCR remaining above or close to 1 across the range of parameters tested.

As outlined above, a high proportion of the incremental benefits of the preferred option are freight productivity benefits. The estimated scale of the freight productivity benefits is based, in part, on the assumption that relative road / rail productivity remains unchanged over the forecast horizon post the infrastructure works. In order to test the sensitivity of the economic analysis to this assumption, break-even analysis was conducted based on a series of road productivity scenarios. The BCR was found to equal 1 under the assumptions that there is:

- a reduction in the relative cost of road freight for bulk gain exports of 10 per cent, and
- a reduction in the rail mode share for bulk gain exports at the Port of Portland by 20 percentage points.

The analysis suggests that the extent to which the preferred project option delivers net community benefits is sensitive to assumptions related to the relative cost of rail over the forecast period.

Table 46: Sensitivity testing of the preferred option

| Parameter | BCR of preferred project option (\$m PV 2023 @ 7%) |
|------------------------|---|
| Demand scenario | |
| Low demand scenario | 0.75 |
| Medium demand scenario | 1.32 |
| High demand scenario | 1.86 |
| Capital costs | |
| P50 | 1.32 |

| Parameter | BCR of preferred project option (\$m PV 2023 @ 7%) |
|--|---|
| P90 | 1.12 |
| Discount rate | |
| 4 pe cent | 1.89 |
| 7 per cent | 1.32 |
| 10 per cent | 0.96 |
| Road productivity scenario | |
| Decrease in the assumed (i) rail mode share at the Port of Portland by 20 percentage points; and (ii) the relative economic cost of road freight by 10 per cent. | 1.0 |

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Implementation

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8. IMPLEMENTATION

CHAPTER SUMMARY

ARTC regularly implements track upgrade works across its broader rail network and has established a range of business-as-usual procedures and practices that can be leveraged to deliver the preferred project option.

Procurement

Three distinct work packages were identified for procurement as part of the preferred project option. Each of the identified work packages is not overly complex and involves proven technology / products that are well understood and can be delivered by a range of suppliers.

Governance and management

The Major Construction Projects division of ARTC will be responsible for delivering the Portland Line upgrades, and as such, existing risk management, governance, asset and change management, and approvals processes will apply in implementing the Portland Line upgrade. The ARTC will also continue to re-engage with stakeholders during the pre-delivery, delivery and post-delivery phases aligning with the ARTC's Project Management Procedure (EGP-20-01).

Benefits realisation

ARTC plans to monitor and report on indirect measures of project benefits including the ongoing operating performance of the Portland Line and the number of weekly rail freight trips to measure the benefit realisation and successful implementation of the project.

8.1. PROCUREMENT STRATEGY

8.1.1. PURPOSE

The purpose of this section is to identify the most efficient methods to package and procure the scope of works outlined in Chapter 6 that is required to deliver the preferred project option.

8.1.2. APPROACH

The preferred procurement approach was developed in close collaboration with ARTC procurement specialists via the following steps:

- **Packaging:** Alternative packaging options for the scope of works were explored and assessed based on technical and engineering requirements.
- **Staging:** Alternative procurement staging strategies were considered that could in theory focus on (i) specific areas of the rail network, and/or (ii) specific technical elements of each work package.
- **Characteristics of work packages:** The characteristics of each work package was reviewed including the scope, scale, risks and whole-of-life opportunities to engage the contractor.
- **Alternative contracting models:** A long-list of alternative contracting models were identified and reviewed in order to assess the applicability to the work packages.
- **Preferred procurement approach:** Preferred procurement approaches for each work package were identified based on the steps above.

8.1.3. PROCUREMENT AND DELIVERY STRATEGY

Three distinct work packages were identified for procurement as part of the preferred project option

ARTC has the option to procure goods and services from the private sector to complete the full scope of works for the preferred option under a single package of works or under multiple packages of works that vary in terms of technical and engineering requirements.

Procuring services from the private sector to deliver the preferred option under multiple packages of works is associated with a number of trade-offs including, but not limited to:

- Reducing the value and financial risk of the scope of works enabling a wider range of contractors to participation and, in turn, increase the level of market competition, and/or
- Lead to interface and coordination risks during the delivery of the preferred project option.

In consideration of the varying technical capabilities to each package of works for the preferred option⁵³, and the trade-offs outlined above, ARTC has chosen to procure three distinct work packages as detailed in the table below:

Table 48: Shortlisted packaging options

| Work packages | Brief Description | Scope Inclusions |
|---------------|------------------------------------|---|
| Package One | Procurement rail track components | Procurement of sleepers, ballast, and rail lengths |
| Package Two | Rail track upgrade services | Services required to perform track upgrades, structure works, and turnout refurbishments. |
| Package Three | Level crossing technology upgrades | Installation of axle counters at 22 level crossings between Marroona and Portland |

The procurement of rail track components including sleepers will be managed through existing policies and practices that have been used to source similar inputs for other rail upgrade initiatives. In doing so, ARTC expects to be able to achieve bulk discounts that would not be possible for individual tenderers.

Staging the procurement process was not considered appropriate for any of the three work packages

The procurement of each of the three work packages above could in theory be staged to focus on (i) specific areas of the rail network, and/or (ii) specific technical elements of each work package. Staging the procurement process was not considered appropriate for the scope of works identified above as:

- Staging of rail track upgrades to focus on specific areas of the rail network overtime would limit the value of upgrades to rail operators until the final stage was complete
- Staging of either work package by specific technical elements would be likely to lead to cost inefficiencies and project delays.

Each work package is not overly complex and involves proven technology / products that are well understood and can be delivered by a range of suppliers

The characteristics of the three work packages that comprise the preferred project option were reviewed in order to help inform the assessment of the feasibility of alternative contracting options that are available to ARTC (Table 49).

Table 49: Characteristics of the work packages

| Characteristics of work package | Package of works | | |
|---------------------------------|-----------------------|----------------|------------------------------------|
| | Rail track components | Track upgrades | Level crossing technology upgrades |
| s47G(1)(a), s47G(1)(b) | | | |

⁵³ For example, the installation of axle counters at level crossings are expected to require a specialist signaling contractor.

| Characteristics of work package | Package of works | | |
|---------------------------------|-----------------------|----------------|------------------------------------|
| | Rail track components | Track upgrades | Level crossing technology upgrades |
| s47G(1)(a), s47G(1)(b) | | | |

‘Construct only’ contracting models were thus considered appropriate for the three distinct work packages

ARTC has a number of contracting options that could, in theory, be considered for procuring the work packages that are required to upgrade to the Portland Line in line with the preferred project option outlined above. This section identifies a long-list of potential contracting options and provides an overview of how each model could work in practice to procure the required engineering services.

Table 50: Contract model options

| Contracting model | Description |
|---------------------------------------|---|
| Construct only | Under this model, the design and construction stages would be undertaken separately, with ARTC preparing the design specifications either in-house or using consultant resources, and a contractor subsequently being engaged to construct the works in line with an agreed program, pre-existing design and other project documentation. |
| Design and construct (D&C) | Under this delivery model, a contractor would be engaged to both design and construct the project works, based on a design brief supplied by ARTC. The contractor would either use in-house design resources to prepare the design or bids as part of a consortium that includes external designers. ⁵⁴ |

⁵⁴ Under this approach the contractor owns design and interface risk which provides for greater flexibility if changes are required during the construction process. It makes the model generally more suitable than construct only contracts for ARTC where there is a level of design complexity or risk.

| Contracting model | Description |
|---|--|
| Construction management | This model would involve ARTC engaging the designer and trade contractors directly, whilst also engaging a construction manager to act as its agent and manage the delivery of the construction works on its behalf. |
| Managing contractor | This model would involve ARTC employing a head contractor as the 'managing contractor' to manage the development of the design, coordinate production of construction documentation, enter into contracts and manage the delivery of the works on behalf of the project owner. |
| Directly managed | This delivery model would involve ARTC directly managing the full delivery of the project works. |
| Early contractor involvement (ECI) | Under the ECI approach designs would be collaboratively developed to a point where risks can be efficiently scoped and costed by the contractor. Once this has been achieved the model switches to a fixed price approach, more like a D&C. |
| Alliance | ARTC and one or more non-owner participants would work collaboratively to deliver the project, sharing project risks and rewards. This model is often used for highly complex projects with uncertain risk profiles that would be difficult to effectively scope, price and deliver under a more traditional delivery model. ⁵⁵ |
| Private-public partnership | In broad terms, ARTC would provide a concession to a private sector operator (concessionaire) to make them responsible for the construction and maintenance of the Portland Line. Under this approach the concessionaire would bear the full costs and risk associated with the project and either be eligible to take up any reward (have the ability to charge for access to the track, for example) or be paid a fixed annual price for keeping the line available over its term (in which case ARTC would wear the demand risk). |

The feasibility and efficiency of each of the contracting options were assessed based on the project characteristics outline above (Table 51). In summary, the **'Construct Only'** approach is the recommended procurement method for each work package, with ARTC separately managing design requirements and environmental approvals. This contract model is considered most suitable due to the standard component / practice nature of the proposed works to be undertaken. A detailed breakdown of the scope of works to be procured is outlined in Section 6.1.

Table 51: Contracting options assessment

| Contracting option | Applicability to package of works |
|---------------------------------------|---|
| Construct only | The low level of complexity associated with each work package lends itself to a traditional 'Construct Only' procurement strategy. |
| Design and construct (D&C) | A D&C approach is not warranted for either if the work packages given there is very minimal requirement for specialist design. This conclusion was reached by key ARTC stakeholders and is consistent with the procurement approach adopted for other similar rail upgrades that have been delivered by ARTC in recent years. |
| Construction management | The work packages are not viewed as sufficiently complex in scope to warrant consideration of these contracting approach. |
| Managing contractor | |
| Directly managed | |
| ECI | |
| Alliance | The work packages do not lend themselves to an Alliance procurement method as there is limited design requirement and the scope is well defined. |
| PPP | PPP is not considered to be an appropriate contract model due to the inability of the rail line to generate a sufficient revenue stream. As such, this model is unlikely to generate sufficient market interest or deliver a value-for-money outcome given its relatively small scale. |

⁵⁵ This model can be more appropriate than a D&C approach, for example, where a contractor would be unable to efficiently scope and cost risks, necessitating higher risk premiums or increasing the chance of conflict during the delivery process. Where D&C contracts generally used fixed pricing, Alliances use a Target Outturn Cost (TOC) approach with a 'pain share / gain share' mechanism that sees cost over runs and under runs shared between Alliance participants.

ARTC has significant experience with the procurement of rail track upgrades and will be guided by its thorough procurement policy

ARTC has significant experience procuring services from the private sector to upgrade segments of the rail network that it currently operates including, but not limited to, Adelaide to Tarcoola Rail Upgrade Acceleration and Tarcoola to Kalgoorlie Rail Upgrade Acceleration Project. ARTC's procurement practices are governed by the following key principles:

- Ethical standards, including open and fair competition
- Value for money
- Compliance with procurement procedures
- Declaration and management of Conflicts of Interest.

ARTC will follow business-as-usual processes and practices to procure the work packages

In order to align with the principles outlined above, ARTC would procure the upgrade works via the following process:

- Release an Expressions of Interest ('EOI') to selected market participants that includes a specification requirement
- Assess submissions, short-list preferred tenderers, and develop a formal request for quote ('RFQ')
- Assess submissions and invite the preferred candidate(s) to submit their Best and Final Offer ('BAFO').

In seeking best value for money in its procurement processes, ARTC will consider where appropriate:

- Fitness for purpose
- Quality of products/services
- Whole of life cycle costs
- Price
- After sales support
- Supplier's past performance
- Lead times
- Supply risks.

Market assessment of capacity and capability

At the time of drafting, a market sounding process has not been undertaken with potential delivery parties. Given the similarity of a number of recent projects undertaken by ARTC, the fact that Portland is not considered a remote location compared to recent ARTC projects, and the relatively low-level of complexity associated with the scope of works, ARTC is confident that a competitive market exists of parties who have the capability to perform the project works.

8.2. ENVIRONMENT AND PLANNING APPROVALS, RISKS AND STRATEGIES

The required upgrades to the existing Portland Line under the preferred project option are expected to result in minor environment impacts that can be mitigated under ARTC's Standard Environmental practices

No priority sites were identified along the rail corridor from ARTC registers and a literature review of publicly available registers of ecologically sensitive areas, contamination, cultural significant heritage areas, regulated waterways and waterbodies.⁵⁶

The scope of works associated with the preferred option are restricted to the existing rail track and subsequently any associated risks and/or impacts are expected to be low, temporary and are considered to be readily mitigated under ARTC's Standard Environmental practices.

Where upgrade works to the Portland Line occur in areas of relatively high environmental risk (e.g. waterways), there may be a requirement under the Standard Environmental practices for ARTC to undertake specific inspections and targeted studies to further inform required mitigations measures.

While the preferred project option does propose the removal of some contaminated ballast and spoil from the line, it is not expected to be in a volume that would trigger the need for environmental approvals.

8.3. PROJECT GOVERNANCE AND MANAGEMENT

PROJECT GOVERNANCE

The Major Construction Projects division of ARTC will be responsible for delivering the Portland Line upgrades

The Portland Line upgrades will be delivered by the Major Construction Projects division of ARTC which is responsible for designing, constructing and commissioning all new major projects, including Inland Rail in Victoria. These projects range from track and junction upgrades and capacity improvements through to construction of new railway lines.

A consistent internal governance framework is applied to all major construction projects (MCP)

The proposed governance structure for the delivery of the Portland Line upgrades will be consistent with previous major projects delivered by the Major Construction Projects division of ARTC and is designed to provide transparency and accountability throughout the project lifecycle on decision making, project objectives, risks and issues financial management and progress of delivery. The governance model operates within the ARTC three-lines-of-defence assurance model including:

- Internal controls and management controls
- MCP PMO assurance reviews
- Internal Audit.

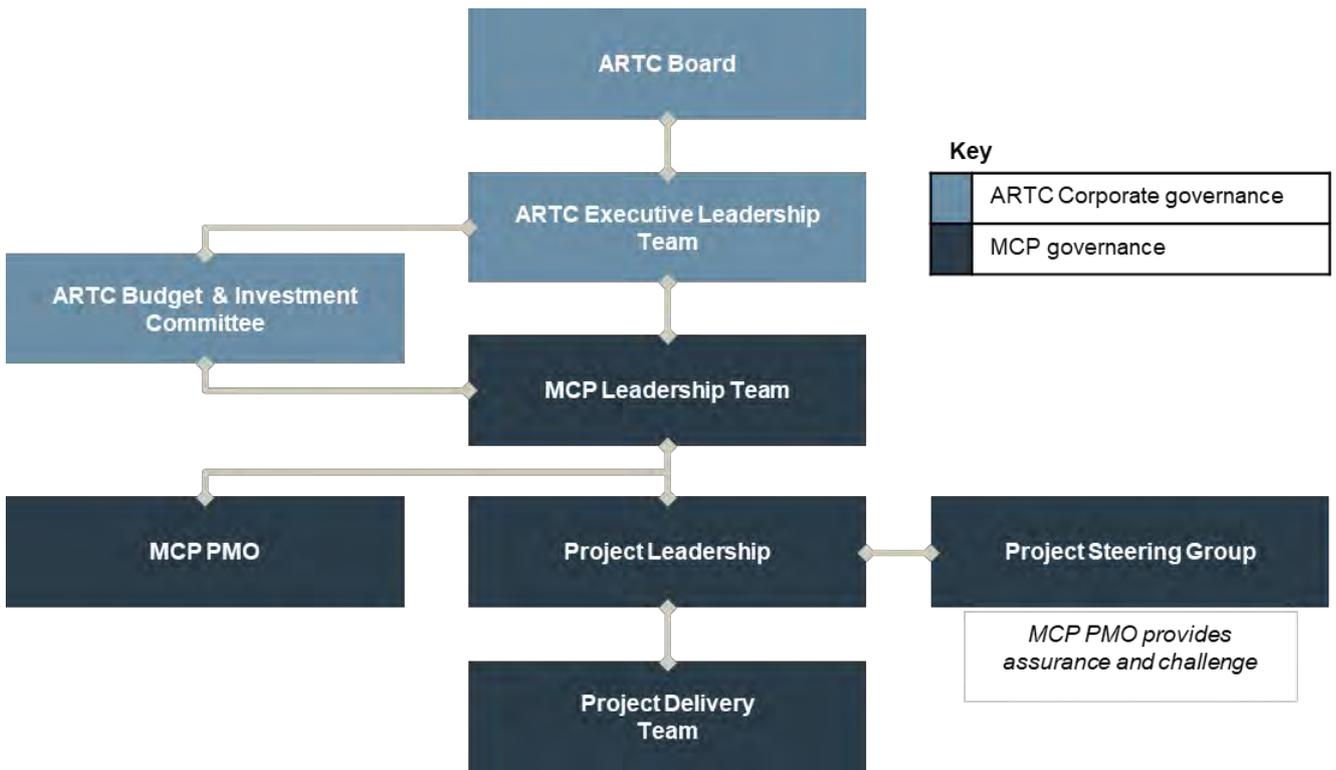
Additional project control group(s) may also be formed in the event that external funding is secured in line with the internal ARTC governance framework

As outlined above, funding is being sought from state and federal government agencies to support the delivery of the preferred project option. It is customary to complement the internal ARTC governance framework with a project control group when external funding is provided to support major construction projects.

In the event that external funding is provided, project control group(s) would be expected to be made up of representatives from relevant government agencies who will monitor progress against the proposed project budget and schedule.

⁵⁶ It should however be considered that spoil management and any required disposal of spoil offsite is treated as contaminated.

Figure 52: Proposed governance structure to deliver to Portland Rail Upgrades



PROJECT MANAGEMENT

ARTC’s project management procedure contains best practice practices and procedures for delivering the Portland Line upgrades

Clear project planning, scoping, development and delivery processes are detailed in ARTC’s Project Management Procedure (EGP-20-01) with key documentation including defined templates for:

- Project Management Plan
- Risk & Safety Management Plan
- Procurement strategy and material plans
- Stakeholder engagement and management plan
- Detail design and scope of works
- Project delivery reporting (Scope, Schedule, Risk, Cost, Safety)
- Roles & Responsibilities Report
- Environmental Management report.

Detailed project reporting will be conducted throughout the implementation phase in accordance with ARTC’s Project Management Procedure. The PCR will then include an analysis of how efficiently the project was delivered against forecast capital costs, and whether delivery objectives were achieved.

Lessons learned in relation to management, governance and regulation have been captured as part of the closure of previous major capital projects and will be used to improve project planning, delivery and risk mitigation for the Portland Line upgrades.

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8.4. STAKEHOLDER ENGAGEMENT PLAN

ARTC will re-engage with the stakeholders consulted as part of the development of this Business Case during the various stages of the rail track upgrades

The Portland Line upgrades are not expected to lead to any significant social or environmental (negative) impacts. The required community stakeholder engagement is thus expected to be minimal. ARTC does understand however that continued engagement with the broader community throughout the phases of the project life-cycle is essential to the success of the Project and will develop a detailed stakeholder engagement and management plan that aligns with ARTC's Project Management Procedure (EGP-20-01).

In particular, ARTC will re-engage with the stakeholders consulted as part of the development of this Business Case during the various stages of the rail track upgrades, including:

- **Pre-delivery phase:** ARTC will re-engage with stakeholders prior to the delivery of the Portland Line upgrades to ensure there is a common understanding (and to receive input where required) regarding the program schedule, coordination of infrastructure investments, commercial arrangements and the design and staging of rail track upgrades.
- **Delivery phase:** ARTC will re-engage with stakeholders during the delivery of the Portland Line upgrades to ensure there is a common understanding regarding how the delivery of the rail line upgrades and any complementary investments is progressing relative to the program schedule.
- **Post-delivery phase:** ARTC will have key performance indicators related to the utilisation of the Portland Line following the delivery of the preferred project option. As part of a broader benefit management plan, ARTC will intermittently re-engage with relevant stakeholders during the post-delivery phase to monitor and understand progress made towards key performance targets.

Table 52: Stakeholder engagement plan

| | Pre-delivery phase | Delivery phase | Post-delivery phase |
|---|--|--|--|
| Nature of consultation | | | |
| Consultation requirements | Consultation with relevant stakeholders to ensure a common understanding and input (where required) regarding: <ul style="list-style-type: none"> - Program schedule, key milestones, as well as the timing and duration of rail line closures, - Coordination of infrastructure investments such as terminal and/or carriage upgrades, - Commercial arrangements such as any required variations to access arrangements, - Design and staging of the rail track upgrades, - Safety protocols and/or approvals. | Ongoing consultation with relevant stakeholders to ensure a common understanding regarding how the delivery of the rail line upgrades and any complementary investments is progressing relative to the program schedule. | Ongoing consultation with relevant stakeholders regarding progress towards achieving key KPIs that are included in the benefits management plan. |
| Engagement with key stakeholders | | | |
| s47G(1)(a), s47G(1)(b) | ✓ | ✓ | ✓ |
| | ✓ | ✓ | |
| | ✓ | ✓ | ✓ |
| | ✓ | ✓ | ✓ |
| | ✓ | ✓ | |
| | ✓ | ✓ | |
| | ✓ | ✓ | |
| | ✓ | ✓ | ✓ |
| | ✓ | ✓ | |
| | ✓ | ✓ | |

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8.5. CHANGE MANAGEMENT

No significant changes are expected to be required to ARTC's commercial interfaces

ARTC has a number of commercial interfaces including a long-term lease agreement with the State Government to operate the Portland Line and access agreements with rail operators that specify the terms and conditions associated with rail access. ARTC has reviewed its commercial arrangements and has determined that no variations are required as a result of upgrading the capacity and performance of the Rail Line. In particular, no alterations to access pricing (or other funding mechanisms) are expected to follow the upgrades to the Portland Line due to the requirement to ensure parity pricing with the Geelong Line.

Engagement with clients maybe required outside of normal access agreements regarding complementary infrastructure upgrades

Insights and learnings from the market sounding process indicate that some ARTC clients may require complementary infrastructure upgrades to support the utilisation of the upgraded Portland Line including (for example) upgrades to feeder lines. Current access agreements do not include provisions for such infrastructure upgrades, which would require ARTC to engage with relevant clients to discuss potential infrastructure requirements and funding arrangements.

ARTC expects to manage changes that stem from the upgrade to the performance of the Portland Line through business-as-usual operations

As outlined above, consultation will be undertaken with the State Government, rail operators and the ONRSR to ensure that each stakeholder is fully notified of the nature and timing of the upgrades associated with the preferred project option. Potential increases in the volume of rail freight on the Portland Line due to an upgrade to its capacity and performance will be accommodated through ARTC's current internal systems and processes. No additional training, personnel, systems or processes are expected to be required to manage any additional increase in rail freight volumes.

ARTC will adhere to legislated change management requirements stipulated by the Office of the National Rail Safety Regulator

The preferred project option is expected to involve the introduction of new systems (axle counters), changes to network performance requirements, and the accommodation of additional freight volumes on the Portland Line. ARTC is aware of the legislated change management requirements embedded in the *Rail Safety National Law Act* that are associated with such changes to the Portland Line and will adhere to all relevant provisions utilising existing staff and resources.

8.6. RISK MANAGEMENT PLAN

ARTC's approach to risk management is based on the principles and guidelines embedded in national recognised ISO Standards

The upgrade works required to deliver the preferred project option will involve changes to existing rail infrastructure which is considered generally low risk due to the fact that the scope of works is generally known and will be further investigated and confirmed as part of the detailed scoping and development of work packages.

ARTC has recent experience in successfully delivering work of this nature and scale within similar environments.

The type of works proposed are being undertaken by ARTC elsewhere on the network on a regular basis. The rail track upgrades will utilise suitably qualified and experienced contractors where required, that are engaged on a competitive basis and are actively managed by ARTC to ensure safety and performance objectives are achieved.

Key risks that have been identified for the delivery phase include, but are not limited:

- Lack of available and capable industry resources due to competing projects
- Increased contractors costs due to competing projects
- Safety risks during construction and risks associated with operating trains during the construction period
- Adverse weather that may impact possession works
- Lack of cooperation of key stakeholder's engagement regarding interface works.

The risks listed above are not considered likely to compromise the overall successful delivery of the project.

ARTC's approach to risk management is based on AS / NZS ISO 31000:2009 Risk Management and AS4292.1 Rail Safety Risk Management. All ARTC activities are subject to ARTC's established Risk Management Policy, Risk Management Procedures and relevant Work Instructions prior to and during field and construction activities.

A Project governance framework will be developed in compliance with the ARTC Project Management procedures and DIRDC reporting and governance requirements.

8.7. ASSET MANAGEMENT

The method of disposing existing rail infrastructure will be confirmed with the State Government prior to any upgrade works in line with current lease provisions

The upgrade works proposed under the preferred project option are expected to be associated with the replacement and disposal of a number of components of the Portland Line including, but not limited to, degraded sleepers and ballast.

ARTC's lease agreement with the Victorian Government contains a number of provisions related to the disposal of rail infrastructure. In particular, as the owner of the infrastructure asset, the Victorian Government needs to be consulted regarding the method of disposal of any infrastructure assets managed by ARTC.

The method of disposal will therefore be determined in consultation with the Victorian Government following a detailed investigation of the Portland Line prior to the commencement of the upgrade works.

Ongoing maintenance of the Portland Line will be undertaken by ARTC and follow current safety and procurement practices

ARTC is conscious of the importance of effectively maintaining the Portland Line at the proposed performance specification following the proposed rail upgrades under the preferred project option given:

- stakeholder feedback that indicated private investment in critical interdependent projects would be limited if there was doubt that the performance specification of the Portland Line would reduce overtime with inadequate maintenance practices
- operational risks associated with increased freight volumes and loading on the Portland Line including but not limited to the stability of embankments and formation issues.

ARTC currently manages the maintenance of the Portland Line and other segments of the rail network that it manages on behalf of the State Government. The ongoing maintenance of the upgraded Portland Line is expected to require ARTC to undertake (i) major periodic maintenance; (ii) minor capital improvements; and (iii) routine corrective and reactive maintenance including, but not limited to, sleeper renewal, railway tamping, turnout maintenance, and safety inspections.

A detailed account of the assumed maintenance task including key activities, frequency and staff requirements is provided in Table 4-3 and Table 4-4 of the Maintenance Cost Model Report provided in Appendix 2.

A resource plan for the required maintenance tasks outlined above for the Portland Line will be developed in order to identify any potential changes required to staff levels in order to deliver the works.

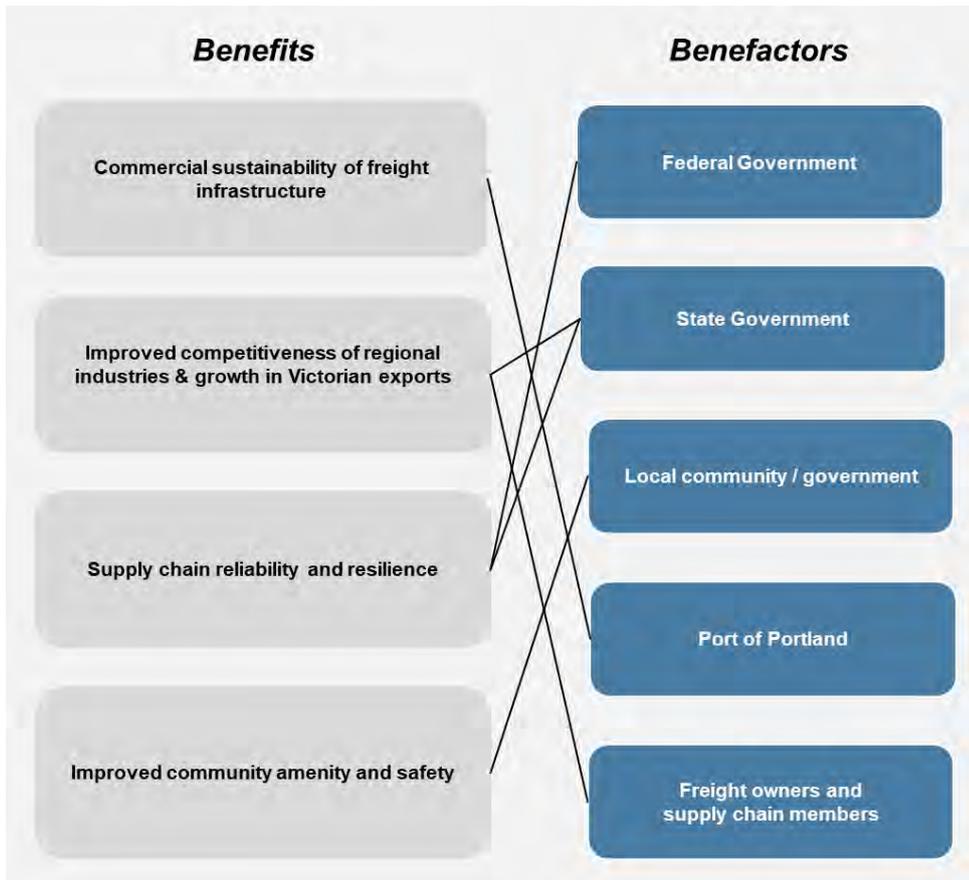
In the event that major capital works are required to, for example, replace existing structures or culverts, specialist services would be sourced from contractors following existing procurement practices.

8.8. BENEFITS REALISATION

ARTC plans to monitor and report on indirect measures of project benefits including the ongoing operating performance of the Portland Line and the number of weekly rail freight trips

The preferred project option is expected to lead to a range of benefits for the regional community that will be distributed across a number of benefactors including government agencies, the Port of Portland and private freight owners. The range of benefactors complicates the tasks of directly measuring and reporting on the scope and scale of the expected benefits from the proposed upgrade works.

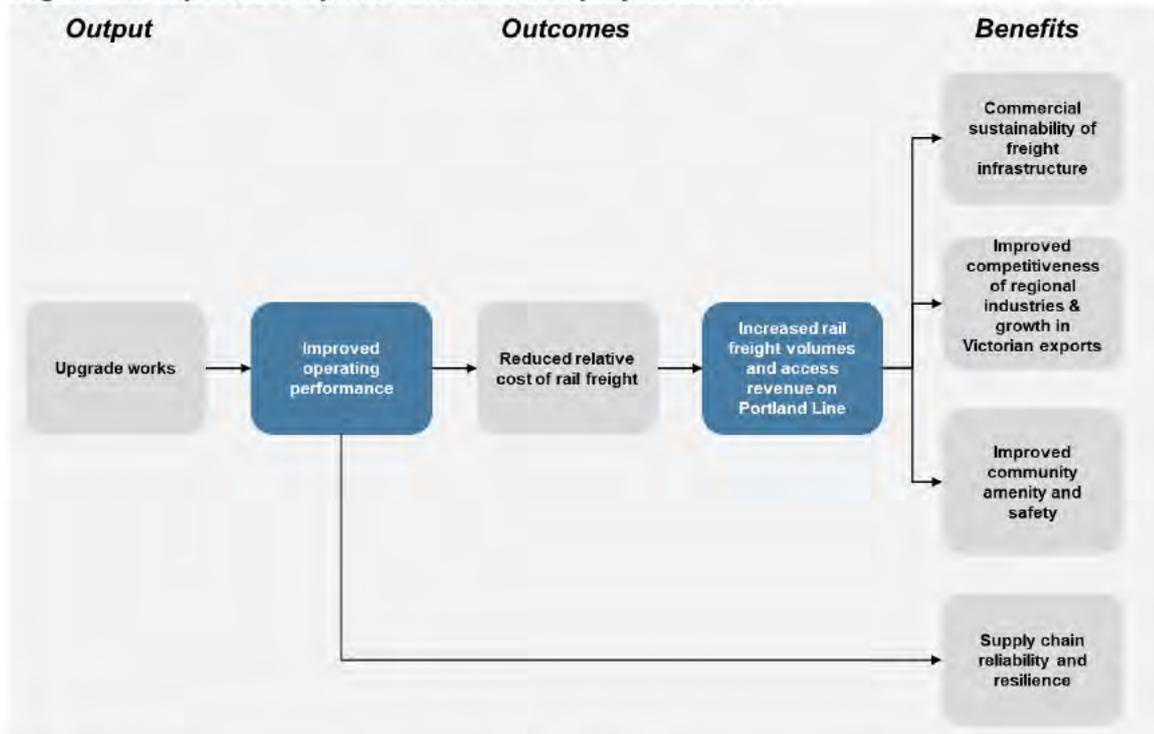
Figure 53: Expected benefits and benefactors



ARTC does not currently have the data and information systems available to directly measure the full range of benefits expected to stem from the preferred project option, with the cost of doing so viewed as prohibitive. Instead, ARTC intends to focus on indirect measures of the expected benefits achieved through the operational outcomes (highlighted by the blue boxes in Figure 54 the figure below) that can be monitored through existing internal systems and processes.

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Figure 54: Expected outputs, outcomes and project benefits



The Table 53 below outlines the proposed (indirect) key performance indicators for the project benefits which will be measured and reported on by the ARTC Major Capital Projects team through existing data systems and reporting channels.

Table 53: Key performance indicators

| Project benefits | Indirect measures | Indirect KPIs |
|--|---|--|
| Commercial sustainability of freight infrastructure. | Volume of freight transport to the Port of Portland via rail. | s47G(1)(a), s47G(1)(b) |
| Improved competitiveness of regional industries. | | |
| Improved community amenity and safety. | | |
| Supply chain resilience and reliability. | Operational performance of the Portland Line. | Ongoing axle load of 23 TAL and speed allowance at or above 60 km/h. |

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